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CHIEF EDITOR BOARD

Message from Associate Editor In Chief

Let me first of all take this opportunity to wish all our readers a very happy, peaceful and prosperous year ahead.

This is the second Issue of the Fifth Volume of International Journal of Engineering Research and General Science. A total of 34 research articles are published and I sincerely hope that each one of these provides some significant stimulation to a reasonable segment of our community of readers.

In this issue, we have focused mainly on theGlobal challenges and its innovative solutions. We also welcome more research oriented ideas in our upcoming Issues.

Author's response for this issue was really inspiring for us. We received many papers from many countries in this issue but our technical team and editor members accepted very less number of research papers for the publication. We have provided editors feedback for every rejected as well as accepted paper so that authors can work out in the weakness more and we shall accept the paper in near future. We apologize for the inconvenient caused for rejected Authors but I hope our editor's feedback helps you discover more horizons for your research work.

I would like to take this opportunity to thank each and every writer for their contribution and would like to thank entire International Journal of Engineering Research and General Science (IJERGS) technical team and editor member for their hard work for the development of research in the world through IJERGS.

Last, but not the least my special thanks and gratitude needs to go to all our fellow friends and supporters. Your help is greatly appreciated. I hope our reader will find our papers educational and entertaining as well. Our team have done good job however, this issue may possibly have some drawbacks, and therefore, constructive suggestions for further improvement shall be warmly welcomed.

Er. Pragyan Bhattarai,

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A SURVEY ON SECURITY ANALYSIS OF A SINGLE SIGN-ON MECHANISM FOR DISTRIBUTED COMPUTER NETWORKS

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Abstract— With extensive spread use of distributed computer networks, it has become common to permit users to access different kinds of network services that are given by distributed service providers. User verification is a key process for the security in the distributed computer network. A new certification scheme is used which is called as Single sign-on mechanism, which facilitates the users with a single credential to be verified by multiple service providers. By providing structurally organized security arguments Chang and Lee proposed a novel SSO scheme and claimed its security. But their proposed scheme is actually not much secure as it fails to meet credential privacy and reliability of authentication. Here, we present two impersonation attacks. In the first attack a malicious service provider communicated with a legal user to gain the user's credential parameters and then take the control for accessing resources & different services offered by service providers. In second type of attack, an outsider who does not having any credential may be able to take the control of user account and can enjoy network services easily by impersonating any legal user or a nonexistent user. Particularly, this survey promote the formal study of the soundness of authentication.

Keywords— single sign-on (SSO), Authentication, distributed computer networks, Attacks, soundness, impersonation,

INTRODUCTION

Distributed system is a kind of network in which different systems are connected through some medium but can be handling from single computer system. There are various real time examples of Distributed system such telephone n/w, Google Cloud, Banks, etc. There are various software components in distributed computer system work from single system. In this kind of systems computers are connected through some network such as LAN, MAN, WAN or wireless. Distributed computer networks consist of clients and servers where they have their respective jobs to do, such as server will monitor all the activities of clients and client can send request to server. There are various advantages of Distributed systems such as more clients can be added effortlessly with less redundancy. But here the problem of security arises, so some security measures should be included in this network so that after completing proper verification process then only client will be added in the network .If verification fails he will not allowed to be part of the existing network. Our paper focuses on these security measures[4].

Various network services are provided by distributed network service providers to different users in Distributed Network. So in distributed n/w user verification is important to check whether he/she is valid user to the services requested. As well as user also required to verify the service provider to avoid fake service provider. Hence after this verification process, a session key may be assigned between user and service provider to keep the confidentiality of the data exchanged between them. In various circumstances, the legal user's privacy must be protected. So it is a big challenge to design efficient as well as secure verification protocols with these security properties in complex computer network environments [3].To maintain individual pair of identity & password for various service provider is difficult task for any user, because it would increases the workload of both service providers and user as well as the communication overhead of networks. This problem was tackled by the single sign-on (SSO) mechanism[5] , where verified user's agent can obtained their credential from a trusted party for a short period(may be one day),and complete verification process of user on behalf of the user to access services provided by multiple service providers. Three basic security requirements that should be meet by an SSO scheme are unforceability, credential privacy, and soundness. Un forgeability means that, a valid credential of a new user could not be forge by any no. of users and service provider except the trusted party. Credential privacy means that malicious service provider could not impersonate the legal user to log in to other service providers by recovering a legal user's credential's. Soundness means that the services offered by service providers should not be access by unregistered user [6].

2. Related work

To improve the security of distributed n/w various SSO mechanisms are suggested.

In 2013, G. Wang et al. [3], presented two attacks on Chang Lee scheme , to prove their scheme is insecure. These attacks are impersonation attack without credentials & credential recovery attack. In credential recovery attack the malicious service provider impersonate the legal user by recovering user's credential to access services provided by different service provider. In the impersonation attack services provided by various service providers could be accessed by unregistered user without credential by impersonating a legal or a non-legal user.

In 2008, W. Juang et al. [7], used Elliptic curve cryptosystem to provide identity protection, session key agreement, and squat communication and computation cost as well as prevent an offline dictionary attack & insider attack. It's a nonce-based scheme in which user can freely choose & change the password and have no time-synchronization problem when server & user can authenticate to each other.

In 2010, X. Li et al. [8], has presented a trick for transmission of data in randomized manner so that an opponent cannot link conversations over the channel. The author addressed the initiator traceability property. Hence author uses symmetric encryption decryption, hash function as well as security parameter such as session key agreement, authentication, and initiator secrecy.

In 2011, A.K. Das here the author, shows the scheme in which authentication is done by random nonce used by server & user, password, biometric. This process was done in four phases to secure various attacks are the registration phase, login phase, authentication phase and password changing phase.

In 2012, Chang-Lee has presented a new scheme to reduce the overhead of the system. & to solve timestamp problem, is RSA based Single Sign-On (SSO) scheme based on one-way hash functions and random nonce. Chang-Lee scheme taken communication cost and computation cost as a parameter but their scheme is actually insecure for impersonation attack, this was shown by the authors [3].

3. Parameters and Attacks Considered for Better Security

To check the security of SSO following parameters are considered.

3.1 Parameters

A. Mutual Authentication

In mutual authentication user and server agree upon a common key (i.e. session key) , hence sever and the user is authenticated at the same time.

B. Initiator Privacy

Only the server knows the identity of the user, while anyone else cannot do this.

C. Initiator Untraceability

It is the toughest property than privacy because it is difficult for the opponent to trace who is the initiator, or whether the one or more conversations are initiated by same initiator. It prevents opponent form linking user & server interaction[10].

D. Password Change Phase

User can change his password by notifying to the authentication party in advance, so that the new hash code is generated for the password and can be used during login[11].

3.2 Attacks is To Be Prevented

A. Impersonation Attack

In this attack a rival assumes the identity of a legal user in a system and tries to change login request message. But he is unable to obtain the data of legal user so no changes will be done and detect the address.

An impersonation attack is an attack in which a challenger successfully assumes the identity of one of the genuine in a system or in a communication protocol. So, as the identity is achieved the illegitimate user tries to modify a login request message, but the illegal user will be unable to obtain the data so no modification will be done and the address must be detected.

B. Credential Privacy Attack

This attack is done during login phase and authentication phase by detecting logon ID's and password of a legal user. The attacker tries to pretend as a authorized server by creating forged reply message which impersonate the user when received user login request message.

4. Methodology

A. System Initialization Phase

i. SCPC selects large prime p.

ii. SCPC now choosing a generator element g. This number must be between 1 and p − 1

iii. Then SCPC choosing the private key.

The private key d is any number bigger than 1 and smaller than p−1.

iv. The ElGamal public key consists of the three parameters (p, g, y). So Computing part of the public key, the value y is computed from the parameters p, g and the private key x as $y=g^d \bmod p$

v. Protect d, and publish Public key.

B. Registration Phase

In this phase user send its identity to SCPC. Then, SCPC returns Ui, the credential Si=(IDI||h(Idi))d mod N, || denotes a concatenation of strings and h(.) is a cryptographic one-way hash function.

SCPC	Smart Card Producing Centre
Ui , Pj	User & service provider
IDi , IDj	Unique identity of Ui & Pj
Si	Credential of Ui created by SCPC
h(.)	One way hash function

C. User Identification phase

In this phase, to authenticate user RSA-VES is employed and service provider is authenticated by normal signature.

D. Security Analysis

The user authentication plays crucial role to analyze the security of SSO ,specifically soundness and credential privacy . credential is secured by the unforgeability of RSA signatures, and the security of service provider verification is ensured by the unforgeability of the secure signature scheme chosen by each service provider.

CONCLUSION

In this paper, we presented two powerful impersonation attacks based on Chang and Lee's single sign-on (SSO) scheme. The first attack demonstrates that their scheme cannot defend the confidentiality of a user's credential, and because of that a wrong intentional service provider can copy a legal user to enjoy the resources and services from different service providers. The second attack disrupts the reliability of validation by giving an outside attacker without credential the chance to even impersonate a imaginary user and then easily access resources and services provided by service providers. We also discussed why their well-organized security arguments are

not much powerful to assured the security of their proposed SSO scheme. As the future work, the open problems are to formally define authentication soundness and can build efficient and probably secure single sign-on schemes.

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ENHANCED THERMAL PROPERTIES OF TiO_2 NANOFILLER IMPOSED EPOXY COMPOSITES

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Abstract- Nanocomposites are new materials made with fillers which have nanosize. The purpose of this study is to analyze the thermal properties of epoxy resin with titanium dioxide nanoparticles. Titanium dioxide nanoparticles are prepared by sol-gel method by using the compounds Titanium tetra isopropoxide and acetic acid. The prepared Titanium dioxide nanoparticles are characterized by PXRD and the grain size in nanoscale is confirmed. The sheets of neat epoxy resin and epoxy with addition of TiO_2 are primed by solution casting method. The developed polymer is subjected to thermal studies. The inception decomposition temperature increases as the percentage of nanofiller increases**.** The glass transition temperature value is considerably increasing with the increase in amount of TiO_2.

Keywords: Sol-gel, Titanium dioxide, Solution Casting method, Epoxy, Polymers, Nanocomposites, TGA/DSC

1. INTRODUCTION

Polymer nanocomposites have attracted increasing attention in recent years because of their significant improvement of physical and chemical properties over the matrix polymers. The addition of just a few percent by weight of nanoparticles can result in significant improvement in thermal, dielectric and mechanical properties. Many studies have been carried out on the incorporation of rigidinorganic nanoparticles, which is a promising approach to improve both stiffness and toughness of plastics simultaneously [1–6].The effects of inorganic fillers on properties of the composites strongly depend on filler size and shape, type of particles, the fraction surface characteristics and degree of dispersion [7-8]. Various nanoscale fillers including montmorillonite, silica, calcium carbonate and some metal oxides have been reported to enhance the mechanical properties, thermal stability, electrical properties, gas barrier properties and flame retardancy of the polymer matrix [9-11]. Among various metal oxide fillers, nano-sized zinc oxide (ZnO), titaniumdioxide (TiO_2) and cerium oxide (CeO_2) fillers have attracted considerable attention because of the unique physical properties as well as their low cost and extensive applications in diverse areas [12-15].

2. EXPERIMENTAL DETAILS

2.1 Synthesis of TiO_2 nanoparticles

The nanopowder is prepared by sol-gel method. 1M of TTIP is mixed in 4M of acetic acid. The mixture is stirred for one hour using magnetic stirrer. To this mixture 10M of double distilled water is added dropwise. During the addition of water this mixture is transformed to gel. The obtained gel is kept for 24 hours. After aging of 24 hrs, gel is dried in an oven at 200°C. The soild crystals formed are ground by an agate mortar. The fine powder is calcined to 600°C in a muffle furnace for 2 hours.

2.2 Preparation of pure epoxy sheet

ARALDITE Epoxy resin (EP103) and hardener (HY- 956) are used in this study to form pure and TiO_2(1wt%, 3wt%) added epoxy/nanocomposites.Epoxy resin of 60gm and hardener of 6gm are poured into beakers separately. To remove the air bubbles, both are to be ultrasonicated for 30 minutes. After the completion of this process, the hardener is added and it is mixed with hand stirring. Finally it is ultrasonicated to remove any gas bubbles generated during the mixing process. After degassing, the mixture was poured into the mould. Then the mould is placed in an oven at 100°C to cure for 2hours. Thus neat epoxy sheet is obtained.

2.3 Preparation of Epoxy/TiO_2 polymer nanocomposite sheets

The TiO_2nanofillers (1 wt%) are dispersed into 60gm of epoxy resin, and both are mixed by a high speed mechanical mixer (at 600 rpm). It is then ultrasonicated to remove the gas bubbles. After the completion of the degassing process, the 6gm of hardener is added into epoxy/nano filler slowly with hand stirring. The mixture is ultrasonicatedfor another 30 minutes to remove any gas bubbles generated during the mixing process. After degassing, the mixture is poured into the mould. Then the mouldis placed into the oven at 100°C for 2 hours. The same procedure is repeated for 3 wt% nanofiller dispersed epoxy nanocomposite [16]. The photograph of developed polymer sheets is shown in Fig.1.

Fig.1: Photograph of developed polymer sheets

3. RESULTS AND DISCUSSION

3.1 Powder X- Ray Diffraction Analysis

The PXRD analysis was performed using XPERT-PRO diffractometer system with monochromatedCuK_α (λ=1.54056Å) radiation. PXRD pattern of synthesized titania nanoparticles is reported in Fig.2. The X-ray diffraction spectrum confirms that the synthesized Titania particle is in anatase crystalline phase. The data obtained is in good agreement with standard JCPDS card no.21-1272. The crystallite size D is estimated from the Debye Scherrer's formula

$$D = K\lambda/\beta cos\theta$$

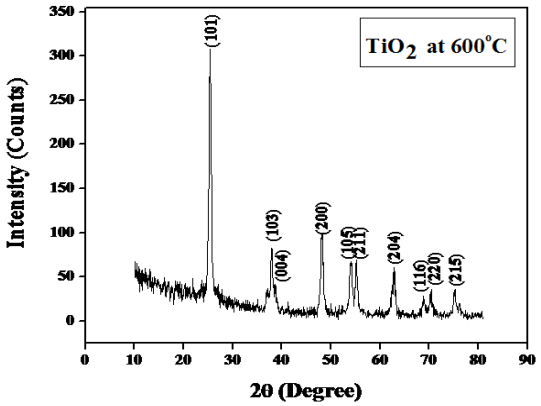

Fig.2: PXRD pattern of TiO_2 nanoparticles

The crystallite size of synthesized TiO_2 particle is found to be 15.98nm and this confirmsthat the prepared TiO_2 particle is in nanoscale.

3.2 Thermal analysis

The thermal properties are analyzed using thermogravimetric analysis and differential scanning calorimetry. The thermal analysis is performed using NETZSCH STA 449F thermal analyzer. 5 mg of dried material is heated from 20ºC to 600ºC at a scan speed of 10ºC/min. The thermogravimetric graph of epoxy/TiO_2nanocomposites is shown in Fig.3.

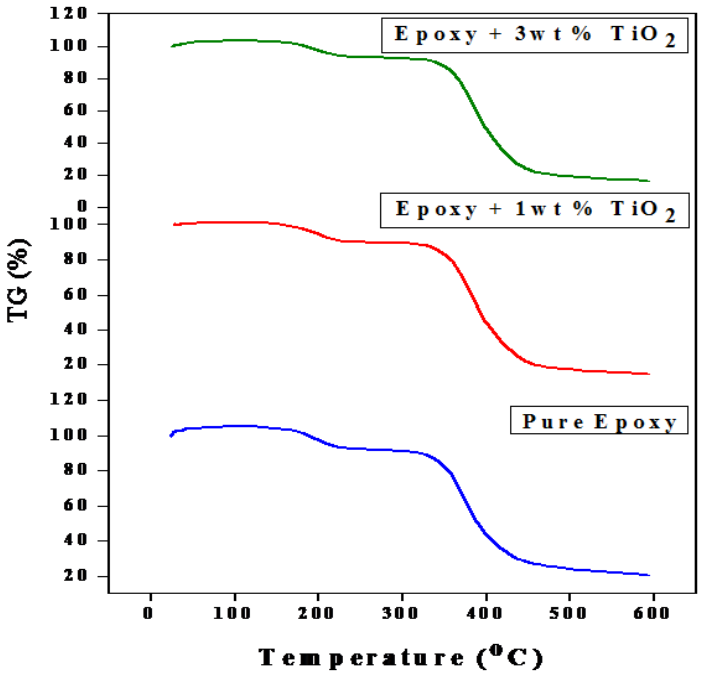

Fig.3: Thermogravimetric curve of pure and nanofiller (1 wt%, 3 wt%) added Epoxy nanocomposites

The inception decomposition for pure epoxy and nanofiller (1 wt%, 3 wt%) incorporated epoxy occurs at temperature 154ºC, 156ºC and 159ºC respectively. The inception temperature increases as the percentage of nanofiller increases [17]. The second decomposition temperature for pure,1 wt% and 3 wt%nanofiller added epoxy nanocomposites are 313ºC, 321ºC and 328ºC respectively. The major weight loss at temperatures higher than 310ºC is due to the effective dispersion of nanoparticles with epoxy resin. The temperature corresponding to 5% initial mass loss ($T_{5\%}$) for pure,1 wt% and 3 wt%nano TiO_2 added epoxy composites are 201ºC, 211ºC and 226ºC respectively. The TG variation with temperature designated the thermal stability of nanocomposites.

The differential scanning calorimetrycurves are shown in Fig.4. The glass transition temperature of neat epoxy is 71ºC which exactly matches with the reported value [18]. The Tg value of 1 wt% and 3 wt% TiO_2 added epoxy nanocomposites are 75ºC and 78ºC respectively. The glass transition temperature value is considerably increasing with the increase in amount of TiO_2. The observed increase in Tg of the nanocomposites may have primarily attributed to the resistanceto polymer chain mobility introduced by the presenceof nanoparticles in the epoxy matrix, which becomes comparatively more effective with increased homogeneity in dispersion of the particles in the matrix. The presence of particles restrains the mobility of polymer chain and reinforces the effect of cross-linking becauseTiO_2 nanoparticles act as physical cross-linkers by increasing the apparent cross-link density.

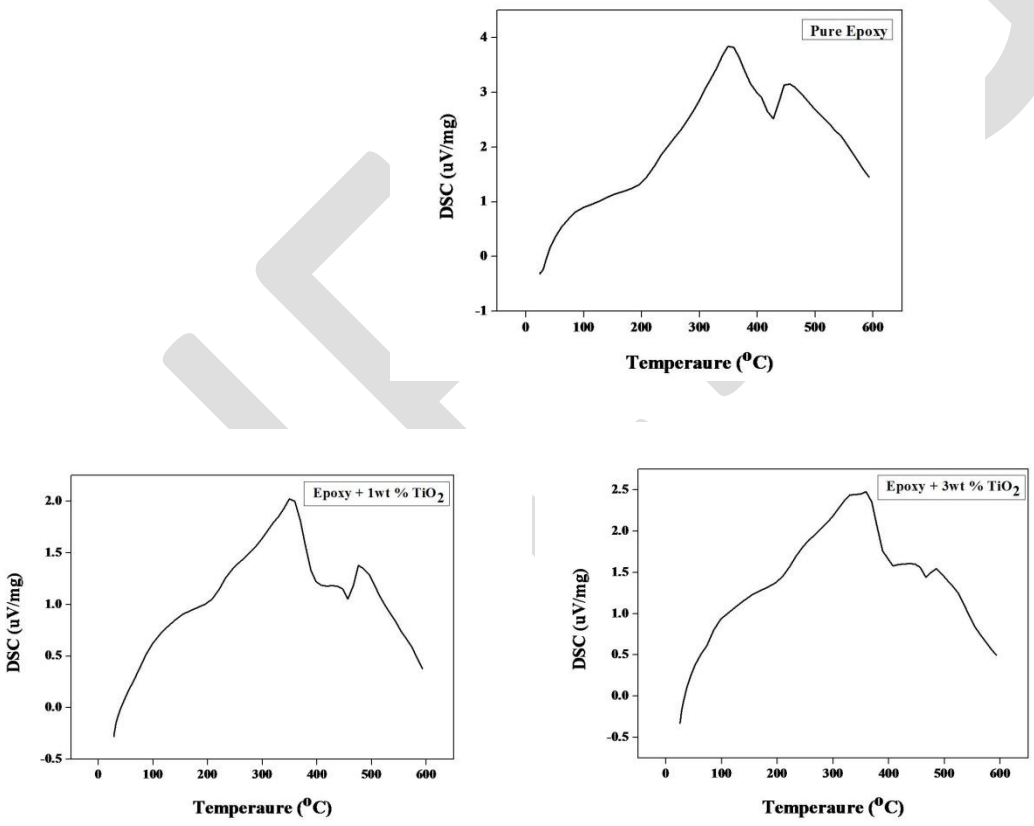

Fig.4: Differential Scanning Calorimetry curves of pure and TiO_2 (1wt%, 3wt%)added

Epoxy nanocomposites

4. Conclusion

Titanium dioxide has been prepared by sol-gel technique using titanium tetra isopropoxide and acetic acid. The powder X-ray diffraction spectrum confirms that the synthesized Titania particle is in anatase crystalline phase. The crystallite size of synthesized TiO_2 particle is found to be 15.98nm. Neat and nano filler added epoxynanocomposites are synthesized by solution casting method. An increaseof about 7°C in the glass transition temperature (T_g) and significant improvement in thermal stability of epoxy/TiO_2nanocomposites are achieved with 3wt%nanoparticles loading in epoxy matrix, which is attributed to the homogeneous dispersion of nanoparticles inthe epoxy matrix.

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A fuzzified Industrial warehouse inventory model for deteriorating items with decreasing demand and various fuzzy cost parameters

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Abstract: In this research study, an attempt has been made to develop an industrial warehouse inventory model considering demand as exponentially decreasing function of time. Shortages are not allowed in the model and fuzziness is introduced in the system by assuming the various cost components(holding cost,ordering cost,purchase cost,deterioration cost).In the fuzzy environment cost parameters are taken to be triangular fuzzy numbers.The purpose is to minimize the total cost associated with the inventory system.A numerical example is given to illustrate the model approximately.

Keywords: Inventory model, Deterioration, Decreasing demand, Triangular fuzzy number, Holding cost, Defuzzification.

Introduction: Demand has always been the prime issue in dealing an inventory system.Sometimes the demand of the items may be probabilistic in nature, sometimes it may be static i.e, constant for each time period.Further it may follow the pattern of increasing and decreasing type or constant type.So, due to the change in the market scenario demand varies from time to time.Seasonal factor is one of the major things on which the demand depends.For an example when winter approaches Room Heater,Woolen clothes etc are of high demand and at the end of winter season demand of these items decreases.In this context both increasing and decreasing demands are coming in to the picture.But in an inventory model not only demand but also different cost factors play a vital role as cost parameters(holding cost,ordering cost etc) are known and have definite value with ambiguity.Some of the business situation fit such conditions but in most of the cases due to the change in market scenario these parameters are imprecise.This uncertainty concept can be defined as fuzziness or vagueness.The industrial authority have to decide the quantity to be manufactured.Also deterioration factor must be taken in to consideration as so many physical goods are there which deteriorate during the stock in periods due to different factors like dryness,rusting of iron,damage,spoilage and vaporization.So considering all the factors an inventory model has to be prepared so that the total cost associated with the system is minimum and profit is maximum.

During the last few decades innumerable numbers of inventory model have been prepared. Ghare and Schrader(1963) developed for the first time an inventory model for deteriorating items. Convert and Philip(1973) extended their work. Hartely (1976) first proposed a problem in his book "Operations Research – A Managerial Emphasis. Dave (1988) discussed the two-warehouse inventory models for finite and infinite rate of replenishment .Donaldson (1977) developed an optimal algorithm for solving classical no shortage inventory model.Benkherouf (1997) presented a two-warehouse model for deteriorating items with the general form of time dependent demand under continuous release fashion. Lee and Ma (2000) developed a no-shortage inventory model for perishable items with free form of time dependent demand and fixed planning horizon. In their model, some cycles are of single warehouse system and the remaining is of two-warehouse system.On the other hand, considering two-storage facilities, Yang (2004) developed two inventory models for deteriorating items with uniform demand rate and completely backlogged shortages under inflation. Recently, Yang (2006) extended the models introduced in Yang (2004) by incorporating the partially backlogged shortages.Deb Choudhury.P and Dutta.P (2015) developed a two warehouse inventory model considering demand as cubic function of time. Also Deb Choudhury.P and Dutta.P(2015) have fuzzified the same model. The concept of fuzzy logic was first proposed by Zadeh(1965) .Bellam and Zadeh(1970) discussed the difference between randomness and fuzziness . Zimmermann(1985) gave a review on applications of fuzzy set theory. Park (1987) discussed the EOQ model in which trapezoidal fuzzy numbers are used. Yao and Lee(1999) presented a fuzzy inventory model with and without backorder for fuzzy order quantity with trapezoidal fuzzy number.

As fuzziness means vagueness,certain parameters like various cost parameters are not always measurably properly,so we have assumed these parameters as fuzzy number in fuzzy system. A comparative study between crisp and fuzzy system has been highlighted properly.In the current research study, an inventory model has been prepared considering demand as decreasing function of time.Fuzzification is allowed in the system considering the cost parameters as triangular fuzzy numbers.Signed distance method has been used for defuzzification.

PRELIMINARIES:

FUZZY SET

A fuzzy set $\breve{A}$ in a universe of discourse X is defined as the set of pairs $\breve{A} = \{(x, \mu_{\breve{A}}(x)): x \in X\}$, where $\mu_{\breve{A}}(x)$:X→ [0,1] is a mapping and $\mu_{\breve{A}}(x)$ is called membership function of $\breve{A}$ or grade of membership of x in $\breve{A}$.

CONVEX FUZZY SET

A fuzzy set $\breve{A}$ in a universe of discourse is called convex if for all

$x_1, x_2 \in X, \mu_{\breve{A}}(\delta x_1 + (1-\delta)x_2 \geq \min\{\mu_{\breve{A}}(x_1), \mu_{\breve{A}}(x_2)\}, where\ \delta \in [0,1]$.

NORMAL FUZZY SET

A fuzzy set $\breve{A}$ is called normal fuzzy set if there exists at least one $x \in X$ such that $\mu_{\breve{A}}(x_1) = 1$.

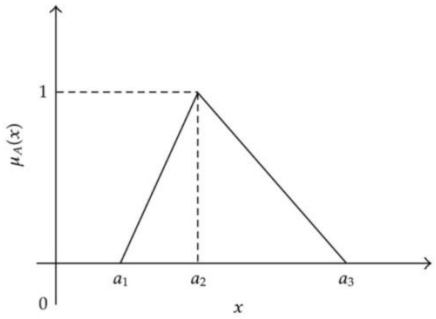
FUZZY NUMBER

A fuzzy number is a special case of a fuzzy set. Different definitions and properties of fuzzy numbers are encountered in the literature .But it actually represents the notation of a set of real numbers 'closer to a' where 'a' is the number being fuzzified. A fuzzy number is a fuzzy set which is both convex and normal.

TRIANGULAR FUZZY NUMBER (TFN)

A triangular fuzzy number $\breve{A}$ is represented by the triplet (a_1, a_2, a_3) and is defined by its continuous membership function where $\mu_{\breve{A}}(x)$:X→ [0,1] is given by

$$\mu_{\breve{A}}(x) = f(x) = \begin{cases} \frac{x-a_1}{a_2-a_1} & \text{if } a_1 \leq x \leq a_2 \\ 1 & \text{if } x = a_2 \\ \frac{a_3-x}{a_3-a_2} & \text{if } a_2 \leq x \leq a_3 \\ 0 & \text{otherwise} \end{cases}$$

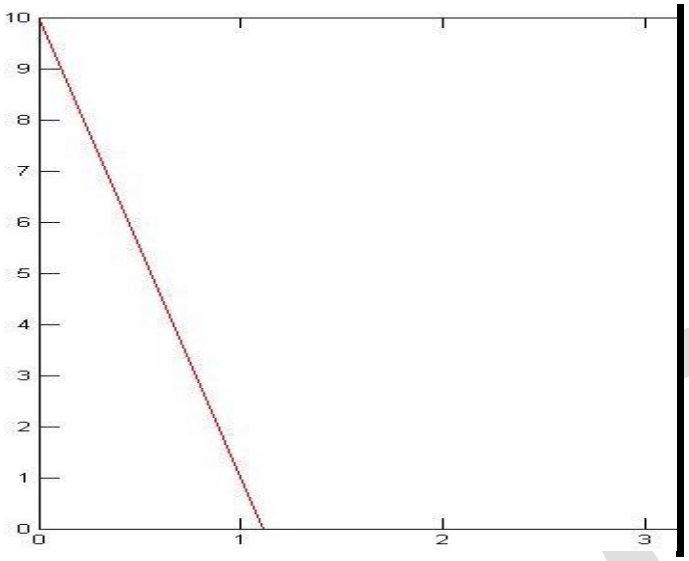


Assumptions and Notation:

The following assumptions have been used in developing the model:

- Replenishment rate is infinite.
- Lead time is constant.
- Shortages are not allowed in the system.
- Costs are considered as triangular fuzzy numbers.
- Model is formulated both in Crisp and Fuzzy system.

- A single item is considered over the prescribed period T units of time, which is subject to variable demand rate.
- Model is considered for imperfect items.
- Deterioration rate is constant.
- Demand is assumed as $D = Ae^{-bt}, decreases\ with\ time\ .A > 0, b > 0.$

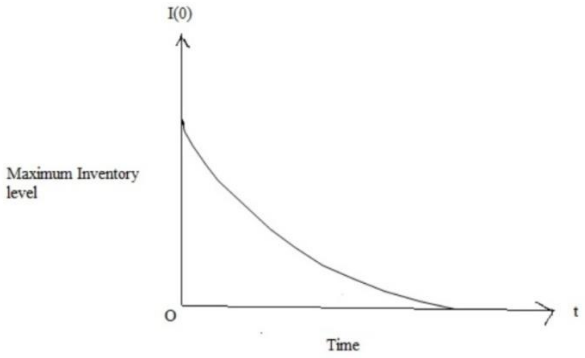


(Demand Vs Time graph, demand is of decreasing type) t→

The following notations have been used in the present model :

- T=total cycle length.
- I(t)=Inventory level in the Industrial warehouse.
- h=holding cost in Industrial warehouse per unit per unit time.
- c =Deterioration rate.
- C_d =Deterioration cost per unit.
- O_c =Ordering cost per unit.
- C_p =Purchase cost per unit.
- Q =Ordering quantity.
- t_1 =time at which the inventory level falls to zero.
- C_h =Inventory holding cost.

Mathematical Model: Let Q be the total amount of inventory purchased at the beginning of each period. Now the demand may be a decreasing function of time but still the inventory level is falling during $[0, t_1]$due to the demand an deterioration and vanishes



Graphical representation of the model

completely at $t = t_1$

Let I(t) be the on-hand inventory level at time t. The differential equations associated with the system is

$$\frac{dI}{dt} + cI = -Ae^{-bt}, I(t_1) = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The solution of the equation is given by,

$$I(t) = \frac{Ae^{-bt}.}{b-c} - \frac{Ae^{ct_1-bt_1}.e^{-ct}}{b-c} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Inventory Holding cost,

$$C_h = \int_0^{t_1} hI(t)dt$$

i.e, $C_h = \frac{Ah}{(b-c)}\left[-\frac{e^{-bt_1}}{c} - \frac{e^{ct_1-bt_1}}{c} + \frac{e^{-bt_1}}{b} + \frac{1}{b}\right] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$

Deterioration cost= $C_d \int_0^{t_1} I(t)dt$

$$= \frac{cC_dAh}{b-c}\left[-\frac{e^{-bt_1}}{c} - \frac{e^{ct_1-bt_1}}{c} + \frac{e^{-bt_1}}{b} + \frac{1}{b}\right] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Ordering cost=O_c

Purchase cost= $C_p\left[-\frac{Ae^{ct_1-bt_1}.}{b-c} + \frac{A}{b-c}\right] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$

Total cost of the system=$\frac{1}{T}[C_h + C_d + O_c + Purchase\ Cost]$

$$= \frac{1}{T}\left\{\frac{Ah}{(b-c)}\left[-\frac{e^{-bt_1}}{c} - \frac{e^{ct_1-bt_1}}{c} + \frac{e^{-bt_1}}{b} + \frac{1}{b}\right] + \frac{cC_dAh}{b-c}\left[-\frac{e^{-bt_1}}{c} - \frac{e^{ct_1-bt_1}}{c} + \frac{e^{-bt_1}}{b} + \frac{1}{b}\right] + O_c + C_p\left[-\frac{Ae^{ct_1-bt_1}.}{b-c} + \frac{A}{b-c}\right]\right\} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

The total cost per unit time is minimum if

$$\frac{\partial TC}{\partial t_1} = 0$$

Fuzzy model:

By using signed distance method we have solved the model in fuzzy environment. We have used triangular fuzzy number for holding costs, deterioration cost, ordering cost, purchase cost.

(i) $h \in [h-\Delta_1, h+\Delta_2], 0<\Delta_1< h, 0<\Delta_1\Delta_2$
(ii) $C_d \in [C_d-\Delta_3, C_d+\Delta_4], 0<\Delta_3< C_d, 0<\Delta_3\Delta_4$
(iii) $O_c \in [O_c-\Delta_5, O_c+\Delta_6], 0<\Delta_5< O_c, 0<\Delta_5\Delta_6$
(iv) $C_p \in [C_p-\Delta_7, C_p+\Delta_8], 0<\Delta_7< C_p, 0<\Delta_7\Delta_8$

The signed distance method of the above fuzzy numbers are as

(i) $d(h,0) = h+\frac{1}{4}(\Delta_2-\Delta_1)$
(ii) $d(C_d,0) = C_d+\frac{1}{4}(\Delta_4-\Delta_3)$
(iii) $d(O_c,0) = O_c+\frac{1}{4}(\Delta_6-\Delta_5)$
(iv) $d(C_p,0) = C_p+\frac{1}{4}(\Delta_8-\Delta_7)$

Now, $T\check{C} = (TC_1, TC_2, TC_3)$

$$TC_1 = \frac{1}{T}\left\{\frac{A(h-\Delta_1)}{(b-c)}\left[-\frac{e^{-bt_1}}{c}-\frac{e^{ct_1-bt_1}}{c}+\frac{e^{-bt_1}}{b}+\frac{1}{b}\right]+\frac{c(C_d-\Delta_3)A(h-\Delta_1)}{b-c}\left[-\frac{e^{-bt_1}}{c}-\frac{e^{ct_1-bt_1}}{c}+\frac{e^{-bt_1}}{b}+\frac{1}{b}\right]+(O_c-\Delta_5)\right.$$
$$\left.+\quad (C_p-\Delta_7)\left[-\frac{Ae^{ct_1-bt_1}.}{b-c}+\frac{A}{b-c}\right]\right\}$$

$$TC_2 = TC$$

$$TC_3 = \frac{1}{T}\left\{\frac{A(h+\Delta_2)}{(b-c)}\left[-\frac{e^{-bt_1}}{c}-\frac{e^{ct_1-bt_1}}{c}+\frac{e^{-bt_1}}{b}+\frac{1}{b}\right]+\frac{c(C_d+\Delta_4)A(h+\Delta_2)}{b-c}\left[-\frac{e^{-bt_1}}{c}-\frac{e^{ct_1-bt_1}}{c}+\frac{e^{-bt_1}}{b}+\frac{1}{b}\right]+(O_c+\Delta_6)\right.$$
$$\left.+\quad (C_p+\Delta_8)\left[-\frac{Ae^{ct_1-bt_1}.}{b-c}+\frac{A}{b-c}\right]\right\}$$

The total inventory cost per unit time by signed distance method is

$$d(T\check{C}) = TC+\frac{1}{T}\left\{\frac{A(\Delta_2-\Delta_1)}{(b-c)}\left[-\frac{e^{-bt_1}}{c}-\frac{e^{ct_1-bt_1}}{c}+\frac{e^{-bt_1}}{b}+\frac{1}{b}\right]+\frac{(\Delta_4-\Delta_3)A(\Delta_2-\Delta_1)}{b-c}\left[-\frac{e^{-bt_1}}{c}-\frac{e^{ct_1-bt_1}}{c}+\frac{e^{-bt_1}}{b}+\frac{1}{b}\right]+(\Delta_6-\Delta_5)+(\Delta_8-\Delta_7)\left[-\frac{Ae^{ct_1-bt_1}.}{b-c}+\frac{A}{b-c}\right]\right\} \quad \text{.....(7)}$$

Numerical Example: In order to illustrate the above system of equations connecting total cost of the system , consider an inventory system with the following data and compute in both crisp and fuzzy system.

Crisp Model:

Consider $c = 0.05, h = 0.4, C_d = 0.5, C_p = 0.6, O_c = 2000$ *then* $t_1 = 1.2$ *and* $TC = 1669.04$.

Fuzzy Model:

Consider $c = 0.05, h = (0.3, 0.4, 0.6), C_d = (0.4,0.5,0.7), C_p = (0.5,0.6,0.8), O_c = (1900,2000,2200)$ *then* $t_1 = 1.15$ *and* $TC = 1690.88$.

Conclusion:

We have developed an industrial warehouse inventory model for deteriorating items having time varying exponentially decreasing demand.The model has been formulated with the practical assumption of demand rate for seasonal products.More precisely during the end of particular seasons like winter the demand rate of room heaters ,woolen clothes, etc decreases so taking in to account these quantities the system has been solved.Also deterioration of products is a natural phenomenon as almost all the products undergo decay during the course of time so deterioration factor has played a vital role in the inventory model.The model we have solved is highlighted in both crisp and fuzzy system.As cost parameters are imprecise and sometimes it is not possible to get the suitable result so fuzziness is used.Well known triangular membership function is used for all the fuzzy numbers.Signed distance defuzzification method is also used to formulate the resulting equations in fuzzy system.

Acknowledgement:

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Intelligent Tracker cum Protector for Industrial Motor

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Abstract— Three phase induction motors are the motors most frequently encountered in industry. They are simple, rugged, low price, and is to maintain. Most of electrical energy is utilized by induction motor and thus it is essential to monitor the performance of motor without changing its operation.

Here in this paper, introduces a new technique in which embedded system is integrated into the serial communication network .during this technique different senors are connected with motor and the values are extracted using PIC microcontroller. It is also possible to protect the motor against some faults such as over current, over voltage, over temperature in windings, over loading of motor. Therefore, controlling, monitoring and protection of the system are realized in real time.

Keywords— Three phase induction motor, computer,PIC 16F877A,16X2 LCD display,MAX 232 , LM35, voltage transformer , current transformer,realy.

Introduction-3 phase induction motors are very popular in industrial applicaton because of their simple and safe structure. Therefore several controlling methods have been suggested to obtain a better controlling system for them in recent year traditional control system have been given up, and intelligent control system have been used instead. In 20th century development in electronics and computer technology has started new processing control technology and automation.

Controlling of electrical motors used in various systems and process control specially induction motor became very important. Performance of induction motor is directly affected by whole fundamental quantities. On the other hand controlling the machines during the process of production continues to be dangerous operation in some branches of industry.

Large number of motors are being used for general purposes in our surrounding from house hold equipment to machine tool in industrial facilities. The electrically related faults such as over voltage, over current, over temperature. The sources of over voltage and over current can be man-made or natural.

Possible causes for over current include short circuits, excessive load and incorrect design . monitoring of a induction motor is a fast emerging technique for the detection of initial faults. It avoids unexpected failure of an industrial process. In spite of there robustness they do occasionally fail and there resulting unplanned down time can prove very costly. Therefore , condition monitoring of electrical machines has received considerable attention in recent years.

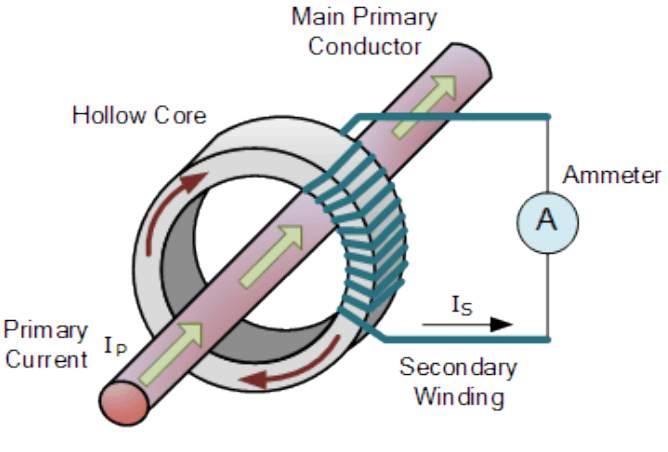
The control of the parameters such as voltage ,current and temperature is also become very important for the help of induction motor. To the faults in such parameter their can be damage to the motor. A computer based protection sytem has been introduced , measurements of the various faults f phase voltage, phase current, phase temperature were achieved and transfer to computer for final protection decision.

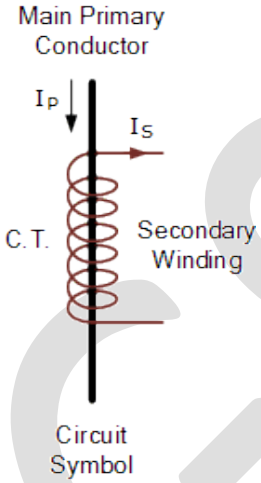
Remaining contents-

1]Over current :-

- Current transformer are used as a current sensor .

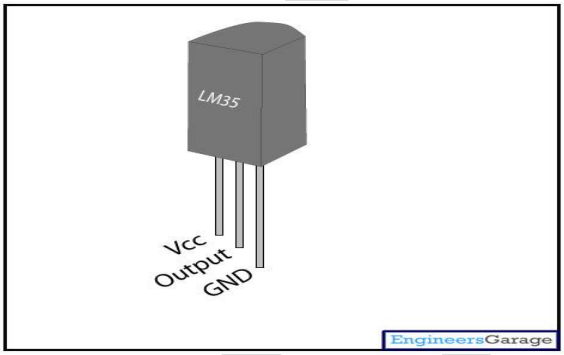
- The current transformer is a type of "instrument transformer" that is designed to produce an alternating current in its secondary winding which is proportional to the current being measured in its primary .
- Current transformers reduce high voltage currents to a much lower value and provide a convenient way of safely monitoring the actual electrical current flowing in an AC transmission line using a standard ammeter.





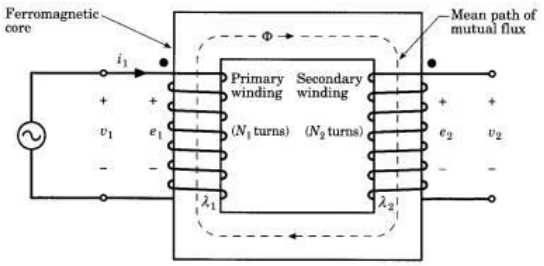
2] Over temperature:

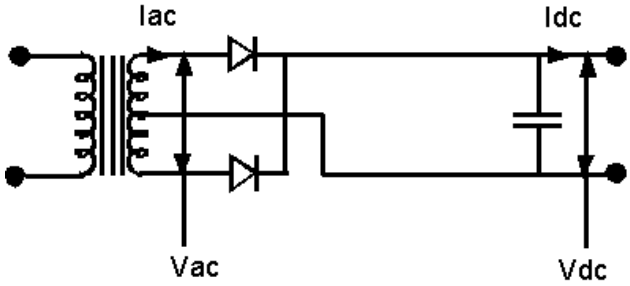
- LM35 is used as temperature sensor.
- The LM 35 series are precision integrated circuits temperature sensors , whose output voltage is linearly proportional to the Celsius temperature.
- Set point for LM35 is 45degree Celsius.
- When temperature increases above set point then it displays over otherwise displays ok.



3]Over Voltage :

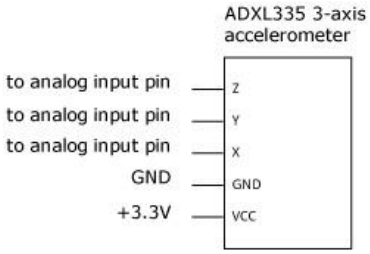
- voltage transformer is used as voltage sensor.
- A transformer is an electrical device to change a given alternating emf into a larger or smaller alternating emf.
- It works on the principle of mutual induction between two coils. A changing current in the primary coil induces an emf in the secondary coil.
- Transformer equation : Vs/Vp=Ns/Np
- A voltage sensor is going to be able to determine and even monitor and measure the voltage supply.

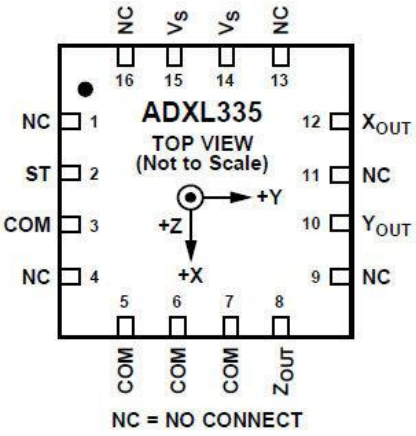




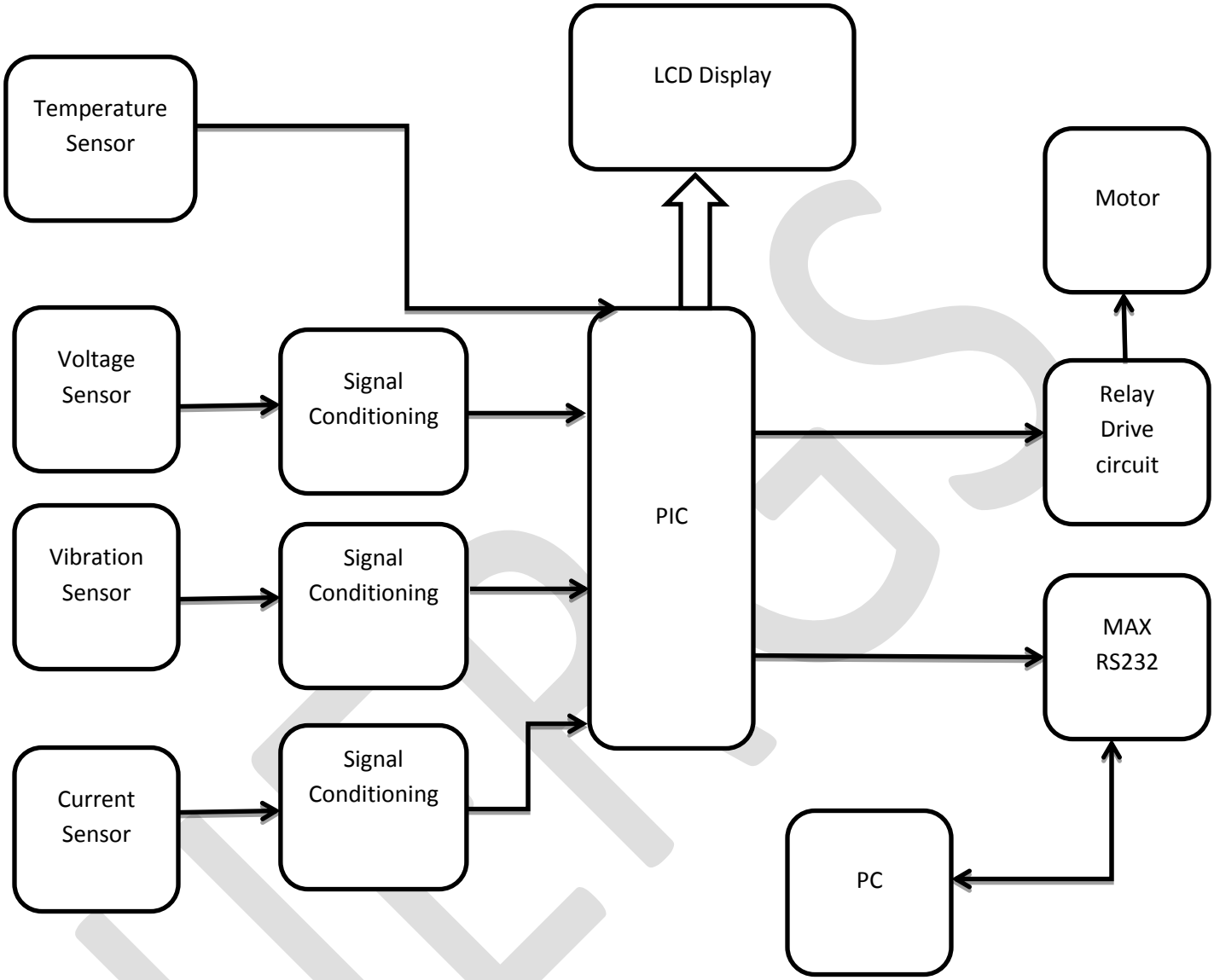
4]Vibration sensor:

- Accelerometer is used as a vibration sensor.
- Input is 3.3 to 5v DC.
- PIC channel number 7 and PIC pin no. 10 is used.
- Accelerometer is connected in X-Axis.





BLOCK DIGRAM:



- This project is divided into two parts. First part is server side and second part is actually motor side.
- The motor side part compromises central processing controller is PIC16F877A to which required power supply that is 5v on board is generated again 16*2display is interfaced to the PIC controller.
- Other components like crystal and reset circuitry is also on the board. To this controller various sensors including voltages of all three lines that is voltage sensor again current of all three lines that is current transformer and temperature of the motor and also vibration sensors are attached all the data of voltages, current, temperature and vibration is received and display on the site.
- At the same time after certain intervals the data is sent to server.MAX232 interface is established between controller and server net.
- In server side visual basic software is used to create a graphical user interface simultaneously the received data is stored in data base for the same Microsoft access is used. Thus all the parameters of the motor are received simultaneously and stored again in a controller side in order to secure the motor from various hazardous situations set points are created that is for current if particular current exceeds the set point value then automatically motor gets off again for any failure of phase or less voltage than set voltage if the voltage comes down automatically motor gets off.
- Again operating temperature is set up to 45degree Celsius if motor temperature crosses 45degree automatically motor gets off. Again the vibration sensor indicates that for any misalignment due to failure of bearings etc. which causes vibrations if vibration level is reached to certain limit automatically it indicates that premaintenance is required. Thus entire system helps in monitoring all the parameters and controlling actions are taken.

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CONCLUSION- In this project we are dealing with different problems of IM such as over current, over voltage, over temperature, vibration monitoring during it's time of operation and gives indication to PC through serial communication. Suppose during operation if load increases on motor then relay stop the motor. And gives continues readings of all parameters. In this way we can overcome the problem of product failure. And saves the time of workers.

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STUDY OF STRUCTURAL BEHAVIOUR OF A FRAMED C, T, L, RECTANGULAR STRUCTURES WITH AND WITH OUT CONSIDERING TEMPERATURE STRESSES AND EXPANSION JOINTS

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Abstract: Expansion joints are the gaps in the building structure provided to allow for the movement of the building due to temperature changes. They are provided commonly in the structures of slabs, bridges and other structures where there is a change of expansion of the structure due to temperature. Significance of these joints are mainly to control the uneven surface in the structure when it is subjected to temperature changes. In present scenario the designers of the buildings are not considering expansion joints while designing a multi storied structure. Consideration of expansion joints in the design can reduce the temperature stresses and displacement of R.C. framed structures. In this view studied the effect of expansion joints in structural behaviour of RC framed regular and irregular structures. For this purpose considered four different types of RC framed buildings (C, T, L and Rectangular) in each case compared the lateral displacement and quantity of steel by considering with and without expansion joints by using computer software STAAD Pro.

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Key words- STAAD, C, T, L, Structural behaviour.

I INTRODUCTION:

The term “expansion joint” as used refers to the isolation joints provided within a Building to permit the separate segments of the structural frame to expand and contract in response to Temperature changes without adversely affecting the building's structural integrity or serviceability. The normal practice in runways, bridges, buildings and road construction is to provide expansion joints between cutting slabs of reinforced concrete at designing intervals and at intersections with other constructions. These joint filers are then covered with sealing compounds.

Concrete expands slightly when the temperature rises. Similarly, concrete shrinks upon drying and expands upon subsequent wetting. Provision must cater for the volume change by way of joint to relieve the stresses produced. An Expansion joint is actually a gap, which allows space for a building to move in and out of. The movement of the building is caused most frequently by temperature changes, the amount of expansion and contraction of building depends upon the type of material it is constructed out of. A steel framed building will move by a different amount then a concrete framed one. In case of a small building, the magnitude of expansion is less and therefore, no joint is required either in the floor or roof slab. But in case of the long building, the expansion is very large and may be as much as 25 mm. Therefore, buildings longer than 45 m are generally provided with one or more expansion joints.

II. LITERATURE SURVEY:

Michael J. Pfeiffer, David Darwin (1987) is talked about the construction, contraction and expansion joints in reinforced concrete buildings. They are addressed the purpose of each type of joint and emphasizes the selection of joint locations and joint spacing. Some aspects of joint configuration and construction are also covered. Empirical and analytical design techniques are presented.

HERBERT H. SWINBURNE (2000) the study was carried out under the direction of the Federal Construction Council Standing Committee on Structural Engineering. The Committee first examined in detail an unpublished report in which horizontal changes in dimension in nine federal buildings were observed and related to recorded temperature changes. Additionally, the Committee studied the current practices of federal agencies regarding expansion joint criteria. To enhance its understanding of the distribution of stresses and associated deformation in frames subjected to uniform temperature change, the Committee formulated and conducted an analytical study of the effects of uniform temperature change on typical two-dimensional elastic frames. A theoretical computer model was developed for this purpose. Observed dimensional changes caused by temperature changes were correlated with data obtained

from the computer analysis. The results of the Committee's study and analysis, as well as its collective experience and judgment, served as the bases for this report.

Grant T. Halvorsen (2001), all buildings are restrained to some degree; this restraint will induce stresses with temperature changes. Temperature induced stresses are proportional to the temperature change. Large temperature variations can result in substantial stresses to account for in design. Small temperature changes may result in negligible stresses.

James M. Fisher, S.E (2005) he has experienced several issues relative to construction difficulties associated with expansion joints. The first is that temperature changes to which an unenclosed unheated structure is subjected to during construction may exceed the design temperature changes after completion of the structure. These increased temperature changes should be considered by the designer. The temperature to be considered during construction, of course, varies depending upon building location. Sometimes it is very difficult for the steel erector to adjust the expansion joint at the desired location, as normal erection tolerances may force the expansion joint to one end of its travel. This problem can be eliminated if the designer considers a detail at the far end of the member to which the expansion joint is located, as a means of adjustment. In this way, the construction tolerance can be compensated

A.Plumier, V. Denoël, L. Sanchez, C. Doneux, V. Warnotte, (2007) an elastic analysis of an existing 20-storey reinforced concrete moment resisting frame divided in 3 blocks shows that beams supported on corbels of the adjacent block at the expansion joint loose their support when each independent block vibrate on its own under earthquake. Different reconnection hypothesis were considered, ranging from fixing totally each block to the adjacent one to more flexible options leaving some free relative move between blocks. An elastic modal superposition followed by a pushover analysis considering the final reconnection principle was made. The degrees of freedom of the joint reconnections were observed to be an important parameter.

III. THEORY/METHODOLOGY

BASIC MODEL SPECIFICATIONS

Building type :

RC frames with and without expansion joints for “C”, “T”, “L”, and
RECTANGULAR type Buildings Floor area

“C”: 78.81mt X 30.26 mt, “T”: 65.25 mt X 30.26 mt , “L”: 75.18mt X 30.26 mt, “RECTANGULAR”: 88.41MX 10.68 Meters

Storey Height: 3m

No. of Stories: G+4

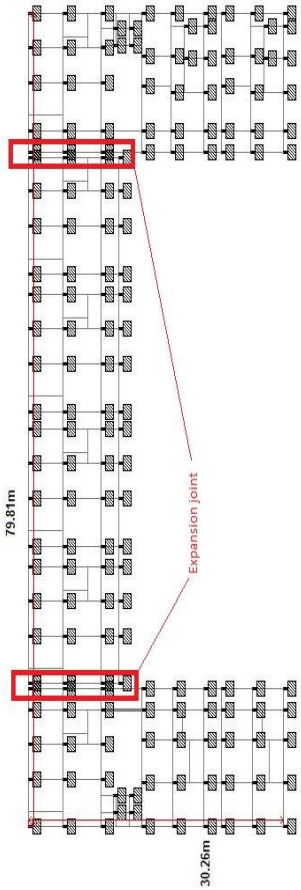
Beam 230X450

Column 230X450

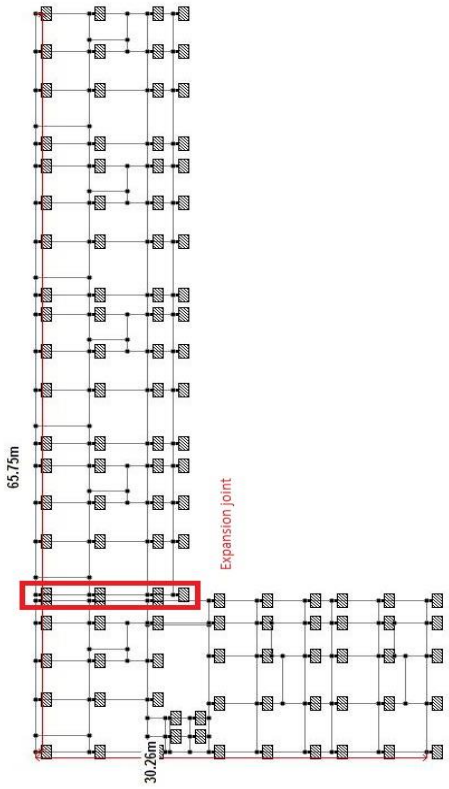
Slab thickness 150

IV. ANALYSISAND DESIGN RESULTS

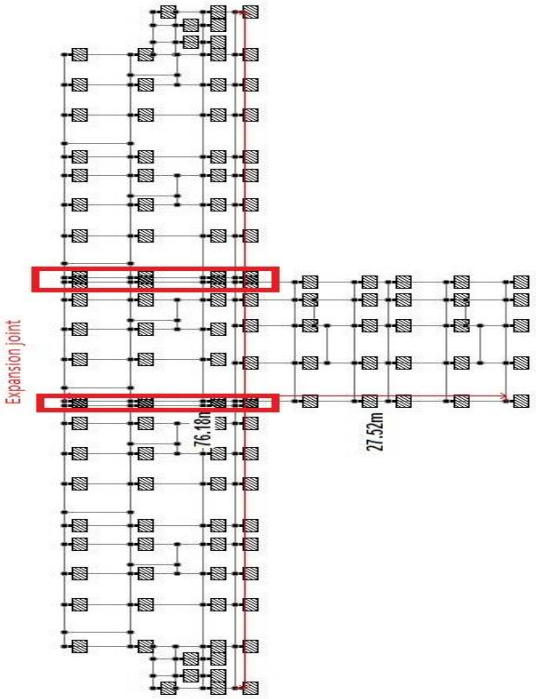
From the study obtained the lateral displacements for limit state of serviceability condition.



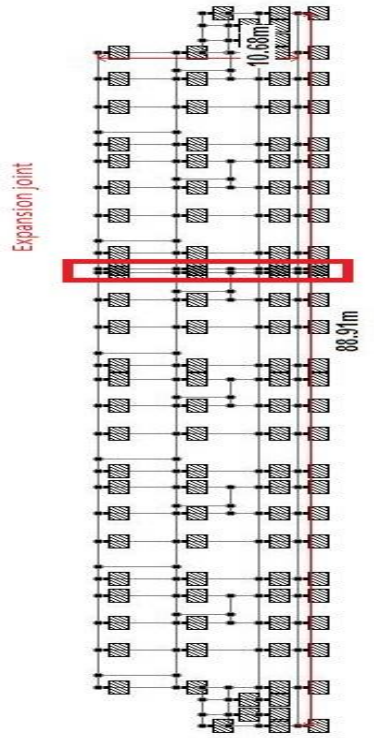
Plan showing “C” type residential building with expansion joints\



Plan showing “L” type residential building with expansion joints



Plan showing “T” type residential building with expansion joints

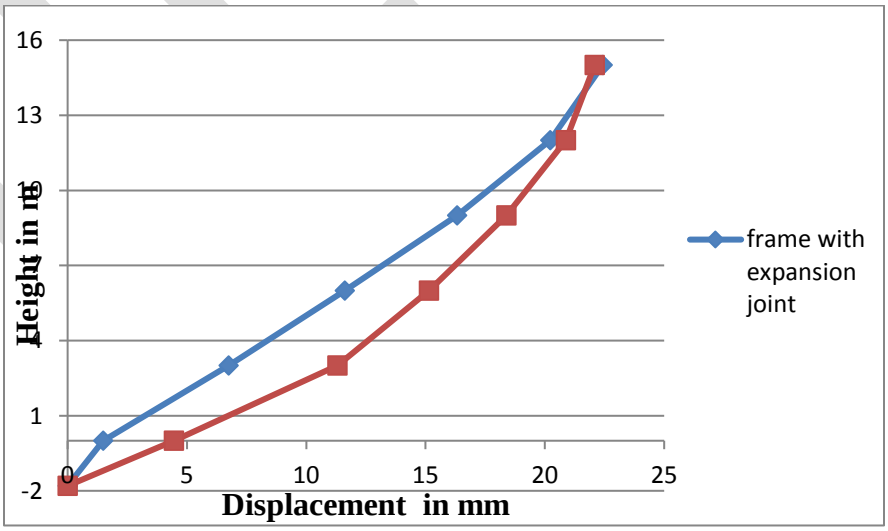


Plan showing "rectangular" type residential building with expansion joints

V. RESULTSAND DISCUSSIONS

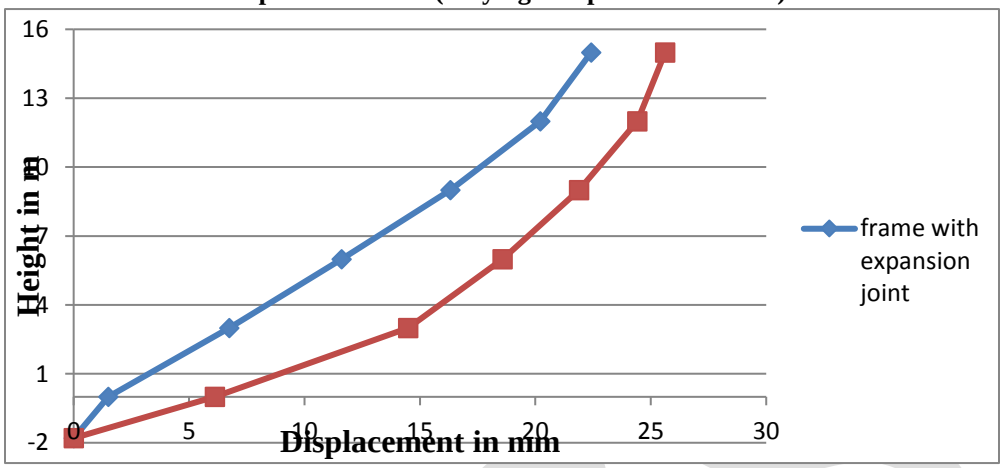
COMPARSION FOR "C" TYPE BUILDING: COMPARISON OF LATERAL DISPLACEMENTOF RC FRAMES:

- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 20^0C)**



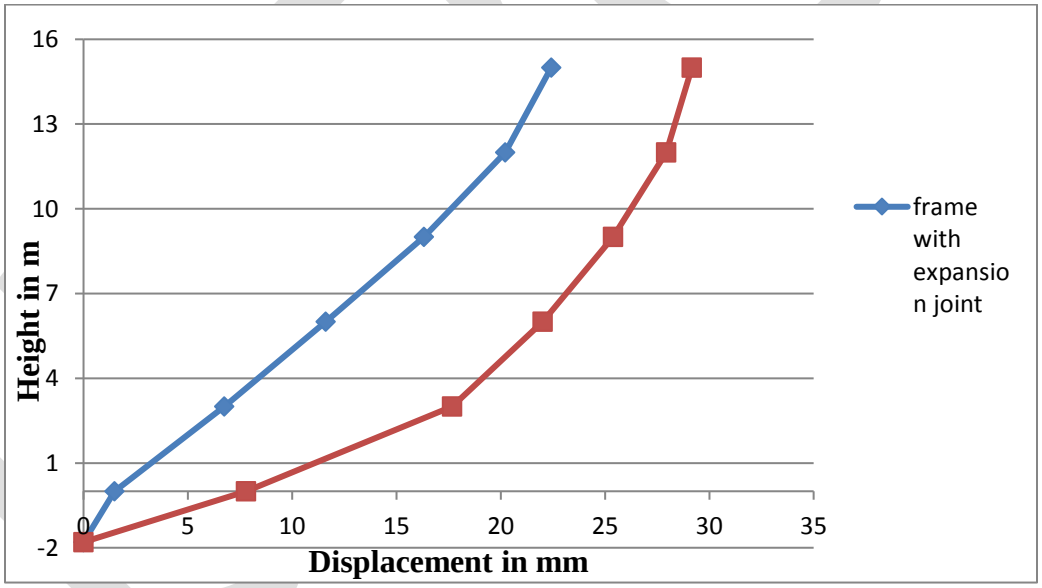
It was observed that there was an decrease in lateral displacement of 1.5% for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 20^0C)

- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 30^0C)**



It was observed that there was an increase in lateral displacement of 14.28% for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 30^0C)

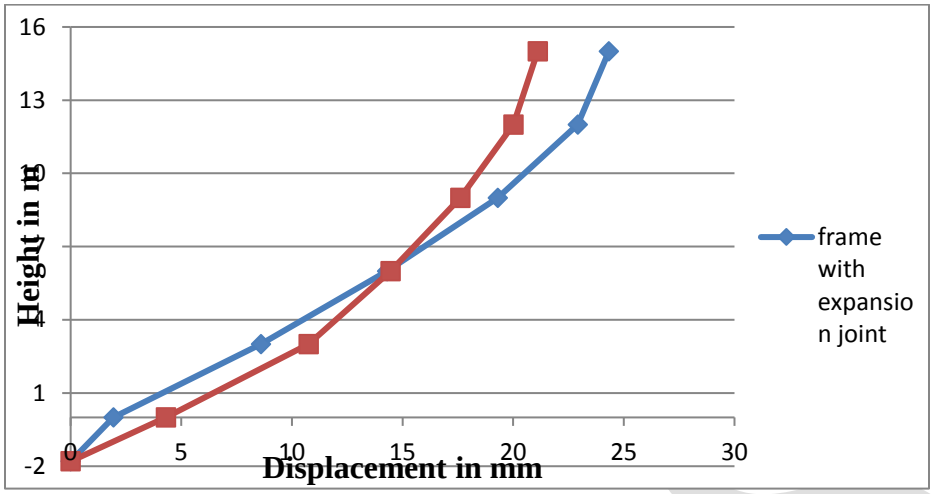
- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 40^0C)**



It was observed that there was an increase in lateral displacement of 30.07% for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 40^0C).

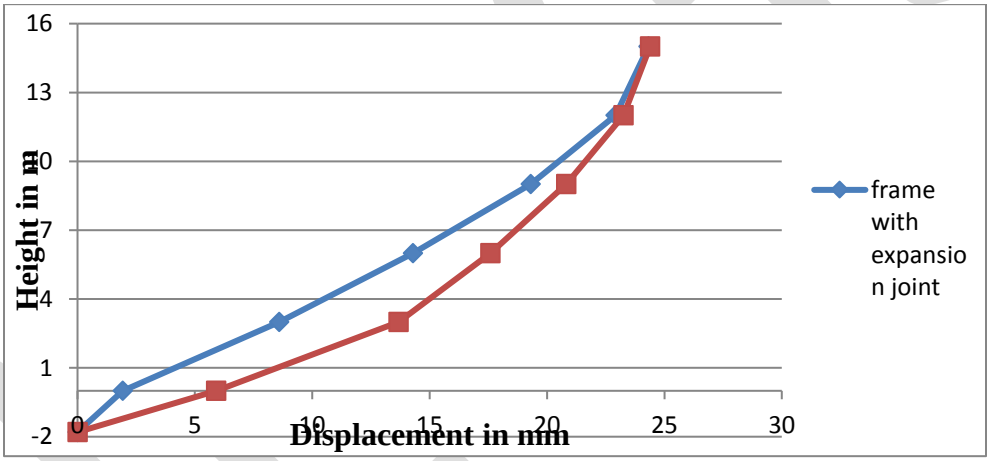
FOR "L" TYPE BUILDING

- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 20^0C)**



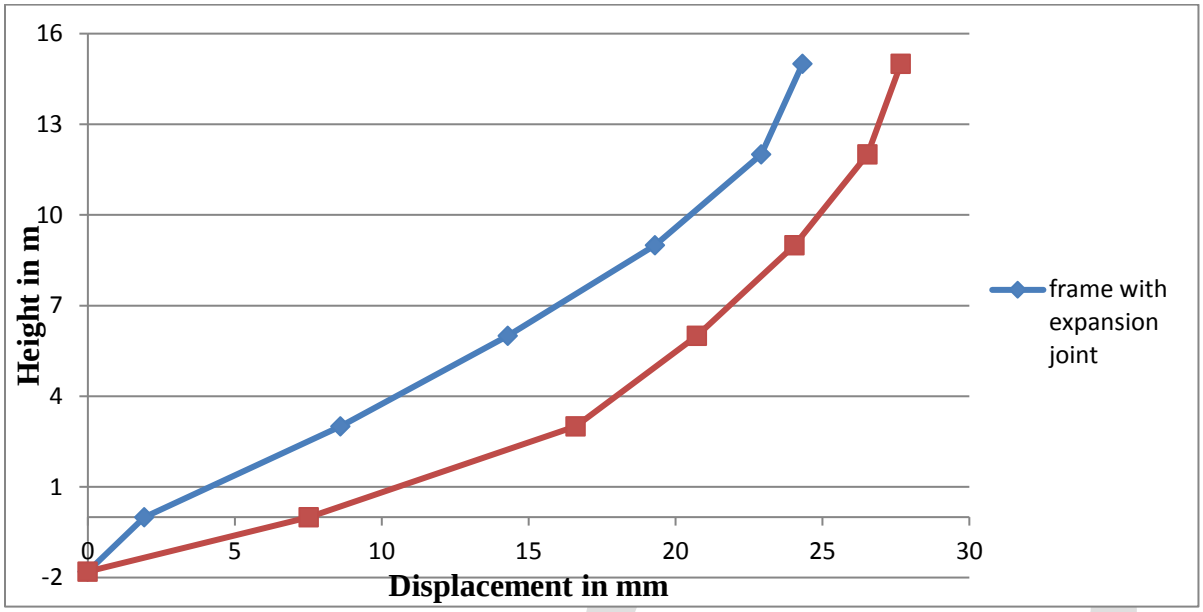
It was observed that there was an decrease in lateral displacement of 13.22% for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 20^0C)

- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 30^0C)**



It was observed that there was an decrease in lateral displacement of 0.263% for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 30^0C)

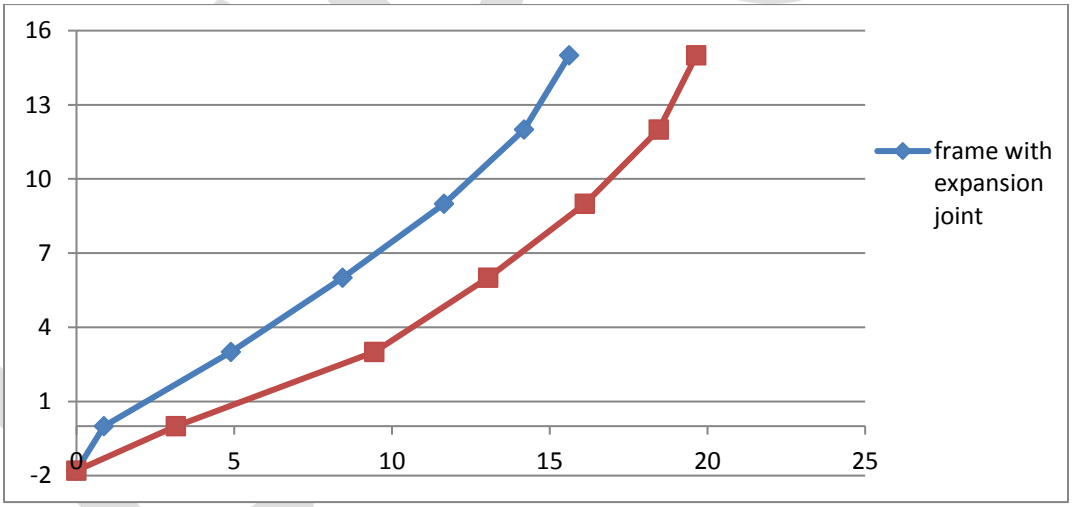
- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 40^0C)**



It was observed that there was an increase in lateral displacement of 13.75 % for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 40^0C)

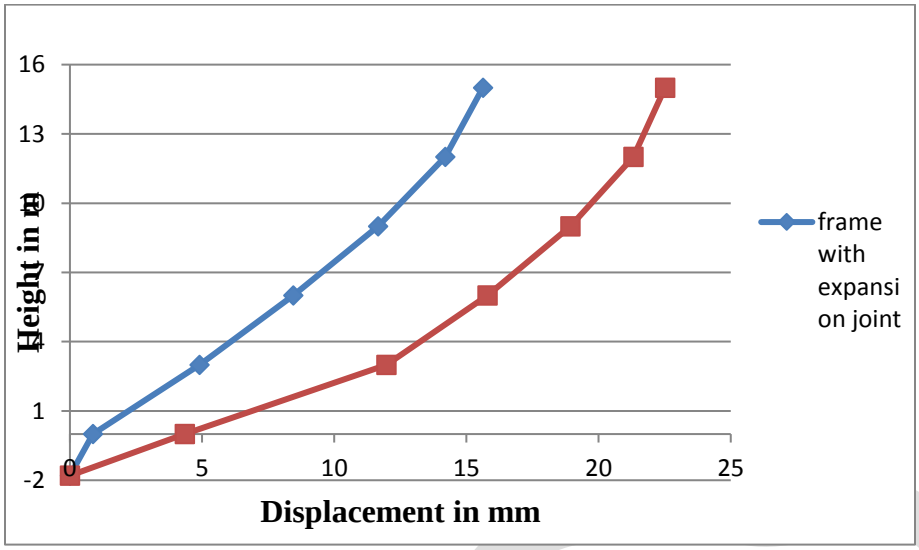
FOR "T" TYPE BUILDING

- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 20^0C)**



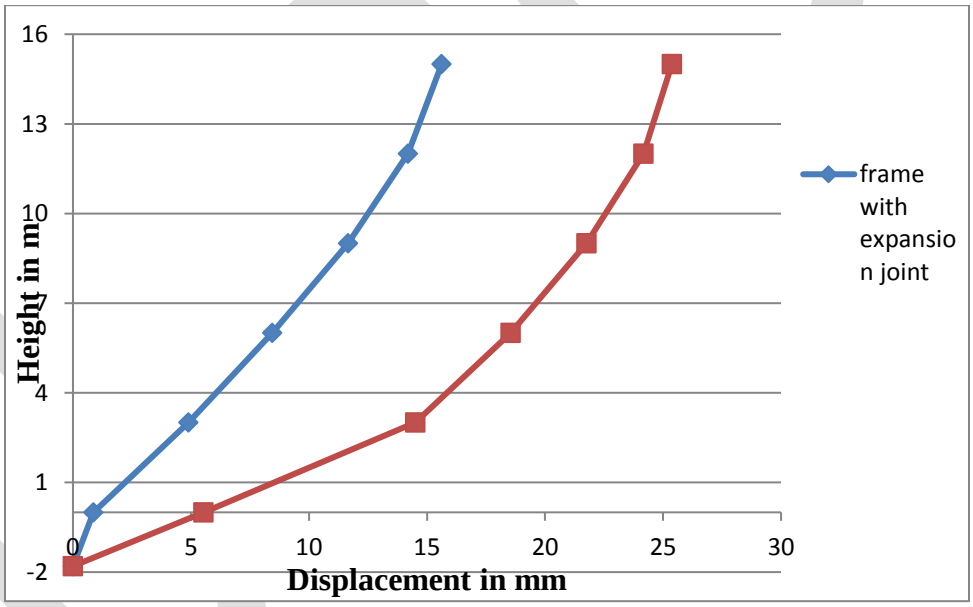
It was observed that there was an increase in lateral displacement of 25.77% for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 20^0C)

- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 30^0C)**



It was observed that there was an increase in lateral displacement of 44.10 % for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 30^0C)

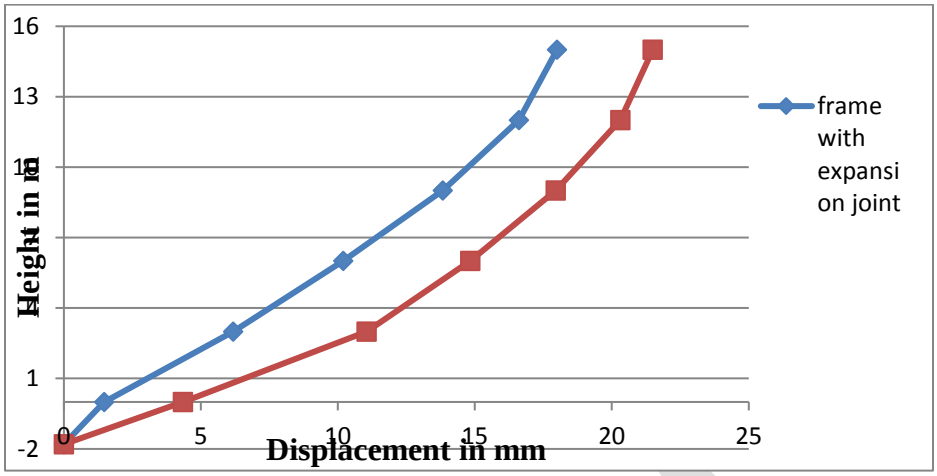
- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 40^0C)**



It was observed that there was an increase in lateral displacement of 62.43% for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 40^0C)

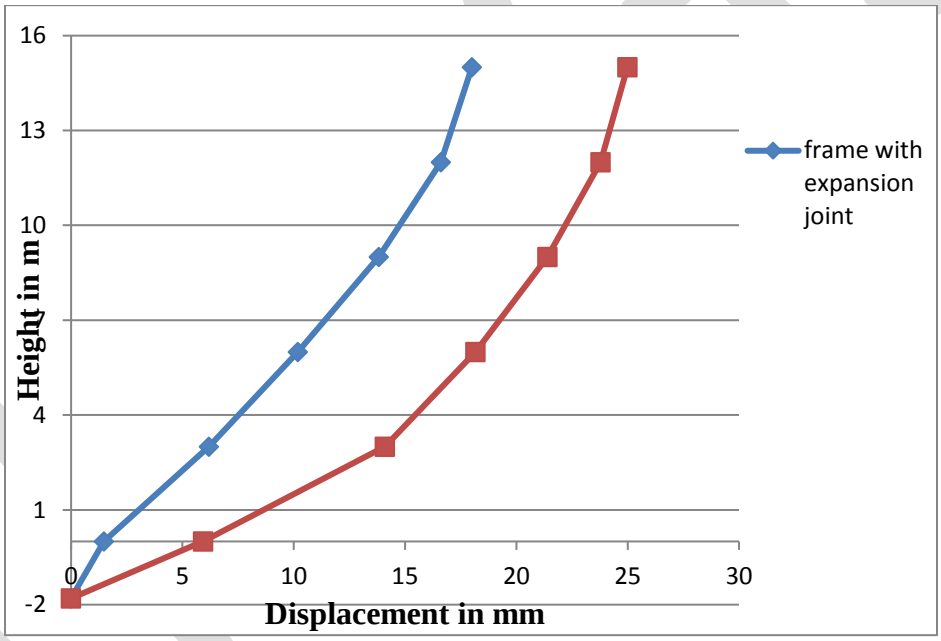
FOR RECTANGULAR BUILDING

- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 20^0C)**



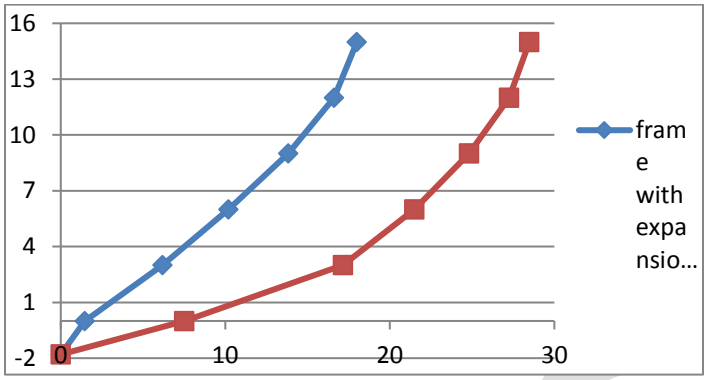
It was observed that there was an increase in lateral displacement of 19.42 % for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 20^0C)

- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 30^0C).**



It was observed that there was an increase in lateral displacement of 38.8 % for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 30^0C)

- **Comparison of lateral displacement of frames with Expansion joint and without expansion joint subjected to temperature stress (varying temperature of 40^0C)**



It was observed that there was an increase in lateral displacement of 58.21 % for frames with Expansion joint when compared to structure without expansion joint subjected to temperature stress (varying temperature of 40^0C)

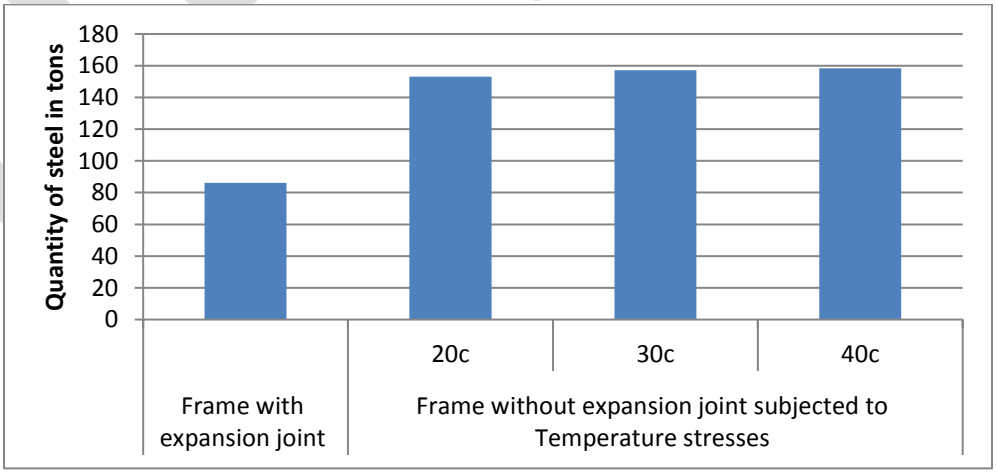
COMPARSION OF QUANTITY OF STEEL

Comparison of quantities of steel in frames with Expansion joints and without Expansion joints subjected to temperature stress (varying temperatures of 200C, 30^0C and 40^0C).

FOR C TYPE BUILDING

Quantities of steel for frame with expansion joints and without expansion joints subjected to temperature stresses (varying temperatures of 200C, 30^0C and 40^0C).

Type	Frame with expansion joint	Frame without expansion joint subjected to Temperature stresses of		
		20^0c	30^0c	40^0c
quantity of steel	86.155	153.145	157.09	158.258

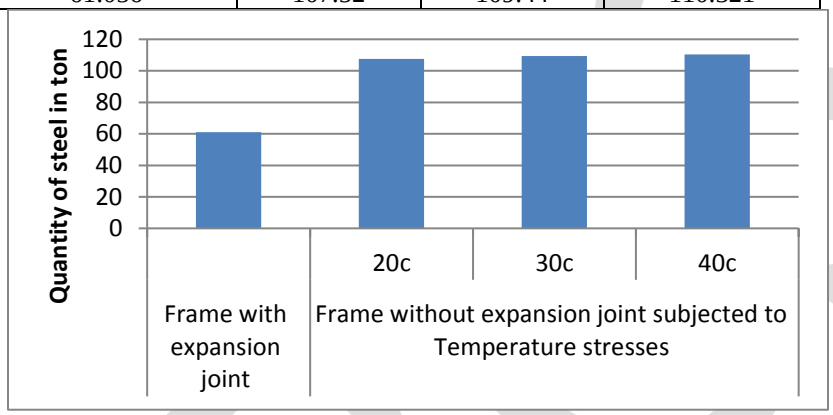


When compared to R.C frame with expansion joints and without expansion joint subjected to temperature stresses (i.e. varying temperature of 20^0C, 30^0C and 40^0C), there was a increase in percentage of steel of 77.75, 82.33 and 83.68 respectively.

FOR L TYPE BUILDING

Quantities of steel for frame with expansion joints and without expansion joints subjected to temperature stresses (varying temperatures of 200C, 30^0C and 40^0C).

Type	Frame with expansion joint	Frame without expansion joint subjected to Temperature stresses of		
		20^0c	30^0c	40^0c
quantity of steel (Ton)	61.056	107.52	109.44	110.321

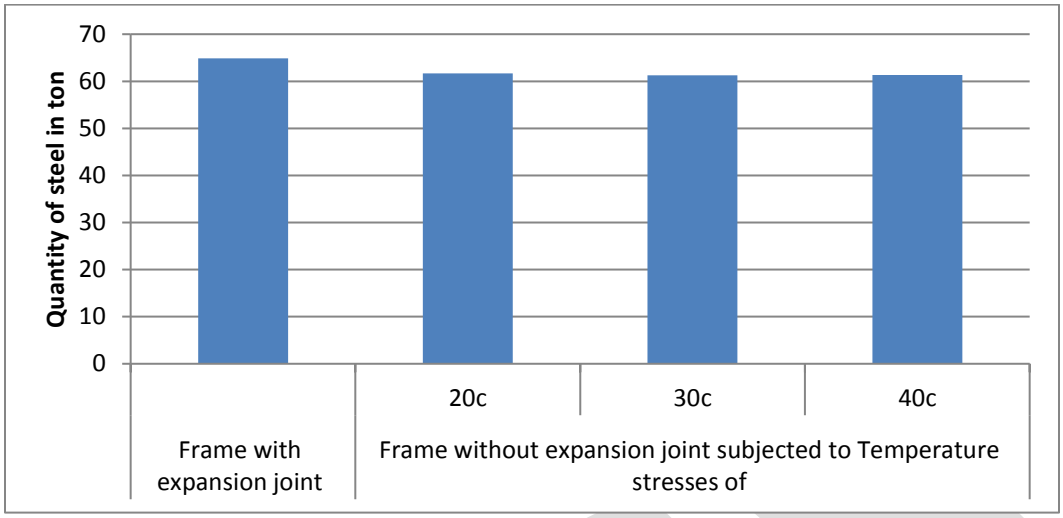


when compared to R.C frame with expansion joints and without expansion joint subjected to temperature stresses (i.e. varying temperature of 20^0C,30^0C and 40^0C), there was a increase in percentage of steel of 76.1, 79.24 and 80.68 respectively.

FOR T TYPE BUILDING

Quantities of steel for frame with expansion joints and without expansion joints subjected to temperature stresses (varying temperatures of 20^0C, 30^0C and 40^0C).

Type	Frame with expansion joint	Frame without expansion joint subjected to Temperature stresses of		
		20^0c	30^0c	40^0c
quantity of steel (ton)	64.893	61.7	61.25	61.357

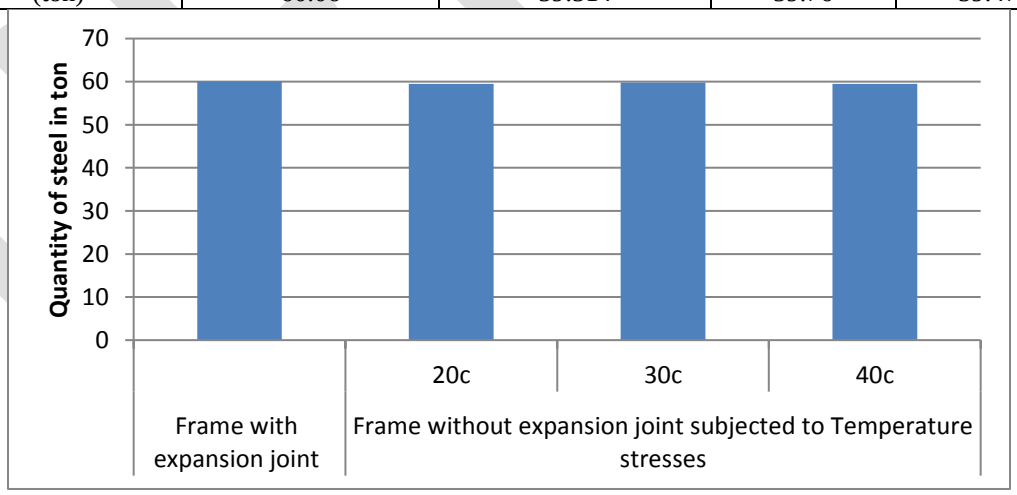


When compared to R.C frame with expansion joints and without expansion joint subjected to temperature stresses (i.e. varying temperature of 20^0C,30^0C and 40^0C), there was a decrease in percentage of steel of 4.9, 5.61 and 5.44 respectively.

FOR RECTANGULAR TYPE BUILDING

Quantities of steel for frame with expansion joints and without expansion joints subjected to temperature stresses (varying temperatures of 20^0C, 30^0C and 40^0C).

Type	Frame with expansion joint	Frame without expansion joint subjected to Temperature stresses of		
		20^0c	30^0c	40^0c
quantity of steel (ton)	60.06	59.514	59.76	59.47



When compared to R.C frame with expansion joints and without expansion joint subjected to temperature stresses (i.e. varying temperature of 20^0C,30^0C and 40^0C), there was a slightly decrease in percentage of steel of 0.909, 0.49 and 0.98 respectively.

CONCLUSIONS:

The lateral displacements and quantity of steel for Regular and Irregular R.C framed structures with and without expansion joints were investigated using the linear static analysis. Following were the conclusions drawn from the study.

1. For "C" type G+4 storey building, it was observed, when compared to frame with expansion joint to frame without expansion joints, there was an decrease in percentage of lateral displacement of 4.17 at a temperature stress of 20^0c and there was an increase in percentage of lateral displacements of 10.73 and 25.236 at a temperature stresses of 30^0c and 40^0c respectively.
2. For "L" type G+4 storey building, it was observed, when compared to frame with expansion joint to frame without expansion joints, there was an decrease in percentage of lateral displacements of 17.18 and 4.865 at a temperature stresses of 20^0c and 30^0c and there was an increase in percentage of lateral displacement of 7.45 at a temperature stresses of 40^0c respectively.
3. For "T" type G+4 storey building, it was observed, when compared to frame with expansion joint to frame without expansion joints, there was an increase in percentage of lateral displacement of 26.84, 44.63 and 62.41 at a temperature stresses of 20^0c, 30^0c and 40^0c respectively.
4. For "Rectangular" type G+4 storey building, it was observed, when compared to frame with expansion joint to frame without expansion joints, there was an increase in percentage of lateral displacement of 21.49, 40.619 and 59.74 at a temperature stresses of 20^0c, 30^0c and 40^0c respectively.
5. For "C" type building it was observed, when compared to frame with and without expansion joint subjected to temperature stresses (i.e. varying temperatures of 20^0c, 30^0c and 40^0c) there was an increase in percentage of steel of 77.75, 82.33 and 83.68 respectively.
6. For "L" type building it was observed, when compared to frame with and without expansion joint subjected to temperature stresses (i.e. varying temperatures of 20^0c, 30^0c and 40^0c) there was an increase in percentage of steel of 76.1,79.24 and 80.68 respectively.
7. For "T" type building it was observed, when compared to frame with and without expansion joint subjected to temperature stresses (i.e. varying temperatures of 20^0c, 30^0c and 40^0c) there was an decrease in percentage of steel of 4.9,5.61 and 5.44 respectively.
8. For "Rectangular" type building it was observed, when compared to frame with and without expansion joint subjected to temperature stresses (i.e. varying temperatures of 20^0c, 30^0c and 40^0c) there was an decrease in percentage of steel of 0.9, 0.49 and 0.98 respectively.
9. From the study, concluded that consideration of expansion joints in analysis of structure (wherever applicable) can improve stiffness as well as it will be cost effective.

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A Hybrid approach for the Detection and Recognition of Faces with PCA & Enhanced K-Mean Clustering in facial image Database

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Abstract—Biometrics is one of the fastest growing areas because of need of high security. The basic recognition that is employed in biometrics is unique characteristics of human so that they can be differentiated easily. Uniqueness in traits of humans have lead to hike in popularity of these biometric systems in all parts of the world. The features that are used in biometric systems are fingerprints, eye retina, voice or either facial features. Face recognition is one of reliable biometric system that captures and recognizes facial features of an individual. Face recognition is said to be reliable biometric system because of differences in human facial features. Many techniques like PCA, Linear Discriminant Analysis and Support Vector Machine etc have been used conventionally for face recognition. The need is to improve the speed and the accuracy of the technique employed for recognizing face. In this paper, a hybrid approach has been proposed for the face recognition. Along with PCA, K-mean clustering is used for generating efficient and accurate results. From the results obtained it is concluded that the accuracy of this proposed system is more than the traditional face recognition system. A comparison is performed that show that the error of this system is less. Also the processing time less.

Keywords— Face recognition, PCA, K-mean clustering, Biometeric system

INTRODUCTION

Biometrics is mechanized strategies for perceiving a man in view of a physiological or behavioral trademark. The past of biometrics incorporates the distinguishing proof of individuals by particular body elements, marks or some unique features that distinguish them from other individuals like height, skin color or texture, retina, voice etc [1]. The present components are face acknowledgment, fingerprints, penmanship, hand geometry, iris, vein, voice and retinal output. Biometric procedure is presently turning into the establishment of a wide exhibit of exceedingly secure ID and individual confirmation. The need to increase the level of security rupture and exchange trick builds, the requirement for well secure recognizable proof and individual confirmation innovations is getting to be obvious. Late world occasions had lead to an expansion enthusiasm for security that will incite biometrics into larger part utilize. Territories of future use contain Internet exchanges, accessing systems, telephone exchanges and tourist industry. There have diverse sorts of biometrics: Some are old or others are most recent innovation. Biometric systems use fingerprint, facial features, eye retina, voice, signatures, hand geometry as the matching features for distinguishing individuals and the advancements in the field are still taking place [1].

Face recognition is one of the applications of biometrics that differentiates an individual from others [2]. By analyzing and comparing two images and then extracting and matching the features of both the images, face recognition can be done and this application of biometrics is used widely and primarily for security reasons [3].

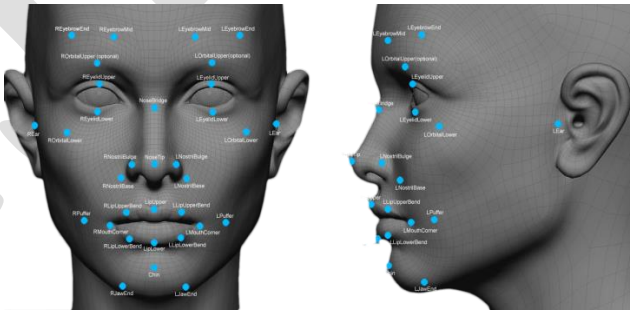

Fig 1 Face recognition process.

Face identification and acknowledgment are assuming an essential part in our present society, because of their utilization for an extensive variety of uses, for example, observation, banking and mixed media gear as cameras and computer game consoles [4] which are only some of the examples from its wide applications. Face recognition is a particular instance of article class discovery, which principle undertaking is to discover the position and size of items in a picture having a place with a given class. Face recognition

calculations were firstly engaged in the location of frontal human appearances, yet these days they endeavor to be more broad attempting to tackle face multi-view identification: in-plane revolution and out-of-plane turn. Be that as it may, face recognition is still an exceptionally troublesome test because of the high variability in size, shape, shading and composition of human appearances. By and large, confront discovery calculations execute face location as a parallel example order assignment. That implies, that given an information picture, it is separated in pieces and every square is changed into an element. Highlights from class face and non face are utilized to prepare a specific classifier. At that point given another info picture, the classifier will have the capacity to choose if the specimen is a face or not .Face recognition can also be used to detect faces in image or videos and it can be used for recognizing criminals too [5]. Many techniques are used for face recognition like PCA i.e. Principal Component Analysis, LDA, SVM i.e. Support Vector Machine, LBP i.e. Linear Binary Patterns, ICA, Gabor wavelet etc. [2]. The prime need of the face recognition technique is reliability and accuracy and that is what have been improved in each new developed technique.

TECHNIQUES FOR FACE RECOGNITION

Various techniques have been used till date for extracting the features from an image for face recognition. Some of the techniques have been described below:

i. **Principal Component Analysis**: PCA is the earliest method that was used for face recognition. Recognition is done by reducing the original data space by using feature space. The drawback of the PCA technique for face recognition is high computation and low discriminating power which was then overcome using LDA technique [6].

ii. **Linear Discriminant Analysis:** LDA finds most of its applications in appearance based methods. It is considered to be an efficient and qualitative algorithm for selection of features in the applications it is being employed. But whenever LDA is applied, it is applied together with PCA. The dimensions are reduced using PCA and the problem of low power is overcome by LDA as it maximizes power. The demerit of LDA is that it is inefficient in extracting features [7].

iii. **Support Vector Machine**: This algorithm finds its uses in classification problems such as face recognition [8]. This algorithm cannot be applied for extracting features when entries are missing from any sample. This method is considered better than neural networks because it performs better than those networks and generates much efficient and better results than conventional ANN systems [8].

iv. **Independent Component Analysis**: ICA is a strategy for finding hidden variables or segments from multivariate (multidimensional) measurable information. There is have to actualize face acknowledgment framework utilizing ICA for facial pictures having face introductions and diverse light conditions, which will give better results as contrasted and existing frameworks. The advantage of using ICA method for face recognition is that it not only considers non Gaussian components but also takes into account statistically independent components [8].

v. **Gabor Wavelet**: Gabor wavelet when used along with ICA method extracts enhanced features for face recognition. The features that are extracted using Gabor wavelet approach are considered to be the best features that could be extracted for face recognition [9].

vi. **Artificial Neural Networks**: Artificial Neural networks have been used in face recognition because of their simplicity. This method of face recognition is capable of matching patterns after obtaining training. These neural networks are intelligent systems that generate output on the basis of training provided to these at the beginning [10]. These are useful in classification problems.

vii. **Local Binary Patter**n: LBP technique was developed with the prime purpose of texture description [4]. It's invariant to monotonic dark scale changes which are fundamental for surface depiction and investigation for the reason of computational effortlessness handling of picture continuously is conceivable. With LBP it's conceivable to clarify the composition and model of an electronic computerized picture. This is finished by isolating a photo into a few little areas from which the components are extricated. These components contain paired examples that portray the natural surroundings of pixels in the locales. The elements that are framed from the areas are connected into a solitary element histogram, which depicts to shapes a representation of the picture. Pictures will then be thought about by measuring the similitude (separation) between their histograms. Concurring various studies face acknowledgment using the LBP technique gives positive results, both with respect to speed and segregation execution. Because of the way the surface and model of pictures is portrayed, the strategy is clearly entirely hearty against face pictures with various outward appearances, changed helping conditions, maturing of persons and picture pivot. Facial representation in view of Local Binary Pattern (LBP) highlights for individual autonomous outward appearance acknowledgment. LBP elements were proposed initially for composition investigation, and as of late have now been acquainted with speak to faces

in facial pictures examination. The most pivotal properties of LBP elements are their resistance against light changes and its simple computation [11].

viii. **Compound Local Binary Pattern**: An augmentation of the first LBP administrator that allots a 2P-bit code to the middle pixel taking into account the dark estimations of a nearby neighborhood containing P neighbors. Not at all like the LBP that utilizes one piece for every neighbor to express just the indication of the contrast between the middle and the relating neighbor dark values, the CBLP strategy utilizes two bits for every neighbor keeping in mind the end goal to speak to the sign and additionally the size data of the distinction between the inside and the neighbor dim qualities. Here, the principal bit speaks about the difference between the value of middle bit and the value of its neighbor pixel. The CLBP administrator sets this bit to 1 if the greatness of the contrast between the middle and the comparing neighbor is more noteworthy than the edge Message Otherwise, it is set to 0. Message is considered as reference value and the bit is set to 1 if the difference between the middle and its neighbor comes out to be higher than the reference value and 0 if vice versa [12].

PROBLEM FORMULATION

Face is our primary focus of attention in social intercourses. It plays an important role in providing human identity. Face recognition is a section of pattern recognition in which human visual perception is saved in computer. This approach is much popular in many of the fields the main and the important one is recognition or can say as the security or authentication purpose. Many researchers are working on this field from many of the years, many algorithms and techniques are developed to update the traditional systems the common these days are PCA, LDA, and Gabor etc. But these approaches individually are not that much efficient in some of the cases, so the mixing of the algorithms are done as an example if PCA approach is used it will provide better results for small datasets. So to overcome these disadvantages the continuous research is processed to get better results. There is one issue too if the algorithms are getting advanced the fake parties are also able to make the algorithm crack able. So there is need to develop an algorithm which will work as advanced and modified approach to make classification that much complex that will not be easy to crack up to an extent, so a study gives an proposed work for thesis in field of classification or security.

PROPOSED WORK

In which the main approach will be to extract the features with the PCA and k-mean clustering techniques and the systems as this is much better approach to work with as per literature and more successful for large dataset. After combining feature extraction of both techniques. Finally the classification will be done and the performance will be evaluated.

METHODOLOGY

In this a new method for face recognition is proposed .this method is proven to be better than the traditional methods. The methodology if the proposed work is defined below.

1) Initially selection of the images is done for creating the data base. So that further this set is used for the classification.
2) After creating the data base, next step is to extract the features is done; these features are used for matching purpose.
3) In this step the features that are extracted are collaborated by using the hybrid approach. As these features are used for the detection purpose.
4) Now a data set for the classification of the features is created, after the features are collaborated by using an hybrid approach.
5) In this step the testing images are browsed, the features are extracted from the selected images these features are then matched with the features of image that are extracted earlier and the difference is calculated.
6) Finally the calculation of the various parameters that are obtained is done the results calculated will depict the accuracy of the system. The proposed system is more accurate than the traditional systems.

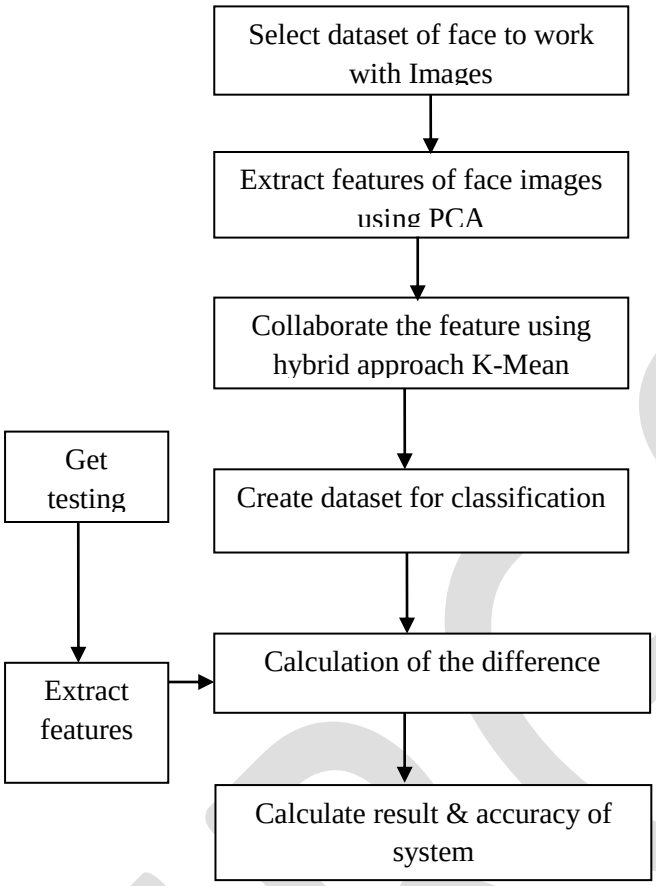

Fig 2. Flow diagram of the proposed approach

RESULTS AND ANALYSIS

The technique proposed in paper for face recognition is K-mean clustering is combined with PCA and named as hybrid system, for obtaining better results. The accuracy of the proposed technique is better than the conventional algorithm used for face recognition. The results for accuracy of the proposed technique are shown below:

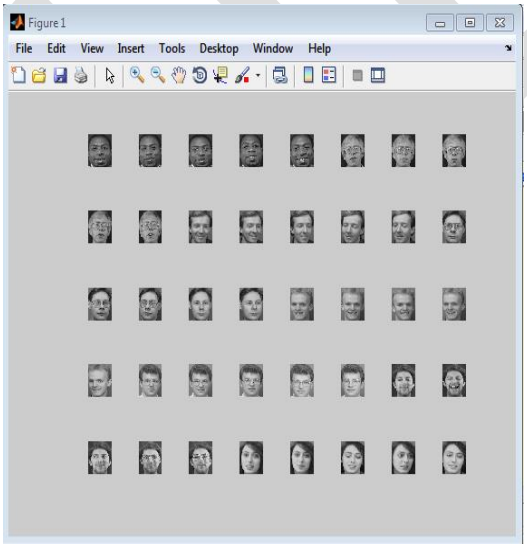

Fig 3 Training images

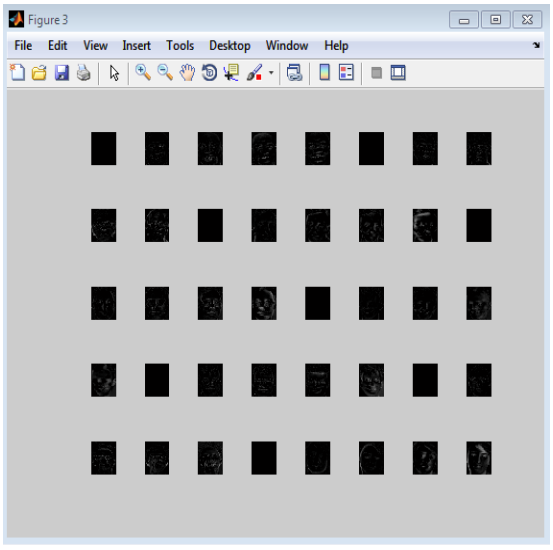

Fig 4 Applying PCA on the training images

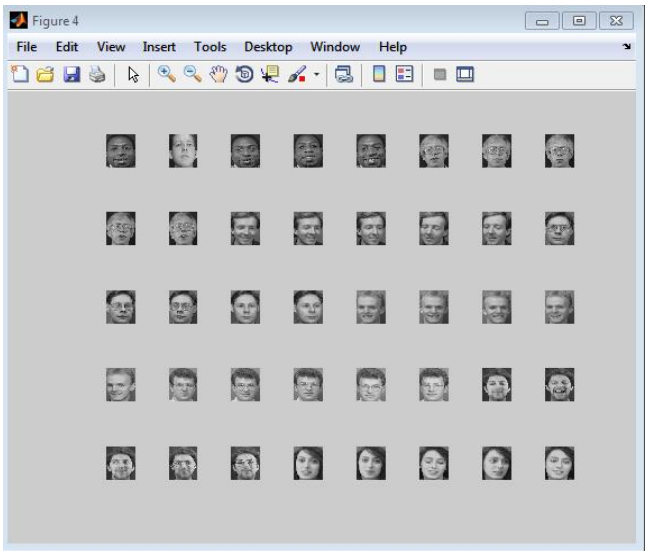

Fig 5 Testing images

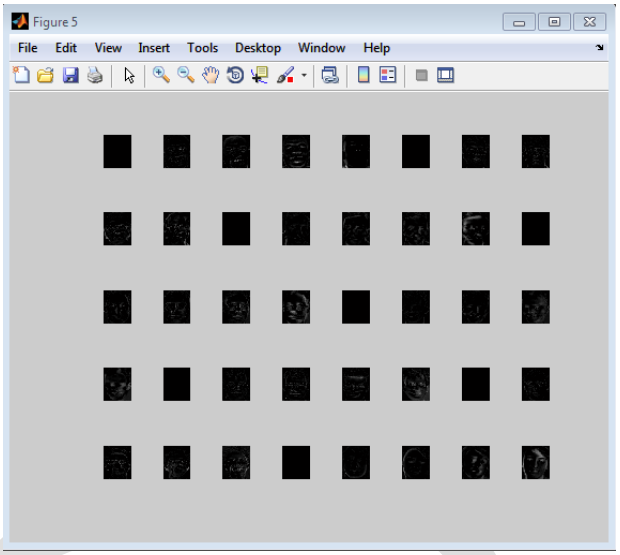

Fig 6 Applying PCA on testing images

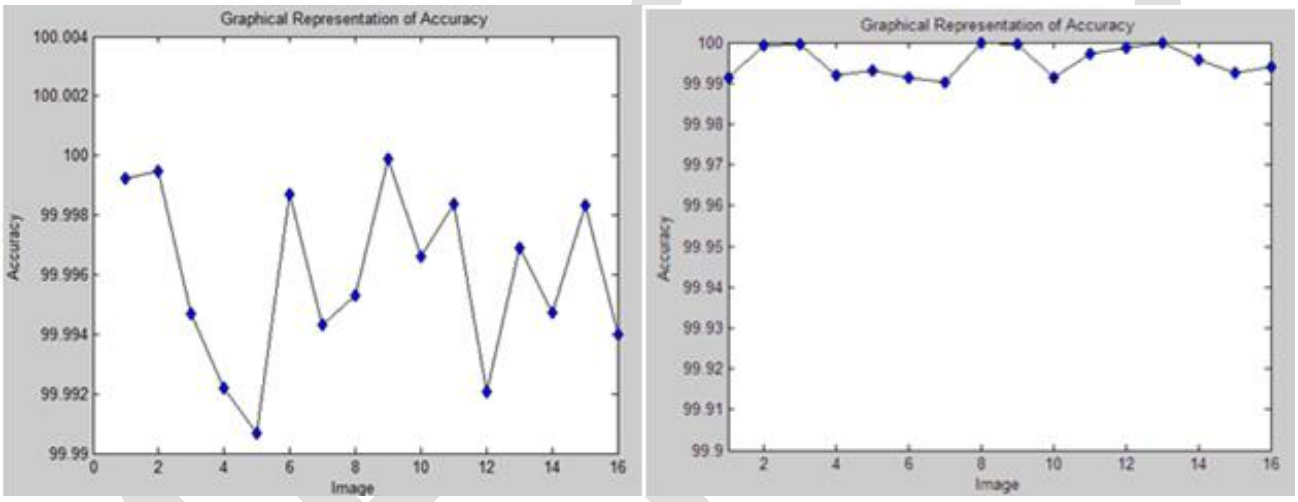

Fig 7 The accuracy of the proposed technique i.e. PCA with K-Mean Clustering

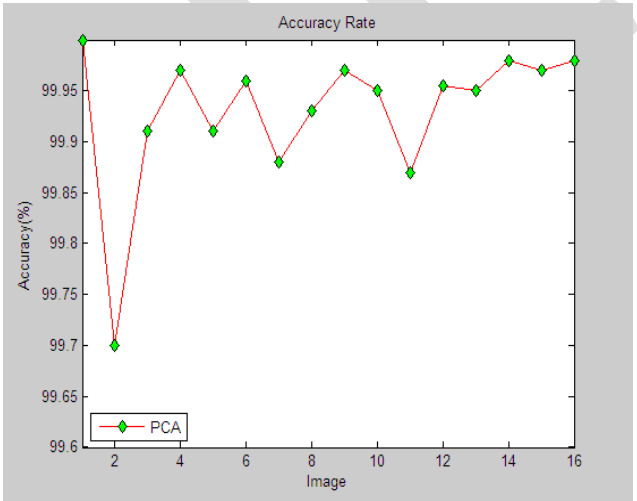

Fig 8. The accuracy representation of the PCA algorithm alone.

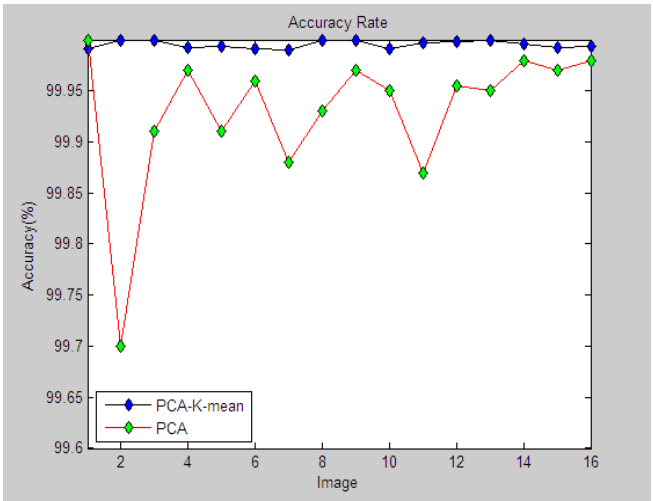

Fig 9 The comparison of accuracy rate of the proposed and individual PCA technique

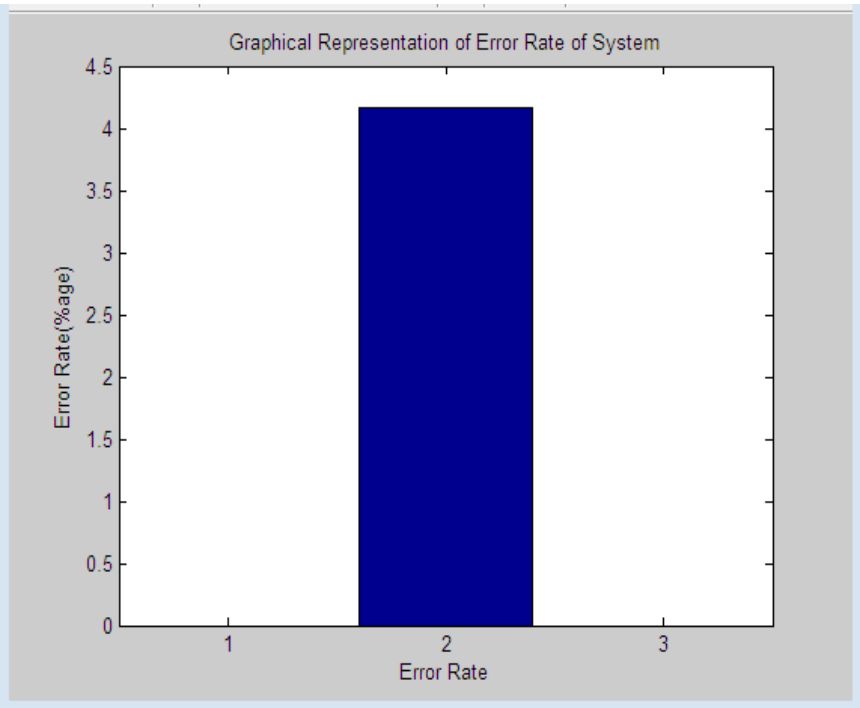

Fig 10 Error-rate of proposed technique

Total No. of Images	Variation in images	Accuracy	Error-rate
16	1	99.99%	1.4%
16	3	99.96%	4.2%
16	5	89%	6.9%
20	3	99.97%	3.3%
20	5	88.9%	5.5%
30	3	99.98%	2.3%
30	7	89%	5%
40	3	99.9%	1.7%
40	1	99.99%	0.5%

Fig 11 Accuracy, Error-rate Table

CONCLUSION AND FUTURE SCOPE

Face recognition system is one of the widely used biometric systems that is used for the identification In this paper the hybrid system is designed for the face recognition .In this PCA and k-mean clustering approach is used for the designing the system . From the results obtained it is concluded that the processing time and accuracy of the system is more as compared to the traditional approaches.

The accuracy rate of the hybrid system is high as compared to the traditional systems. So this system is considered to be better and efficient.

In future the enhancement can be done by using the trending techniques for the feature extraction so that the accuracy of the system can be increased as the detection is done precisely.

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Review on Meta-heuristic Scheduling Optimization Techniques in Heterogeneous Clouds

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Abstract— As cloud computing is turning out to be evident that the eventual fate of the cloud industry relies on interconnected cloud systems where the resources are probably going to be provided by various cloud service suppliers. Clouds are also seen as being multifaceted; if the user requires only computing capacity and wishes to personalize it as per his requirements, the infrastructure cloud suppliers are able to provide this convenience as virtual machines. Many optimized meta-heuristic scheduling techniques are introduced for scheduling of bag-of-tasks applications in heterogeneous framework of clouds. The overall analysis demonstrates that, utilizing different meta-heuristic techniques can offer noteworthy benefits in the terms of speed and performance.

Keywords— Bag-of-tasks, Heterogeneous clouds, Meta-scheduling, Meta-heuristics, Simulated Annealing, Tabu Search, Multi-criteria Decision Making

1. INTRODUCTION

1.1 Cloud Computing

Within the course of the past couple of years, cloud computing has come forth as a standout amongst other solutions for delivering IT oriented services to the clients. It is the novel concept with the help of which services are distributed amongst consumers and providers after identifying the customer demands and sandboxing their requirement in virtualized settings [12]. From the infrastructure point of view, Cloud Computing is propitious resolution that extends the resource capacity of independent computing systems dynamically. Cloud computing is analogous to Grid computing in the manner that it also deploys the distributed resources to attain application-level targets [8]. Its proficiency to leverage virtual technologies at the hardware level as well as application level in order to recognize the properties of sharing the resources, providing dynamic resource scaling "on-demand" while offering a flexible price framework in conjunction with ease of modification and high availability makes it superior to the Grids. On the other hand, with the help of utility based price frameworks and on-demand resource as well as service provisioning, service suppliers can maximize the resource utilization along with minimization of operational cost. A service provider does not need to offer capacities in accordance with the peak load anymore, which results in magnificent savings when the resources are set free to save operational costs in case service request is reduced [8].

1.2 Inter-cloud Systems

The term "inter-cloud" implies an interoperable environment in which multiple criteria collude to satisfy QoS levels [12]. Once the multiple clouds are interlinked together, different clouds provide dissimilar architectures and varying resources which are consolidated into a single entity in a transparent manner [16]. Inter-cloud intends to expand the service elasticity of cloud and scalability while minimizing the performance and service cost overheads [15]. Inter-cloud systems support dynamic workload supervision to initiate decision making for job distribution at meta-brokering level. Inter-cloud meta-broker is built to be decentralized and dynamic by improving the way choices are made for service distribution [12]. This can be carried out through the use of heuristic criterion and algorithms to achieve improved meta-scheduling in inter-cloud environments. In each scheduling decision, percentage of required resources is ought to be reconfigured, displacing them to an alternate cloud region. This course of action causes some virtual machines to be paused for a short time period, which in turn can cause performance degradation temporarily [10].

1.3 Meta-scheduling Paradigms

We pay attention to performance optimization using meta-scheduling paradigm to attain a much better job scheduling across multiple clouds. When numerous distinct clouds are merged, a multi-layered technique is needed that ought to have a universal scheduler, which manages the allocation of jobs amongst the clouds in addition to the ones that are local cloud schedulers [16]. The meta-broker

invokes the scheduler sporadically that allows optimization of entire infrastructure cost dynamically by placing some VMs to the most inexpensive cloud [6]. The nature of jobs being processed is a crucial aspect of multi-layered model [16]. The conventional parallel and distributed systems could capture only a single characteristic of jobs to be scheduled in the real workload. But in the realistic workload of the modern parallel systems, apart from the fact that they are distributed identically and independently, the workload is identified by other significant features like burstiness (temporal as well as spatial), long range dependence in the method of job arrival and bag-of-tasks behavior [5].

1.4 Bags-of-tasks

The inherent extensive dissemination of heterogeneous and dynamic nature of clouds induces them to be more suited to execute the loosely coupled parallel applications like BoTs. These embarrassingly parallel tasks can be executed on any processor and have the ability of scaling out, but do not facilitate the inter-task communication [11]. According to the definition According to the definition proposed in [5], each of the jobs within a BoT can have the identical credentials like group name, queue name, user name, user approximate runtime, which makes it evident to assume that all the jobs within same BoT are considered to have comparable runtime. Due to environmental heterogeneity, tasks belonging to same BoT can have different completion times [13]. A part of jobs arrived at the local level are also crucial and are required to be scheduled with precedence much higher than the remaining jobs. The distinct permutations of a respective schedule delegating BoT tasks to various virtual machines assist to form the search area of the problem [16].

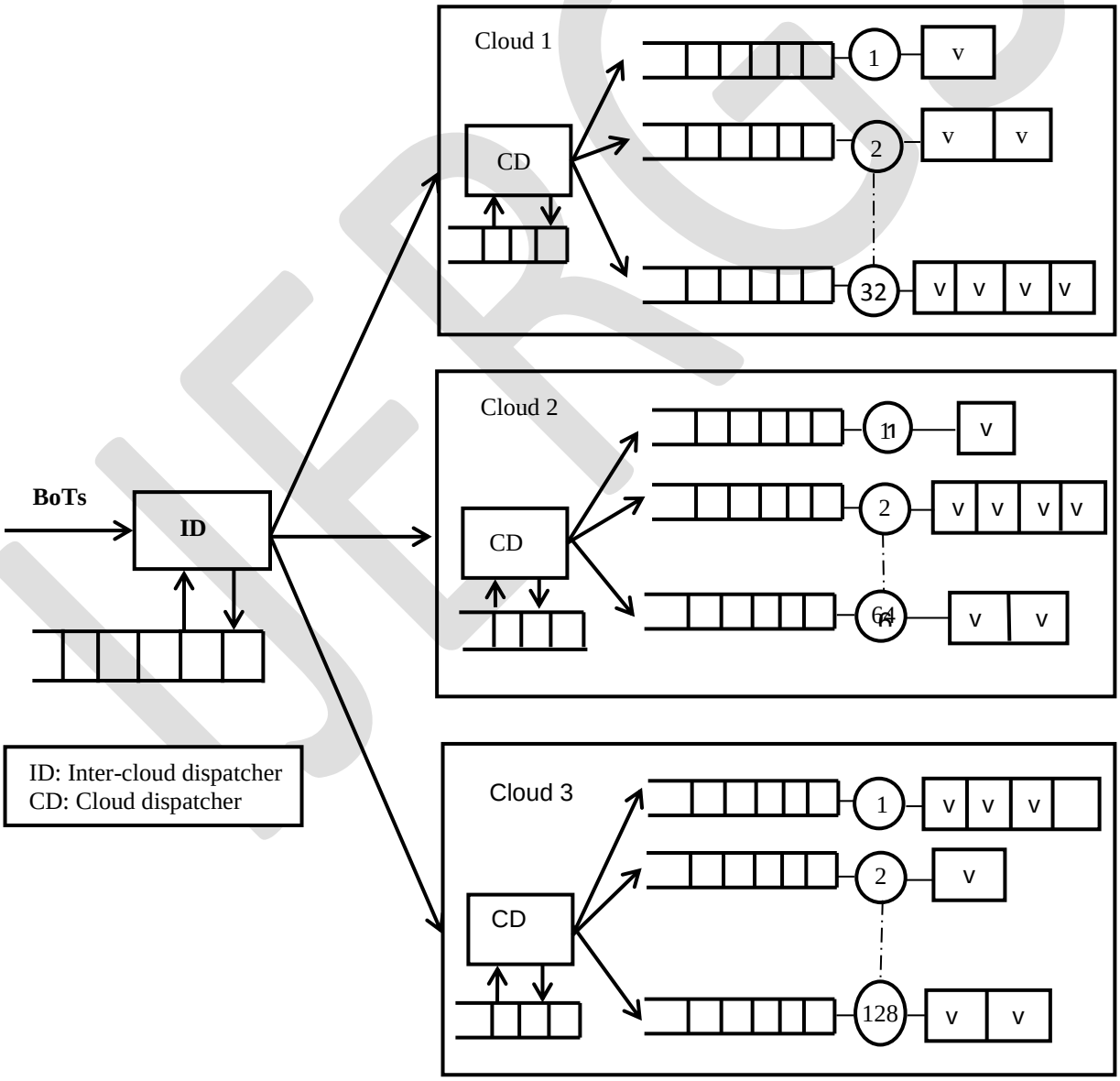

Figure 1. Inter-cloud System

1.4 Meta-heuristic Techniques

Meta-heuristics based techniques can be easily hybrid with any auxiliary approach available to solve non-linear optimization problems. The main aim behind the hybridization of different algorithmic ideas is to fully exploit and combine the advantages of individual pure strategies to get the better performing systems. Multi-criteria decision making problems are special case of vector optimization problems. Scheduling is conceived as a multi-objective task because we use multiple criteria for the evaluation of the quality solutions by minimizing two or more conflicting objectives instead of taking only one objective into the account. Herein, the main motive is to choose a trade-off among all the feasible solutions. In order to select the best suited alternative amongst the available ones, every solution is measured according to more than a single objective function, each of which must be maximized or minimized.

2. TECHNOLOGIES USED

2.1 Meta-heuristic Techniques

Meta-heuristics are considered to be the generic methods that provide good solutions, global optimum within a genuine computation time [7]. They mimic the natural metaphors to solve complex optimization problems such as annealing process, particle swarm, bee colony, artificial bee colony. In other words, meta-heuristic is the upper level approach that is used to guide the underlying heuristics to solve specific problems [7]. They direct the search through the solution space, using substitute algorithms as some form of heuristic, usually local search that can formulate the problems to find a solution maximizing a criterion among a number of candidate solutions [2]. Meta-heuristics customize the operations of supporting heuristics to generate higher quality results efficiently, optimizing both performance and cost while considering heterogeneity of virtual machines [14]. The different meta-heuristic algorithms comply separate procedures for multi-criteria scheduling of loosely coupled parallel jobs named, BoTs in multiple clouds. They are known to be the iterative master processes that improve the solutions at each step until a forbidden criteria is met. Two contrasting criteria must be taken into consideration while designing a meta-heuristic exploration of the search space which is referred to as diversification, and exploitation of the best solutions found, termed as intensification. Meta-heuristics are extended to hybridized versions of variant algorithms [7]. Hybridization of different algorithmic abstractions aims at obtaining more effective systems that exploit the merits of respective classic strategies.

(a) Simulated Annealing

It is one of the earliest meta-heuristic techniques and is motivated by the physical annealing process that establishes the link between its thermodynamics and hunts for global minima in discrete optimization problem [16]. The fundamental characteristic of Simulated Annealing is that it allows an effective approach to escape local optima with sharp probability and time variations by permitting the hill climbing moves hoping to discover global optimum [1]. Simulated annealing refers to the process used in metallurgy in which physical substances are elevated to a higher degree of energy and after that they are gradually cooled until metal alloys are typically in solid state. At each step, a neighbor state is determined by using a neighboring function. The choice of relevant neighborhood ends up being significant for the quality of the outcomes and has probably enormous effect on the quality of SA algorithm [14]. The system can either remain at the current state or move to the next one. Right here, simulated annealing makes the usage of virtual cooling schedule that defines the temperature drop. It figures out if a "worse" move to a favorable machine be accepted, searching for a global optimal solution. As the temperature falls, it becomes hard for the "worse moves" or moves towards high energy states, to be accepted, but the system always accepts the moves to the neighbors having lesser energy. In due course, when the temperature becomes very low, the algorithms being greedy, starts carrying out down-hill moves [16].

Algorithm:

Inputs = x_0, $d_{max.}$

Outputs = x_{best}

$x = x_0$, $g = G(x)$

$x_{best} = x$, $g_{best} = g$

$d = 0$

while $d < d_{max}$ do

    T = temperature (d/d_{max})

    x' = nbr (x)

    g' = G (x')

```
        if P(g, g', T) > uniform (0,1) then
                x = x', g = g'
                if g < g_best then
                        x_best = x, g_best = g
                end if
        end if
        d+ = 1
end while
return x_best
```

Although the main loop of the given algorithm is moderately enough to be applied, still there are some other functions which can be modified according to each problem. Such functions are:

i. G = It represents the energy function that computes the energy of the given state.
ii. P ( ) = It is the probability function which figures out if the moves ought to be acknowledged.
iii. nbr ( ) = It gives the neighbors of a given state.
iv. temperature ( ) = It evaluates the cooling schedule.

(b) Tabu Search

Tabu search makes the use of memory constructs to prohibit those states of search space which have already been visited [16]. TS algorithm uses a mathematical function that analyses how much a chosen solution satisfies the desired measures. This function considers a set of numerous possible moves at each stage that are neighbors of the current state. Each time TS is implemented, it may use one or multiple number of memory structures which uphold the lists of states that have either already been visited or are forbidden on the basis of criteria defined by the user [3]. This list of forbidden moves is known as "tabu list" and cannot be expanded beyond the given maximum size. So, it's considered to be expired when they reach the maximum size. Once it expires, tabus are removed in First in First out (FIFO) manner [16]. TS has capability to get high quality solutions with modest computational efforts. Sometimes, tabus may forbid fair moves even if there is no danger of cycling and in addition they may result in the stagnation of the search process [2].

Algorithm:

```
Inputs = x_0, d_max, n_max
Outputs = x_best
tblist  = [ ]
x = x_0, g = G (x)
x_best = x, g_best = g
d = 0
while d < d_max do
        ngbrs = [ ]
        while nbrs.size < n_max do
                x_temp = nbr (x)
                if not x_temp in tblist then
                        nbrs += x_temp
                end if
        end while
        x = choose_best (nbrs)
        g = G (x)
        if g < g_best then
                x_best = x, g_best = g
                tblist+ = x
                expire (tblist)
        end if
        d + = 1
end while
```

Apart from the functions used in Simulated Annealing, Tabu Search deploys two more functions which are as follows:

i. choose_best: It is used to select the best solution from the respective candidates.

ii. tblist and expiration function: The tabus gets expired when the tabu list hits the maximum size.

3. RELATED WORK

Zheng, Shu and Gao et al. 2006 [1] suggested the merging of the merits of simulated annealing and genetic algorithm and came up with a parallel genetic simulated annealing that is employed in order to resolve the crucial challenge of scheduling in grid computing. The algorithm generated the new group of individuals and afterwards simulated annealing normalized all the generated individuals independently. The result provided the overall optimal solution and proposed algorithm is proved to be better than pure Simulated Annealing and Genetic Algorithm. Fayad, M. Garibaldi and Ouelhadj et al. 2007 [2] formulated a scheduling algorithm with an aim to maximize the number of scheduled jobs utilizing Tabu Search to resolve the problem of grid scheduling by determining the optimal solutions. Fuzzy technology became active in this application by supporting the usage of fuzzy sets so that processing times of jobs, patterned with uncertainty could be represented. The algorithm was inspected against robustness while processing times of jobs changed by evaluating its performance in crisp modes as well as fuzzy modes. Moreover, the effect of varying shapes of fuzzy completion times and the average job length on the schedule performance was addressed. Xhafa, Carretero et al. 2009 [3] contrived another variant of Tabu Search to attain high performance by resolving an issue of batch scheduling in grid-based applications. This new form of Tabu Search was considered as a bi-objective algorithm meant for minimizing the flow times and makespan of scheduled jobs. For a classical benchmark, the novel tabu search was formalized against three other algorithms. Furthermore, some more realistic benchmarks were taken into consideration with larger size instances in static and dynamic environments and the results showed us that Tabu search exceeded the compared algorithms to a great extent. Lee, Chun and Karzy et al. 2011 [9] proposed a method to reconsider the resource allocation and job scheduling to comprehend the heterogeneity of cloud-based analytics platforms. They suggested architecture for resource allocation to deploy advanced analytics in heterogeneous clusters with the aim to improve performance and reduce cost overheads. A metric scheme was formulated to achieve better performance and fairness amongst jobs when multiple jobs share the cluster. Sotiriadis, Bessis, Antonpoulos et al. 2012 [12] examined that because of increasing the number of users, supervision of the internal resources in a widely distributed environment is a critical matter that needs to be dealt with. A meta-broker approach was conceptualized for inter-cloud frameworks to arrange them in a decentralized manner, facilitating the coordination of multiple cloud brokers to demonstrate the responsive service mechanization. An inter-cloud system was simulated to evaluate the average execution time required for bulky services and it showed efficient performance with this solution. A.Moschakis and D. Karatza et al. 2014 [14] described another way to get the optimized interlinked cloud systems in the terms of better performance-to-cost ratios and reliability so that cloud clients can acquire high accessibility and quality of service demands. This research involved the resource allocation schemes and distribution of tasks, for which manipulation of Simulated Annealing and Thermodynamic Simulated Annealing were examined with the scheduling of dynamic multi-cloud framework accompanying virtual machines offering heterogeneous performance while executing bags-of-tasks. The simulation results illustrated substantial influence of heuristics in sustaining satisfactory cost-performance trade-off. Sotiriadis, Bessis, Anjum and Buyya et al. 2015 [15] canvassed that the technique of inter-clouds alleviate ascendible resource allocation across multiple cloud infrastructure. A new inter-cloud scheduling paradigm, known as “Inter-Cloud–Meta-Scheduling” was ushered in. The consequences of the above mentioned framework demonstrated better flexibility, robustness and decentralization. To design and enforce various entities of clouds and policies in ICMS, a tool-kit called, “Simulating the inter-cloud” (SimIC) was used. For several arguments such as makespan, turnaround and execution times, this experimental desiccation was proved beneficial as it produced improved performance of individual clouds when imparted together beneath ICMS model.

4. COMPARISON TABLE

Sr No.	Authors	Year	Title	Technique	Heterogeneity	Meta-heuristic	Convergence Speed
1	Zheng, Shijue, Wanneng Shu, and Li Gao	2006	Task scheduling using parallel genetic simulated annealing algorithm	Parallel Genetic Simulated Annealing Algorithm	No	Yes	Higher
2	Fayad, Carole, Jonathan M. Garibaldi,	2007	Fuzzy grid scheduling using tabu search	Tabu search	No	Yes	Average

	and Djamila Ouelhadj.						
3	Xhafa, Fatos	2009	A Tabu Search algorithm for scheduling independent jobs in computational grids	Tabu Search	No	Yes	Average
4	Lee, Gunho, and Randy H. Katz.	2011	Heterogeneity-aware resource allocation and scheduling in the cloud	Hetero-geneous cluster scheduling	Yes	No	Average
5	Sotiriadis, Stelios, Nik Bessis, and Nick Antonpoulos	2012	Decentralized meta-brokers for inter-cloud: modeling brokering coordinators for interoperable resource management	Inter-cloud meta-broker scheduling in decentralized manner	Yes	No	Poor
6	Moschakis, Ioannis A., and Helen D. Karatza	2014	Multi-criteria scheduling of bag-of-tasks applications on heterogeneous interlinked clouds with simulated annealing	Simulated annealing	Yes	Yes	Higher
7	Sotiriadis, Stelios	2015	ICMS simulation framework: architecture and evaluation	Meta - scheduling	Yes	No	Higher
8	Moschakis, Ioannis A., and Helen D. Karatza	2015	A meta-heuristic optimization approach to the scheduling of bag-of-tasks applications on heterogeneous clouds with multi-level arrivals and critical jobs	Simulated Annealing and Tabu Search	Yes	Yes	Higher

5. CONCLUSION

This paper represents the cloud computing has potentially revolutionized a huge portion of IT industry, causing software to be more attractive to a greater extent as a service. It shows the comparison on meta-heuristic techniques based on scheduling of bag-of-tasks applications in heterogeneous environment of clouds. They provide various benefits in speed and performance, but still there are some issues related to them. Simulated Annealing does not determine whether it has found the optimal solution. So, another complementary method is always the utmost need for this purpose. Using Tabu Search, complete solutions can be recorded, but it needs huge storage

that makes it highly priced to check if a potential move is tabu. To overcome these issues in the future, we will propose a hybrid technique for parallel scheduling using SA and PSO.

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Analysis of HVDC Link in Large Scale Offshore Wind farm, Study and Comparison of LCC and VSC Based HVDC Links and Interconnection of Asynchronous Power Systems Utilizing VSC-Based HVDC Converter

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Abstract— HVDC transmission system and offshore wind farms are not very popular in many countries across the globe. This paper highlights research on offshore wind farms as it contains many advantages over onshore wind parks. Also on possibilities of appropriate transmission schemes, if Pakistan is to have offshore wind farms in premises of Arabian Sea in future years. Grid integration, design layout and power quality issues in offshore wind farms and comparison of two HVDC technologies by simulated models of HVDC system are discussed. At the end results are concluded from simulated models of HVDC link and appropriate scheme for offshore wind farm design is selected showing that two Dc interconnected systems are more feasible for operation than Ac interconnected system.

Keywords— HVDC transmission, Offshore Wind farms, Low voltage ride through (LVRT), Voltage source converter (VSC), Line Commutated Converter (LCC).

1. INTRODUCTION

Due to high wind pressure and abundant space in oceans. The offshore wind farms which consist of large and modern wind turbines are replacing many small onshore wind farms. In present era large offshore wind farms like Horns Rev (160MW) or Nysted (165MW) in Denmark are in operating condition also number of offshore wind farms are under planning all across the Globe due to large and shallow offshore reservoirs [1]. Extensive construction of such wind farms means that our power system is more vulnerable on the wind speed. Therefore adequate arrangements are to be made for stability, protection scheme and power quality issues in order to make our system stable and free from transients or to scour from any sort of intricate situation in our power system.

Denmark has credit to initialize the practical concept of offshore wind parks. As there is strong wind speed in ocean as compared to land. Offshore wind parks have been installed in several parts of the world, due to the cleanliness and green production of electrical energy. Pakistan recent wind power projects are all onshore. However, Pakistan does have the capability to install offshore wind farm in premises of Arabian Sea as shown in the wind map report proposed by NASA/SSE (**Fig. 1)** the wind speed in offshore areas of Pakistan is around 6 to 6.5 (m/s) annually [2] which is best suited for the offshore wind power generation.

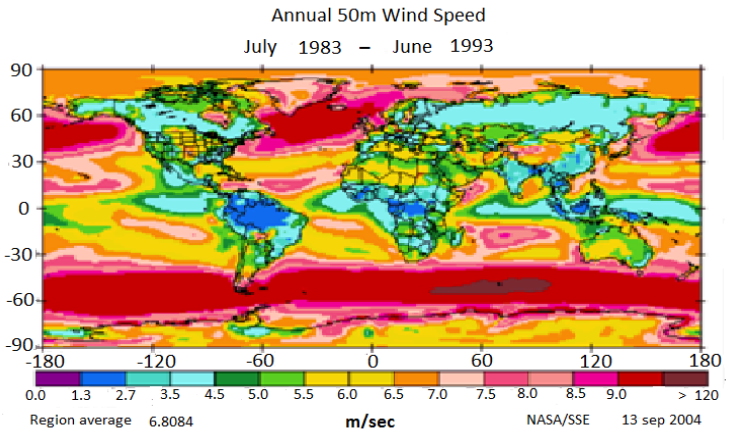

Fig 1. Wind Map from NASA/SSE Report

2. HVDC TRANSMISSION SYSTEM

Mostly offshore wind power plants are located hundreds of kilometers away from load centers AC transmission system can't be implemented because of high line losses. Therefore HVDC transmission system is best suitable method to transmit high amount of power with least possible losses. In case of HVDC transmission at the generating station the voltage is stepped up. Before the power is transmitted through HVDC transmission system this generated power is rectified by using Ac to Dc converters (rectifier). Then near the load centers or at termination points power is inverted by using Dc to Ac converter (inverter) then this inverted power is distributed to the load centers [3].

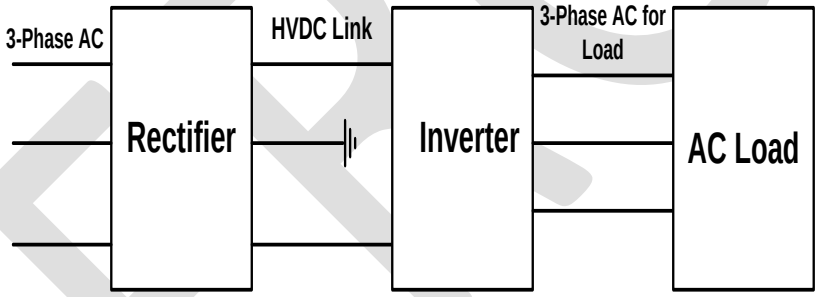

Fig : HVDC Transmission System

3. DESIGN PROCESS DESCRIPTION

The procedure for optimization is illustrated below.

1. On the basis of fixed wind park layout, choose appropriate place for transformer.
2. Considering cost limitations, plan string structure on the basis of former work.
3. After reliability analysis and economic cost assessment, construct suitable redundancy design.

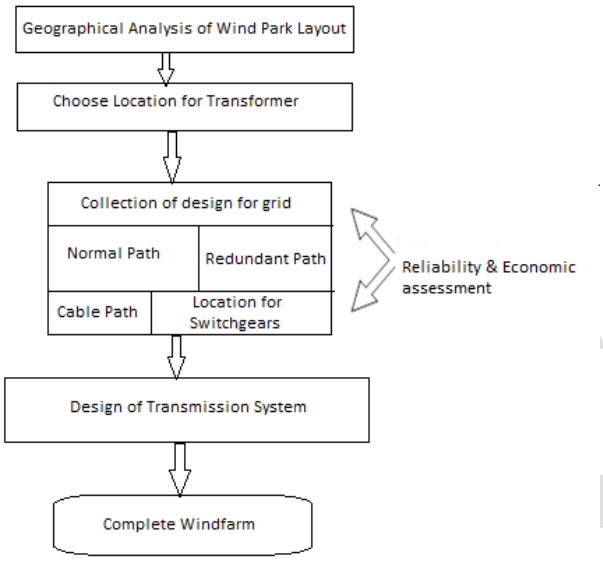

Fig3. Hierarchy Chart for Design of Wind Farm

4. DESIGN LAYOUTS

4.1 Small DC wind farm

In this every wind turbine is connected to rectifier and thus DC power sent to grid interface is inverted and then fed to grids. System topology is shown in **(Fig. 4)**.

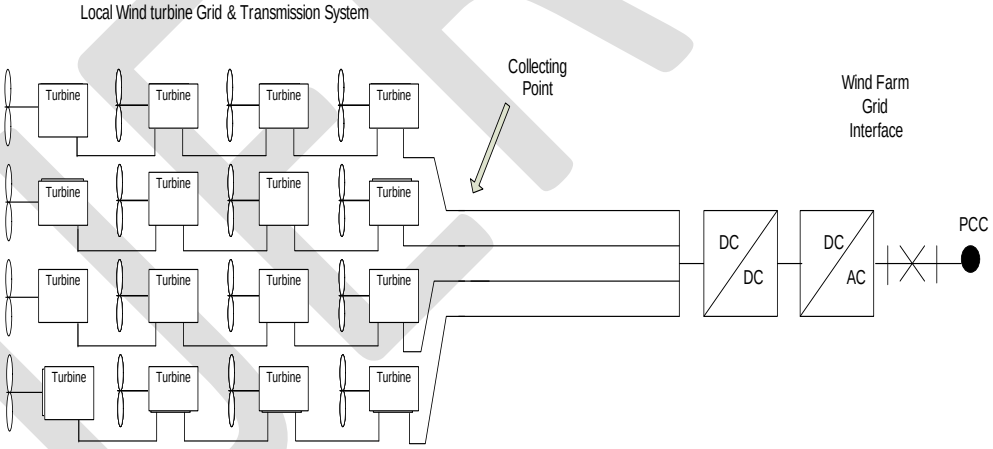

Fig 4. Small DC Wind Farm Layout

4.2 Large parallel DC wind farm

Each section consists of number of wind farms which are connected to DC/DC converter. After that DC power is supplied to main grid interface where this DC power is boosted and fed to wind farm grid interface where it is inverted and transmitted to grids [4]. System topology is shown in **(Fig. 5)**.

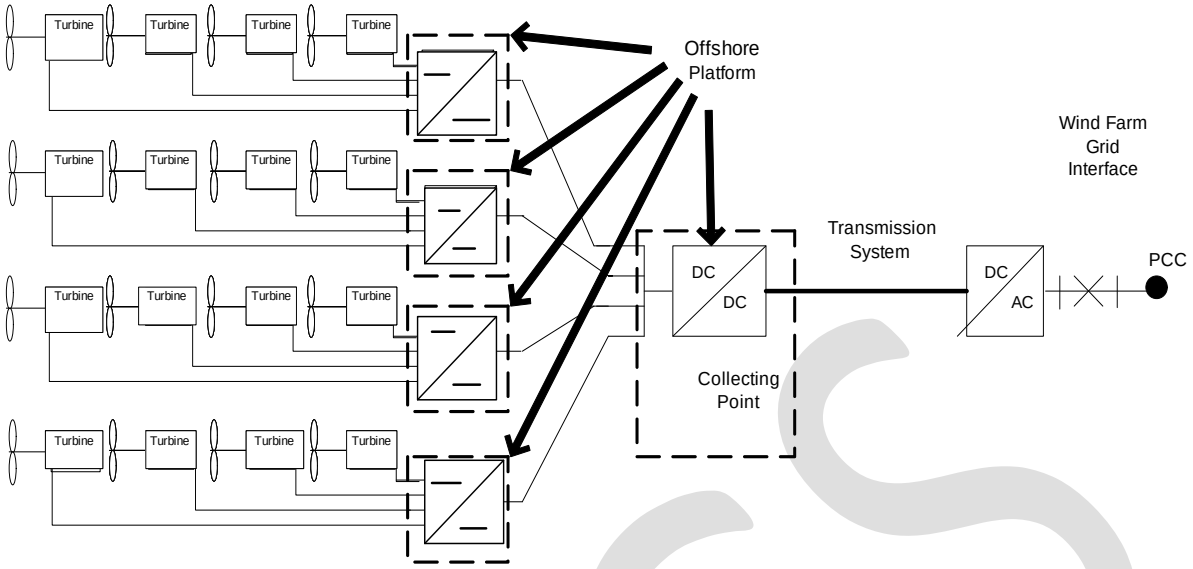

Fig 5: Large DC Wind Farm Layout

4.3 Series DC wind farm

Here 'n' number of wind turbines are in series arrangement to get the voltage level feasible for transference as well as 'm' number of series connection are made in parallel in order to get desired power level [4]. Main advantage of this topology is, here DC generators are used and bulk DC power is directly inverted without any need of rectifiers.

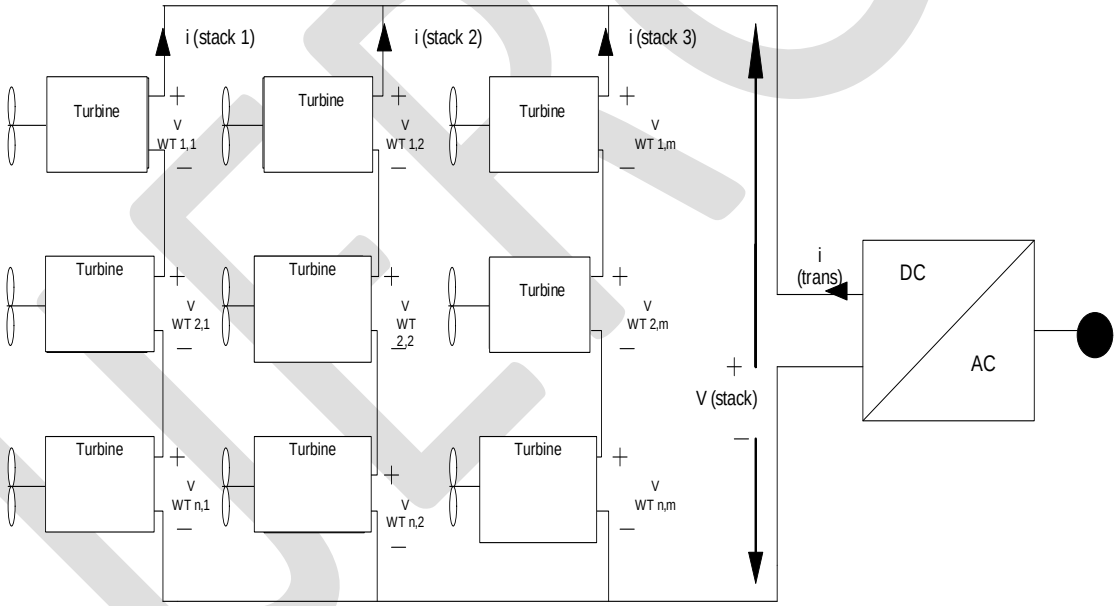

Fig 6: Series Wind Farm Layout Based on DC Generators

5. OFFSHORE GRID INTEGRATION

There are number of ways to construct/design offshore grids, depending on the size of wind farms and level of redundancy required. It must be kept in mind that redundancy level depends on economy [4]. The notional designs which are implemented for layout of seaward wind park are mentioned below [4],

5.1 Radial design

In radial design several wind turbines are connected in series as its name implies "Radial". This grid integration is mostly used in small scale offshore wind parks. Design for radial type grid integration is shown in **(Fig. 7).**

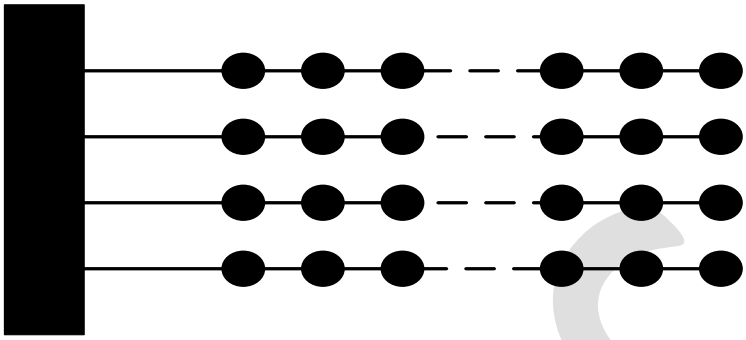

Fig 7. Radial Offshore Grid

5.2 Loop design

Design is somehow similar to radial offshore grid, but here redundancy is established between wind turbines. Some versions of loop design offshore grid integration are shown in **(Fig. 8, 9)**.

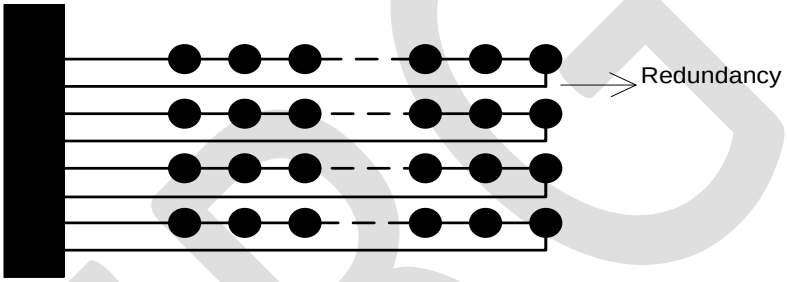

Fig 8. Single sided ring offshore grid

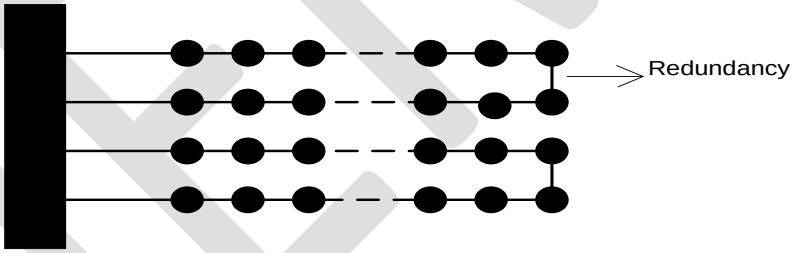

Fig 9. Double Sided ring offshore grid

5.3 Star design

Wind turbines are spread over number of feeders. Mainly used to operate equipment with low rating. This system is more reliable because outage of cable affects only one wind turbine and give liberty to use less number of cables. **(Fig. 10)** shows its practical form.

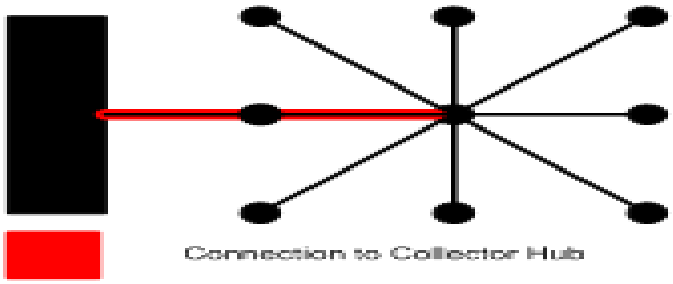

Fig 10. Star offshore grid

6. Power Quality Issues in Offshore Wind farm & Their Proposed Solutions

Due to availability of vast area and lack of involvement in human activities, offshore wind parks are growing their root across the globe. In coming future as it is expected that adequate amount of power will be dependent on offshore wind generation, hence such wind farms are under great consideration of concerned authority. Furthermore, to obtain maximum efficiency with minimum cost investment following major issues in offshore wind parks should be analyzed and methods to scour out from these issues must be proposed.

6.1 Low voltage ride through (LVRT)

LVRT is the most consistent issue occur in offshore parks in which under low wind pressure condition generators fail to supply reactive power hence power to load end cannot be delivered. **(Fig. 11)** shows LVRT characteristic curve [5].

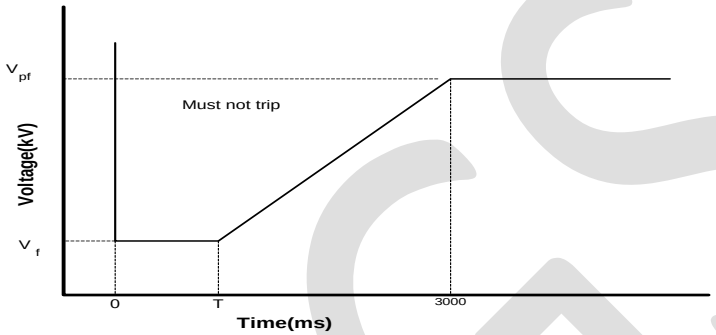

Fig 11. Low Voltage Ride through Characteristic

To increase LVRT capability in generating stations following issues are proposed [6].

- By insertion of chopper resistor in DC links.
- Energy must be dumped in Energy Storage System, like batteries & super capacitors etc.
- Using STATCOM near load centers & reactive power compensator also increase LVRT capability.

6.2 Harmonics

The two main causes which produce harmonics in the wind farms are non-linear characteristics of electronic devices and resonance [7]. Harmonics may cause following harmful effects on HVDC transmission system.

Inappropriate heating in transformer and rotating machine, over loading in neutral conductor, transmission lines are over loaded, deterioration of fuses [8]. Following **(Table. 1)** of IEEE standard 519-1992 suggest limits of total distortion in demand at customer side [9].

Table 1: limit for Harmonic Distortion

Max Distortion of Harmonic Current IL						
Individual Odd Harmonic						
Isc/IL	H<11	11<h<117	17<h<23	23<h<35	35<h	TDD
<20	4.0	2.0	1.5	0.6	0.3	5.0
20<50	7.0	3.5	2.5	1.0	0.5	8.0
50<100	10.0	4.5	5.0	1.5	0.7	12.0
100<1000	12.0	5.5	4.0	2.0	1.0	15.0
>1000	15.0	7.0	6.0	2.5	1.4	20.1
Limit of Even harmonics is 25% of odd Harmonic Limit						
Distortion in Current is Limited in DC offset Not Allowed						
There is a limit for current distortion values in power generation equipment irrespective of actual Isc/IL						
Where, Isc = maximum short circuit current at PCC IL = maximum demand load current (fundamental frequency component) at PCC						

Solutions for harmonic mitigation are given as under [10]

- In delta-star system neutral of star connection must be ground.
- In delta-delta system secondary delta is ground by using tertiary winding.
- Using Power line Carriers (PLC) separates distinct frequency signals as in de-multiplexing reduce harmonic distortion.
- Using hybrid filters which allow specific frequency signals to pass through them.

6.3 Voltage stability

Voltage stability in wind parks is analyzed under following conditions.

- Steady state voltage at the time of generating power.
- Voltage flickers.
  - Fluctuation at time of operation
  - Fluctuation at time of switching

Solutions for voltage stability issue are [11].

- Frequent load flow analysis is required to ensure that system voltage must not go beyond or below the prescribed limits.
- Using SSSC (FACTS) controller near load end overcome the issue of voltage regulation [12].

7. SIMULATIONS IN MATLAB-SIM POWER SYSTEMS

7.1 Single phase diode bridge rectifier & single phase two pulse IGBT inverter

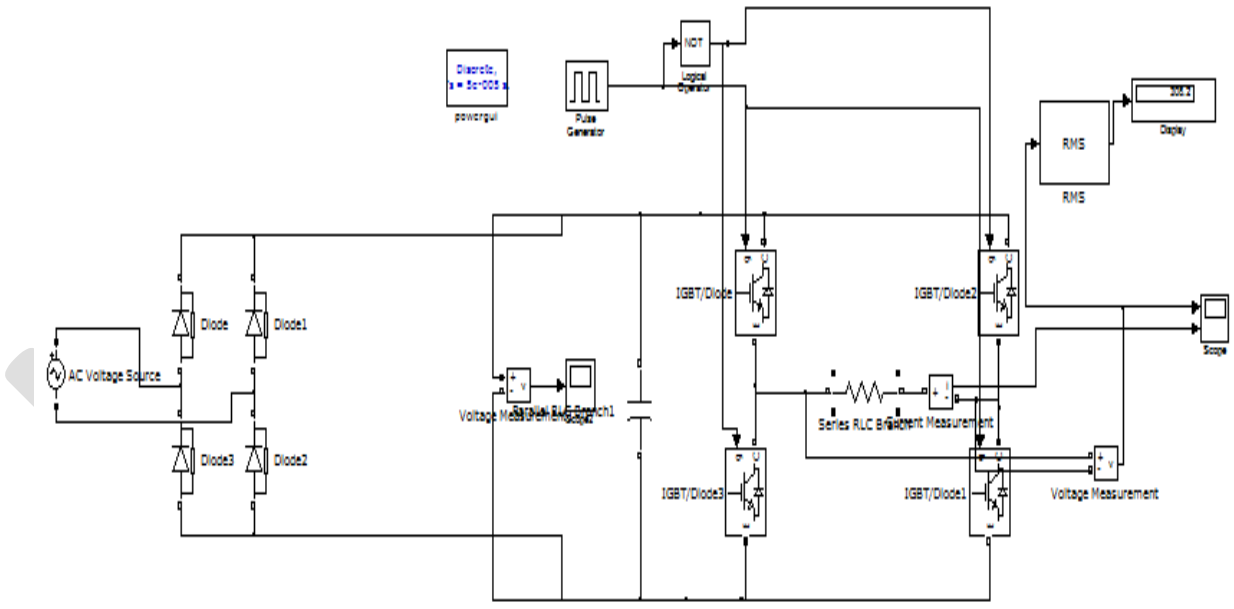

Fig 12: Simulation of VSC-HVDC link

Simulated model at **(Fig. 12)** shows Ac source of peak voltage 311.127V-50Hz supply is used as an input. This input voltage is fed to single-phase diode bridge rectifier which converts the input Ac to Dc, output obtain from single-phase diode bridge rectifier is 308.2V Dc. After eliminating ripples through capacitor. The Dc from rectifier is fed to inverter which makes peak voltage 308.2V-50Hz square wave Ac.

Table 2: Obtained Results

Input Peak Voltage	311.127V Ac
Input RMS Voltage	220V
Input Frequency	50Hz
Output Voltage of Rectifier	308.2V Dc
Output Peak Voltage of Inverter	308.2V Ac
Output RMS Voltage of Inverter	217.5V
Output Peak Current of Inverter	0.6A
Output RMS Current of Inverter	0.43A
Gate Pulses of Inverter	Amplitude=1, Period= 0.02sec Pulse width= 50%, Phase delay= 0sec
Active Power	93.525W
Reactive Power	0 (As load is pure resistive)
Power Factor	1 (Pure resistive load)
Current THD (Total Harmonic Distortion)	48.30%
Voltage THD (Total Harmonic Distortion)	48.30%
Voltage Drop	2.5V
Voltage Regulation	0.413%

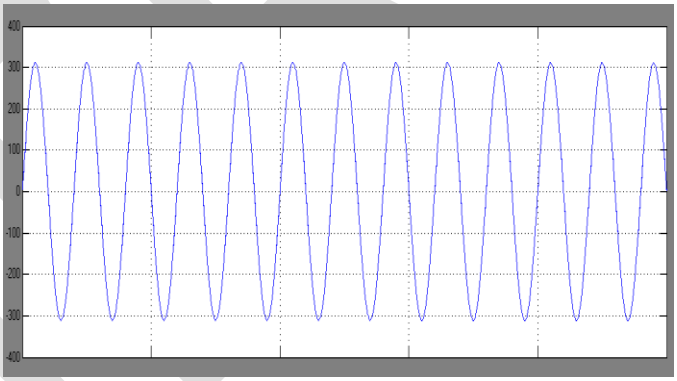

Fig 13. Rectifier Input Voltage

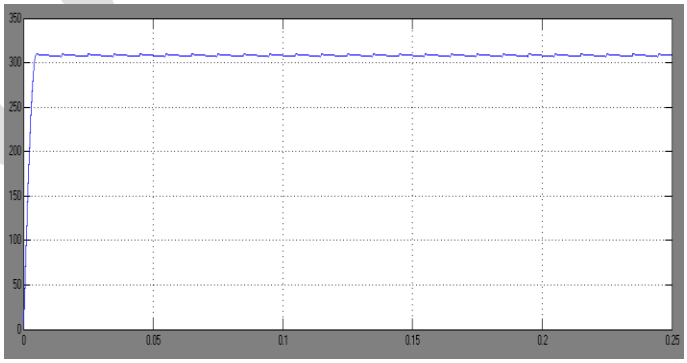

Fig 14. Rectifier Output Voltage

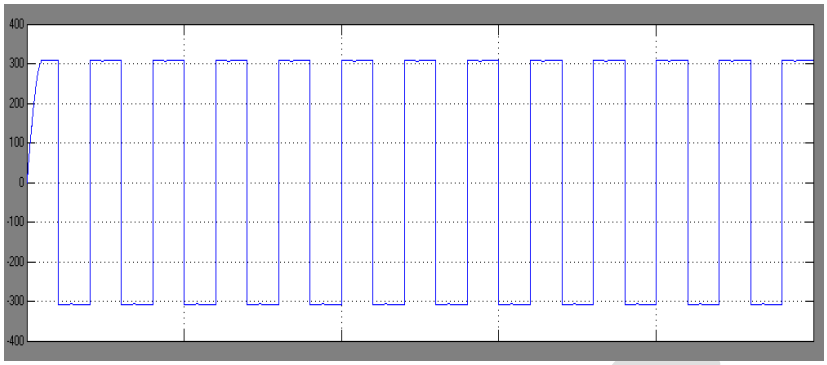

Fig 15: Inverter Output Voltage

7.2 Single phase thyristor bridge rectifier & single phase two pulse IGBT inverter

Ac source of peak voltage 311.127V-50Hz supply is used as an input. This input voltage is fed to single-phase thyristor bridge rectifier which converts the input Ac to Dc, output obtain from single-phase thyristor bridge rectifier is 205.8V Dc. After eliminating ripples through capacitor. The Dc from rectifier is fed to inverter which makes peak voltage 205.8V-50Hz square wave Ac.

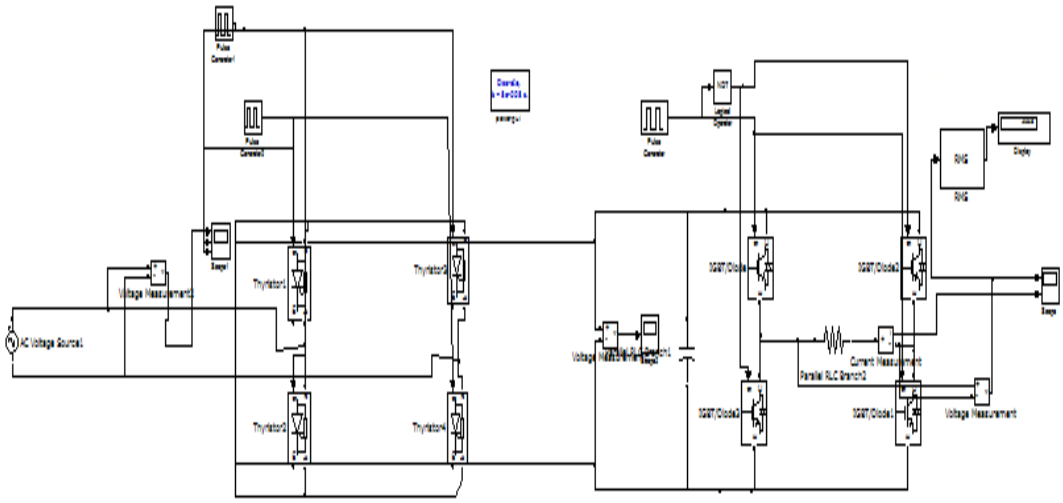

Fig 16. Simulation of LCC-HVDC link

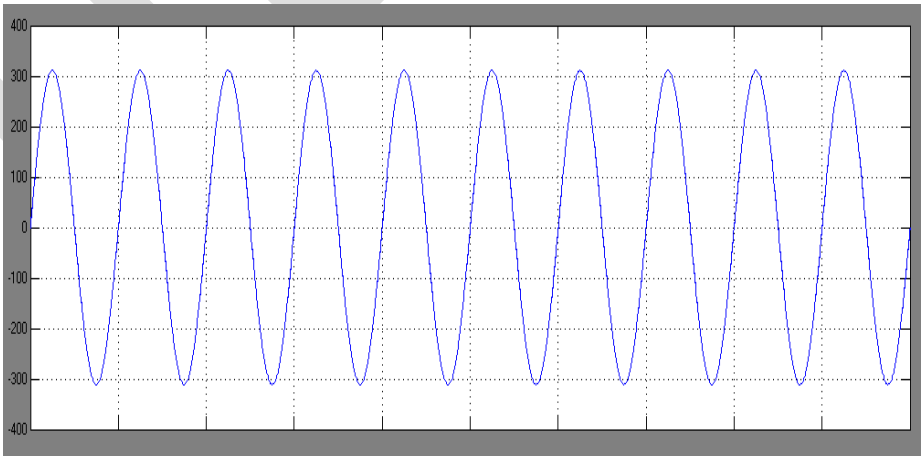

Fig 17. Rectifier Input Voltage

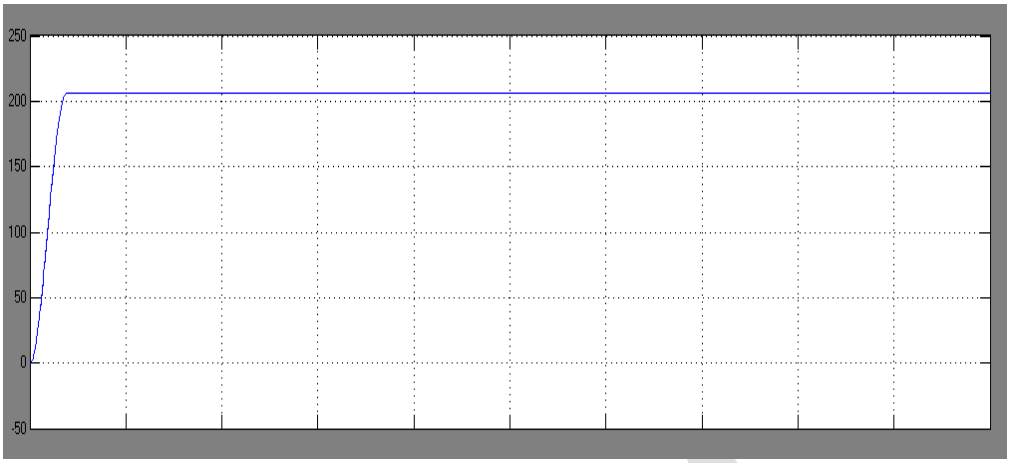

Fig18. Rectifier Output Voltage

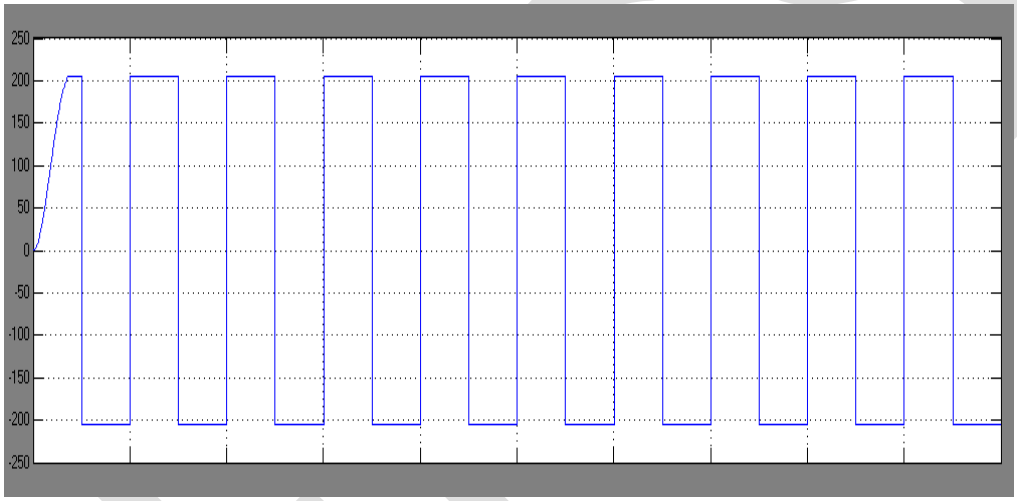

Fig 19. Inverter Output Voltage

Table 3. Obtained Results

Input Peak Voltage	311.127V Ac
Input RMS Voltage	220V
Input Frequency	50Hz
Output Voltage of Rectifier	205.8V Dc
Output Peak Voltage of Inverter	205.8V Ac
Output RMS Voltage of Inverter	145.2V
Output Peak Current of Inverter	0.42A
Output RMS Current of Inverter	0.15A
Gate Pulses of Inverter	Amplitude=1, Period= 0.02sec Pulse width= 50%, Phase delay= 0sec
Gate Pulse of Thyristor 1 &4	Amplitude=1, Period= 0.02sec Pulse width= 10%, Phase delay= 0.01sec
Gate Pulse of Thyristor 2 &3	Amplitude=1, Period= 0.02sec Pulse width= 10%, Phase delay= 0sec
Active Power	21.78W

Reactive Power	0 (As load is pure resistive)
Power Factor	1 (Pure resistive load)
Current THD (Total Harmonic Distortion)	48.34%
Voltage THD (Total Harmonic Distortion)	48.34%
Voltage Drop	74.8V
Voltage Regulation	4.686%

7.3 Connection and inversion of two (50 hz & 60 hz) single phase ac schemes to 220 v, 50 hz output

Simulation shown in (Figure 20) consists of two different Ac sources with the same voltage ratings of 220V- Ac but with different frequencies (50 Hz and 60 Hz) respectively. The output from each Ac source is rectified by using diode bridge rectifier. Ripples are removed by the help of two parallel connected capacitors. Then the rectified powers from rectifier are coupled and supplied to the IGBT based inverter, which produces an output 220V and 50Hz Ac.

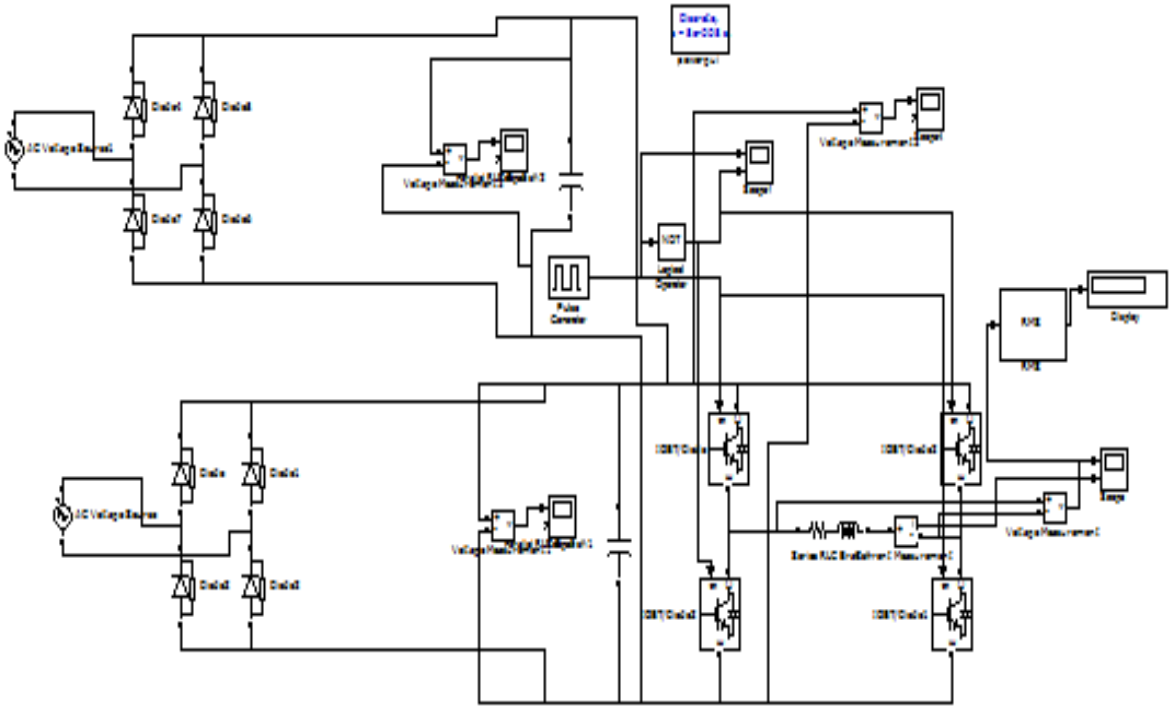

Fig 20. Connection and Inversion of two (50 Hz & 60 Hz) single phase Ac schemes to 220V, 50 Hz output

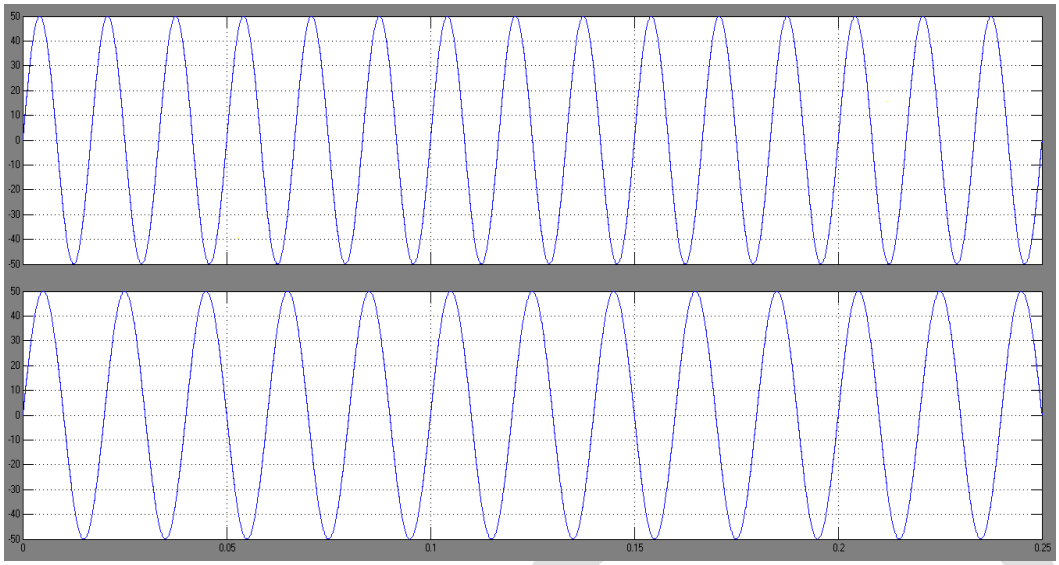

Fig 21. Two ACs 220V 50 Hz and 220V 60HzTwo ACs 220V 50 Hz and 220V 60Hz

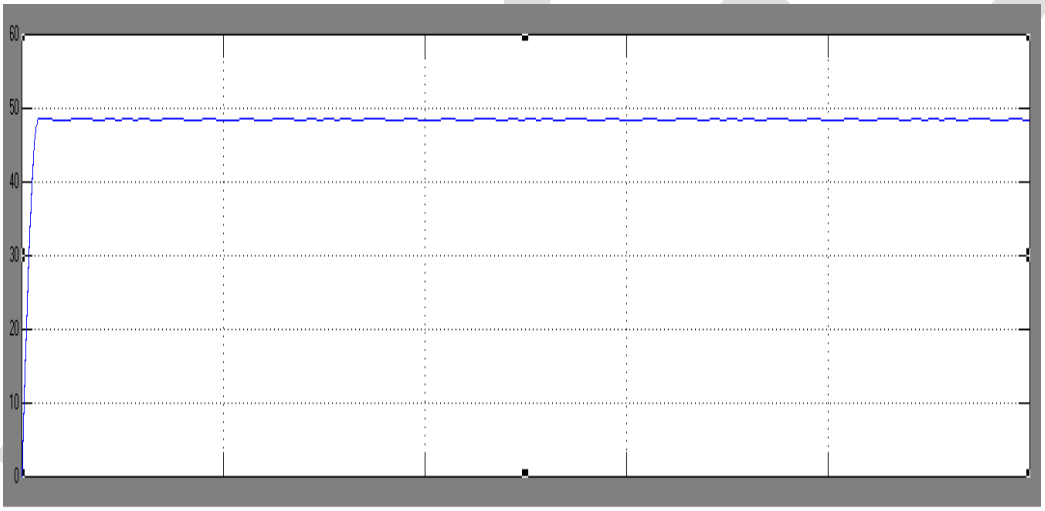

Fig 22. Rectifier Output Voltage

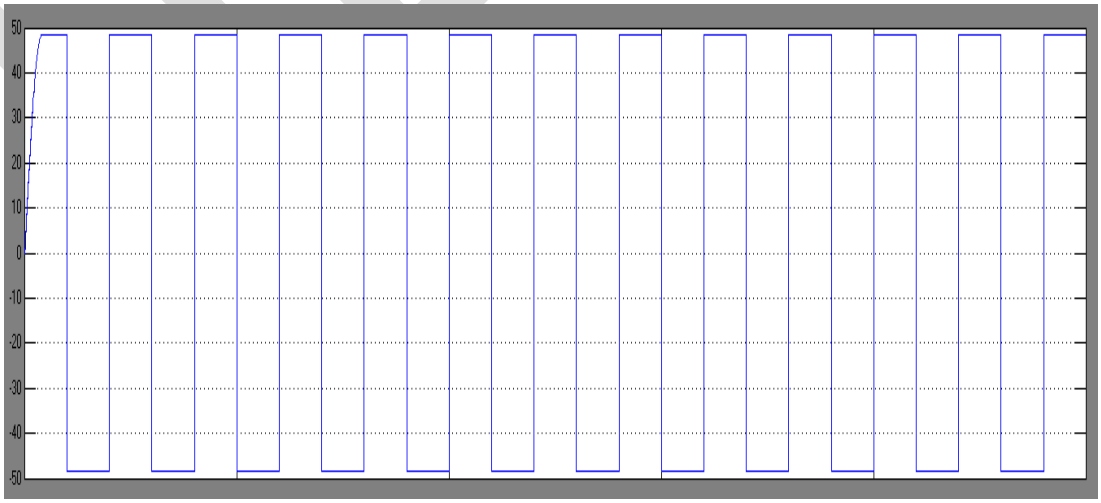

Figure 23. Inverter Output Voltage

8. ACKNOWLEDGMENT

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9. CONCLUSION

After study in every perspective of offshore HVDC based wind farms. We come to conclude that as Pakistan is coasted with Arabian Sea, thus we have an ample space to install IPPs (Independent Power Plants) within our premises. Moreover, two distinct and most extensively used converter technologies (Voltage Source Converter & Line Commutated Converters) are compared and suitable HVDC transmission scheme is proposed on the basis following parameters.

- Voltage Regulation
- Voltage Drop
- Total Harmonic Distortions
- Control Strategy
- Pulse generator
- Reactive Power Control

Considering all above mentioned parameter VSC-HVDC transmission system is found to be more feasible in both aspects (economically and technically). On the basis of modern developments VSC based transmission system is considered as the most convenient and functional way for HVDC transmission as well as for asynchronous tie lines. Though for higher voltage transmission system, VSC based Dc transmission schemes are not preferred due to high economic factor. But the high level of controllability is the main reason for its adaptation.

At last, the interconnection of two Ac power sources with the voltage level of 220V and frequencies of 50Hz & 60Hz respectively using VSC based HVDC link is shown in fig 20. Using VSC-PWM based HVDC link enables the entire control on the flow of power as well as on the reactive power and grant full control in independent dynamic voltage. For the purpose of black start back-to-back converters are used. VSC based system is the most favorable and simple tool for the interconnection of two power systems. Furthermore, using this technology the power transfer control is made possible and even more sophisticated.

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Review on the Bat Algorithm and Various Metaheuristic Techniques for Efficient Parallel Scheduling

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Abstract— The various meta-heuristic techniques for cloud and grid environment are: Ant Colony Optimization (ACO), Genetic Algorithm (GA), Particle Swarm Optimization (PSO), Tabu Search, Firefly Algorithm, BAT Algorithm and many more. So this paper represents the two types of meta-heuristic techniques, i.e. BAT algorithm and Genetic Algorithm. The different types of methods which comprise meta-heuristic algorithms range from simple local search approach to complex learning methods. It also shows the comparison of various techniques, i.e. one of the BAT intelligence (BI) and Genetic algorithm (GA) are used to figure out single objective multiprocessor scheduling problem utilizing objective functions as makespan, tardiness and power consumption. BI depicts significant improvement in terms of solution quality when compared with GA in terms of contradictory between makespan and energy furthermore among tardiness and energy.

Keywords— Bat Algorithm, Constant Absolute Target Direction (CATD) Technique, Metaheuristics, Dynamic Voltage Scaling, Energy-Aware Multiprocessor Scheduling, Energy Utilization, Normalized Weight Additive Utility Function (NWAUF)

1. INTRODUCTION

1.1. Cloud Computing

Over the last few years, cloud computing has come forth as one of the most promising resolutions for delivering IT oriented services to the users. Cloud computing has become popular for high performance distributed computing because it provides, "on-demand" having use of a shared pool of assets that would speedily provisioned over the web inside of a self-carrier, dynamically scalable and quantified way. Author use this environment to work out on various and large group of tasks[11]. Thus, scheduling problem up-here is going to be corresponding to multiple tasks to multi-machines. The purpose of scheduling is to outline the tasks to permit assets that optimize number objectives.

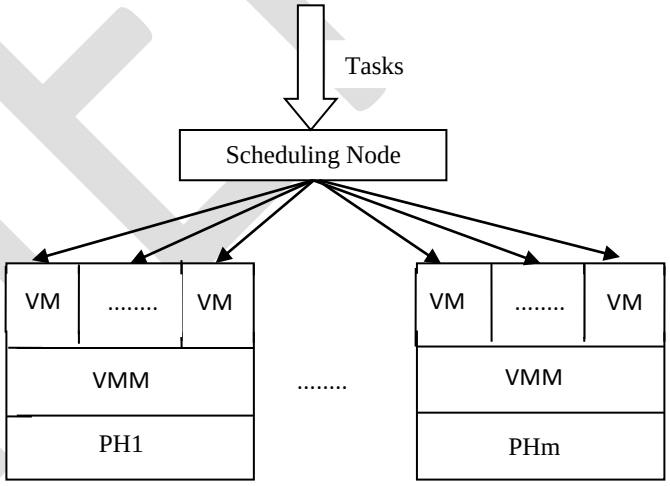

Figure 1. Framework of task scheduling on the cloud platform

1.2. Scheduling

Scheduling in cloud computing belongs to the problems are called N-P hard problems because of large resolution space and acquire long time to search out the solution[16]. Apply Meta-heuristics techniques to achieve sub-optimal algorithms in an effort to receive good solutions for such problems. Here, a novel heuristic termed as BAT intelligence (BI) is placed for fixing Multi-Objective Energy

Aware Multiprocessor Scheduling issues. BAT intelligence is based on prey hunting behavior. Multi-objective optimization approaches are used to solve parallel machine scheduling problems. The multiprocessor scheduling algorithm plays an important role to assigning parallel program tasks to the mainframes of multiprocessor devices, although conserving the preceding requirements and reduces the response time along with increase throughput of the system [1].

1.3. Dynamic Voltage Scaling (DVS)

Most recently, scheduling is carried out so as to reduce energy consumption at the same time meeting given hard timing constraints. To regulate and optimize system performance, these devices are engaged multiprocessor architecture[7].So Dynamic Voltage Scaling strategy is utilized in laptop or computer system to power consumption. It has been extensively recognized as a robust along with possible methods for concession power utilization for execution time. In Dynamic Voltage Scaling (DVS) diverse electric potentials (voltages) are directed to multiprocessors in a way every mainframe can differ its developing rate of motion while accomplishing a specific task that permit reducing power consumption and increasing system throughput [18]. Dynamic Voltage Scaling is also known as N-P hard and involves utilization of heuristic in less time to acquire good solution. The system objectives in multiprocessor scheduling problems are: maximum throughput, minimum tardiness and minimum power utilization

1.4. Normalized Weight Additive Utility Function (NWAUF)

The energy aware multiprocessor scheduling problems, therefore, normally multi-objective optimization problems satisfies multiple conflicting objectives[10]. A recognized well known procedure for solving multi-objective optimization problems are Normalized Weight Additive Utility Function (NWAUF) whereas collective targets are normalized and introduced to create a utility function. Normalized weight additive utility function has been utilized in a broad layout of multi-objective optimization.

1.5. BAT Intelligence

BAT intelligence formulation solves the problem of single objective and multi-objective optimization problems. BAT intelligence created by determining the behavior of bat of hunting the prey[13]. The bat is waiting for the prior conveyed signal to the comeback before transmitting resulting signs and extract data from the returning signs to generate its subsequent move. Bat engages Constant Angle Target Direction (CATD) method while chasing a prey and the bat sustains the same chasing angle to pursue prey because this is the best technique for seizing a prey or food moving at arbitrary directions. Therefore, bat captures numerous preys throughout the chasing process.

Bat intelligence is also formulated for resolving energy-aware multiprocessor scheduling problems.Energy-aware contains two challenges: job/task arrangements and current scaling[13]. These are the framework that integrates collectively to decrease energy consumption of real-time reliant tasks on a given number of variable voltage mainframes. In Bat intelligence, arrangement of task/job and voltage scaling executes simultaneously where BI to eliminate Energy-Aware Multiprocessor Scheduling problems[14]. BI utilizes to resolve number of multiprocessor scheduling problems as various quantities of jobs, tasks as well as processors, by combining two or three objectives to locate lists of efficient solutions for multiprocessor scheduling problems.

2. TECHNOLOGIES USED

2.1. Metaheuristic Techniques

Heuristic intends ‘to discover’ or ‘to detect by trial and errors’. Excellent solution from hard optimization problems can determine in a reasonable amount of time. But it is not necessary to get best or optimal solution. Meta intends ‘beyond’ or ‘higher stage’ and is usually superior to basic heuristic. It is outlined as an iterative generation approach leading a subordinate heuristic by merging intelligently unique concept for “exploring and exploiting” the search area, finding out methods are used to structure data in an effort to locate effectually near optimal solutions[17]. Techniques which constitute meta-heuristic algorithms range from simple local search procedures to complex learning processes. Meta-heuristic techniques are used to prove near optimal solutions within less time period for N-P hard problems. Various meta-heuristic techniques for cloud and grid environment are: Ant Colony Optimization (ACO), Genetic Algorithm (GA), Particle Swarm Optimization (PSO), Tabu Search, Firefly Algorithm, BAT algorithm and many more.

A. BAT Algorithm

The standard BAT Algorithm was created by Xin-She-Yang in 2010. The main features in the bat are based on the echo sounding nature of microbats. They discover their way in the night by radiating the sound signal called sonar/echolocation and used that signal to detect the object or obstacles surrounding them. They emitted sonar signal very noisy, so that they can listen echo which bounce back from the obstacles in their way or from the prey. Such echolocation nature of microbats will also be developed into a technique that can be related with the objective features to be enhanced and it can be used to develop a new optimization algorithms.

After idealize, three major characteristics of microbats are used to develop the basic structure of BAT algorithms[17]:

1. Most of bats utilize echolocation to detect distance and they usually also "know" or guess the distinction between food or target and background obstacles in some means.
2. Bats travel randomly with v_i speed at x_i position with a fixed frequency f_i, changing wavelength λ as well as loudness $A_{0,}$ to seek for prey. They are able to instantly alter the wavelength (or frequency) of their released pulse rate and modifies the speed of pulse emission 'r' in the range of [0,1],rely upon the target proximity.
3. Despite, the sound intensity can fluctuate in many approaches. For simplicity, the sound intensity varies from large and positive A_0 to minimal steady value which denotes by A_{min}.

THE PSEUDO CODE OF THE BAT ALGORITHM:

The standard steps of proposed Bat Algorithm are as follows:

Step1. Evaluate the initial population of Bat have position z_i and velocity v_i.Determine pulse frequency $f_i$at z_i. Loudness A and pulse rate r_i are initialized.

Step2. By adjusting the frequency, new solutions are generated and updating velocities and positions/solutions.

Step3. If (random > r)

From the best solutions, select the solution and around the selected best solution generate a neighborhood solution.

Step4. Else

Fly random to create a new solution.

Step5. If (random <A && $f(z_i) < f(z_0)$)

whereas $f(\cdot)$= objective function.

Acknowledge the new solution, increase and diminish A.

Step6. Find the current best (z_0) by ranking the bats.

Step7. While (iteration< maximum number of emphases)

Post procedure outcomes and representation. The algorithm terminates with the best aggregate solution.

B. Constant Absolute Target Direction(CATD) Technique

Bat use the Constant Angle Target Direction approach while pursuit a prey and in which the bat holds the identical pursuit angle throughout capturing the prey. The bats determine the position of the quarry through conducting echolocation signs and capture the quarry in a continuous manner. Bat intelligence merges the concepts associated with CATD and echolocation to provide a collection of signs and select the most effective signal to transfer toward best results. This done by transmits search signals at each sequence and identify at each sequence and identify the location of prey by determining the coming back signs. Whenever a bat pursuit and utilizes a prey, it forwards to other prey within scrounging field. This intends that bat's hunting process will pursue multiple preys.

Bat generalized a set of solutions in each iteration and the best solution is to be chosen from selected solution. When common element is choosen, the ending status is assured to decide whether to proceed with the heuristic or not. At each iteration terminating conditions are checked and if it satisfies, then current cycle terminates and next cycle starts. When a new iteration starts, BI reinitialize captured procedure.

C. Dynamic Voltage Scaling (DVS) Technique

Dynamic Voltage Scaling is an approach to discovering the hardware characteristics associated with processors to reduce power consumption by lowering the supply of voltage and the performing frequency. It is a power management technique in computer architecture where voltage can increase or decrease according to the situation. In DVS, different voltages are provided to multi-processors as every processor may deviate its processing speed and while performing a particular task, that allow to modify the total energy utilization and system throughput for each processor.

The DVS techniques are used to produce dramatic power saving as supplying the high computing power in a general purpose system. Yet, for a significant category of functions in the entrenched real-time process, the varying operating frequency insures with their deadline ensure mechanism and DVS. To supply real-time guarantee, DVS ought to look at deadlines and a series of actual-time duties

requiring integration with specific time scheduler. DVS has been taken knowledge of the high variance in processing demands by varying the frequency and processor's operating voltage for the duration of run-time. DVS has the ability to deal compromise between energy and speed. Therefore, endeavor of the processor varies, there are ideal periods when utilization is performed and energy is consumed. DVS can be used to remove power wasting time by way of reducing the processor voltage and frequency although less workload time. So that processor will have relevant work, that leads to reduction in overall power utilization.

D. Normalized Weight Additive Utility Function (NWAUF)

Many approaches used to solve multiple objective optimization problems and one optimal solution does not exist. Also objectives are conflicting in nature. One of the most used techniques is the Normalized Weight Additive Utility Function (NWAUF). In NWAUF multi-objectives, normalized and utility function is formed by adding them. Due to its simplicity and effectiveness for efficient solution, NWAUF has become integrated into the range of multi-objective optimization applications.

RELATED WORK

Pablo Eliseo Reynoso Aguirre and María de Guadalupe Cota Ortiz et al.2015 [13]. This paper applies Bat Algorithm to scheduling and work allocation using a multiprocessor, in which the main objectives of the problem that intends to minimize are makespan and tardiness. In this type of problems usually employ a scheduler, which divides the amount of available time of all of the processors between all of the processes associated towards problem in order to be executed. Naturally, the scheduler only selects tasks that could be able to be executed and this has basically no dependence restriction incomplete which has to be needed for its execution. Rahli Mostefa, Latifa Dekhici et al. 2015[14]. Experiment proposes to solve a well known power Redundancy Optimization Problem (ROP) known as Power system design optimization applying bio-inspired metaheuristic Bat Algorithm (BA). Here aggregate them to Universal Moment generating Function (UMGF). The problem creates, on choosing the suitable elements from the system have minimum cost so to accomplish a reliability of the system. Observational results describe that the algorithms can search the best design and give superior results. Behnam Malakooti , Shaya Sheikh, Hyun Kim et al.2013 [5]. A different heuristic known as bat intelligence (BI) is initialized for determining energy-aware multiprocessor scheduling problems. Bat intelligence is generally a new search space development approach which designs on prey chasing behaviors of bats. As compared to GA, the BAT algorithm is more significant regarding solution quality. For solving bi-objective multiprocessor scheduling problems and Tri-objective multiprocessor scheduling problems are also introduced. A Normalized Weighted Additive Utility Function (NWAUF) is utilized to obtain desirable efficient solutions. Association, among makespan and energy, and even among tardiness and energy is conflicting shown by computational simulation. M. Mezmaza, N. Melab, Y. Kessaci, Y.C. Lee et al.2011 [12]. Difficulty of scheduling priority restricted parallel purposes on Heterogeneous Computing Systems (HCSs). These types of works considered methods to reduce the finishing time (makespan) after having much care about energy utilization. Author; determine an alternate aligned bi-objective hybrid genetic algorithm that considers, not merely makespan, but also utilization of energy. The new technique will be depend upon Dynamic Voltage Scaling (DVS) to lessen energy decay. Xiaohui Li, Lionel Amodeo and Hicham Chehade et al. 2010 [16].Multi-objective parallel machines scheduling problem is solved during this paper. It comprises in scheduling 'n' impartial tasks of 'm' identical parallel machines. The goal will probably be to improve two unique aims: the makespan and the entire tardiness. Non-Dominated Sorting Genetic Algorithm (NSGA-II) is projected to fix this issue. Ever the frameworks of a Genetic Algorithm are actually challenging, a formal logic administrator together with the NSGA-II (FLC-NSGA-II) consequently remains proposed. The experimental results exhibit the benefits and likewise the effectivity of FLC-NSGA-II. Lee Kee Goh, Bharadwaj Veeravalli et al. 2009 [9]. With this particular paper, 2 heuristic Energy-Aware Scheduling Algorithms: 1) Energy Gradient-based Multiprocessor Scheduling (EGMS) algorithm and 2) Energy Gradient-based Multiprocessor Scheduling with Intra-task Voltage scaling (EGMSIV) algorithm enhance EGMS. For arranging task priority charts in the fixed multiprocessor system having working factors capabilities with dynamic voltage scaling. The outcome display algorithms are able to get energy-efficient schedules utilizing less optimization time. A. Berrichi, F. Yalaoui et al.2009 [2]. A recent bi-objective method enables the administrator to locate compromise solutions between the event objectives and sustenance ones. The target would be to concurrently enhance two principles: the reduction of the makespan for the progress section and also the decreasing of the system in accessibility for taking care aspect. Two selections are taken simultaneously: finding the very fine work of 'n' jobs to 'm' machines to be able to scale down the makespan and determining when to make use the deterrent upkeep moves so as to minimize the approach unavailability. Two progressive genetic algorithms are in contrasting with finding an estimation of the Pareto-optimal front in the parallel computer case. Jiong Luo and Niraj K. Jha et al.2007 [7]. This article deals with the situation of variable-voltage arrangement of tasks with priority associations with heterogeneous allocated actual time enclosed systems. It executes power-profile and timing-detention consumed abate distribution to optimize energy minimization through voltage scaling. It could be built into the interior circle of approach degree synthesis device for conceive space analysis of actual-time assorted fixed methods, because it is very quick.

4. COMPARISON TABLE

Ref No	Authors	Year	Title	Technique	Hetero-geneity	Meta-heuristic	Convergence Speed
13	Pablo Eliseo		Multi-	BAT			

	Reynoo Aguirre, and Pedro Flores Perez	2015	Objective Optimization Using Bat Algorithm to Solve Multi-processor Scheduling andWorkload Allocation Problem.	Algorithm	Yes	Yes	Higher
14	Rahli M.,Guer-rache K.,	2015	BAT Algorithm to Series-Parallel Power System Design	BAT Algorithm	No	Yes	Average
5	Behnam Malakooti & Hyun Kim & Shaya Sheikh	2012	Multi-objective energy aware multiprocessor scheduling using bat intelligence	BAT Intelligenc e	Yes	No	Average
12	M. Mezmaz, N. Melab, and Y. Kessaci	2011	A parallel bi-objective hybrid meta-heuristic for energy- aware scheduling for cloud computing systems	parallel bi-objective hybrid genetic algorithm, Dynamic Voltage Scaling	Yes	Yes	Higher
16	Xiaohui Li, Lionel Amodeo, Farouk Yalaoui	2010	Multi-objective optimization approach to solve parallel machines scheduling problem	Non-dominated Sorting Genetic Algorithm (NSGA-II)	No	Yes	Higher
9	Lee Kee Goh, Bharadwaj Veeravalli	2009	Design of Fast and Efficient Energy-Aware Gradient-Based Scheduling Algorithms For Hetero-geneous Embedded Multiprocesso r Systems	Energy aware scheduling algorithms	Yes	No	Average

2	A. Berrichi · L. Amodeo.	2009	Bi-objective optimization algorithms for joint produ-ction and maintenance scheduling: application to the parallel machine problem	Genetic Algorithms	Yes	Yes	Higher
7	Jiong Luo and Niraj K. Jha	2007	Power-Efficient Scheduling for Heterogeneous Distributed Real-Time Embedded Systems	Energy Efficient scheduling	Yes	No	Poor

CONCLUSION

Meta-heuristic techniques are used to prove near optimal solutions within less time period for N-P hard problems. In this paper comparison of various meta-heuristic techniques has been carried out. As table shows that Bat algorithm converges very quickly at the early stage and the convergence rate slow down as well as Large scale problem is not cleared what the best values for most applications. So to overcome these issues in the near future we will propose a hybrid technique for parallel scheduling using BAT and TABU search.

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Review on Feature Extraction and Classification Techniques in Speaker Recognition

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Abstract— This paper provides a brief survey on human speech production, feature extraction techniques and classification techniques in speaker recognition. It also discussed about the basic theories of speaker recognition and applications of speaker recognition which is increasing day by day like authentication , surveillance and forensic speaker recognition, etc. LPC, MFCC and WT are the important feature extraction techniques and GMM, HMM and SVM are the important classification techniques. The main aim of this paper is to summarize different feature extraction and classification techniques used for speaker recognition.

Keywords— Speaker Recognition, Feature Extraction, LPC, MFCC, WT, Classifier, GMM, HMM, SVM

1. INTRODUCTION

Speech is the vocalized form of communication based upon the movements of articulatory organs. Each spoken word is a combination of a limited set of vowel and consonant. Speech is the most efficient way of communication. Each individual has their own unique voices, or we can say that voice keeps the identity of each person. This uniqueness mainly due to the length of the vocal tract , sharp and precise movement of articulatory organs and differences in their speaking habits. Actually speaker recognition is a complex task. Speaker recognition is used to identify a person. The person's identification process is carried out from the characteristics obtained from voices, It is also called voice recognition. Speaker recognition can be classified into two speaker identification and speaker verification.

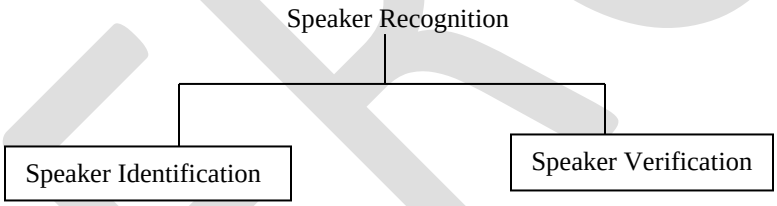

Fig 1. Classification [2]

Speaker identification identifies who is speaking. Speaker verification is the process of accepting or refusing a particular speaker [2] . Speaker recognition mainly consists of two steps one is feature extraction and feature classification [1] . Widely used Feature Extraction techniques are LPC, MFCC, WT. Preprocessing has another name called front end processing. Preprocessing mainly removes the unwanted information present in the speech signals. The main steps of preprocessing are end point detection, pre emphasis filtering, frame blocking and windowing. Wavelet transform used for reducing the noise present in the speech signal. Feature extraction techniques are mainly used to obtain the information which is embedded in the speech signal. Techniques used for feature extraction are LPC, LPCC, MFCC, WT. After extracting the features it has given to the classifier section. Widely used classifier techniques are DTW, HMM, GMM, SVM.

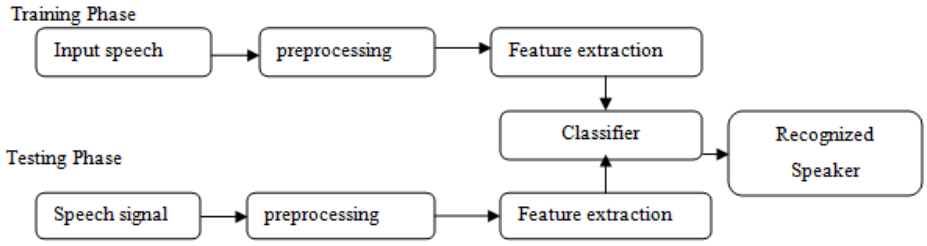

Fig 2 . Main blocks of speaker recognition [1]

II. HUMAN SPEECH PRODUCTION

Speech can be defined as a communication tool. Speech allows the communication between human beings. Speech production in human beings is a daily mechanism. We think that it is a simple mechanism, but its internal mechanism is very complex. Breathing is the first step of speech production. Breathing consists of two processes one is inhaling and the other is exhaling. During inhaling air enters into the lungs. Exhaling is the flow of air out of the organism. During exhaling air flows through the lungs, trachea, larynx, vocal folds, mouth, lips, nasal cavity etc. Movement of these organs called articulatory movement. Articulatory movement control is called motor control and it is done by human brain [3] .

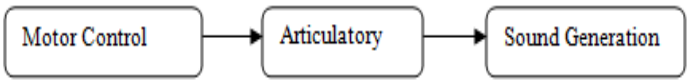

Fig 3: Block diagram of human speech production mechanism

Fig 4 . Human speech production [3]

Pitch, mean, signal to noise ratio, quality, variance, etc. Are some of the basic parameters of speech.

III. FEATURE EXTRACTION TECHNIQUES

Feature extraction plays an important role in speaker recognition. It is very difficult to obtain the data that embedded in the speech signal, so we go for different feature extraction techniques for extracting features from the speech signal. LPC, LPCC, MFCC,WT are some of the feature extraction techniques used today [6] .

A)LINEAR PREDICTIVE COEFFICIENTS (LPC)

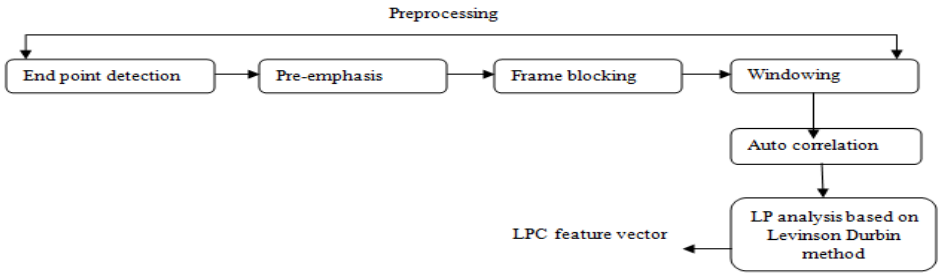

Fig 4. Steps involved in LPC [7] , [6]

LPC (Linear Predictive Coding) is widely used in speech processing. Which features can be obtained as predictive coefficients. From the name it is clear that it predicts the values. In LPC predict the future values of the future values [6]. In LPC linear prediction is the basic principle. Redundancy in the speech signal exploited in LP. The prediction of a present value is determined from the combination of 'm' previous samples. Predicted sample is s_1 (n). 'm' is called the prediction order of the LP [7].

$s_1(n) = \sum_{K=1}^{m} a_{KS}\,(n-k)$……(1)

a_ks are the linear prediction coefficients. S (n) is the widowed speech.

S (n) = x (n). w (n)……(2)

Prediction error can be calculated as, e (n) = s (n) - s_1 (n). Each frame of autocorrelations is converted into LPC parameter set by using Levinson Durbin's method.

B) LINEAR PREDICTIVE CEPSTRAL COEFFICIENTS (LPCC)

LPCC is one of the predetermined techniques used for extracting features from the speech signal. It is an extension to the above mentioned LPC technique [6] . In LPCC also a linear prediction is the basic principle. The current value is predicted from the previous value. In LPCC coefficients are represented in Cepstrum domain.

Fig 5 . Steps involved in LPCC [6]

C) MEL FREQUENCY CEPSTRAL COEFFICIENTS (MFCC).

The audio signal is a non stationary signal, which is its frequency and amplitude response variable with respect to time. We consider a small duration with an assumption that in that small time interval signal not varying much. We usually take 20 ms to 40 ms frames. MFCC can be defined as a short term power spectrum of the human voice. Now a days MFCC has greater significance in speech processing. It approximates the human system response accurately. After applying MFCCC to the speech signal we get features as in the form of Cepstral coefficients [7].

1. Frame the signal
2. Take FFT of the signal
3. Multiply each FFT magnitude of the corresponding Mel frequency filter value.
4. Take the log of filter bank energies.
5. Take DCT on Mel log energy values (Cepstrum).
   Mel (f) = 2595*$\log_{10}$ (1+f/700) [6]

Mel scale is defined as the perception scale of pitch. Two main advantages of MFCC are highest identification rate and least false rejection rate. By taking Mel scale and log value MFCC approximates the human perception system.

D) WAVELET TRANSFORM (WT)

Wavelets are finite length waves. It simplifies the task of feature extraction. It provides multi resolution and multi scale analysis. Scaling and shifting are the two important operations in wavelet transform. It comes under sub band coding [7] . In WT we divide the speech signal into two sub bands high frequency and low frequency bands. Mainly low frequency component provides the identity of the signal and high frequency component mainly contains the noise part of the signal. But sometimes it may contain the useful information. Main classification of WT is a DWT (Discrete Wavelet Transform).

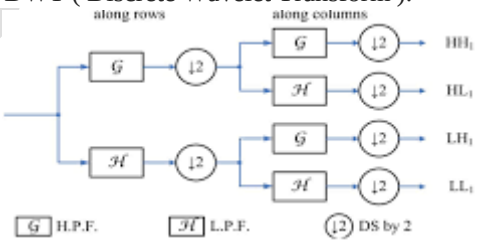

Fig 6. Decomposition tree of DWT [19]

During each level of decomposition we can remove the noise present in the speech signal. Another classification of DWT is WPD and DWPD. In WPD we decompose a high frequency signal also. DWPD is also known as hybrid wavelet transforms. In DWPD, DWT is

applied in the low frequency band and WPD applied in the high frequency band. DWPD combines the features of both DWT and WPD.

IV. FEATURE CLASSIFICATION TECHNIQUES

After feature extraction step we obtain the features. Then these features apply to the classifier section. Classifier compares the obtained features with stored features [8] . Based upon this comparison classifier recognizes the particular speaker. Classifiers can be mainly classified into two supervised and unsupervised. If a classifier requires training data, then it comes under supervised otherwise unsupervised.

A) DYNAMIC TIME WARPING (DTW)

DTW is mainly developed for speaker recognition. It is mainly used to find out the similarities between two times based sequences. For example, similarities in walking could be detected by using DTW. Here calculate the time normalized distance, for finding the similarities between the sequences. In speaker recognition, sequences are in the form of speaker information. Each speaker's information sequence is compared to the reference sequence. Then find out the time normalized distance between the sequences. Speaker with minimum time normalized distance is taken as the authenticated speaker.

B) HIDDEN MARKOV MODEL (HMM)

HMM is similar to a Markov model. We can call HMM as a stochastic process. In Markov model future states depend only on the current state, not on the past states [8]. The states are directly visible to the observer. But in Hidden Markov model, the state is not directly visible to the observer. But the output dependent on the state is visible. HMM follows the Markov Property.

C) VECTOR QUANTIZATION (VQ)

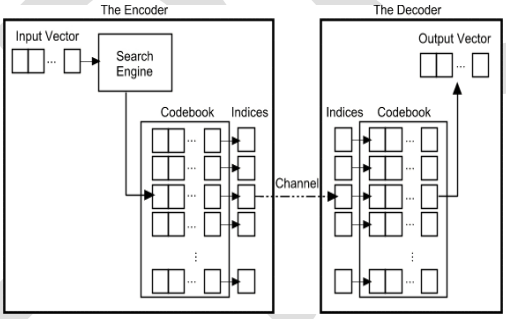

Fig 9. VQ encoder and decoder [10]

VQ comes under lossy compression technique. In vector quantization first the signal is divided into vectors. Then apply quantization to each vector. VQ provides multidimensional representation. Main steps involved in VQ are given below,

1) Construct codebook which is composed of code vector.
2) For encoding calculate the minimum Euclidian distance between each input vector with vectors in the code book.
3) After obtaining the minimum distance replace the vector by the index in the codebook.

Decision boundaries and reconstruction levels are two important terms comes under VQ. LBG algorithm is used for finding the decision boundaries.

D) SUPPORT VECTOR MACHINE (SVM)

SVM is used for classification. SVM can be classified into binary SVM and multi SVM. In binary SVM, we can determine whether the person is recognized or not. Binary SVM compares the features of two speakers. But multi SVM compares the features of more than two speakers. It comes under supervised classifier. Basic of SVM is to create a hyper plane. This hyper plane differentiates the features [8]. In binary SVM features are classified into two classes, each class for recognized and non recognized speaker.

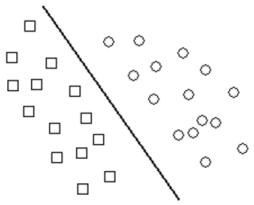

Fig 10. Binary SVM [10]

TABLE 1: COMPARISON OF DIFFERENT FEATURE EXTRACTION METHODS [6], [7]

Technique	Characteristics	Advantages	Disadvantages
LPC	Formant estimation technique, It is modeled by all pole model	Reliable, accurate & robust technique, high speed, low bit rate	Not distinguish similar vowels, Degradation
LPCC	Modeled by all pole model	Smoother & stable representation	Give detail to all frequencies
MFCC	Mimics the human auditory system, Filter bank coefficients	The accuracy is high, Low Complexity	Background noise
WT	Decomposition to sub-bands .	Time-frequency localization, MRA	Denoising, computationally fast

TABLE 2: COMPARISON OF DIFFERENT CLASSIFIERS [8],[16]

Technique	Characteristics	Advantages	Disadvantages
DTW	Unsupervised	Requires less storage space, beneficial for variable length	Cross-channel issue
HMM	Unsupervised	Rail system outputs, efficient performance	Computationally more complex, more storage space
GMM	Unsupervised	Needs less training and test data.	Compromise between DTW and HMM
VQ	Unsupervised	Computationally less complex	Real time encoding is complex
SVM	Supervised	Simple operation	Binary SVM has limitations in speaker recognition.

V. CONCLUSION

This paper has reviewed the research done in the area of speaker recognition. Different feature extraction and classifier techniques have been discussed. Each technique has its own advantages and disadvantages. After the review, we can conclude that speech production is a complex task. LPC is a very simple technique used for feature extraction. Linear prediction is the basic principle of LPC technique. MFCC approximates the human perception system more accurately due to Mel scale. MFCC is widely used today for feature extraction. Binary SVM gives result that a particular speaker is present or not in a given set of data. Multi class SVM provides classification of more than two speech signals very accurately. Main advantage of binary class SVM over Multi class SVM is that it can recognize and identify a particular speaker from a number of speakers. GMM and HMM is also widely used in speech processing. Wavelet Transform provides both time and frequency localization. Wavelet Transform comes under sub band coding. It removes the unwanted signals present in the speech. Wavelet Transform is also used for feature extraction. In future we can introduce Fusion of the techniques called hybrid techniques.

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Feasibility of Solar Wind Hybrid Renewable Energy in India

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Abstract-India has a population of 1.25 billion. Out of which, more than 200 million people are living in rural areas and with no grid-connected power. The Indian power grid failed spectacularly in 2012, plunging more than 600 million people into total blackout. Hybrid power systems would be a convenient & cost-effective solution which not only reduce dependency on grid supply but also improve reliability. There are some specific constraints that prevent the development of solar and wind energy system in India. However, our country has adequate sunshine and balanced wind speed. Hence there is a greater opportunity for existence of solar and wind energy system in the India. The total cost of hybrid unit can be calculated using the analysis of life cycle cost and payback period.

Keywords- Solar energy/PV system, Wind energy, Hybrid energy in India, Grid Parity, Modelling of hybrid systems.

Introduction

In the current scenario, the development of a country is based on several factors. Electricity is one of them. Looking at several developed countries like US, China, Russia; they got 100% electrified in late 90's whereas India has achieved 81%(2013) as per data bank of World Bank and is assumed to attain 100% by 2019. India has fixed a target of 175GW of power comprising only renewable energy sources by the end of 2021. Out of which 100GW comes from Solar Power and 60GW from Wind power. India has already crossed a mark 26.8 GW of wind and 7.6 GW of solar power installed capacity during May 2016.The solar-wind hybrid unit returns the least cost of unit values to keep up the same level of DPSP (Direct Profit Sharing Plan) as compared to stand-alone solar and wind power systems. The energy cost for PV-wind framework is always lower as compared to standalone solar or wind harnessing system, while this hybrid system has not gained much market maturity. In the coming future, the PV-wind hybrid option is supposed to be techno-economically viable for rural electrification. After the success of pilot project(in 2008) of setting up a solar-hybrid system in one of the villages at Morni hills of Haryana, more other panchayats have come forward to get similar hybrid system installed in their respective areas. Few panchayats have already approached the Haryana Renewable Energy Development Agency (HAREDA) and various plans are under progress to put such projects in the Aravalli belt of Haryana.

Components of Solar-Wind Hybrid System

The solar-wind hybrid system consists of the following components:-

1. Solar Photovoltaic panels which collect the incident radiation of the sun whenever it falls on them and converts it into Direct Current output.
2. Mini Wind Turbine which is installed on top of a tall tower or placed in an open field to collect kinetic energy from the wind whenever it is available.
3. Aero-Wind Generator which converts kinetic energy of the wind turbine into electricity.
4. Battery Bank includes a group of batteries which are connected together to have one large battery bank having required voltage and ampere-hour capacity. Batteries are connected in series to increase the net voltage of the bank and in parallel to increase the amperage.

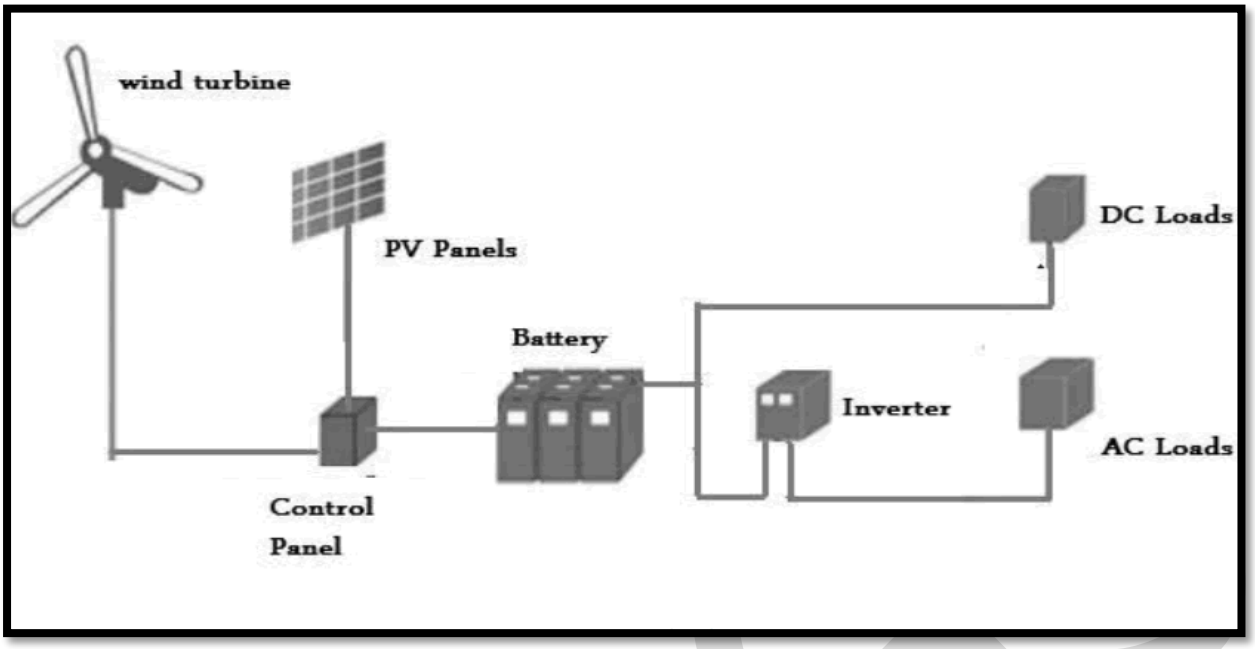

Fig (a) Components of Solar-Wind Hybrid system

5. Maximum Power Point Tracking Controller (MPPT) is an electronic power converter which does the optimization of the power coming from the solar panels and wind generators and matches it to the capacity of the battery bank. Usually DC power is generated from both the system and this is quite high for charging of batteries. So, this higher DC voltage output is brought down to the lower voltage level required to charge the batteries.
6. PV Panel Trackers track the movement of the sun for maximum sunlight. Solar panels are mounted on these trackers.
7. Inverter is connected to the battery bank. Inverter converts the DC power received from the solar panels and the wind generator into AC power which is then utilized for residential or any other commercial purpose. Inverter supplies AC loads connected to it.

Points of differentiation

The difference between solar, wind and hybrid system in various aspects is shown in tabular form as under:

	Solar	Wind	Hybrid
Operation	Produce electric current directly from sunlight	Kinetic energy of wind turbine drives the generator	Combination of both

	Solar	Wind	Hybrid
Technical Specifications	Rated Power 250W No. Of solar panel :4 Operating Voltage 24V Operating Current 5.6A Open Circuit Voltage 37V Short Circuit current 8.63A	Cut-in Speed 5.6m/s Rated Voltage 12V Wind turbine Material- Galvanized Iron No. of wings 7 Cut-out speed 50 m/s Weight :90Kgs	
Average Life	25 years	15-25years	Average of both
Initial Investment	INR49000/KW	INR89000/kW	Calculated Below

The solar-wind hybrid model utilize the combined energy from solar panel and wind energy units and generate a continuous supply of power.

Lifecycle Cost

Since the complete lifecycle cost of a solar-wind hybrid system is the aggregate cost of the capital investment, operational costs, maintenance costs and battery replacement costs.
For a residential house in India, usually, it will have 4-5 fluorescent lamp or LED bulbs,1 TV or computer, 2-3 Fans, and a 0.5HP motor as the typical connected load. The power consumption of the house in a day can be calculated to be around 1600-1800 WH or 1.8 units/day.

For an approximate power consumption of 1.8 units/day in areas without grid connected power, the cost assumed to be around INR20/unit.
Monthly cost = 1.8units x 30days x 20= INR1080.00
Annual bill = 1,242 x 12= INR12960
Since Indian villages cannot afford this high investment cost, most of it would be subsidized by the Government of India. On this basis, the cost for the solar-wind hybrid system is calculated. This tabular chart shows that solar-wind hybrid systems can be very cost effective for Indian villages as this is one-time investment for continuous supply of power:

Cost of Solar-wind hybrid system	
Capacity of solar plant –	1 unit of power
Cost of solar panel(1Kw) –	INR49000

Cost of Solar-wind hybrid system	
Wind power generation –	1.5units/day
Wind system cost(1.5KW) –	INR67,500
Inverter	INR22,000
Two lead acid batteries –	INR18,000
MPPT controller	INR2,000-6000
Installation works –	INR18,000
Total cost –	**INR1,76,000**

Payback Period calculation

The cost of the system varies from Rs 1.70lacs to Rs 5.00lacs per kW depending on the ratio of wind and solar components. The approximate installation cost, including civil works, is about Rs 13,000 per kW and maintenance cost is about Rs 3000 per kW per annum.

Total Cost of Solar and wind hybrid system=Rs. 1,76,000/-

Total Cost of utility supply= Approximately Annual bill(calculated above) + initial cost (substation, transformer and transmission line cost)

= Rs.13000 +3000+ 1,00,000

= Rs. 1,16,000/-

So , payback period for hybrid system will be,

$$\text{Payback Period} = \frac{\text{Total cost of solar and wind hybrid system}}{\text{Total cost of utility supply}}$$

Payback Period= 1,76,000/1,16,000= 1.5 years

= 2 years (approximately depending upon the climate variation)

So, Solar and Wind Hybrid System can be employed efficiently for rural area which are not yet electrified.

Application of Solar-Wind Hybrid Systems to Rural India

Solar-Wind Hybrid Systems have a long way to go since over 18,000 villages were un-electrified amid FY2016. The tremendous initial cost involved in installation and servicing of transmission lines is the prime issue for this problem. There is another problem of heavy losses in transmission and distribution along with poor power reliability. More than 200 million people living in rural areas of India are devoid of any access to grid-connected power.

Pertaining to above discussion, there is a need to set up alternative sources of energy in the remote areas which help in reducing transmission losses and providing reliable power. Solar photovoltaic and wind power generation systems may take a lead in this case. As we are aware that standalone systems are not sufficiently adequate to provide continuous electricity round the year, because of varying climate conditions. Solar energy is available only in the day-time, that too in summers, while wind energy intermittently available.

As revealed from Bridge to India's report, India has become the fourth largest solar market in 2016 globally, with an expected 8.8GW of solar power generation capacity by 2017. However, the installed capacity of wind power in India is around 28700.44MW by the month of February 2017. Both the sources of energy are cheaply available and complement each other's limitations.

Hybrid model comprising of solar and wind power will be ideal for rural implementation, since the capabilities of both the systems are utilized to provide continuous supply of power. Rural areas lack electrical equipment and they can utilize this vitality to store electricity in batteries, which serve as a backup when customary power goes down.

Grid Parity

Grid parity is said to be possible when the cost of solar and wind working as a hybrid unit equals the cost of conventional electricity. It also means that it is equal *without* subsidies like net metering, feed in tariffs, and tax credits, etc.. Grid parity depends particularly on location for a hybrid plant. Solar power plant needs insolation (Solar energy) to work and that in a nation like India; it varies with latitude and regional climate. However, the thing of great importance is that the wind and the sun extremely complement each other. Actually, there's a explanation for that. More windy months are less sunny and meanwhile, the more sunny months are less windy. A monthly distribution of solar and wind power availability is shown in the figure (b). In India, it is predicted that wind power will approach the grid parity with coal and petroleum plants without carbon sequestration by 2022 and will be cheaper than the conventional power.

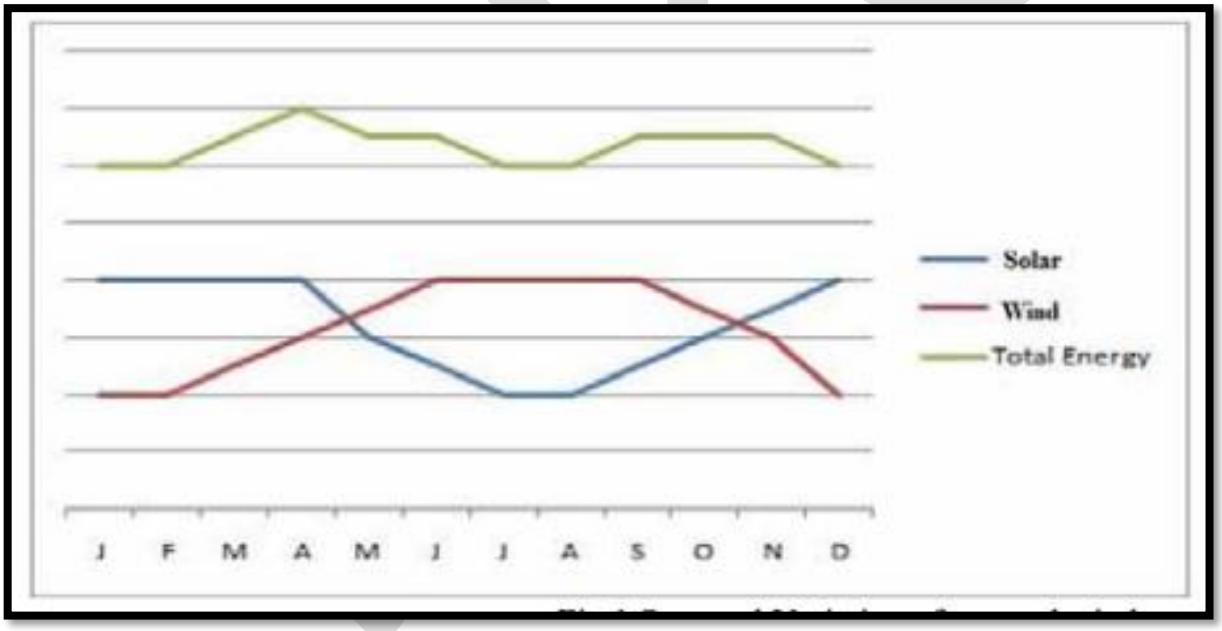

Fig (b) Monthly availability of PV and wind power

There are managers in the grid to coordinate in between the energy supply and demand in the real time. As demand of energy rises and falls all over the day, the grid operators have to employ more electricity generators depending upon the requirement of load. It is quite obvious that wind and solar photovoltaic (PV) energy production vary with climatic conditions, and so, it is the ability of an electric grid to utilize renewable energy in such a way that the scarcity of electricity can be met during peaking loads. If the electric grid has no available storage capacity and the power from wind and solar PV generation exceed the flexibility limit of the grid then excess renewable energy needed to be curtailed, for example, moving turbine blades away from the direction wind. This curtailment may reduce the income from the wind and PV hybrid plant and effectively increasing the final costs of electrical unit(1Kwh).

For a realistic case, a fixed 70% flexibility limit has been set in the hybrid energy system (meaning that 70% of capacity of the hybrid plant is ramp-able while 30% of utility is always on), and a 10% maximum limit of curtailment is set. On stand-alone basis, wind can achieve 18% of total generation while a stand- alone PV system can achieve maximum of 12% of total generation. Both wind and PV as hybrid unit can achieve a generation of almost 27% which can be approximated to 30%.

Market Availability

In a country like India, the market awareness of the hybrid systems is quite low and the capital investment for such a system is high. For roof-top solar panel mounting, the terrace space should be large enough to provide space for setting up solar panels and wind turbines. If an area doesn't receive a sufficient amount of wind or sunlight, there is no point of installing a hybrid system at that place. Due to high initial investment cost, consumers are sceptical about feasibility of the hybrid system and hence government should take major steps in setting these hybrid units for rural households in terms of subsidies or other low initial cost plans. Current Indian markets have very few businesses involved in the designing and manufacturing highly efficient solar-wind hybrid systems. The companies which are currently supplying hybrid units in India are:

1. SIKCO – Society for Innovative Knowledge & Cost Optimization: It is one of the most integrated company in renewable energy sector in India. It produces products like Solar, Wind and Biogas power plants.
2. SU Solartech Systems: One of the leading manufacturer of PV Systems, solar thermal systems, SWEG, energy saving and security devices, etc. Other companies include K-lite Industries, Akshar electronics, Powermax Energies Pvt Ltd, Soyo power, Shaktee power, Shantee Power, Prolight Systems etc.

Conclusion

In this review of future of hybrid power in India, we studied the prevailing scenarios for renewable energy in India. The above discussion shows that conditions of renewable energy sources such as solar and wind energy is satisfactory in India but requires additional attention for better development and utilization of renewable energy sources. Although, the cost reduced so much due to technological developments in the field of renewable energy systems in recent years, but still they are the expensive source of power. According to the above discussion India reaches "Grid Parity" in solar energy in 2017-2018 and in wind energy by 2022. For further development, it is necessary to focus on a specific technological system which requires better investment policy, better management and requires more attention of the government in that way.

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Maximum Power Point Tracking for PV Systems & simulations based on Perturb &Observe technique

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Abstract— The efficiency of a PV panel is very low (about 20-40%).In this paper, we examine a solar charge controller based on MPPT. Various algorithms techniques for implementing the MPPT are discussed in brief. Further P&O algorithm is discussed in detail. The required hardware is also mentioned. The approach of this paper is to understand the need for MPPT, its various techniques and simulating the MPPT based controller by using P&O algorithm.

Index Terms— Boost Converter, DC-DC converter, MPPT, Perturb & Observe (P&O), PV (Photo-Voltaic).

INTRODUCTION

A solar panel converts only 20-40% of energy incident on it, into electrical energy. A charge controller hence becomes vital for increasing the solar efficiency. Now, different charge controllers based on various techniques are used for this purpose such as those based upon PWM, MPPT etc. PWM controller though being economical are found to be less efficient than MPPT controller under certain conditions. Moreover for applications above 150 W MPPT based controllers are used since PWM controllers have a constant harvesting efficiency regardless of size of PV module. A MPPT based controller is a high frequency DC-DC converter that changes the carrying DC input from solar panel & convert it into high frequency AC and then rectifies it to such a value of DC voltage & current which exactly matches the panels to battery bank.

There are different techniques for MPPT such as Perturb and Observe, Incremental conductance (hill climbing method), Fractional Short Circuit Current, Fractional Open Circuit Voltage, Fuzzy Control, Neural Network Control etc. Among all the methods Perturb and observe (P&O) and Incremental conductance are most commonly used because of their simple implementation, lesser time to track the MPP and several other economic reasons.

Under abruptly changing weather conditions (irradiance level) the maximum power point changes continuously, in such a case P&O based controller takes it as a change in MPP due to perturbation rather than that of irradiance and hence ends up in calculating wrong MPP [1]. This problem can be avoided by using Incremental Conductance method, since this technique takes two samples of voltage and current to calculate MPP [2]. However despite increase in efficiency, the complexity & cost of implementation also increases. So again a trade-off between complexity and efficiency needs to be considered. When multiple solar modules are connected in parallel, another analog technique indicated by acronym TEODI [3] is also very effective which is based on "equalization of output operating points in correspondence of forced displacement of input operating points of two identical PV system". It is very simple to implement and has higher efficiency under stationary as well as time varying atmospheric conditions.

STANDALONE PHOTOVOLTAIC SYSTEM COMPONENTS

a) Photovoltaic cell

A photovoltaic cell or photoelectric cell is a semiconductor device that converts light to electrical energy by photovoltaic effect. If the energy of photon of light is greater than the band gap then the electron is emitted and the flow of electrons creates current.

However a photovoltaic cell is different from a photodiode. In a photodiode light falls on n-channel of the semiconductor junction and gets converted into current or voltage signal but a photovoltaic cell is always forward biased.

b) PV module

Usually a number of PV modules are arranged in series and parallel to meet the energy requirements. PV modules of different sizes are commercially available (generally sized from 60W to 170W). For example, a typical small scale desalination plant requires a few thousand watts of power.

c) PV modelling

A PV array consists of several photovoltaic cells in series and parallel connections. Series connections are responsible for increasing the output voltage of the module whereas the parallel connection is responsible for increasing the output current in the array.

Typically a solar cell can be modelled by a current source and an inverted diode connected in parallel to it. It has its own series and parallel resistance. Series resistance is due to hindrance in the path of flow of electrons from n to p junction and parallel resistance is due to the leakage current.

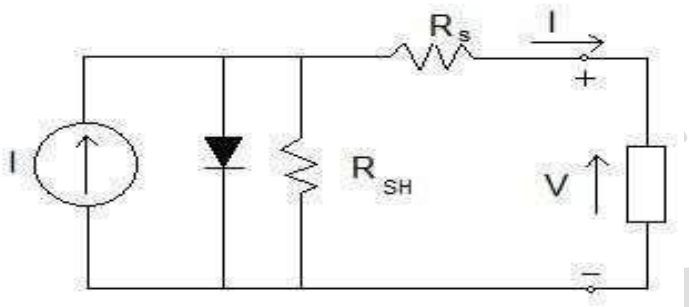

Fig. 1 Single diode model of a PV cell

In this model we consider a current source (I) along with a diode and series resistance (R_s). The shunt resistance (R_{SH}) in parallel is very high, has a negligible effect and can be neglected. The output current from the photovoltaic array is :

$$I = Isc - Id \quad (1)$$

but $$I_d = I_o (V_d/kT - 1)$$

where 'I_o' is the reverse saturation current of the diode; 'q' is the electron charge; 'V_d' is the voltage across the diode; 'k' is Boltzmann constant (1.38×10^{-19} J/K) and T is the junction temperature in Kelvin (K).

From above equations

$$I = I_{sc} - I_o (V_d/kT - 1) \quad (2)$$

MAXIMUM POWER POINT TRACKING TECHNIQUES

The maximum efficiency of a solar panel can only be upto 30-40%.So a charge controller is required to get the maximum power. In this paper a controller based on MPPT technique is studied. Now, for harvesting maximum power from solar panel we take a que from Maximum Power Transfer theorem as per which "the power output of a circuit is maximum when the Thevenin impedance of the circuit (source impedance) matches with the load impedance". Hence our problem of tracking the maximum power point reduces to an impedance matching problem. In the source side we are using a boost convertor connected to a solar panel in order to enhance the output voltage so that it can be used for different applications like motor load, & by changing the duty cycle of the boost converter appropriately we can match the source impedance with that of the load impedance.

There are different techniques used to track the maximum power point. Few of the most popular techniques are:

i. Perturb and Observe (hill climbing method)
ii. Incremental Conductance method
iii. Fractional short circuit current
iv. Fractional open circuit voltage
v. Neural networks
vi. Fuzzy logic

The choice of the algorithm depends on the time complexity the algorithm takes to track the MPP, implementation cost and the ease of implementation. [7]

Perturb & Observe

Perturb & Observe (P&O) is one of the simplest method to implement. We use only voltage sensor to measure the PV array voltage. So it is less costly as compared to other methods and hence more economical and easy to implement. Although the time complexity of this method is very less but it doesn't stop on reaching close to the MPP and continues to perturb on both the directions. We can overcome this limitation by setting an appropriate error limit or can use a wait function, however this increases the time complexity of the algorithm. One more limitation of this method is that it does not take account of the rapid change of irradiation level (due to which MPPT changes) and considers it as a change in MPP due to perturbation and ends up
calculating the wrong MPP. To overcome this problem we can use incremental conductance method. [2, 6, 7]

Incremental Conductance

In Incremental conductance method, two sensors (a voltage and a current)are used to sense the output voltage and current of the PV array. The slope of the PV curve at MPP is 0. So,

$$\left(\frac{dP}{dV}\right)_{MPP} = \frac{d(VI)}{dV}$$

$$\left(\frac{dP}{dV}\right)_{MPP} = \frac{-I}{V} \qquad (3)$$

Where,

$\left(\frac{dP}{dV}\right)_{MPP}$: - instantaneous conductance of solar panel

When the condition represented by eq. (3) is satisfied the solar panel is said to be operating at MPP. Also, since the output sensors are only for voltage & current, hence the error due to the variation in irradiance is removed. But when it comes to realising the algorithm physically, the hardware cost & complexity of design becomes a problem. This trend will continue to increase as we go down in this list. Hence the systems designed for these algorithms are superior class facilities or power plants. [7]

Fractional open circuit voltage

Even under continuously changing irradiance and temperature , V_{MPP} and V_{OC} of the PV array are nearly linearly related .This property is used in the fractional V_{OC} method.

$$V_{MPP} = k_1 V_{oc} \qquad (4)$$

'k_1' being the constant of proportionality. The value of k_1 depends upon the characteristics of the PV array being used So its value is calculated in advance by approximating V_{MPP} and V_{OC} for the PV array at different irradiance level and temperature .The value of k_1 is in between 0.71 and 0.78. By knowing the value of k_1,and measuring V_{OC} by shutting down the power converter momentarily, V_{MPP} can be calculated using the relation given in (4). However shutting down the power causes power loss, which is one of the disadvantage of thus technique

Fractional short circuit current

Fractional I_{SC} is similar to Fractional V_{OC} method.In this method ,the linear relation between I_{MPP} and I_{SC} for different irradiance and temperature is used.

$$I_{MPP} = k_2 \, Isc \qquad (5)$$

k_2 being the constant of proportionnality. In this case too, the value of k_2 has to be for the PV array in use. The value of k_2 leis between 0.78 and 0.92.It is problematic to measure the value of I_{SC} during operation. So an additional switch along with a current sensor is employed to short the converter and measure I_{SC} .[7]

Fuzzy Logic Control

The use of Fuzzy logic for MPPT has gained popularity over the last decade because here we have the liberty of using imprecise inputs,no requirement of accurate mathematical model and handlng non linearity. [7]

Neural Network

Along with Fuzzy logic controller ,the neural networks have also gained popularity in the recent years. Neural networks usually works with three layers: input, hidden, and output layers.

Each layer has different number nodes and are user-dependent .Relevant PV array parameters like V_{OC} and I_{SC}, irradiance level and temperature are given as input to the controller and a reference signal (duty cycle) is obtained at the output .This duty cycle is then used for impedance matching and hence maximum power is transferred. [7]

PERTURB & OBSERVE ALGORITHM

Under the perturb and observe algorithm follows the process wherein the working voltage or module voltage is varied in small step , which in turn results in adjustment of power, if resultant variance of power is positive, then we are heading towards maximum power point, and we keep on incrementing the voltage in the same direction, where as if the resultant variance of power is negative, indicating that we are heading away from the maximum power point therefore we need to decrement the supplied voltage.

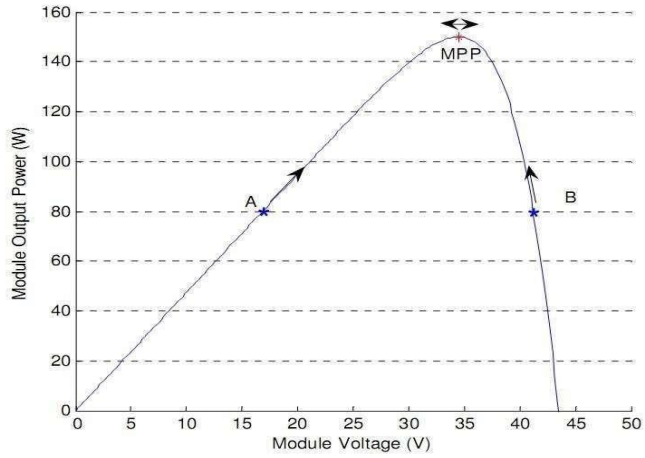

Fig. 2 Solar panel characteristics showing MPP and operating points A and B

Fig 5 is a graph plotted between power and the operating voltage of the solar panel at the given intensity of light .The maximum power point is marked as MPP, which is the maximum output generated by PV module. Here points A and B are two operating points, A is situated on the left side of MPP and B is situated on the right side of MPP. Therefore in case of A , as we increase the voltage taking us further toward MPP resulting in positive change in power but on the other hand as we increase voltage beyond MPP the change is power is negative depicting that we ought to steer the perturbation in the opposite direction to achieve MPP in case of B.

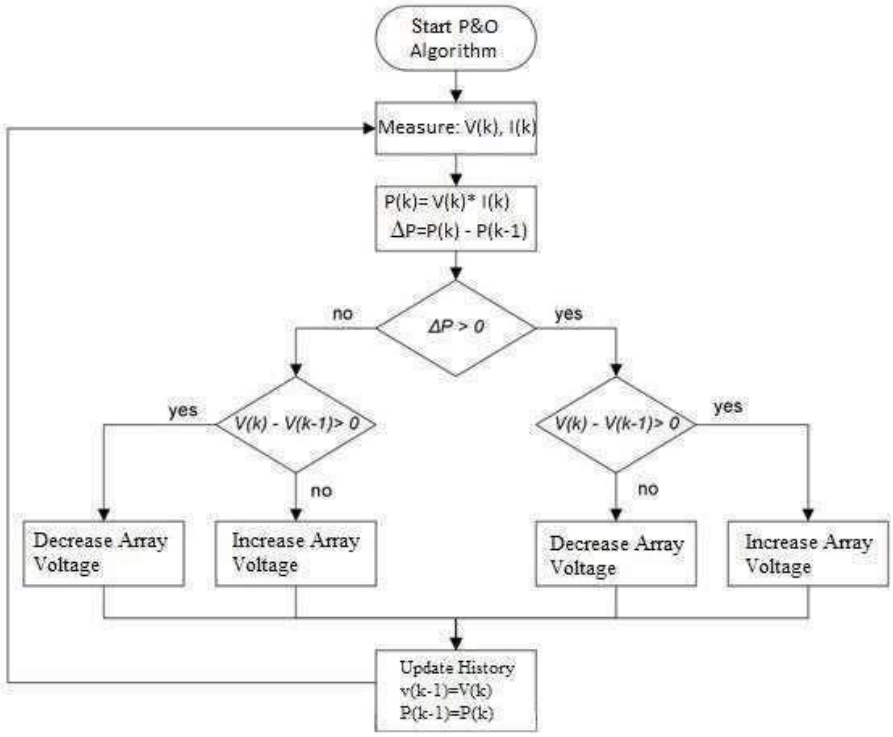

Fig. 3 Flowchart of Perturb & Observe algorithm

Limitations of Perturb & Observe algorithm

Given the certain circumstances, where the intensity of light changes speedily, the maximum power point shift onto right side of curve. This algorithm deciphers this change as perturbation and the next iteration changes the direction of disturbance and henceforth goes away from MPP as shown in fig. also, in this algorithm requires only one sensor or detector (voltage sensor) which detects the PV module operating voltage. The time complexity and the price of enforcing this algorithm is very less. On the other hand complexity may be less but as we approach towards MPP or very close to MPP, it does not halt at MPP and keeps on vibrating very close to MPP. To overcome this error, as soon as algorithm approaches MPP, we employ two main methods:

1. Use wait function which develops the time complexity.
2. Develop an error function which sets is its limit.

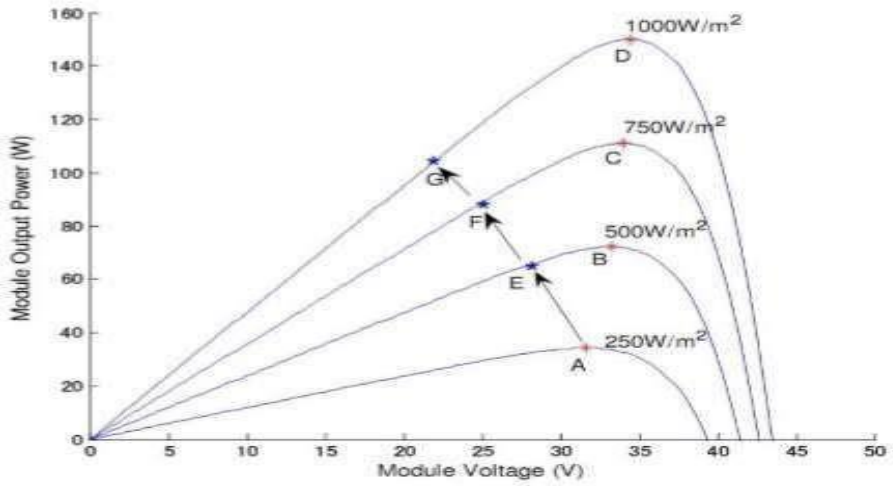

Fig. 4 Curve showing wrong tracking of MPP by P&O algorithm under rapidly varying irradiance

BOOST CONVERTER ASSISTED MPPT

In order to change the input resistance of the panel to match the load resistance (by varying the duty cycle), a DC to DC converter is required. It has been studied that the efficiency of the DC to DC converter is maximum for a buck converter, then for a buck-boost converter and minimum for a boost converter. To widen the scope of MPPT into practical or real world usage we employ boost converter which helps in better utilization of solar panel. Boost converter shifts the initial low voltage output to a higher point. One main highlighting point is that there are no switching losses in case of Boost Converter. Fig. 8 given below is the circuit implementation of MPPT using boost converter.

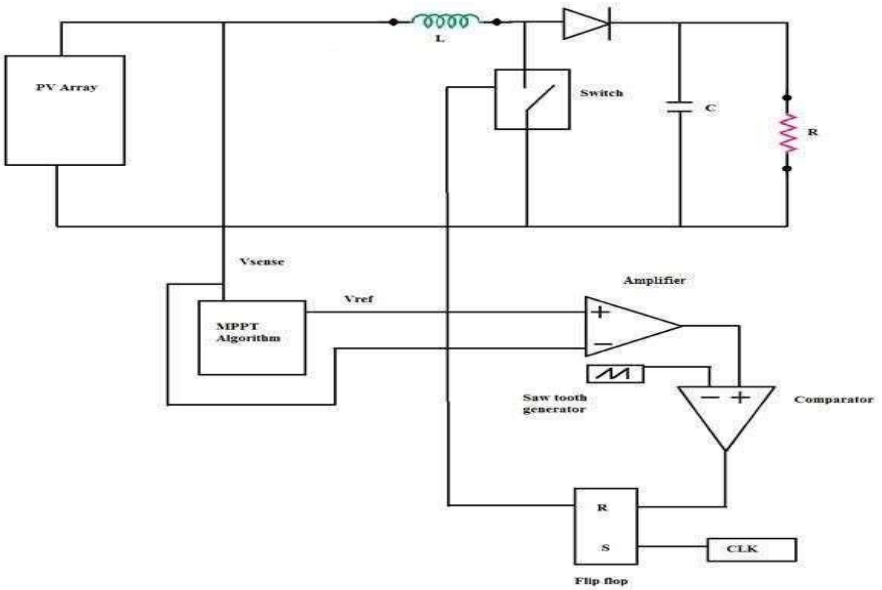

Fig. 5 Circuit implementation for MPPT system

MODELLING OF STANDALONE PV SYSTEM

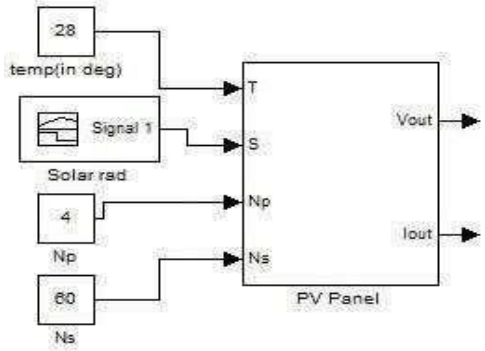

Fig. 6 Masked block diagram of the modelled solar PV panel

Solar panel

Modelling of whole system has been done on MATLAB™ 2013a and Simulink™. Solar panel block diagram has been depicted in fig. shown below. The various inputs of PV module are listed below:

1. Solar irradiation
2. Number of solar cells in series
3. Given temperature
4. No. of rows of solar cells

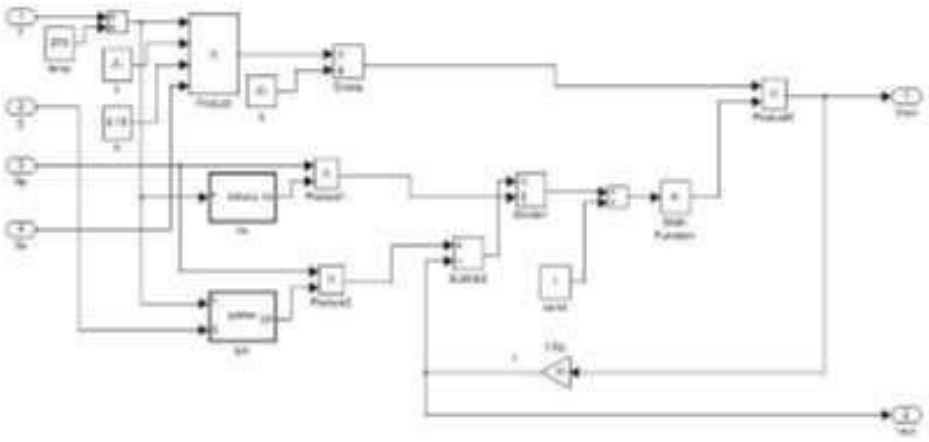

Fig. 7 Block diagram (unmasked) of modelled solar PV panel (unmasked)

The simulations are conducted at a temperature of around 28 °C with 60 solar cells connected in series placed along 4 parallel rows. Irradiance of various intensity level is taken to imitate the real world conditions and exhibit the role of MPPT. The intensity of irradiance vary from 60 watt per sq. cm to 85 watt per sq. cm which is close enough to the distribution of per day insolation on earth surface. The process is carried out for 0.12 seconds during which level of intensity changes every .03 seconds.

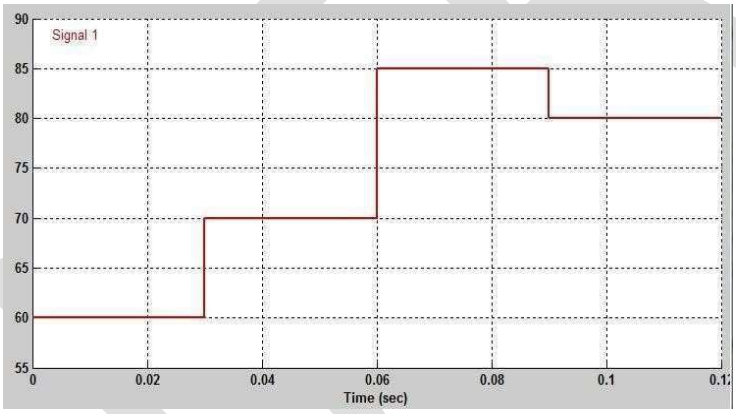

Fig. 8 Irradiation signal (Watt/ cm^2 vs time)

MPPT INTERFACING

The modelled panel is interfaced to the other parts using inverters of two types

i. Current source inverter
ii. Voltage source inverter

Also a boost converter is employed using *Simpower* system module in the MATLAB. Block diagram in Fig. 12 represents the case of deviating output voltage. This simulation is carried out to showcase the divergence between the power outputs during the two cases viz. while using MPPT & without using MPPT & analysing the power in both instances. The model contains a switch which is operated manually. The PV Module by passes the MPPT algorithm when the switch is moved to left and the required power output is obtained. Similarity when switch is moved towards right, it uses MPPT algorithm to harness maximum power.

Boost Converter

Boost converter used in our situation is employed for numerous real life applications such as pumping water, running DC motors , battery charging . The resistive load employed is about 300 ohm and inductor of .763 mH and capacitance of .61uF for ripple less current.

PI Controller

The purpose of a MPPT system is to match the operating voltage of PV module with the reference voltage V_{ref} at which maximum power output is obtained. This system employs a PI controller which is the external control loop responsible for controlling the voltage at input. The sampling process is done at a rate of 1 to 10 samples per second. The pulse width modulation is performed in the PWM block at a considerably faster switching frequency of 100 KHz. The values of K_p & K_i are given in Table 1 . The higher relative value of K_i is so as to ensure that the system stabilizes at a faster rate. The main aim of the controller is to reduce the difference between the reference and measured voltage by adjusting the duty cycle through switching. In this case the switch is physically realised by a gate voltage controlled MOSFET by varying duty cycle.

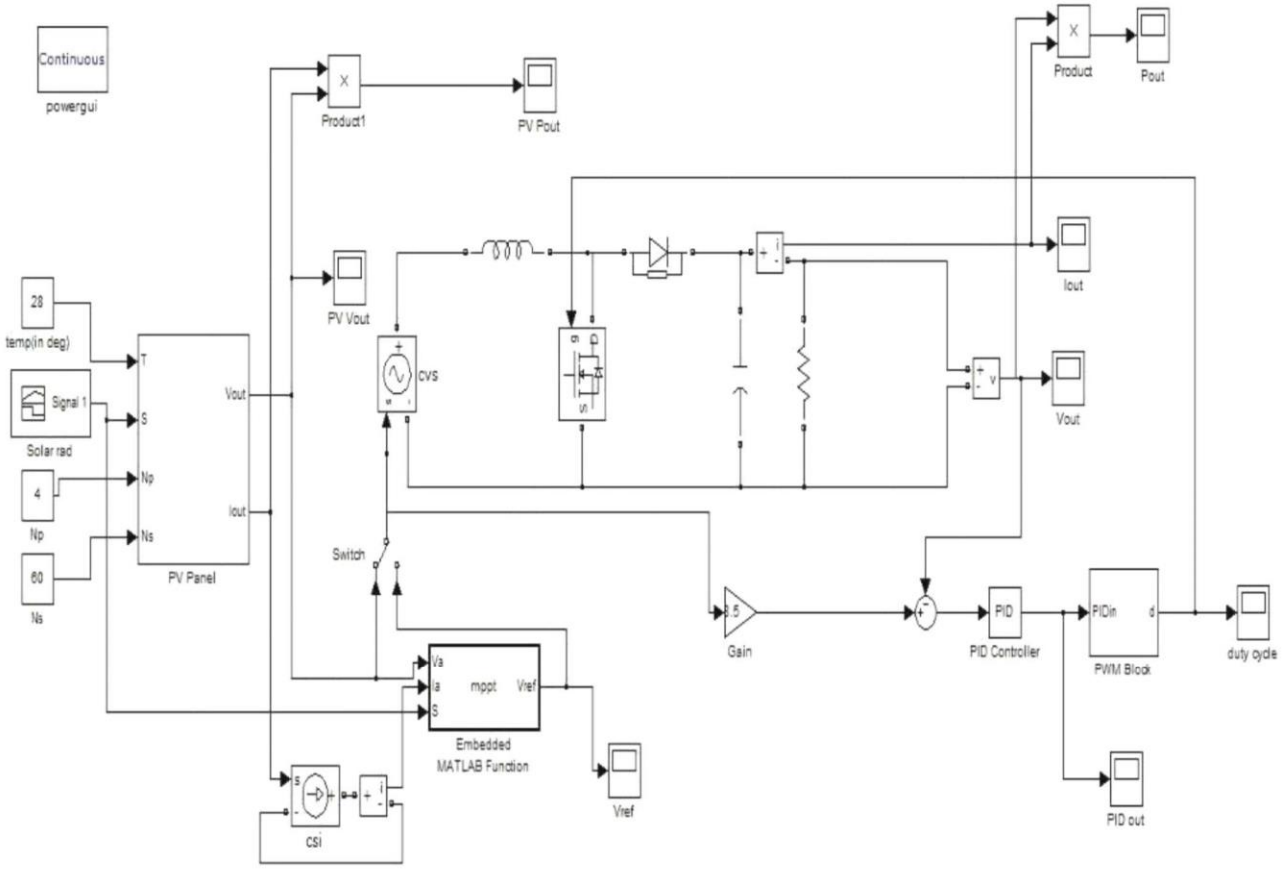

Fig. 9 SIMULINK Model of MPPT system using P&O algorithm

Parameter	**Value taken for simulation**
Solar Module Temperature (T)	28°C
No of rows of solar cells in parallel (N_P)	4
No. of cells in series	60
Resistance of load (R)	300 Ω

Capacitance of boost converter (C)	0.611 µF
Inductance of boost converter (L)	0.763 mH
Switching frequency of PWM	100 KHz
Proportional gain of PI controller (K_P)	0.006
Integral gain of PI controller (K_I)	7

Table 10 : Different parameters of the standalone PV System

RESULT FIGURES

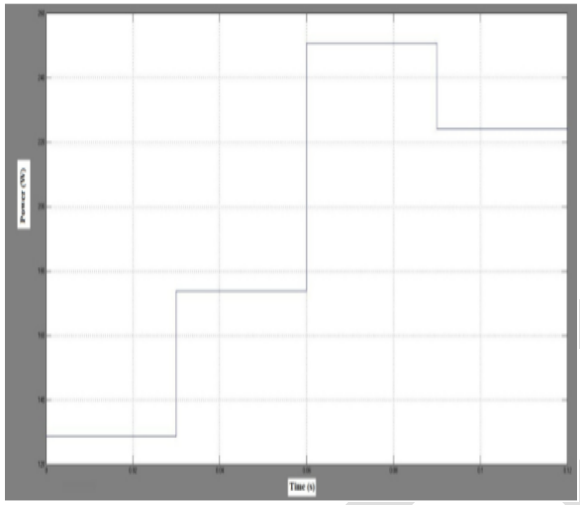

Fig. 11 Plot of Power obtained at panel side vs time (without MPPT)

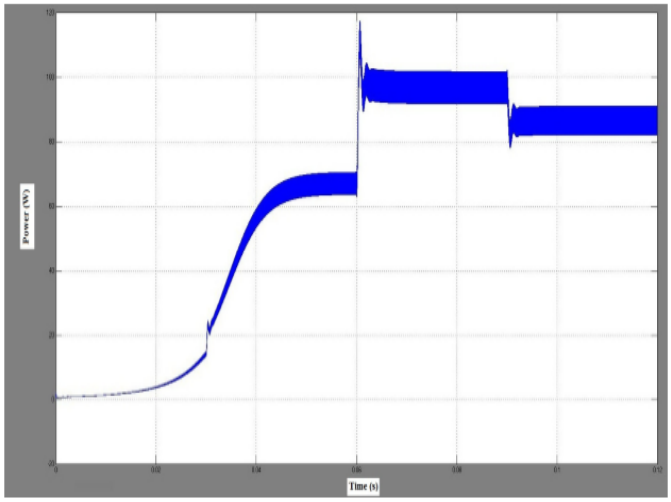

Fig. 12 Plot of Power obtained at load side vs time (without MPPT)

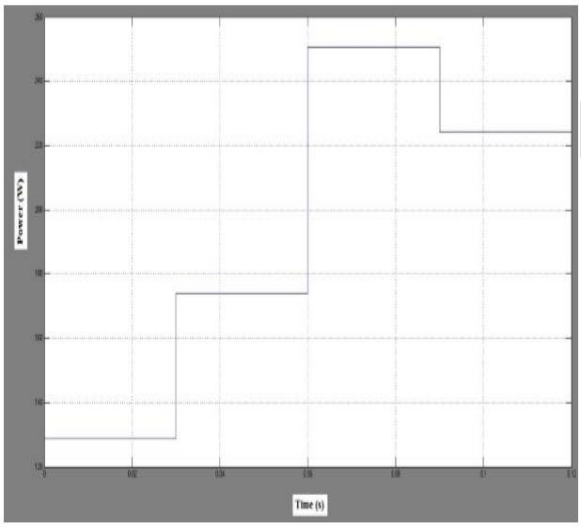

Fig. 13 Plot of Power obtained at panel side vs time (using MPPT)

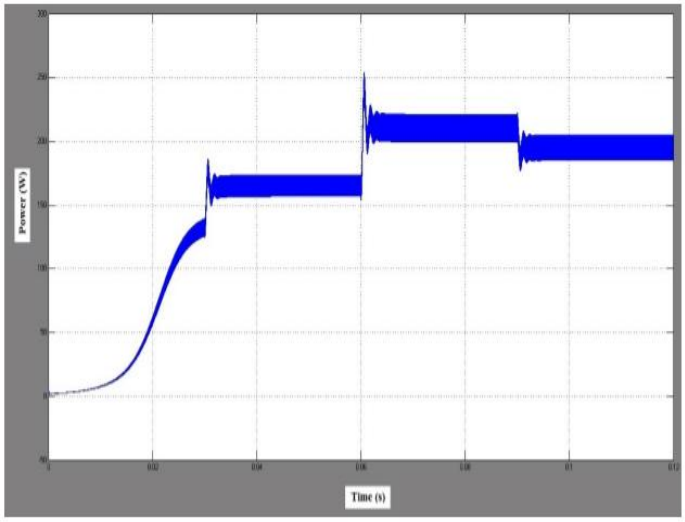

Fig. 14 Plot of Power obtained at load side vs time (using MPPT)

CONCLUSION

As seen in the result figures the simulations were carried out in two stages viz. "no MPPT mode" & "MPPT mode". The respective results obtained for each were as follows:
With the MPPT algorithm block bypassed (under irradiation condition of 85 W/cm$^{2)}$, the power obtained across load was 95 W. In the MPPT mode V_{ref} (calculated by the P&O algorithm) was fed to the PI controller under the same irradiation conditions. The power obtained in this case was around 215 W. Thus it can be seen that under this (P&O) algorithm the efficiency of panel was increased by around 126 %.

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HARDWARE BASED HIGH SPEED NETWORK SECURITY SYSTEM

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Abstract— In the field of networking, role of network security is immense. It is a very vital tool which provides the security against various external and internal threats in any network. This paper provides solution for multi gigabit network security through packet content scanning mechanism. The most of network firewalls are software based, they runs sequentially. To achieve packet inspection at GigaHz line speed, hardware implementation of parallel Bloom filters are employed. Each Bloom filter is for specified length of hashed signature, the hash function provides compact data base. If the incoming packet signature matches with data base, then the corresponding Bloom filter indicates the presence of harmful content. The Improved Counting Bloom Filter (CBF) architecture is used in this work instead of previous SRAM array. The proposed implementation utilizes an array of up/down linear feedback shift registers (LFSR) and local zero detectors, which have better energy, speed and area constraint. The overall throughput achieved is about 3 Gb/sec. The proposed CBF based security system has been implemented with Xilinx FPGA.

Keywords— CBF, LFSR, FPGA, SRAM, PHP, Hash Function, Network security.

Introduction

The network security is most important concern for any organization; nowadays entire data base is handled by group of computers that are connected through less privacy network. Therefore skilled persons can illegally access the network for valuable information like military secrets, banking details etc; they also destroy it through malicious attack. This unauthorized access is limit by Firewall, which is uses software based packet inspection which execute sequentially.

There is a class of packet processing applications that inspect packets deeper than the protocol headers to analyze content. For instance, if a packet payload carries certain malicious Internet worms or computer viruses, then the network security applications must drop such types of packets . Most payload scanning applications have a common requirement for string matching [9]. For example, the presence of a string of bytes (or a *signature*) can identify the presence of a harmful content. Well-known Internet worms such as Nimda, Code Red and Slammer propagate by sending malicious executable programs identifiable by certain byte sequences in packet payloads. Such applications must be able to detect strings of various lengths starting at arbitrary locations in the packet payload.

Packet inspection applications [15], when deployed at router ports, must operate at line speeds. With networking speeds doubling every year, it is becoming increasingly difficult for software-based packet monitors to keep up with the line rates. These changes have underscored the need for specialized hardware-based solutions that are portable and operate at line speeds.

Proposed design describes a hardware-based technique using Counting Bloom filters. Without degrading network throughput, Counting Bloom filters can detect strings in streaming data . A Bloom filter consists of a set of signatures that represents a data structure . In order to compute multiple hash functions on each member of the set, a bloom filter stores that set of signatures . This technique uses a database of strings to check for the membership of a particular string.

One of the important property of this data structure is that the computation time for performing the membership of a particular string is independent of the number of strings stored in the database.The memory used by the data structure scales linearly with the number of strings stored in it. Furthermore, the amount of storage required by the Bloom filter doesn't depend on the string length.

Related works

SNORT is a type of software used for the purpose of deep packet inspection [9] Measurements on SNORT show that 31% of total processing is due to string matching; the percentage goes up to 80% in the case of web-intensive traffic .many different algorithms or combination of algorithms have been introduced and implemented in general purpose processors (GPP) for fast string matching, using mostly SNORT open source NIDS rule set. However, intrusion detection systems running in GPP can serve only up to few hundred throughput .therefore, seeking for hardware-based solutions possibly the only way to increase performance for high speeds higher than few hundred Mbps.

Network intrusion detection systems (NIDS) attempt to detect attacks by monitoring incoming traffic for the suspicious contents [4]. They collect data from network, monitor activity across the network, analyze packets, and report any intrusion behavior in an automated fashion. Intrusion detection systems use advanced matching techniques (i.e.Boyer and Moore, Aho and corasic, Fisk and Varghese) on network packets to identify the known attacks.

They use simple rules to identify possible security threats, much like virus detection software, and report offending packets to the administrator for further actions .NIDS should be updated frequently, since new signatures may be added or others may change on a weekly basis. NIDS rules usually refer to the header as well as to the payload of a packet .

Proxy server method breaks the traditional client/server model. Clients are required to forward their requests to a proxy server instead of the real server. After the proxy receives those requests, it will forward them to the real server only if the requests meet a predefined security policy. The real server receives the requests from the proxy, which forces it to believe that the proxy is the real client. This allows the proxy to concentrate all requests and responses from clients and servers. But the worst problems are it is expensive and time consuming to write code for proxy servers.

Another technology used for performing network security was packet-filtering firewalls. It was implemented by using access control lists (ACL) embedded in routers. Access control was one of the primary concerns of the early age of commercial use of the Internet. Because routers are the connection point between internal and external networks, they are used as access control devices . Simple packet filters analyze each of the packets passing through a firewall which matches a small part of their contents against previously defined groups of access control rules. The basic limitations were as follows:

- Because they analyze individual packets, they could not identify security violations that can only be visualized by screening more of the traffic flow.
- Very little information from the packets was analyzed, avoiding the identification of several problems that could only be seen in the application layer.
- The rules were static, creating many security problems for screening protocols that negotiate part of the communication options, like ports and connections, on the fly (the FTP service is a classic example).
- In general, router ACLs, implemented through command-line parameters, are harder to manage than rules created in easy-to-use graphical user interfaces.

The hardware-based technique using Bloom filters, [1] which can detect strings in streaming data without degrading network throughput. A Bloom filter is a data structure that stores a set of signatures compactly by computing multiple hash functions on each member of the set. This technique queries a database of strings to check for the membership of a particular string.

The design takes multiport SRAM as memory [7] for hash table data base maintenance, which use hashed address for adding, removing and query of elements. The SRAM access path can be broken down into two components: the decoder, which is the portion from the address input to the word line, and the output multiplexer, which is the portion from the cells to the output.

The read access as it determines the critical timing for the SRAM. For the read access, the address input is decoded to activate a specific word line. The decoder typically employs the divided word line structure, where part of the address is decoded to activate the horizontal global word line and the remaining address bits activate the vertical block select line. Energy dissipation in an SRAM are dynamic energy to switch the capacitance in the decoders, bit lines, data lines and other control signals within the array, the energy of the sense amplifiers and the energy loss due to the leakage currents.

Counting bloom filters

The updating of signature database by inserting and deletion of stings is difficult task in Bloom filter; in order to overcome this, Counting Bloom Filter (CBF) is adopted, shown in fig 1.

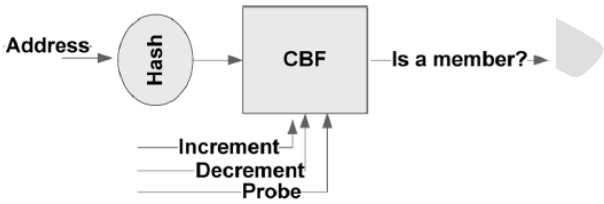

Fig.1 Counting Bloom

The significance of hardware *counting bloom filters* (CBFs) is that they improve the power, delay and performance of various complex multiprocessor or multi-core systems. CBFs have been also utilized to improve the scalability of load/store scheduling queues and to reduce instruction replays by assisting in early miss determination at the L1 data cache.

In the existing *SRAM-Based CBF Implementation*, both delay and energy suffer as updates require two SRAM accesses per operation. In order to avoid accesses over long bitlines ,an array of up/down counters with local zero detectors are built. In this way, Low power CBF operations would be localized and there would be no need to read/write values over long bitlines.

For the CBF, the actual count values are not important and we only care whether a count is "zero" or "nonzero." Hence, any counter that provides a deterministic up/down sequence can be a choice of counter for the CBF. L-CBF consists of an array of up/down LFSRs with embedded zero detectors.

Instead of synchronous up/down counters with the same count sequence length , L-CBF uses up/down LFSRs that offer a better delay, power, and complexity tradeoff . Compared to S-CBF , L-CBF significantly reduces energy and delay but results in more area. Though the increase in area is a minor concern in modern processor designs, compared to most other processor structures, the CBF provides the abundance of on-chip resources and the very small area compared to most other processor structures. (e.g., caches and branch predictors).

A maximum-length-bit LFSR sequences through 2^{n-1} states. It goes through all possible code permutations except one. The LFSR [5] consists of a shift register and a few embedded XNOR gates fed by a feedback loop. Each LFSR has the following defining parameters:

- Width, or size, of the LFSR (it is equal to the number of bits in the shift register);
- Number and positions of *taps* (taps are special locations in the LFSR that have a connection with the feedback loop);
- Initial state of the LFSR which can be any value except one (all ones for XNOR feedback).

State transitions proceed as follows. The non-tapped bits are shifted from the previous position. The tapped bits are XNORed with the feedback loop before being shifted to the next position. The combination of the taps and their locations can be represented by a polynomial. Fig 2 shows an 8-bit maximum-length Galois LFSR, its taps, and polynomial.

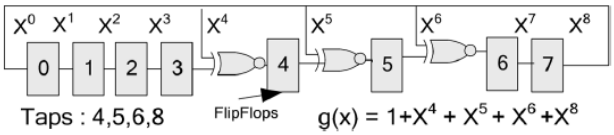

Fig.2 LFSR Structure

By appropriately selecting the tap locations it is always possible to build a maximum-length LFSR of any width with either two or four taps. Additionally, ignoring wire length delays and the fan-out of the feedback path, the delays of the maximum- length LFSR is independent of its width (size).

System Overview

This system relies on a predefined set of signatures grouped by length and stored in a set of parallel Bloom filters in hardware [8]. Each Bloom filter contains signatures of a particular length. The system uses these Bloom filters to monitor network traffic and operate on strings of the corresponding length from line data. The high-level organization of L-CBF is shown in Fig 3 L-CBF includes a hierarchical decoder and a hierarchical output multiplexer.

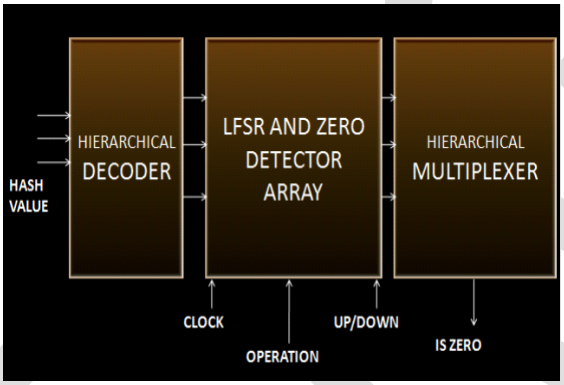

Fig.3 Architecture of L-CBF

The core of the design is an array of up/down Linear Feedback Shift Registers and zero detectors. The L-CBF design is divided into several partitions in which each row of a partition consists of an up/down LFSR and a zero detector.

L-CBF accepts three inputs and produces a single-bit output that is noted as *is-zero*. One of the input *operation select* identifies the type of operation: INC, DEC, PROBE, and IDLE. The input *n* bit *address* specifies the address in question and the input *reset* is used to initialize all LFSRs to the *zero* state. The LFSRs utilize two phase clocks generated internally from an external clock.

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To minimize the energy-delay product, the decoder is used for decoding [6] the address . The decoder consists of a predecoding stage, a global decoder to select the appropriate partition, and one local decoder per partition. Each partition has a shared local *is-zero* output. A hierarchical multiplexer collects the local *is-zero* signals and provides the single-bit output *is-zero* .

The system tests each string for membership [11] in the Bloom filters. If it identifies a string to be a member of any Bloom filter, the system then declares the string as a possible matching signature. Such strings receive further probing by an analyzer, that determines if the string is indeed a member of the set or a false positive.

The window length will vary with signature length; here six byte length window is used with four Bloom filters. The signatures are grouped based on their length and they are allocated to unique Bloom filter, the length of filters are three, four, five and six. The incoming serial bits are continuously inspected by parallel Bloom filters; control signal from PHP(*Packet Header Processor)* enables the bloom filters whenever the payload arrive the window.

The packet length is calculated by Packet Header Processor (PHP) through reading total length field at IP header. There is 16 bit representation of total length that gives length of IP header, TCP header and Payload .

The length of payload is extracted which is used to enables the control signal to parallel Bloom filter. Therefore the inputs are applied to parallel Bloom filter only at payload part of each TCP/IP packet flows through streaming data window .

The counting sequences are used in PHP for tracking the fixed header length and variable payload length. There are three counting, first one count up to Total Length field at IP header then exact payload length is calculated. Second count is up to TCP header termination and third count is equal to payload length that is calculated previously. The hierarchical decoder is used for decoding [6] the address x. The decoder consists of a predecoding stage, a global decoder to select the appropriate partition, and a set of local decoders, one per partition. Each partition has a shared local *is-zero* output. A hierarchical multiplexer collects the local *is-zero* signals and provides the single-bit output *is-zero* .

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Results and discussions

The parallel Bloom filter is allowed to inspect the in coming packet at desire time only, the payload streaming time is calculated by PHP then control signal is used to enable the Bloom filters. The zero detector produce valid output only when operation is set to low. During insertion and deletion signal operation is set to high, the up or down signal select whether insertion or deletion to be takes place. The LFSR is enabled by during this process. The figure 5 shows parallel Bloom filter outputs 'v1, v2, v3, v4' are zero detectors output signal, which indicates presence and absence of signatures. The serial data is applied to streaming window from packet switching line.

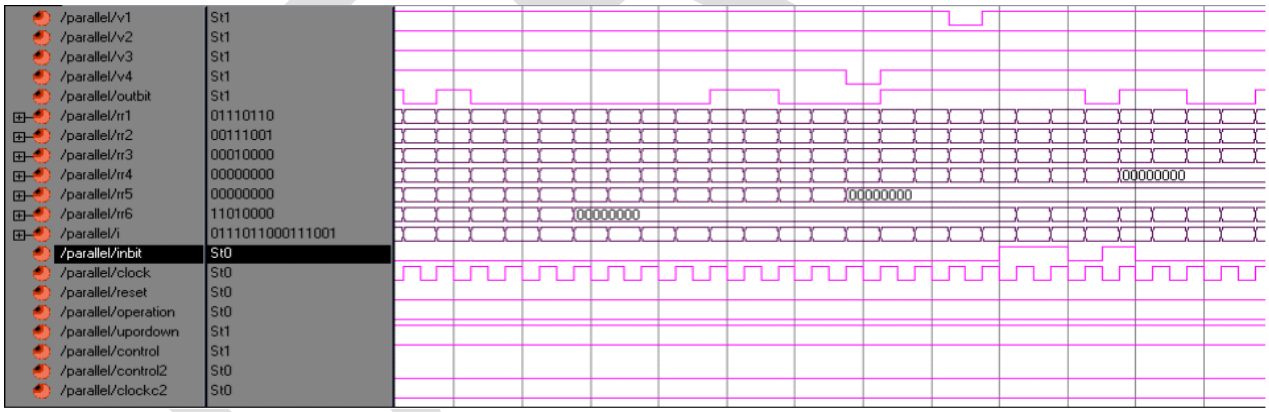

Fig.5 Parallel Bloom filter waveform

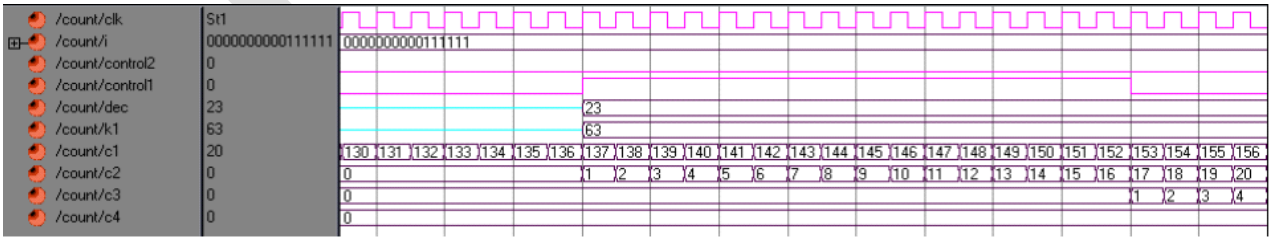

Fig. 6 Packet Header Processor waveform

The 'rr1, rr2, rr3, rr4, rr5, rr6' are byte of data at window, which are applied to Bloom filters with clock. There is control over data flow through window during Bloom filter Programming.

The figure 6 shows the packet length calculation performed by PHP, here total length is 63 bytes in which header is 40 bytes remaining 23 bytes are payload. The control2 signal is set to high for payload length.

Conclusion

The proposed Counting Bloom Filter based Network security system has been developed using Verilog and the functionality is verified using modelsim simulator. The system is implemented with Xilinx Spartan 3E FPGA. The system ensures that local network security against virus attacks, based on signature matching by packet content inspection through parallel Bloom filter. The performance is improved by LFSR based Counting Bloom Filter (CBF) design in terms of delay, power and area. The signature database updating is simplified to up or down count of corresponding LFSR. The system throughput is improved to line speed through parallelism. This design can efficiently implement in FPGA, in order to achieve real time virus detection that inspect all internet protocol packets. The existing system maximum throughput is 150Mb/sec which is improved by hardware implementation up to 3 Gb/sec.

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REMOTELY SENSED IMAGE ENHANCEMENT BY USING FUZZY METHOD

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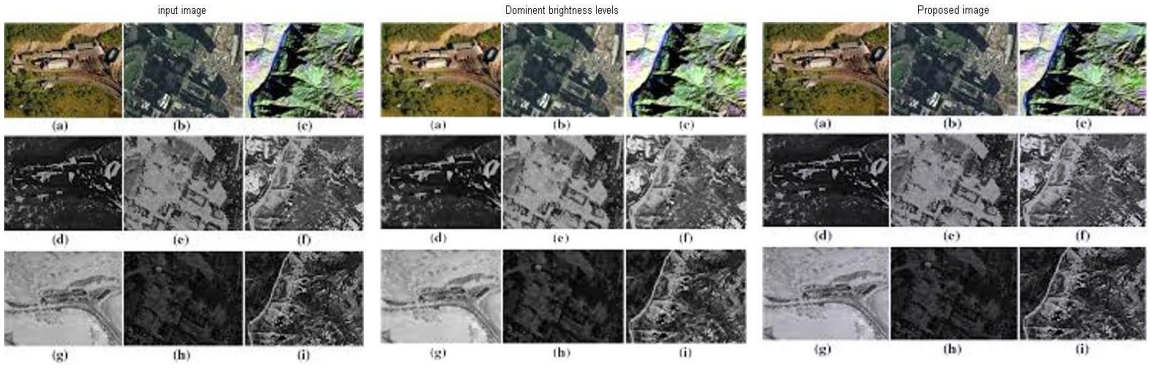
Abstract— Image Processing is a way in which any image can be changed into its digital version to conduct certain processes on it to get an enhanced image. Image enhancement plays main role in digital image processing applications. Enhancement means highlighting main details and improving features and quality of images and making images more visually appealing. In latest times abundant work is done to enhance the clarity for improving the exactitude of remote sensing images. This research work projected the DWT, DBLA as well as Fuzzy logic technique as the post processing utility to enhance the exactitude of image by decreasing the problematic of noise.

Keywords: DWT, SVD, DCT,Fuzzy technique, Dominant brightness level analysis.

1. INTRODUCTION

Remote sensing images have an essential function in several areas for example for instance metrology, agriculture geology etc[1]. Dominant brightness level analysis (DBLA)[1] indicates that it is an efficient method for the image enhancement. Contrast improvement images could have power distortion and eliminate image data in number of sections. To irresistible the glitches of images ,decompose the original image into numerous levels. The projected algorithm conduct discrete wavelet transform (DWT)[2] on the original images that decompose the original image into different sub-bands LL, HL, HH and HL[2]. From then decompose the LL sub-band into low, middle, and high intensity layers. Intensity transfer functions are adaptively estimated by applying the knee transfer function and the gamma adjustment function. The resultant improved image is obtained by applying the inverse DWT(IDWT).



Fig(a) Fig(b) Fig(c)

Fig 1.1(a) show input image Fig (b)show dominant brighness level output(c)show proposed technique outpot

2. DIFFERENT TECHNIQUES OF IMAGE ENHANCEMENT

2.1DWT The decomposition images into several regularity ranges lets the particular seclusion involving the regularity in to particular sub-bands. This method brings about isolating small variations in an image largely in low frequency sub-band images. The 2D wavelet decomposition with an image is conducted by using 1D DWT along the lines of image 1st, as well as, next, the email address are decomposed along the columns[3]. This particular Decomposition brings about several decomposed sub-band images referred to as low-low (LL), low-high (LH), high-low (HL), as well as high-high (HH)[5].

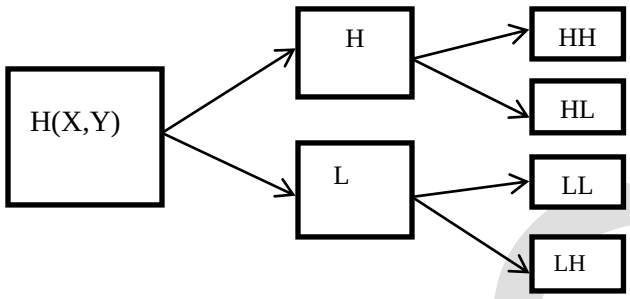


Fig 1.2 Block diagram of DWT

2.2 DCT

The DCT changes a transmission out of spatial domain into a frequency domain. DCT is definitely real-valued and supplies a more rewarding approximation of a transmission by using couple of coefficients[2]. This approach decreases how big is the traditional equations by discarding increased frequency DCT coefficients. Essential design data is within the reduced consistency DCT coefficients. Hence, distancing the high-frequency DCT coefficient and utilizing the lights advancement while in the low–consistency DCT coefficient, it can acquire and include the extra edge information out of satellite tv images

2.3 SVD

SVD is actually with different theorem through straight line algebra that states that a rectangular matrix Some sort of, a product regarding about three matrices that is (i) an orthogonal matrix UA, (ii) a diagonal matrix ΣA and (iii) the transpose of orthogonal matrix VA[2].Singular-value-based image equalization (SVD) process draws on equalizing the unique importance matrix acquired by means of unique importance decomposition (SVD). SVD of image, is often translated being a matrix. Basic advancement develops due to scaling with single ideals in the DCT coefficients

2.4 FUZZY BASED ENHANCEMENT

A new fuzzy logic and histogram based algorithm for enhancing low contrast color images has been proposed here. The method is computationally fast compared to conventional and other advanced enhancement techniques[2]. It is based on two important parameters M and K, where M is the average intensity value of the image, calculated from the histogram and K is the contrast intensification parameter. The given RGB image is converted into HSV color space to preserve the chromatic information contained in the original image[6]. To enhance the image, only the V component is stretched under the control of the parameters M and K. The proposed method has been compared with conventional contrast enhancement techniques as well as with advanced algorithms.

2.5ADAPTIVE HISTOGRAM EQUALIZATION

Adaptive histogram equalization [AHE] is an excellent contrast improvement method for both natural images and medical images[2]. It is dissimilar from standard HE in the respect that the adaptive process figures numerous histograms, each equivalent to a dissimilar part of the image[8]. AHE is the process by which at lower scales contrast is improved, though at larger scales contrast of a image is reduced. The benefit of AHE is that it is , reducible and frequently creates superior images.

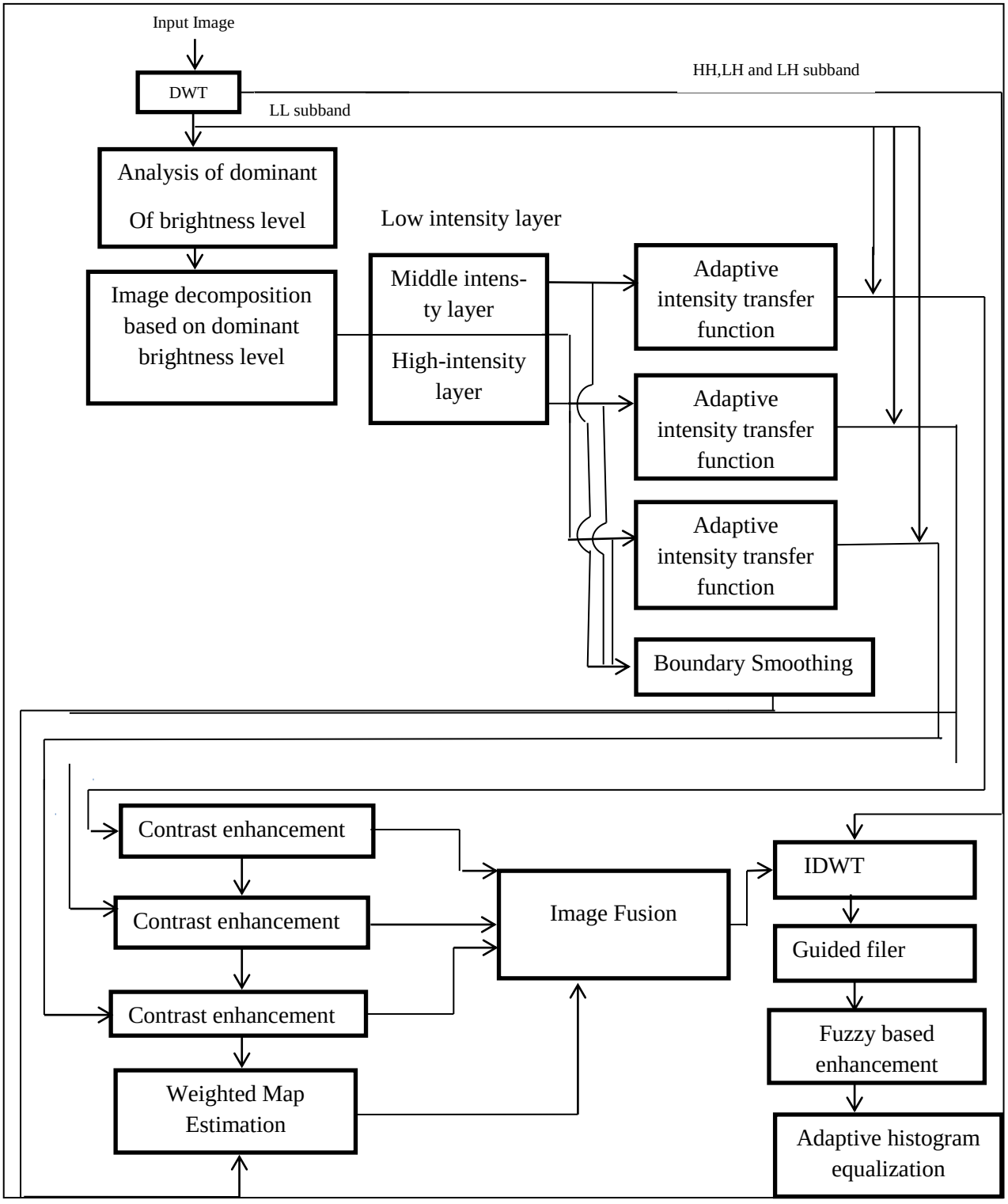
2.6 DOMINANT BRIGHTNESS LEVEL ANALYSIS

This algorithm computes brightness by using the Low–intensity factor in the wavelet domain and transfer intensity values[12]. First of all DWT is attained on the new images and formerly utilise the log-average luminance. The LL sub group split in to three different forms. Power transfer functions are adaptively predicted utilise the log transfer function and the gamma adapt function. Since at that point, the subsequent improved image is attained usage the inverse DWT[10]. The algorithm promotes the complete contrast and recognition facts better than present techniques

3. LITERATURE SURVEY

Jayaram et al.(2011)[1] has proposed a fuzzy inference system based contrast enhancement of gray level images .A new method of generating the fuzzy if-then rules actual to a specified image based on the local information wieldy to be used by a fuzzy inference system. Akho et al.(2012) [2] has recommended a novel fuzzy logic based algorithm for increasing low contrast color images. It is founded on two significant variables M and K, where M is the average depth value of the image which is determined from the histogram and K could be the contrast amplification parameter. The given RGB image is changed into HSV color room to preserve the chromatic data contained in the original image. To enhance the image, only the V element is stretched to manage of the variables M and K**4.**Zhang et al. (2012) [3] has described approximate histogram analysis technique based on gamma correction by a local pilot. First, image based on histogram portioned settlement means each partition local minima and gray-level calculations. Then, gamma correction resulted in median gray-level access. Analyze histograms, portioned by parameters are adjusted automatically. Experimental results demonstrate good contrast enhancement and preservation of image brightness can be obtained by the proposed method. Lee et al. (2013) [4] has presented an optimal contrast enhancement strategy for remote sensing images which is founded on dominant brightness level analysis and adaptive intensity transformation for remote sensing images. The assessed process perform discrete wavelet transform (DWT) on the input images and then divide the LL sub band in to low, heart, and high intensity levels utilising the log average luminance. The knee transfer function and the gamma adjustment function on the basis of the dominant brightness level of each layer are used to determine the adaptive intensity transfer functions. Srivastava et al. (2013) [5] has discussed histogram equalization has one of the best method to process the digital contrast enhancement but has not been suitable for every image. Sometimes it shows not good outcomes. To overcome this problem it provides a new method to improve the image result. Yu et al.(2014)[6] has offered that edge protection ratio (EPR) objective image quality evaluation (IQA) for a full reference metric. This is the notion that the human visual system for important messages are mainly of image structures, and can be extracted by these structures under edge detection. Deshmukh et al.(2015)[7] has presented novel fuzzy based contrast enhancement method. Contrast enhancement is important and stimulating region of image processing. The first image fuzzify, function and defuzzify image pixels back plane is proposed. Fuzzy set classic set in place more than improbability comes into an image is used. Arora et al.(2015)[8] has defined that a vastly overexposed color image is considered by high brightness, low chromaticity and loss of detail. Improves the contrast and lightness in a fuzzy based approach development is proposed. Brightness and color of a alike brightened white brightness relative to selecting fuzzy operators are accurate. Hue, saturation and intensity value (HSV) color model images to preserve hue. Jin et al.(2015)[9] has offered a new method for both noise suppression and edge protection. To detect the edge information the structure tensor is applied in wavelet domain. Both reduction and detection and quantified process are integrated as a matrix mask. Mamoria P et all.(2015)[10] has defined the methods of Digital Image processing to change input image into an superior image form.Many methods are presented to improve the images as per necessities.There is different present approaches of Contrast enhancement methods are being equated with the fuzzy based image enhancement method.

4.**PROPOSED METHODOLOGY**



5. RESULTS AND DISCUSSIONS

Towards appliance the planned algorithm, plan and implementation has been prepared in MATLAB applying image control toolbox.

This method provides superior effects than surviving procedures. As revealed in provided numbers, were comparing the outcomes of many images. Results shows assessed method results which are a lot better than existing methodologies. The outcomes shows the performance analysis between existing and in the projected methods.

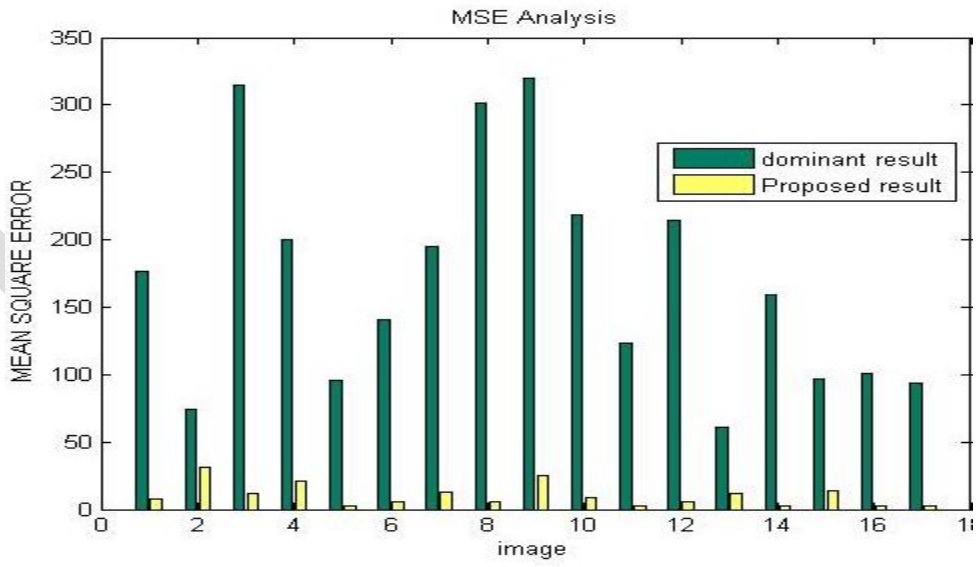
5.1Mean square error:MSE is the best common measure for performance measurement of the surviving technique and the the coded Images.

. $$\mathrm{MSE} = \frac{1}{\mathrm{MN}}\sum_{\mathrm{i}}^{\mathrm{M}} = 1\sum_{j}^{M} = 1(\mathrm{f(i,j)} - \mathrm{f'(i,j)})^2$$

Where $f(i, j)$ signifies the original image and $f'(i, j)$ signifies the distorted image and i and j are the pixel position of the M×N image. MSE is zero when: $x(i, j) = y(i, j)$

Table 1.1. Mean square error

Image	Dominant results	Proposed dominant results
Image 1	177	8
Image 2	74	31
Image 3	315	12
Image 4	200	21
Image 5	96	3
Image 6	141	6
Image 7	195	13
Image 8	301	6
Image 9	335	25
Image 10	218	9



Analysis of mean square error

5.2Peak signal to noise ratio evaluation: PSNR is the ratio between the maximum probable degree of signal and the power of corrupting noise that affect the quality of image. PSNR represent the peak error. To measure the PSNR first complete the MSE. PSNR is defined as:

PSNR is defined as:

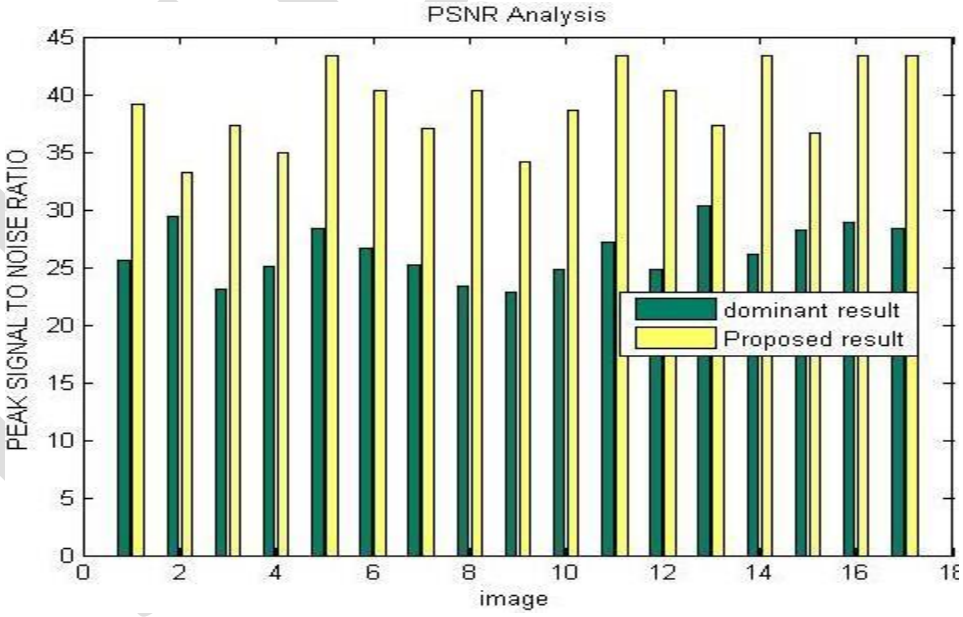
$$PSNR = 10.\log_{10}\frac{MAX_I^2}{\text{MSE}}$$

$$=20.\log_{10}\frac{MAX_I^2}{\text{MSE}}$$

$$=20\log_{10}(MAX_{10})-10.\log_{10}(MSE)$$

1.2 Peak Signal to Noise Ratio Evaluation

Image	Dominant results	Proposed dominant results
image 1	25.6511	39.0999
image 2	29.4385	33.212
image 3	23.1477	37.3390
image 4	25.1205	34.9086
image 5	28.3081	43.3596
image 6	26.6386	40.3493
image 7	25.2305	36.9914
image 8	23.3451	40.3493
image 9	22.8804	34.1514
image 10	24.7462	38.5884

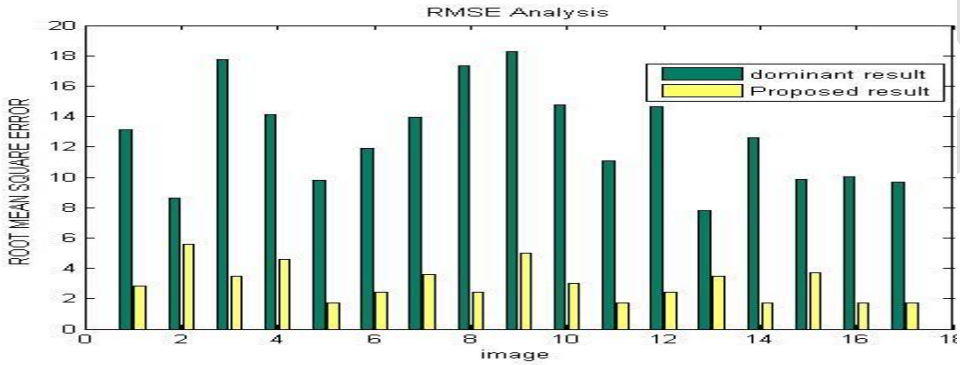


Analysis of Peak signal to noise ratio

5.3Root mean square error (RMSE): The RMSE is used to calculate the difference between the predicted values and values actually observed from the surroundings that is being demonstrated. RMSE need to be minimized.

Table 1.3Root Mean Square Error

Image	**Dominant results**	**Proposed dominant results**
image 1	13.1421	2.8284
image 2	8.6023	5.5678
image 3	17.7482	3.4641
image 4	14.1421	4.5826
image 5	9.7980	1.7321
image 6	11.8749	2.4495
image 7	13.9642	3.6056
image 8	17.3494	2.4495
image 9	18.3030	5



Analysis of Root Mean Square Error

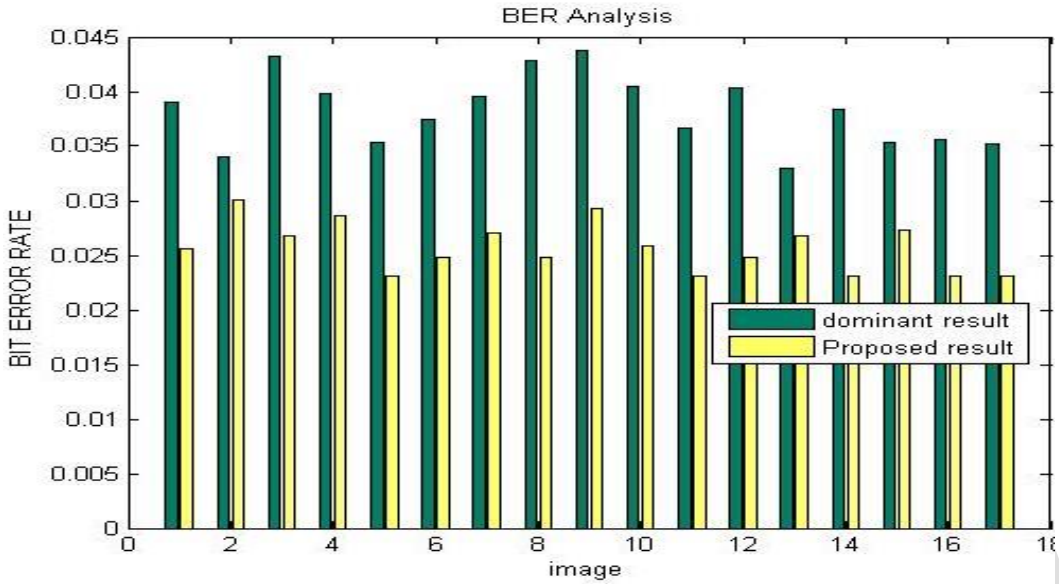
5.4 Bit error rate (BIR): Bit Error Ratio is simply the Bit Error Ratio among the input image and final image. It need to be minimized.

$$\text{BER} = \frac{1}{\text{MN}} \sum_{i=1}^{M} \sum_{j=1}^{N} [f(i,j) - f'(i,j)]$$

f(i,j)signifies the input image and $f'(i, j)$ signifies the slanted image and i and j are the pixel position of the M×N image.

Table 1.4 Bit Error Rate

Image	**Dominant results**	**Proposed dominant results**
image 1	0.0390	0.0256
image 2	0.0340	0.0301
image 3	0.0432	0.0268
image 4	0.0398	0.0286
image 5	0.0353	0.0231
image 6	0.0375	0.0248
image 7	0.0396	0.0270
image 8	0.0428	0.0248
image 9	0.0437	0.0293
image 10	0.0404	0.0259



Analysis of Bit Error Rate

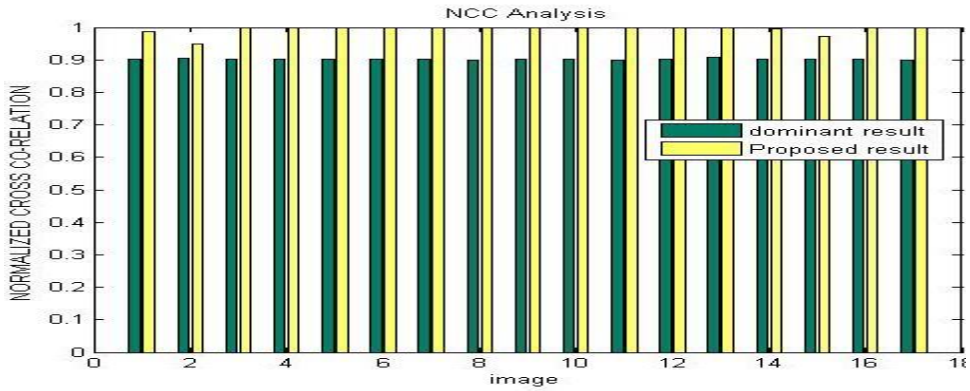
5.5 Normalized cross co-relation(NCC)

An Improved Dominant Brightness Level Analysis (DBLA) Approach for Image Contrast EnhancementNCC necessities to be close to 1, so planned algorithm show improved results than the existing methods as NCC is close to 1 in every instance .The main objective is to preserve NCC as much as possible to close to one.

$$NCC = \frac{\sum_i^m = 1 \sum_j^n = 1(A_{ij} - B_{ij})}{\sum_i^m = 1 \sum_j^n = 1(Aij^2)}$$

Table 1.5 Normalized cross co -relation

Image	**Dominant results**	**Proposed dominant results**
image 1	0.9007	0.9875
image 2	0.9057	0.9489
image 3	0.9010	0.9998
image 4	0.9014	0.9991
image 5	0.9007	0.9998
image 6	0.9014	0.9996
image 7	0.9034	0.9990
image 8	0.9005	0.9995
image 9	0.9012	0.9998
image 10	0.9009	0.9999



Analysis of Normalized cross co- relation

CONCLUSION

This paper represents enhancement approach based on dominant brightness level analysis Fuzzy logic for remote sensing images. The existing technique has been done work on the low-contrast images acquired by a satellite camera . As such no work has done for the images having the color artifacts.In this work proposed the DWT as well as adaptive histogram equalization as the post processing function and also uses the illuminate normalization to enhance the accuracy of image by reducing the problem of noise.The evaluation of technique is done on the basis of the parameters Mean square error, Peak signal to noise ratio, Root mean square value, Bit error rate, Normalize cross co-relation, Normalize absolute error has performed well as compared to existing technique.

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A Theoretical Comparison of Different Live Virtual Machine Migration Techniques in Cloud Computing

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Abstract— Cloud computing is most fascinating technology which attract more attention of users by offering services over the internet. It is a practice to store, manage, and process data by using a network over the internet consisting of remote servers, rather than a private computer. Virtualization is the key technology behind the cloud computing for providing services in cloud surroundings. The process of live migration consists of transferring an active virtual machine across different bodily hosts. Different techniques are summarized in this paper which deals with the performance metrics like minimum total migration time, down time to reduce service degradation. The main objective of this paper to examine gaps associated with existing techniques based on live virtual machine migration.

Keywords— Cloud computing, Virtualization, Migration, Live migration, Pre-copy, Post-copy

INTRODUCTION

Cloud computing is a term mainly used for the delivery of hosted services over the net. It is a practice to store, manage, and process data by using a network over the internet consisting of remote servers, rather than a private pc. Cloud computing is a kind of computing system consisting of assortment and virtualized computers that are vital provision and conferred as mutually or more consolidate computing resources which supports a concession between service provider and customers called service-level agreements(SLA)[8].

Clouds are massive pool of simply useable and accessible virtualized resource (such as hardware, development platform and services). These resources can be changed back to their original state to regulate a changeable load for optimum resource utilization. As the needs of the customers or cloud consumers are changing vigorously, it is the duty of cloud service providers to handle and assign all the finite resources in time. These resources are exploited by a pay-per-use model that guarantees the custom-built service-level agreement. [1][8]

BACKGROUND

A. Virtualization

Virtualization is that part of cloud computing that permits the cloud computing paradigm, because it permits resources to on demand assigned to completely different applications and the resource sharing complexness should be hidden from cloud customers.[2][10] It provides support for the creation of customizable, isolated and secure atmosphere for the execution of applications. Virtualization offers chance to form scalable systems, which provide additional power at minimal price. Therefore, it is used extremely to offer elastically scalable environment on demand and also partition from the elementary physical machine is allowed by a request for a service made by the service users.[10]Virtualization has some major characteristics such as increased security, portability and managed execution which includes isolation, emulation, sharing and aggregation.

B. Virtual machine migration

Virtual machine Migration [18] plays a vital role for proper use of resources in cloud systems.[9][8]Migration of VM can be divided into two categories: a)non-live migration (Off-line) method : this method pause the VM and transfer all the states of VM to focus on host then finally resume the VM within the new host. The advantage is easy procedure and disadvantage is long downtime. b) Live Migration method: In this method, state of virtual machine is conveyed with minimum service disruption from one to another host. Main advantage of live VM migration is user-invisible downtime with quick network [17]

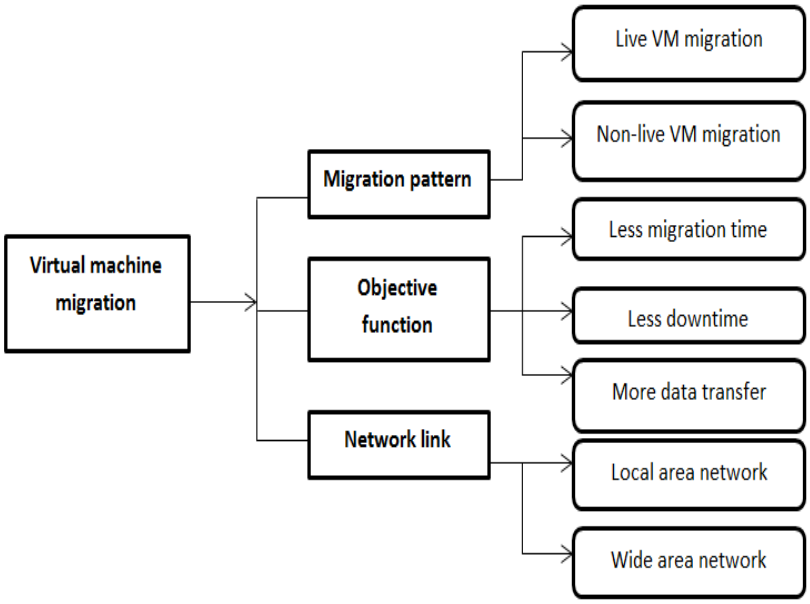

Figure1. Virtual machine migration schemes

C. Live migration

In virtualization, live virtual machine migration is one amongst the inmost characteristics of this technology [17]. It comprehends an approach of moving the all states of running virtual machine from two different hosts. This approach permits a supervisor to necessitate a VM offline for sustentation or promoting while not contenting the system's users to downtime. This offers fascinating benefits that includes [4]:

1) Load balancing: under this productive usage of resources are provided while during migration of VMs.
2) Power efficiency: power off resources are permitted when Virtual Machines with less workload are centralize to less host machines
3) Maintenance: supervisor can dislocate virtual machine to other nodes without any prominent interruption of service for users, before machines are carrying forward for maintenance purpose.

D. Approaches employed for Live Migration:

The two mainly used approaches for live migration are –

1) Pre-copy approach and
2) Post copy approach

In the Pre-copy approach, the mixture of push phase with halt and copy phase is served .[3] Pre-copy approach iteratively copies pages of memory from the source machine and then transfer it to the destination machine, this whole process occurs without even stopping the migration process of the virtual machine once. As in Pre-copy approach there is a copy of memory page on each side, hence it provides with high trustworthiness in opposition to system slip-up. In the post-copy approach every single memory page is transferred just only one time, which is its key advantage over the pre-copy approach. Memory page can be found at single side solely in the post-copy approach. Whereas as it is also opposite to the former approach as it serves the mixture of pull phase with halts and copy phase. [3].There is basically three sections of the Memory Transfer process [3]:

1) Push phase: A certain number of pages are pushed earlier to the new destination prior to the source virtual machine when it transfers to destination and also a number of tailored pages are resent to ensure reliability.
2) Halt and copy phase: Halt and copy phase is the simplest approach in which at the source the source virtual machine is stopped and entire virtual machine is copied or transferred to the destination so resumed it at its designated destination.
3) Pull phase: In this particular phase the page is pulled across the network from the source virtual machine when a page is required which is not copied earlier during the implementation on target machine which is initiated by the virtual machine.

ANALYSIS OF LIVE MIGRATION TECHNIQUES

For migration of Virtual Machine from one host to other, there has been an active research of live migration and a range of techniques are projected. To gauge the performance of live virtual migration strategy subsequent metrics may be employed.(a)Downtime: migration downtime is the period of time for which user have to wait to keep working on virtual machine;(b)Total Migration Time: the total time needed for the migration of virtual machine to destination machine and hence to begin it on same is known as Total Migration Time;(c)Total Data Transmitted: this term is used to designate the total amount data is which is transferred whilst synchronizing the both virtual machine condition and the memory image accounts for the immense majority[15]. Relating to the concept of Live Migration several studies has been done:

A pre-copy technique [2] which is based on time series which is better than the former is discussed. To satisfy Service Level Agreements (SLAs) live migration is the suitable technique to migrate virtual machines swiftly and plainly. With the assistance of the time series forecasting procedure, recently uploaded dirty pages (high dirty pages) are known more exactly, and hence they are transmitted into the last round of iteration, so as in order to cut back redundant, repetitive broadcast of dirty pages. The total migration time will be considerably reduced by performing this method.

In [3], author argued about the migration of data from one virtual machine to a different virtual machine. There exists several methods that makes process of migration seemingly effective but however still throughout migration, variety of copied pages are transmitted that results in increasing total migration time and total downtime. Hence there is utter requirement for process that cut back moving of copied pages. To reduce the superfluous transfer of pages an approach was projected which termed modifying the optimized pre-copy and its mixture with Characteristic Based Compression (CBC) algorithm two parameters will be handled viz. (i) total downtime and (ii) total migration time which will create migration process more realistic

By accumulating a bitmap page [4] which marked the regularly updated pages gave a better pre-copy method on Xen3.3. In the iteration technique, regularly reorganized pages are placed into the bitmap of the page, and that placed pages can solely be transferred within the final round of the iteration technique which assures that often reorganized pages are transferred only one time that reduce total downtime and total migration time.

The modified the pre-copy method [5] through the usage common memory storage. The assumption that was taken was that connection of each and every physical host with the common storage and then transmission of merely those pages which are not available in shared storage. A method has been proposed by them to trim down the overall time needed to transfer an operating VM from one host to different whilst maintaining the minimum downtime. On the basis of the recent observation that trendy working systems utilize the higher fraction of the physical memory to cache data from the secondary storage, hence this procedure records the Virtual machine's input output operations to the storage device which is attached to the network and hence regulates an up to date tracking of memory the pages that presently exists in indistinguishable form on the storage device. Rather than moving pages from source to the designated host, in the iterative pre-copy migration process the memory-to-disk tracking is distributed to the designated host which further then collects the constituents straightly from the network-attached storage device. Therefore, resulting in reduction of total data transferred.

The two phase strategy [6] that employs Second Chance (SC) method for determination of high dirty pages. Verification of To-send and To-skip will occur in the first phase. If each of the parameters are equivalent to one and zero respectively after that they are passed to second chance. The page gets migrated to the target only if the page is found clean during this stage. Therefore, by using this strategy duplication of frequently modified pages is averted by using two phase method.

A technique [7] that lessens the quantity of transmitted memory of live migration is discussed. They named that technique "memory reusing". The memory image of the virtual machine is kept within the source host when a VM is migrated to different host. Memory pages will be reserved incase when the VM returns back to the initial host later so that the reserved memory image could be reused. They also employed a scheme called "Miyakodori". It utilizes the memory reutilizing in live migrations which results in reduction of the number of transmitted memory of live migrations and also when once incorporated with dynamic VM consolidation system 87% of additional energy consumption will be reduced.

The two major performance metrics [8] that the customers of a VM service care about the foremost is total migration time and downtime. As a result they are anxious regarding degradation in quality of service and the extent for which the service is entirely not available. They used a pre-copy approach however this technique is economical only in the scenario when the page dirtying rate is exceptionally towering as the total migration time also increases with it. They putted forward a way during which the

migration time can be trimmed down by moving the page that don't seem to be lately used and by sending the register reports of modifications rather than sending the dirty pages again.

A memory exploration and encoding [9] approach is proposed. In this approach firstly valuable pages are identified and after that compression using run length encoding (RLE) algorithm is applied. Pre- copy being the existing method, which memory page is used cannot be distinguished, leading to transfer massive amounts of useless memory pages. For various Guest OS, ME2 is required to write Exploration Module .This technique helps in reducing the migration time and downtime.

In [10], author described implementation of the function of delta compression throughout the transport of memory pages in order to lengthen migration throughput and thus reducing the downtime. This algorithm for live migration is enforced as an alteration to the KVM hypervisor. A major decrement is indicated in the migration downtime when its performance is evaluated by migrating operating VMs with absolutely different kind of workload. They indicate that there is high risk of interruption in service when VMs migrate with high workloads or over low-bandwidth networks. As in delta compression as data is kept in the form of changes among versions, peril of service will be minimized. Either the dirtying rate has to be minimized or the network throughput has to be increased in order to obtain best performance.

In [11], author projected that using post-copy technique with flexible pre-paging which is engaged to shun moving of copy pages and to shun the moving of free memory pages dynamic self-ballooning process is used in order to enhance the total migration time and total pages being transferred. The comparison between post-copy against the typical pre-copy method on top of the Xen Hypervisor is done extensively. By utilizing a variety of VM workloads development is exhibited in several migration metrics also the pages which were transferred, in addition to that total migration time and network overhead. The rate of migration will surely be increased by this.

In [12], author showed a blueprint and execution of a unique memory compression (MECOM) that initially uses memory compression to present quick, firm virtual machine migration, whereas ensuring the services of virtual machine up to some extent exaggerated. On the basis of memory page uniqueness, they manufactured a flexible zero-aware compression algorithm for leveling the efficiency and the charge of virtual machine migration. In each round at the source node data which is being transferred is compressed by their algorithm and after reaching at the target it is decompressed. Due to this compression algorithm system overhead could get amplified.

A technique [13] is projected a technique with efficient VM migration referred to as bitmap matrix. This approach deplete the overall migration time in live migration. Traditional pre-copy approach further improved by taking sample number of times. A fixed time-slot variable they used for determine a period of time with each sampling. By demonstrating many experiments they conclude that there is intensive decrease in both migration and downtime.

In [14], author projected an improved virtual machine consolidate system which uses a post-copy live migration strategy that intensively help to reduce performance downfall. Due to usage of dynamic resources, VM positions are heavenly efficient. In this strategy a model of consolidation system has been formed and its feasibility is checked with the help of doing certain experiments. As a result by using post copy strategy, consolidation system gained a better performance assurance rather than pre-copy migration.

In [15], author discussed about the strategy of migration with data duplication in virtual machine According to the author, the self-similarity of moving memory image of machine is checked by this technique. Here hash key based fingerprints technique is used to seek out selfsame pages. Total data transferred rate is to be minimized. Another encoding scheme (RLE) is used mainly for minimizing data transfer rate. Overall by comparing with another system like Xen's default Pre- Copy mechanism, this technique will lower down more total data transferred throughout migration.

In [16], author implemented a scheme where downtime and total migration time is to be minimized for live migration. They proposed a scheme where threshold values are set-to see that the pages should be moved within the halt-and-copy phase on the basis of memory alteration prediction method. By incorporating the likelihood of memory alteration, the chance of memory modification may be determined and might also the pages with the largest range of alteration can be determined.

COMPARITIVE ANALYSIS

The various famous techniques that are used by various researchers are categorized and their merits and demerits are outlines in below table 1:

Table 1: Comparative Analysis of Live Virtual Machines Strategies

S No	Techniques	Conclusion	Merits	Demerits
1.	Enhanced time-series pre-copy strategy**[2]** J. Arpurtharaj et al. **(2013)**	Constantly contemporize dirty pages that find out more accurately Transfer in last round of replication	Minimized total migration time	Downtime overhead.
2.	Optimized pre-copy **[3]** Megha R. desai et al. **(2015)**	Reduce unnecessary transfer of pages. Characteristic Based Compression (CBC) algorithm is used.	Overall migration time and is reduced Down-time is minimized	Compression overhead may arise
3.	Improved pre-copy**[4]** F. Ma et al. **(2010)**	Constantly updated pages transferred at the end of last round and only one time.	Migration time and downtime get decreased	Send pages on basis of previous iteration not current.
4.	Live migration **[5]** C. Jo et al. **(2013)**	Attachment of physical machines with shared storage is taken into consideration	Total data transferred get decreased.	Migration time is more.
5.	Two-phase pre-copy strategy**[6]** Lin C-C et al. **(2012)**	Two phase strategy used by giving second chance to the used pages Heavily dirty bit rate is of pages are identified	Duplication of frequently updated pages are avoided	More service Downtime
6.	Reusing memory approach for VM consolidation**[7]** Soramichi Akiyama et al**. (2012)**	Memory image of physical machine is kept on host and reused it again in every iteration Results in minimization of transferred memory	Downtime and migration time has been reduced	More Data to be transferred
7.	Optimized pre-copy approach using log records**[8]** Anju mohan et al. **(2013)**	Pages that are not recently used are transferred Firstly Log records of alterations are taken and send for final results.	Migration time is reduced	Still exist downtime overhead
8.	Compression based on run length encoding(RLE)**[9]** Y. Ma et al. **(2012)**	Differentiate VMs useless memory Result in decrease in total transferred memory	Reduced downtime and migration time	Existence of Compression overhead.

9.	Delta memory compression approach**[10]** P. Svard et al. **(2011)**	Modified KVM hypervisor is used. Compression leads to more data transfer	Reduced downtime Increases migration throughput	Compression operations introduced additional overhead
10.	Post-copy approach**[11]** R.hines et al. **(2009)**	Prosecution states of virtual machines are migrated first Overall pages in the memory are transferred once	Amount of memory pages reduced during transfer.	Downtime overhead
11.	Adaptive memory compression approach**[12]** H. Jin et al. **(2009)**	Memory pages are compressed first and transfer large amount of pages.	It provides quick and steady VM migration. Minimizes the downtime and total migration time.	Compression operations introduced additional overhead.
12.	page bitmap**[13]** Cui W et al. **(2010)**	Pages which are changing Continuously are kept simultaneously as a bitmap. They are further moved at end in last round	Reduced migration time Minimized total data transfer rate	In wide-areas ,VM migration is not suitable
13.	Post copy approach**[14]** T. Hirofuchi et al. **(2011)**	To resolve the excessive use of server nodes, Virtual machines are suddenly lashed among the hosts.	Performance degradation less. Memory-intensive workloads also reduced to half.	Live migration may not be completed properly. Introduced some overheads.
14.	Migration with data de-duplication**[15]** X. Zhang et al. **(2010)**	To find similar memory pages, fingerprints using hash mechanism is employed. Run Length Encoding mechanism is taken into consideration to remove the duplicate information	Reduce migration time, total transfer rate and downtime.	Compression overhead
15.	Pre-copy approach**[16]** Tin-Yu et al. **(2013)**	On the basis of the memory alteration forecast approach, different threshold values are assumed.	Decreases downtime and total migration time	Performance degradation.

SECURITY CONCERN DURING MIGRATION

The major concern while shifting virtual machines from source machine to destination machine is their security. Some of the major security threats while transferring of virtual machine from source machine to destination server are stated below:

1. Assailant steals the Bandwidth by taking control over source virtual machine and hence transferring its virtual machine to destination.
2. By advertising false resource accessibility, assailants may attract more virtual machines towards it.
3. Active exploitation.
4. Passive intrusions.

To provide high level of data security, the Cloud Service Providers generally use the process of cryptography. As cloud service provider give them surety of confidentiality and integrity to transmit the data. Therefore, secure data migration is most important issue. During the migration process, to avoid attacks certain Cryptographic algorithms and authentication keys are used. The initiator of migration and the destination machine strictly enforce the following during migration:

- Migration initiator legitimacy.
- During migration, maintenance of trust chain among entities.
- Secrecy of Migration process.

Legitimacy, secrecy and confidentiality of source and destination are the main three steps for effectively implementing the security of the migration process.

GAPS IN LITERATURE

Various shortcomings in the former techniques are listed below in the succeeding section.

a) In the previous approach downtime and the migration time used to be same since Virtual Machine is not started on target host until all its pages are sent to target. Drawback of this method was that Virtual Machine services are completely unavailable until it is started on destination causes increased downtime.

b) The major flaw of present migration techniques is that they transport a hefty amount of data to migrate a Virtual Machine. Due to transferring of data in such huge amount causes two issues:

- Performance of the applications running in the Virtual Machine is degraded during the process of migration because it accesses memory.
- Consolidation gets delayed because several Virtual machines get consolidated into the host at once which results in congestion in the network of the host.

c) Compression leads to distortion of the information so in existing techniques compression is overhead.

CONCLUSION

By the virtue of Virtualization, several resource provisioning capabilities which are flexible as well as dynamic are supplied to the end users. The process of live migration consists of transferring an active virtual machine across different bodily hosts. Achievement of least down time and migration time is the main aim of the migration process. This paper has presented a review on various live virtual machine migration approaches. The assessment has clearly indicated that each approach has its own pros and cons. On several parameters proportional study has been done of virtual machine migration. The other key concern during the virtual machine migration process is security. The communication is exposed to assailants during the virtual machine data transfer. In order to minimize the loss of data on memory space to assailants and to increase the privacy of the data which is being migrated, a secure migration is done by using the cryptographic algorithms in future. In the existing approaches compression of data is done but compressing the data will lead to some distortion in the information. So during the memory transfer, a performance model, focusing on reducing the data amount transfer size and the memory that is stored on the host for time in advance used by restating and then using the existing data will be proposed. This will prove to be useful in the pursuit of minimizing the migration time as well as downtime.

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A Comparative Review Of Various Approaches To Ensure Data Security In Cloud Computing

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Abstract— Cloud Computing is a rising field in the history of computing. The cloud computing is a collection of clouds that act as the large pool, inside which there are several, accessible and virtualized resources. These resources include hardware, development platforms. It provides gigantic storage for data and faster computing to customers over the internet. It shifts the database and application software to the large data centers, as a result management of data and services trustworthiness becomes a major problem. In existed cloud computing system there comes many security problems as number of organizations increases. So, cloud security becomes essential part for securing the data which resides on the cloud. This paper has presented a comparison between some well known data security techniques. The review has clearly shown that each technique has its own benefits and limitations. And none of each is perfect if we take security parameters into consideration.

Keywords— cloud computing, data security, cryptography, steganographic, survey.

INTRODUCTION

Cloud computing is an on-demand and self-service internet infrastructure that provides delivery of computing services. It is considered to be the combination of virtualization and automation. It separates the operating system from the physical hardware. User can pay for the services it wants form the cloud and it is also scalable as shown is fig-1. It can be divided into three major categories: Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). It has deployment models: Public Cloud, Hybrid Cloud, Private Cloud, Community Cloud. Public Cloud can be accessed by everyone therefore a more secure mechanism is needed to secure it. E.g Amazon EC2, Google Cloud, etc. Private cloud is accessibility and services are provided by particular organizations. Hence, it is more secure than public clouds. Hybrid cloud which is the amalgamation of private and public cloud in which there are two sections: critical and non-critical activities. Critical activities are performed by private cloud and non-critical activities are performed by public cloud. These deployment models help organizations and businesses to secure user applications as well as cost benefits by keeping applications and shared data on the public cloud. [9]

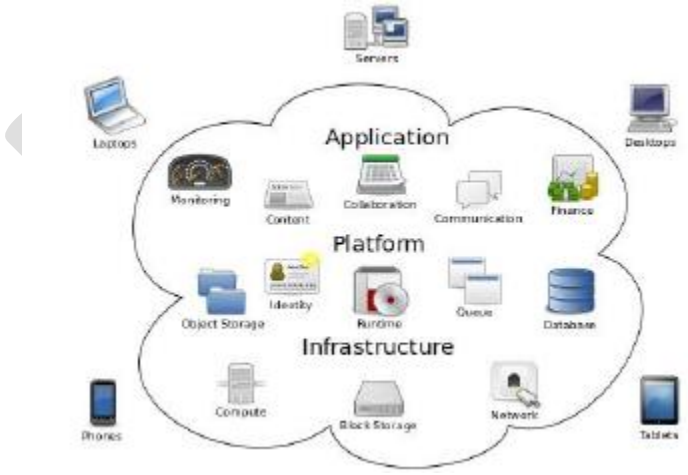

Fig-1 [10]
A general view of Cloud Computing

The cloud computing model has three functional units or components as listed below:

1. ***Cloud service provider:*** It is an entity which manages Cloud Storage Server (CSS). It has a large pool of storage space that preserves the clients' data. It has high computation power.
2. ***Client/Owner****:* it can either be classified as an individual consumer or organizations. It is an entity, which has large data files to be stored in the cloud and relies on the cloud for data maintenance and computation.
3. ***User:*** It is a unit, which is register with the owner and uses the data of owner stored on the cloud. The user can be an owner itself as well.[1]

The distributed nature of cloud makes it a major concern about security and privacy. The Cloud Security Alliance's (CSA) emphasizes that cloud computing needs more security than traditional IT solutions. This is due to the fact that security responsibilities for both the service provider and consumer are different in deployment and delivery models. These security solutions need to address the three aspects of computer security: Confidentiality, Availability and Integrity [10]

1. ***Confidentiality:*** it ensures that the assets are accessed only by authorized parties. Only those have the access will actually get the access. For example: access of reading, viewing, modifying etc. this can also be called as secrecy or privacy. The encryption and cryptography techniques are the access control mechanism for preserving and supporting confidentiality in the Cloud.
2. ***Integrity:*** It means that modification can be only done by authorized parties or in authorized ways. Modification can be of any type like: writing, deleting, creating, changing, and changing status.
3. ***Availability:*** It means that assets are accessible to authorized parties at appropriate times. If some person or system has legitimate access to a particular set of objects, that access should not be prevented. For this reason, availability is sometimes known by its opposite, denial of service.[10]

We provide here an overview of cloud computing. The rest of this paper is arranged as follows: Section II introduces cloud data security issues; Section III describes scope of comparative study; Section IV discusses literature survey; Section V shows the comparison table; Section VI discusses gaps in literature survey; section VII describes conclusion and future scope.

CLOUD DATA SECURITY ISSUES

1. ***Threat from cloud service provider****:* The cloud stores the data after being transmitted by the owner. But data is not in the control of owner so CSPs can't be trusted blindly. By encryption of data stored at the cloud this problem can be solved. A certificate as used in the proposed model encrypts private communications over the public Internet. SSL consists of public and private keys for encrypting/decrypting the data, so that only the key owners can read the data. For example: 128-bit SSL encryption encrypts the data in such a way that attackers find it difficult to decrypt the data by brute force attack. [1]

2. ***Loss of user identity and password****:* For unauthorized access, authentication is needed in the cloud security system. Thus, if in any case the user losses or by mistake reveals his/her username and password to any unknown person, the data can be in leaked out. So to protect the data, another parameter is added to make data access in cloud. In this, the user will be asked a security question whose answer is known to the authorized user only, so the unauthorized user will not be able to hack the data. He must have given the correct answer to get the access to the data. Moreover, it is necessarily that the attacker must know the master key for decrypting the data that is received from the cloud. [1]

3. ***Performance Unpredictability:*** For large scale distributed systems, the performance unpredictability is a considered to be a serious problem. It is observed that virtual m/c can share CPUs and RAM quite well but cannot share the network and disk I/O. A better Operating System and architecture can help to improve these problems. And for improving performance Flash (semiconductor) storage should be used rather than mechanical disks. The cloud computing the scalable computation is well performed but there is still an open issue for scalable storage i.e., the ability to scale up or down on demand. [10]

4. ***Confidentiality:*** Data confidentiality becomes a major issue in cloud as user store their data applications on the cloud. User data is stored at remote locations and cloud infrastructures are used for storing backups, monitoring logs or servers. There is shared system where customers can share their data and applications. So sometimes there comes a problem of confidentiality because of malicious attackers, activities or system failures. So there must be powerful mechanism to secure, sensitive as well as less secure data.

5. ***Data Acquisition****:* To acquire data from different hardware we use a technique called data acquisition. For this the users and service providers should know some basic knowledge of data streaming and peer to peer operations to know from where and how we are accessing the data.

6. ***Multi-tenancy****:* Multi-tenant environment let multiple user access resources on the same physical machine. It is where cloud shares resources, networks, storage and services. It provides better utilization and is cost effective. Controlling the data and information becomes difficult when malicious attacker harms the network or system. For secure cloud researches are made to solve these problems.

7. ***Data Integrity and Authenticity:*** It means that modifications can be only done by authenticated parties or in authorized way and refers to data, software, and hardware. These include protecting data from unauthorized modification, deletion. Data integrity is difficult in cloud environment as cloud serves with multiple databases, servers, applications and networks. Authentication is act to control access of data and information. Only authorized users are allowed to access the data. As cloud is open environment so there comes problem of authorization and access of data.

8. ***Cyber-Attacks****:* We use the facilities provided by the internet as technology is growing day-by-day. But many security problems are also arising with it. Cyber-attack is one of them. In this malicious codes are used to change user data and information which results in harmful effects to data which leads to cybercrimes like information and identity theft, malware, phishing, spoofing, password sniffing, Denial-of-service(DOS) and distributes denial-of-services(DDOS) attacks, Trojans and viruses. [5]

Table 1: Represents the types of attack along with its description.

Table-1
Types of Attack [6]

Name of Attack	Description
Repudiation	Sender tries to refuse, or refute the validity of a statement or contract which is send by him/her.
Replay Attack	When an attacker or originator sends a valid data with intention to use it maliciously or fraudulently.
Elevation of Privileges	An attacker may access unauthorized to information and resources.
Viruses and Worms	Very common and well known attacks. These are piece of code that decrease the performance of h/w and application even these malicious codes corrupts files on local file system.
Identity Spoofing	It occurs when an attacker impersonates the users as the originator of the message in order to gain access on a network
Man-in-the Middle Attack	It occurs when an attacks infiltrates the communication channel in order to monitor the communication and modify the message for malicious purposes.
Differential Analysis Threats	When new versions are released, a differential analysis of the new and old version would indicate where difference in the code exists.
Eavesdropping Information Disclosure	It occurs when attacker gains access in the data path and gains access to monitor and read the messages.
Tampering	An attacker may alter information either stored in local files, database or is sent over public network.

SCOPE OF COMPARATIVE STUDY

Data security technique is still an open research in cloud computing and found to be challenging task in cloud research. Scope of comparative study is to improve the performance of various algorithms that are used in improving the data security. This paper has presented review of various data security techniques. The paper has clearly shown that each technique has its own benefits and

limitations over each other. Further, comparison of different research papers in the terms of technique used, its issues discussed, benefits and limitations have been shown in the comparison table. These techniques are as follow:

RSA*:* It is the most recognizable asymmetric algorithm. And is a public key algorithm. RSA was created by Ron Rivest, Adi Shamir and Leonard Adleman in 1978. It uses two different keys for public/private key encryption and decryption. [9] User data is encrypted first and is placed on the cloud. When the user wants that data it is first checked for authentication. Only the authenticated user gets the access of the data. As RSA has private key which is known by the user and public key is known by all. The encryption is done at the cloud service provider side and the decryption is done at the user side. Once the data is encrypted with the public key, it can be decrypted with the corresponding private key only. [4]

AES: The AES stands for Advanced Encryption Standard. It replaces the DES algorithm. It supports on various small platforms and is fastest, secured and flexible. It is a symmetric-key block cipher algorithm. It has 3 fixed 128-bit block ciphers with cryptographic keys i.e. 128 bits, 192 bits and 256 bits. The size of the keys is unlimited and the block size is maximum upto 256 bits. [8]
DES: The DES stands for Data Encryption Standard which was developed in 1977 by National Institute of Standards and Technology (NIST). 64-bits is used for key size and block size in DES. In 1977 many attacks were found which makes DES as insecure block cipher. [8]

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3DES*:* the 3DES was an improvement over the traditional DES algorithm. It was developed in 1998. It is similar to the DES but here we apply three times encryption level i.e. Three phase encryption. This makes it slower than other encryption block cipher methods. The block size and key size of 3DES is 64-bits and 192-bits respectively. As it takes more time to encrypt the data so, it is considered to be low in performance, consume more power and throughput is also low. [8]

KP-ABE*:* It stands for Key Policy Attribute-Based Encryption. It is a public key cryptography primitive for one-to-many communication. Public components are defined for each attributes used in this algorithm. The encryption associates the set of attributes to the message by encrypting it with the corresponding public key components. An access tree over data attributes is defined by each user. If the data structure satisfies then only the user is able to decrypt a cipher text. [3]

PRE: a Proxy Re-Encryption is a cryptographic primitive in which a semi-trusted proxy is able to convert a ciphertext encrypted under Alice's public key into another ciphertext that can be opened by Bob's private key without seeing the underlying plaintext. [3]

LITERATURE SURVEY

In 2015, V. Pant et al. [5] discuss a mechanism for storing the data and information. Cryptography and steganography techniques are used in the paper. The 3 step data security model has been introduce to secure the cloud data. Firstly cryptography is used with RSA then stenography technique is used to hide the data and in final step the data is accessed by decrypting the data using RSA algorithm.

In 2012, SK. Sood et al. [1] proposed a mechanism to ensure security of data from owner of cloud to the user. For better results of security combined approach of MAC, classification of data and index and encryption is used. Also to protect the data check the integrity and authentication, the author has divided the data into 3 sections: index builder 18bit SSL encryption, Message authentication code and a double authentication of user by owner and other by cloud.

In 2013, P. Yellamma et al. [4] proposed RSA technique to provide data storage and security in cloud. In this paper first key is generated, then encryption, decryption is applied in virtual environment.

In 2016, A. Bhandari et al. [9] proposed a framework which considers the time and memory limitations with the help of AES algorithm and encrypting it with RSA algorithm. The aim is to preserve sender, receiver authentication, integrity and confidentiality. Error localization algorithms are also applied.

In 2015, A. Dhamija et al. [2] discuss a secure migration of data by combining cryptography and steganographic techniques. For cryptography process, we use simple technique of one's compliment SCMACS. For encryption, decryption symmetric keys are used. The main advantage of this approach is that it generates private key so that no one can gain the access to the data.

In 2013, Rewagad et al [6] They have proposed an architecture to protect confidentiality of data stored in cloud by making use of digital signature and Diffie Hellman key exchange with (AES) Advanced Encryption Standard encryption algorithm .Even if the key

in transmission is hacked, the facility of Diffie Hellman key exchange make it useless because key in transit is of no use without user's private key, which is provided only to the legitimate user.

In 2010, C. Wang et al. [3] discuss the problem of fine-grainedness, data confidentiality and scalability in cloud. The KP-ABE, proxy re-encryption and lazy re-encryption techniques are used. Moreover, the data owner can delegate most of computation overhead to powerful cloud servers.

In 2015, N. Surv et al. [8] presented a secured data mechanism to solve the data security problem in cloud. AES encryption and decryption scheme is used to make cloud users secure and to guarantee the privacy of their data.

In 2010, Somani et al. [7] In this RSA algorithm is used to ensure the confidentiality aspect of security whereas Digital signatures were used to enhance more security by authenticating it through Digital Signatures. The approach used carryout encryption in 5 steps. In first step, key is generated. In second step, digital signing is performed and in step 3 and step 4 encryption and decryption is carried out. In last step Signature verification is performed.

In 2012, Sherif et al. [12] discuss the main problem of data security. They presented the data security model of cloud computing based on cloud architecture. They use various encryption algorithms (RC4, AES, DES, 3DES, MARS) for analyzing the most suitable technique and determine its performance. The most suited software is applied in Amazon EC2 Micro instance for evaluation process.

In 2011, Prasad et al. [13] discuss a new approach for authentication. This 3-dimensional approach is capable of removing various existing problems like denial of services, data leakage etc. the technique is more flexible and capable to meet the rising demand of today's complex and diverse network.

In 2012, Volker et al. [11] presents a security architecture that enables a user of cloud networking to define security requirements and enforce them in cloud networking infrastructure. This allows various kinds of optimization, like reducing latency, network load, etc.

COMPARASION TABLE:

Table 2: Following are some of the details of literature survey paper which includes the published year of the paper, techniques names that is been used in the paper, the major issues that paper discussed followed by benefits and limitations that is been observed in the paper.

Table-2
Summary of data security models papers

Ref no.	Year	Techniques	Issues	Benefits	Limitations
[5]	V. Pant et al. (2015)	Cryptography, steganography	To tackle security problems	Provide security for image data	Algorithms are not robust, data hiding capacity poor
[4]	Yellamma et al. (2013)	RSA	To protect data from unauthorized attackers	Improve security of high potential data	Slow due to large mathematical computations.
[9]	A. Bhandari et al. (2016)	HMAC, RSA, AES	To design a secure framework	Searching is easy due to indexing, Study of various cryptography tech, Gives better execution of time.	Algo not proven mathematically, Time complexity is not given
[1]	SK. Sood et al.(2012)	Combination of MAC, classification of data indexing	Data leakage, modification, privacy of users confidentiality, etc	The combine tech provides better security than executing them individually, Better flexibility,	Time consuming

[2]	A. Dhamija et al. (2015)	Cryptography, steganography	Secure migration of data	Provides a multilayered protection to data, Less costly app.	Poor Implementation , Comparisons with other approaches not given.
[3]	Wang et al. (2010)	KBE, Proxy re-encryption, Lazy re-encryption	To remove heavy computational overhead when fine grained data	Achieve fine – grainedness, scalability, Efficient data sharing framework	User access privilege is not protected from the proxy server. Do not support User secret key accountability.
[6]	Rewagad et al.(2013)	Diffie hellman key exchange, AES	To protect confidentiality	Provide 3 way mechanism which is tough to crack	Time consuming
[8]	N. Surv et al. (2015)	AES	To ensure integrity in the network.	Fast, flexible, secured mechanism Support all types of data(text, audio, video, etc),	Too many keys to distinguish.
[7]	Somani et al. (2010)	RSA	To access cloud storage methodology and data security	Improves security of network	Slow technique, Not efficient for large for large data.
[13]	Prasad et al. (2011)	3 dimensional technique	To prevent denial of services and data leakage, etc	Flexible, capable to handle complex network problems.	Unencrypted data can be easily retrieved by unauthorized user.
[11]	Volker et al. (2012)	Security architecture for cloud networking	To preserve the security goals of service users	Allows various kinds of optimizations like reducing latency or network load.	Need for Extension of architecture by auditing techniques, More transparency is required for service users.
[12]	Sherif et al. (2012)	Various encryption algorithms (RC4,RC6, AES, DES, 3DES,MARS)	To implement various encryption techniques and analyzing them in cloud security	To implement software in enhancing cloud security and apply this s/w in Amazon EC2Micro instance.	Time consuming.

GAPS IN LITERATURE SURVEY

Subsequent section contains the various limitations in earlier techniques.

1. Existing techniques have not implemented mathematically to provide time complexity, security theorems and proofs.
2. Automatic classification of data is not done in previous methods.
3. More secure cryptographic algorithms should be used in combinations so as to provide confidentiality to user data.

CONCLUSION

Data security has found to be challenging task in cloud computing. This paper has presented a review on various data security techniques. The review has clearly shown that some each technique has it benefits and limitations. But none of technique is found to be effective in all cases. In future, the data classification will be implemented so that the user efforts in recognizing the category of data become less. This will help them in saving the time and more accurate results will come. Moreover, the more attention will be on users highly confidential data by combining different data security algorithms.

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College Information Chat Bot System

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Abstract-User interfaces for software applications can come in a variety of formats, ranging from command-line, graphical, web application, and even voice. While the most popular user interfaces include graphical and web-based applications, occasionally the need arises for an alternative interface. Whether due to multi-threaded complexity, concurrent connectivity, or details surrounding execution of the service, a chat bot based interface may suit the need.

Chat bots typically provide a text-based user interface, allowing the user to type commands and receive text as well as text to speech response. Chat bots are usually a stateful services, remembering previous commands (and perhaps even conversation) in order to provide functionality. When chat bot technology is integrated with popular web services it can be utilized securely by an even larger audience

1. Introduction

A CHATBOT is an artificial person, animal or other creature which holds conversations with humans. This could be a text based (typed) conversation, a spoken conversation or even a non-verbal conversation. Chat bot can run on local computers and phones, though most of the time it is accessed through the internet. Chat bot is typically perceived as engaging software entity which humans can talk to. It can be interesting, inspiring and intriguing. It appears everywhere, from old ancient HTML pages to modern advanced social networking

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websites, and from standard computers to fashionable smart mobile devices. Chat bots talk in almost every major language. Their language (Natural Language Processing, NLP) skills vary from extremely poor to

very clever intelligent, helpful and funny. The same counts for their graphic design, sometimes it feels like a cartoonish character drawn by a child, and on the other hand there are photo-realistic 3D animated characters available, which are hard to distinguish from humans. And they are all referred to as “chat bots”.

Modules and their Description

The system comprises of 3 modules as follows:

- **Admin Login**
- **Bot Chat**
- **Text to Speech**

Description: -

Admin Login:
User has to login to the system to access various helping pages through which user can ask queries to the system with the help of bot.

Bot Chat:
User can chat with the bot it implies as if enquiring to the college person about college related activities.

Text to Speech:

The bot also speaks out the answer.

2. Review of Literature

Existing System

1.Emanuela Haller and Traian Rebedea**, "Designing a Chat-bot that Simulates an Historical Figure"**, IEEE Conference Publications**,** July 2013.
There are many applications that are incorporating a human appearance and intending to simulate human dialog, but in most of the cases the knowledge of the conversational bot is stored in a database created by a human experts. However, very few researches have investigated the idea of creating a chat-bot with an artificial character and personality starting from web pages or plain text about a certain person. This paper describes an approach to the idea of identifying the most important facts in texts describing the life (including the personality) of an historical figure for building a conversational agent that could be used in middle-school CSCL scenarios.

2. Maja Pantic, Reinier Zwitserloot, and Robbert Jan Grootjans, **"Teaching Introductory Artificial Intelligence Using Asimple Agent Framework"**, IEEE Transactions On Education, Vol. 48, No. 3, August 2005.

This paper describes a flexible method of teaching introductory artificial intelligence (AI) using a novel, Java-implemented, simple agent framework developed specifically for the purposes of this course. Although numerous agent frameworks have been proposed in the vast body of literature, none of these available frameworks proved to be simple enough to be used by first-year students of computer science. Hence, the authors set out to create a novel framework that would be suitable for the aims of the course, for the level of computing skills of the intended group of students, and for the size of this group of students. The content of the

introductory AI course in question is a set of assignments that requires the students to use
intelligent agents and other AI techniques to monitor, filter, and retrieve relevant information from the World Wide Web. It represents, therefore, a synthesis of the traditional objectivist approach and a real-world-oriented, constructivist approach to teaching programming to novices. The main aim of implementing such a pedagogy was to engage the students in learning to which they personally relate while attaining intellectual rigor. Classroom experience indicates that students learn more effectively when the traditional objectivist approach is combined with a constructivist approach than when this orthodox approach to teaching programming to novices is used alone.

Problem with current scenario

- Traditionally, the chat bot system is not known to people who are not more into the technology.
- Even if there exist a chat bot system, it is not much accurate in proving the answer or solutions.
- Students need to manually visit to the college to get their queries answered by the college help desk.
- This process consumes lot of time as well as money as the customer needed to visit college if its miles away from home.
- Also, this process may lead to communication gap between student and college.

3. Educational Requirements

The Project is developed using Php as a language. We used Notepad++ for Design and coding of project. Created and maintained all databases into My SQL 5.6, in that we create tables, write query for store data or record of project. Managed database using WAMP server.

Hardware Requirement:

- i3 Processor Based Computer
- 4GB-Ram
- 320GB Hard Disk
- Monitor

Software Requirement:

- Windows 7
- WAMP Server
- Notepad++
- My SQL 5.6

4. Proposed System

A Student bot project is built using artificial algorithms that analyzes user's queries and understand user's message.

This System is a web application which provides answer to the query of the student.

Students just have to query through the bot which is used for chatting.

Students can chat using any format there is no specific format the user has to follow.

The System uses built in artificial intelligence to answer the query.

The answers are appropriate what the user queries.

If the answer found to invalid, user just need to select the invalid answer button which will notify the admin about the incorrect answer.

Admin can view invalid answer through portal via login

System allows admin to delete the invalid answer or to add a specific answer of that equivalent question.

The User can query any college related activities through the system.

The user does not have to personally go to the college for enquiry.

The System analyzes the question and then answers to the user.

The system answers to the query as if it is answered by the person.

With the help of artificial intelligence, the system answers the query asked by the students.

The system replies using an effective Graphical user interface which implies that as if a real person is talking to the user.

The user can query about the college related activities through online with the help of this web application.

This system helps the student to be updated about the college activities.

5. System Framework

(A) System Design

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering.

Principles of Chat Bot Design

1. Don‟t pretend to be a human

Playing bait-and-switch with a user can make them feel that they have been duped, or that they don‟t understand how a system works; both are bad user experiences. Don‟t pull the rug out from under your users. This means not using "is-typing" indicators or artificial delays to make it seem more human. On the contrary, bot messages should be styled differently and be clearly labeled in a way that communicates they are not human. This doesn‟t preclude us from giving the bot personality.

2. Keep it incredibly simple

Bot conversations should be bounded to very particular subjects and follow linear conversation routes; we avoid complicated branching paths. We‟re not trying to create a general, self-aware A.I. here. It‟s okay to expose and explain limitations. BASAAP. Individual bot designers shouldn‟t have to account for tricky failure cases. Users will tire of complicated passages of dialogue.

3. Respect the chat medium

One advantage of smart messaging apps is that we can strip away a lot of apps and interface and reduce the interaction to a simple chat UI.
It would therefore be pointless to turn around and drop an entire app directly into a conversation. Keep everything native to the conversational back-and-forth. Every bot interaction is about call and response, with the bot publishing comments into the chat thread and the end user responding in the reply area. Bots can‟t modify conversations in ways that humans can. At the same time, make use of conventions: rather than printing out an ungainly URL in a bot response, show a nicely-formatted card previewing the linked page.

4. Optimise for the end user

Bots should be used to improve the end user experience, not just to make life easier for customer support teams. A designer should ask themselves: would a human be better for the end user? If the answer is yes, you shouldn‟t be using a bot. Bots should not attempt to replace what humans are good at; rather they should attempt to improve what humans are slow at. Machines should work; people should think.

5. Use sparingly

Bot interactions should be short and precise. It should be impossible to get into a protracted back and forth conversation with a bot; anything above two inputs feels laborious.

(B) System Architecture

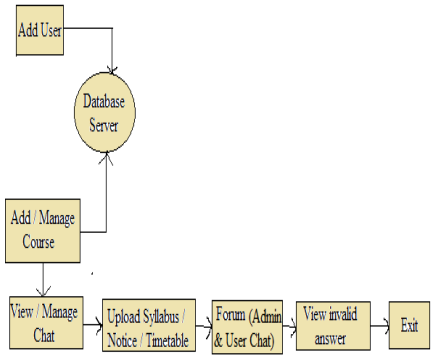

Fig. System Architecture for College Information Chat Bot

According to the architectural diagram of College Information Chat Bot System, there are 7 modules which are explained as follows accordingly.

1.Add User – This module is responsible for adding user to the system. Each user is assigned a unique id and password to get access into the system for its utilization.

2. Database Server – It keeps record of all the users login credentials, college data, user queries,etc.

3.Manage Course – In this module the admin performs the various tasks to fetch into the database various college information requirements like placement sheet, dept info, timetable, general notices, etc . All this fetched information are then retrieved as a response to the user query accordingly. Admin only has the authority to manage course details.

4.View/Edit Chat – In this, User types the query and the bot replies to the user query accordingly.Actual Chating occurs in this phase only.

5.Upload – In this section admin uploads the common/ general notices like time schecdule, exam dates, fee structures, event and seminar notices,etc which user may query out during chatng phase.

6.Forum – In this, if the user founds that answer does not satisfy or make any sense to his query then he can mark that answer as invalid. This invalid answer is later viewed by the admin. Admin then studies that invalid answer and then decides whether to work upon it or just ignore.

7.Exit – This is the phase where user after finishing his work sign out from the system

(C) Algorithm

Chat Bot Algorithm which is been utilized in this project has been developed by Michael Maudlin in 1994 and was first published in the book Julia. He had developed this algorithm for the creation of verbot which was first AI based Chatterbot.

- So when user submits its Question, we store that in a variable "query"
- After that we bring all the main keywords from question table of the database.
- and check if "query" contains any of the main keywords in it.
- If No then we say no answer found.
- If Yes then we bring all sub-keyword with its answer of that matching Main-keyword.
- then we pass "query" through 4 kewyord check procedure ** 4 Keyword check is checking all the 4 sub-keywords are in "query" Code : if(strpos($query,$k1) !== false && strpos($query,$k2) !== false && strpos($query,$k3) !== false && strpos($query,$k4) !== false)
- If any of the entry matches the keyword then we take its answer and then submit it to the user.
- If it does not match then we pass "query" through 3-keyword match algo.

- If it and so on for 2 and 1 keyword match.
- And if we still don't get the output we say No Answer Found.

6. Conclusion

The main objectives of the project were to develop an algorithm that will be used to identify answers related to user submitted questions. To develop a database were all the related data will be stored and to develop a web interface. The web interface developed had two parts, one for simple users and one for the administrator.

A background research took place, which included an overview of the conversation procedure and any relevant chat bots available. A database was developed, which stores information about questions, answers, keywords, logs and feedback messages. A usable system was designed, developed and deployed to the web server on two occasions. An evaluation took place from data collected by potential students of the University. Also after received feedback from the first deployment, extra requirements were introduced and implemented

Advantages of Project

1.User does not have to go personally to college office for the enquiry.

2.This application enables the students to be updated with college cultural activities.

3.This application saves time for the student as well as teaching and non-teaching staffs.

Disadvantage

It requires active internet connection else error may occur.

Application

Enhance AI Based this Chat Bot System can be used in many colleges around the country and it can be used in various firms.

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7. Acknowledgement

Commencing with our final year project **"College Information Chat Bot System"** which would be the decider of all the efforts throughout these four years was a bit hesitant, but the dilemma was soon put to stake by the kind of support we received throughout the building of our idea into work.

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Productive industrial management to establish sustainable growth in micro and small scale industries with using advance production theories like JIT, TQM and customer satisfaction

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Abstract— Resources like Raw, management system and customer satisfaction is important aspects in sustainability strategies of a production or manufacturing company. For improving above mention topic, consumption awareness, practical usable indicators, efficient management practice is required. This work focuses to establish sustainable Productive industrial management growth. Productivity improvement is one of the core strategies towards manufacturing excellence and it is necessary to achieve efficiency and operational performance. It enhances customer satisfaction and reduce time and cost to develop, produce and deliver products and service. This work also focus on productivity as a positive and significant working process, inventory levels and on time delivery. For productivity improvement, three modern management systems are concluded in this research work. Thesis contains JIT (Just in time) work system, TQM (Total quality management) to increase plant efficiency and improve customer satisfaction. This work also counters the challenges in implementation of JIT and TQM and remedies for the same. Thesis also suggests way to improve the customer satisfaction through JIT and TQM. Customer satisfaction will participate to build a strong growth in micro and small-scale industries.

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Keywords— JIT, TQM , Customer satisfaction, Quality Improvement, On time delivery, Inventory level management, Resources Management, Sustainability.

INTRODUCTION

Resources -The facilities, permanent or temporary assets of a company by the use of which a company perform the task is called resources.

Resources Management - The arrangement of the resources to ensure the best performance of available resources and also for arrangements of required resources is termed as the resources management.

In the management of resources is a try or effort for using a company's resources in the most efficient possible way. These resources can include tangible resources such as goods and equipment, financial resources, and human resources such as employees or labors. Resource management is done to manage all the required resources in minimum cost and availability at the time of requirement. Resource management includes ideas such as making sure the organization or company has enough physical resources for one's business or process of making products or outputs.

Raw - The word raw is termed for all the materials, information, energy etc which required to be as a input for further processing to get the final product or output. The basic material from which product is manufactured or made, raw materials is continuing to rise despite every effort to increase productivity of resources. We now live in a world in which product cycles are becoming ever shorter and the products of our industry. Raw materials are all these substances that turn into different things during industrial process.

Management of systems - Documented and tested systematic method aimed at smooth functioning through standard practices. Used primarily in franchising industry, management systems generally belongs to collection and flow of detailed information regarding the points which are important for the organization by the management point of view, these information may be related to the following:

- Organizing process of an enterprise.
- Setting and implementing corporate policies.

- Establishing accounting, monitoring, and quality control procedures.
- Choosing and training employees,
- Choosing suppliers for getting the best value from them, and
- Marketing and distribution etc.

Sustainability - The traditional industrial view shows the parts of sustainability are• product design and process technology typically determine the types of pollutants emitted, solid and hazardous wastes generated, resources harvested and energy consumed. But including above points also many other points are matters in sustainability of a production company or any organization. An organization will be as much sustainable as well it will be up to date production systems, strong communication to support the ill in all the levels of work. By the use of a overall healthy management it will establish the sustainability. With addition some authors with the acronym of sustainable supply chains (SSQ), require a fundamental shift from fragmented and functional approach to an holistic one, with a fundamental reassessment of the value creation. New sustainability concept and constructs, as well as high level structures.

Strategies of a company - The success of the company is largely influenced by decision taken by strategic management. A whole range of models of strategic management is used in practice. The paper develops a methodology of strategic model implementing into the engineering company. Furthermore, the methodology recommends procedures while solving an up-to-date worldwide task of the definition of the company strategy.

Efficient management practice - Effectiveness is concerned with 'doing the right thing', and relates to inputs and what the manager does. (Laurie J. 1996) posit that Efficiency "is concerned with 'doing things right', and relates to inputs and what the manager does''. This however involves balancing the amount of resources used to achieve an objective, against what was actually accomplished. Here the more favorable the ratio of benefits to costs, the greater the efficiency. It is the achievement of ends with the least amount of resources. Most Organizations who are more profit oriented rather than satisfying their customers, end up running into loss that they least expected. A scenario is a block industry that moulds/produces blocks to sell for erecting building. If for every 100 blocks to be mounded or produced, the quantity of sand to be used to produce a quality product (block) is one tipper load of sand and the quantity of cement needed to produce that same quality is thirty (30) bags, the company is said to meet the needs of the consumers. This also goes in achieving the objective of the Organization. In some industries where inefficiency does not exist, and the management in the quest to maximize profit rather than maximizing quality.

Literature Review

Marcel T. Ngambi (2015) said that - the development of total quality management from 1950 onwards can be credited to the works of various American experts such as Edward Deming, Improve every process: improve constantly and forever every process for planning, production and service. Institute training on the job: institute modern methods of training on the job. Institute leadership: adopt and institute leadership aimed at helping people and machines to do a better job. Drive out fear: encourage effective two-way communication and other means to drive out fear throughout the organization. Break down barriers: break down barriers between department and staff areas. Eliminate exhortations: eliminate the use of slogans, posters and exhortations Eliminate targets: eliminate work standards that prescribe numerical quotas for the workforce and numerical goals for people in management. Permit pride of workmanship: remove the barriers that rob hourly workers and people in management.(A- 12). Masao Nakamura(1998) stated - A fully recognized and implemented quality management system, will ensure that the customer is satisfied by meeting their requirements, and will thus enhance the confidence of the customer. Attaining customer satisfaction is a great achievement for the organization that will assist in capturing the market, or increase the market share (A- 25). Swapnil S Dange (2016) stated that - Just in Time (JIT) means, making only what is needed, when it is needed, and in the amount needed. For example, to efficiently produce a large number of automobile parts, which can consist of around 40,000 parts, it is necessary to create a detailed production plan that includes parts procurement. Supplying what is needed, when it is needed according to this production plan can eliminate waste, inconsistencies, and unreasonable requirements, resulting in improved productivity. In addition, these goals should be achieved by paying utmost respect to the humanity of the employees who make the system work. Sometime, the difficulty of achieving the goals lies in the complexity of manufacturing operations. It is not difficult to build the high quality product, but is extremely difficult to do so while maintaining excellent quality, and at some time respecting the humanity of people who do the actual work of building that product (A- 5). Ogbari, Mercy (2015) - Globalization has resulted in making the world 'smaller'. This means that organizations now have a wider reach and this has led to fiercer competition between rival companies. In other to survive and remain profitable, organizations must come up with cost efficient Over the years, JIT has evolved to a relatively low cost, flexible and simple process of manufacturing whereby the production rates are determined by the end user and not the manufacturer. But despite the evolution, one thing has remained in the JIT philosophy and that is the quest to eliminate waste from all stages of manufacturing.

Application of JIT Manufacturing should be founded on the following sys-teems:

- Improved inventory control system
- Quality improvement system
- Maintenance improvement system
- Set-up time improvement system (A -10)

Swapnil S Dange (2016) - Just in Time (JIT) means, making only what is needed, when it is needed, and in the amount needed. For example, to efficiently produce a large number of automobile parts, which can consist of around 40,000 parts, it is necessary to create a detailed production plan that includes parts procurement. Supplying what is needed, when it is needed according to this production plan can eliminate waste, inconsistencies, and unreasonable requirements, resulting in improved productivity. In addition, these goals should be achieved by paying utmost respect to the humanity of the employees who make the system work. Sometime, the difficulty of achieving the goals lies in the complexity of manufacturing operations. It is not difficult to build the high quality product, but is extremely difficult to do so while maintaining excellent quality, and at some time respecting the humanity of people who do the actual work of building that product (Part A- 5). Mohammadi (2016) - Mixed-Model assembly lines are often used in manufacturing based on just-in-time techniques. The effective utilization of these lines requires a schedule for assembling the different models be determined. The objective is to minimize the total deviation of actual production rates from the desired production rates. Mathematical method with the optimization algorithm is proposed here to solve this problem. To prove the efficiency of the proposed algorithm, a number of test problems are solved. The results show that the proposed algorithm is an efficient and effective algorithm which gives better results with the large problem sizes. This paper presents a practical procedure to minimize total product variation rates, and easy to use by practitioner (Part A - 6). J. Schonberger (2015) - Each small reactor makes a different grade; the JR is to run every grade every day at their daily sales rates. Finished goods store the most value. Thus, for its promise of slashing FOI, JIT holds great attraction to the process/commodity industries. Additionally, there is a substantial derivative effect: raw material reductions. This effect comes from moving away from batches and making some of each formulation every day, which means the supplier can count on a known daily usage rate for raw materials a rate that can be stabilized usually for 2-4 weeks. This offers hope for working out true just-in time delivery schedules for barges, barrels or bales of raw material.(A -8). Raj Urs S (2014) - On time delivery is a measure of process and supply chain efficiency which measures the amount of finish goods or services delivered to customers on time and in full. It helps determine how efficiently we are meeting our customer's or agreed deadlines. If the figure is too low or below the benchmark it could be used as a signal that somewhere along the supply chain there are bottlenecks, inefficient or time consuming processes which are not adding value and warrant further investigation or a slower delivery method is being employed(A -14). Neeraj Malhotra (2012) - Processes need management in the same way our people and systems do. If we don't manage our people, we risk knowledge/skill gaps. If we don't manage our systems, they become inefficient (I'm sure we have experienced a brand new computer getting slower and slower over time!) Without good process management. our processes will fall out of alignment with our people and systems. Management of People, Processes and Systems is proactive action. But if we don't manage them. we become reactive. Reactive action to improve existing processes can be termed as "Process Simplification" (A-21). Better quality is a form of beneficial change. It is applicable to both the kinds of quality that are summarized in Product features; these can increase customer satisfaction(C-5).

Proposed Methodology -

This proposed methodology suggests implementing the JIT and TQM techniques in a combination to perform the following modification:

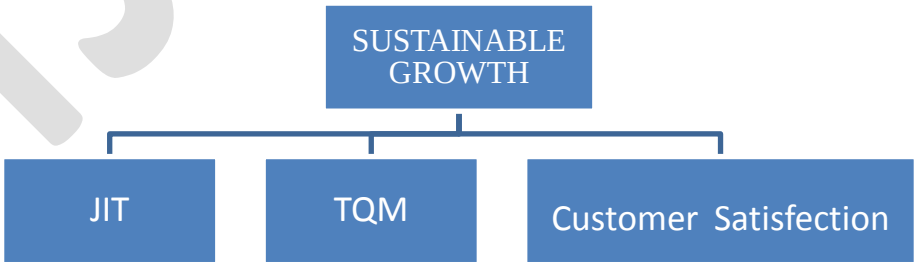

Figure: 1 Hierarchy of work.

With use of Just in time system an effort is made to minimize the required resources. At least the requirement time can be delay so the investment in storing inventory can be reduce further it provide the more working space to a micro scale industry no need to build unnecessary construction area, storing expenditure will reduce and also risk on the entrepreneur or owner will reduce with reduction in

requires raw. Total quality Management system will support industry to overall growth in all dimensions from maintenance to production process. The paper guide the leadership of an organization must be committed to be visible throughout all layers of management. Management must "walk the talk." Only when management is committed will employees excel at what they do. It takes time to change work cultures and work habits, but with perseverance, the message of enlightened management will prevail. Employees want to do a good job. All they need are the right tools and the right systems. Only management can supply these.

The research work starts from the resources or resources management, and show the important role of JIT and TQM in management system, inventory management, sustainable growth, productivity improvement, industrial performance, and on shop benefits. At the conclusion work show that the JIT and TQM improve plant efficiency continuously at play an very important role for optimization, cost reduction, reduction in delivery time and enhance the customer satisfaction.

Modification through TQM:

1 Management of systems:

Arrange a system which full fill all the requirement to run the industry in a smooth and profit full way without any kind of barrier with well known atmosphere for the each employee of the industry.A process and step should be well defined and easy to understand or everybody. There should not be any condition of confusion; It should be no space for hidden steps to any employee whatever is related to his/ her work.

TQM modification:

Pre planed healthy strategies of a company -A well manage system will give the ability to management level to plan how to react at the situation of any critical condition. It give the strategy which help for the future planning and action – reaction related to particular situation of the industry.

Efficient management practice -As per TQM the daily routine of production, work must be documented in a the systematically and regularly in an each stage at the time of current processes or before, ask the subordinates to review and evaluate with the following critical questions.

Operational performance - Technical training and motivation should be provided to all level of employee to perform better those particular job at the industry. A regular process of thinking should be going on for performing better in daily job operational process.

Continues improvement in working process -There should be a regular process of improvement in the working process development of the industry.

Simplifying the process -We should select the simplest way to perform any action on the job, and the process of doing the work should be selected after following question:1.Is this step in necessary for the process?, 2.Can some of the steps be automated to free up time?. 3.Is this step a bottleneck?. 4.Are we waiting too long for this step to complete and why?

Quality Improvement - Quality improvement activity should be carry on in is department of industries care should be taken for quality from starting to end raw material management to production the finished product.

Sustainability - Apply a fundamental shift from fragmented and functional approach to an holistic one, with a fundamental reassessment of the value creation. New sustainability concept and constructs, as well as high level structures of production management.

Customer satisfaction - Use TQM to reduce customer frustration over having to deal with multiple personnel to get service Quality improvement to reduce deficiencies that create chronic waste may consist of such actions as Increase of the yield of factory processes Reduction of the error rates in offices Reduction of field failures.

Modification through JIT:

Efficient Resources Management-The raw material for producing the final product should not be stored in stock in bulk quantity but it should be purchased on the basis of actual requirement at instant of orders. It will save the money blockage, work space and reduce the uncertainty of market risk.

Increasing the working space -Do the effective management of work space as efficient inventory level the unnecessary stocking it will reduce the wastage of work space. It can cause company high productivity. There for it must be a regular improvement activity for the purpose of effectively manage a diverse workspace.

Elimination of unnecessary steps -Identify Inefficiencies, in the form steps of process, mark the Bottlenecks and waste activities introduce changes in technology as per business needs. Initiate to change in the attitude of employees like habit "It's always been done." Encourage your staff to get out their magnifying glasses once a year to uncover roadblocks and inefficiencies.

Increase Labor Productivity -Creating a system for measuring productivity, Determination of reserves of labor productivity growth by growth factors, taking into account the resource potential of the enterprise Develop an plan to increasing productivity; 25 - Develop incentive schemes for staff to achieve the planned targets, Training of employees more efficient ways of working. Implementation of

new system One of the most important methods of increasing productivity is successful organization operation or implementation of new management personnel

Productivity improvement -By increasing the labor productivity means cost savings of labor (working hours) for the manufacture of a product unit, or an additional amount of output per unit of time, which directly affects the efficiency of production, since in one case, reduced operating costs per unit of output and in another - in a unit time producing more products.

Reduces time and cost - Create customized transformational solutions to deliver more efficient back office functions and reduce the cost of citizen communications. Reduced cost– We will manage your print communications more effectively, reducing wastage and warehousing costs and using our procurement expertise, Innovative -procurement system and unrivalled print spend leverage to drive down costs. Improved interaction, our innovative, technology-led solutions enable us to create powerful communications in the most suitable formats for your audience.

Supporting On time delivery -Using JIT above mention techniques complete assailments on the time and deliver the projects to the customer before dead line.

CONCLUSION

This proposed methodology suggest for **Efficient Resources Management** and guide to not store raw materials stock in bulk quantity but purchase on the basis of **actual requirement at instant of orders.** JIT proved detail techniques **avoiding the excess inventory**. Methodology support the opinion that the instant amount of raw materials or finished goods must be in the range of actual requirement or meeting to the nearest planed future duration requirement that a organization required for his work as per current orders. Present demand, of the product should be observed regularly to deciding the producing quantity. It will **reduce the wastage of work space**. It can cause **company high productivity**. There for it must be **a regular improvement** activity for the purpose of **effectively manage a diverse workspace.** After **efficient system management** further step becomes **Elimination of unnecessary steps** in which identify inefficient steps in the process. Then developing a system for measuring productivity & determination of **labor productivity growth.** With increasing the labor productivity directly affects the **efficiency of production**, since in one case, reduced operating costs per unit of output and in another - in a unit time producing more products. Create customized transformational solutions to **reduced cost and delivery time.** Through TQM. It is suggested to arrangement of a system to **smooth and profitable run** of industry. Avoiding the condition of confusion, **Pre planed healthy strategies** of a company will be prepared by following the prefers points in the methodology, and such system will give the ability to management level to plan **Efficient management practice.** Technical training and motivation will help the staff to **increase the Operational performance,** so the industry **Continues improvement** in working process will start to take place, TQM also add the **Simplification of the process**, and simplified process make easy to **maintain the Quality Improvement plans.** Quality improvement activity would be carry to produce **Sustainability,** with a fundamental reassessment of the value creation **Customer satisfaction will enhanced** simultaneously chances of customer frustration will tense to reduce. Overall output will be the in the form of profitability of the industry.

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Comparative Study on the Effect of Structural Configuration on Seismic Analysis of Cable Stayed Bridge Using SAP 2000

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Abstract— The subject of seismic response of cable stayed bridges has received increasing attention in recent years as these types of bridges are widely designed for large crossing projects. This paper provides a comparative study on the effects of structural configuration (i.e., shape of pylon and cable arrangement) on seismic analysis of cable stayed bridges. The modeling of bridge is prepared on SAP 2000 software and was analyzed as FEM model using non-linear time history analysis. The parameters considered in the study are Base shear, Mid-Span displacement and Tower Head displacement. The study revealed that the fan type cable arrangement and H-shape pylon is found to be effective in earthquake prone areas.

Keywords— Base shear, Cable stayed bridge, Mid-span displacement, Pylon, SAP 2000, Time History Analysis, Tower head displacement.

INTRODUCTION

The cable-stayed bridge finds wide application in engineering for its convenience in construction and economy factor [5]. Many cable stayed bridges have been successfully built around over the world in only last two decades of the 20th century. Due to their highly appreciable appearance & significantly utilized structural materials, cable stayed bridges have been taken as one of the most popular type of bridges in last decades. With increasing span length, the modern cable stayed bridges are more acceptable & flexible strong enough to the effect wind as compare to ever. A typical cable stayed bridge consists of deck with one or two pylons erected above the piers in the middle of the span. The cables are attached diagonally to the girder to provide additional supports [3].

In recent years, several cable-stayed bridges have been constructed with different shapes of pylons such as single pylon, double pylon, H-shaped, A-shaped, Diamond shaped, Inverted Y-shaped etc. which results in a great demand to evaluate the effects of different shapes of pylon on cable stayed bridges under the seismic effect. Therefore, there is a need to study the behavior of the bridge system having conventional pylons under seismic loading. For study of such phenomenon computational analysis of bridges using finite element programs.

The purpose of the pylons is to support the cable system and transfer forces to the foundations. They are loaded with high compressions and bending moments that depend on the stay cable layout and the deck-pylon support conditions. Pylons can be made of steel or concrete, being the latter generally more economic considering similar stiffness conditions. Thus, the dynamic response of the pylons will be conditioned by several aspects, and in addition to the previous idea, the geometric shape of the pylons, which depends on the applied loads, cable-stay system and aesthetic conditions, is a very important aspect [3].

The dynamic effects under the effect of seismic loading were studied by the software SAP 2000. SAP 2000 is finite element based program and is recognized by international community for the research purpose.

ANALYTICAL INVESTIGATION

SAP2000 is a stand-alone finite-element-based structural program for the analysis and design of civil structures. It offers an intuitive, yet powerful user interface with many tools to aid in the quick and accurate construction of models, along with the sophisticated analytical techniques needed to do the most complex projects.

A. Material properties

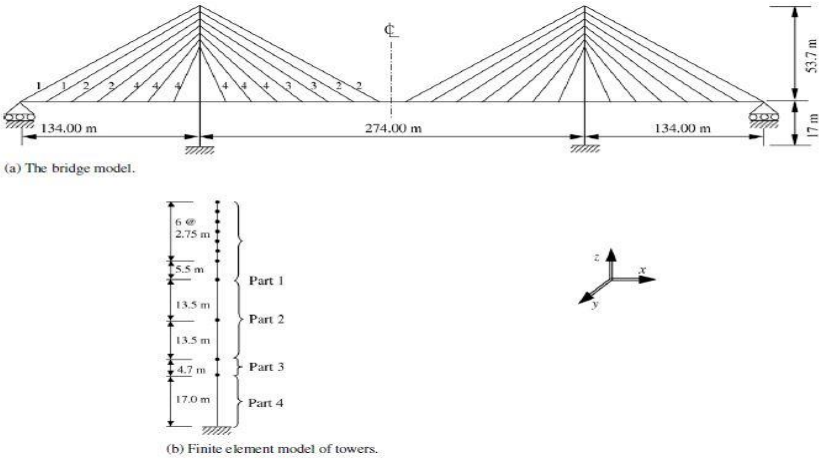


Fig.1. Details of materials used in bridge [1]

Table 1

Properties of the deck and towers of cable stayed bridge [1]

Part of the structure	Cross-sectional area(m^2)	Moment of inertia about z-z axis(m^4)	Moment of inertia about y-y axis(m^4)	Moment of inertia about x-x axis(m^4)	Young's modulus(MPa)	Mass density (kg/m^3)
Deck	0.827	0.341	19.760	0.027	205000	7850
Tower part 1	14.120	28.050	531.670	15.390	30787	2400
Tower part 2	14.120	28.050	670.970	15.390	30787	2400
Tower part 3	17.450	30.620	1239.400	19.760	30787	2400
Tower part 4	35.390	32.750	1422.420	27.640	30787	2400

Table 2

Properties for the stay cables of the cable stayed bridge [1]

Cable no.	Cross-sectional area(m^2)	Young's modulus(MPa)	Cable weight (N/m)
1	0.0180	205000	1765.80
2	0.0135	205000	1324.35
3	0.0107	205000	1049.67
4	0.0070	205000	686.70

B. Loads

The seismic response of the cable-stayed bridge is investigated under four different real earthquake ground motions, namely (i) Imperial Valley, 1940, (ii) Kobe, 1995, (iii) Loma Prieta, 1989, and (iv) Northridge, 1994 earthquakes. The first one has been used widely by researchers in the past, and the last three represent strong earthquake motion records. Although in the present study the four seismic acceleration records have been taken from the database, in professional applications, deeper attention should be devoted to the sample (and its size) of the excitation time histories. The peak ground accelerations (PGAs) of selected earthquake ground motions are shown in Table 3.

Table 3

Earthquake	Recording station	Applied direction of bridge		
		Longitudinal PGA (g)	Transverse PGA (g)	Vertical PGA (g)
Imperial Valley,1940	El Centro	0.060	0.060	0.040
Kobe,1995	Nishi-Akashi	2.220	1.530	1.600
Loma Prieta,1989	Los Gatos - Lexington Dam	1.220	1.100	0.460
Northridge,1994	Sylmar Converter Station	1.800	1.720	2.430

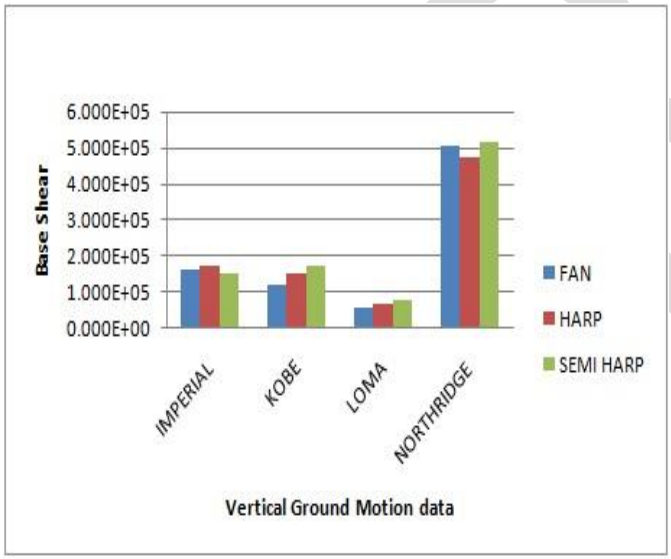
ANALYSIS

The study was conducted as two phases and in both stages non-linear time history analysis has been done using the ground motion data mentioned in Table 3.

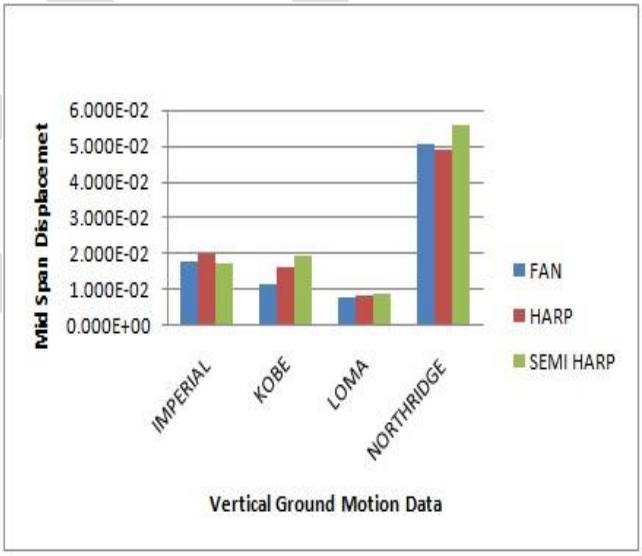
Phase 1:-

To find the best cable arrangement among Fan, Harp, Semi-Harp. The models were created in SAP 2000 with H shape pylon as constant and changing the cable arrangements. The parameters considered are base-shear, mid-span displacement, and tower - head displacement.

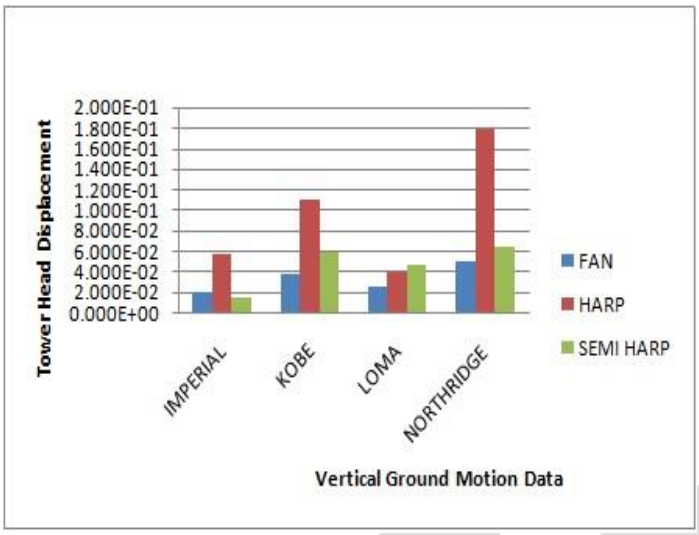
The following graphs obtained on analysing the result. The graphs shown are obtained for vertical data similar pattern are obtained while applying longitudinal and transverse data.



(a)



(b)



(c)

Fig.2. Effect of vertical ground motion data on H shape pylon with different cable arrangement (a) Base Shear (b) Mid span displacement and (c) Tower Head Displacement.

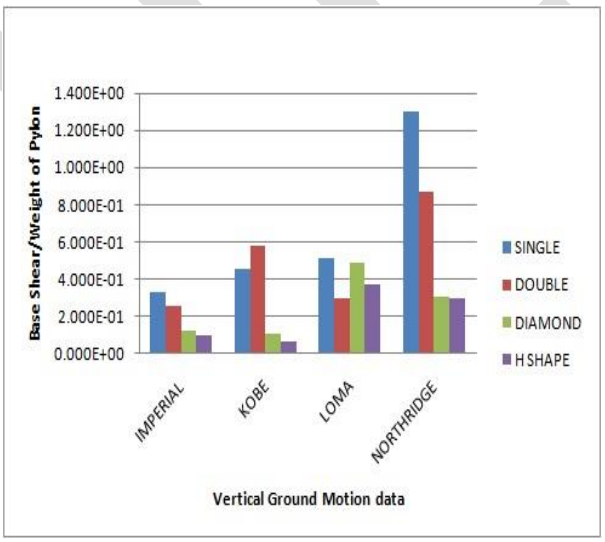
Observation:

The study based on finding the best configuration among the various layouts of cable stayed bridge was successful in finding fan sections as one of the better configuration in terms of reduced responses. Earthquake analysis which mainly concentrates base shear and displacement was found less and hence fan sections are chosen as a better configuration.

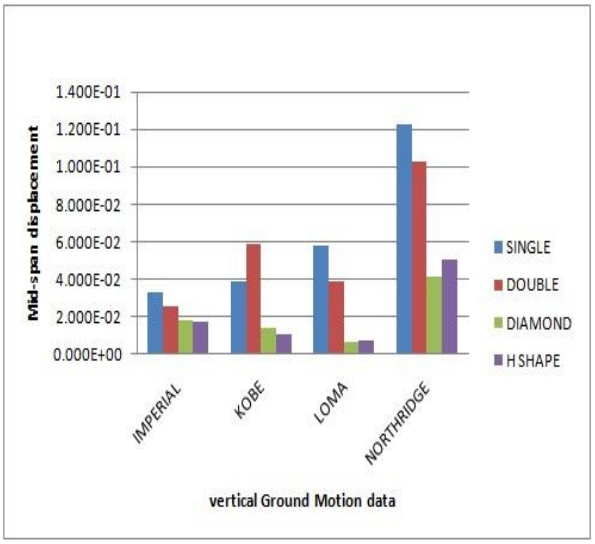
Phase 2:-

To find the best pylon shape among Single Pylon, Double Pylon, H shape Pylon and Diamond Shape Pylon with Fan shape Cable Arrangement. The models were created in SAP 2000 with Fan type cable arrangement kept constant and changing the shapes of pylon. The parameters considered are base-shear, mid-span displacement, and tower - head displacement.

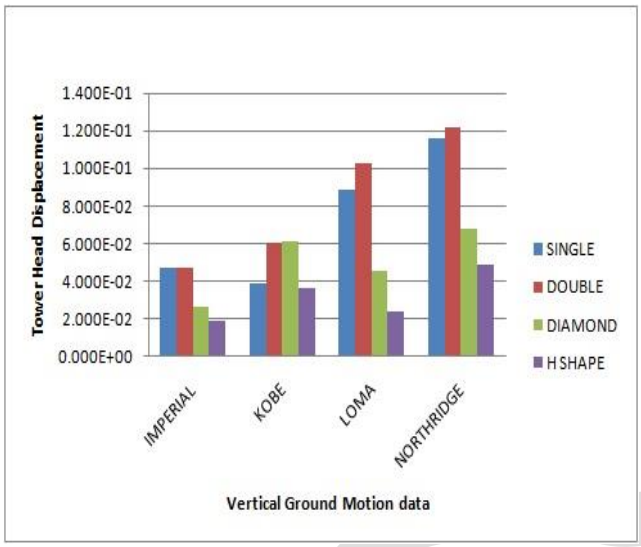
The following graphs obtained on analysing the result. The graphs shown are obtained for vertical data similar pattern are obtained while applying longitudinal and transverse data.



(a)



(b)



(c)

Fig.3. Effect of vertical ground motion data on Fan type cable arrangement with different shape of pylon (a) Base Shear (b) Mid span displacement and (c) Tower Head Displacement.

Observation:

The study based on finding the best configuration among the various shapes of pylon of cable stayed bridge was successful in finding H shape pylon as one of the better configuration in terms of reduced responses. Earthquake analysis which mainly concentrates base shear and displacement was found less and hence H shape pylons are chosen as a better configuration.

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My sincere gratitude to my guide, Mrs. Aiswarya G Nair, Assistant professor who has believed in me since the beginning and accepted in undertaking my research work. Moreover, she has helped me from start to finish.

I'm thankful to all the teaching and non-teaching staffs of department of Structural Engineering, Universal Engineering College for offering me the opportunity to do this research work.

Finally, deep thanks to God for his unconditional support, and also to my family and friends.

CONCLUSIONS

In this study, the modeling of cable stayed bridge has been done for three different cable arrangement i.e. Fan, Harp, Semi-Harp with H Shape Pylon on SAP 2000 software and found that Fan arrangement gives better seismic stability. Thus, on the second stage of study four different types of pylon shapes i.e. Diamond type, H type, Double pylon type and Single pylon Type with fan type cable arrangement were modeled on SAP 2000 software. The analysis results showed that H shape pylon with Fan Type cable arrangement gives better seismic stability.

The conclusions are based on the models which were prepared using SAP 2000 software therefore; an experimental verification may be performed on these before implementing these in practice.

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REDUCTION OF EARTHQUAKE RESPONSE OF STEEL FRAMED BUILDINGS BY FLUID VISCOUS DAMPERS IN SAP 2000

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Abstract— This paper is focused on the fluid viscous dampers to be used as energy absorbing devices in buildings using SAP2000. Their advantages and disadvantages as well as their application on three model structures have been described. The analytical studies of the model structures exhibiting the structural response reduction due to these fluid viscous dampers are presented. In order to exhibit the benefits of these dampers, non linear analysis is carried out for all case studies: (a) a 3 storey steel frame, (b) a 10 storey steel frame and (c) a 20 storey steel frame. The parametric studies are about seismically efficient configuration and appropriate placement of fluid viscous dampers in all three models. The roof displacements as well as roof accelerations and base shear values obtained indicate that these fluid viscous dampers when incorporated into the super structure reduce earthquake response significantly when compared to base model.

Keywords— Base shear; Earthquake response; Fluid viscous dampers; Non linear time history analysis; Retrofitting; Roof displacements; Roof accelerations; SAP 2000

INTRODUCTION

Building design usually involves proportioning the elements of the structure such that the constraints on strength and serviceability limit states are satisfied. The conventional approach is to proportion the components to satisfy the strength limit states and then follow it up with serviceability checks. But based on the modern control theory, structural control has emerged to mitigate the negative effects that the external disturbances impose on the structures. Structural control has been investigated and shown great potential for reducing vibrations in various civil structures under dynamic loading. Structural control is usually classified by its method, or the type of device used to impart the control force. The three classes of structural control system are passive energy dissipation, active and semi-active energy dissipation. The first class of energy dissipating system, the passive systems are uncontrollable. The basic function of the passive devices is to absorb a part of input energy, reducing energy dissipation on structural members and minimizing the damage on structures. Contrary to semi-active or active systems there is no need of external power supply. The second class of energy dissipating devices, the active devices are controllable and require significant amount of external supply. The third class includes the semi-active devices which combine the aspects of active and passive devices. Passive devices are frequently used type of control system implemented because they involve no external power and such devices are inherently stable. Passive devices encompasses a range of materials and devices for enhancing damping and strength such as fluid viscous dampers, friction dampers and metallic dampers have been developed since the1990's. This papers deal with the study of fluid viscous damper on steel moment resisting frames.

GENERAL DESCRIPTION OF FLUID VISCOUS DAMPER

Fluid viscous dampers in recent years have been incorporated into a large number of civil engineering structures. The major parts of FVD are shown in Figure 1 [1].

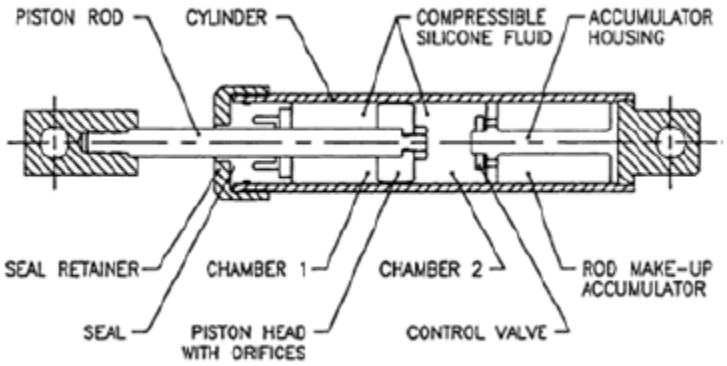

Figure 1: Fluid Viscous Damper

The viscous dampers are modeled as Maxwell element, which is a nonlinear damper with a nonlinear spring.Viscous damper system will be modelled as pure stiffness-free damping behaviour. Stiffness of damper element is considered zero in order to reach the pure damping in linear analyses. To eliminate the spring effect, its stiffness should be considered significantly high in nonlinear analyses where series model of spring damper is used. The energy dissipation per cycle of FVD is a function of different parameters. The ideal damping force of viscous damper is given by,

$$F = CV^{\alpha} \quad (1)$$

In (1), F is the damping force, C the damping coefficient, V the velocity of piston relative to cylinder and α is the damping exponent.

MODELLING OF THE BUILDING

Procedures have been developed through years for the seismic design of buildings equipped with fluid viscous dampers. The NEHRP (National Earthquake Hazards Reduction Program) [2] and other codes give a trial-and-error approach for identifying the mechanical characteristics of additional damping devices. A simple procedure for the determination of damping coefficient is been used in this study [3].

C

$$2m \quad (2)$$

Equation (2) is used to find out the damping coefficient. In (2), m is the total floor mass is to be calculated by knowing the different dead loads acting on the structure, ξ is the damping coefficient and ω is the natural frequency of the structure. Modal analysis of the finite element model is done using SAP2000. From the modal analysis the time period T, is obtained. The natural frequency, ω of the structure can be calculate using,

$$\omega = \frac{2\pi}{T} \quad (3)$$

Knowing the value of ω and assuming a suitable value of damping ratio ξ, the damping coefficient is to be determined using (2). This value of damping coefficient C is used in the analysis of the structure in SAP2000.

A three , ten and twenty storeyed steel moment resisting frames have been considered for the analysis for first parametric study. Height of each storey is 3.96 m for 3 storeyed buiding and height of each storey for 10 and 20 storeyed building is 3.2 m. Soil structure interaction has not been considered . The material properties of the building are assigned. Beam and column members have

been defined as frame elements. Slabs are defined as area elements having the properties of shell elements with the thickness of 250 mm. The building plan taken for the study is shown in Figure 2 and 3.

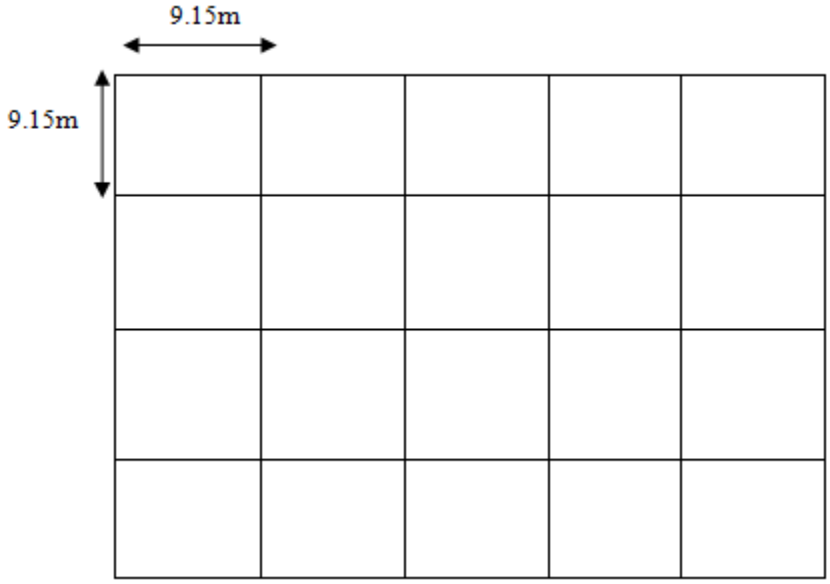

Figure 2: Plan of 3 storeyed steel building

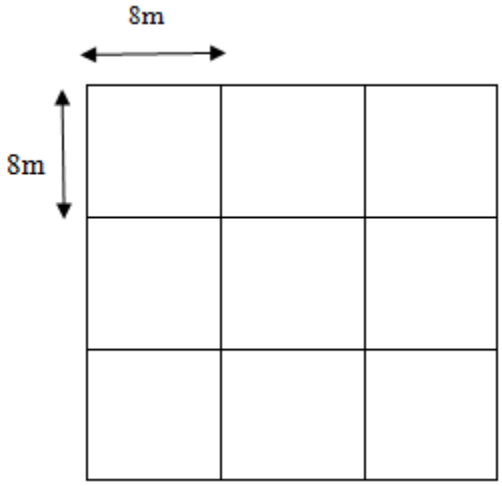

Figure 3: Plan of 10 and 20 storeyed steel buildings

After having modeled the structural components, the loads as per the codal provision are assigned. Gravity loads on the structure include the self weight of beams, columns, slabs and walls. The self weight of the beams and columns (frame members) and slabs (area sections) is automatically considered by the program itself. Nonlinear time history analysis has been carried out for determining various structural parameters of the model. The value of damping exponent is 1 and consider it as linear fluid viscous damper . This study is concerned with the behavior of the structure under the unidirectional ground motion with and without the presence of FVD at different configurations and positions.

PARAMETRIC STUDY

Analysis is done to evaluate the performance of steel buildings under unidirectional seismic loading with and without FVD at different configurations and different locations along the width .To study the effectiveness of different damper placement

configuration like chevron, diagonal, double diagonal, 3, 10 and 20 storeyed steel buildings are considered .To study the effect of placement of FVD along the width, 10 and 20 storeyed symmetric plan building are taken into consideration and nonlinear time history analysis is carried out for structural models with and without FVD in SAP2000.

Effect of FVD in different damper configuration

FVD is placed in different configurations like diagonal, chevron and double diagonal.

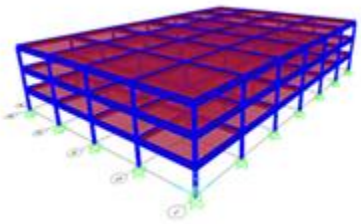

Figure 4: Bare 3 storeyed steel building

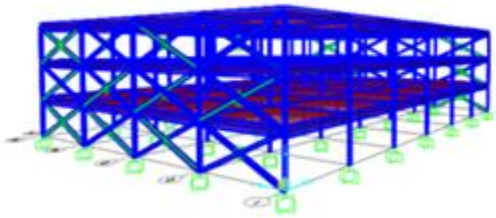

Figure 5: FVD in double diagonal configuration

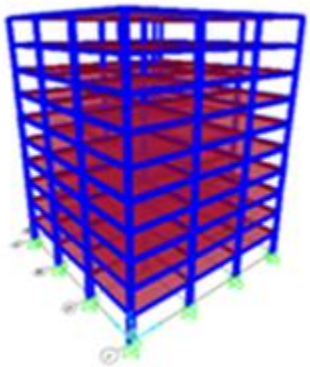

Figure 6: Bare 10 storeyed steel building

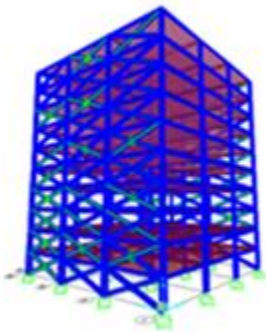

Figure 7: FVD in double diagonal configuration

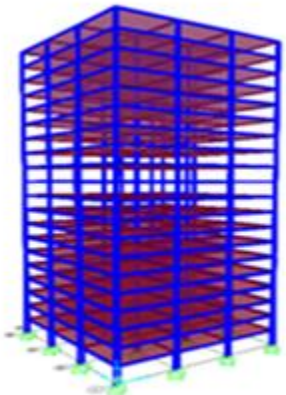

Figure 8: Bare 20 storeyed steel building

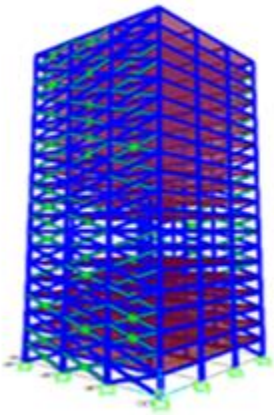

Figure 9: FVD in double diagonal configuration

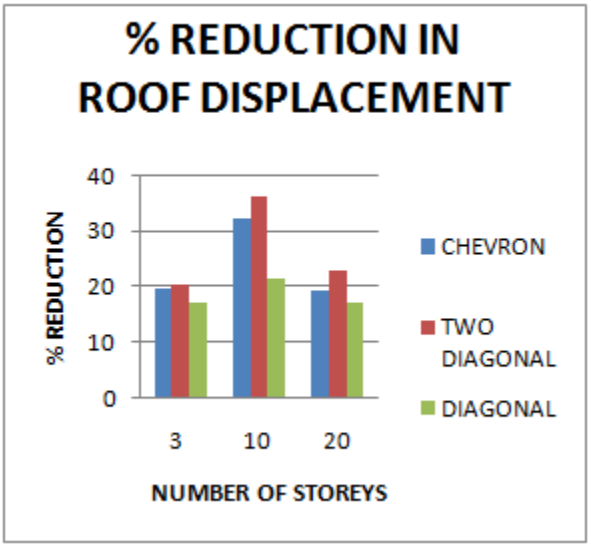

Figure 10: Percentage reduction in roof displacement compared to bare model

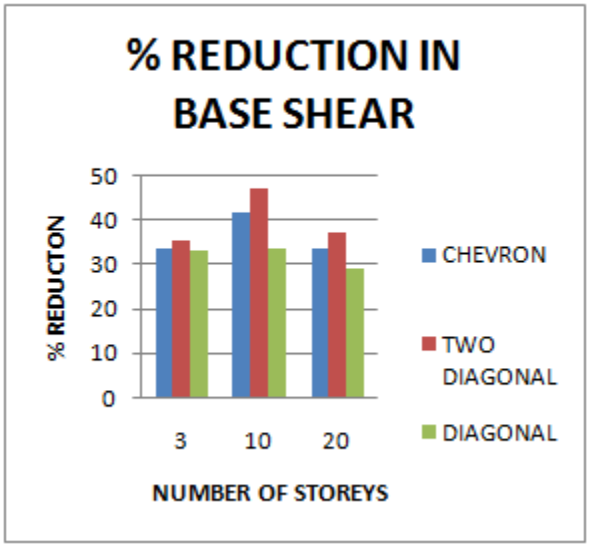

Figure 11: Percentage reduction in base shear compared to bare model

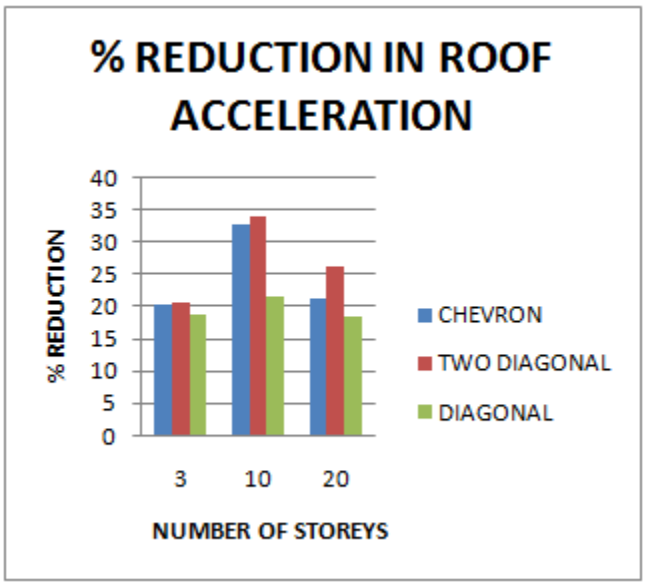

Figure 12: Percentage reduction in roof accelerations compared to bare model

Nonlinear time history analysis are carried out and from the result it is clearly obtained that the building with FVD in double diagonal configuration shows more reduction in base shear, roof displacement and roof acceleration compared to base model. In the case of 3 buildings, double diagonal configuration of FVD placement shows more reduction in base shear, roof acceleration and displacement. Installation of FVD in 10 storeyed steel building shows more reduction in response during earthquake compared to bare model.

Effect of FVD along the Width

To study the effect of FVD along the width, analysis was done on ten storied and twenty storied buildings. From the previous section, it was concluded that, FVD in double diagonal configuration was found to be the most effective. The different cases that are taken into consideration to understand the effectiveness along the width are,

- Case1:Steel buildings without FVD
- Case 2:FVD are placed in all bays uniformly
- Case3:FVD are placed in all the exterior middle bays
- Case4:FVD are placed in all the exterior corners

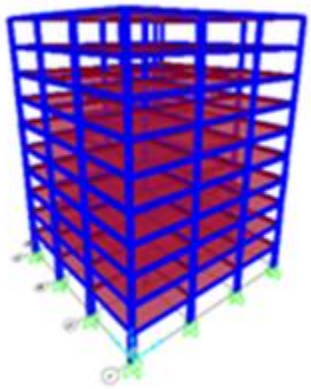

Figure 13: Case 1 (10 storeys)

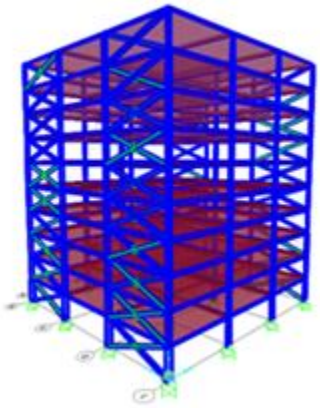

Figure 14: Case 4 (10 storeys)

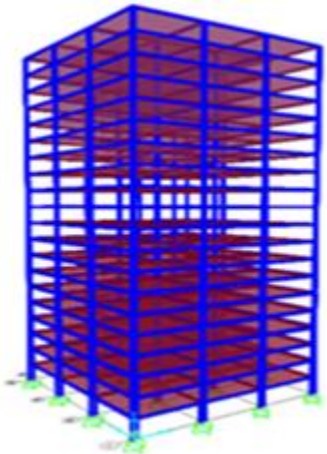

Figure 15: Case 1 (20 storeys)

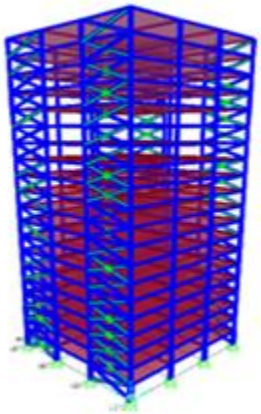

Figure 16 : Case 4 (20 storeys)

Analysis results of the 10 storeyed and 20 storeyed steel building with three different cases of damper position when subjected to unidirectional earthquake are obtained. From the results it is clearly obtained that case 2 is more effective compare to case 3 and case

4. But in an economic sense, case 2 requires a lot of dampers and cost will be very high. So usually by considering economy, case 4 is usually consider for installation in practical cases.

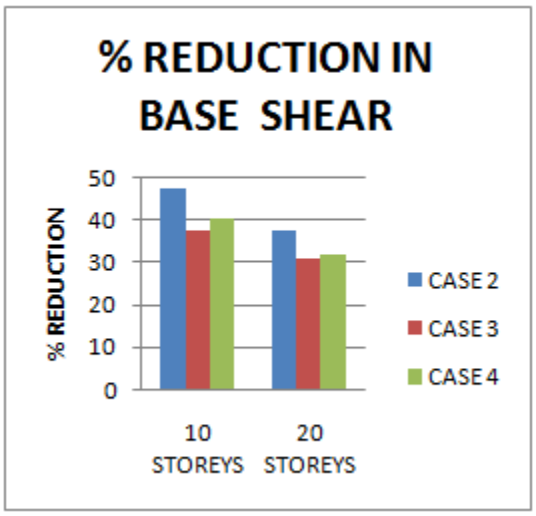

Figure 17: Percentage reduction in roof displacement compared to bare model

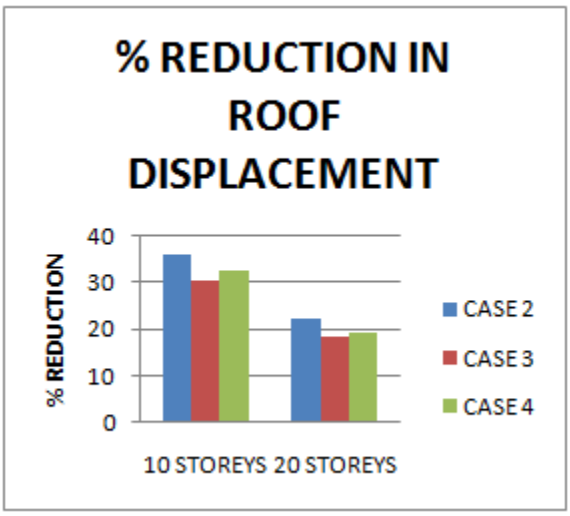

Figure 18: Percentage reduction in base shear compared to bare model

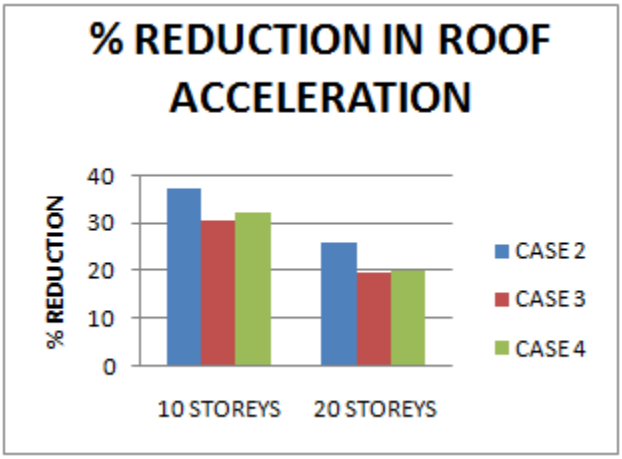

Figure 19: Percentage reduction in roof acceleration compared to bare model

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My sincere gratitude to my guide, Ms. Thahzin Sageer, Assistant professor who has believed in me since the beginning and accepted in undertaking my research work. Moreover, she has helped me from start to finish. I'm thankful to all the teaching and non-teaching staffs of department of Structural Engineering, Universal Engineering College for offering me the opportunity to do this research work. Finally, deep thanks to God for his unconditional support, and also to my family and friends.

CONCLUSIONS

The purpose of this study is to assess the seismic performance of steel buildings with fluid viscous dampers. Using nonlinear time history analysis, responses of structures have been evaluated and the following conclusions have been made.

- The effect of FVD is more predominant in mid rise building

Effectiveness of FVD in different damper configuration

From non linear time history analysis , it is clear that damper placed in double diagonal configuration show more reduction in roof displacement, roof acceleration and base shear when compared to bare model.

Effectiveness of FVD along the Width

From the dynamic floor responses of the buildings, it can be concluded that, placing FVD at the external corners of the building is effective for square plans.

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COLLABORATIVE DETECTION OF POLYMORPHIC WORMS

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Vallam, Thanjavur

ABSTRACT- Internet worms pose a serious threat to computer security. Traditional approaches using signatures to detect worms pose little danger to the zero day attacks. The focus of malware research is shifting from using signature patterns to identifying the malicious behavior displayed by the malwares. This project presents a novel idea of extracting variable length instruction sequences that can identify worms from clean programs using process monitoring and intrusion detection techniques. The analysis is facilitated by the program control flow information contained in the instruction sequences. Based upon general statistics gathered from these instruction sequences this proposed work formulates the problem as a binary classification problem and built tree based classifiers including decision tree, bagging and random forest.

Keyword: worms, zero day attacks, malwares

INTRODUCTION

We live in the information age and it is very useful for us to share and store information conveniently for the purpose of education, research, increase in productivity and quality of service, electronic storage and easy retrieval etc. One efficient and cost effective way of ensuring these is through the use of computer networks. A network is a connected collection of devices and end systems such as computers, servers, printers which can communicate with each other and share resources. Networks are implemented and in use in homes, small offices, large enterprise and in governmental organizations. Their components include personal computers, interconnections, switches, router, firewalls, etc. Each of these devices perform distinct functions to enable information storage or access information in a faster, reliable, secured, cost effective and convenient manner. The internet, which is a 'network of networks,' has been growing rapidly because it directly affects business, education, governmental activities and social interaction. Because of the benefits of using the internet, a lot of valuable and sensitive information travel through the network and these data transfer attracts attackers to steal, intercept or destroy valuable information and to disrupt normal network connection for fun, fame or money. One way of deploying such attacks is through the deployment of computer worms.

A computer worm is malicious software (malware) designed to attack a network with the aim of either stealing information on the network, destroying network resources or to deny legitimate network users of needed resources- thistype of denial attack is called denial of service (DoS). It is a self-replicating special type of virus program that propagates itself via network connections, taking advantage of security flaws in computers on the network. Worms do not need human intervention to propagate. Worms pose a big threat to network because they evade network security measures stealthy, that is, unnoticed. A computer worm, after it is released, includes the following phases: target finding, worm transferring, worm activation, and worm infection. During the first two phases, the worm is active over the internet thus making it possible to be detected by network-based intrusion detection systems (NIDS). The other two phases are hard to detect by

NIDS. The first step of a worm's life is to find targets.

A worm may find its target or next victim using many different strategies. These strategies include: blind scan- the blind scan method includes sequential, random and permutation scanning, though they are probabilistic because of high failure connection rate and because the worm has no prior knowledge about the targets. The second target finding strategy is using a hit-list. The hit-list is a list of pre-scanned vulnerable addresses, by this the worm knows exactly where the targets are. The variation for this type of target finding

strategy is that the larger the size of the hit-list, the more accurate and the more damage it can cause. Thirdly, the use of network topology can enable a worm to find its target because many hosts on the internet store information about other hosts on the network revealing their vulnerabilities. Fourthly, a passive strategy is another approach worms employ in finding targets by patiently waiting for victims to communicate with where the worm is resident. Lastly, web searching is another strategy used by worms to find their targets because web searches avoid being detected by traditional detection techniques.

The second phase of a worm's life cycle is its transferring or propagation. It does this by employing three different schemes, namely: self-carried- this method allows the worm code to be transferred in a packet by itself. Second channel-this method allows the worm, after finding its target, to go into the target and download the worms code through a

'backdoor' that has been installed by some applications. Embedded- this method allows the worm to attach its code to legitimate traffic for example an e-mail in order to hide itself. This method is very deceitful and often unnoticed. The third phase of a worm's life cycle is worm activation, that is, how the worm is transmitted over the network. There are two basic ways in which worms are transmitted over the network; they are transmission control protocol (TCP) and user datagram protocol (UDP). The main difference is that TCP worms are connection oriented because they require a connection to be established before infection can begin, unlike UDP worms that are connectionless and requires no connection to infect targets, this makes them spread very rapidly.

The last phase of a worm's life cycle is worm infection. This phase of the worm is associated with the actual worm code format. Worms usually send their code in a direct manner which causes detection systems to identify them quickly. Worms can be monomorphic in format; filling the code with irrelevant data but maintaining a single signature. They can also be polymorphic in format; that is, their code changes dynamically by scrambling them so that the worm takes different forms from different views though maintaining the same. The last phase of a worm's life cycle is worm infection. This phase of the worm is associated with the actual worm code format. Worms usually send their code in a direct manner which causes detection systems to identify them quickly. Worms can be monomorphic in format; filling the code with irrelevant data but maintaining a single signature. They can also be polymorphic in format; that is, their code changes dynamically by scrambling them so that the worm takes different forms from different views though maintaining the same function.

This type of worm format is very hard to be detected by signature-based detection. Another worm format is metamorphic worms. It changes not just appearance but also behavior. Worm structures may have features that enable them to locate targets, propagate infections, a remote control that enables the author to control the worm remotely, an update interface that enables author to update the worm's code. Some examples of worms are Stuxnet, Morris Worm, Code Red, Nimda, Slammer, Sasser, Witty, etc.e function. This type of worm format is very hard to be detected by signature-based detection. Another worm format is metamorphic worms. It changes not just appearance but also behavior. Worm structures may have features that enable them to locate targets, propagate infections, a remote control that enables the author to control the worm remotely, an update interface that enables author to update the worm's code. Some examples of worms are Stuxnet, Morris Worm, Code Red, Nimda, Slammer, Sasser, Witty, etc.

Detecting worm attacks has become a thing of concern because of the kind of havoc they can cause on networks. This research focuses on analyzing how intrusion detection systems (IDS) detect worm attacks. An intrusion detection system is hardware or software that is installed on the network or host computers that monitor data traffic on the network in order to discover illegitimate or malicious traffic that disobeys the security policy of a particular network. IDS can be network-based or host-based. Network-based intrusion detection systems (NIDS) analyze network traffic at all layers of the open system interconnection (OSI) model and check for anomalous packet behavior or unwanted packet signatures, and when these are detected, it raises an alarm, calling for the attention of a security administrator. They are easy to deploy and can monitor traffic from many systems at once. Host-based intrusion detection systems (HIDS) are usually software installed on host systems and they generally analyze network traffic and system specific settings such as local security policy, local log audits, and so on. Although both NIDS and HIDS have their strengths and limitations, a use of both at different points in the same network improve the effectiveness of threat detection.

IDSs uses two schemes in detecting illegitimate traffic, these schemes are signature-based and anomaly-based detection methods. It is not just enough to detect worms. The next thing that should be done is to contain them and trace them back to the source. This

research will only analyze the approaches of tracing back attacks. Attack trace back just as the name implies, is merely the tracing of attacks back to their origin. This can be seen as a sort of network forensics, which is the capture, recording and analysis of network events in order to discover the source of security attacks or other problem incidents. It is a reactive measure of attack trace back. There are many reactive approaches for attack trace back, they include; link testing, logging, ICMP (internet control message protocol) trace back and packet marking.

PROBLEM STATEMENT

In order to detect an unknown (zero-day) worm, a straightforward way is to use various threshold-based anomaly detection methods. We can directly use some well-studied methods established in the anomaly intrusion detection area. However, many threshold-based anomaly detections have the trouble in dealing with their high false alarm rate. In this paper, we do not try to propose another threshold-based anomaly detection method. Instead, we present a non-threshold based detection methodology, "trend detection", by using the principle "detecting monitored traffic trend, not burst". Traditional threshold-based anomaly detection methods try to detect a worm by detecting either the long-term or the short-term burst of monitored traffic. However, the monitored data contains noisy background traffic that is caused by many other factors besides the worm we want to detect, such as some old worms' scans or hackers' port scans. Thus traditional threshold-based detections usually will generate excessive false alarms. In the case of worm detection, we find that we can take advantage of the difference between a worm's propagation and a hacker's intrusion attack: a worm code exhibits simple attack behaviors and its propagation usually follows some dynamic models because of its large scale infection; on the other hand, a hacker's intrusion attack, which is more complicated, usually targets one or a set of specific computers and does not follow any well-defined dynamic model in most cases.

EXISTING SYSTEM

Internet attacks such as Distributed Denial-of-Service (DDoS) attacks and worm attacks are increasing in severity and frequency. Identifying and mitigating realtime attacks is an important and challenging task for network administrators. An infected host can make a large number of connections to distinct destinations during a short time. Such a host is called a superpoint. Detecting superpoints can be utilized for traffic engineering and anomaly detection. The existing sysem proposes a novel data streaming method for detecting superpoints and proves guarantees on its accuracy with low memory requirements. The superior performance of this method comes from a new data structure, called Vector Bloom Filter (VBF), which is a variant of standard Bloom Filter (BF). The VBF consists of six hash functions, four of which take some consecutive bits from the input string as the corresponding value, respectively. The information of super-points is obtained by using the overlapping of hash bit strings of the VBF. Theoretical analysis and experimental results show that the proposed method can detect superpoints precisely and efficiently through comparison with other existing approaches.

Disadvantages

I. Existing methodology is not suitable to the recent day trends of worm attacks.

II. The result will not be accurate if the worm is from different sources.

III. Worm detection only implemented but prevention and security is not implemented in the existing methodology.

PROPOSED SYSTEM

In out proposed system an effective algorithm named **Collaborative Internet Worm Detecton (CIWD)** is used for early detection of the presence of a worm and the corresponding monitoring system. Based on epidemic model and observation data from the monitoring system, by using the idea of

"detecting the trend, not the rate" of monitored illegitimated scan traffic, the system proposes to use a Malware filter to detect a worm's propagation at its early stage in real-time. In addition, the system can effectively predict the overall vulnerable population size, and correct the bias in the observed number of infected hosts. Our simulation experiments for Code Red and SQL Slammer show that with observation data from a small fraction of IP addresses, the system can detect the presence of a worm when it infects only 1% to 2% of the vulnerable computers on the Internet.

Advantages

Fig. 1. The proposed system is modified to support the worm detection mechanism of current trends The CIWD shows better performance than the existing systems and effective in detecting internet worms.

Fig. 2. The proposed system not only detects the internet worms it also provide the prevention security for the server data.

PROPOSED ARCHITECTURE

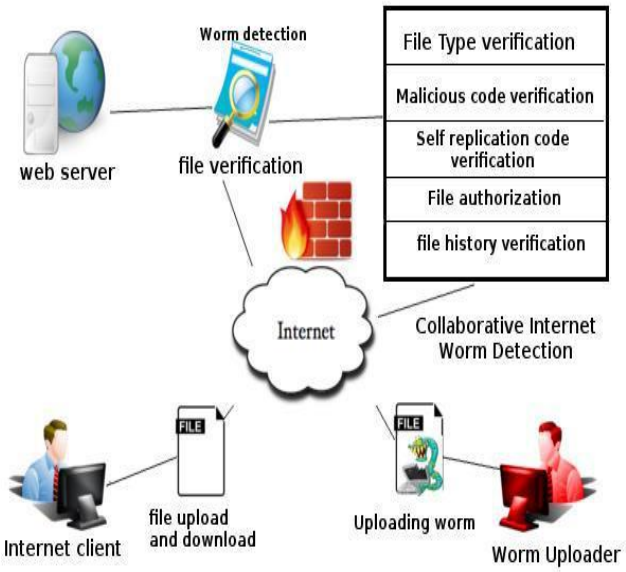


Fig – Architecture diagram of Collaborative Interdependent Worm Detection

MODULES

The proposed Collaborative Internet Worm Detection algorithm uses the following modules in order to verify the uploading and downloading files on the network.

[1] File Type verification

[2] Malicious Code Verification

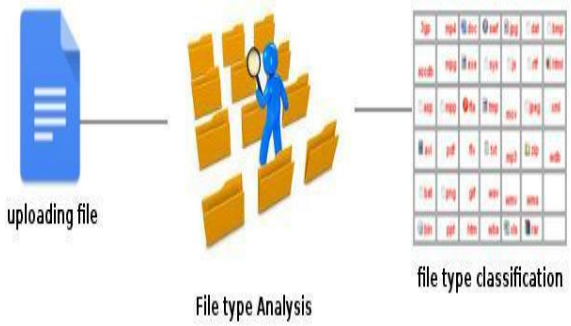
[3] Self Replication Code Verification

[4] File Authorization

[5] File History Verification

File Type Verification

This module is implemented for file type verification, you can process files based on their true file type, so you can take more precautions with risky file types like EXEs, perhaps setting different policies or rules based on file type. Spoofed file types indicate potentially malicious intent, so to mitigate this risk, Metadefender Core can block files with incorrect extensions, preventing for instance EXE files posing as TXT files from entering your organization. Every file has a particular format. Files are either binary or ascii. Common ascii files would be simple text or more complicated formatted text such as PDF or XML

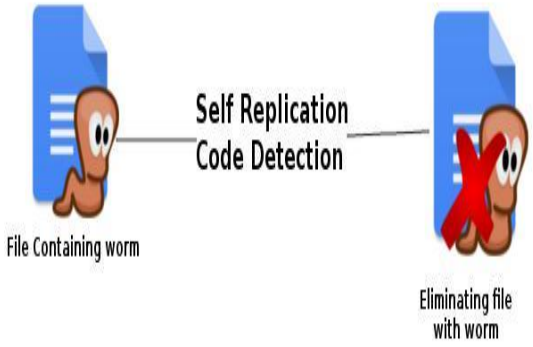


Common binary files are images (jpeg, gif, png) or compressed files. But the file formats can be layered, such as DOCX or PPTX. These are a collection of ascii XML files in a zip archive which makes it a binary file.

Malicious code verification

Perhaps the first large-scale practical instance of the language-based approach was the Java programming language. Javas language-based mechanism is designed to protect against malicious applets. The Java runtime environment contains a bytecode verifier that is supposed to ensure the basic properties of memory, control flow, and type safety. In addition, a trusted security manager enforces higher-level safety policies such as restricted disk I/O. The Java compiler produces platform-independent virtual machine instructions or bytecode that can be verified by the consumer before execution. The bytecode is then either interpreted by a Java virtual machine (VM) interpreter or further compiled down to native code. Early versions of Java contained a number of highly publicized security flaws. For example, a subtle defect in the Java type system allowed an applet to create and control a partially instantiated class loader. The applet could then use this class loader to load, say, a malicious security manager that would permit unlimited disk access.

Self Replication Code Verification



An approach to the detection of malicious software by detecting its ability to self-replicate is proposed, implemented and tested. The approach is justified by the following realities most malicious programs propagate themselves through the Internet to maximize the impact of the information attack; self-replication of legitimate programs is quite uncommon; number of practical self-replication techniques is quite limited and is to be repeatedly used by new malicious codes. A Source Code Analyzer operating as a specialized compiler (interpreter) and a special syntax library were developed for the detection of self-replication functionality in source codes/scripts prior to execution. Major building blocks of the existing self-replication techniques were defined in the domain of system calls and their attributes, and a procedure for the reconstruction of these blocks by analyzing the flow of system call was established. A dynamic Code Analyzer and System Calls Monitor were developed for the run-time detection of the attempted self-replication in executable and encrypted executable codes. The efficiency of the developed technology, including the ability to detect previously unknown malicious programs has been experimentally demonstrated.

File Authorization

Access control in a public cloud is usually accompanied by safety certification. Users have to login to the cloud platform to access data by using the certificate interface provided by the service providers and manage the resources accordingly. In a hybrid cloud, access right permissions usually encounter problems such as inconsistency of file access rights which may cause the employees being unable to access the same resources on the public cloud. File authorization is performed by the File Authorization Module. It checks the access control list (ACL) of the server file handler to determine whether a user should have access to the file. ACL permissions are verified for the file identity and accessible security.

File History Analysis

File History analysis tools are designed to analyze source code and/or compiled version of code in order to help find security flaws. Ideally, such tools would automatically find security flaws with such a high degree of confidence that what's found is indeed a flaw However, this is beyond the state of the art for many types of application security flaws. Thus, such tools frequently serve as aids for an analyst to help them zero in on security relevant portions of code so they can find flaws more efficiently, rather than a tool that just automatically finds flaws. Some tools are starting to move into the IDE. For the types of problems that can be detected during the software development phase itself, this is a powerful phase within the development life cycle to employ such tools, as it provides immediate feedback to the developer on issues they might be introducing into the code during code development itself. This immediate feedback is very useful, especially when compared to finding vulnerabilities much later in the development cycle.

Scope of Defense

Different locations of implementation give different scopes of worm detection and containment. Figure 6 illustrates the correlation of these different network levels. Most IDSs are designed for local area or enterprise network detection and containment. The local area or enterprise network is a clearly defined entity and is normally controlled by one single organization, which has central management when it comes to deciding the type of IDS to implement.

A broader extent that is well defined, is the scope of an ISP or AS, which has multiple customer networks connected to it. After detecting worms from a certain customer network, the ISP can slow down or block off partial traffic from that network to prevent worms from spreading to other customer networks. The detection might be more complex for signature- based algorithms because of dealing with large amounts of traffic, so anomaly-based algorithms may be more feasible. Wagner and Plattner proposed an entropy2-based anomaly detection system to detect worms in fast IP networks (networks with large amounts of traffic) such as the Internet backbones . Essentially, the larger the coverage, the more accurate the normal model definition. The DAW architecture is another example of a system for this scope, which is implemented with anomaly-based detection and containment inside an ISP network. Different parameters are used for different scopes of detection. As the scope grows bigger, detection may be rougher, but containment is more effective. Worms spread at very fast speeds. The damage of a worm outbreak is normally very broad, often across countries. In previous sections we have seen that many of the worm detection algorithms are implemented based on monitoring larger size networks. Also showed that worm containment is only practical if a large fraction of the Internet unites and works together. This leads us to conclude that global scope is necessary in defending against worms proposed a system combining both control plane data (routing data) as well as data plane data (packet headers and payloads) to detect and contain Internet worms mor efectively. In this system, anomalies detected on the data plane are used to identify ASs that are associated with the attacks and apply control plane filters to contain them. Furthermore, anomalies detected on the control plane (e.g., IP hijacking) can be used to deploy strict data plane controls on a particular

Conclusion

Identified the characteristics of existing and hypothetical forms during the target finding and propagation phases of a worm's life cycle. They are classified based on target finding, propagation, transmission scheme, and payload format. Current detection algorithms are organized based on the categories of signature-based, anomaly-based, or hybrid. Evaluated these categories against worm characteristics. Classified current containment schemes based on the methods they use to control the spread of worms. Aalso explored the implementations of detection and containment at different network locations and system scopes. An ideal system should use a combination of schemes to have more comprehensive coverage. Different detection schemes are useful at different levels of implementation. So far, there is no ultimate solution to deal with all existing and hypothetical worms. New attack technologies are being developed every day, and the threat constantly exists. We have pointed out the remaining challenges and future work to be done based on the analysis of current algorithms. So far, there are limited solutions for detecting passive and topological scanning worms, flash worms, and metamorphic worms; nevertheless, as pointed out in research by Kienzle and Elder the majority of new worms coming out every day are not novel and are derivative in nature. As a result, by defending against yesterday's worms, we can

effectively protect ourselves against most new worms; at the same time, we also need to prepare for the threats of new novel worms that can hit us in the future.

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DESIGN OF POWER GENERATION SYSTEM USING VEHICLE SUSPENSION

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ABSTRACT- All vehicles have suspension system. Only 26 % of the available fuel energy is used to drive the vehicle, i.e. to overcome the resistance from road friction. One important loss is the dissipation of vibration energy by shock absorbers in the vehicle suspension under the excitation of road irregularity and vehicle acceleration or deceleration. The suspension system mainly consist of a mechanical spring. The objective of this project is to design a vehicle suspension system which can harness the energy. In the present work, spring is a one type of suspension system that converts parasitic intermittent linear motion and vibration into useful energy, such as electricity. In our project, we used spring, rack & pinion arrangement and doubly fed induction generator. As shock absorber effect formed, spring is compressed and linear movement of rack is converted in rotary motion due to pinion moves as the rack is meshed with pinion. And the pinion is mounted on the shaft which is connected to shaft of doubly fed induction generator. Due to this arrangement, rotary motion of pinion is used to rotate generator. As generator rotation leads to generation of energy. And this energy is used to charge the battery and this stored energy is used for different vehicle accessories like power window, lights and air conditioner etc. And also the power generation is monitored by using PCB circuit with the help of VISUAL BASIC software.
Key words: vehicle suspension, Rack & Pinion, BESS system, Ultra capacitor, etc

1. INTRODUCTION

Fossil fuels are being consumed with very fast rate. Also the cost of fuel is increasing with a very fast rate. So somebody has to work on saving of the fuel consumption. Our aim is to demonstrate how the kinetic energy from the suspension of a vehicle can be utilized to achieve our goal of obtaining maximum energy that would otherwise have gone waste. We propose a design plan that converts the mechanical energy in vehicles to electrical energy much more efficiently than it has been done before. The electricity generated will then be used to recharge the vehicle battery for further use for functioning of the vehicle. There is a wide scope for regeneration of energy like regeneration of breaking systematic. We have decided to work on utilization of suspending mass of a vehicle through regeneration system with the help of shock absorber. Shock absorbers are having reciprocating motion in it. Although the reciprocating distance is very low the suspending mass is very high i.e. the mass of total vehicle. When vehicle is on a normal road then also shock absorbers are working due to uneven roads, sudden breaking or sudden acceleration and also a running conditions. So this reciprocating motion of shock absorbers can be converted into rotary motion and through small gearbox arrangement, i.e. rack & pinion attached to doubly fed induction generator, electricity will be generated when shock absorbers will be reciprocating.

2. LITERATURE REVIEW

The purpose of this literature review is to go through the main topics of interest. The literature review is concerned with design of spur gear, DC generator, Design of Shaft, selection of bearings & shock absorber with theoretical and experimental evaluation. The objective of this project is to design a regenerative shock absorber which can harness the energy.

A regenerative shock absorber is modeled and analyzed for emf generated using a soft Maxwell and a physical model was built to validate the model. A regenerative shock absorber model with NdFeB magnet as core and three piston stacked generated 12 volts AC operated at a speed of 1 m/s and the physical built based on this computational model developed 2 volts when operated at the same speed but with steel as core[1]. If vehicular motion can be put to generate useful power, it can be put to effective use. This idea has mothered the invention of "power generation through speed breakers", inspired by various other existing designs. In this paper an attempt has been made to generate power using speed breakers through rack and pinion mechanism by tapping the energy and utilizing it for various purposes such as lightening the street lights, etc. [2]. This paper deal with energy harvesting shock absorber is able to recover the energy otherwise dissipated in the suspension vibration while simultaneously suppress the vibration induced by road roughness. It can work as a controllable damper as well as an energy generator. The key component is a unique motion mechanism, which we called "mechanical motion rectifier (MMR)", to convert the oscillatory vibration into unidirectional rotation of the generator [3]. Electronic equipment systems are precision system. There are some vibrations and impact in moving vehicles for road environments. Therefore, shock absorber is significant in protection of electronic equipment in moving vehicles. In this paper a systematic investigation to design or evaluation of a shock absorber for protection of electronic equipment system in harsh vibration-impact environment [4]. Instead of dissipating the vibration energy into heat wastes, the damper in regenerative suspension will transform the kinetic energy into electricity or other potential energy and store it for late use. The stored energy can be used to tune the damping force of the damper to improve the suspension performance or to power vehicle electronics to increase vehicle fuel efficiency [5].

3. COMPONENTS USED

3.1. MECHANICAL COMPONENTS

3.1.1. SHOCK ABSORBER

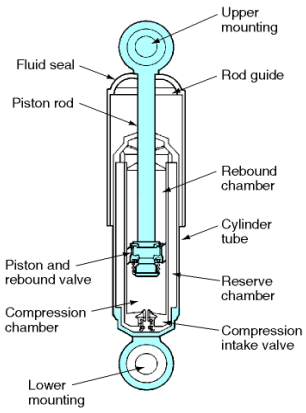


Figure: 1.Shock absorber

3.1.2. SPRING

Figure: 1.Spring

A spring is an elastic object used to store mechanical energy. Springs are usually made out of spring steel. There are a large number of spring designs; in everyday usage the term often refers to coil springs. Small springs can be wound from pre-hardened stock, while larger ones are made from annealed steel and hardened after fabrication. Some non-ferrous metals are also used including phosphor bronze and titanium for parts requiring corrosion resistance and beryllium copper for springs carrying electrical current (because of its low electrical resistance). When a coil spring is compressed or stretched slightly from rest, the force it exerts is approximately proportional to its change in length (this approximation breaks down for larger deflections).

3.1.2. RACK &PINION

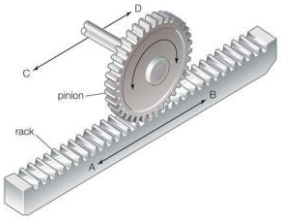


Figure: 2. Rack & Pinion

A **rack and pinion** is a type of linear actuator that comprises a pair of gears which convert linear motion into rotational motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack"; linear motion applied to the rack causes the pinion to move relative to the gear, thereby translating the linear motion of the rack into rotational motion.

3.1.3. DOUBLY FED INDUCTION GENERATOR

Figure: 3.Doubly Fed Induction Generator

The doubly fed induction machine is a useful motor for industrial application and a largely adopted generator. Its speed and torque can be controlled by rheostats or frequency converter connected to the rotor winding, what allows the reduction of converter power just to a fraction of induction machine mechanical power, saving installation costs. The benefits of the use of doubly fed induction machines are undeniable; nevertheless, to take advantages of them it is mandatory to provide electrical connection between the rotor winding and the rheostat or the frequency converter. The most common way to access the rotor winding is by brushes and slip-rings. However, the mechanical contact between moving slip-rings and static brushes wears these components and involves high rate of maintenance. Powder generated by brushes wearing can be also prejudicial for motor insulation. Additionally, any fault on electrical contact can generate sparks, limiting this machine installation only to non-explosive environment. It is mainly used to produce alternating current (AC) in both positive and negative cycles.

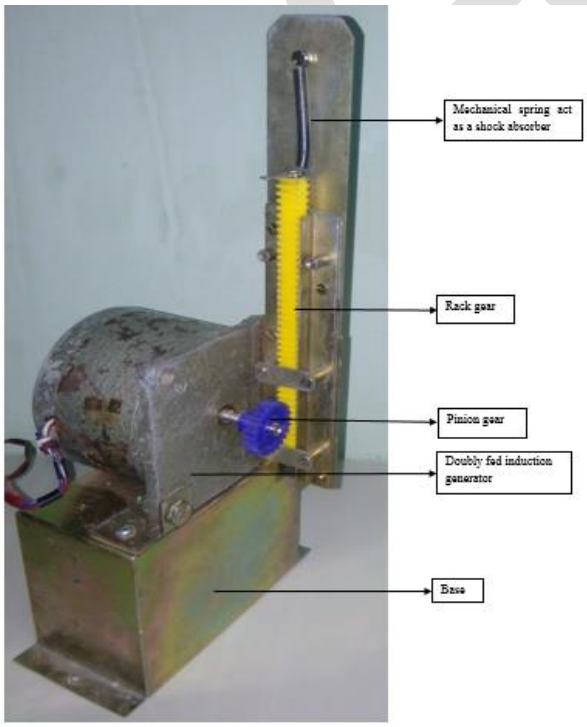


Figure: 4. Mechanical components arrangement

3.2. ELECTRICAL AND ELECTRONICS COMPONENTS

Electrical power transformer is a static device which transforms electrical energy from one circuit to another without any direct electrical connection and with the help of mutual induction between two windings. It transforms power from one circuit to another without changing its frequency but may be in different voltage level. A capacitor (originally known as a condenser) is a passive two -terminal electrical component used to store electrical energy temporarily in an electric field. The SI unit of capacitance is the farad (F), which is equal to one coulomb per volt (1 C/V). A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits. The SI unit of resistance is Ohm (Ω).A bridge rectifier is an arrangement of four or more diodes in a bridge circuit configuration which provides the same output polarity for either input polarity. It is used for converting an alternating current (AC) input into a direct current (DC) output. 7805 is a voltage regulator integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. . 7805 provides +5V regulated power supply. A crystal oscillator is an electronic oscillator circuit that uses the

mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a precise frequency. A light-emitting diode (LED) is a two- lead semiconductor light source. 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.

3.2.1. ULTRA CAPACITOR BATTERY

Ultra capacitors can be defined as an energy storage device that stores energy electrostatically by polarizing an electrolytic solution. Unlike batteries no chemical reaction takes place when energy is being stored or discharged and so ultra-capacitors can go through hundreds of thousands of charging cycles with no degradation. Ultra capacitors are also known as **double-layer capacitors** or **super capacitors.**

Figure: 5.Ultra capacitor battery

3.2.2. 40 PIN PIC IC BASE

The name PIC initially referred to **"Peripheral Interface Controller"**. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory.

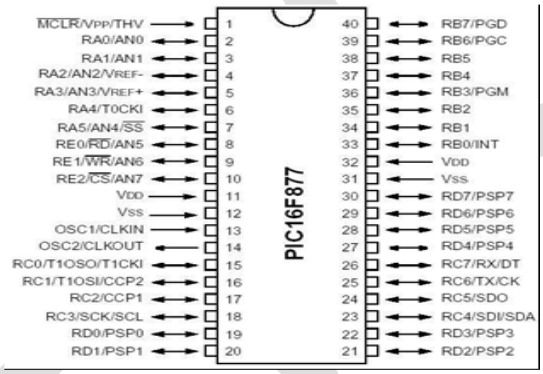


Figure: 6.PIC 16F877

3.2.3. PERSONEL COMPUTER:

In personal computer, data transfer takes place serially. RS-232standard is used for serial communication .PIC Micro controller is linked to PC through the RS-232 port. The PC displays the menu for selecting the calibrating equipment and all the calibration results graphically and in tabular form. The user can access the calibration data to get calibration reports, comparison graphs etc. at any time using the menu offered in the PC.

3.2.4. RS 232 CONNECTOR

The most common communication interface for short distance is RS-232. RS-232 defines a serial communication for one device to one computer communication port, with speeds up to 19,200 baud. Typically 7 or 8 bit (on/off) signal is transmitted to represent a character or digit. The 9-pin connector is used. The pin detail is given below.

Figure: 7.RS 232 Connector

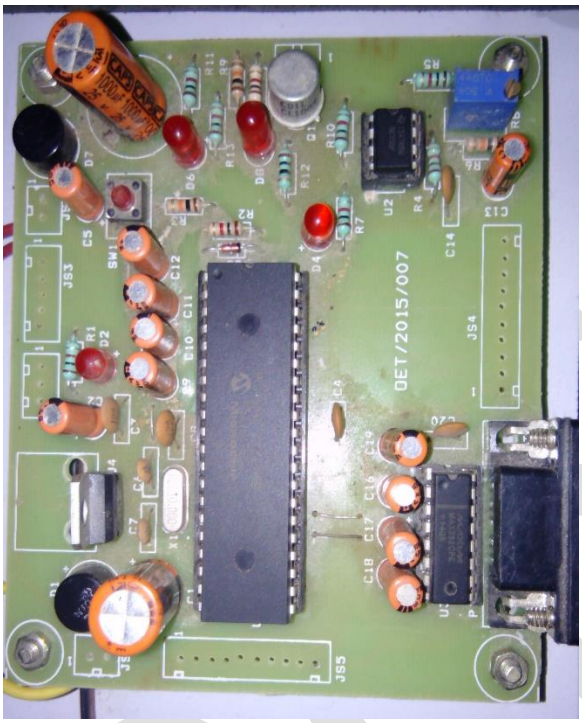


Figure: 8. Electronics components arrangement in PCB

4. SOFTWARE USED

4.1. VISUAL BASIC 6.0

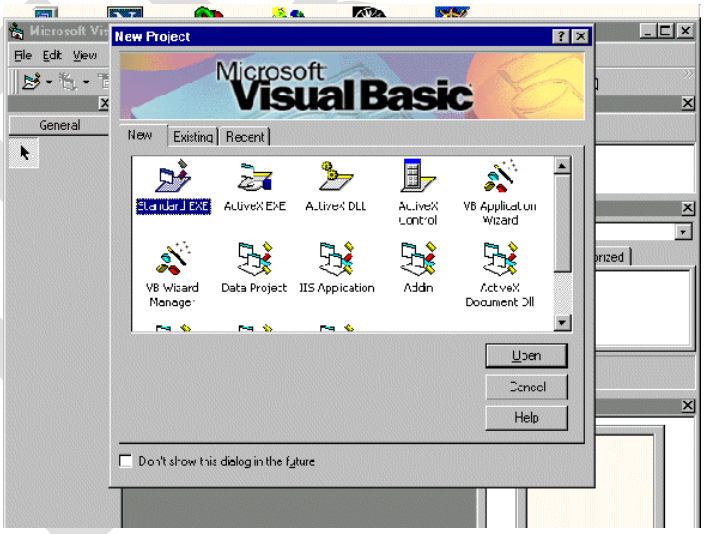


Figure: 9 .Visual Basic

Visual Basic is a third-generation eve-driven programming language and integrated development environment (IDE) from Microsoft for its COM programming model first released in 1991 and declared legacy in 2008. Microsoft Intended Visual Basic to be relatively easy to learn and use. Visual Basic was derived from BASIC and enables the rapid application development (RAD) of graphical user interface (GUI) applications, access to databases using Data Access Objects, Remote Data Objects, or ActiveX Data Objects, and creation of ActiveX controls and objects.

Paradigm : Object-based and Eve driven
Developer : Microsoft
First appeared : 1991; 25 years ago
Stable release : 6.0 / 1998; 18 years
Typing discipline : Static, strong
OS : Microsoft Windows and MS-DOS

Major implementation: Microsoft Visual Studio

5. MECHANISM USED

5.1. RACK &PINION MECHANISM

A **rack and pinion** is a type of linear actuator that comprises a pair of gears which convert linear motion into rotational motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack"; linear motion applied to the rack causes the pinion to move relative to the gear, thereby translating the linear motion of the rack into rotational motion.

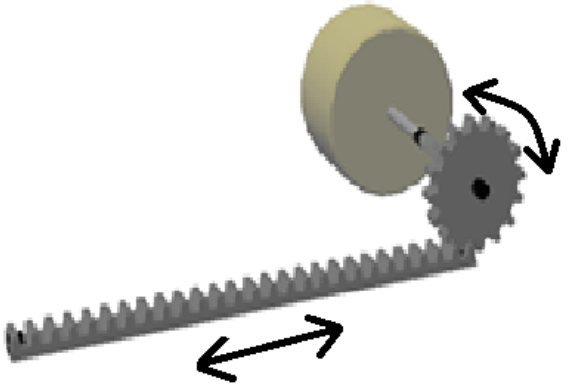


Figure: 10.Rack & Pinion Arrangement

6. CONSTRUCTION

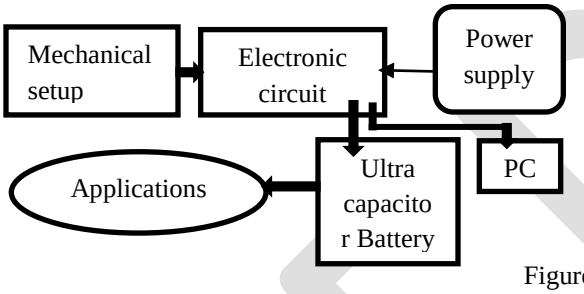
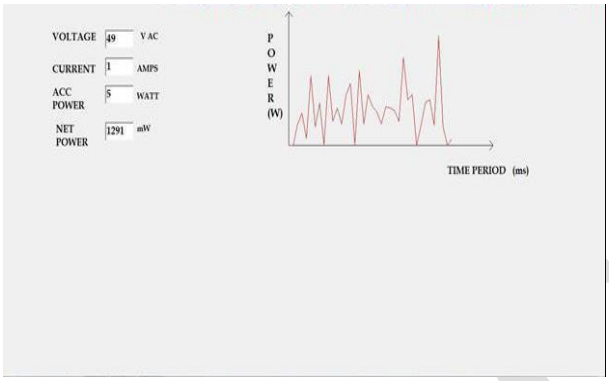


Figure: 11. System Block Diagram

The system consists of following components such as suspension system, rack and pinion, doubly fed generator and embedded system. The suspension system absorbs the small vibration that is produce in the vehicle. Rack and pinion converts linear vibration motion into rotary motion. Generator is used to produce continuous alternating current (AC). The embedded system controls the whole process. Connections are made for the designed working condition. Initially high frequency charge controller is wired with doubly fed induction generator for power generation. Input power is given by rack and pinion due to small vibration of vehicle suspension. Suspension is the system used to allow relative motion between road and vehicle tires. And act as a weight transfer. This suspension gets small range of deflection rate from moving vehicle vibration. And this vibration makes spring system to gradual movement dependently with rack and pinion movement. Total jacking force of suspension system is converted to rack and pinion movement. This linear force is converted into rotary movement because of pinion mechanism. After this undamming rotary force directly applied to generator through pinion movement. Generator gets powered then it rotates mechanically to produce power. Power producing is concerned only with rack and pinion not with vehicle movement. Leveling suspension is continuously working among with deflection of vehicle movement.so the power output is very precious with small input. Fortunately we can furnish our power output exactly with VISUAL BASIC software. It is used to acute graph calculation for future assumption of enormous power. Produced level of power again transferred cyclically for vehicle movement. So it is called as heterogeneous power generation. This type of active power can be used in many industrial applications and home appliances.

7. GRAPH



Graph 1: At maximum energy level

Graph plotted for the maximum value of energy at peak condition of vehicle movement. At this condition, rack and pinion movement is slightly increased for maximal. So energy value is high.

8. DESIGN CALCULATION

8.1. DESIGN OF SPRING

For suspension system we are selected the helical spring.

Kw = (4C-1/4C-4) + (0.615/C)

τ = (8FDm/πd3)× kw

But C = Dm/d

Dm = C×d

τ =8FC/πd2 kw

d2=8FC/ $\tau\pi$

Where, F=Load on the System

C=spring index

G= Modulus of rigidity

τ = Permissible shear stress

Wire Diameter = d

Mean diameter =Dm

Outer diameter = D0=Dm+d

Inner diameter = Di=Dm-d

Spring is plain grounded , N=Nt

Solid Length = Nt× d

Total gap= (Nt – 1) ×gap between two adjacent coil

Free Length (Lf) = Solid length + Total gap length +δ

Pitch of Coil = Free Length/(Nt-1)

8.2. DESIGN OF RACK & PINION

Lewis form factor is

Y = 0.289 for 24 teeth

Cs = service factor

Cv= 3/ (3+v)

And v =πdn / (60×1000)

Pt = 2Mt/dp, Peff = (Cs*Pt) / Cv

Wear Strength, Sw = bQdpK

Q =2ZG/(ZG+ZP)

K = 0.16((BHN)/100)2

BHN= 270 for cast iron material, K = 1.17

Factor of Safety f'(s) = Sw/Peff

= 298.77 / 575

= 0.51

RESULT AND CONCLUSION

Vehicle Suspension Energy Generation is very efficient and useful in converting the Kinetic Energy from the movement of the vehicle, especially the suspension, which usually goes waste, to electric energy that can be used to fulfill needs of the auxiliaries in the vehicle. Currently the batteries of automobiles are charged by specific alternator which is attached to IC engine shaft. So that the fuel used in automobiles is also consumed for rotating the alternator to charge the battery, this consumption is found to be 4% of total consumption. By newly designed suspension, regeneration system presently using alternator is detached from the engine and attached to the suspension system. The advantage of this concept is energy storage system is possible using "BESS system" and even fully drained battery is charged by ultra capacitor using high frequency charge controller system.

If we install this regeneration system for all 4 wheels then we can generate high amount of electric power. This high amount of electric power can be used for the working of vehicle air conditioner or refrigeration system of vehicles. This suspension system will be mostly useful for heavy compressed vehicles, milk trucks, fire brigade trucks and also those having high requirement of electricity inside it. From result graph we are observed that for a small amount of vibration of vehicle, we get the maximum voltage and current.

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Summary of Research and Studies on Heat Transfer Enhancements by Nanofluids

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Abstract— Need for the equipment and processes with low space and energy requirements is driving force towards innovative practices in chemical process engineering. Energy requirement is one of the major costs involved in the plants. Many plants depend on fossil fuel and conventional sources of fuel. Use of nanofluid with the water like liquid can be very effective in increasing thermal conductivity. A fluid containing nanometer-sized particles, called nanoparticles is nanofluid. These are colloidal suspensions of nanoparticles in a base fluid. Metals, oxides, carbides, or carbon nanotubes are used as nanoparticles. The nanoparticles suspended in base fluid increases thermal conductivity. Current review summarizes research and studies on application of nanofluids and nanoparticles for heat transfer enhancement with affecting parameters and results obtained in various investigations.

Keywords— Thermal conductivity, heat transfer coefficient, base fluid, Nusselt number.

I.INTRODUCTION

Process intensification has become most important study area for chemical and process engineers [1, 2]. Need for the equipment and processes with low space and energy requirements is driving force towards innovative practices in chemical process engineering [3, 4]. Many modifications in unit processes and operations and their combinations have yielded efficient results [5, 6, 7]. Energy requirement is one of the major costs involved in the plants. Many plants depend on fossil fuel and conventional sources of fuel. Biotechnology has helped in obtaining various products in energy efficient manner [8, 9, 10]. The biotechnological research indicates that use of low cost material for fuel synthesis is viable and cost effective alternative [11]. The initial high installation cost is limiting factors for this and many other non-conventional energy synthesis methods. The sources such as tidal and solar energy are being explored[12,13,14,15,16]. The regeneration, waste heat recovery and cogeneration are very effective methods to increase energy efficiency of the process [17, 18, 19, 20]. Use of Nanofluid with the water like liquid can be very effective in increasing thermal conductivity [21, 22, 23]. A fluid containing nanometer-sized particles, called nanoparticles is nanofluid. These are colloidal suspensions of nanoparticles in a base fluid. Metals, oxides, carbides, or carbon nanotubes are used as nanoparticles. The nanoparticles suspended in base fluid increases thermal conductivity. Many investigations are reported on use of nanoparticles and nanofluids for heat transfer enhancements Current review summarizes research and studies on application of nanofluids and nanoparticles for heat transfer enhancement with affecting parameters and results obtained in various investigations.

II. HEAT TRANSFER ENHANCEMENTS BY NANOFLUIDS

Maisuria et.al. carried out investigation on fin heat exchanger using nanofluids [24]. The nanofluids are fluids with higher thermal conductivity and better thermo-physical properties. They compared the nanofluids with base fluid containing water and ethylene glycol. They carried out theoretical analysis to investigate the variation in thermo-physical properties of base fluid. Sudarmadji et.al. carried out investigation on convective heat transfer and pressure drop of nanofluid[25]. In their investigation, they used alumina-water nanofluid under laminar flow regime. Nanofluid was used in tube side and water shell in side. They carried out experiments at nanoparticle volume concentration of 0.15%, 0.25% and 0.5%.They found that increase in nanoparticle concentration had positive impact on heat transfer. There was insignificant rise in pressure drop with concentration. Studies were carried out with ZnO Water nanofluid for concentric heat exchanger by Krishna [26]. According to him, low thermal conductivities of many utility fluids such as water, mineral oil, and ethylene glycol hampers the development of energy-efficient heat transfer in fluids. They synthesized nano-fluids using metal and metal oxide nanoparticles. Important steps in synthesis of nanomaterials were dissolving, preparation of solution, formation of gel, filtration and drying. They obtained 11 percent rise in heat transfer for 0.5 percent nanofluid. Rana and Bhargava carried out investigation on flow and heat transfer analysis of a nanofluid using Galerkin finite element method (FEM) for spherical shaped nanoparticles[27].They carried out experiments on vertical flat plate with non-uniform heating. They observed increase in heat transfer after nanoparticle addition. They also observed enhancement in skin-friction and Nusselt number. Smaller size nanoparticles resulted in higher Nusselt number than larger ones. Al_2O_3/water nanofluid was used by Mukeshkumar et.al. for

increasing heat transfer[28].They carried out experimental study on parallel and counter flow configuration of a shell and helically coiled tube heat exchanger. They used X-ray diffraction (XRD) and scanning electron microscope (SEM) for characterization of nanofluids. They observed 4-8% higher heat transfer for counter flow than that of parallel flow at 0.4% nanofluid. They also found that heat transfer performance for 0.8% nanofluid was higher than 0.4% nanofluid. Ali and Al-Hattab carried out investigation on the transient 3-D fully developed forced convection in laminar flow [29]. They carried out thorough investigation with CuO/water and Al_2O_3 in horizontal triangular duct. They found that heat transfer rate became more remarkable after employing nanofluid. particle volume concentration increase had positive effect on heat transfer. Under same operating condition, CuO-water was better than Al_2O_3 in heat transformation process.

Shekarian et.al. carried out investigation on enhancement of thermal efficiency of shell and tube heat exchangers by using Al_2O_3/water nanofluid [30]. In their wok, they provided a combination of techniques such as adding nanoparticles to the hot or cold fluids, and/or using tube inserts as turbulators on tube side as well as changing baffles to a helical or twisted profile on the shell side to increase the impact of these improvements quantitatively. By using combined method, they were able to reduce heat transfer area by 10 percent. Abu-Nada and Chamkha carried out investigation on a CuO-EG-Water nanofluid in enclosures for natural convection studies[31]. Their focus was on effect of nanofluid variable properties.They also presented results from previous work for the streamline and isotherm contours as well as the local and average Nusselt numbers. According to them, the effects of the viscosity models were more predominant on the behavior of the average Nusselt number than the influence of the thermal conductivity models. Enclosure aspect ratio also had significant effect on Nusselt number. Arian et.al. used carbon nanoparticles with a diameter of 10-15 nm and a volume concentration of 0.2% (v/v) for studying performance heat transfer and overall heat transfer in a double pipe heat exchanger [32].They carried out studies on effect of parameters such as temperature, mass flow rate and concentration of nanoparticles on the overall heat transfer coefficient. They found that, with twisted tape and nanofluid, heat transfer coefficient was about 15 to 30 percent higher. Senthilkumar et.al. carried out investigation on copper nanofluid for increasing performance of heat pipes[33].They carried out experiments with copper nanofluid for examining the effect of filling ratio in heat pipe on the thermal performance. They found that maximum increase in heat pipe performance was observed at 100 mg/l of nanofluid. Cieslinski and Kaczmarczyk carried out an investigation on heat transfer during pool boiling of two nanofluids [34]. They carried out investigation with two nanofluids namely water-Al_2O_3 and water-Cu. In their investigation, they established the influence of nanofluids concentration as well as tube surface material on heat transfer characteristics at atmospheric pressure. They found that while boiling of water-Al_2O_3 or water-Cu nanofluids on smooth copper tube, concentration nanoparticle material (Al_2O_3 and Cu) has almost no influence on heat transfer coefficient.They obtained higher heat transfer coefficient for stainless steel tube than for copper tube for the same heat flux density. Wang et.al. carried out an investigation on effective thermal conductivity of mixtures of fluids and nanometer-size particle [35]. They carried out studies on Al_2O_3 and CuO, dispersed in water, vacuum pump fluid, engine oil, and ethylene glycol. They found that thermal conductivities of nanoparticle fluid mixtures were higher than base fluids. Their studies also indicated that with decreasing the particle size, there was increase in the thermal conductivity of nanoparticle-fluid mixtures. They also found that thermal conductivities computed by theoretical models were lower than the measured data. This was due to deficiencies in existing models in describing heat transfer at the nanometer scale in fluids.

Barber et.al. carried out review on boiling heat transfer enhancement with nanofluids[36]. They carried out studies on recent advances in both pool boiling and convective boiling applications in the last decade by researchers. They observed that there was conflicting data on the nanofluids boiling heat-transfer coefficient. Most significant common observation in all investigations was an enhancement in the critical heat flux during nanofluid boiling.Yu et.al. carried out investigation on single-phase convective heat transfer of nanofluids [37]. They observed different degrees of enhancement over the base fluids. They carried out investigation on convective flow boiling and two-phase flow for Al_2O_3–water nanofluids through a minichannel.Their investigation indicated that presence of nanoparticles delays onset of flow instabilities (OFI). Due to the nanoparticles, there was delay in onset of nucleate boiling, ONB and suppression of OFI. In nanofluid flow, this was attributed to available nucleation sites and surface wettability as well as thinning of thermal boundary layers. According to studies carried out by Mahrooghi and Moghiman, the overall heat transfer coefficient increases with nanoparticle volume concentrations in the heat exchangers [38]. They studied forced convection flow and heat transfer of a Al_2O_3/water nanofluid. They studied single and two phase (volume of fluid) models. They found that the particle volume concentration of 3% at the inner tube of concentric sinusoidal double tube heat exchanger resulted in 220% enhancement in overall heat transfer coefficient. Aghayari et.al. carried out investigation on the overall heat transfer coefficient of nanofluids in heat exchangers[39]. They also studied various factors affecting heat transfer. Their studies indicated remarkable 8%–10% rise in the mean HT and the OHTC. They also observed that, with an increase in the processing temperature and/or particle concentration, there was an increase in the OHTC. Kedzierski investigated the influence of copper (II) oxide (CuO) nanoparticle concentration on the boiling

performance[40]. They carried out investigation on R134a/polyolester mixtures on a roughened, horizontal flat surface. They prepared two lubricating nanofluids using a synthetic polyolester and 30 nm diameter CuO particles. They observed 50 to 275 percent enhancement in heat transfer with a 0.5 % nanolubricant mass fraction with R134a.

Davarnejad and Ardehali carried out an investigation on effect of TiO_2-water nanofluid on heat transfer and pressure drop[41].They carried out work on turbulent heat transfer for the heat transfer coefficient (Nusselt number) and pressure drop of the nanofluid in a horizontal copper tube. They observed increase in Nusselt number with increasing the Reynolds number and nanoparticles volume fractions. With use of nanofluids, they also observed increase in the pressure drop. In their review, Wang and Mujumdar studied fluid flow and heat transfer characteristics of nanofluids in forced and free convection flows[42]. They also explored applications of nanofluids.They found that many interesting and complicated phenomena involving nanofluids have been observed by various investigators. Investigators had given more importance to the thermal conductivity than heat transfer coefficient earlier. According to them, there is lack of complete understanding of the process with nanoparticle. Also there are differences among the investigators about model fitting and agreement of model parameters with actual experimental data. They expressed need for further extensive research understand the heat transfer characteristics of nanofluids and identify new and unique applications. Qiang and Yimin carried out investigation on Cu-water nanofluid[43]. Their studies were concentrated on convective heat transfer and flow characteristics. They discussed effect of the volume fraction of suspended nanoparticles and the Reynolds number on the heat transfer and flow characteristics. Their investigation indicated increase in the convective heat transfer coefficient of the base fluid because of nanofluids.They also found that there was no significant change in the friction factor of the sample nanofluid with the low volume fraction of nanoparticles. With 2.0 vol% Cu nanoparticles at the same Reynolds number, they observed about 60% increases in convective heat transfer coefficient.

Vahidinia and Miri carried out an investigation on the effect of the Reynolds number on the thermal and hydrodynamic parameters of mixed convection heat transfer of the water-Al_2O_3 nanofluid turbulent flow[44]. They used an inclined circular channel as the subject of the investigation. They observed that with increasing Reynolds number, there was increase in the convective heat transfer coefficient and shear stress. Abdulwahab carried out an investigation on numerical investigation of turbulent magnetic nanofluid flow[45]. They investigated square straight channel flow. They used computational fluid dynamics method with a single-phase approach. In their work, they studied the effects of the concentration of nanoparticles and flow rate on the convective heat transfer and friction factor in turbulent regime. They observed increase in Nusselt number with volume fraction and Reynolds number. Also friction factor decreased with Reynolds number. Afshoon and Fakhar investigated heat transfer coefficient and friction factor of CuO water nanofluid [46].They observed that increase in the volume concentration and Reynolds number of nanofluid increase the local heat transfer coefficient, overall heat transfer coefficient and pressure drop of nanofluids. By using nanofluid, 32 percent enhancement was observed by them in heat transfer. An investigation carried out by SanthoshCibi et.al. suggested promising future for graphite nanofluids[47].They developed higher convective heat transfer behavior of graphite nanofluids through the shell and tube heat exchanger under laminar flow.They observed increase in the heat transfer with increase in graphite concentration. The increase in the thermal conductivity cause increase in heat transfer.They concluded that the effect of graphite on thermal conductivity of nanofluids is much more than heat transfer coefficient of nanofluids. An investigation carried out by Hasanuzzaman et.al. was focused on nanofluid driven effectiveness enhancement of heat exchanger[48]. For counter flow heat exchanger, they estimated convective heat transfer coefficient of water, Cu-water, Al-water, Al_2O_3-water and TiO_2-water of 2% nanoparticle concentration. They observed that convective heat transfer coefficients were 81%, 63%, 66% and 64% higher compared to pure water for Cu-water, Al-water, Al_2O_3water and TiO_2-water nanofluids respectively, whereas overall heat transfer coefficients were 23%, 20%, 21 % and 20% higher. Wen carried fundamental studies on the effect of nanoparticles on boiling heat transfer[49].They revealed the potential effect of nanoparticles on boiling heat transfer by performing two sets of experiments. In one set, they studied pool boiling of nanofluids on two well defined surfaces. In second set of experiments, they studied, bubble formation in a quiescent pool of nanofluids under adiabatic conditions. They found that the relative size between particles suspended in the liquid medium and the surface geometry influences the particle deposition effect. Also nanoparticles affect bubble dynamics by modifying pinning behaviour of the triple line. Mali et.al. reviewed research on flow boiling heat transfer enhancement with nanofluids[50]. In their review, they presented advances in the last decade in flow boiling and convective boiling applications.They focused on various aspects such as the preparation methods, stability of nanofluids, bubble dynamics in flow boiling. An investigation was carried out by Shareef et.al. with an Al_2O_3 -water based nanofluid as the working fluid for flat tube in plate type solar collector[51].They used di-ionized water as a base fluid.Then they used Al_2O_3 nanofluid of 0.5% volume fraction in base fluid. They found that the temperature difference increased with Al_2O_3-water nanofluid. They concluded that the nanofluids can be used as an appropriate heat transfer fluid for solar collectors.Yerrennagoudaru et.al. carried out studies on effect of nanofluids on heat transfer[52].They also summarized recent

developments in research on nanofluids. In experimental work, they used four nanofluids namely Magnesium oxide-water, copper oxide-water, Titanium oxide-water, and Iron oxide-water. They also compared experimental results with cfd results.

In their investigation, Senthilraj et.al., carried out estimation of heat transfer coefficient of CuO/Water nanofluid in double pipe heat exchanger with or without electric field[53].The system consisted of a CuO/water nanofluid circulating inner tube and a hot air stream flowing through the outer tube.They reported that there was increase in convective heat transfer coefficient of the nanofluid up to 0.15% volume fraction. The high voltage supply to the electrode had positive effect on heat transfer.They concluded that with increasing the electric field intensity and nanofluid volume concentration, there was improvement in the convective heat transfer coefficient. Kadhim et.al. carried out an investigation on nanofluid (MGO) on heat transfer characteristics for integral finned tube heat exchanger[54]. As expected they found improvement in heat transfer with nanofluids. With 0.75 percent nanofluid, they obtained maximum 2.17 percent increase in thermal conductivity. With same concentration of nanofluid, they obtained maximum rise in heat dissipation rate. This maximum enhancement was 15.85%.They also observed 16.31 percent rise in air side Nusselt number. Aghayari et.al. carried out research on heat transfer in double pipe heat exchanger with nanofluid[55].They investigated the performance of the water/iron oxide nanofluid. A double pipe heat exchanger had perforated twisted tapes and was used in turbulent flow regime. They obtained 130 percent enhancement in heat transfer by reducing twist ratio and increasing the nanofluid concentration. Twist ratio of 2.5 and nanofluid concentration of 0.2 percent by volume yielded the best results. Kasaeian and Nasiri carried out studies on the effects of adding nanoparticles including TiO_2 to a fluid media[56].Their studies also emphasized the fact that adding nanoparticles to the fluid generally causes increment and development of heat transfer coefficient. In the modeling studies, they found that the Pakand viscosity model predicted a higher increase in viscosity. According to their studies, free convection heat transfer of nanofluids can be better explained by the Brinkman model, the Einstein model and the Brownian movement model.Chavda et.al. used aluminum oxide nanofluid in double pipe heat exchanger[57]. According to them, the factors such as type of nanoparticles, size of nanoparticles and concentration of nanoparticles in base fluid affects the heat transfer enhancement. Volume concentration of 0.008 % was found to be optimum for nanoparticles. Sharifi et.al. used numerical simulation and experimental investigation for studying laminar forced convective heat transfer of Al_2O_3/water nanofluid[58]. Experimental data and computer-aided simulation showed remarkable enhancement of convective heat transfer by adding small amounts of Al_2O_3 nanoparticles. They also observed decrease in heat transfer coefficient by increasing amount of ethylene glycol. In their investigation, Ferrouillat et.al. carried out investigation on influence of nanoparticle shape factor on convective heat transfer[59].They used ZnO aqueous colloidal suspensions of both polygonal and rod-like nanoparticles. They observed that pressure drop of nanofluid with polygonal particles was more than rod-like nanoparticles. Polygonal particles showed higher heat transfer augmentation. Higher dynamic viscosity can be reason for the same.

Sivashanmugam emphasized that enhancement of heating or cooling in an industrial process may create a saving in energy, reduce process time, raise thermal rating and lengthen the working life of equipment[60]. Increasing thermal conductivity is one of the way to increasing heat transfer coefficient. Addition of small solid particles can increase the conductivity appreciably. Nanoparticles, generally metal or metal oxides, greatly increase heat transfer. Studies were carried out by Cieliski and Krygie for augmentation of the critical heat flux(CHF) with nanofluids[61]. They carried out investigation with water-Al_2O_3, water-TiO_2 and water-Cu nanofluids. Their studies indicated that the CHF of water-Al_2O_3 water nanofluids - while boiling on a flat plate, was about 200% higher than that for pure water. They found that Enhancement factor for all tested nanofluids decreased with heat flux. Kumar and Pandey carried out review on heat transfer in nano-fluids flowing under laminar and turbulent flow regime[62]. According to them, for very low thermal conductivity of liquids such as water, air, engine oil, there is curb and hindrance in heat transfer rate. Combined properties of nanoparticles as well as base fluid resulted in advantage for heat transfer. The aspects like heat transfer and thermal performance of nano-fluid as coolant for industrial applications were discussed by them.Chavda et.al. used Aluminum oxide nanofluid for heat transfer enhancement[63]. The factors affecting nanofluid heat transfer are mainly type of nanoparticles, size of nanoparticles and concentration of nanoparticles in base fluid. In their work, they experimentally investigated the effect of various concentration of Al_2O_3 nano-dispersion mixed in water. As expected, they observed increase in friction factor and loss coefficient of different pipes and pipe fittings with increase in volume concentration of Al_2O_3 nano-dispersion. Kuppalapalle et.al. carried out investigation on the effects of the temperature dependent viscosity on the flow and heat transfer of a nanofluid[64]. They studied heat transfer over a flat surface in the presence of viscous dissipation. They transformed nonlinear partial differential equations into nonlinear ordinary differential equations. They also observed increase in heat transfer with increase in nanoparticle volume fraction. Ahmed and Mahdy investigated heat transfer through a truncated cone with magnetic field effect[65]. They investigated heat transfer enhancement by using water-based nanofluids containing Cu, Ag, CuO, Al_2O_3, and TiO_2.They found that as the solid volume fraction increases, the rate of heat transfer increases. Reverse trend was observed for skin fraction coefficients.

III. CONCLUSION

Nanoparticles, generally metal or metal oxides, greatly increase heat transfer. Metals, oxides, carbides, or carbon nanotubes are used as nanoparticles. Addition of small solid particles can increase the conductivity appreciably. The nanoparticles suspended in base fluid increases thermal conductivity. Many investigations are reported on use of nanoparticles and nanofluids for heat transfer enhancements. Current review summarizes research and studies on application of nanofluids and nanofluids for heat transfer enhancement, affecting parameters and results. Studies suggest that low thermal conductivities of many utility fluids such as water, mineral oil, and ethylene glycol hampers the development of energy-efficient heat transfer fluids. Dissolving, preparation of solution, formation of gel, filtration and drying are important steps in nanoparticle synthesis. The factors such as type of nanoparticles, size of nanoparticles and concentration of nanoparticles in base fluid affects the heat transfer enhancement. Most of the investigations reported significant rise in heat transfer with 0.2 to 0.5 percent volume by volume concentration of nanoparticles in base fluid.

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Re-Using of Waste Tyre Materials as Coarse and Fine Aggregate in Concrete

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Abstract—Discarded waste tires are one of the important parts of solid waste which had historically been disposed of into landfills also causing serious environmental problems. Waste rubber can be used as a part of fine aggregate and coarse aggregate. It can be used as an additive to Portland Pozzolana cement (PPC).The waste tires substituted into the concrete mix by weight 0%,5%,10% respectively. Two types of waste tires i.e., as coarse and fine aggregate are tested to find their mechanical properties. In order to determine the optimal enhancing replacement ratios of waste tires as compressive strength, Flexural strength performing slump at curing of 7,28 days for standard concrete mix.A total of 30 cubes and 15 beams are casted of M30grade by replacing 0%,5%,10% of tire aggregate with coarse aggregate and fine aggregate compared with regular M30grade concrete.

Keywords—Chipped Rubber, Rubber Powder, Portland Pozzolana Cement (PPC), Compressive Strength, Flexural Strength, Workability, Conventional Concrete

INTRODUCTION

Sustainability was a big issue that being concerned in making a development. This is because sustainable development has become a key aspect in society, Economics and development. Sustainable development shall meet the needs of the present without compromising ability of future generation to meet their own needs. It also shows that development that is going to be made to sustain the planetary resources by using them effectively without making unnecessary wastage. Like the usage of waste tire rubber as a partial replacement for coarse and fine aggregate in concrete. Now-a-days coarse and fine aggregate has become scarce and very cost. Hence we are forced to think of alternative materials. The waste tire rubber may be used in the place of coarse and fine aggregate fully or partly. Tire rubber wastes represent a serious environmental issue that needs to be addressed with urgency by the scientific community.Concrete is specially recommended for structures located in earth quake prone areas and also for applications submitted to severe dynamic actions like railway sleepers. This material can also be used for non-load bearing purposes such as noise reduction barriers. Investigations about rubber waste concrete show that concrete performance is very dependent on the waste aggregates. Nevertheless, future investigations should clarify which treatments can maximize concrete performance being responsible for the lowest environmental impact.

LITERATURE REVIEW

K.C. Panda, P.S. Parthi and Jena have researched on accumulated waste tires, that they have become a problem of interest because of its non-biodegradable nature. In this study an attempt has been made to identify the various properties necessary for the design of concrete mix with the coarse tire rubber chips as aggregate in a systematic manner. In the present experimental investigation, the M30 grade concrete has been chosen as the reference concrete specimen. Scrap tire rubber chips, has been used as coarse aggregate with addition of conventional coarse aggregate.

Parvin A. Shirule, MujahidHussainhad worked on a safe and environmentally consistent method of disposal of tire waste material. The fine rubber particles obtained during remoulding process of tire at state transport workshop are used for replacement of fine aggregate (sand) in certain percentage in concrete. The blends are prepared by replacing 0%, 3%, 6%, 9%, 12%, 15% and 18% of fine aggregate (sand) by fine rubber particle by weight. The mechanical property of wet concrete like density, compressive strength, split tensile strength and flexural strength are test for strength of concrete.

Kotresh K.M, MesfinGetahunBelachew investigated that the disposal of waste tires is becoming a major waste management problem in the world. It is estimated that 1.2 billion of waste tire rubber produced globally per year. This is estimated that 11% of post-consumer tires are exported and 27% are sent to landfill, stockpiled or dumped illegally and 4% is uses for civil engineering project. Hence efforts have been taken to identify the potential application of waste tires in civil engineering projects. In this context, our present study aims to investigate the optimal use of waste tire rubber as coarse aggregate in concrete composite.

MATERIALS USED

Waste Tire Rubber:

Rubber Powder and Chipped Rubber are obtained from locally available mills. The Chipped Rubber was sieved through 20mm and retained on 16mm. Rubber Powder sieved through 2.36mm to remove large size particles. The specific gravity of Chipped Rubber is 1.04 and Rubber Powder is 0.4

Fig1: Rubber Powder

Fig2: Chipped Rubber

Coarse Aggregate:

These are materials passing through 20mm and retained on 16mm, these are generally used in preparation of concrete, as it is a parametric material. Coarse aggregates are used in concrete as they are the reason for strength properties and reduce the shrinkage in concrete.The specific gravity of Coarse aggregates is 2.8

Fine Aggregate:

These are materials with the size less than 2.36mm, these are generally used in preparation of concrete, as it is a parametric material. Fine aggregates are used in concrete as they are the reason for strength properties and reduce the shrinkage in concrete. The specific gravity of Fineaggregates is 2.62

Cement:

It is a material which is used for providing the binding property between the materials of the concrete. It also increases the strength. The specific gravity of cement is 2.79

Water:

In this experimental investigation portable water which is free from organic substances is used for mixing and curing.

EXPERIMENTAL INVESTIGATIONS

In present study, M30 grade concrete was designed as per IS: 10262-2009.

A. Workability

Freshly mixed concrete were tested for workability by slump value. In this investigation, M30mix concrete is considered to perform the test by weight basis by partially replacing 0%, 5%, 10% of coarse and fine aggregate by Chipped Rubber and Rubber Powder.

B. Compressive Strength

In this investigation, M30 mix concrete is considered to perform the test by partially replacing 0%, 5%, 10% of fine and coarse aggregate byRubber Powder, chipped rubber. A 150 X 150mm concrete cube was used as test specimen to determine the compressive strength of concrete. The ingredients of concrete were thoroughly mixed till uniform consistency was achieved. The cubes were properly compacted. All the concrete cubes were de-moulded within 24 hours after casting. The de-moulded test specimens were properly cured in water available in the laboratory at age of 28 days. Compression test was conducted with 2000KN capacity on universal testing machine. The load was applied uniformly until the failure of the specimen occurs. The specimen was placed horizontally between the loading surface of the compression testing machine and the load was applied within shock until the failure of the specimen occurred.

C. Dry density

The dry densities at each curing age tend to decrease with the increase of waste tire rubber ratio in each concrete mixture, but the dry densities tend to increase with time for each concrete mixtures at all curing ages. It is clear that at 28 days curing age, the lowest dry density (2370 kg/m3) exceeds the range of the dry density for structural light weight concrete. The use of modified tires rubber concrete for each curing age reduced the dry densities of all mixtures with increasing the waste tire rubber, because, the density of waste tire rubber lower than that of sand by (53.1) %, (10,11) %.

D. Flexural Strength

In this investigation, M30 mix concrete is considered to perform the test by partially replacing 0%, 5%, 10% of fine and coarse aggregate by Rubber Powder, chipped rubber. A 15 X 15 X 70cm beam mouldused as test specimen to determine the flexural strength of concrete.The ingredients of concrete were thoroughly mixed till uniform consistency was achieved. The beams were properly compacted. All the concrete beams were de-moulded within 24 hours after casting. The de-moulded test specimens were properly cured in water available in the laboratory at age of 28 days. Flexural test was conducted with 400 kg/ min capacity on universal testing machine. The load was applied uniformly until the failure of the specimen occurs. The specimen was placed horizontally between the loading surface of the Flexural testing machine and the load was applied within shock until the failure of the specimen occurred.

RESULTS AND DISCUSSIONS

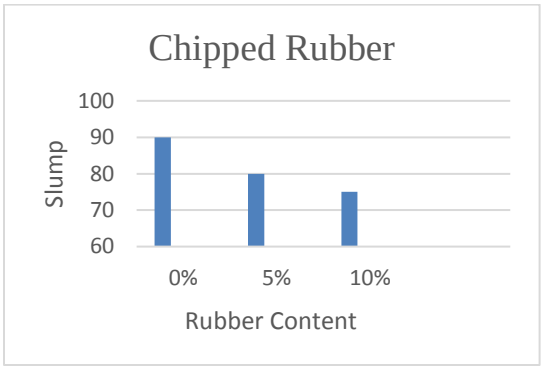
A. Workability

Table-1: Slump values for partial replacement of Rubber Powder as fine aggregate of M30 grade concrete.

S. No	Rubber Content	Slump value (mm)
1	0%WTR	90
2	5%WTR	86
3	10% WTR	79

Table-2: Slump values for partial replacement of Chipped Rubber as coarse aggregate of M30 grade concrete.

S. No	Rubber Content	Slump value (mm)
1	0% WTR	90
2	5 % WTR	80
3	10% WTR	75



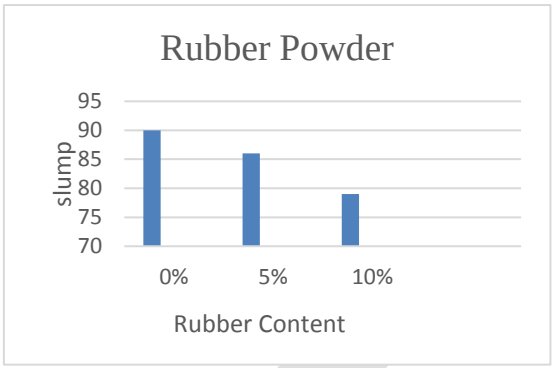


Fig3: Slump values for partial replacement ofFig4: Slump values for partial replacement of Rubber Powder asfine aggregateChipped Rubber as coarse aggregate

B. Compressive Strength Test

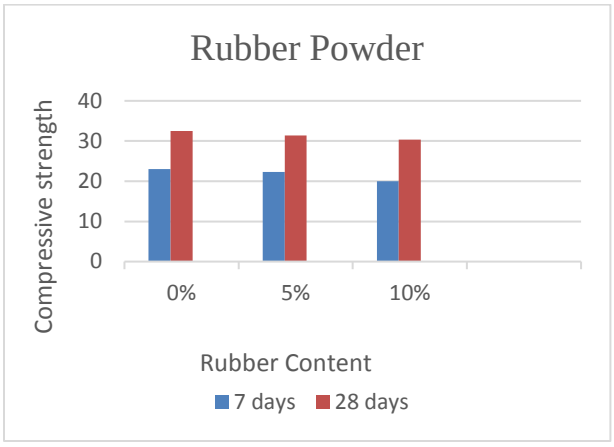
The compressive strength test of concrete was achieved in 28 days of various proportions and presented below. The specimens were casted and tested as per IS: 516-1959.

Table-3: Compressive Strength values for partial replacement of rubber powder as fine aggregate of M30 grade concrete.

S. No	Rubber content	Average compressive strength @ 7 days (N/mm^2)	Average compressive strength @ 28 days (N/mm^2)
1	0% WTR	23	32.5
2	5% WTR	22.3	31.4
3	10% WTR	20	30.37

Table-4: Compressive Strength values for partial replacement of Chipped Rubber as coarse aggregate of M30 grade concrete.

S. No	Rubber content	Average compressive strength @ 7 days (N/mm^2)	Average compressive strength @ 28 days (N/mm^2)
1	0% WTR	23	32.5
2	5% WTR	20	30.66
3	10% WTR	16.5	24.44



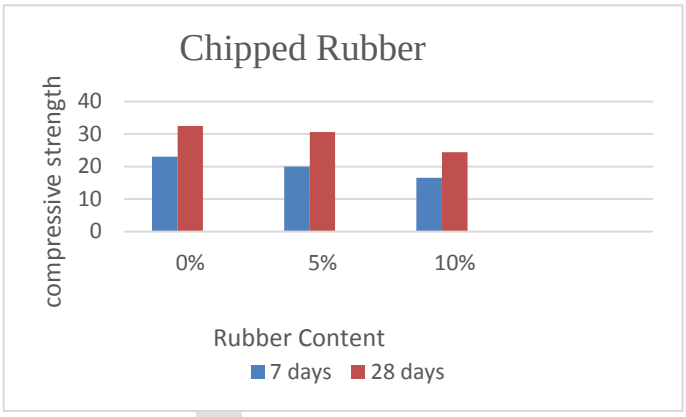


Fig5: Compressive Strength for partial replacement of Rubber Powder as fine aggregate

Fig6: Compressive Strength for partial replacement of Chipped Rubber as coarse aggregate

From the above compressive strength results, it is observed that Rubber based concretes have achieved a decreased in strength for partial replacement of coarse and fine aggregate for 28 days when compared to conventionalconcrete.

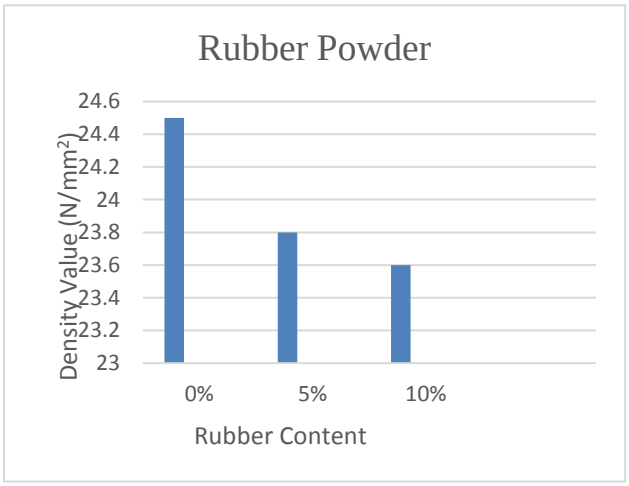
C. Dry density

Table-5: Dry Density values for partial replacement of Rubber Powder as fine aggregate.

S. No	Rubber Content	Density Value
1	0%	24.5 N/mm^2
2	5%	23.8 N/mm^2
3	10%	23.6 N/mm^2

Table-6: Dry Density values for partial replacement of Chipped Rubber as coarse aggregate.

S. No	Rubber Content	Density value
1	0%	24.5 N/mm^2
2	5%	23.07 N/mm^2
3	10%	23.09 N/mm^2



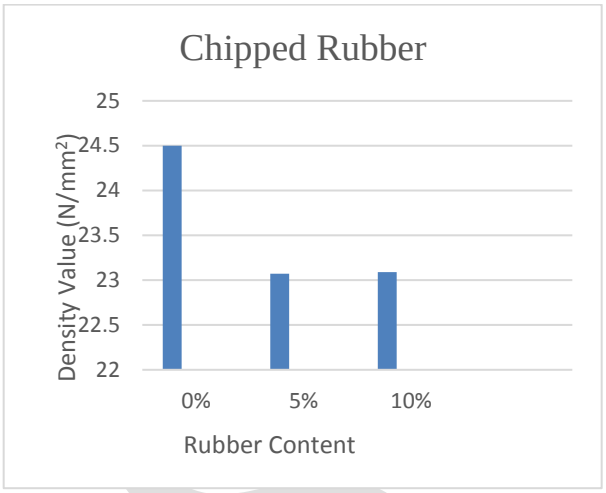


Fig7& Fig8:: Dry density for partial replacement of Rubber Powder as fine aggregate Chipped Rubber as coarse aggregate

D. Flexural Strength Test

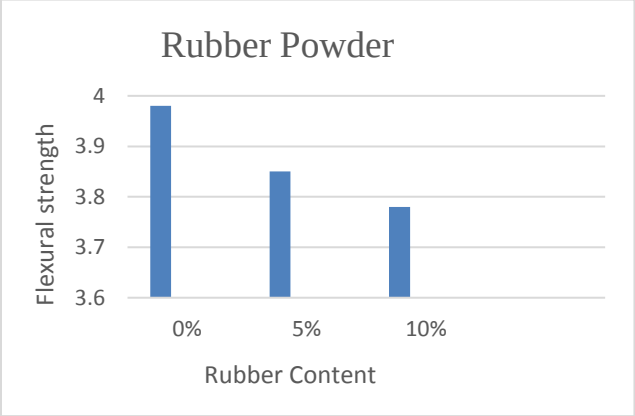
TheFlexural strength test of concrete with 28 days curing period for various proportions and presented below. The specimens were casted and tested as per IS: 516-1959

Table-7: Flexural Strength values for partial replacement of Rubber Powder as fine aggregate of M30 grade concrete.

S. No	Rubber content	Average flexural strength @ 28 days (N/mm^2)
1	0% WTR	3.98
2	5% WTR	3.86
3	10% WTR	3.78

Table-8: Flexural Strength test for partial replacement of Chipped Rubber as coarse aggregate of M30 grade concrete.

S. No	Rubber content	Average flexural strength @ 28 days (N/mm^2)
1	0% WTR	3.98
2	5% WTR	3.8
3	10% WTR	3.6



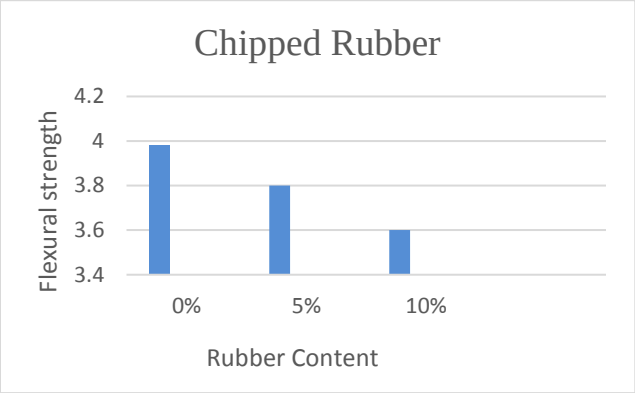


Fig9& Fig10: Flexural Strength for partial replacement of Rubber Powder asfine aggregateChipped Rubber as coarse aggregate

From the above Flexural strength results, it is observed that Rubber based concretes have achieved decreased in strength for partial replacement of coarse and fine aggregate for 28 days when compared to conventional concrete.

CONCLUSION

Based on the experimental results and their plots and subsequent discussion on the results the following conclusions are given:

- Slump values are decreased as the percentage of waste tire rubber increased. So, there is decrease in workability.
- The compressive strength is decreasedwith increased percentage of waste tire rubber, but rubber concrete developed slightly higher compressive strength than those of without rubber concrete.
- The Flexural strength is decreased with increased percentage of waste tire rubber.
- Decrease in compressive strength, flexural strength of the specimen is due to lack of proper bonding between rubber and concrete.

FUTURE SCOPE OF WORK

- Replacing coarse aggregate and fine aggregate with different proportions will give different strength and can be investigated as well as optimum amount can also be determined to get maximum strength.
- Similar investigation can be done for M40, M50 and also for high strength concrete.

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Utilization of Plant Based Waste Materials as Alternatives to Sand in Zeer Pot Refrigerator

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Abstract-Zeer pot refrigerator has been introduced at household level in dry and hot climatic areas to preserve foods under the principal of evaporative cooling. The absorbent material of the typical zeer pot is sand. Since replacing sand with suitable absorbent material can alter the cooling efficiency of zeer pot, the present work mainly focuses on utilizing plant derived wastes as the absorbent material instead of sand to enhance the cooling efficiency. The experiment was conducted under complete randomized design with 4 treatments using absorbent materials namely sand, coir dust, saw dust and crushed corn husk together with corn hair with 3 replicates. The results showed that cooling efficiency of sand, coir dust, saw dust and crushed dried corn husk with corn hair were 69%, 58.6%, 60.8%, 22.9% respectively. It can be concluded that considering temperature drop, RH increment and cooling efficiency, saw dust and coir dust except corn husk can be used as an alternative to sand in zeer pot refrigerator.

Keywords, Evaporative cooler, Absorbent material, Cooling efficiency, Preservation

INTRODUCTION

It has been estimated that 30-40% of total fruit production and 16-41% of total vegetable production in Sri Lanka loss during different handling operations from farm gate to consumer [1]. Considerable post-harvest losses of perishables in developing countries are occurred at the consumer level because of the poor storage facilities. To reduce these post-harvest losses, several storing structures were developed from ancient time to present. Among such preservation methods, the mechanical refrigerator has introduced as the best solution to reduce these losses in storage at domestic level. Currently, selecting a refrigerant for mechanical vapor compressor refrigerators has become a major challenge of concern because most of them are not environmental friendly due to high global warming potential and high ozone depletion rate. Furthermore, the domestic refrigerator comprises with some drawbacks such as using large power by compressor, high initial cost, low efficiency due to energy wastage and may cause accidents due to presence of highly inflammable gasses [2]. However, the most inconvenient factor that affects to rural and poor people about mechanical refrigeration is epileptic power supply and low income of farmers which makes refrigeration expensive [3]. In addition, it has been observed that several fruits and vegetables such as banana, plantain, tomato etc. cannot be stored in domestic refrigerator for a long period as they are susceptible to chilling injury [4]. With these tragic effects, the attention must be drawn to develop energy efficient sustainable refrigerator which can make with the use of locally available materials. In developing countries, there is an interest in simple low-cost alternatives, many of which depend on evaporative cooling [3].

Evaporative cooler designs could be categorized according to the method of evaporation, storage chamber construction, and the absorbent medium. Some of the designs have been constructed using porous materials such that the evaporation is occurred by seeping the water from an inside of a container to outside. Here the evaporation is enhanced by drawing heat from inside cooling chamber.

This heat gradient causes a temperature reduction inside the cooling chamber. Second types of evaporative coolers are designed having a wetted pad as an absorbent media of water facilitating evaporation. The hot air masses passes through this cooling pad thus reducing the inside temperature of the storage chamber [5]. However, different designs of evaporative coolers have been reported in the literature for short-term preservation of fruits and vegetables ranges from straw packing house to some sophisticated design [6]. Among these, Zeer pot refrigerator is the most suitable evaporative cooler for rural community because it requires no special skill to operate. The people who cannot afford to buy a refrigerator could use this pot as a substitute as well.

Zeer pot is made of basic pots, sand and water. Here the evaporation is caused by convective and radiative heat transfer from the hot and dry climate of the surrounding and the cooling load from the food kept for preservation. When dry air mass passes over a wet pad through a porous wall, the water in the wet pad evaporates thus producing cool air masses. This happens because the water needs latent heat of vaporization to get evaporated [7]. As a result, heat is carried away from the center of the pot creating surface of the body much cooler. This irreversible heat and mass transfer process is influenced by the insulating material that is used [8]. Therefore, replacing sand with suitable absorbent material can alter the cooling efficiency of zeer pot.

Many types of research has been done in relation to evaporative coolers considering its design aspects and performance evaluation using various types of natural materials as cooling pads such as charcoal, jute bag, rice husk, wheat straw, coconut fiber, PVC sponge, canvas, jute curtains, hourdis clay blocks, palm leaves, hessian, cotton waste, wood wool, coconut coir, khus and stainless steel [3], [4], [8]-[11]. However, most of these materials have not been tested for zeer pot except charcoal, jute, and cotton waste. Moreover, introducing locally available plant based waste materials such as coir dust, saw dust, and dried corn cobs as alternative absorbent material may reduce the cost of wastes, save money, prevent pollution caused by reducing the need to harvest new raw materials and replace “sand” which is a limited natural resource. Therefore, the main objective of this study was to assess the suitability of locally available plant-based waste materials as an alternative to sand to improve the cooling efficiency of zeer pot.

MATERIAL AND METHODS

The study was carried out under statistical model; complete randomized design with 4 treatments and 3 replicates. The treatments (absorbent materials) were sand (T_1), coir dust (T_2), saw dust (T_3) and crushed corn husk together with corn hair (T_4). All absorbent materials were collected in their natural forms and subjected to air drying for 3-4 days. Corn husk and hair was oven dried at 150 °C for 1-2 hrs and crushed. Thereafter, all materials were sieved using sieve size of 1.5mm.

The zeer pot was designed by placing small clay pot in large clay pot while filling the gap between two pots using prepared absorbent material. The capacity of the inner pot and gap between 2 pots is approximately 1500 cm^3 and 3000 cm^3 respectively and other average dimensions of the made zeer pot are shown in Figure 1. Afterthat, zeer pots were placed on a stand 0.8 m above the ground. The pots were initially saturated with water as shown in Figure 2. Later, the water was continuously fed in to the absorbent material via a designed structure which has a tube with holes. The top of the zeer pots were covered with a damp jute cloth. All the zeer pots were kept in a shade environment for natural convection..

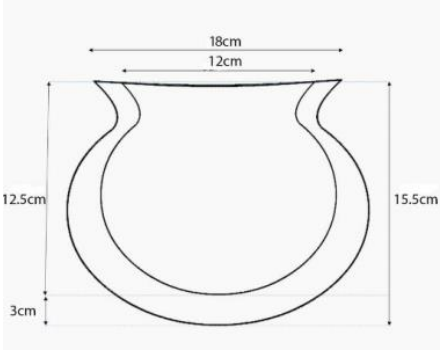

Figure 1. Average dimensions of designed zeer pot

(a) (b) (c) (d)

Figure 2: water saturated Zeer pots filled with (a) sand, (b) coir dust, (c) saw dust and (d) crushed corn husk together with corn hair

Temperature and Rlative Humidity (RH) of inside and outside (ambient) of the zeer pots were recorded using humidity temperature meter (TECPEL 322 type) under natural convention test in hourly from 08:00 hrs to 16:00 hrs for 7 days .

Furthermore, cooling efficiency was calculated using equation 1[12]. Data were analyzed using SAS software with one-way ANOVA followed by Dunnets test ($p<0.05$) for mean separation.

$$\mu = \frac{(Tout - Tin)}{(Tout - Tas)} \times 100 \qquad Equation: 1$$

Where μ is the cooling efficiency (%); T_{out} is the temperature outside the pot (°C); T_{in} is the temperature inside the pot (°C); T_{as} is the air temperature at saturation.

RESULTS AND DISCUSSION

All the treatment showed an increasing the temperature with time as ambient temperature up to 12.30-1.30 pm and then tends to decrease gradually as shown in Figure 3. Coir and saw dust showed a better performance from 8.30am to 10.30 am with a temperature reduction of 2-3 °C than sand and crushed corn husk. Maximum temperature reduction of 2.4 °C was observed in both coir and saw dust around 11.30 am. However, in the evening sand showed better performance with a maximum temperature reduction of 2.7°C (at 1.30 pm) while coir and sawdust showed less temperature drop. It was found that to achieve better temperature drop in the zeer pot, ambient environmental conditions of low relative humidity and high temperature must be prevailed [13]. Since this study was conducted under the high ambient relative humidity, a significant temperature reduction around 7 °C [8] was not observed even for the sand.

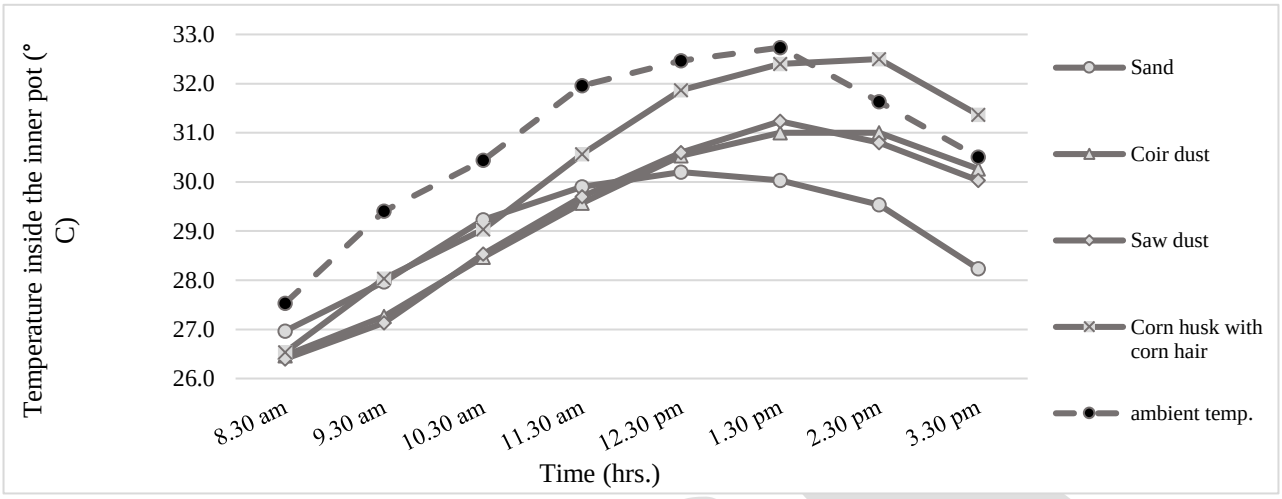

Figure 3: Change in the temperature inside the each zeer pot with respect to ambient temperature

Crushed corn husk showed a significantly lower temperature reduction at the morning compared to other treatments. Furthermore, the inside temperature of corn husk filled zeer pot was higher than ambient temperature in the evening. These results may be due to aerobic deterioration of corn husk when exposed to air as a result of aerobic microbial activity [14]. As reported by Tabacco, et al. [15] aerobic microorganisms use dry matter in silage like maize as their energy source in oxidation process. This oxidation results in the production of carbon dioxide, water and heat. Thus this release of heat and deterioration exhibited the increase of temperature and appearance of mold. Maximum temperature reduction in corn husk with corn hair was 1.4 °C observed during 9.30 – 10.30 am.

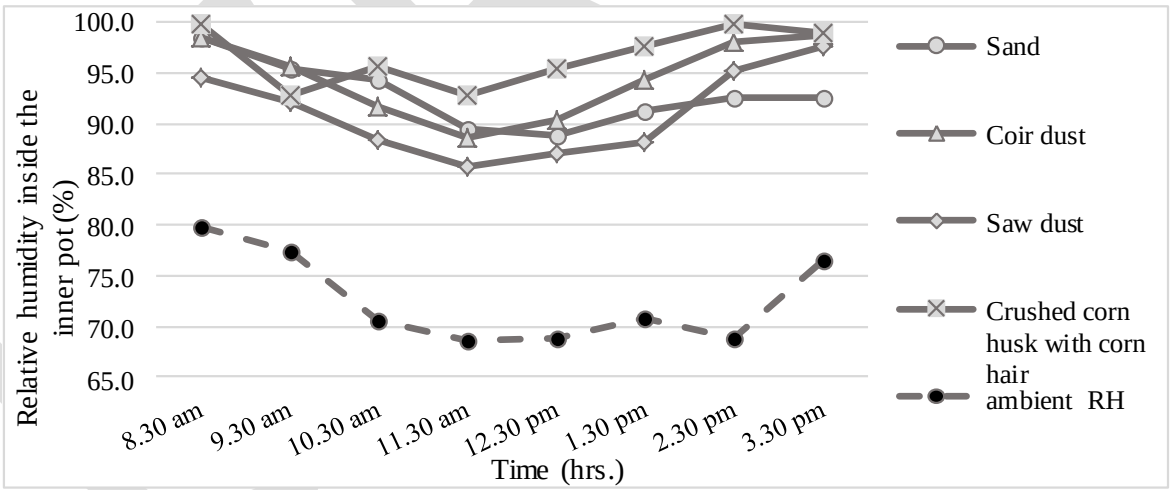

Figure 4: The relative humidity inside the each zeer pot with respect to ambient relative humidity

The relative humidity variations inside the inner pot of zeer pots with different absorbent materials are shown in figure 4. All the treatments showed a high humidity level inside the inner pot ranging from 85-100%. The crushed corn husk seemed to achieve highest humidity level between 90-95% compared to other treatments. Because of that sometimes it was observed that water has been accumulated inside the inner pots of corn husk due to condensation process with achieving dew point. Therefore, heat released during this phase change may result in increasing the temperature inside the inner pot of corn husk zeer pots. However, a 25% increase of relative humidity could be achieved in all the treatment pots.

There were no significant differences of average cooling efficiency % of saw dust and coir dust compared with sand (control) as shown in table 1**.** The average cooling efficiency of all absorbent materials except corn husk were in a range of 58%-69%. It was found that Zeer Pot with sand showed a maximum efficiency of around 78% during noon [16]. The average saturation efficiency percentage of crushed corn husk with corn hair was significantly lower than all other materials.

Table 1: Average cooling efficiency of each zeer pots

Material	**Cooling Efficiency %**
Sand	69.04 ± 5.57^{a}
Coir dust	58.60 ± 3.26^{a}
Saw dust	60.88 ± 8.20^{a}
corn husk with corn hair	22.90 ± 3.36^{b}

Values are mean ± Satandard Daviation (n=3). Means followed by the different letter are significantly different at 5% level .

4 CONCLUSION

It can be concluded that the zeer pots with saw dust and coir dust had similar inside temperature variation as sand with a temperature drop of 2-3 °C under the ambient temperature range of 27-33°C and RH range of 65%-85%.Considering temperature drop, RH increment and cooling efficiency of zeer pots with saw dust and coir dust, they can be used as an alternative to sand in zeer pot refrigerator. The zeer pot with crushed corn husk and corn hair was not suitable to preserve foods because of lower temperature and even generating heat due to microorganism activities compared with other absorbent materials. If all zeer pots keep under hot and dry ambient air conditions, cooling efficiency would be improved significantly for better performances.

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WATER QUALITY MONITORING AND ASSESSMENT: NEED AND ISSUES

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Abstract- Water is the most basic natural resources. Water is used for multiple purposes in a technological society. Water is not only one of the most essential commodities of our day-to-day life, but the development of this natural resource also plays a crucial role in economic and social development processes. While the total amount of water available in the world is constant,it causes problems of scarcity and suitability. The challenge, therefore, is to obtain water suitable for various uses. Water quality is important because it directly affects the health of the people, animals and plants that drink or otherwise utilize the water. When water quality is compromised, its usage puts users at risk of developing health complications. It is therefore imperative that man develops, uses and manages this scarce commodity as rationally and efficiently as possible. In order to execute this task, accurate and adequate information must be available about the quality of the water under constanly changing human pressures and natural forces. Hence, Water quality monitoring and assessment programs are vital for all nations. Objective of such programs is to monitor and assess the fresh available water quality sources.

Key words: water quality, water quality monitoring, water quality assessment

INTRODUCTION

Water Quality

Water quality is commonly defined by its physical, chemical, biological and aesthetic (appearance and smell) characteristics. Water may be used for drinking, irrigating crops and watering stock, industrial processes, production of fish, shellfish and crustaceans, wildlife habitats, protection of aquatic ecosystems, navigation and shipping, recreation (swimming, boating), and scientific study and education.(Postolache et al, 2012).

Factors affecting water quality

The water quality of rivers and lakes changes with the seasons and geographic areas, even when there is no pollution present. Absolutely pure water is not found in nature. Hen the rain falls, dust, volcanic gases, and natural gases in the air, such as carbon dioxide, oxygen, and nitrogen, are all dissolved or entrapped in rain. Other gases such as such as sulfur dioxide,nitrogen oxide as well as toxic chemicals, or lead are in the air, are also collected in the rain as it falls to the ground. When the water flows as runoff, through the soil and rocks, it dissolves and picks up other substances. For instance, if the soils contain high amounts of soluble substances, such as limestone, the runoff will have high concentrations of calcium carbonate. Where the water flows over rocks high in metals, such as ore bodies, it will dissolve those metals.

Water quality is affected largely by uncontrolled land use for urbanisation or deforestation, accidental (or unauthorised) release of chemical substances, discharge of untreated wastes or leaching of noxious liquids from solid waste deposits. Similarly, the uncontrolled and excessive use of fertilisers and pesticides has long-term effects on ground and surface water resources (Chapman, 1996).

Pollution and water quality degradation interfere with vital and legitimate water uses at any scale, i.e. local, regional or international (Meybeck *et al.*, 1989). As shown in Table 1, some types of uses are more prone to be affected than others.

Table 1 Limits of water uses due to water quality degradation (Chapman,1996)

Pollutant	Use						
	Drinking water	Aquatic wildlife, fisheries	Recreation	Irrigation	Industrial uses	Power and cooling	Transport
Pathogens	1	0	1	2	1	NA	NA
Suspended Solids	1	1	1	2	2	2	1
Organic matter	1	2	1	+	1	2	NA
Algae	2	2	1	+	1	2	2
Nitrate	1	2	NA	+	1	NA	NA
Salts	1	1	NA	1	1	NA	NA
Trace elements	1	1	2	2	2	NA	NA
Organic Micro pollutants	1	1	2	2	?	NA	NA
Acidification	2	1	2	?	2	2	NA

1 Marked impairment causing major treatment or excluding the desired use
2 Minor impairment
0 No impairment
NA Not applicable
+ Degraded water quality may be beneficial for this specific use
? Effects not yet fully realised

WATER QUALITY MONITORING AND ASSESSMENT

Water quality monitoring is one of the first steps required in the rational development and management of water resources. In the field of water quality management, there has been a steady evolution in procedures for designing system to obtain information on the changes of water quality. The 'monitoring' comprise all activities to obtain 'information' with respect to the water system. Water quality monitoring has a direct relation with chemistry, biology, statistics and also economics. Its scope is also related to the types of water uses and functions which are manifold and the nature of the sources of water such as surface water (rivers and lakes), sea water groundwater.

Need of Water Quality Monitoring

Demand for the world's increasingly scarce water supply is rising rapidly, challenging its availability for food production and putting global food security at risk. Agriculture, upon which a burgeoning population depends for food, is competing with industrial, household, and environmental uses for this scarce water supply. Even as demand for water by all users grows, groundwater is being depleted, other water ecosystems are becoming polluted and degraded, and developing new sources of water is getting more costly.(Rosegrant,2002)

Almost all users will place heavy demands on the world's water supply under the business as usual scenario. Total global water withdrawals in 2025 are projected to increase by 22 percent above 1995 withdrawals Projected withdrawals in developing countries will increase 27 percent over the 30-year period, while developed-country withdrawals will increase by 11 percent. Together, consumption of water for domestic, industrial, and livestock uses—that is, all non-irrigation uses will increase dramatically, rising by 62 percent from 1995 to 2025 . Because of rapid population growth and rising per capita water use, total domestic consumption will increase by 71 percent, of which more than 90 percent will be in developing countries.(Rosegrant, 2002). These projections show the

challenges for meeting all the demands of society. Hence Water quality management is essential for ensuring the most rational and efficient use of water. Water quality management is for a great deal controlled by authorization of discharges of dangerous substances for which monitoring of discharges, effluents and influenced surface water is essential (CPCB,2008).

Objectives of water quality assessment

Since water resources are usually put to several competing beneficial uses, monitoring which is used to acquire necessary information should reflect the data needs of the various users involved (Helmer, 1994). Consequently, there are two different types of monitoring programmes, depending on how many assessment objectives have to be met:

• *Single-objective monitoring* which may be set up to address one problem area only. This involves a simple set of variables, such as: pH, alkalinity and some cations for acid rain; nutrients and chlorophyll pigments for eutrophication; various nitrogenous compounds for nitrate pollution; or sodium, calcium, chloride and a few other elements for irrigation.

• *Multi-objective monitoring* which may cover various water uses and provide data for more than one assessment programme, such as drinking water supply, industrial manufacturing, fisheries or aquatic life, thereby involving a large set of variables. The Commission of the European Communities has a list in excess of 100 micropollutants to be considered in drinking water alone.

The implementation of the assessment programme objectives may focus on the spatial distribution of quality (high station number), on trends (high sampling frequency), or on pollutants (in-depth inventories). Full coverage of all three requirements is virtually impossible, or very costly. Consequently preliminary surveys are necessary in order to determine the necessary focus of an operational programme. Table 2 summarises the existing types of water quality operations in relation to their main objectives. The process of determining objectives should start with an in-depth investigation of all factors and activities which exert an influence, directly or indirectly, on water quality. Inventories have to be prepared on:

• the geographical features of the area, including: topography, relief, lithology, pedology, climate, land-use, hydrogeology, hydrology etc.,

• water uses, including: dams, canals, water withdrawal for cities and industries, agricultural activities, navigation, recreation, fisheries, etc., and

• pollution sources (present and expected), including: domestic, industrial and agricultural, as well as their stage of pollution control and waste treatment facilities. (Chapman,1996).

Table 2 Typical objectives of water quality assessment operations

	Type of operation	Major focus of water quality assessment
Common operations		
1.	Multipurpose monitoring	Space and time distribution of water quality in general
2.	Trend monitoring	Long-term evolution of pollution (concentrations and loads)

3.	Basic survey	Identification and location of major survey problems and their spatial distribution
4.	Operational surveillance	Water quality for specific uses and related water quality descriptors (variables)
Specific operations		
1.	Background Monitoring	Background levels for studying natural processes; used as reference point for pollution and impact assessments
2.	Preliminary Surveys	Inventory of pollutants and their space and time variability prior to monitoring programme design
3.	Emergency surveys	Rapid inventory and analysis of pollutants, rapid situation assessment following a catastrophic event
4.	Impact surveys	Sampling limited in time and space, generally focusing on few variables, near pollution sources
5.	Modelling surveys	Intensive water quality assessment limited in time and space and choice of variables, for example, eutrophication models or oxygen balance models
6.	Early warning surveillance	At critical water use locations such as major drinking water intakes or fisheries; continuous and sensitive measurements

STEPS FOR WATER QUALITY MONITORING

Water quality monitoring involves 8 steps as explained below (CPCB,2008)

Step-1 Setting Water Quality Monitoring Objectives

Before formulation of any water quality monitoring programme it is very important to have clear understanding on the monitoring objectives. Everybody of the programme team should be fully aware of the objectives, methodology, quality assurance, data validation and other aspects. Clearly environmental monitoring must have a purpose and a function in the process of risk assessment and pollution control. In risk management, monitoring is essential in the stage of problem recognition (indication of water quality deviations), the stage of analysis (with respect to the expected changes) and the stage of management (verification or control of strategy results).

Step 2: Assessment resources availability

Once the monitoring objectives are known, it is important to look into the availability of resources for monitoring. Generally a compromise is made between quality and quantity of data required to fulfil certain objective(s) and resources available. Before planning water quality monitoring programme it is important to ensure that following resources are available:

a. Sampling equipment (as per checklist)

b. Transport for sampling

c. Laboratory facilities

d. Trained Manpower adequate number and competence

e. Equipment/instruments for desired parameters analysis

f. Chemicals/glasswares and other gadgets for analysis of desired parameters

g. Funds for operation and maintenance of laboratory

Step 3: Reconnaissance survey

It is important to make a reconnaissance survey of the river during the planning stage, noting all sources of wastes, all entering tributaries that might contribute a potential pollutant, and all uses and abstractions of the water. This action will also include a survey of background information such as geography, topography, climate and weather, hydrology, hydrogeology, land use, urbanization, industrialization and agriculture, including farming in the riverbed. This information will help in an appropriate siting of sampling locations.

Step 4: Network design

In designing the sampling network, it is important to consider optimum number of sampling location, sampling frequency and parameters required to fulfil the desired objectives.

Step 5: Sampling

Planning for sampling

When planning a sampling programme the number of sampling stations or wells that can be sampled in one day is required. For this is necessary to know the required time needed for sampling, and other actions required, at the site. Since purging is a time consuming activity an estimate of the required purging time is a must to arrive at a fair estimate of the sampling time.

Surface water sampling

• Samples will be collected from well-mixed section of the river (main stream) 30 cm below the water surface using a weighted bottle or DO sampler.

• Samples from reservoir sites will be collected from the outgoing canal, power channel or water intake structure, in case water is pumped.

Different types of samples can be collected:

1) Grab sample (also called spot - or catch samples)

One sample is taken at a given location and time. In case of a flowing river, they are usually taken from the middle of the flowing water (main) stream and in the middle of the water column. When a source is known to vary with time, spot samples collected at suitable time intervals and analyzed separately, can document the extent, frequency and duration of these variations. Sampling intervals are to be chosen on the basis of the expected frequency with which changes occur. This may vary from continuous recording, or sampling every 5 minutes, to several hours or more.

2) Composite samples

In most cases, these samples refer to a mixture of spot samples collected at the same sampling site at different times.

Step 6: Laboratory work

Laboratory work consists of using different analytical techniques for different parameters to be assessed.

Step 7: Data management

This includes data storage and data validation. Data analysis could be used to summarise the data; to transform them to aid understanding or to compare them with a water quality standard that is couched in statistical terms (annual mean, standard deviation, trend, seasonal changes or a percentile for certain parameters). The data can also be summarized in form of index. Graphical presentation of data includes time series graphs, histograms, pie charts, profile plots (river profiles), geographical plots (contours).

Step 8: Quality Assurance

The QA programme for a laboratory or a group of laboratories should contain a set of operating principles, written down and agreed upon by the organisation, delineating specific functions and responsibilities of each person involved and the chain of command.

CONCLUSIONS

Water Monitoring programmes are useful to scarce to protect our waterways from pollution. Farmers can use the information to help better manage their land and crops. The local, state and national governments use monitoring information to help control pollution levels. Water quality assessment programmes are used to understand exactly how we impact our water supply. Such programes are helpful for developing framework by policy makers and government regulatory authorities for maintaining the quality of the already scarce fresh water sources.

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Effect of Spacing of Grid Beams and Opening Size in a Waffle Slab with Central Opening

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Abstract—Whenever large spaces within a building need to be covered without hindrance and supports, architects often deploy waffle slabs to construct floors and ceilings. An assembly of intersecting beams placed at regular interval and interconnected to a slab of nominal thickness is known as Grid slab or Waffle slab, is a good choice for assembly halls, auditoriums, theatre halls. The Grid structure is monolithic in nature, stiffer and it can hold greater amount of loads compared to traditional concrete slab. Sometimes openings have to be provided in the floor slabs for stairs, elevators, and air conditioning ducts. This paper proposes a new kind of composite waffle slab that consists of orthogonal steel girders and flat RC slab. The steel beams help decrease the cracking in concrete. Composite slab structure has a good load-bearing capacity because it makes full use of the compressive resistance of concrete slab and the tensile resistance of steel. Since less concrete is used, slab is of less weight than traditional RC composite slabs. In this study a non – linear static analysis is conducted to investigate the effect of spacing of grid beams in the waffle slab with central opening and the effect of opening size in the waffle slab, using FEM software ANSYS 2015.
Key words: ANSYS 2015, composite waffle slab, FEM, grid beams, opening, steel girders, spacing

INTRODUCTION

Waffle slab is a very popular structural configuration often deployed in the construction of hotel porticos, airport terminal buildings, large banquet hall, convention centres and car parks. Void space formed in the underside of waffle slabs are utilized for architectural lighting. This type of slab has more structural stability without using a lot of additional material. This makes a waffle slab perfect for large flat areas like foundations or floors. Waffle foundations are resistant to cracking and sagging and can hold a much greater amount of weight than traditional concrete slabs. In almost all constructions slab system includes openings for multitude purposes like stairs, air conditioning ducts and elevators. And also the opening with smaller dimensions is needed to accommodate heating, plumbing, and ventilating risers, floor and roof drains, and access hatches. The behaviour of waffle slabs are modified by the presence of these openings. Introducing openings will reduce the strength of waffle slabs.[7]

A waffle slab is usually regarded as a two-way system to cover square areas in buildings, which transfers loads in two mutually perpendicular directions. It takes advantage of two-way load-bearing capacity, and the engineering demand stays high. Traditional waffle slab uses RC beams as the slab ribs. In the composite waffle slab proposed in this paper, the RC ribs are replaced by steel girders that are connected to the flat slab by shear studs. The design of composite slabs can take advantage of the compressive strength of concrete slab and the tensile strength of steel girders. A good composite action can be obtained by preventing slip between the RC slab and steel girders using proper studs.[8]

Waffle slabs, also known as two-way ribbed flat slabs, are being used increasingly in modern construction to reduce dead weight and ensure efficient lateral distribution of loads. The most common types have large square voids or recesses between the ribs. In addition to the economic and architectural benefits, they are best suited for flat-plate structures with large spans as they exhibit higher stiffness and smaller deflections. Information on the strength and behavior of reinforced concrete waffle slabs is rather limited, but there have been a few theoretical and experimental investigations of waffle plates and slabs mostly in the elastic range. [8]

In this thesis a steel concrete waffle slab with central opening is selected, the deformation and load distribution of the specimens with different steel beam spacing are obtained and analyzed in detail. Steel concrete waffle slab with different central opening size is also selected and deformation and load distribution of the specimens were obtained.

OBJECTIVES OF THE WORK

In this thesis a steel concrete waffle slab with central opening is selected, the deformation and load distribution of the specimens with different steel beam spacing in rectangular and diagonal waffle slabs are obtained and analyzed in detail. Steel concrete waffle slab with different central opening size is also selected and deformation and load distribution of the specimens were obtained.

DESCRIPTION OF WAFFLE SLAB MODEL

Based on the structure of RC waffle slab, this paper presents a new kind of composite waffle slab that consists of orthogonal steel grillages and flat RC slab. The shear studs are used to connect the RC slab and steel grillages, as shown in Fig. 4.1 Composite slab structure has a good load-bearing capacity because it makes full use of the compressive resistance of concrete slab and the tensile resistance of steel. The steel beams help decrease the cracking of concrete that occurs when the composite slab is subjected to positive bending moment. The method of using composite waffle slab reduces framework and speeds up the construction by first installing prefabricated RC slabs on the steel grillages and then pouring. [8]

Cast-in-place concrete to connect the RC slabs and the steel grillages. The design also gives the slab less weight than traditional RC composite slabs because less concrete is used. Therefore, it has a broad prospect of applications in China, where many large-span buildings and stadiums are constructed. [8]

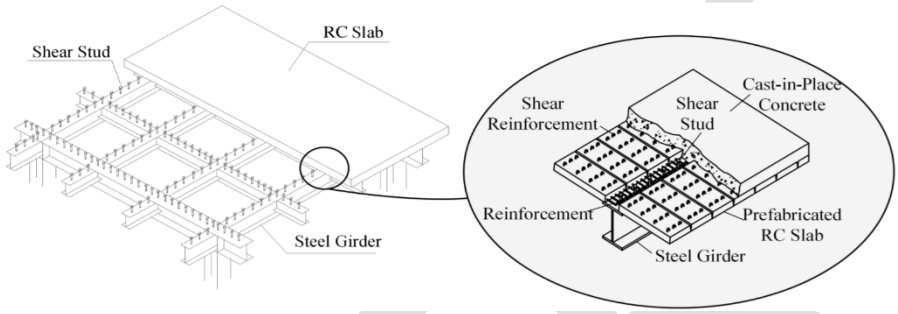

Fig. 1 Isometric view of two-way steel-concrete composite slab [8]

Composite waffle with thickness of RC slab (50 mm), type of steel section (200 mm in height), reinforcing bars (6 mm diameter), and dimension of the studs (10 mm diameter, 40 mm height, 50 mm transverse spacing, and 80 mm longitudinal spacing) were applied for both specimens. Different number of grillage beams was adopted for the specimens was divided into 3 × 3 regions, was to investigate the influence of beam spacing on bearing capacity, deformation, and load distribution.[8]

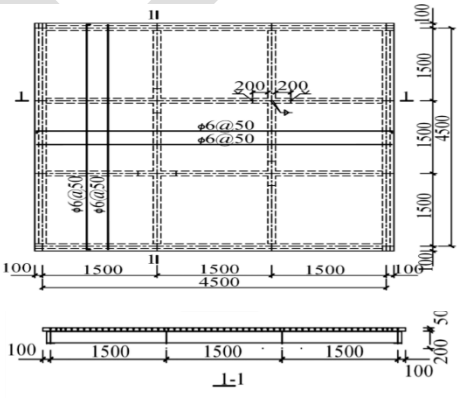

Fig. 2 Overall view of specimen (dimensions in millimeters) [8]

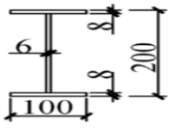

Fig.3 Steel beam section [8]

Table 1 Main Properties of Steel and Reinforcement

Material	Concrete	Flexural Reinforcement Bars	Web	Flange
Young's modulus (MPa)	30000	200000	200000	200000
Tangent modulus (MPa)		2060	2060	2060
Poisson's ratio	0.17	0.3	0.3	0.3
Characteristic compressive strength, fck (N/mm^2)	33.8			
Yield strength, fy (MPa)		369	337	431
Ultimate strength, fu (MPa)		479	469	558
Diameter (mm)		6	6	8

Fig. 4 Material properties: (a) constitutive curve of concrete; (b) tensile stress–crack width curve; (c) constitutive curve of steel

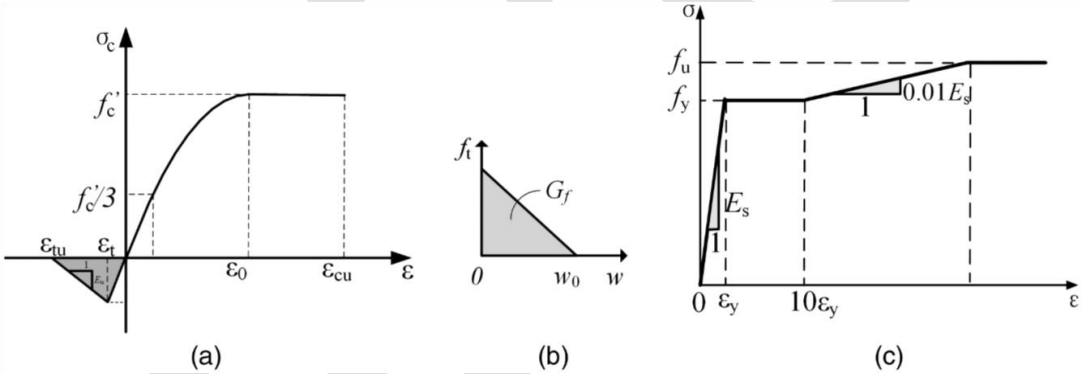

Table 2 Dimensions of rectangular waffle slabs with beam different spacing

Slab name	Dimensions of slab (mm)	Grid beam spacing		opening size (mm)
		x (mm)	y (mm)	
S1	4700 x 4700	1500	1500	1000 x 1000
S2	5000 x 4700	1600	1500	
S3	5300 x 4700	1700	1500	
S4	5600 x 4700	1800	1500	
S5	5900 x 4700	1900	1500	
S6	6200 x 4700	2000	1500	

Table 3. Dimensions of Rectangular Waffle Slabs with Different Opening Size

Slab name	Dimensions of slab (mm)	Grid beam spacing		opening size (mm)
		x (mm)	y (mm)	
B1	4700 x 4700	1500	1500	1000 x 1000
B2				1100 x 1100
B3				1200 x 1200
B4				1300 x 1300
B5				1400 x 1400
B6				1500 x 1500

BOUNDARY CONDITIONS

Vertical displacements of the bottom of steel girder ends were constrained in the z-direction. In-plane rotation was prevented by constraining the displacements of the bottom of steel girder ends in the x- and y-directions.

LOADING

Monotonic concentrated loads were applied synchronously at the crossing point of perpendicular steel girders. Multiple point constraints to the loading points were used to achieve the same load value to the different loading points.

MATERIAL MODELING

Concrete

A Solid65 element was used to model the concrete. This element has eight nodes with three degrees of freedom at each node translations in the nodal x, y, and z directions. Solid65 is used for the 3-D modeling of solids with or without reinforcing bars (rebar). The solid is capable of cracking in tension and crushing in compression. The concrete element is similar to a 3-D structural solid but with the addition of special cracking and crushing capabilities. The most important aspect of this element is the treatment of nonlinear material properties. The concrete is capable of cracking (in three orthogonal directions), crushing, plastic deformation, and creep. The rebar are capable of tension and compression, but not shear. They are also capable of plastic deformation and creep. The solid capability of the element may be used to model the concrete while the rebar capability is available for modeling reinforcement behavior.

Reinforcement

A Link180 element was used to model steel reinforcement. This element is a 3D spar element and it has two nodes with three degrees of freedom translations in the nodal x, y, and z directions. This element is capable of plastic deformation. Link 180 useful for variety of engineering applications. The element can be used to model trusses, sagging cables, links, springs, and so on. The element is a uniaxial tension or compression element. Tension-only (cable) and compression-only (gap) options are supported. As in a pin-jointed structure, no bending of the element is considered. Plasticity, creep, rotation, large deflection, and large strain capabilities are included. The element is capability of plastic deformation. LINK180 includes stress-stiffness terms in any analysis that includes large-deflection effects. Elasticity, isotropic hardening plasticity, kinematic hardening plasticity, Hill anisotropic plasticity, and creep are supported. To simulate the tension or compression only options, a nonlinear iterative solution approach is necessary, therefore, large-deflection effects must be activated prior to the solution phase of the analysis.

In this study modelling is done by using symmetrical boundary conditions at the two continues edges of waffle slab.

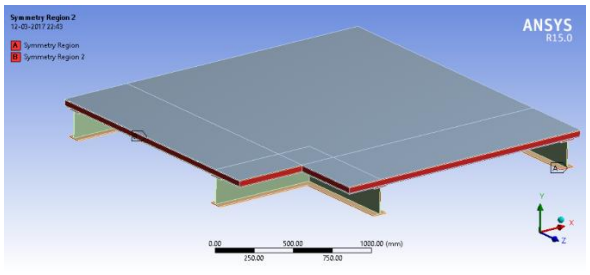

Fig. 5 Symmetry in slab S1

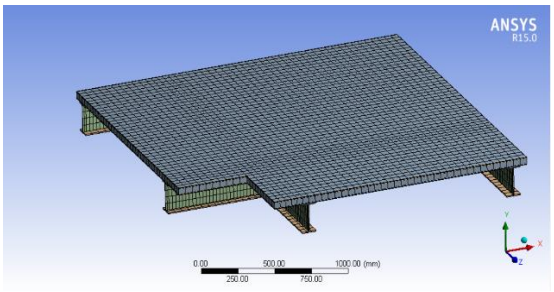

Fig. 6 Meshed model of slab S1

Meshing

The slabs were meshed using mapped hex meshing. The meshing size is set so that the nodes of meshed concrete can be overlapped with nodes of reinforcement.

RESULT AND DISCUSSION

Here the ultimate load carrying capacity, displacement and stress of waffle slab models with different grid spacing and opening size are compared.

Study 1

Jianguo Nie et al. studied the behavior of composite waffle slab of size 4700 x 4700 with grid beam size 1500 x 1500 mm without opening, get the ultimate load carrying capacity as 988.4 kN and corresponding deflection as 120.16mm.

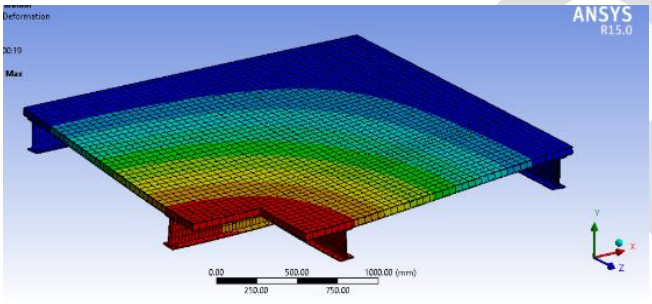

Fig. 7 Deformation in slab S2

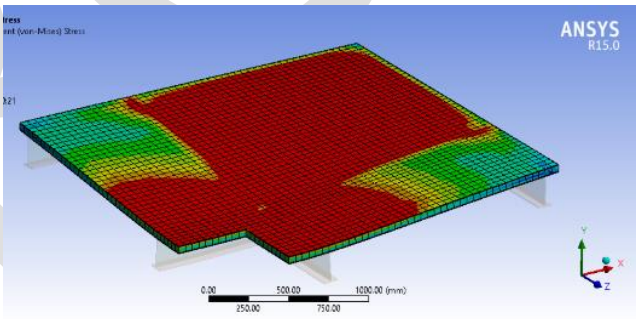

Fig. 8 Stress in S2

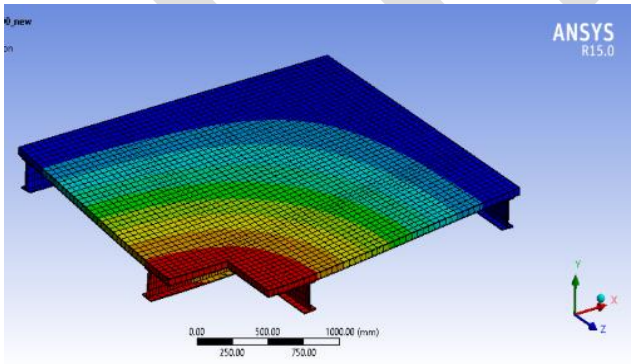

Fig. 9 Deformation in slab S3

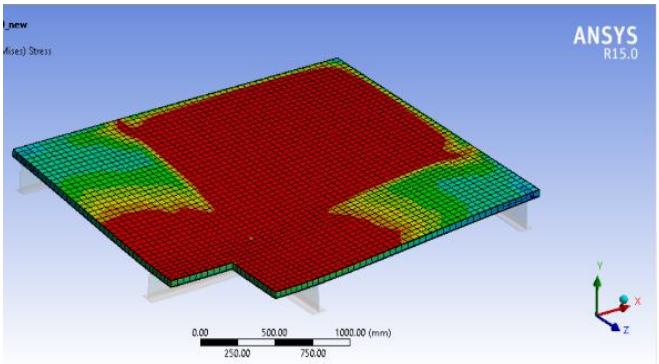

Fig. 10 Stress in S3

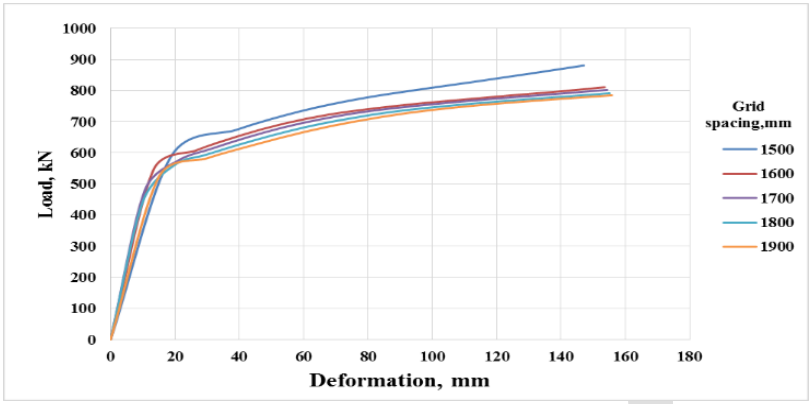

Fig. 11 load Vs deformation graph

a. From the graph it can be seen that, when grid beam spacing of waffle slab increases, there is a decrease in ultimate load carrying capacity and increase in total deformation.

b. For grid beam spacing 1500 x 1500 mm the ultimate load carrying capacity is very high and deformation is very less compared to other grid beam spacing.

c. When grid beam spacing in one of the direction increases from 1600 mm to 2000 mm, there is a small decrease in ultimate load carrying capacity and a small increase in total deformation.

d. Comparing to a composite waffle slab of size 4700 x 4700 mm and grid beam spacing of 1500 x 1500 mm without opening with same concrete, reinforcement and steel girder properties there is a reduction in load carrying capacity and increase in deflection.

Study 2

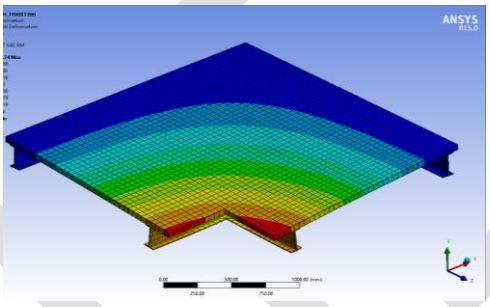

Fig.12. Deformation in slab B2

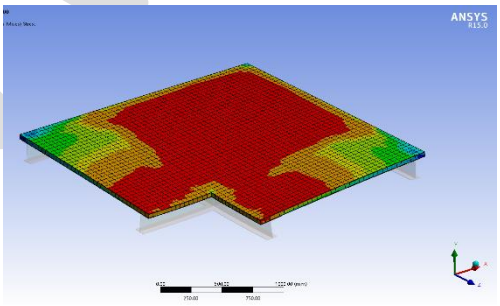

Fig. 13 Stress in slab B2

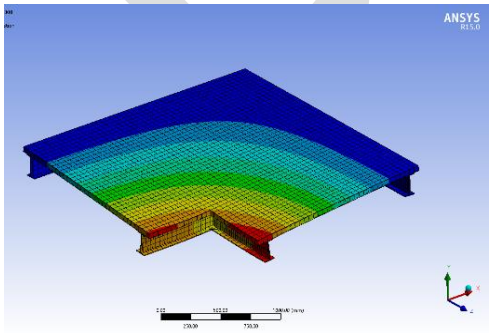

Fig. 14 Deformation in slab B4

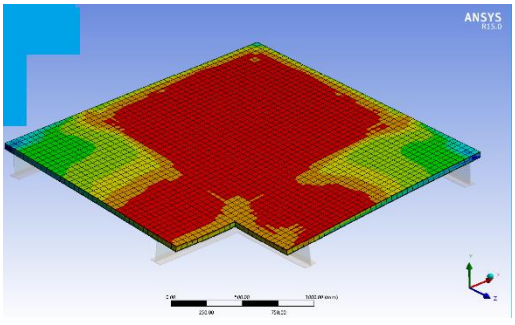

Fig. 15 Stress in slab B4

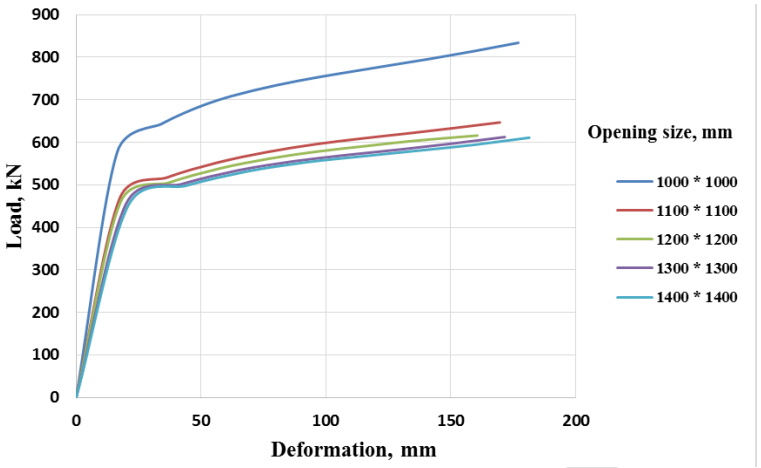

Fig. 16 load vs deformation graph

From the graph it can be seen that,

a. when grid beam spacing of waffle slab increases, there is a decrease in ultimate load carrying capacity and increase in total deformation
b. For the opening size 1000 x 1000 mm the ultimate load carrying capacity is very high and deformation is very less compared to other higher opening size
c. When opening size increases from 1100 x 1100 mm to 1400 x 1400 mm ultimate load carrying capacity decreases and deformation increases, but at a small rate.

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Finally, deep thanks to God for his unconditional support, and also to my family and friends.

CONCLUSION

1. **By analyzing different grid beam spacing, provide smaller spacing between grid beams for better performance.**
2. **By analyzing different opening sizes, for higher load carrying capacity and better performance provide small opening sizes.**

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A brief review on Hadoop architecture and its issues

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Abstract— With enormous data present all over the world, the need of managing the data has also risen. Hadoop is used to maintain and process such large amount of data. Hadoop is an Apache framework which is used to store and process large amount of data. The data is stored in a distributed environment in Hadoop. Hence, Hadoop consists of hadoop distributed file system which is used to store this large amount of data. The data present in such a large scale and complex structure is termed as big data. It is very difficult to process big data using conventional computing techniques. Therefore different methodology has been opted to process big data. Map reduce is one of them. Map reduce is used for large scale processing. The data is processed by breaking down it into various jobs which are fed as input to map tasks and reducer processes the data came as output from the mapper. Various scheduling algorithms are proposed to schedule these jobs. This paper covers all the aspects related to Hadoop and big data. A study related to various work done in this field is also covered in this paper.

Keywords— Hadoop, Map reduce, Big data, Hadoop distributed file system, job tracker, task tracker, AES-MR

INTRODUCTION

Due to rapid development of internet applications, the demand of computing power has risen manifolds. Many new technologies like grid computing, cloud computing, distributed computing or parallel computing have emerged to provide enormous computing power. [1] Due to invention of cloud computing, more and more applications are now deployed in the cloud environment enabling people to have access to data at very less rate. As a result volume of data has also increased which has led to the invention of big data.

1. Big data

Big data is basically a terminology that is used for very massive data sets that have a large variation along with complex structure. These are the characteristics that usually add difficulties like storing the data, analyzing it and further applying procedures after which results are to be extracted. [2] Big Data is related to data that surpasses the usual storage, processing power, and computing capacity of traditional databases and data analysis techniques. Moreover, to process such a large amount of data, Big Data requires a large set of tools and methods which can be applied to analyze and extract patterns from large-scale data. Need of big data has risen because storage capabilities, computational processing power and availability of large volumes of data has increased. Big data can be characterized by three Vs: Volume, Variety and Velocity. Here volume means that there is large amount of data present which can be in the order of terabytes or petabytes. With variety we understand that the data comes from varied sources like text, audio, video, images etc. Velocity defines how the data is kept in motion and how the analysis of streaming data is done. [3]

2 Big Data technologies

To handle such a large amount of data one common technique is load balancing i.e. to redistribute the data in multiple servers so that load on single server is reduced. HADOOP can be used to handle big data.

2.1 HADOOP

HADOOP is basically a framework provided by Apache which is used to run applications on systems which includes thousands of nodes and data is in the order of terabytes. It handles large amount of data by distributing it among the nodes. [4] It also helps system to work properly even when a node in the network fails. As a result risk of catastrophic system failure is reduced. Apache HADOOP consists of the HADOOP kernel, HADOOP distributed file system (HDFS) and map reduce paradigm. [5]

Figure 1: HADOOP Architecture

2.2 Hadoop distributed file system

There is a fault-tolerant storage system present in HADOOP which is called HADOOP Distributed File System, or HDFS. [6] With HDFS we can store huge amounts of information along with scaling up incrementally and surviving the system failure without threat of losing data.

HDFS contains three major components:

- Name node
- Data Node
- Secondary Name node

Name node, also called the master node is the one in which the information about the name system along with the information of the data blocks is present. Whereas data nodes are the nodes where actual storage is done and data can be held and moreover upon request it can be read and write as well. Secondary Name nodes are helper of master nodes. Whenever name node performs any action, a checkpoint is created and that check point saved on secondary name node. Hence, if the master node gets failed, we can restart the node and by using secondary name nodes we can retrieve checkpoints back. Therefore, secondary name nodes act as a saviour during system failure. [5]

2.3 Map reduce

Map reduce is a paradigm used for parallel processing of data using two functions: map and reduce. [7] It provides scheduling, parallelization, replication and failover. Using map and reduce phase map reduce basically encodes data for faster processing. Input to Map tasks is the fixed sized blocks which is obtained by partitioning the input data and then feeding into map tasks in parallel. Collection of key- value pair tuples are generated as intermediate output. These tuples are then sent to different reduce nodes on the basis of key values. Reduce task is used to perform following three steps:

- Copy – The output of map node is copied on reduce node
- Sort – Sorting is done on the collected map output on the basis of key values
- Reduce - Reduce function applied to the data.

Basically there is one master i.e. job tracker and many workers i.e. task trackers present in map reduce architecture. Duty of job tracker is to receive job from user, feed it into map task which breaks it down and then reduce task reduces it. After that job is assigned to task tracker. Progress of task tracker is also monitored by job tracker. Whenever all the work is completed job tracker informs user about the completion. To perform map and reduce task each task tracker is allotted a fixed number of map and reduce task slots. [8]

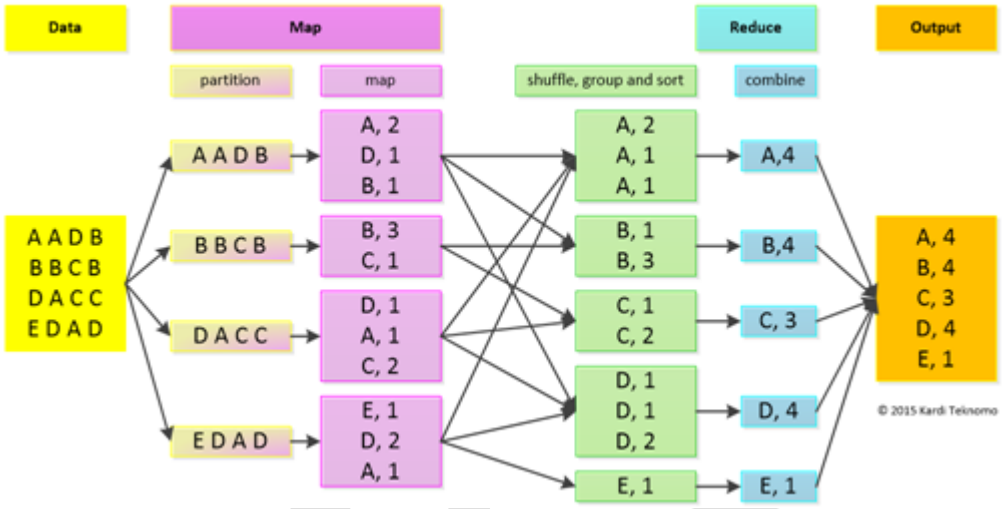

Figure 2: Map reduce

2.4 Scheduling in cloud

There are various algorithms proposed for scheduling of applications in cloud environment. Basically, scheduling can be defined as method to select and decide the task which is most appropriate to execute. It is also defined as allocation of machines to tasks so that makespan of workflow is minimized. [7] Algorithms like data aware scheduling algorithms, first come first serve, round robin, minimum completion time, heterogeneous earliest finish time etc can be used for scheduling workflows in a HADOOP environment. FIFO scheduling algorithm is the default algorithm provided by Hadoop architecture. In FIFO scheduling, jobs are executed in first come first serve order. A FIFO queue is maintained by FIFO scheduler which keeps multiple tasks in it. [4]

2.5 Encryption of big data

As a large amount of data is stored in HDFS, security of data is an important issue in HADOOP. Various algorithms have been proposed to secure data in HDFS. Kerberos is used to attain authorization and authentication in HDFS. Kerberos is a protocol which can be used to authenticate the users who are requesting access to data. However with the invention of new and advanced hacking tools, hackers can now break the security given by Kerberos, hence leaving data in an unsecured state. To overcome this issue, a new algorithm called AES- MR has been proposed which uses AES along with mapper reducer function in parallel. [6]

LITERATURE SURVEY

The work done for the implementation of Hadoop architecture is as follows:

1. Big data: B. Saraladevi et al. has covered the various issues involved in big data in their paper. Big data is a term used to store large amount of data collected from various sources. The various issues discussed in the paper are management, security, storage and processing issues. The author has used various approaches for securing data in HADOOP distributed file system. These approaches are based on Kerberos, Bull eye algorithm and name node. Using Kerberos only authorised users can access HDFS. In bull eye algorithm, how security from node to node can be obtained is explained. The third approach replicates name node so that problem arising due to server crashes can be reduced. These all algorithms are implemented in base layer of HADOOP.

2. HADOOP: Anam Alam in 2014 has provided insight into HADOOP architecture and it's uses. HADOOP has been used in a large number of areas like data intensive applications, social media, data analytics etc. It can be used for opinion mining in terms of social media. The author has worked on the major shortcoming of HADOOP i.e. incremental computations. To overcome this problem, author has used caching. [5]

3. HADOOP DISTRIBUTED FILE SYSTEM: HADOOP has two components: HADOOP distributed file system (HDFS) and Map reduce. HDFS is used to store data and map reduce is used to process the data. Nusrat Sharmin Islam et al. in their paper have proposed various data access strategies which can be used to access HDFS efficiently. They have considered the heterogeneity of data. According to the author's data access strategies, the read performance of HDFS is improved by up to 33% as compared to the default locality aware data access. Moreover, in their study execution times of HADOOP and Spark sort is also reduced by upto 32% and 17% respectively. [10]

4. MAP REDUCE: Map reduce is a framework used to process large chunks of data. Hirotaka Ogawa et al. in their paper have come up with the limitations of existing map reduce framework and have come up with a new map reduce framework called SSS. SSS is based on distributed key- value store. The authors have taken two benchmarks: word count and iterative composite benchmark. According to the study done by the authors, results show that SSS is 1- 10 times faster than conventional HADOOP. [11]

5. SCHEDULING IN HADOOP: Kamal Kc et al. has proposed deadline constraint scheduler in their paper. The conventional scheduler used in HADOOP is FIFO. The authors have tried to design a scheduler which schedules job according to the deadlines specified by users. The study ensures that only those jobs are scheduled whose deadlines can be met. The results show that whenever deadlines for different jobs are different, then scheduler assigns different number of tasks to task tracker due to which whether deadline is met or not is ensured. [9]

6. ENCRYPTION IN HADOOP: Encryption is a process to encode the data in such a way that it is not understandable. While large amount of data is stored in HDFS, security of data has become a primary concern. Viplove Kadre et al. have proposed a new encryption method called AES- MR which works in parallel to encrypt large data sets. The author have combined AES algorithm with mapper function so that encryption is done in a faster manner. The results show that encryption is not only done in a faster manner but security at HDFS level is also improved. [6]

OUTLINE OF HADOOP ARCHITECTURE AND ISSUES

TECHNIQUE	AUTHOR & YEAR	BASED ON	FINDINGS	FUTURE SCOPE
Big Data	B. Saraladevi, N. Pazhaniraja, P. Victer Paul, M.S. Saleem Basha, P. Dhavachelvanc in 2015	Data security in big data	Three approaches implemented in base layer for securing data in HDFS: Based on Kerberos Based on bull eye algorithm Based on name node replication	These approaches can be implemented in other layers of HDFS
Hadoop	Anam Alam, Jamil Ahmed in 2014	Shortcoming in Hadoop: incremental computation	Caching can be done at three levels: Job base, Task base and hardware base	Caching can be extended at other levels as well
Hadoop distributed file system	Nusrat Sharmin Islam, Md. Wasi-ur-Rahman, Xiaoyi Lu, Dhabaleswar K. (DK) Panda in 2016	Efficient data access strategies for Hadoop and Spark with heterogeneous storage	Read performance of HDFS improved by up to 33% Execution time of HDFS reduced by up to 32% Execution time of Spark reduced by up to 17%	Evaluate impact of data access strategies on different middleware. Dynamic switching
Map Reduce	Hirotaka Ogawa, Hidemoto Nakada, Ryousei Takano, Tomohiro Kudoh in 2010	Map reduce framework	SSS and packed SSS performs 1-10 times faster than Hadoop	Provide fault tolerance Provide higher level programming tool Provide more comprehensive benchmarks
Scheduling in Hadoop	Kamal Kc, Kemafor Anyanwu in 2010	User deadline constraint scheduler	When jobs have different deadlines, scheduler assigns	Map/reduce task runtime estimation

			different number of tasks to task tracker to ensure that deadlines are met	Filter ratio estimation Data distribution Multiple map reduce cycle support
Encryption in Hadoop	Viplove Kadre, Sushil Chaturvedi in November, 2015	Encryption using AES- MR	Data security at HDFS level is enhanced Less time due to parallel processing	Increase number of workers Chunk sizes can be distributed.

CONCLUSION

Currently, the amount of data present in the world has risen so much that need for high computing power has emerged. Hadoop comes as a rescue in such scenario which has enabled us to store and process this large amount of data. Various scholars and researchers have worked on different aspects of Hadoop and big data. Work has been done on different scheduling algorithms to schedule the jobs in Hadoop. Kamal Kc and Kemafor Anyanwu have given user deadline constraint scheduler which performs scheduling on the basis of deadlines specified by users. There is a need to encrypt the data stored in Hadoop. Till date, only Kerberos is used to provide authentication and authorization. Therefore, it is possible to formulate effective encryption algorithms which can be used to encrypt the data to make it more secure.

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USAGE OF SUGARCANE BAGASSE ASH IN CONCRETE

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Abstract—Day to day consumption of cement, developing alternate binders that are ecofriendly and contribute towards waste management is to be initiated. sugarcane bagasse and its ash is one of the agro waste which is a fibrous waste product obtained from sugar mills as byproduct. Usage of sugarcane industry waste such as bagasse and its ash needs to be disposed in appropriate way for solid waste management. The present study was carried out on SCBA obtained by controlled combustion of sugarcane bagasse. Sugarcane production in India is over 300 million tons/year leaving about 10 million tons of as unutilized and, hence, wastes material. This paper analyzes the effect of SCBA in concrete by partial replacement of cement at the ratio of 0%, 5%, 10%, 15% and 20% by weight. The experimental study examines the compressive strength, split tensile strength of concrete. The main ingredients consist of Portland cement, SCBA, river sand, coarse aggregate and water. After mixing, concrete specimens were casted and subsequently all test specimens were cured in water at seven and 28 days for M25 concrete.

Keywords—Cement,Sugarcane bagasse ash, River sand Coarse aggregate, Slump test, Compressive strength test and Split Tensile Strength.

INTRODUCTION

Construction has been an important element in the rapidly changing modern society. Innovation in construction is highly linked with the development of advanced construction materials. Cementitious materials are the major class of construction materials that have been used for several millennia. The ancient cementitious materials were lime alone or lime in combination with natural pozzolanic, as well as gypsum, while the modern ones are largely portland cement. Many countries are in severe shortage of cement, in spite of higher demand. There would be an increase in the use of combination of Portland cement with large contents of mineral additives. Therefore, the search for alternative binder or cement replacement materials has become a technological interest and there is an urgent need to develop newer concrete as a reliable and durable construction material.

From ecological point of view one has

i. To produce binders that consume less energy and emit less greenhouse gases, in particular carbon dioxide.
ii. To incorporate industrial by-products and recycled materials in the cementitious binder as well as in the concrete.
iii. To produce structures that would function more efficiently over time, in terms of their durability performance.

Blended cements are produced by the addition of well-known cement replacement material to ordinary Portland cement. Many of these cement replacement materials or mineral admixtures are industrial wastes. Agricultural wastes such as rice husk ash and sugarcane bagasse ash are also considered as mineral admixtures due to their pozzolanic property.

Currently, there has been an attempt to utilize the large amount of bagasse ash, the residue from an in-line sugar industry and the bagasse-biomass fuel in electric generation industry. When this waste is burned under controlled conditions, it also gives ash having amorphous silica, which has pozzolanic properties. A few studies have been carried out on the ashes obtained directly from the industries to study pozzolanic activity and their suitability as binders, partially replacing cement. Therefore it might possible to use sugarcane bagasse ash (SCBA) as cement replacement material to improve quality and reduce the cost of construction materials such as mortar, concrete pavers, concrete roof tiles and soil cement interlocking block etc.

MATERIALS USED

Sugarcane Bagasse Ash

The sugarcane bagasse consists of approximately 50% of cellulose, 25% of hemicelluloses and 25% of lignin. Each ton of sugarcane generates approximately 26% of bagasse (at a moisture content of 50%) and 0.62% of residual ash. The residue after combustion presents a chemical composition dominates by silicon dioxide (SiO_2). In spite of being a material of hard degradation and that presents few nutrients, the ash is used on the farms as a fertilizer in the sugarcane harvests. In this sugarcane bagasse ash was collected

Table 1: Chemical composition of SCBA

Sr. No.	Component	Mass %
1	Silica (SiO_2)	66.89
2	Alumina (Al_2O_3)	29.18
3	Ferric Oxide (Fe_2O_3)	
4	Calcium Oxide (CaO)	1.92
5	Magnesium Oxide (MgO)	0.83
6	Sulphur Tri Oxide (SO_3)	0.56
7	Loss of Ignition	0.72

Fig 1: specific gravity test of SCBA

Coarse Aggregate:

These are materials passing through 20mm and retained on 16mm, these are generally used in preparation of concrete, as it is a parametric material. Coarse aggregates are used in concrete as they are the reason for strength properties and reduce the shrinkage in concrete.The specific gravity of Coarse aggregates is 2.8

Fine Aggregate:

These are materials with the size less than 2.36mm, these are generally used in preparation of concrete, as it is a parametric material. Fine aggregates are used in concrete as they are the reason for strength properties and reduce the shrinkage in concrete. The specific gravity of Fine aggregates is 2.62

Cement:

It is a material which is used for providing the binding property between the materials of the concrete. It also increases the strength. The specific gravity of cement is 2.79

Water:

In this experimental investigation portable water which is free from organic substances is used for mixing and curing.

EXPERIMENTAL INVESTIGATIONS

In present study, M_{25} grade concrete was designed as per IS: 10262-2009.

E. Workability

Tests performed on the fresh concrete give an idea about the workability of concrete mix. Since pervious concrete is also known as zero slump concrete the slump cone test isn't carried out. Hence in order to determine the workability slump cone test is performed. Freshly mixed concrete were tested for workability by slump value. In this investigation, M_{25} mix concrete is considered to perform the test by weight basis by partially replacing 5%, 10%, 15% and 20%in the weight of cement.

Fig2:Mixing of concrete

F. Compressive Strength

In this investigation, M_{25} mix concrete is considered to perform the test by partially replacing 0%, 5%, 10%, 15% and 20% in the weight of cement. A 150 X 150mm concrete cube was used as test specimen to determine the compressive strength of concrete. The ingredients of concrete were thoroughly mixed till uniform consistency was achieved. The cubes were properly compacted. All the

concrete cubes were de-moulded within 24 hours after casting. The de-moulded test specimens were properly cured in water available in the laboratory at age of 28 days. Compression test was conducted with 2000KN capacity on universal testing machine. The load was applied uniformly until the failure of the specimen occurs. The specimen was placed horizontally between the loading surface of the compression testing machine and the load was applied within shock until the failure of the specimen occurred.

Fig 3:Casting and compressive strength testing of cube

C.Split Tensile Strength

In the investigation,M25 mix concrete is considered to perform the test by weight basis by replacing0%, 5%, 10%, 15% and 20% in weight of cement. cylinders having mathematical dimensions of 150mmdiameter and 300mm length were used as test specimen to determine the split tensile strength of concrete .the various ingredients of concrete were mixed thoroughly until uniform consistency was achieved .the cylinders were compacted properly. All the cylinders were de moulded within 24 hours after casting .the de-moulded test specimens were properly cured in water which is available in the laboratory for an age of 28 days .The split tensile strength was conducted as per IS:5816-1976.the specimen was placed horizontally between the loading surfaces of the compression testing machine and the load was applied without any sudden impact until the failure of the specimen occurred.

Fig 4: split tensile strength testing of cylinder

RESULTS AND DISCUSSIONS

E. Workability

Table-2: Slump values for partial replacement of SCBA as cement for M_{25} grade concrete.

Sl. No	% of Cement replaced with SCBA	Slump Value
1	**0%**	76
2	**5%**	78
3	**10%**	80
4	**15%**	81
5	**20%**	82

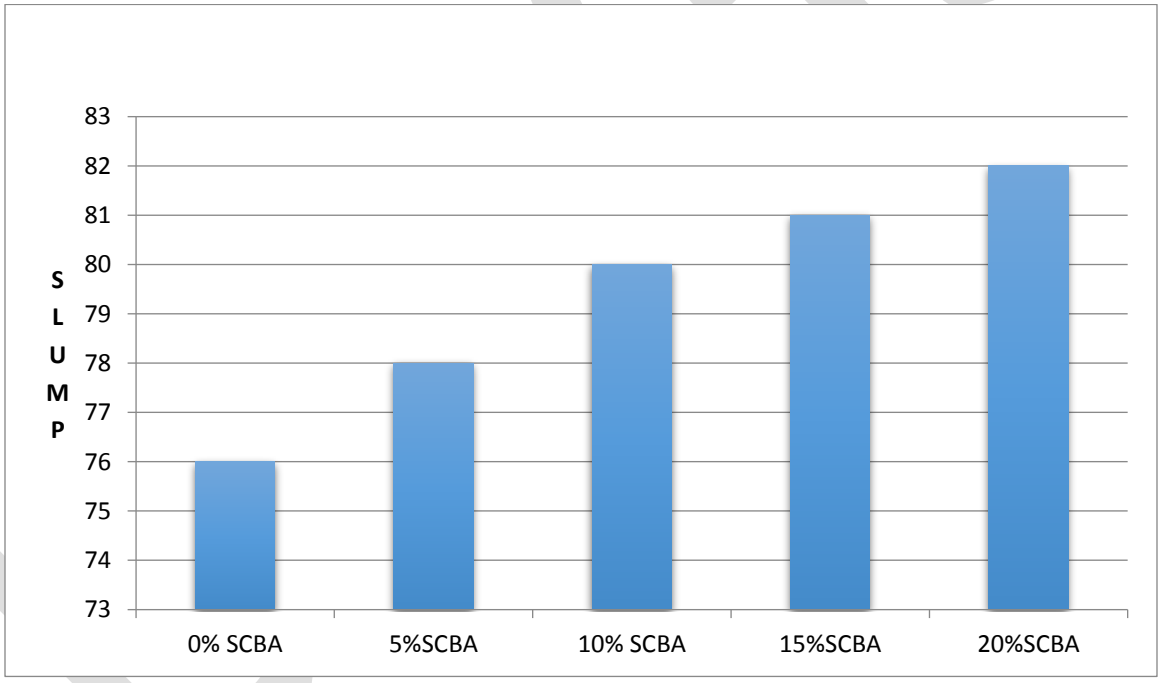

Fig 5 : Slump values for partial replacement of SCBA as cement

F. Compressive Strength Test

The compressive strength test of concrete was achieved in 28 days of various proportions and presented below. The specimens were cast and tested as per IS: 516-1959.

Table-3: Compressive Strength values for partial replacement of SCBA as cement for M_{25} grade concrete.

S.no	Type of Design	Cube no	Weight of each cube (KG)	Reading on dial gauge (KN)	Compressive Strength (N/mm^2)	Average compressive Strength (N/mm^2)
1	Nominal concrete mix	1	8.340	640	28.45	27.70
		2	8.290	510	22.67	
		3	8.140	720	32	
2	5% Replacement of cement	1	7.760	590	26.23	26.45
		2	7.690	530	23.55	
		3	7.720	600	26.67	
3	10% Replacement of cement	1	7.830	370	16.44	17.03
		2	7.710	370	16.44	
		3	7.750	410	18.22	
4	15% replacement of cement	1	7.680	320	14.22	16
		2	7.460	400	17.78	
		3	7.550	360	16.00	
5	20% Replacement of cement	1	7.300	210	9.34	10.97
		2	7.400	280	12.45	
		3	7.230	250	11.12	

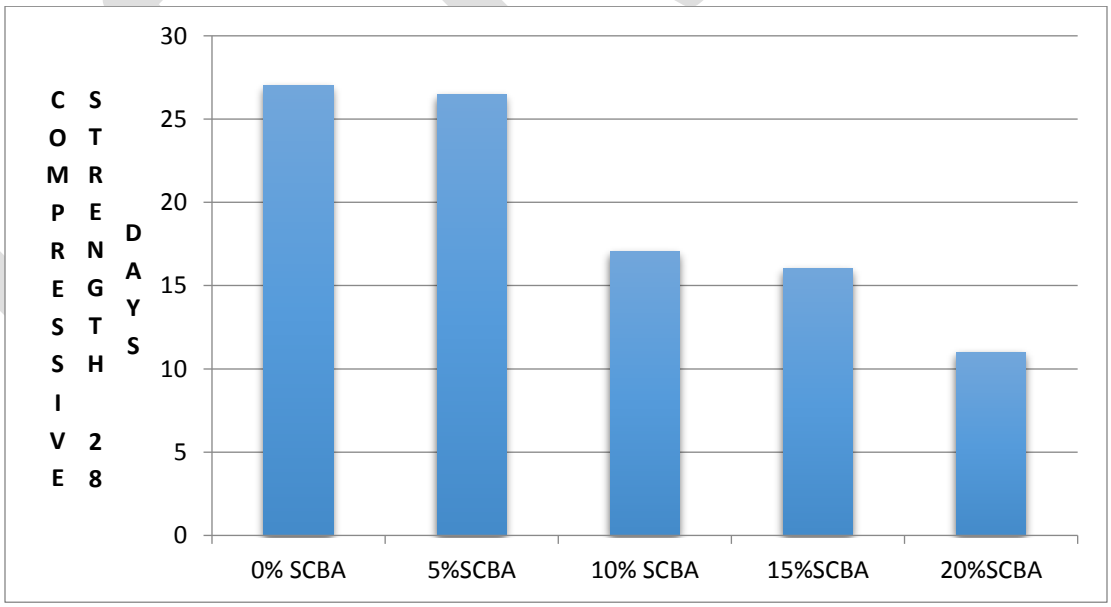

Fig6: Compressive Strengths for partial replacement of SCBA as cement

From the above compressive strength results, it is observed that Rubber based concretes have achieved a decreased in strength for partial replacement of coarse and fine aggregate for 28 days when compared to conventionalconcrete.

C. Tensile Strength Test Values

TheTensile strength test of concrete with 28 days curing period for various proportions and presented below. The specimens were cast and tested as per IS: 516-1959

Table-4: Tensile Strength values for partial replacement of SCBA as cement for M_{25} grade concrete.

S.no	Type of Design	Cube no	Weight of each Cylinder (KG)	Reading on dial gauge (KN)	Split Tensile Strength (N/mm^2)	Average Split Tensile Strength (N/mm^2)
1	Nominal concrete mix	1	12.750	144	2.03	1.94
		2	12.900	139	1.96	
		3	12.360	130	1.83	
2	5% Replacement of cement	1	12.760	135	1.91	1.89
		2	12.610	135	1.91	
		3	12.720	130	1.84	
3	10% Replacement of cement	1	11.950	120	1.7	1.68
		2	12.05	120	1.7	
		3	11.900	115	1.63	
4	15% replacement of cement	1	11.650	110	1.56	1.51
		2	11.400	100	1.41	
		3	11.500	110	1.56	
5	20% Replacement of cement	1	11.250	90	1.27	1.31
		2	11.380	100	1.41	
		3	11.180	90	1.27	

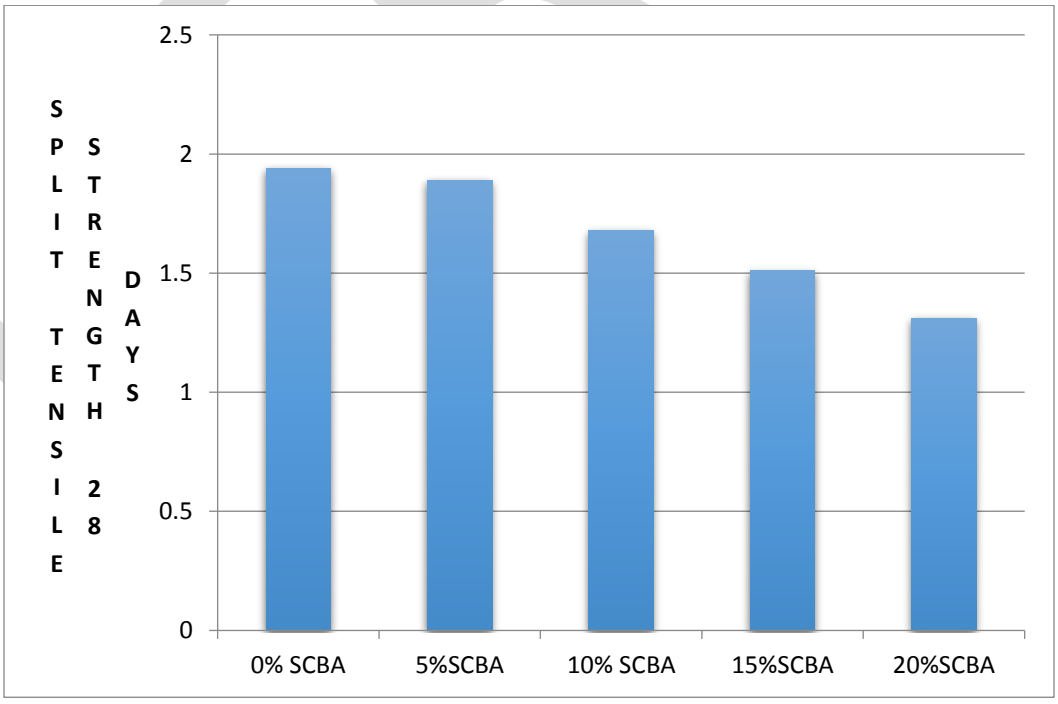

Fig 7: - Tensile strengths for partial replacement of SCBA as cement

CONCLUSION

Based on the experimental results and their plots and subsequent discussion on the results the following conclusions are drawn:

1. Workability of concrete increases by increasing the percentage of replacement of SCBA in concrete.
2. The compressive strength of concrete increased at 5% replacement of cement with SCBA.
3. Further increase in percentage of SCBA results in decrease in compressive strength.
4. The tensile strength of concrete decreasing with addition of SCBA.

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A Survey on Performance Evaluation of AOMDV Routing Protocol for Internet of Things

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Abstract— Internet of things (IOT) is derived from two words i.e. "Internet" which is a global system of interconnected networks and "Things" which shows some objects. IOT is conceptually defined as a self configured, dynamic global network infrastructure based on standard and interoperable communication protocols where virtual and physical things having identities, virtual personalities, and physical attributes, use intelligent interfaces and are seamlessly integrated into the information network. We had gone through various dissertations adopted by various authors in the study of Internet of things (IOT). All the dissertations studied works on the comparative analysis on performance of networks with Internet of things.

Keywords— Internet of things, Routing, Protocols, AOMDV, AODV, Ad-hoc Network, Mobile Network, MANET, Wireless Network.

INTRODUCTION

1.1 Wireless sensor networks (WSNs)

Wireless sensor networks (WSNs) consist of a huge number of small devices that sense and gather information from their immediate environment. The gathered data is transmitted hop-by-hop through the network and then to the sink node where these data are analyzed. These types of networks pose many challenges because of their limited energy, low computational capabilities, low memory, unattended operation, and dynamic environmental changes [3].

WSN monitoring network includes various components:

a) WSN hardware - Typically a WSN hardware node contains sensor interfaces, processing units, transceiver units and power supply. They comprise of multiple analog to digital converters for sensor interfacing and recent sensor nodes have the ability to communicate using one frequency band making them more versatile.

b) WSN communication stack - The nodes are likely to be deployed in an adhoc manner for most applications. Nodes in a WSN need to communicate among themselves to transmit data in single or multi-hop to a base station. Designing a suitable topology, routing and MAC layer is critical for scalability and longevity of the deployed network. When the node drop outs the consequent degradation in the network lifetime are common. The communication stack at the sink node should be able to communicate with the world via the Internet to operate as a gateway to the WSN subnet and the Internet.

c) WSN Middleware - A method to combine cyber infrastructure with a Service Oriented Architecture (SOA) and sensor networks to give access to various sensor resources in a deployment free manner and is based on the idea of isolating resources so as to be used by several applications. A platform independent middleware for developing the sensor applications is required, for example an Open Sensor Web Architecture (OSWA). OSWA is designed on a uniform set of rules, operations and standard data representations as stated in the Sensor Web Enablement Method (SWE) by Open Geospatial Consortium (OGC).

d) Secure Data aggregation – A secure and efficient data aggregation method is required to extend the lifetime of the network as well as ensuring reliable data gathered from sensors. As node failures are a common characteristic of WSNs, the network topology should have the capability to heal itself. Ensuring security is critical because the systems are automatically connected to actuators and protecting the systems from intruders is very important [8].

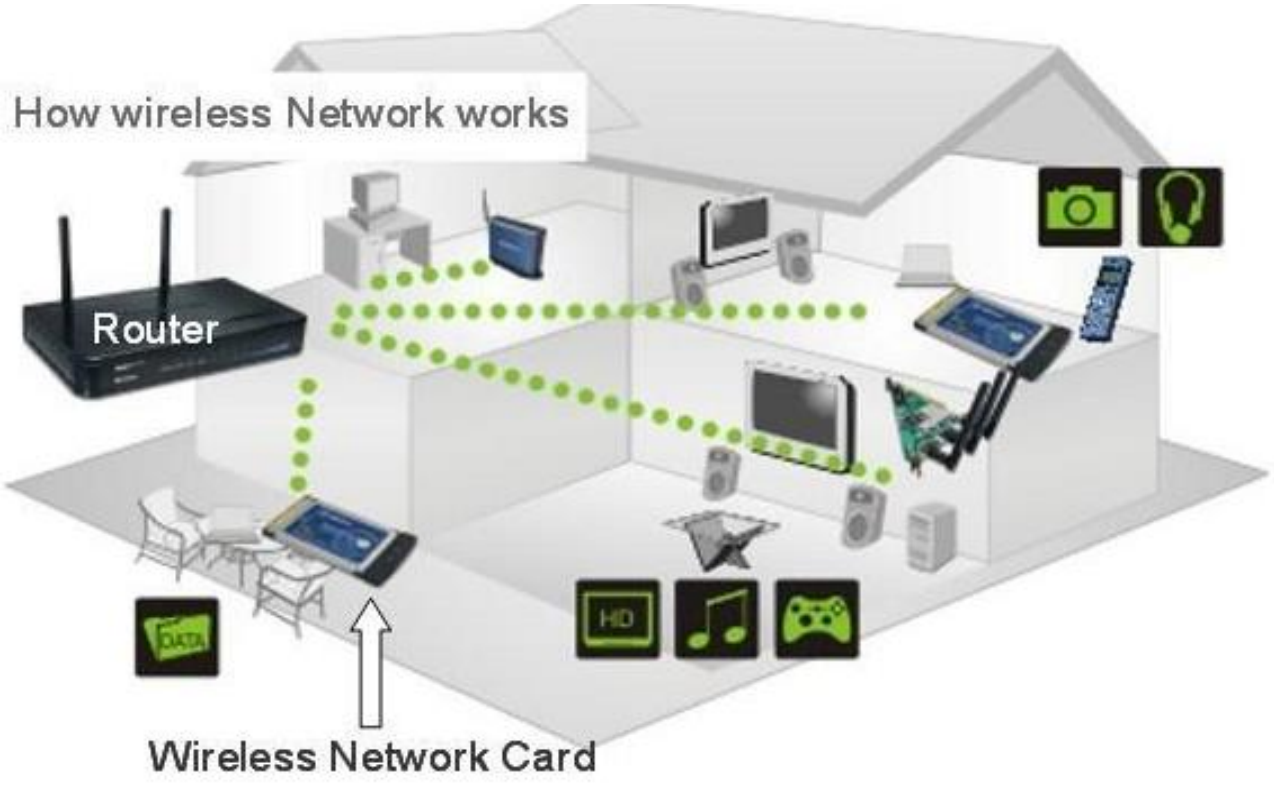

Figure 1: How wireless network works

1.2 Mobile Ad hoc Network (MANET)

Mobile Ad hoc Network (MANET) is a self-organizing and infrastructure-less multi-hop network which contains several wireless mobile nodes, such as Personal Digital Assistants (PDAs), laptops, etc. Each node in MANET is both a host and a router, a source node therefore can reach the destination node directly or by intermediate nodes [5].

1.3 Internet of Things (IOT)

IOT is derived from two words i.e. "Internet" which is a global system of interconnected networks and "Things" which shows some objects. IOT which is also known as Internet of Objects is the networked interconnection of daily objects, uniquely addressable, based on standard Internet protocol suite (TCP/IP). It is a self-configuring wireless network of sensors whose idea would be to interconnect everything [1] [6].

Nowadays the world is entirely dependent on the information provided on internet, which is captured by taking images or through text. This needs the major involvement of a human being for collection of the information but problem is that people have limited time and less accuracy, which leads to inappropriate and inconsistent data. Hence, such a system is needed which can automatically collect the data and transfer it to the internet without any human to machine interaction [6].

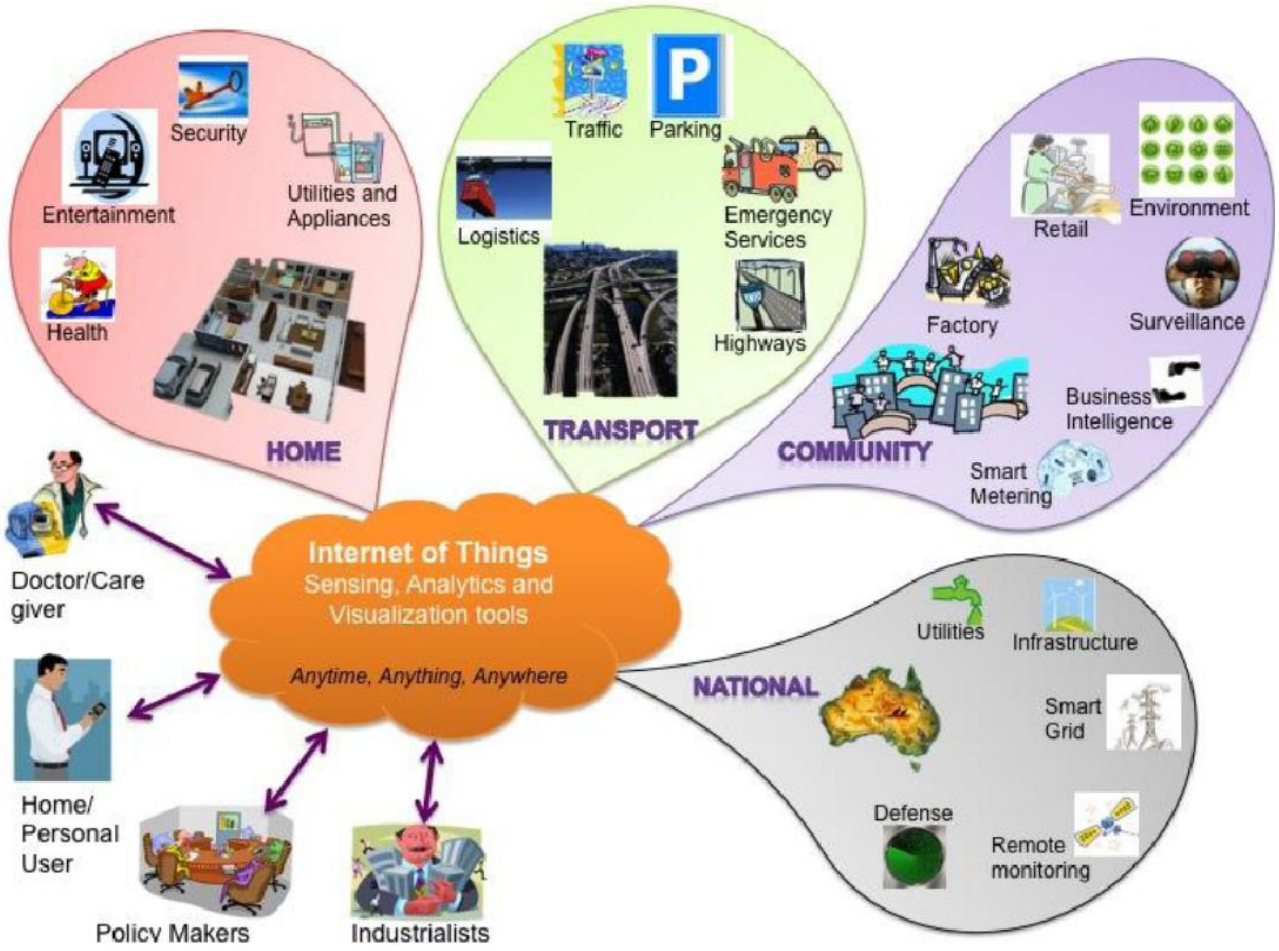

Figure 2: IOT Schematic showing the end users and application areas based on data.

Internet of things is a scenario in which all the objects/things are connected to the internet. The information sensing devices connect things with the purpose of intelligent identification and management. Wireless technology and the internet is used majorly in the making of IOT. IPv6 plays a very important role in IOT, by using its large address space through which one can easily assign a unique IP address to things on this planet and could transfer the data over network [6].

IOT is conceptually defined as a self configured, dynamic global network infrastructure based on standard and interoperable communication protocols where virtual and physical things having identities, virtual personalities, and physical attributes, use intelligent interfaces and are seamlessly integrated into the information network. In the IOT, smart objects/things are active participants in information, business and social processes where they are enabled to communicate and interact among themselves and also with the environment by interchanging data and information sensed about the environment, while reacting autonomously to the physical/real world events and effects IOT by running processes that have trigger actions and create services with/without human intervention directly [2].

By the smart usage of IOT, it would be possible to discover when the things need to repair, recall or replace without the human interference; which greatly reduce the waste and loss of the things [6].

There are many similarities between IOT and MANET [1].

•Both the network structure is horizontal. Each node has the same priority and there is no sink node like wireless sensor network, so energy consumption is steady and avoiding energy hole effect happens.

•The nodes there can move randomly so that the network needs some methods to create connection quickly and steadily. Moreover, the movement of nodes leads to the routing table updated frequently, therefore, link costs may disturb the normal data transportation and some algorithm should be designed to minimize the routing costs.

•With the development of microchip technology, nodes are becoming more and more powerful, so nodes are based on IP address and their main compute unit can process more command in a time unit. As a result of that, we can design a more complex routing algorithm to lower the link costs and make the network more efficiency.

In some extent, IOT is the evolution of MANET, but there are lots of differences between them. One of the greatest differences is that IOT will connect to the Internet, IOT is not only a local interconnected network, through the connection to the internet, several internet of things can make up a great IOT global interconnected system [1].

LITERATURE SURVEY

Yicong TIAN, Rui HOU (2010) In this paper designed a routing method that can take function as routing destination not just nodes. Compared with AOMDV in the internet of things, simulation results demonstrate that AOMDV-IOT achieves enhanced performance in average end-to-end delay, packet loss and discovery frequency. This proposed work improvement proves to be more suitable for the use in internet of things [1].

Marie-Aurelie Nef et al. (2012) In this paper focus is on possible WSNs integration approaches in the IoT while providing QoS and which best practices to adopt. Regarding QoS requirements, this paper also defines service models for the IoT and expose their feasibility through a categorization of IoT applications [2].

Monika Grajzer et al. (2014) This paper mainly focus on the provision of new services based on the interconnection of smart devices into the IPv6-based Internet of Things (IoT) calls for offering the possibility of automated, unsupervised network configuration and operation. This aspect is important for mobile ad hoc networks as a key enabling technology for IoT. The mechanisms of Stateless Address Auto configuration goal is to provide basic self-configuration capabilities to the IPv6 networks, though they are still not enough to offer full support for MANET networks. To deal with this challenge the paper has proposed the Neighbor Discovery++ (ND++), an extended IPv6 Neighbor Discovery protocol for efficient Duplicate Address Detection in MANETs. This paper presents the simulation results verifying the ND++ behavior in the NS-3 simulation environment. [4].

Hou Songfan, Wu Muqing, Liao Wenxing, Wang Dongyang (2015) This paper presents an investigation with a goal to compare the performance of two characteristic routing protocols, AODV and DSR, in real multi-hop environment. Apart from testing the end-to-end packet loss, delay and routing path parameters, the performance of DSR and AODV routing protocols with factors of some applications based on Internet of Things (IoT), such as Radio Frequency Identification (RFID) service, voice service and temperature monitoring service are also tested [5].

Mayuri A. Bhabad, Sudhir T. Bagade (2015) The paper is mainly focusing on the concept of IOT, architecture and security issues with suggested countermeasure and suggested further areas of research needed. Internet of things (IOT) is a widely distributed network of interconnected things/objects in which all the information is routed to the internet with the use of sensing devices and Radio Frequency Identification (RFID) tagging system. As IOT does not need any human to machine interaction, hence security is needed. But the rapid development of IOT has evolved with the challenges in terms of security of things [6].

Vellanki et al. (2016) This paper propose a novel node level energy efficient (NLEE) routing protocol to enhance the energy efficiency. The validation of NLEE algorithm is confirmed using an IoT environment with discrete C ++ platform. Internet of things (IoT) involves connecting devices that forms the networks which work based on our surroundings, and can make our lives healthier, faster and safer. This paper is going to deliberate and explain energy issues that emerge while using Internet of Things [7].

Jabir et al. (2012) This dissertation proposed an enhanced architecture for SPMIPv6 called Clustered SPMIPv6 (CSPMIPv6). In the proposed architecture, the Mobility Access Gateways (MAGs) are grouped into clusters, each having a

distinguished cluster Head MAG (HMAG). The HMAG is designed to decrease the load on Local Mobility Anchor (LMA) by performing intra-cluster handoff signaling and providing an optimized path for data communications. The architecture proposed in this paper is evaluated analytically, and the numerical results demonstrate that the proposed CSPMIPv6 outperforms both protocols (PMIPv6 and SPMIPv6) in terms of LMA load, local handoff delay, and transmission cost performance metrics. [3].

ear	Title	Objective/Approach	Findings
010	An Improved AOMDV(Ad-hoc On demand Multipath Distance Vector) Routing Protocol for Internet of Things	Designed a routing method that can take function as routing destination not just nodes.	Improvement of AOMDV-IOT, which can select the stable internet transmission path dynamically through regular updating the internet connecting table.
012	Enabling QoS in the Internet of Things	Possible WSNs integration approaches in the IoT while providing QoS.	Summarized the service models and the performance analysis of the IEEE 802.15.4 also presented the best ways to integrate WSNs in the IoT providing QoS.
014	Performance evaluation of Neighbor Discovery++ protocol for the provisioning of self-configuration services in IPv6 mobile ad hoc networks	Simulation results verifying the ND++ behavior.	ND++ is a promising solution for provisioning of self-configuration services for the needs of the Internet of Things.
015	Performance Comparison of AODV and DSR in MANET Test-bed Based on Internet of Things	Compare the performance of two typical routing protocols, AODV and DSR, in real multi-hop environment with factors packet loss rate, time delay and routing path.	DSR performs better performance indoors while AODV can better adapt to outdoor complex electro-magnetic environment.
015	Internet of Things: Architecture, Security Issues and Countermeasures	Concept of IOT, architecture and security issues with suggested countermeasure and suggested further areas of research needed.	Security issues of IOT and some countermeasure for required security parameters.
016	Node Level Energy Efficiency Protocol for Internet of Things	Proposed a novel node level energy efficient (NLEE) routing protocol that improves energy efficiency based on some factors i.e. Expected transmission count, residual energy of nodes, and hop count of nodal paths.	An improved efficient usage of nodal energies. It also provides the shortest path in the network while routing setup delay is increased. As a result, the routing success probability is decreased.
012	A cluster-based proxy mobile IPv6 for IP-WSNs	An enhanced architecture for SPMIPv6 called Clustered SPMIPv6 (CSPMIPv6). In this architecture, the Mobility Access Gateways (MAGs) are grouped into	CSPMIPv6 performs better than the basic PMIPv6 and the SPMIPv6 in terms of LMA load, handoff latency, and the transmission cost.

		clusters, each with a distinguished cluster Head MAG (HMAG). The HMAG reduce the load on LMA by performing intra-cluster handoff signaling and provide optimized path for data communications.	

CONCLUSION

A theory of an improved AOMDV (Ad-Hoc On Demand Multipath Distance Vector) routing protocol for internet of things designed a routing method that can take function as routing destination not just nodes. A theory of enabling QoS in the internet of things designed the possible WSNs integration approaches in the IoT while providing QoS. A theory of performance comparison of AODV and DSR in MANET test-bed based on internet of things compares the performance of two typical routing protocols, AODV and DSR, in real multi-hop environment with factors packet loss rate, time delay and routing path. A theory internet of things architecture, security issues and countermeasures defines the concept of IOT, architecture and security issues with suggested countermeasure and also suggested further areas of research needed. A theory based on node level energy efficiency for internet of things improves energy efficiency based on some factors i.e. Expected transmission count, residual energy of nodes, and hop count of nodal paths. A theory based on cluster-based proxy mobile IPv6 for IP-WSNs provides an enhanced architecture for SPMIPv6 called Clustered SPMIPv6 (CSPMIPv6). In CSPMIPv6 architecture, the Mobility Access Gateways (MAGs) are grouped into clusters, each with a distinguished cluster Head MAG (HMAG). The HMAG reduce the load on LMA by performing intra-cluster handoff signaling and provide optimized path for data communications.

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Blood at one touch

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Abstract— We know that blood is very important for human life. In real world everything is produced artificially but not blood. When blood is required we need a donor to give blood. In this paper we are presenting blood donation system. In that we provide service to the blood bank, hospital and users (Donor's and Acceptor's). In this blood bank project we are using latest technology like Spring and Hibernate to improves the performance of the system. We are also use the GPS system to show the route to user of nearest hospitals and blood banks. In our system blood bank can organize the blood camp to fill blood stock. Our system sends notification to users when blood camp is organize. We are also providing android app to user to search nearest hospitals and blood banks as per the blood group.

Keywords- Blood bank, Spring, Hibernate, GPS, Donor's, Acceptor's, Blood donation camp.

INTRODUCTION

Blood is a saver of all existing lives in case of emergency needs. During the blood transfusion process, the acceptor receiving blood should be considered before donating the blood. The blood donor information should be checked before displaying their details on the website. Technopedia is nothing but web service with a mobile application. An availability of blood is major issue in today's life. The reason behind that is number of accidents as well as major diseases. The possibility of finding blood in nearest blood bank is less. At that time patient may face severe problem. The need for the blood is important for treating in medical field. For every second someone needs blood to save their life. The task of blood bank is to receive blood from various donors, to monitor the blood groups database and to send the required blood during the need to the hospital in case of emergencies. In developing countries, especially like India, the blood resource lacks in quantity which is a barrier to others life. The Southern regions of Asia are weak in regulation of BTS and some times transferring the real time data are difficult.

There are many shortcomings like decentralized nature of donor and required blood is needed at serious times. Manually is difficult in the current existing system and tracking the database for particular blood group is complicated. The aim of serving an efficient quality of blood to the patient. The last minute update of information are done in bidirectional way. So the information regarding the Blood Transfusion Services(BTS) is explained as entering the details about the blood groups, members, contact details, etc. and finding the donor with GIS. The update about the information after the donation of the blood by a donor is not entered in the system. The online blood bank management system helps to maintain the database and quality of blood.

LITERATURE SURVEY

Blood is a saver of all existing lives in case of emergency needs. During the blood transfusion process, the acceptor receiving blood should be considered before donating the blood. The blood donor information should be checked before displaying their details on the website. In this paper, also the proposed work has a Push technology with security, to protect the contact details of the donors in web application where it can be misused by third parties. It also maintains the amount of each available blood groups, if the stock of a particular blood group is lower than the required amount then the proposed method notifies the donor to donate blood. In addition to web application, an android mobile application is proposed to search the donors who are available nearby during the emergency cases such as accidents. [1]. The growing demand in the blood bank sector makes it necessary to exploit the whole potential of stored data efficiently. Data mining can contribute with important benefits to the blood bank sector; it can be a fundamental tool to analyze the data gathered by blood banks through their information systems. In this paper an attempt has been made to classify and predict the number of blood donors according to their age and blood group. J48 algorithm and Weka tool have been used for the complete research work [2]. This paper focuses on the data mining and the current trends associated with it. It presents an overview of data mining system and clarifies how data mining and knowledge discovery in databases are related both to each other and to related fields. Data Mining is a technology used to describe knowledge discovery and to search for significant relationships such as patterns, association and changes among variables in databases. This enables users to search, collect and donate blood to the patients who are

waiting for the last drop of the blood and are nearby to death. We have also tried to identify the research area in data mining where further work can be continued [3]. Google Android platform for mobile devices has quickly developed into a serious open source alternative. We explored the Android Operating System (OS) and software development environment and evaluated several of its capabilities by constructing a working application. This application collected speed and location information from the

Global Positioning System (GPS) receiver, used the Google Maps Application Programming Interface (API) to determine the location of nearby hospitals, and gives message to hospitals and relatives, if a person need a help. The platform proved capable of supporting a melding of different services, and we believe such smart phones have broad applicability to public safety problems [4].

EXISTING SYSTEM

The recruitment of blood donor when compared with other countries is very less in overall blood donating percentage annually. Besides this recruitment, the screening of donor and the management system is not well maintained. The details of the information of donors are given for the usage of the users for contacting them when in need of blood in case of any emergency. The problem which currently exists in the medical field is that blood is needed immediately for an injured person or for any major operation. It is not easily available even though blood banks are present. There are some websites present for donating blood were the phone numbers of the donors are present which are not reliable since they don't get often updated. At present there are no proper websites.

PROPOSED SYSTEM

1. First of all the users (Acceptors/Donors), Blood Banks and Hospitals are registered with our System.
2. Blood Bank Maintain their stock details by updating its database every time.
3. Acceptor search for required blood component (Platelets, RBC's, WBC's etc.) for respected Blood group. Our system tracks the GPS location of that acceptor and displays the nearest Blood bank details to that acceptor.
4. Acceptor selects any of the one option by clicking. After clicking details of that blood bank i.e., Address, contact no., Availability of blood, and also Show path.
5. If user clicks on Show path our system will show the path from acceptor location to that blood Bank.
6. Our system also notifies the respected donors if any blood campaign is organized.
7. Our system sets a minimum threshold for all blood banks if any blood bank stock touches to that threshold our system sends warning message to that blood bank.
8. Our system also maintains track of donor's blood donation details.
9. If any donor wants to donate blood before 3 months of previous blood donation system shows a Warning message to donor.

SYSTEM ARCHITECTURE

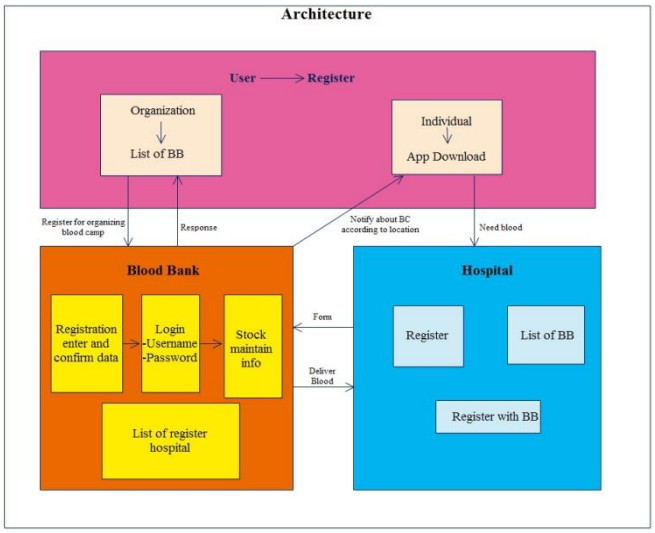

Fig. 1: System Architecture

Fig.1 gives the system details along with various blocks. System architecture is explained below:

1) User Module: - In this user module user has to registers in this system. They have to fill personal information like name, address, blood type, etc. From the system user can download the mobile application. Link for mobile application is provided by the system. In user module our system shows nearby blood banks, hospitals and organizational camp to user. It will also provide GPS location. It also shows user shortest route to hospital and blood bank.

2) Blood Bank Module: - In this blood bank module blood bank has to registers in this system. They have to fill their blood bank information like blood bank name, it's location, address, contact number, blood bank registration id, etc. Blood bank has to maintain it's blood stock. Blood bank can tie-up with hospital**.** Blood bank can accept or reject blood request.

Blood bank can see list of register hospital. Blood bank can organize blood camp and send notification to users.

3) Hospital Module: - In this hospital module hospital has to registers in this system. They have to fill their hospital information like hospital name, it's location, address, contact number, hospital registration id, etc. Hospital should be tie-up with blood banks. Hospital can send the blood request to blood bank. Hospital can send request to blood bank to organize blood camp.

VI. CONCLUSIONS

In this system an efficient and reliable blood donor information and management system based on GIS integrated in android mobile application. The service provided by the system is needed and valuable to health sector where a quality of the blood is considered for the safety of the patient through a systematic process by the blood management system. This system will be the solution for the problems such as wrong information of donors, misuse by third parties and updating the donated blood by the donor

which replaces the older systems. This system is a web based android application helps us to reduce the human mistakes which are done in the existing system. The wireless internet technique enables the flow of data to work more rapidly and conveniently. This is integrated framework which has a cloud-based application on mobile devices.

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A Review Project study of Product Life Cycle Management With Detail Implementation of modern Techniques Likes Three S's, and CE

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Abstract - In this research work maximum effort has done to present a detail review of PLM (Product Life Cycle Management) to making sustainability of Product Life Cycle Management through different modern techniques or as the steps involved in PLM. For the deep understanding of PLM function and make easier approach to practical implementation of PLM in manufacturing industry a detail step wise study is provide for the different modern techniques which may steps to establish an efficient PLM system, like Product's Use Full Life, Iterative or Repeated process for PLM, Morphology, Three S's, Environmental consideration in PLM, Concurrent engineering, Modular design for PLM, Mass customization, in PLM Design for: Form and Functional, Simplified Process, Evolution, Innovation, Manufacture. This research work guide for better product quality, sales, and durability this project work is being derived, we can get the benefits of reduced time to reaching the market, Increased full price sales Improved product quality and reliability, Reduced prototyping costs, Reduced waste, Seasonal fluctuation management, Improved forecasting to reduce material costs, Maximize supply chain collaboration. Areas of PLM in which the implementation will affect is higher productivity, Enhanced market image, Elimination of defects and waste, reduced costs and better cost management, Higher profitability, after following the suggestion and recommendation of this work it is possible to develop the Improved customer focus from the company or manufacturare side and satisfaction to Increase customer loyalty and retention, This work will also be beneficial to increase job security of the employees, and finally present the improved and innovative processes with continuous improvement.'

Keywords— Product lifecycle management (PLM), Three S's, CE, Implementation of modern Techniques, Concurrent engineering, , Mass customization, PLM Design, Improved product quality and reliability.

INTRODUCTION

PLM stands for Product Life cycle management is a broader concept which covers a product hen it start just as a concept end at the disposal of that product. As it making sense from its name, it is a process of managing the complete life cycle of a product from start to end. In actual the life cycle of product is started at very earlier even when the a concept take place in mind generating from a need, and life cycle of a product is consider to be end with the retirement and disposal of the product. PLM is a broader concept than PDM, which takes in the whole lifecycle as well as the tools used for authoring data. PDM remains the foundation of a PLM system, but the term PLM is used to consider the product lifecycle and collaboration aspects regarding product data. (CIMdata 2002). Product Lifecycle Management (PLM) is supported a lot by the information technology (IT) concept whose aim is a more effective and more efficient flow of product definition information through all phases of the product lifecycle. The use of computers, with virtual reality descriptions and simulations, and databases containing information of real products, enables organizations to develop products in ever shorter times, at ever lower costs and of ever increased product quality. As Grieves (2006) puts it, PLM "allows us to capture and represent information as we move along in the product's life, but also allows us to simulate various actions to the product that would be prohibitively costly, if not destructive, in real life."

MattiasBokinge 2012, Purpose, aim and research goals the overall aim of the work is to develop new tools and methods that can lead to improved outcomes from PLM implementations in industry. A solid understanding of the characteristics and challenging issues in contemporary PLM implementations, as well as the contexts in which they occur, is needed in order for the likelihood that such new tools and methods can be used to address real issues in future PLM implementations. Hence, the research goals are:

1. Clarify the characteristics of and challenging issues in real contemporary PLM implementations, as well as the contexts in which they occur. Subsequently, the tools and methods need to be proposed, developed and evaluated.
2. Develop and evaluate tools and methods that can be used to improve the outcomes of PLM implementations. The research goals stated above guide the conceptual framework presented in which subsequently leads up to specific research and the corresponding scientific research approach.
3. The research presented in this thesis focuses on the activity of implementing PLM, including the development and deployment of a PLM solution. The initial chartering activity.
4. PLM investment is considered in this thesis. Likewise, the subsequent activities' stabilization, improvement and retirement are also excluded from the scope.
5. Although PLM as a concept concerns products of any combination of all engineering disciplines, the scope of the PLM implementations studied in this research is delimited mainly to the area of mechanical engineering.
6. The research summarizes the results in the result and discussion, conclusion and proposes future work in the area is also presented.

LITERATURE REVIEW

The roots of plm system are in engineering industry jim brown (2003) describes it as the official an enterprise application. however, plm is not just another version of erp (enterprise resource planning) system. the main difference between systems is that plm system takes care of engineering design and innovation side of the product life cycle, while erp is concentrated on production. they are two different systems, and not to pollute erp with design or manufacturing data or plm with material costs it is an appropriate to have both systems. (Brown 2003). PLM is "a strategic business approach that applies a consistent set of business solutions in support of the collaborative creation, management, dissemination, and use of product definition information across the extended enterprise from concept to end of life – integrating people, processes, business systems and information."(CIMdata 2002)**.** The challenges of integrating PLM systems in mechatronic product development have many dimensions. . It has not yet been shown in industry or research how to successfully integrate mechatronic development in PLM systems. Accordingly (DagBergsjö 2009). (MattiasBokinge 2012) Explained that - Product Lifecycle Management (PLM) is an information technology-based concept bringing several benefits to product development organizations. However, it has been reported that PLM implementations in industry render unsatisfactory results. (Centric Software Oct 2014) - The luxury goods, outdoor gear and sporting goods industries, From large numbers of samples to extensive prototyping and exacting production requirements, material costs loom large for these companies. Obviously, this has a significant impact on a company's bottom line, many companies its advanced product lifecycle management software for apparel, footwear and consumer goods industries (PLM) designed to meet the specific needs of materials-driven product development. PLM has long been recognized for helping companies improve the design, development and production of on-trend products, optimizing lead times and managing sourcing. PLM replaces a chaotic system of multiple spreadsheets, scattered documents and an overwhelming amount of email. And it allows every person involved in a product's design and manufacture—from marketing and product designers to sourcing and international suppliers—to work collaboratively with one set of comprehensive, accurate and up-to-date information.

PROPOSED METHODOLOGY

The proposed methodology provides the techniques and already proved process to make a strong. The methodology suggest following steps in detail to develop a PLM system which satisfy the customer and also increase the sale and performance of product. Following steps are given in detail

1. Prepare a Simplified design procedure
2. Always effort to Extend the Product's Use Full Life
3. Use Morphology of design for improvement in PLM
4. Design should be Environmental friendly
5. Product Development Processes and Methods should be environment friendly
6. Information Modeling should be standardized.
7. Efficient Information Management must be adopted
8. Think for Configuration Management

9. Engineering Change Management as when required.

Achieve following guidelines:

1. Minimize Total Number of Parts - Eliminating the parts tends to less maintenance during the product services. parts reduction should not go beyond limit that it adds cost because the remaining parts become too heavy or too complex.
2. Standardize Components - Use and manufacture commercially available standard components, it will help to increase in quality with minimum cost and are easier to be inventory.
3. In a Production Line maximum Common Parts should be try to use- Same material, geometrical shape, size and weight leads less cost per unit and also simplifies the process control.
4. Multifunctional Parts Design - Such parts tends to reduce the number of parts, Ease of Fabrication, save from machining processes which are generally costly and give the nearest to the desired shape.
5. Avoid too Tight Tolerances - Too tight tolerances requires extra precision into the tooling, longer operating cycles and more skilled workers.
6. Design should aim for minimum weight to strength ratio.
7. Try to perform task with general purpose tooling rather than special dies wherever possible

RESULT & DISCUSSION

Where cost-reductions, time-to-market reduction, increased design re-use, and increased design for customer and environment the main factors leading to product life cycle management are globalization of business, company fusions, growing competition, tightening budgets, industry and quality regulations as well as, shortening deliver. This pressure of continual changes requires competence to change own processes and to operate more efficiently and this methodology support for these all.The most important benefit of PLM systems is development of an internal and external communication. It improves as well transfer of different types of file formats, which brings quality, effectiveness and speed up the operations management. However, it's important to remember that PLM is only a tool which removes distances and improve effectiveness only when implemented and used properly. Usually PML implementation demands changes of current data management, and in the beginning may cause more work for the users but it gives valuable advantages. As immediate advantages time saving for example in terms of faster product structure because of easier information utilization, improve quality control.

Expected Out comes after implementing the methodology: It guide for step by step procedure and reduce the probability of creating the mistake, systematic decision making process. Guide for the innovative work. It is an iterative process. Designs are prepared in the limit of found as per actual condition. The work is tested on mathematical model which reduce the probability of failure after production.The reliability of Product among the customer increased. As the work suggest to prepare design a life cycle of product which can be remanufacture at the end of life and for the disposal purpose such design will save the natural resources and also provide the resell value to the last consumer. It provides a chance at every step to make changes in design on the basis of simultaneously out come. It gives very comfort condition to work with the accuracy and in the way of desire objective. With minimum probability of mistake such a work can give the great results in the field of product life cycle management. By implementing the Morphology a better concept design will help to develop the better products and also it will increase the production speed. And the product developed on as per customer requirement will satisfy the customer it will be the first step to increase the level of PLM. Advantages of simplification in respect to PLM save a lot of storage space, As we know that with simplified design less components used, as no complex structure is used. Also simplified design gives the ability to work even with less materials and finished products. So in case of simplified design inventory also reduce. Low investment -.Simplify, planning, and production methods give the support to simplified plant and equipment and inspection and control. In this manner plant running cost also decreases. Standardization founds to be useful in Global acceptance of product – As the standardization Limit the variation in physical dimension and tolerances of components so for same purpose same size product can be used and interchange as per requirement.

Result from CE implementation in PLM: In traditional design approach product design it takes a long time and pass it to the process engineering and operational personals. The process design and ramp up of product generally take again a long time, Concurrent design reduces this development time in two ways. First the process design and testing being soon after product design begins. And process design may begin 1 month later rather after completing the process design long period. After the starting of product design testing and modification are easier. Concurrent engineering Improved the PLM - Concurrent engineering is an advance method of production and differ from the traditional used methods of production. The concurrent engineering provides the opportunity to check the product

design is meeting with the requirements of high quality production and production process. It provides the base to design and test the production process when the product is being design.

CONCLUSION

This research work provides the conclusion that although PLM generates benefits, the expectations were even higher. PLM system argues that the value gained from investments made in PLM can and should be questioned, and claims have been made that many failures are due to inabilities in implementation. Reporting from industry, Baker states that "nobody could have foreseen how big, messy, and tough this project would turn out to be." A well-developed PLM is one of the vital organs for the business development. It reduces the dependencies and uncertainties regarding the product. Hence the focus in this thesis that PLM can generate benefits, the expectations were even higher. It has been argued that the value gained from investments made in PLM can and should be questioned, and claims have been made that many failures are due to inabilities in implementation. Reporting from industry. In an attempt to describe the complexity of PLM implementation, implementation in detail steps provides a complete guide to implement the PLM system in different industry. To conclude, the area of PLM implementation has potential for improvement and is, hence, the focus in this work. This proposed methodology can give a big step by simplified design procedure, as the step by step procedure provided and also it reduce the probability of mistakes during the work. The established and simplified design procedure also helps for decision making process. It is first step for iterative development.

The work is support full to extended Product's Use Full Life as the implementation process provide the advantage of extended Life cycle of a product, most important advantage to all over the environment and that is it helps to reduce the consumption rate of natural resources ultimately which save our requirement. The reliability of Product among the customer increased. The durability of product will be increased and the faith of customer on the product will also be increased. The adaptable design of product will provide the flexibility for required change at the different stage of product life cycle. A design which can be repairable will be the money saving point at the situation of any damage or maintenance problem in the product. As the work suggest to prepare design a life cycle of product which can be remanufacture at the end of life and for the disposal purpose such design will save the natural resources and also provide the resell value to the last consumer.The products which can be reuse enhance the probability of resell of the product, and can also be use for another similar purpose. An easily disassembled in minimum cost after completing the life cycle of product give the edges to recover all or some material used in product. A disposal product design will give the independency to the last customer at the end of life cycle of the product to dispose it easily without any extra effort, expenditure or any type of legal formalities like government permission or anything as. A continues improving PLM system make effect on loyalty of customer and for a brand it will be increased customer loyalty and reduce the customer jumping behavior to other brands. The suggested Iterative nature of design provide the edge of work**,** it provides a chance at every step to make changes in design on the basis of simultaneously out come. It gives very comfort condition to work with the accuracy and in the way of desire objectives. With minimum probability of mistake such a work can give the great results in the field of product life cycle management. The work also suggest for the Morphology of design in PLM and better concept design will help to develop the better products and also it will increase the production speed. And the product developed on as per customer requirement will satisfy the customer it will be the first step to increase the level of PLM.

The configuration and parametric design for parts and components for any product also increase the accuracy level and decreases the chance of error. These techniques are very help full to establish a better PLM system. Also this suggested system will develop a working methodology where before taking the final decision of a product design and will effect on the PLM it will be must to check the dimensions, tolerance, material name, quantity and manufacturing process. It will very supportive for actual optimization of a product Life Cycle. In such a prepared PLM system Distribution Plan will be improve continuously, a well planned application for the use of consumer will developed a greater level and long life for product life. At the last of product life cycle, retirement plan will be available which is very important and supportive for the end users, when at the last stage of any product proper disposal is suggested in the manual provided by manufacture it will give the satisfaction to the customer also at the Last stage of product. and such life cycle which care for the customer from requirement and need to use and application and at the last also for the disposal after completing the retirement of the product such a PLM will provide the complete satisfaction to the customer. As we know that with simplified design less components used, as no complex structure is used. Also simplified design gives the ability to work even with less materials and finished products. So in case of simplified design inventory also reduce and less space occupied for storage. It minimizes investment cost, reduction in sales price, Shorten or eliminates order queues. Standardization in PLM gives the product global acceptance of product, required similar methods and equipments for testing - As the products are in same standard size and characteristics so the product testing and methods becomes similar, minimum precaution, waste reduction, Increase simplification and specialization,

inventory Reduction, give freedom that no high level skill required Reduction in price, reduction in maintenance and service costs. **The environmental considered design PLMsave**the environment. Eco-friendly products saving the environment and protecting the planet, It *ensure that our future is secure. It gives the feel that we completing our responsibility and tends to provide an environment which is safe for upcoming generation.* The environmental considered PLM system supports the reuse; recycle of product and this tendency to control the consumption of natural resources. In traditional design approach product design it takes a long time and pass it to the process engineering and operational personals. The process design and ramp up of product generally take again a long time, Concurrent design reduces this development time in two ways. First the process design and testing being soon after product design begins. The modular design technique can be advantageous in ways, the product do not have to be specially designed for each version of-the module and the assembly process for different models and benefit of modularity is that combing several functions into a single module simplifies the testing. Mass customization aims to provide goods and services that meet particular customer requirements. Mass customization appreciate to give the consumers the product as per customer choice and at the time when, where and how they want it also at a price they can happily afford. The mass customization works as a tool to focus the customers. It provides the variety to the customer at low cost.

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A REVIEW ON A HIGH SPEED BINARY FLOATING POINT MULTIPLIER USING DADDA ALGRITHM IN FPGA

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Abstract— Floating Point (FP) Multiplication is widely used in large set of scientific and signal processing computation. Multiplication is one of the common arithmetic operations in these computations. Most of the DSP applications need floating point numbers multiplication. The possible ways to represent real numbers in binary format floating point numbers are; the IEEE 754 standard represents two floating point formats, Binary interchange format and Decimal interchange format. To improve speed multiplication of mantissa is done using specific multiplier replacing Carry Save Multiplier. To give more precision, rounding is not implemented for mantissa multiplication. The binary floating point multiplier is to be implementing using VHDL and it is simulated and synthesized by using Modelism and Xilinx ISE software respectively.

Keywords—Single Precision and double precision, Dadda Multiplier, Floating point, VHDL, FPGA, Digital signal processing, IEEE Standard 754.

INTRODUCTION

Floating point numbers are one possible way of representing real numbers in binary format; the IEEE 754 standard presents two different floating point formats, Binary interchange format and Decimal interchange format. Multiplying floating point numbers is a critical requirement for DSP applications involving large dynamic range. Floating-point implementation on FPGAs has been the interest of many researchers. FPGAs are increasingly being used in the high performance and scientific computing community to implement floating-point based hardware accelerators. FPGAs are generally slower than their application specific integrated circuit (ASIC) counterparts, as they can't handle as complex a design, and draw more power. However, they have several advantages such as a shorter time to market, ability to re-program in the field to fix bugs, and lower nonrecurring engineering cost costs. Vendors can sell cheaper, less flexible versions of their FPGAs which cannot be modified after the design is committed. The Development of these designs is made on regular FPGAs and then migrated into a fixed version that more resembles an ASIC.

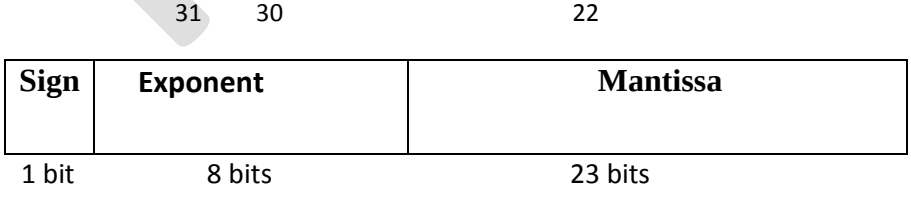


Fig1.Single Precision Floating point format

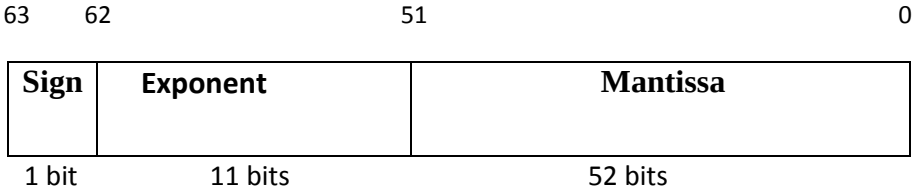


Fig2.Double Precision Floating point format

This paper presents a high speed binary floating point multiplier based on Dadda Algorithm. The coding is done for 32-bit single precision floating point multiplication using VHDL. Our method using Dadda method can have a great impaction improving the speed and reduce the area and power consumed by the Digital Signal Processors. The design achieves high speed with maximum frequency of 526 MHz compared to existing floating point multipliers. The floating point multiplier is developed to handle the underflow and overflow cases. To give more precision, rounding is not implemented for mantissa multiplication. The multiplier is implemented using VHDL. The multiplier is compared with Xilinx floating point multiplier core.

Double precision floating point numbers are 64-bit binary numbers. The 64-bits are divided into 3 parts- sign, exponent and mantissa. The 52 least significant bits (LSBs) are used to represent the mantissa of the number. The next 11-bits are used to represent the exponent of the number. The most significant bit (MSB) of the number is used as a sign bit to represent the sign of the number.

- Sign bit „0 "indicates positive number".
- Sign bit „1 "indicates negative number".

Most of the DSP applications need floating point numbers multiplication. The possible ways to represent real numbers in binary format floating point numbers are; the IEEE 754 standard represents two floating point formats, Binary interchange format and Decimal interchange format. Single precision normalized binary interchange format is implemented in this design. Representation of single precision binary format is shown in Figure 1; starting from MSB it has a one bit sign (S), an eight bit exponent (E), and a twenty three bit fraction (M or Mantissa). Adding an extra bit to the fraction to form and is defined as significand1. If the exponent is greater than 0 and smaller than 255, and there is 1 in the MSB of the significant then the number is said to be a normalized number.

LITERATURE REVIEW :

Various researches have been done to increase the performance on getting best and fast multiplication result on two floating point numbers. Some of which are listed below-

Addanki Puma Ramesh, A. V. N. Tilak, A.M.Prasad [1] the double precision floating point multiplier supports the LEEE-754 binary interchange format. The design achieved the increased operating frequency. The implemented design is verified with single precision floating point multiplier and Xilinx core, it provides high speed and supports double precision, which gives more accuracy compared to single precession. This design handles the overflow, underflow, and truncation rounding mode resp.

Itagi Mahi P and S. S. Kerur [2] ALU is one of the important components within a computer processor. It performs arithmetic functions like addition, subtraction, multiplication, division etc along with logical functions. Pipelining allows execution of multiple instructions simultaneously. Pipelined ALU gives better performance which will evaluated in terms of number of clock cycles required in performing each arithmetic operation. Floating point representation is based on IEEE standard 754. In this paper a pipelined Floating point Arithmetic unit has been designed to perform five arithmetic operations, addition, subtraction, multiplication, division and square root, on floating point numbers. IEEE 754 standard based floating point representation has been used. The unit has been coded in VHDL. The same arithmetic operations have also been simulated in Xilinx IP Core Generator.

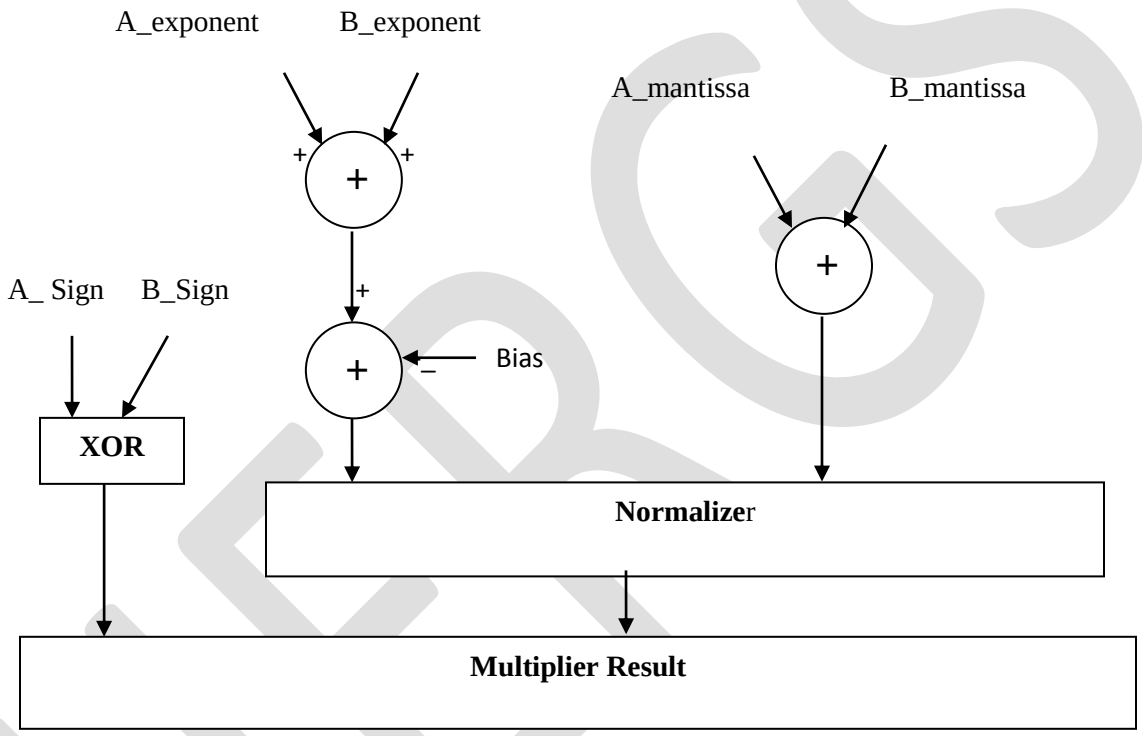
Remadevi R [3] Multiplying floating point numbers is a critical requirement for DSP applications involving large dynamic range. This paper presents design and simulation of a floating point multiplier that supports the IEEE 754-2008 binary interchange format, the proposed multiplier does not implement rounding and presents the significant multiplication result. It focuses only on single precision

normalized binary interchange format. It handles the overflow and underflow cases. Rounding is not implemented to give more precision when using the multiplier in a Multiply and Accumulate (MAC) unit.

Rakesh Babu, R. Saikiran and Sivanantham S [4] A method for fast floating point multiplication and the coding is done for 32-bit single precision floating point multiplication using Verilog and synthesized. A floating point multiplier is designed for the calculation of binary numbers represented in single precision IEEE format. In this implementation exceptions like infinity, zero, overflow are considered. In this implementation rounding methods like round to zero, round to positive infinity, round to negative infinity, round to even are considered. To analyse the working of our designed multiplier we designed a MAC unit and is tested. These results are compared with the previous work done by various authors.

PROPOSED WORK:

In this paper we implemented a double precision floating point multiplier with exceptions and rounding. Figure shows the multiplier structure that includes exponents addition, significant multiplication, and sign calculation.



The normalized floating point numbers have the form of

Z= (-1S) * 2 (E - *Bias*) * (1.M). The following algorithm is used to multiply two floating point numbers.

1. Significant multiplication; i.e. (1.M1*1.M2).
2. Placing the decimal point in the result.
3. Exponent's addition; i.e. (E1 + E2 - Bias).
4. Getting the sign; i.e. s1 xor s2.
5. Normalizing the result; i.e. obtaining 1 at the MSB of the results significant.
6. Rounding implementation.

7. Verifying for underflow/overflow occurrence.

Consider the following IEEE 754 single precision floating point numbers to perform the multiplication, but the number of mantissa bits is reduced for simplification. Here only 5 bits are considered while still considering one bit for normalized number.

Dadda proposed a sequence of matrix heights that are predetermined to give the minimum number of reduction stages. To reduce the N by N partial product matrix, dada multiplier develops a sequence of matrix heights that are found by working back from the final two-row matrix. In order to realize the minimum number of reduction stages, the height of each intermediate matrix is limited to the least integer that is no more than 1.5 times the height of its successor. The process of reduction for a dadda multiplier is developed using the following recursive algorithm.

1. Let d1=2 and dj+1 = [1.5*dj], where dj is the matrix height for the jth stage from the end. Find the smallest j such that at least one column of the original partial product matrix has more than dj bits.

2. In the jth stage from the end, employ (3, 2) and (2, 2) counter to obtain a reduced matrix with no more than dj bits in any column.

3. Let j = j-1 and repeat step 2 until a matrix with only two rows is generated.

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CONCLUSION

The main focus of this paper is to introduce a method for calculating the multiplication of two floating point numbers with comparatively lesser time. It describes an implementation of a floating point multiplier that supports the IEEE 754- 2008 binary interchange format. The multiplier is more precise and it presents the significant best multiplication result. It may be used applications such as digital signal processors, general purpose processors and controllers and hardware accelerators etc. The design achieves high speed with maximum frequency of 526 MHz compared to existing floating point multipliers. The floating point multiplier is developed to handle the underflow and overflow cases. The implemented design is also efficient in terms of device utilization **.**The idea proposed here may set path for future research in this direction. Future scope of research this is to reduce area requirements and can be extended to various fields of DSP.

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Fatigue Mechanical Life Design-A Review

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Abstract

Fatigue is due to cyclic loading and unloading of one kind or the other. It is due to the presence of discontinuities in the material. Mostly fatigue failure is progressive and plastic in nature. It is due to the nucleation, growth and propagation of a micro crack at the point of a discontinuity. There are materials having unlimited fatigue life (plain low carbon steels) as well as limited fatigue life (nonferrous as well as ferrous materials). Fatigue is mostly due to tensile stresses and is random as well as sudden without any warning. 90 % of the service failures are due to fatigue. Lot of work on fatigue failures has already been done and is still continued because of very complex nature of fatigue failures which result in loss of life and property. Fatigue failures thus must be avoided by a proper selection of material, surface finish, stress raisers, residual stresses, reliability, surrounding environment and temperature as per type the cyclic loading and unloading. Fatigue can be reduced by proper selection of fatigue resistant material like composites, by drilling a hole at the point of a probable crack, use of laser peeing and high frequency mechanical impact (HFMI) treatment of welds. Stress fatigue and strain fatigue life approaches have been used for plastic and elastic deformations respectively. This short review paper cannot treat the vast subject thoroughly and the reader is advised to consult more references for additional knowledge.

Keywords: Fatigue, endurance limit, discontinuity, fatigue life, cyclic loading and unloading, residual stresses, surface finish, reversal of stresses.

INTRODUCTION-

Under cyclic loading and unloading, failure is due to fatigue. Fatigue/endurance limit (σ_e) represents a stress level below which the material does not fail even after infinite number of cycles. Fatigue is reduction in strength due to a progressive and localized structural damage. Fatigue takes place in a moving component only such as automobiles on roads, ships at sea, aircraft wings and fuselages, nuclear reactors, jet engines, and turbines. Fatigue was initially recognized in early 1800 in Europe from the observed fact that bridge and railroad components were cracking subjected to repeated loading[1-10]. Three basic factors to cause fatigue are: (1) a sufficiently high tensile stress, (2) a large variation in the applied stress, and (3) a sufficiently large number of repetitions in loading and un-loading. The nominal maximum stress which causes fatigue is much less than the ultimate tensile strength of a brittle material and the yield stress of a ductile material. If the stress present is above a certain threshold value, microscopic cracks will start at the points of stress concentrations like a scratch, keyway, square holes or sharp corners. The crack then travels along weaker points and ultimately results in a fracture. Fatigue is thus a progressive plastic failure. This phenomenon occurs in three phases namely crack initiation, crack propagation catastrophic overload failure.There are two types of materials experiencing fatigue. One type which has a fixed endurance limit as plain low carbon steels. These steels do not undergo fatigue even for infinite life if the actual stress present in the component is slightly less than the fatigue limit. While other materials brittle or ductile which do not have a fixed fatigue limit (Cast iron, Copper, Aluminum and their alloys), these are designed for a fixed number of cycles 5 x 10^8(500 million cycles). If the component has 750 RPM with one reversal per cycle, it will have a life of about four years. If the RPM increases, life will reduce [1-16]. Thus importance of fatigue is that it directly governs the useful life of a component under cyclic loading. Lots of research has been carried on fatigue because number of well-known catastrophic fatigue failures which took place all over the world. Fatigue failures must be avoided by a proper selection of material, surface finish, stress raisers, residual stresses, reliability, surrounding environment and temperature as per type of cyclic loading and unloading. Salient features of fatigue include randomness and sudden failure without any warning, mostly due to tensile stress and the presence of a stress raiser, strongly affected by the surrounding environment, temperature, surface finish and residual stresses. Fatigue can be reduced by proper selection of fatigue resistant material like composites, drilling a hole at the point of a probable crack, use of laser peeing and use of high frequency mechanical impact (HFMI) treatment of welds. Out of different fatigue design approaches, stress life and strain life has been used for plastic and elastic deformations respectively [17-24].

LITERATURE STUDY

[i]. 1837: Wilhelm Albert published the first article on fatigue related to conveyor chains used in the Clausthal mines.
[ii]. 1839: Jean –Victor Poncelet described fatigue failure as metals being tired.

[iii]. 1842: William John Macquorn Rankine recognized the importance of stress concentrations of railroad axle failures. The Varsaillies train crash was caused by axle fatigue.

[iv]. 1843: Joseph Glynn reported fatigue failure due to a keyway.

[v]. 1848: The Railway Inspectorate reported fatigue failure due to a rivet hole in tire failure of railway carriage wheel.

[vi]. 1849: Eaton Hodgkinson is granted a "small sum of money" to report to the UK Parliament on his work in "ascertaining by direct experiment, the effects of continued changes of load upon iron structures and to what extent they could be loaded without danger to their ultimate security".

[vii]. 1854: Braithwaite reported on common service fatigue failures.

[viii]. 1860: Systematic fatigue testing undertaken by Sir William Fairbrain and August Wöhler.

[ix]. 1870: Wöhler summarised that cyclic stress range is more important than peak stress in railroad axle's failures and gave the concept of endurance limit.

[x]. 1903: Sir James Alfred Ewing demonstrated the origin of fatigue failure is microscopic cracks.

[xi]. 1910: O.H.Basquin proposed a log-log relationship for S-N curves, using Wöhler's experimental data.

[xii]. 1954: The world first disaster de Havilland Comet of three planes breaks up in mid-air caused replacement of square apertures like windows with oval ones.

[xiii]. 1954: L.F.Coffin and S.S.Manson explained fatigue crack-growth as plastic deformation.

[xiv]. 1961: P.C.Paris proposed the methods for predicting the rate of growth of individual fatigue cracks under cyclic loading and unloading.

[xv]. 1968: Tatsuo Endo and M.Matsuishi devised the rainflow-counting algorithm and applied Miner's rule to random loadings.

NOTABLE FATIGUE FAILURES

1. Versailles train disaster

A train returning to Paris crashed in May 1842 by breaking of a leading locomotive axle which was found to be due to stress concentration. At least 55 passengers were killed.

2. The 1862 Hartley Colliery Disaster was caused by the fatigue fracture of a steam engine beam and killed 220 people.

3. De Havilland Comet crash

Two de Havilland Comet passenger jets crashed in mid-air killing all persons and the failure was caused by fatigue due to the repeated pressurization and de-pressurization of the aircraft cabin.

4. Alexander L. Kielland oil platform capsizing

The Alexander L.Kielland, a Norwegian semi-submersible drilling rig capsized (1980) killing 123 people. The investigations concluded that the rig collapsed owing to a fatigue crack in one of its six bracings.

5. The 1919 Great Molasses Flood, the 1948 Northwest Airlines Flight 421 crash, the 1957 of Philippine President aircraft crash, the 1965 capsize of UK's first offshore oil plateform, the 1968 Los Angles Airways Flight 417 crash, the 1968 MacRobertson Miller Airlines Flight 1750 crash, the 1977 Dan-Air Boeing 707 crash, the 1980 Lot Flight 7 crash, the 1985 Japan Airlines Flight 123 crash, the 1988 Aloha Airlines Flight 243 crash, the 1989 United Airlines Flight 232 crash, the 1992 EI AI Flight 1862 crash, the 1998 Eschede train disaster, the 2000 Hatfield rail crash, the 2002 China Airlines Flight 611, the 2005 Chalk's Ocean Airways Flight 101 and the 2009 Viareggio train derailment were all due to fatigue failure in one part or the other. There are many more to quote.

FATIGUE MECHANICAL LIFE

There are various types of mechanical failures. Some of these are buckling, corrosion, creep, fatigue, fracture, impact, wear, yielding and mechanical overload. However 90 % of the service failures are due to fatigue alone of one or the other type. Fatigue failure is thus the most important. It is due to any one of the following cyclic loadings:

DIFFERENT TYPES OF CYCLIC LOADINGS CAUSING FATIGUE

(i) Tensile load increases from zero to maximum and then back to zero
(ii) Compressive load increases from zero to maximum and then back to zero
(iii) Shear load increases from zero to maximum and then back to zero

(iv) Tensile load increases from zero to maximum and then back to zero, then to maximum compressive and back to zero (like a vibratory load), maximum tensile being equal to maximum compressive
(v) Tensile load increases from zero to maximum and then back to zero, then to maximum compressive and back to zero (like a vibratory load, completely or partially reversible load), maximum tensile is not equal to maximum compressive
(vi) Completely or partially reversible torsion load
Thus the cyclic loads can be static, repeated and reversed, fluctuating and shock or impact.

FACTORS AFFECTING ENDURANCE LIMIT

Endurance limit 'σ_e' depends on the following factors:

(i) Surface factor, k_a
(ii) Size factor, k_b (considered only for bending and torsion loads)
(iii) Load factor k_c
(iv) Temperature factor k_d
(v) Reliability factor, k_e
(vi) Factor of safety, k_f

CAUSES OF FATIGUE FAILURES

1) A high tensile stress
2) A large variation in the applied stress
3) A large number of cyclic repeated cycles
4) Stress concentration
5) Overloading
6) Residual stresses
7) Complex or Combined stresses
8) Corrosion
9) Working as well as surrounding environment
10) Type of cyclic loading/stress
11) Notch sensitivity
12) Grain size
13) Type of material
14) Surface finish
15) Types and distribution of internal defects
16) Environmental conditions

Each parameter reduces the life under fatigue.

DIFFERENT PHASES IN FATIGUE

Fatigue phenomenon is a progressive plastic failure and takes place in four steps.

1) Crack nucleation at the points of high local stress due to a geometric stress raiser, flaws and pre-existing crack
2) Stage I Crack-growth due to repeated plastic deformation
3) Stage II Crack Growth
4) Ultimate sudden ductile failure when the section becomes sufficiently weaker

FATIGUE SALIENT FEATURES

(i) All fatigue failures originate at the surface of a part.
(ii) Compressive residual stresses increases resistance to fatigue failure.
(iii) Cold working also increases resistance to fatigue failure

(iv) Plain low carbon steels exhibit a theoretical endurance limit below which no fatigue failure can ever occur.
(v) Fatigue is a cumulative effect due to the slow movement of a micro crack inside the material.
(vi) In majority of the cases, starting of the crack is due to tensile stress but in few cases only, it can due to other stresses also.
(vii) Fatigue depends on the type, size and orientation of discontinuities like scratch, hole, dent, sudden change of cross section and a keyway. All these cause stress concentration which give rise to the birth of a micro-crack.
(viii) Because of so many affecting factors, fatigue is random in nature.
(ix) Fatigue failure strongly depends on parameters like temperature, surface finish, microstructure and surrounding corrosive atmosphere.
(x) Fatigue life is less at higher stress and vice versa.
(xi) Fatigue life is infinite for low plain carbon steels.
(xii) Fatigue life is less for brittle materials.
(xiii) Fatigue failure is catastrophic, very suddenly and without any warning
(xiv) Fatigue failure strongly depends on parameters like temperature, surface finish, microstructure and surrounding corrosive atmosphere.
(xv) Fatigue life is less at higher stress and vice versa.
(xvi) Fatigue life is infinite for low plain carbon steels.
(xvii) Fatigue life is less for brittle materials.
(xviii) Fatigue failure is catastrophic, very suddenly and without any warning
(xix) Fatigue failure is like a brittle fracture.

PRACTICAL APPLICATIONS OF FATIGUE FAILURES

[i]. Shafts, buckets, disks and blades of jet engines
[ii]. Crank shafts of ground vehicles
[iii]. Gears used in ground vehicles, mining equipment and marine equipment
[iv]. Compression springs n ground automobiles
[v]. Anything or everything in motion under cyclic loading of one kind or the other.
[vi]. Low amplitude and high cycle loading is the common cause for fatigue as in jet engines Vanes, Spacers, Disks, Blades and Sheet metal work.
[vii]. Compressors, pumps, turbines and bridges

STEPS TO REDUCE FATIGUE

[i]. Drill a hole at the point of a probable crack.
[ii]. Use a fatigue resistant material like composites.
[iii]. Use of a laser peening
[iv]. Use high frequency mechanical impact (HFMI) treatment of welds

PRINCIPAL CONSIDERATIONS IN DESIGN AGAINST FATIGUE

Durable and Dependable design against fatigue-failure requires thorough deep knowledge as well as practical experience. Thus while designing for fatigue, it is important to know which loads are frequent, which are occasional, and which are exceptional. Past experience is very helpful in this determination. Fatigue is found in every sphere of life. There are a few important principal considerations in fatigue design

1. Design to keep design stress below threshold of endurance limit.
2. Design to select materials free from discontinuities.
3. Design to shape free of stress raisers.
4. Design for a limited safe life say for 5/10 years.
5. Predict the fatigue life based on fatigue crack growth rates for a crack of a certain size.
6. Check design on the basis of strength, stiffness, stability, wear and also with the various theories of elastic failures before manufacturing the part.

CONCLUSION

1) Fatigue behavior is based on many factors which are random in nature.
2) Fatigue design is closely related to the geometrical shape and the dimensions, quality of the fabrication as well as the type and size of acceptable defects.

3) The designer should be skillful to do fatigue load analysis in detail to know the stress strain behavior in actual use.
4) Designer should also be knowledgeable and experienced to interpret main factors affecting fatigue resistance.
5) Selection of the material of construction should be after considering all possible considerations affecting fatigue.
6) The designer must then select the proper fatigue strength curve as per details of use of the component.
7) Fatigue life selection should be done with utmost care.
8) Design should be based analytical research, experimental findings and experience.
9) Before designing, various codes and standards available such as AASHTO for steel bridges, ASTM fatigue and fracture standards, FEM analysis of welded joints must be consulted
10) Design should be checked for failure on the basis of strength, stiffness, stability, wear and also with the various theories of elastic failures as applicable to the selected material of construction.

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