

SIMPLE SURVEILLANCE STRUCTURE USING PIR SENSOR NETWORK AND GSM

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ABSTRACT

Surveillance is most main security systems in house, industrial, office and public places. In this security system is based on the embedded system along with GSM and sensor networks. The human movement is detect using the PIR sensors. In this time, the system triggers an alarm detecting the presence of person in a specific interval of time and simultaneously sends the how many persons are intruder via message to the SMS through GSM Modem. When the security scheme is activated, the CCTV camera is activated. This highly reactive approach has low computational condition. Therefore it is well suited for home surveillance system. This surveillance security system implemented using PIC micro controller, camera, GSM and Sensors.

Key words: PIR Sensor; GSM; PIC microcontroller; Camera.

I INTRODUCTION

Surveillance is most essential field in security system. Surveillance is the monitoring of the behavior, actions, or other changing information, usually of people for the purpose of influencing, running, directing, or protecting them. surveillance systems are normally used in home, office, factory or vehicle monitoring and image recognition, but this system requires a high performance center, which works against some advantages of embedded systems, such as low power consumption and low cost. Surveillance is very useful to governments and law execution to keep social control, recognize and monitor threats, and prevent/investigate wrong activities.

Home/office security systems have grown in popularity in recent years, a home/office owner's look for ways to defend their personal space and improve their home values. It is necessary for every home owner to allowing for adding up a home security system, as burglaries, thefts and murders have become everyday in big cities.

PIR sensor are low cost security system for house applications in which Passive Infrared (PIR) sensor has been implemented to sense the movement of human through the detection of infrared radiation from that human body. PIR device does not emit an infrared radiation but passively accepts incoming infrared radiation. PIR sensor notice the presence of human in the home and generates signal which is read by the microcontroller. According to the signal received by microcontroller, a call is acknowledged to mobile station through a GSM modem and thus alert the presence of human in the home to owner-occupier.

Designed an advanced GSM based electronic security system for home applications using infra red progress detectors and RISC based Micro controller using embedded C language. Infra red motion detectors will sense any

intruder with 10 feet and alert the Owner of house or police control room by sending SMS through GSM modem about the intruder.

II EXISTING SYSTEM

2.1 Video Cameras

Security and crime control concerns are the motivating factors for the process of video supervision cameras. Closed-circuit television (CCTV) is the utilize of video cameras to transmit a signal to a specific place, on a limited set of monitors. This performance just uses the cameras to do surveillance. It needs a command and control center to monitor all the tricks using cameras. All the cameras are connected to the command center and send their data directly to the central location. All the behavior which is happening in the association or inside the building can be viewed live from the command center.

2.2 RFID

Radio Frequency Identification (RFID) use radio waves to robotically identify human being or objects. There are many methods of recognition, but the most general is to store a unique serial number that identifies a human or object on a microchip that is attached to an antenna. The combined antenna and microchip are called an "RFID transponder" or "RFID tag" and work in mixture with an "RFID reader". An RFID system consists of a reader and one or more tags. The reader's receiver is used to broadcast radio frequency (RF) energy. Depending on the tag type, the force is "harvested" by the tag's antenna and used to power up the interior circuitry of the tag. The tag will then adapt the electromagnetic waves generated by the reader in classify to transmit its data back to the reader. The reader receives the modulated waves and converts them into digital data. In the case of the Parallax RFID Reader Module, correctly received digital data is sent serially through the SOUT pin.

III PROPOSED METHOD

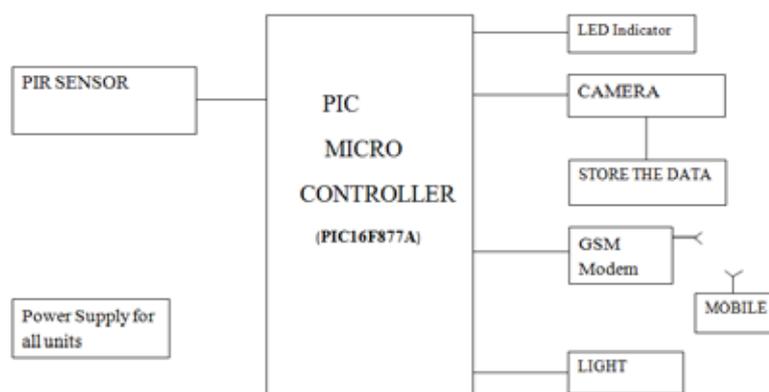


Fig 3.1 System Architecture

In this proposed system, the home based simple surveillance structure which evaluates the improvement of a very Low-cost security system using PIR (Pyroelectric Infrared) sensors and video cameras built in the region of the PIC(Peripheral Interface Controller) microcontroller. The person progress is detected using the PIR sensors. In this time, the system triggers an alarm detecting the attendance of unauthorized person in a detailed interval of time and concurrently send a message to the SMS through GSM Modem. When the security system is activated, the CCTV camera is activated. This highly reactive approach has low computational requirement. Therefore it is well suited for home surveillance system.

IV HARDWARE SPECIFICATIONS

4.1 PIR Sensor

A Pyroelectric Infrared Sensor (PIR sensor) is an electronic sensor, in that type of sensor actions the infrared (IR) light glowing from objects or human in its field of view. the normal sensor release the radiation but in this sensor detect the radiation .

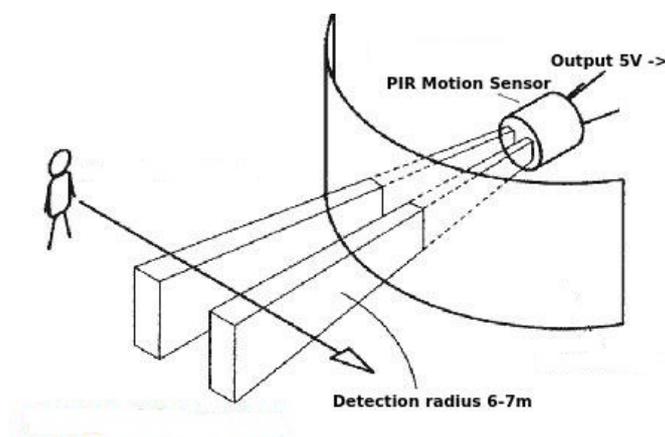


Fig 4.1 PIRSensor

All the objects with a temperature above absolute zero release warmth energy in the form of radiation. Usually this radiation is not observable by person eye because it radiates at infrared wavelengths, but in this infrared can be detected by electronic devices considered for detecting the human movement.

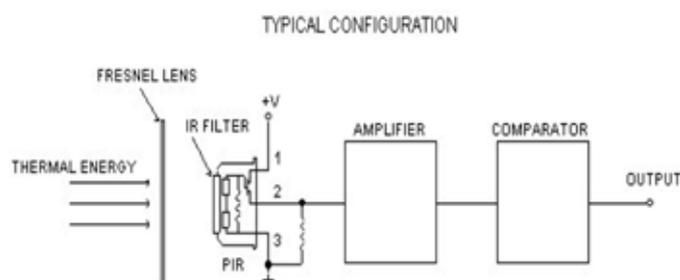


Fig 4.2 Internal structure of PIR

The PIR Sensor has a range of approximately 20 feet (6 meters). The sensor is considered to identify the gradually changing situation that would happen normally as the daily progresses and the environmental situation changes, but it responds by creation its output when sudden changes happen, such as when there is motion. This device is

considered mostly for internal use. Operation outside or in very high temperatures may affect constancy negatively. Due to the high compassion of PIR sensor device, it is not suggested to use the some situation like rapid environmental changes and strong shock or vibration. and also in not functioning in direct sun light or direct wind from a heater or air condition.

Pin	Name	Function
-	GND	Connects to Ground or Vss
+	V+	Connects to Vdd (3.3V to 5V) @ ~100uA
OUT	Output	Connects to an I/O pin set to INPUT mode (or transistor/MOSFET)

TABLE1. Pin representaion of PIR sensor

4.2 PIC Microcontroller

PIC is a family of adapted Harvard architecture microcontroller made by Microchip technology, derived from the PIC1650 originally developed by General Instrument’s Microelectronics Division. The name PIC is referred to as "Peripheral Interface Controller". PICs are popular with both industrial developers and hobbyists due to their low cost, wide availability, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.

Microchip introduced the new PIC32MX family of 32-bit microcontrollers operates at 2.3V to 3.6V supply voltage with 80 MHz frequency. The initial device line-up is based on the industry standard MIPS32 M4K Core. The device can be planned using the Microchip MPLAB C Compiler for PIC32 MCUs.

PIC microcontroller is the first RISC based microcontroller made-up in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory. The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with a small pin count.

TABLE 2. Various PIC Microcontrollers

PIC MCU device	PIC MCU No. of Pins	PIC MCU Flash memory
12F675	8	1k
16F88	18	4K
16F877A	40	8K

The main benefit of CMOS is that it has resistance to noise than other fabrication techniques. Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most freshly urbanized. Technology that is used in pic16F877 is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877.

4.3 GSM

The GSM stands for Global System for Mobile Communications. In this technology is used to the communication purpose; it operates at a baud rate of 9600bps in standard UART model through AT Commands. This GSM Modem can recognize any of the 2G or 3G network operator SIM card and act like as cellular phone with its unique phone number. Advantage of using this GSM modem will be that it can use RS232 port to communicate and develop embedded safety applications or any other applications.

This modem used to SMS Control, data transfer, remote control and logging can be developed easily. The modem can either be associated to PC serial port directly or microcontroller. It can be mainly used to send and receive SMS or make/receive voice calls. This GSM modem is a highly flexible for plug and play quad band GSM modem for direct and easy integration to RS232 applications.

AT commands are also noted as Hayes AT commands. There are numerous views to know the meanings of "AT". Some call it "Attention telephone", whereas others recognize as "Attention Terminal" commands. AT commands giving instructions to both cell phone and normal landline telephones. The AT commands are sent to the phone's modem, which can be a GSM modem or PC modem. Different creator may have different sets of AT commands. Luckily, many AT commands are the similar commands. Mobile phone manufactures may also provide with attention to operators to allow or not to allow some commands on phones. List of AT commands are listed in TABLE 3.

TABLE 3. AT commands

AT command	Meaning
AT+CMGS	Send message
AT +CMSS	Send message from storage
AT +CMGW	Write message to memory
AT +CMGD	Delete message
AT +CMGC	Send command
AT +CMMS	More messages to send

4.4 CCTV camera

Closed-circuit television (CCTV) is the use of video cameras to broadcast a signal to a specific place, on a incomplete set of monitors. It differs from broadcast television in that the signal is not openly transmit, though it may employ point to point (P2P), point to multipoint, or mesh wireless links.

4.5 Keypad

Keypad is used for multiple purpose .It can be use for routine time setting, manual time setting ,opening and deactivation of sensors at particular interval of time.

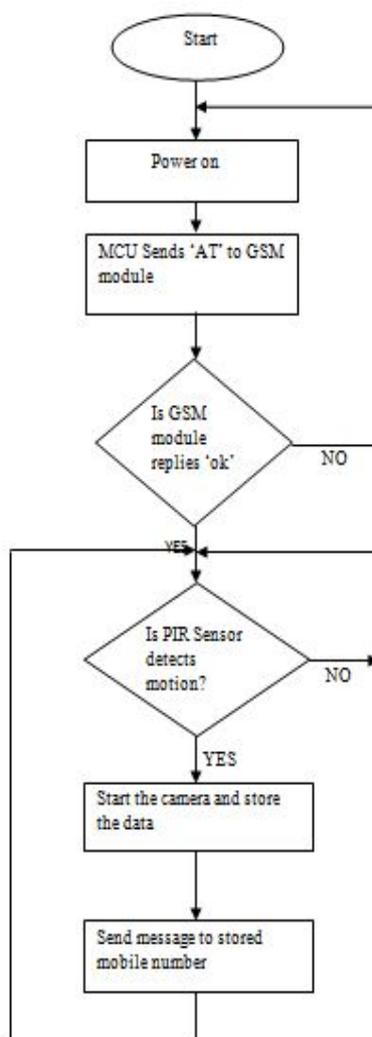


Fig 4.1 Flowchart Representation

V CONCLUSION

In this surveillance security scheme PIR sensor has been used which is low power, and low cost. It have a wide lens range, and are simple to interface with microcontroller. This security scheme can be implemented in places like home, office, shop etc. The sensitivity range for detecting motion of this system is 3to 4 feet. It can be raised up to 20 feet through careful using the concentrating optical lenses as future development. In addition to this, this system can be prepared with glass fracture detectors to enhance the level of protection. Use of multi-sensor data fusion and difficult algorithm can be used to increase the effective FOV for larger spaces. In order to enhance the location accuracy and to improve the method of processing the PIR sensor signal, use of more advanced techniques such as probabilistic theories.

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EFFICIENCY ENHANCEMENT OF CLUSTER STABILITY AND ENERGY CONSUMPTION IN THE CLUSTERING ALGORITHMS

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ABSTRACT

Ad Hoc network is a collection of wireless mobile hosts forming a temporary network without the aid of any centralized administration, in which individual nodes cooperate by forwarding packets to each other to allow nodes to communicate beyond direct wireless transmission range. The main focal point of the work is to enhance Weighted Clustering Algorithm (WCA) and other similar algorithms like Weighted based hierarchical clustering algorithm, An On-Demand Weighted Clustering Algorithm. The node degree is considered as an important weight metric in cluster head selection process. Regrettably this metric is not steady especially when it is considered separately at the node environment such as the neighbors' location within the transmission range zone of this node. To overcome this inefficiency, two new models node degree aggregation model and range zone aggregation model are going to propose. Thereafter these two models are combined to gain their efficiencies. The new combined model motivates to generate and reformulate many node degree based formula given in literature and dealing with Quality of Clustering (QoS) as stability and load balancing clustering parameters. Then the models will show that it outperforms WCA in the in terms of cluster formation and stability.

Keywords— Mobile Ad Hoc Networks, Clustering, Gateway, Cluster Head Election, Node Degree.

I INTRODUCTION

Ad hoc networks are wireless, infrastructure less, multi-hop, dynamic networks established by a collection of mobile nodes. The network is ad hoc because it does not rely on a pre existing infrastructure, such as routers in wired networks or access points in managed (infrastructure) wireless networks. There are no base stations or mobile switching centers in an ad hoc network. Since, there is no fixed infrastructure; a wireless ad hoc network can be deployed quickly. Thus, such networks can be used in situations where either there is no wireless communication infrastructure or situation where such infrastructure cannot be used because of security, cost or safety reasons.

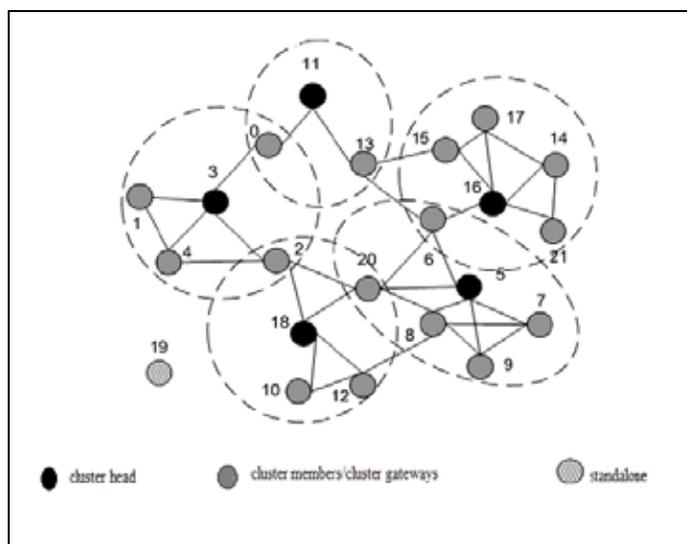
Ad-hoc networks are mainly used for military applications. Since then, they have become increasingly more popular within the computing industry. Applications include emergency search and rescue operations, deployment of sensors, conferences, exhibitions, virtual classrooms and operations in environments

In Ad hoc networks nodes within the transmission range can communicate directly with each other. Nodes outside the transmission range must communicate indirectly using a multi hop routing protocol. Instead of that many clustering schemes have been proposed to organize the manet into a hierarchy with a view to improve the efficiency of routing .clustering is defined

as a way to reconfigure all nodes into small virtual groups according to their regional vicinity. Cluster structure consist of three kinds of nodes namely cluster head, cluster members (ordinary node) and gateway nodes

The major issues in cluster based MANETs are topology management, mobility management, overhead of cluster head and frequent leader re-election. There are no stationary nodes or base stations, each node in the network act as the router that forwards the packet to other nodes. Due to the node heterogeneity, nodes will have highly variable amount of resources and this produces the hierarchy in their roles inside the networks. Cluster heads are analogous to the base station concept in current cellular systems. Electing the leader for a cluster is very important but sophisticated job. The factors like location of the node, mobility, energy and throughput are considered in electing the cluster head. Communication done with the node in the other cluster can be done through gateways. Gateways are nodes that can hear two or more cluster heads.

Gateway nodes are located at edge or boundary of the cluster which listen to transmissions from another cluster's node. Ordinary nodes send the packets to their cluster head that either distributes the packets inside the cluster, or (if the destination is outside the cluster) forwards them to a gateway node to be delivered to the other clusters. By replacing the nodes with clusters, existing routing protocols can be directly applied to the network. Only gateways and cluster heads Participate in the propagation of routing control/update messages. In dense networks this significantly reduces the Routing overhead, thus solving scalability problems for routing algorithms in large ad hoc networks.



1.1 Clustering In Manet

A successful approach for dealing with the maintenance of mobile ad hoc networks is by partitioning the network into clusters. In this way the network becomes more manageable. It must be clear though that a clustering technique is not a routing protocol. Clustering is a method which aggregates nodes into groups. These groups are contained by the network and they are known as clusters. A cluster is basically a subset of nodes of the network that satisfies a certain property. Clusters are analogous to cells in a cellular network. However, the cluster organization of an ad hoc network cannot be achieved offline as in fixed networks.

Clustering presents several advantages for the medium access layer and the network layer in MANET. The implementation of clustering schemes allows a better performance of the protocols for the Medium Access Control

(MAC) layer by improving spatial reuse, throughput, scalability and power consumption. On the other hand, layer by reducing the size of the routing tables and by decreasing transmission overhead due to the update of routing tables after topological changes occur.

Clustering helps aggregate topology information since the number of nodes of a cluster is smaller than the number of nodes of the entire network. Therefore, each node only needs to store a fraction of the total network routing information. The purpose of a clustering algorithm is to produce and maintain a connected cluster. In most clustering techniques nodes are selected to play different roles according to a certain criteria. In general, three types of nodes are defined clustering helps improve routing at the network

1.1.1 Ordinary Nodes

Ordinary nodes are members of a cluster which do not have neighbors belonging to a different cluster.

1.1.2 Gateway Nodes

Gateway nodes are nodes in a non-cluster head state located at the periphery of a cluster. These types of nodes are called gateways because they are able to listen to transmissions from another node which is in a different cluster. To accomplish this, a gateway node must have at least one neighbor that is a member of another cluster.

1.1.3 Cluster-heads

Most clustering approaches for mobile ad hoc networks select a subset of nodes in order to form a network backbone that supports control functions. A set of the selected nodes are called cluster heads and each node in the network is associated with one. Cluster heads are connected with one another directly or through gateway nodes. The union of gateway nodes and cluster heads form a connected backbone.

1.1.4 Why do ad hoc networks require clustering?

It has been shown that cluster architecture guarantees basic performance achievement in a MANET with a large number of mobile terminals. A cluster structure, as an effective topology control means, provides at least three benefits.

First, a cluster structure facilitates the spatial reuse of resources to increase the system capacity. With the non-overlapping multi cluster structure, two clusters may deploy the same frequency or code set if they are not neighboring clusters. Also, a cluster can better coordinate its transmission events with the help of a special mobile node, such as a cluster head, residing in it. This can save much resources used for retransmission resulting from reduced transmission collision.

The second benefit is in routing, because the set of cluster heads and cluster gateways can normally form a virtual backbone for inter-cluster routing, and thus the generation and spreading of routing information can be restricted in this set of nodes. Last, a cluster structure makes an ad hoc network appear smaller and more stable in the view of each mobile terminal. When a mobile node changes its attaching cluster, only mobile nodes residing in the

corresponding clusters need to update the information. Thus, local changes need not be seen and updated by the entire network, and information processed and stored by each mobile node is greatly reduced.

II RELATED WORK

Several heuristics have been proposed to choose cluster heads in an adhoc network.

2.1 Lowest-ID Clustering Algorithm (LIC)

The node with the minimum ID is chosen to be a cluster head. Major drawbacks of this algorithm are its bias towards nodes with smaller ids which may lead to the battery drainage of certain nodes, and it does not attempt to balance the load uniformly across all the nodes.

2.2 Highest Connectivity Clustering Algorithm (HCC)

This algorithm is also known as connectivity-based clustering algorithm. Each and every node will broadcast its ID to the neighbor nodes within its transmission range. The degree for each node is calculated and the node that contains the maximum number of neighbors is selected as the cluster head. Disadvantages are there will be lower throughputs when the degree of the node increases

2.3 Weighted Clustering Algorithm (WCA)

The weighted clustering algorithm (WCA) is based on the use of a combined weight metric. i.e., the number of neighbors, distance with all neighbors, mobility and cumulative time for which the node acts as the cluster head. The weight values are broadcast by each node and so each node knows the weight values of all other nodes and other cluster heads in the system.

2.4 An On-Demand Weighted Clustering Algorithm (WCA) for Ad hoc Network

In this work, a weighted clustering algorithm (WCA) is presented which takes into consideration the number of nodes a cluster head can handle ideally (without any severe degradation of the system performance), transmission power, mobility and battery power of the nodes. Most of the existing clustering algorithms are invoked periodically but this algorithm is not periodic. Its invocation is adaptive based on the mobility of the nodes. More precisely, the election procedure is delayed as long as possible to reduce the computation cost. Frequent updates result in high information exchange among the nodes resulting in high communication overhead. The algorithm is executed only when there is a need, i.e., when a node is no longer able to attach itself to any of the existing cluster heads. This algorithm performs significantly better than both of the Highest- Degree and the Lowest-ID heuristics.

2.5 Distributed Clustering for Ad Hoc Networks

Distributed Clustering Algorithm (DCA) is presented that generalizes the previous approaches by allowing the choice of the cluster heads based on a generic weight associated to each node: The bigger the weight of a node, the better that node for the role of cluster head.

III EXISTING SYSTEM

In the existing system, a weight based distributed clustering algorithm (WCA) is presented which can dynamically adapt itself with the ever changing topology of ad hoc networks is proposed. In this approach, the number of nodes is restricted to be catered by a CH, so that it does not degrade the MAC functioning. It also has the flexibility of assigning different weights and takes into account a combined effect of the ideal degree, transmission power, and mobility and battery power of the nodes. The cluster head selection problem is considered in wireless ad-hoc networks where it is necessary to provide robustness in the face of topological changes caused by node motion, node failure and node insertion or removal. The main contribution of this work is a new strategy for clustering a wireless AD HOC network and improvements in WCA and other similar algorithms. Some analytical models are derived and thereafter some clustering schemes. This contribution also extends previous works in providing some properties and analyses of Quality of Clustering (*QoC*) in ADHOC.

The main drawbacks of the system are

- less energy efficient
- less accuracy of cluster head selection
- less stability

IV PROPOSED SYSTEM

In the proposed system, an innovative technique is introduced which is called Enhanced Quality of Clustering (EQoC) for reducing the energy consumption. Cluster Head (CH) election is the process to select a node within the cluster as a leader node. Cluster Head maintains the information related to its cluster. This information includes a list of nodes in the cluster and the path to every node.

The contributions of this work are:

- (1) In this method, instead of reelecting cluster head the current cluster head assigns the cluster head before its going to dead so that the re-clustering is reduced ,energy is save by reducing re-cluster. If the new cluster head is elected the current cluster head provides their backup details to that new cluster head. The backup details include considering the number of clusters and number of cluster heads within the transmission range of the non cluster head sensor nodes in their clusters.
- (2) Suppose, if the two nodes having same value the centre of the node is elected as cluster head. Suppose, if it is in the cluster edge check with the nearest cluster. Suppose, if it is in the cluster edge check with the nearest cluster.

By using this enhanced quality-of-clustering method, the high amount of energy is saved.

4.1 NQCA : node quality based cluster algorithm

A combined weight clustering algorithm is used to establish a stable clustering architecture in the proposed system. The proposed algorithm and it has a hierarchical structure that can maintain the topology of MANET as stable as possible. Thereby optimizing network performance and making efficient resource allocation for nodes. This makes it

possible to maintain efficient and stable topology in MANET environment. In this algorithm, the node with the highest fitness is elected as the CH. In the proposed algorithm, due to the weight metric, cluster creation is done very quickly which causes network services to be more accessible. The CH is selected efficiently based on these factors like high transmission power, transmission range, distance mobility, battery power and energy. Since the CH will not be changed dynamically, the average number of cluster formations will be reduced.

The NQCA algorithm that effectively combines parameters degree, transmission power, and mobility and battery power of the nodes with certain weighting factors according to the system needs. The flexibility of changing the weight factors helps apply this algorithm to various networks. The output of CH election procedure will be a set of nodes called the dominant set. The CH election procedure is invoked at the time of system activation and also when the current dominant set is unable to cover all the nodes. Every invocation of the election algorithm does not necessarily mean that all the CHs in the previous dominant set are replaced with the new ones. If a node detaches itself from its current CH and attaches to another CH, then the involved CHs update their member list instead of invoking the election algorithm.

NQCA structure

This algorithm is composed of two parts

- i) CH selection
- ii) Cluster member grouping

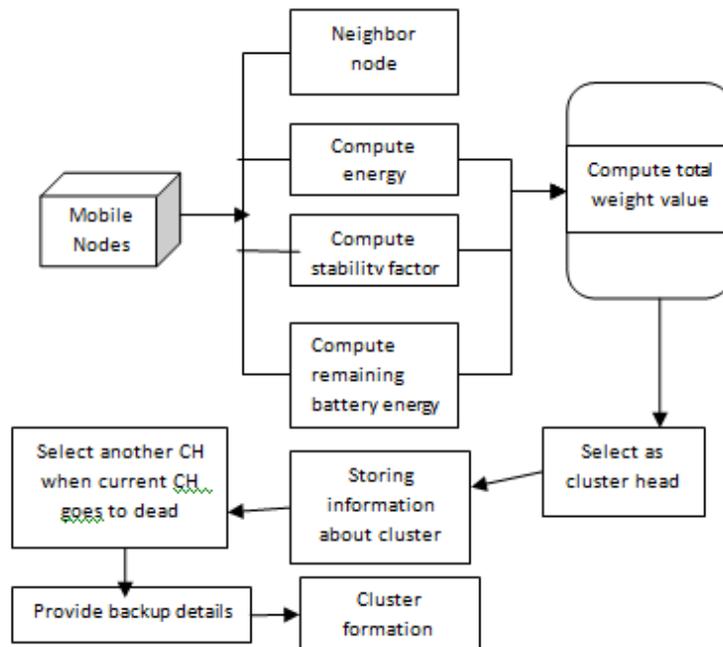


Fig 4.1 Block diagram for proposed system

4.1.1 CH selection:

4.1.1.1 Node priority aggregation model:

CH selection process priorities to the nodes based on their degree in this order: priority of strong node > priority of weak node > priority of border node. For this purpose, introduce the node type indicator (ntype), which is calculated as follows:

$$ntype(v_i) = \begin{cases} 1, & \deg(v_i) \geq 3 \quad (SN: \text{strong node}) \\ 2, & \deg(v_i) = 2 \quad (WN: \text{weak node}) \\ 3, & \deg(v_i) = 1 \quad (BN: \text{border node}) \end{cases}$$

4.1.1.2 Range zone aggregation model

The first two zones contain trusted neighbors whose neighborhood is guaranteed for a well-defined period. However, the other neighbor nodes, which are situated in the *risked zone*, are considered as topologically unfavorable (not trusted) nodes because they can be assumed to leave the partition earlier than trusted nodes. To give higher priority to trusted nodes and less priority to not trusted nodes during the CH selection processes

4.1.2 Cluster member grouping

This stage constitutes the final step of NQCA algorithm and represents the construction of the cluster members' set. Each CH defines its neighbors at two hops maximum, which form the members of the cluster. In the following step, each CH stores all information about its members, and all nodes record the CH identifier.

- **Node quality**

"The node quality" is calculated as follows:

$$ndq(v_i) = comind(v_i) \times deg(v_i)$$

- **Clustering stability enhancement**

Despite the node mobility in MANETs, the cluster structure should be kept as stable as possible. Otherwise, frequent cluster change or re-clustering adversely affects the performance of radio resource allocation and scheduling protocols. By stability, it means that the cluster structure remains unchanged for a given reasonable time period. Stability factor for each node as follows:

$$STF(v_i) = ZD(v_i) / ndq(v_i)$$

- **Energy consumption**

In Adhoc network known that more power is required to communicate to a larger distance. Therefore, they evaluate the energy consumption. For this purpose every node, compute the sum of the distances with its neighbors

$$D(v_i) = \sum_{j=1}^n dis(v_i, v_j)$$

- **Remaining battery energy**

The weakness in WCA is computing the cumulative time during which a node acts as a CH. This cannot guarantee a good assessment of energy consumption because data communication consumes a large amount of energy and varies greatly from node to node. Each mobile node can easily estimate its remaining battery energy (RBE). A node with longer remaining battery lifetime is a better choice for a CH.

- **Combined Weight**

$$W(v_i) = w_1 ZD(v_i) + w_2 RBE(v_i) + w_3 STF(v_i) + w_4 \beta(v_i)$$

V SIMULATION RESULTS

In the table the parameters of the simulation are presented. Each node is randomly distributed in 1000x1000m physical area. Number of nodes was change from 10 to 80 in steps of 10. Weight parameters are equal: W1 = 0.25 for degree of the node, W2 = 0.35 for received power level, W3 = 0.20 for the stationary factor and W4 = 0.20 for the battery level. The simulation time was the same for all scenarios and equal 170 s.

Parameter	Value
network area	1000 x 1000 m
number of nodes	20 – 80
transmission range	160 – 240 m
simulation time	170 s
speed	0 – 10 m/s
weight 1	0.25
weight 2	0.35

Performance Metrics

To performance evaluation of the algorithm, four metrics will be observed:

- The average number of created clusters versus transmission range,
- The average number of created clusters versus number of nodes,

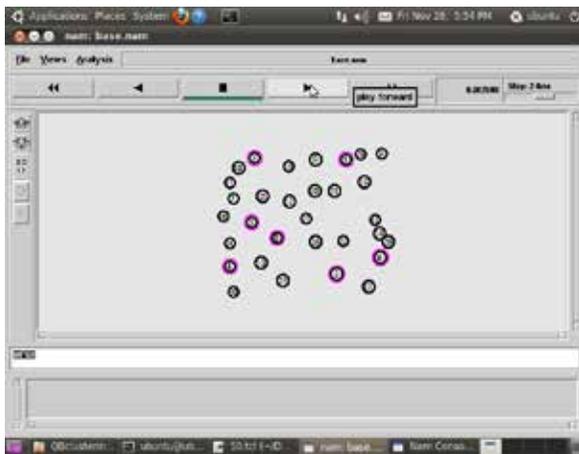


Fig 5.1 cluster head formation

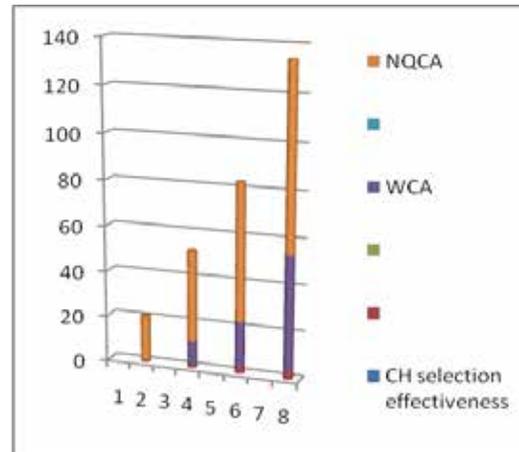


Fig 5.2 CH selection effectiveness

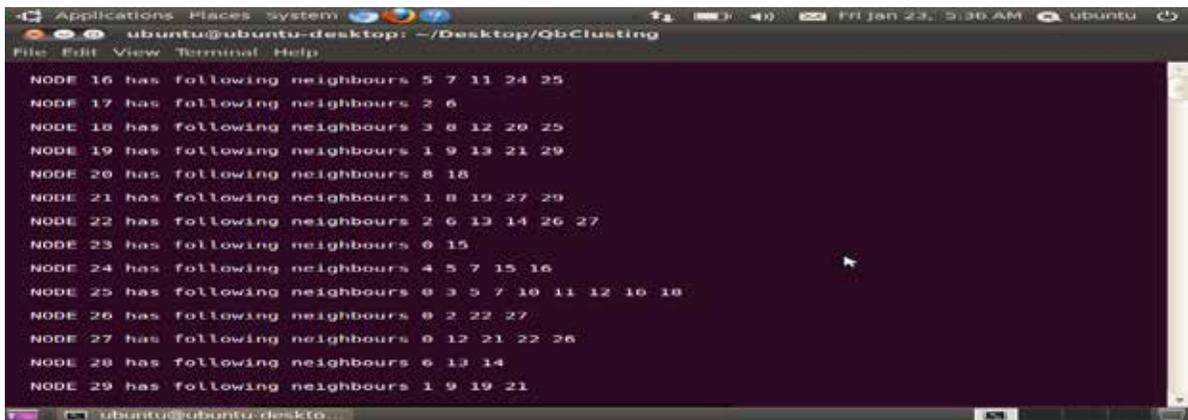


Fig 5.3 Neighbor node estimation

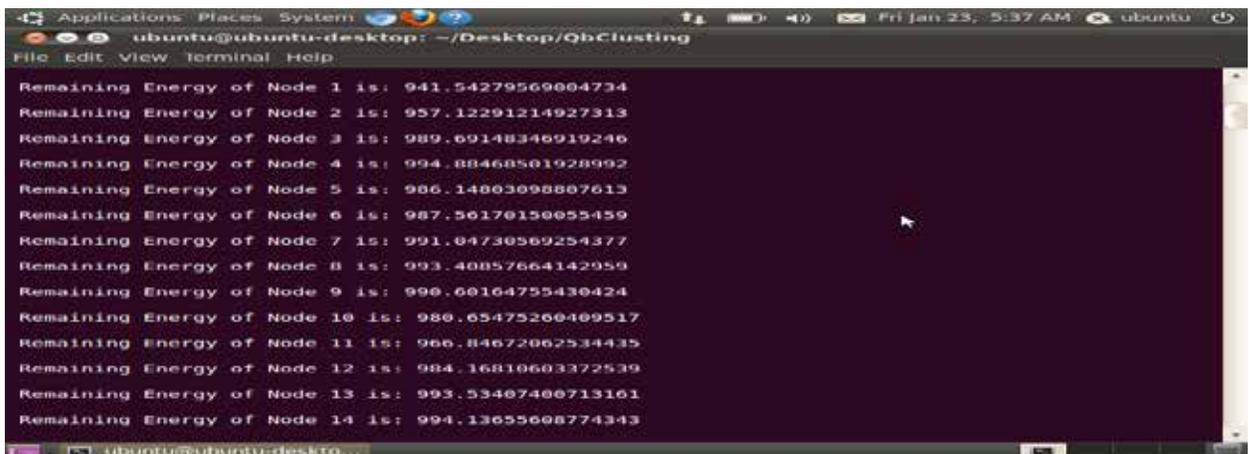
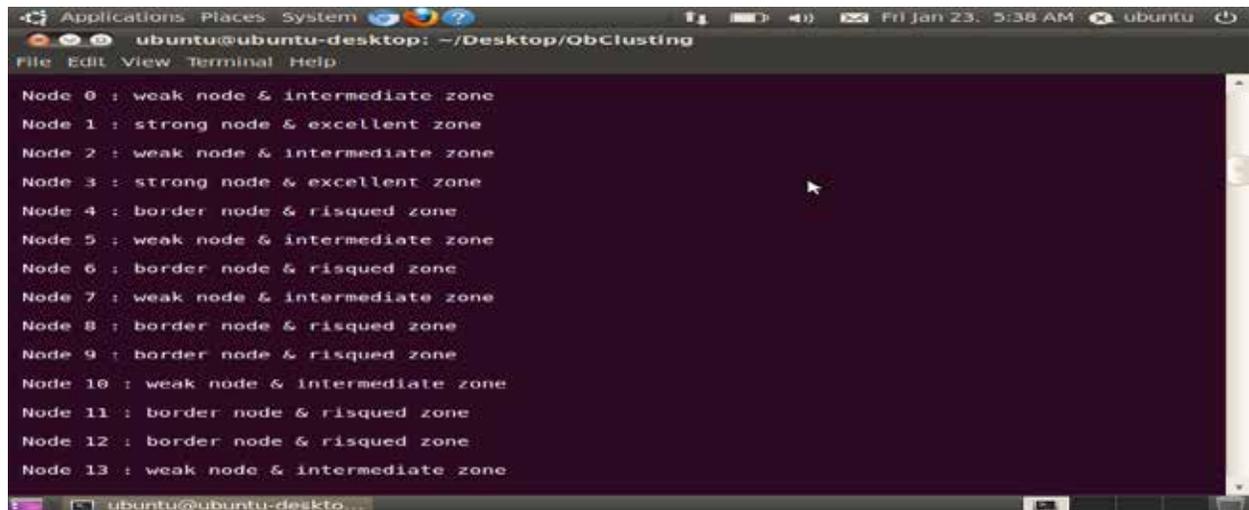


Fig 5.4 Calculation of Remaining energy of the nodes



```

ubuntu@ubuntu-desktop: ~/Desktop/ObClustering
File Edit View Terminal Help
Node 0 : weak node & intermediate zone
Node 1 : strong node & excellent zone
Node 2 : weak node & intermediate zone
Node 3 : strong node & excellent zone
Node 4 : border node & risqued zone
Node 5 : weak node & intermediate zone
Node 6 : border node & risqued zone
Node 7 : weak node & intermediate zone
Node 8 : border node & risqued zone
Node 9 : border node & risqued zone
Node 10 : weak node & intermediate zone
Node 11 : border node & risqued zone
Node 12 : border node & risqued zone
Node 13 : weak node & intermediate zone

```

Fig 5.5 Identification of Node Quality

VI CONCLUSION

This work proposes to use node priority and zone range in the clustering algorithm. Thereby cluster stability and energy consumption will be improved. These proposed schemes overcome some inefficiencies detected in WCA and other similar clustering algorithms. It was shown that the performance of our proposed clustering algorithm is similar to the best well-known algorithms, such as the WCA.

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AN ANALYTICAL SOLUTION OF OVER-ENHANCEMENT PROBLEM IN MIX CLAHE

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ABSTRACT

*In this paper a new algorithm has been designed to remove the problem of over-enhancement found in Mix CLAHE especially for underwater images. The underwater image suffers from low contrast and resolution due to dispossessed visibility circumstances, hence an object identification become typical task. The processing of underwater image captured is necessary because the quality of underwater images distress and these images leads some serious problems when compared to images from a clearer environment. This paper has proposed a hybrid approach which has integrated the MIX-CLAHE with the L*A*B based fuzzy enhancement. The experimental results have shown that the proposed technique outperforms over the available methods.*

Keywords: Fuzzy logic, Mix CLAHE, L*A*B, Underwater images.

I INTRODUCTION

Deprived imaging condition, bad influence of light absorption and dispersal by water molecule, underwater images usually have lower contrast and stronger noise, this is a major problem for many applications of computer vision in underwater images. Underwater image enhancement techniques provided a object detection of the object which is before not exactly visible to reorganization. underwater environment(deep seas and oceans) images get blurred due to deprived visibility conditions and effects “absorption of light”, “reflection of light”, “bending of light”, “denser medium of water”, and “scattering of light” etc. These are the important factor which causes the deprived visible condition of underwater images.

Other reason for deprivation of underwater images is light. When ray light go through from air to denser medium water which is 800 times denser the air , its intensity partly reflect back in the air and partly enters in the water . So the partly light which enter the water slowly get start dropping at different distance under the water. E.g. at the beginning the red color starts depart at the depth of 3 m , after that orange color going to be disappear and in this way the rest of all color will gradually going to be depart at particular depth of the water.

II LITERATURE SURVEY

Zhiyuan et al. (2009) [1] has discussed images degraded by fog suffer from poor contrast. In order to remove fog effect, a Contrast Limited Adaptive Histogram Equalization (CLAHE)-based method has been presented. This method established a maximum value to clip the histogram and redistributes the clipped pixels equally to each gray-level. It can limit the noise while enhancing the image contrast. In this method, firstly, the original

image was converted from RGB to HSI. Secondly, the intensity component of the HSI image was processed by CLAHE. Finally, the HSI image was converted back to RGB image. To evaluate the effectiveness of the proposed method, the experiment with a color image degraded by fog and applied the edge detection to the image. The results showed that this method was effective in comparison with traditional methods. Setiawan et al. (2010) [2] proposed new enhancement method using CLAHE in G channel to improve the color retinal image quality. The enhancement process conduct in G channel was appropriate to enhance the color retinal image quality. Yisu et al. (2010) [3] presented a novel method combing Contrast-limited Adaptive Histogram Equalization (CLAHE) and multi-step integral projection. First, after real-time detecting face images, a sigma filter was used to remove the noise in images. Sigma filtering was chosen in this research because of its validity in noise removal. It has the advantages of providing a good noise removal result, not blurring the image and fast performance. Second, since it was important to extract facial features as accurately and clearly as possible, CLAHE was then applied on images for enhancing the facial features. This step was done after the sigma filter in order not to amplify the noise in images. Third, after enhancing these features, multi-step integral projection was proposed to detect the useful facial features regions automatically. Finally, the detected facial feature region was then extracted by Gabor transformation and the final facial expression recognition is classified by SVMs. They tested their system on the JAFFE database and achieved a high recognition rate of 95.318% on trained data. Sundarram et al. (2011) [4] has proposed the Histogram Modified Contrast Limited Adaptive Histogram Equalization (HM- CLAHE) to adjust the level of contrast enhancement, which in turn gave the resultant image a strong contrast and brought the local details for more relevant interpretation. It incorporated both histogram modifications as an optimization technique and Contrast Limited Adaptive Histogram Equalization. This method was tested for Mias mammogram images. The performance of this method was determined using the parameter like Enhancement Measure (EME). From the subjective and quantitative measures it wa interesting that this proposed technique provided better contrast enhancement with preserving the local information of the mammogram images. Hillers et al. (2012) [5] discussed a new method for enhancing the local contrast of high dynamical range images on conventional low dynamical range displays. Here they used the mean shift clustering algorithm to segment the image and enhanced that segmented image by using contrast limited adaptive histogram equalization (CLAHE) in combination with a new kernel based interpolation technique. Here their main application was the enhancement of welding image sequences, but they tested their method on a larger image database. Experiments demonstrated improvements over the traditional CLAHE based image enhancement. Kurt et al. (2012) [6] have proposed a strong hybrid algorithm which included mathematical morphology, anisotropic diffusion filter and contrast limited adaptive histogram equalization (CLAHE) and obtained successful results for much kind of medical images. The main purpose of image enhancement is to process an acquired image for better contrast and visibility of features of interest for visual examination as well as subsequent computer- aided analysis and diagnosis In the study, the authors have used top-hat transform, contrast limited histogram equalization (CLAHE) and anisotropic diffusion filter methods. The system results were satisfactory for many different medical images like lung, breast, brain, knee and etc. Suprijanto et al. (2012) [7] have discussed the contrast quality of digital image that scanned using transmission and reflection mode was evaluated based on mean and standard deviation of the image. Furthermore, the quality of digital image was enhancement based on spatial technique using contrast stretching, histogram equalization (HE), adaptive histogram equalization (AHE), and contrast limited adaptive histogram equalization (CLAHE).

Evaluation of the preference image quality was performed based on an objective criterion. The dental panoramic radiography is one of dental imaging that used to visualize the entirety of the maxilla and mandible jaws on the one image planes. Although the direct digital panoramic radiography has been available, however film-based panoramic radiography is still used on the mostly dental clinic and laboratory in Indonesia. The quality of film-based image has significant limitation due to chemical processing and image enhancement cannot be done if required. Therefore, digitized film-based image to digital image was required to allow image enhancements in order to improve the interpretability quality of information in the image. Digitized film-based image is performed using a flatbed scanner on transmission and reflection mode. Moreover in this paper, the contrast quality of digital image that scanned using both mode is evaluated based on statistic image characteristic. The results showed that the quality of digitized image using transmission mode is better than using reflection mode. However, if direct digital imaging is used as a gold standard, image enhancement on digitized image is still required. Four methods, i.e. contrast stretching, HE, AHE, and CLAHE are used to attempt improve the quality digitized image. Evaluation of the preference image quality was performed based on objective criterion. The preference image quality for digitized panoramic image can be obtained by using image enhancement based on CLAHE-Rayleigh method that indicated by the lowest value of mean, standard deviation, RMSE, and average difference and the higher value of NAE and SAE. Abhishek et al. (2012) [8] has described a novel and efficient fog removal algorithm. Fog formation is due to attenuation and airlight. Attenuation reduces the contrast and airlight increases the whiteness in the scene. Proposed algorithm used bilateral filter for the estimation of airlight and recover scene contrast. Qualitative and quantitative analysis demonstrated that proposed algorithm performed well in comparison with prior state of the art algorithms. Proposed algorithm was independent of the density of fog and did not require user intervention. It can handle color as well as gray images. The algorithm has a wide application in tracking and navigation, consumer electronics and entertainment industries. Inhye et al. (2012) [9] has described consumer video surveillance systems often suffer from bad weather conditions, observed objects lose visibility and contrast due to the presence of atmospheric haze, fog, and smoke. In this paper, they presented an image defogging algorithm with color correction in the HSV color space for video processing. They first generated a modified transmission map of the image segmentation using multiphase level set formulation from the intensity (V) values. They also estimated atmospheric light in the intensity (V) values. The proposed method can significantly enhance the visibility of foggy video frames using the estimated atmospheric light and the modified transmission map. Another contribution of the proposed work was the compensation of color distortion between consecutive frames using the temporal difference ratio of HSV color channels. Experimental results showed that the proposed method could be applied to consumer video surveillance systems for removing atmospheric artifacts without color distortion. Ullah et al. (2013) [10] has proposed environmental effects, mist, haze, fog, snow and rain considerably affect visibility and result in degradation of image quality. The poor quality weather-degraded images perpetually affect performance of automated surveillance and tracking systems. Water droplets presented in atmosphere cause mist, fog and haze effects due to scattering of light as it propagates through these particles. These chromatic effects of image scattering can be reversed for retrieval of image information. Scattering of light affects image contents in proportion to the depth of scene. The single image dehazing technique using dark channel prior has been further refined. The proposed model considered chromatic as well achromatic aspects of the image to define the Dark Channel. New definition of Dark Channel improves quality of restored haze free

images. Contrast of the restored images has been considerably improved vis-a-vis color fidelity further refined. Major application areas of real time single image dehazing include surveillance and tracking system, consumer electronics and entertainment industry. Hitam et al. (2013) [11] has worked on Mixture contrast limited adaptive histogram equalization for underwater image enhancement. By improving the quality of an underwater image has received substantial attention due to rundown visibility of the image which is caused by physical properties of the water. Here they presented a new technique called hybrid Contrast Limited Adaptive Histogram Equalization (CLAHE) color spaces that specifically developed for underwater image improvement. The technique operated CLAHE on RGB and HSV color spaces and both results were joined together using Euclidean rule. Tentative results show that the future approach considerably improved the visual quality of underwater images by enhancing contrast, as well as dropping noise and artifacts. Sasi et al. (2013) [12] described the effective color model in this paper they work on an efficient color space for the contrast enhancement of myocardial perfusion images. In this, the effects of histogram equalization and contrast limited adaptive histogram equalization(CLAHE) were investigated and out of which one which gives good enhancement results is extended to the suitable color space model with a luminance(Y) and two chrominance components (cb,cr). The color space used either two of the enhancement techniques with which gives better results was chosen practically. Main features of this work was that contrast limited adaptive histogram equalization(CLAHE) technique was applied to the chrominance channels of the cardiac nuclear image, leaving the luminance channel unaffected which resulted in an enhanced image output in color space.

III PROPOSED ALGORITHM

- Step 1:** Select the image from computer memory in to computer program . Any given digital image is represented as an array size $M*N$ pixels.
- Step 2:** Apply cubic root based method on given image which will reduce the number of bits in an image.
- Step 3:** Select the dimension size of an image in order to calculate the values of pixel in a current image which will also helps in obtaining end of file.
- Step 4:** Repeat the following steps until all the pixels of an image is not checked and end of file is not conquered.
- Step 5:** Collect all the pixels from mask following different size $3*3$, $5*5$, $7*7$ in order to obtain pixels valued in selected mask
- Step 6:** Apply CLAHE to remove the haze from the images.
- Step 7:** Convert RGB to $L*A*B$ color space
- Step 8:** Apply fuzzy based image enhancement on the L component of $L*A*B$ color space to enhance the results further.
- Step 9:** Convert $L*A*B$ to RGB color space
- Step 10:** Final image which has been visibly more stronger than the input image and the output of the available CLAHE results.

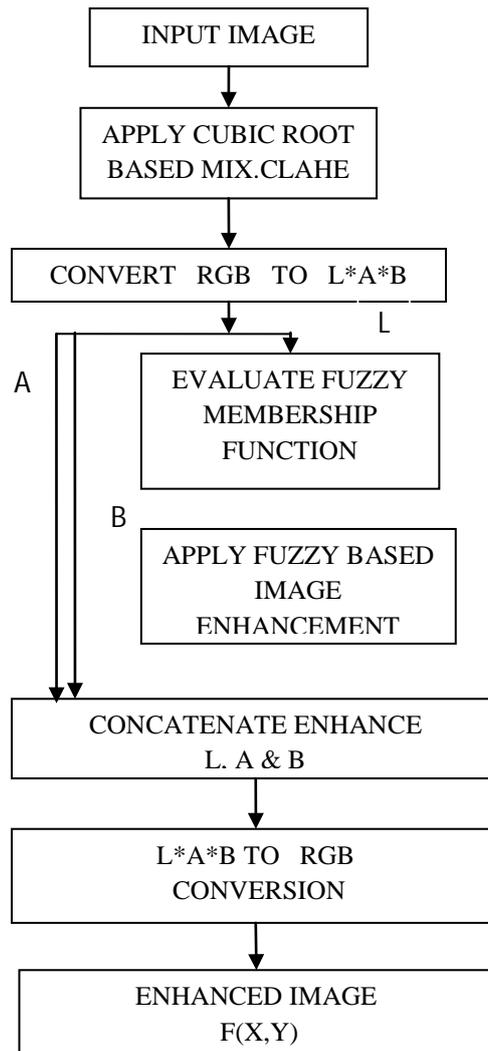


Figure 1: Proposed fuzzy based enhancement using L*a*b

IV RESULTS AND DISCUSSIONS

The proposed algorithm is tested on various images. The algorithm is applied using two performance indices Mean squared error (MSE) and peak signal to noise ratio (PSNR).

4.1 Experimental Set-Up

In order to implement the proposed algorithm, design and implementation has been done in MATLAB using image processing toolbox. Result showed that our proposed approach gives better results than the existing techniques.

Figure 2 has shown the input image which is passed to the simulation.



Figure 2: Input Image

Figure 3 has shown the output of previous filtering technique.



Figure 3: Filtered image



Figure 4: Proposed enhancement method.

After applying proposed enhancement technique Figure 4 has shown the output results are quite effective and has much more better results than the available methods. Thus the proposed algorithm has shown quite significant improvement over the available methods.

4.2 Performance Evaluation

This section contains the cross validation between existing and proposed techniques. Some well-known image performance parameters for digital images have been selected to prove that the performance of the proposed algorithm is quite better than the existing methods.

a) Peak Signal to Noise Ratio

Table 1 is showing the comparative analysis of the Peak Signal to Noise Ratio (PSNR). As PSNR need to be maximized; so the main goal is to increase the PSNR as much as possible.

Table 1: PSNR Evaluation

Images	Existing techniques	Proposed techniques
1	17.31	20.40
2	17.89	19.93
3	9.88	11.19
4	13.41	15.05
5	15.32	17.18
6	12.78	13.66
7	17.59	19.56
8	13.16	13.95
9	20.65	23.03
10	16.00	18.40
11	16.44	17.89

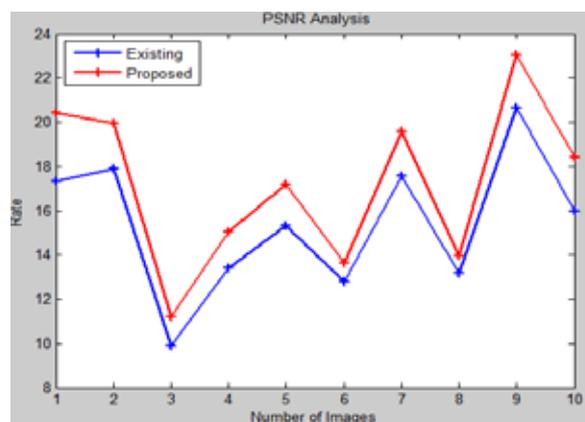


Figure 5: PSNR Analysis

Table 1 has clearly shown that the PSNR is maximum in the case of the proposed algorithm therefore proposed algorithm is providing better results than the available methods. Figure 5 has shown the quantized analysis of the peak signal to noise ratio of different images using fusion. It is very clear from the plot that there is increase in PSNR value of images with the use of proposed method over other methods. This increase represents improvement in the objective quality of the image

b) Mean Square Error

Table 2 is showing the quantized analysis of the mean square error. As mean square error need to be reduced therefore the proposed algorithm is showing the better results than the available methods as mean square error is less in every case.

Table 2: MSE Evaluation

Images	Existing techniques	Proposed techniques
1	1206.39	592.61
2	1054.78	660.20
3	6682.81	4933.47

4	2962.15	2030.38
5	1909.48	1243.70
6	3423.18	2793.16
7	1130.26	718.58
8	3139.90	2614.42
9	559.81	323.42
10	1631.23	938.53
11	1474.59	1056.29

Figure 6 has shown the quantized analysis of the mean square error of different images.

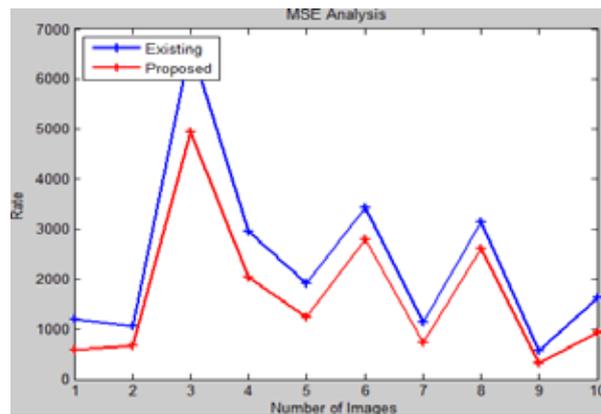


Figure 6: MSE Analysis

It is very clear from the plot that there is decrease in MSE value of images with the use of proposed method over other methods. This decrease represents improvement in the objective quality of the image.

V CONCLUSION AND FUTURE SCOPE

This paper has proposed a new algorithm which has removed the problem of over-enhancement found in Mix CLAHE especially for underwater images. The review analysis has shown that the underwater image suffers from low contrast and resolution due to dispossessed visibility circumstances, hence an object identification become typical task. This paper has offered an hybrid approach which has integrated the MIX-CLAHE with the L^*A^*B based fuzzy enhancement. The proposed technique has been designed and implemented in the MATLAB using image processing toolbox. The experimental results has shown that the proposed technique outperforms over the available methods. However this work has not considered much quality assessment metrics, so in near future we will use some more quality metrics to evaluate the effectiveness of the proposed technique.

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SRF THEORY BASED CONTROL OF D-STATCOM FOR LINEAR AND NONLINEAR LOADS

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ABSTRACT

The presence of harmonics in power supply network poses a severe power quality problem that results in huge power losses in distribution, interference problems to the parallel running communication lines and, sometimes, in operation failures of electronic equipment. D-STATCOM are employed to feed the required reactive power demand, suppress the current harmonics and reduce the total harmonic distortion (THD) in the load. The voltage source converter (VSC) is the core of a D-STATCOM. The hysteresis current control is an indirect method of controlling the VSC. In this paper, Synchronous Reference Frame (SRF) theory has been implemented for the generation of reference current signals for the controller. This paper investigates the effectiveness of the proposed model in mitigation of harmonics currents by modelling a 3- ϕ three-wire D-STATCOM based on SRF theory. Simulation results indicate that the proposed D-STATCOM can restrain harmonics of electrical source current effectively.

Keywords: D-STATCOM, Harmonic Mitigation, MATLAB'13, Power quality, SRF theory, Voltage source converter (VSC).

I. INTRODUCTION

Modern distribution systems face various types of power quality problems which vary in their scope and severity. Unbalanced load, high VAR demand, excessive neutral current and nonlinear load burden are some examples of such problems and have been discussed in the literature [1-4]. Various power quality features are governed by the standards such as the IEEE-519 standard [5]. D-STATCOM is a shunt-connected device, which decreases the problems associated with the power quality of currents [6]. The reactive power is compensated by 3- ϕ 3-wire D-STATCOM, which eliminates harmonics from load current.

In this investigation, D-STATCOM has been realized using 3- ϕ 3-leg VSC, which is controlled for reactive power compensation and harmonic elimination. Synchronous reference frame theory (SRFT) based algorithm is found to have a better performance than other control algorithms for the control of D-STATCOM for 3- ϕ 3-wire systems [7]. The proposed D-STATCOM has been designed, modeled and its performance simulated under different loading conditions.

II. D-STATCOM TOPOLOGY

Fig.1 shows the schematic diagram of the proposed D-STATCOM for power quality improvement. The linear and nonlinear unbalanced loads are connected at PCC (Point of Common Coupling). D-STATCOM consists of 3-leg voltage source converter (VSC) having six insulated-gate bipolar transistor (IGBTs) with anti-parallel diodes configuration, interfacing inductors, and a DC capacitor. The design and control of the D-STATCOM based system have been given in the following sections:

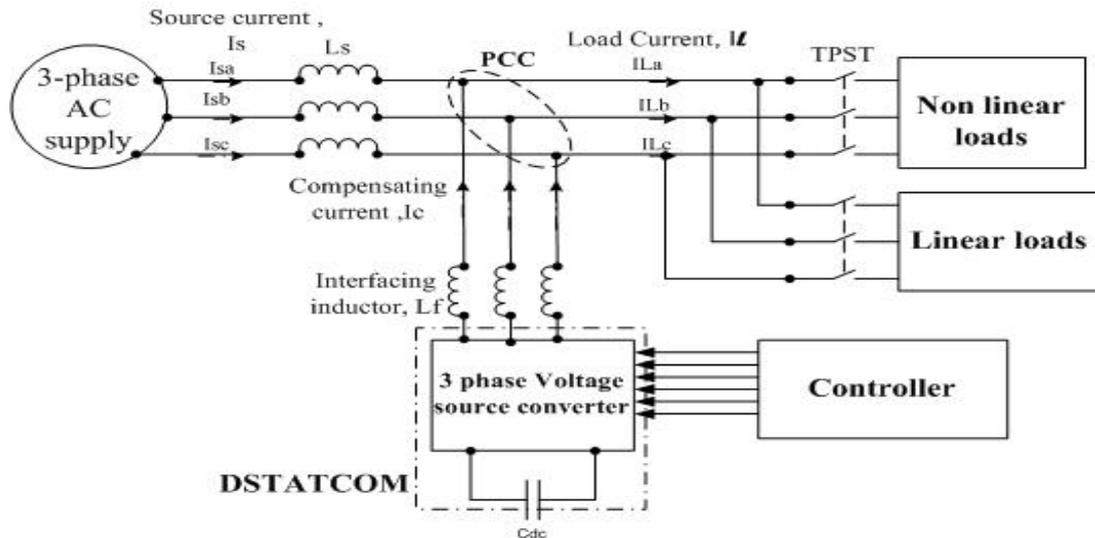


Fig.1. 3-leg VSC-based D-STATCOM connected to three phase system

2.1 DESIGN OF D-STATCOM

3-leg VSC used in DSTATCOM has each IGBT of the rating 2500kV and 1500A [8]. The selection procedure used for dc bus voltage, dc bus capacitor, ac inductor and the ripple filter has been given as follows [9].

2.1.1 DC Bus Voltage (V_{dc})

The DC bus voltage (V_{dc}) magnitude depends on the instantaneous energy given to the D-STATCOM. For a three-legged VSC with a DC capacitor, the capacitor voltage is given by eqn. (1),

$$V_{dc} = \sqrt{2} * \frac{V_{ac}}{m} \tag{1}$$

Where m (modulation index) is taken as 1 and V_{ac} is the AC output voltage of D-STATCOM. Thus the calculated value of V_{dc} is 586.89 V when V_{ac} is selected as 415V (rms), and so V_{dc} is selected as 750V.

2.1.2 DC Bus capacitor (C_{dc})

The principle of energy conservation is given by eqn. (2),

$$\frac{1}{2} C_{dc} [(V_{dc})^2 - (V_{dc1})^2] = 3V_{ac}(\alpha I)t \tag{2}$$

Where V_{dc} is the reference DC voltage, V_{ac} is the phase voltage (230V_{rms}), V_{dc1} is the minimum voltage level of DC bus, I is the phase current, α is the overloading factor, and t is time upto when the DC voltage is to be recovered.

Considering 5% voltage ripple in the DC bus and taking the values of the quantities as - V_{dc1} =740V, V_{dc} =750V, V_{ac} =239.6V, I = 55.64A, t = 350 μ sec and α =1.2, the calculated value of C_{dc} is 2254 μ F and is selected as 2500 μ F.

2.1.3 Interfacing Inductance (L_{ac})

The calculation of the interfacing inductance (L_{ac}) for VSC depends on the current ripple Δi , DC bus voltage (V_{dc} =750V) and switching frequency f_s =10 kHz, and L_{ac} is given by eqn. (3),

$$L_{ac} = \frac{\sqrt{2} * m * V_{dc}}{12 * h * f_s * \Delta i} \tag{3}$$

Where, Δi =5% of 55.64(=I), h (=1.2) is overload factor and m (=1) is modulating index. The calculated value of L_{ac} is 3.24 mH and L_{ac} = 3.5 mH is taken in this investigation.

2.2 CONTROL TECHNIQUE FOR D-STATCOM

In this investigation the SRFT-based indirect control technique [10] is used to generate gate pulses for controlling of D-STATCOM. As grid is supposed to feed only active power to load at PCC, but due to loads reactive or unbalanced or nonlinear nature, unwanted components flow in the line like reactive power, harmonic currents etc. but with the D-STATCOM connected in line, these unwanted components can be fed at PCC directly using DC capacitor connected VSC in shunt. As control technique is indirect in nature so the currents from load end are sensed and using Park’s transformation, the 3-φ load currents (i_{abc}) are converted to dq0 frame [11].

Firstly, the current components in $\alpha-\beta$ co-ordinates are generated. ‘abc’ phasors can then be transformed into $\alpha-\beta$ coordinates using Clark’s transformation as given by eqn.(4),

$$\begin{bmatrix} i_{\alpha} \\ i_{\beta} \end{bmatrix} = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} i_{ia} \\ i_{ib} \\ i_{ic} \end{bmatrix} \tag{4}$$

Then using ωt as the transformation angle, these currents can be transformed from $\alpha-\beta$ to $d-q$ frame using eqn. (5) (Park’s transformation),

$$\begin{bmatrix} i_d \\ i_q \end{bmatrix} = \begin{bmatrix} \cos \omega t & \sin \omega t \\ -\sin \omega t & \cos \omega t \end{bmatrix} \begin{bmatrix} i_{\alpha} \\ i_{\beta} \end{bmatrix} \tag{5}$$

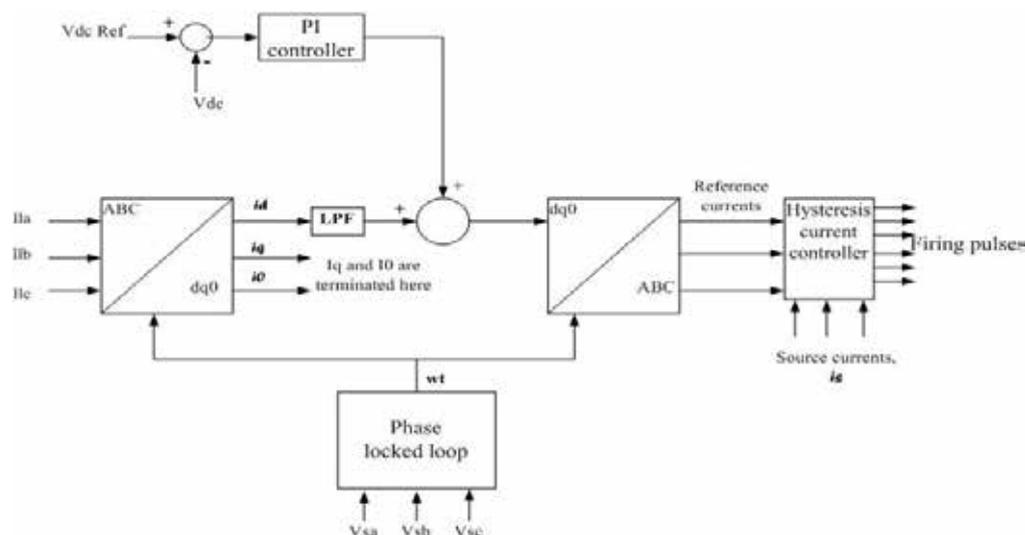


Fig.2. Block diagram for SRF theory based control of D-STATCOM

The block diagram representation of control technique based on SRF theory is shown in Fig.2. From this figure it can be seen that the load’s active power requirement and the power required to maintain constant DC voltage at VSC’s DC terminals is to be fulfilled by the grid and therefore these two are added. To maintain DC voltage constant, the error between reference signal and sensed DC voltage is fed into a PI controller [12], thus generating an output current (i_{loss}) equal to the loss in DC voltage and i_{loss} is given by eqn.(6),

$$i_{loss(n)} = i_{loss(n-1)} + k_p(V_{dc(n)} - V_{dc(n-1)}) + k_i * V_{dc(n)} \tag{6}$$

Where, $V_{dc(n)}$ is error in DC terminal voltage signal and reference DC voltage of 750V and given by eqn.(7),

$$V_{dc(n)} = V_{dc}^* - V_{dc(n)} \tag{7}$$

and the direct component (i_d) of current from dq0 transformation is then selected and filtered using a 2nd order Butterworth filter to eliminate unwanted signals (\hat{i}).

Therefore the total active power comprised in the grid current can be given by eqn. (8),

$$i_{\text{active}}^* = i_{dc} + i_{\text{loss}} \quad (8)$$

A 3- ϕ PLL is used to synchronize these signals with the voltages at PCC. The angle ωt of park's transformation in eqn. (5&9) is the synchronous angular position determined by the PLL. The resultant currents in the dq0 reference frame (i_{active}^* , $i_q^*=0$, $i_0^*=0$) are reverse transformed into reference source current (i_{sa}^* , i_{sb}^* , i_{sc}^*) in abc frame.

3- ϕ reference source current are obtained using reverse Park's transformation [10] given by eqn. (9),

$$\begin{bmatrix} i_{sa}^* \\ i_{sb}^* \\ i_{sc}^* \end{bmatrix} = \begin{bmatrix} \cos \omega t & \sin \omega t & 1 \\ \cos(\omega t - \frac{2\pi}{3}) & \sin(\omega t - \frac{2\pi}{3}) & 1 \\ \cos(\omega t + \frac{2\pi}{3}) & \sin(\omega t + \frac{2\pi}{3}) & 1 \end{bmatrix} * \begin{bmatrix} i_d^* \\ i_q^* \\ i_0^* \end{bmatrix} \quad (9)$$

These reference source currents [13] are fed to hysteresis current controller along with sensed source currents, thus generating switching signal for VSC.

2.3 HYSTERESIS CURRENT CONTROLLER

It is a method to control VSC which generates an output current following the ref. current waveform [14]. In this method switching is done in an asynchronous way to ramp the actual current up and down so that it will follow the reference current. When the source current is exceeding the upper hysteresis limit, it turns on a negative voltage switching function and causes the source current to decrease. And if the current violates the lower hysteresis limit, then it turns on a positive voltage switching function to increase the source current. The hysteresis band limit used in this investigation is 0.2.

III. MODELLING AND SIMULATION

During this investigation of D-STATCOM, simulations studies were carried out to study the behavior under different operating conditions, and permitted the optimization of different control parameters values. Dual control loops have been used for this purpose, one of which is the DC side voltage control loop (outer loop) and the other one is the current control loop (inner loop). The inner loop ensures that the current supplied by the inverter follows the reference currents calculated from sensed load current. The outer loop is to control the DC voltage, by ensuring that sufficient active power is fed from ac source to compensate for the losses in the inverter, and to keep the DC voltage across the DC capacitor equal to reference value. The investigated model of three leg VSC based D-STATCOM is simulated using Simulink tool from MATLAB'2013 for balanced supply system. The specifications and parameters of the simulated circuit have been given in Table I.

Table I. Design specifications and circuit parameters

Source voltage	$V_{ac}(L-L)$	415V(rms)
System frequency	F	50Hz
VSC DC voltage	V_{dc}	750V
DC side capacitance	C_{dc}	2500 μ F
Coupling inductance	L_{ac}	3.5mH
Linear load (3- ϕ)	Y -connected balanced	20kVA, 0.8 pf lag
Rectifier load resistance and inductance	R_l & L_l	10 Ω , 100mH
PI controller constants	K_p & K_i	0.2145 .85

IV. SIMULATION RESULTS AND DISCUSSION

The investigated 3- ϕ 3-leg D-STATCOM for reactive power compensation, voltage regulation, and harmonic elimination for linear and non-linear loads has been simulated and discussed as follows.

4.1 Performance of D-STATCOM for balanced linear load (20kVA, 0.8 pf)

The active and reactive powers measured at load, source and compensator end has been shown in fig. 3(a), 3(b), and 3(c) respectively. It has been seen that at time 0.4sec to 0.8sec D-STATCOM is connected in shunt to the PCC. And in this time the reactive power fed from source is decreased zero and all the reactive power is fed from D-STATCOM.

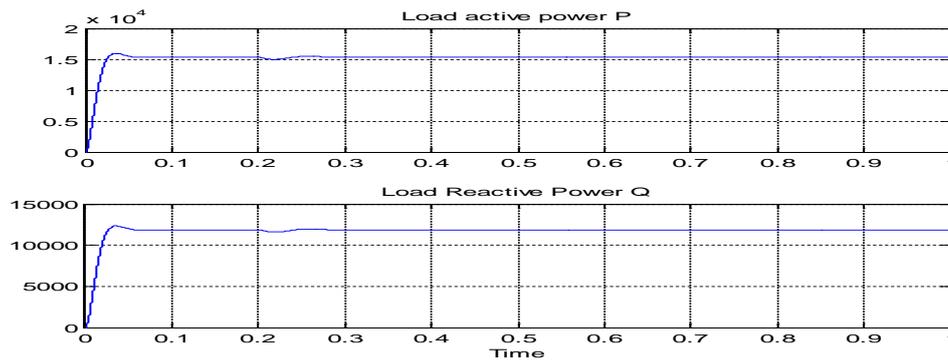


Fig.3 (a) Active and Reactive power demand of linear balanced load of 20kVA, 0.8pf

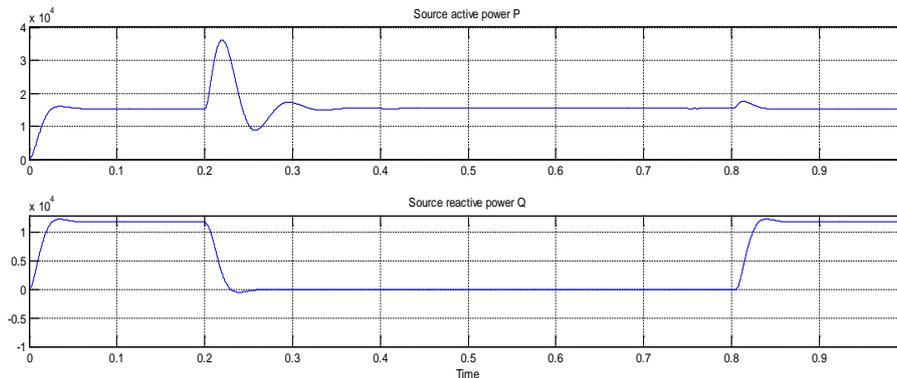


Fig. 3 (b) Active and Reactive Power transferred from source to load

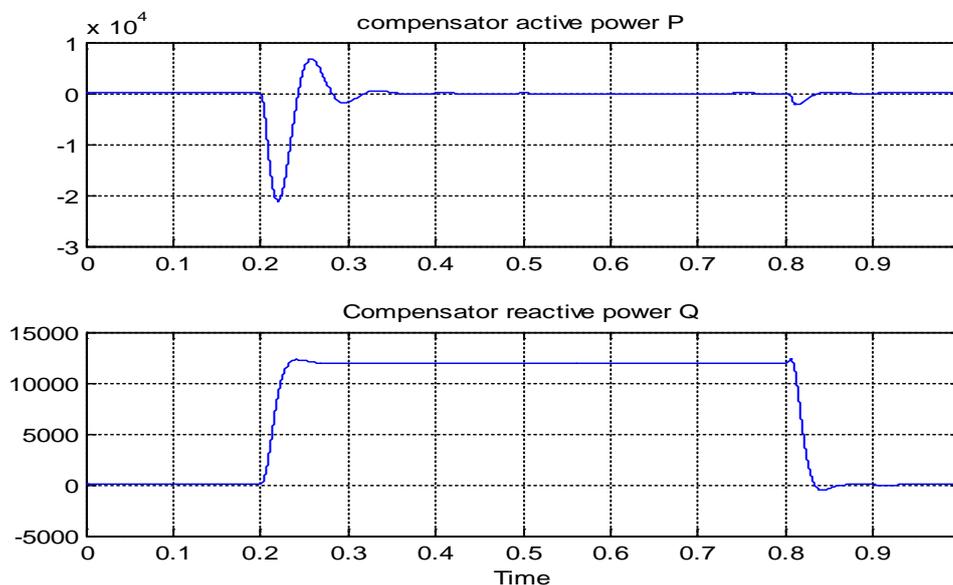


Fig.3 (c) Active and Reactive power supplied from D-STATCOM to the linear load

In Fig. 3(d) the current and voltage waveform of phase-a at source end and at load end are shown. From this it can be deduced that whenever the D-STATCOM is not connected to the system its reactive power is an additional burden to the utility to be fulfilled and at $t=0.4\text{sec}$. D- STATCOM is switched in to the system and it start to supply the load reactive power demand, so the utilities current supply is decreased in comparison to when D-STATCOM not connected to system. So power factor at source side is unity, while at load end it is 0.8pf lagging, and therefore the system DC terminal voltage is maintained to the desired reference value of 750V.

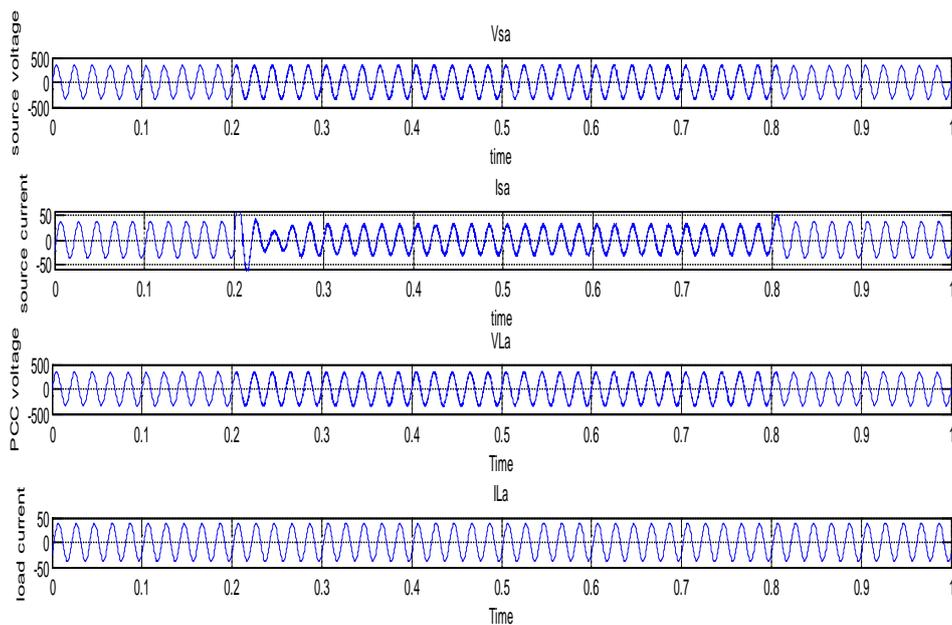


Fig. 3(d) Voltage and Current waveform of phase-a at source end and at load end for Linear Balanced Load

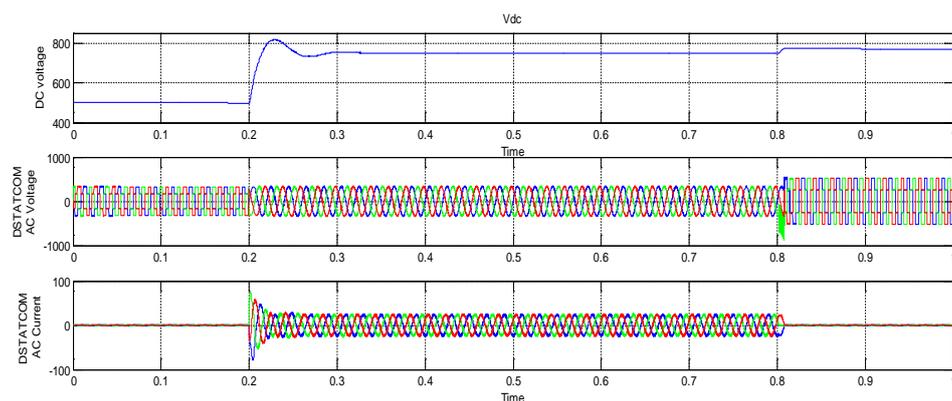


Fig.3 (e) Waveform of D-STATCOM DC terminal voltage and AC terminal Voltage and Current Output for linear balanced load

4.2 Performance of D-STATCOM with non-linear load of 30kVA and 0.98 pf

The performance of DSTACOM with non-linear load can also be observed. The output current and voltage waveform of phase-a at source end and at load end is shown in Fig. 4(a). It can be seen that when D-STATCOM is connected to the system at $t = 0.4\text{sec}$, the source current is changed to sinusoidal. In the Fig. 4(b), FFT

analysis on the load current of phase-a shows that before the D-STATCOM is wired to the system, the total harmonic distortion is 25.34%. Fig. 4(c) shows the harmonic spectrum and THD of source current when D-STATCOM is connected to the system. In this it can be observed that THD is reduced to 4.08%, which is well below the standard requirement of IEEE-519 standards.

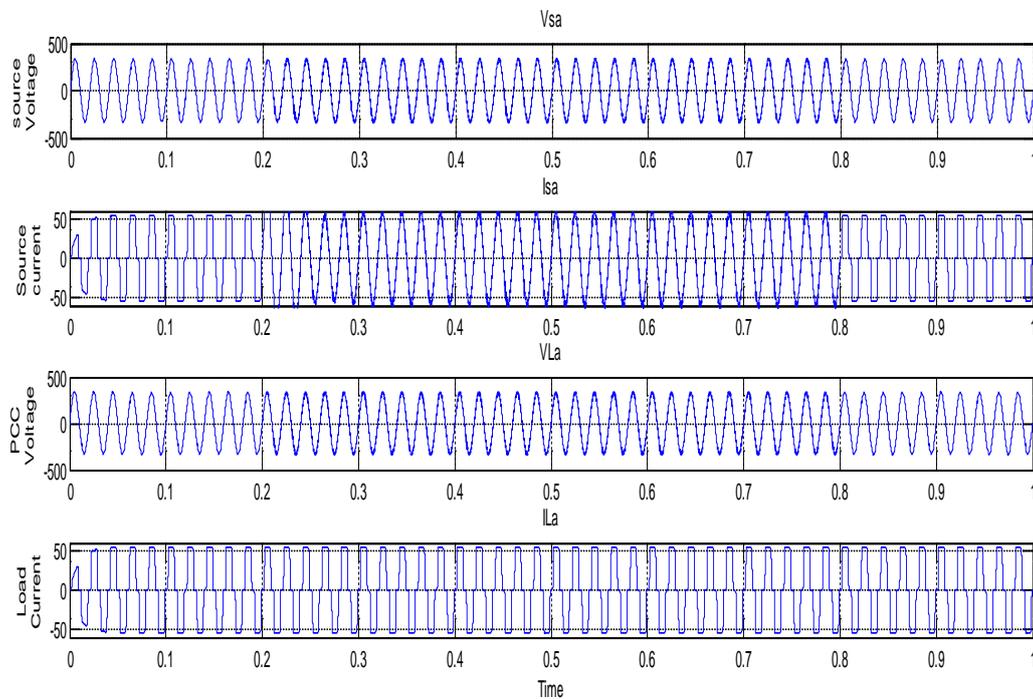


Fig. 4(a) voltage and current waveform of phase-a at source end and at load end for nonlinear load

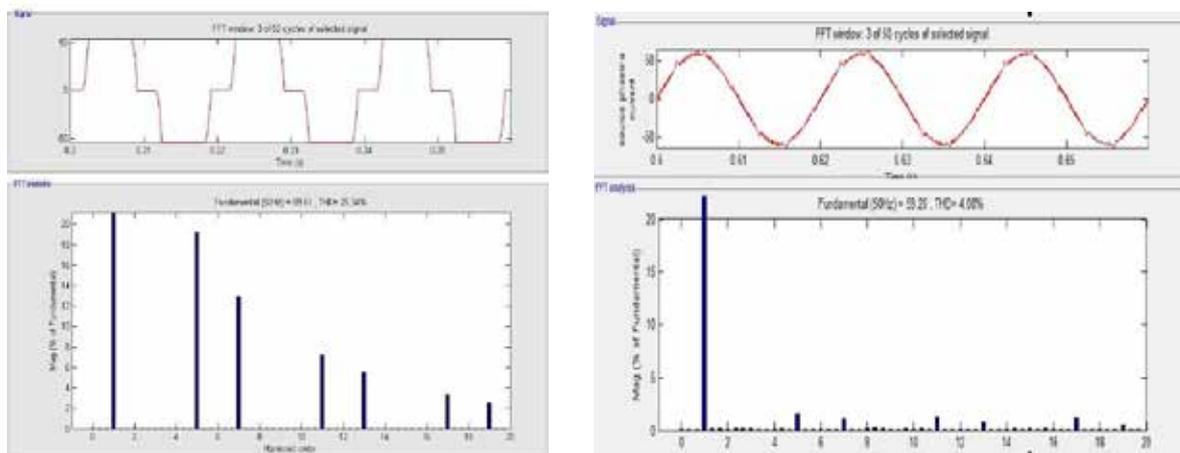


Fig. 4 (b) Load current waveform and its Harmonic Spectrum, (c) Harmonic Spectra and THD of source current for THD of nonlinear load with DSTATCOM

V. CONCLUSION

The performance of proposed D-STATCOM is found to be quiet satisfactory for harmonic elimination and reactive power support for different kind of loads and for source unity power factor operation seems quiet advantageous. The harmonic content of the current at source side is seen to be within limits as per IEEE-519 standards.

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SEMANTIC QUANTIFICATION OF TEXT: A SURVEY

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ABSTRACT

Measuring semantic role in the text document is very essential for extracting meaningful information because text document is a source of required information So it leads to the acquisition of valuable knowledge. When the amount of information will be growing tremendously in the real world it makes the necessity of quantifying the text document with respect to semantics then we can get the relevant information in faster way. The quantification of text document will be the most required technology for growing set of data so that we can make the machine to understand the things in meaningful way and it leads to effective interaction or communication between machines and human beings and this semantic role measuring technique has very much attracted great concern in the field of Artificial Intelligence, Psychology, Text mining and Text classification. In this paper we are going to review some of the methods that have been proposed for measuring the semantic role in the text documents.

Keywords: *Semantic Role, Quantification, Information Extraction, Machine Learning.*

I. INTRODUCTION

The communication between human beings was done very straightly by using natural languages because we have the ability for understanding the languages or thing with respect to different context, situation, but when we communicate with the machine it is not in the position to understand the languages with respect to semantics so, measuring the semantic role with in the text is very essential.

Semantic quantification of text document plays a central role in information extraction or in information management with respect to different context of the text. The text will be quantified based on the relationship between the words that is different feature or properties, synonyms or thesaurus, taxonomy or ontology, terms, frequency, co-occurrence, order of the words.

The amount of information will be growing tremendously in the society and it makes the necessity of quantifying the text for getting most relevant information according to the meaning of the text. The potential application for quantifying the text document includes, knowledge discovery for the decision making systems by constructing the knowledgebase, efficient text summarization, text classification and semantic search engines, semantic similarity.

Yuhua Li have discussed the text can be measured based on the semantic nets and corpus statistics[1], and semantics role is measured in the sentence by using the depth and path length between the words in the semantic nets of the words by constructing the database of the word using synonyms sets and using these two measures best semantic similarity of the words found and along with semantic net the index values are assigned for each word in the sentence for finding the semantics of word and this index value is simply the order number in which the word appears in the sentence and the similarity is calculated by using the cosine similarity measure and finally overall semantic similarity between the two sentence is calculated. Semantic similarity can also be

calculated for selected pair of sentences by constructing the semantic vector for two sentences in this vector if two words are similar with respect to meaning then both the word assigned with same value otherwise the value is assigned based on the distance between the words.

Andreia Dal Ponte Novelli and Jose Maria Parente de Oliveira[2] have reported that, the semantic of the text will be calculated by using the vectors of the terms which is present in the text document, this terms are extracted with respect to syntactic structure of the sentence after that they have measure the semantic role of each sentence, finally the total text similarity will be calculated. In this paper, Section 2 presents Related work on this topic, Section 3 discussion regarding most frequently used measures or some important methods, Section 4 Conclude the paper.

II. RELATED WORK

Some of the works reported in the literature that focused on text mining with respect to semantics and semantic role quantification of text documents. However, some of methods available in the literature are reviewed in this Section.

Shaidah Jusoh [3] have discussed Text documents is source of information, this relevant information can be extracted by using the semantics of the text so, the text is processed and segmented into sentences by syntactically for recognizing the part-of-speech which is present in the sentence and that word is considered as entity after that this word is processed with respect to semantics but while processing the text for semantics system would face ambiguity to resolve this problem subject context knowledge should be considered and according to context of word different meaning of the word is stored in the database and value for different context word is calculated by using fuzzy membership function along with subject of the sentence and the most relevant preceding sentences for resolving the ambiguity is preserved for extracting the meaningful information . Brandon Beamer[4] have reported information regarding the extracting Semantic relation between the words automatically by quantifying the noun features from the wordnet's IS-A backbone and it separates the positive and negative sentences based on the boundary value by using the SemScat learning model after they will find the noun- noun semantics for the better semantic relation extraction of the text .

John A. Bullinaria[5] have discussed about selecting the best method for extracting semantic representation from simple word co-occurrence statistics in large text corpora, this can be achieved by three factors that is functional word stop-lists, word stemming, and dimensionality reduction using Singular Value Decomposition (SVD) by using this factors significant semantic vector will be formed for the better semantic representation of text, after that this semantic vector is tested with different tasks i.e, TOEFL, Distance Comparison, Semantic Categorization, Clustering Purity for finding the similarity of work done in the previous methods based on the performance baselines.

Peter D. Turney[6] have reported Computer systems can't understand the meaning of human language, this limitation was addressed by the survey of vector space model of term-document, word-context, and pair-pattern matrices so using this matrices better semantic measures of the text will be achieved for making the systems to understand the natural languages like human beings so, we can effectively communicate with the machines.

Dingding Wang, Tao Li[7] have presented report on Multi-document summarization that can be done by sentence-level semantic analysis and symmetric non-negative matrix factorization methods of text documents, in first method sentences are extracted by using machine learning methods and the semantic similarity matrix is

constructed after that semantic role and pair wise semantic similarity is calculated but some times it was very difficult to find the similarity by using rectangular matrix so, this can be resolved by using second method that is symmetric non-negative matrix factorization for sentence-sentence similarity measure.

Mehmet Ali Salahli[8] have given some idea about Semantic relatedness that can be achieved by measuring the semantic relatedness between the words via related terms, in this approach pair of sets of words is considered for which words we want to find the similarity and relatedness is calculated by computing the normalized values for that words and this relation are not calculated directly instead that can be computed by using the synonyms of that words.

S. Anitha Elavarsi[9] have reported survey on semantic similarity measures for text processing in different way. The documents can be classified based on the single ontology and cross ontology similarity measure along with the basic methods used for the semantic measure will be discussed so, it will be useful for the finding or considering the best method for the semantic similarity measure.

Eugene Santos Jr[10] have discussed quantifying the semantics in uncertainty is very difficult and also for constructing the knowledge base so, this can be resolved by using the bayesian knowledge-base because it can handle the uncertain data very effectively and this model assign the numerical values for each conditional probability rule implicitly corresponding to conditional probabilities in target probability distribution construction without considering the explicit semantics assumption.

Giannis Varelas[11] have discussed regarding the semantic similarity can be calculated by mapping the terms into ontology and also relationship between the term and ontology measured. Different semantic similarity methods also reviewed by proposing new method that is semantic similarity retrieval model this model analyze the documents and construct the terms vector and in this term vector each term is assigned with its weights based on the frequency of occurrence of terms in the documents and the similarity between two documents is calculated by using cosine similarity measure and it will be applied for the semantic information extraction from the web documents.

III. METHODS

This section reviews the most relevant methods for measuring the semantics of the text documents.

3.1 BAGS OF WORDS or WORD CO-OCCURRENCE

The text documents contains number of frequently occurring words, these words are grouped or clustered based on the frequency count of the words and each cluster value is different from other cluster so, calculating this clustering value we can get most semantically similar information or meaningful information from text documents so, this method is used commonly in information retrieval systems and in this method all meaningful words are collected so, the count of the words are in hundreds or thousands.

The semantic similarity between the word or sentence can be quantified based on the co-occurrence of the words by using pattern matching methods so, the meaning of the text is conveyed with limited set of patterns and also it requires complete set of meaningful words for avoiding ambiguity and also singular value decomposition(SVD) method used for the reduction of dimensionality of the count of the words.

Table 1. DATABASE OF BAGS OF WORDS

Word	Occurrences
------	-------------

Variation	1
Hard	1
Cluster	2
Observation	2
⋮	⋮
Centre	1

3.2 Word net semantic similarity

In wordnet semantic similarity method, the words in text documents are extracted and synonyms of the words are collected and that will be constructed in the form of hierarchical structure and the semantic similarity will be calculated by computing the path length and depth of the synonyms of the word and also it is more important in determining the semantic distance between the words and also it is one of the form of knowledge representation.

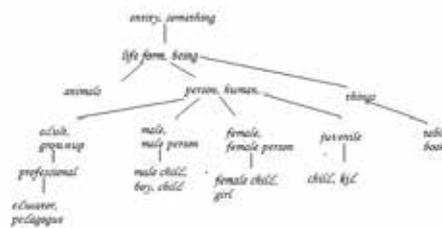


Fig.1 Word Net

Some of the function used for the computation of semantic similarity is,
The path length calculation,

$$S(W_1, W_2) = f(l, h) \quad (1)$$

And

Path length and Depth can be calculated,

$$S(W_1, W_2) = f_1(l) \cdot f_2(h) \quad (2)$$

The path length and the depth of the words can be calculated by using the figure like, educator- professional- adult-person length is 4 and the path length of male child- male- person is 3 so, based on this value we can compute the similarity.

3.3 Feature based method

In feature based method, some of the predefined text semantic features will be collected which is present in the sentence and these features are differentiated as primary and composite feature. The primary feature compare single units which is present in the text and composite feature compares the pairs of units in the text documents so, the text will be represented in the form of vector value of these feature then the similarity between texts can be calculated through this value.

In another way the terms, words, and characters will be considered as features of the text document and this features will be extracted from the text and based on the position or order of this feature the semantic role within the text is measured.

IV. Conclusion

The main objective of this paper is to highlights the basic methods of quantifying the semantic role in text documents as well as to provide review report carried out in this area. According to this methods we can get the better semantic relatedness of the text documents and also it will give the useful information about the strong methods used for the semantic quantification of text.

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INNOVATIVE PUBLIC AUDITING SERVICE FOR MULTI-USER DATA IN CLOUD

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ABSTRACT

Users can simply modify and share data as a bunch within the multi-user cloud with data storage and sharing services. Users within the cluster have to be compelled to reason signatures on all the blocks in shared block for authorization to confirm shared data integrity are often verified publically. For security purpose, once a user is revoked from the group, the block that were signed by this revoked user should be re-signed by associate existing user. For this the simple technique, that permits associate existing user to transfer the corresponding a part of the data that is shared and re-sign it throughout user revocation, is inefficient and time overwhelming thanks to the big size of shared data within the cloud. By utilizing the concept of proxy re-signatures, we have a tendency to permit the cloud to re-sign blocks on behalf of existing users throughout user revocation; by doing that existing users don't have to be compelled to transfer and re-sign blocks by themselves. Additionally, a public supporter may well be shopper UN agency can utilize cloud knowledge for explicit functions or a 3rd party auditor is in a position to supply verification services on knowledge integrity to users. Completely different from these works, many recent works on a way to preserve identity privacy from public verifiers once auditing the integrity of shared knowledge.

Keywords: Cloud Storage, Re-Signature, Provable Information Protection, Public Auditing, Public Verifier.

I. INTRODUCTION

People will easily work together as a cluster by sharing information with each other with information storage and sharing services provided by the cloud. Once a user upload shared information in the cloud, all users in the cluster will do not only access and change shared information, but also share the latest version of the shared information with the rest of the group. Although cloud providers promise a more secure and trusted environment to the users, due to the existence of hardware/software failures and human errors the integrity of information in the cloud may still be compromised.

Most of the previous works concentrate on auditing the integrity of personal information. Different from these works, some of recent works concentrate on how to preserve identity privacy from public verifiers when auditing the integrity of shared information. Unfortunately, none of the above methods considers the efficiency of user revocation when auditing the correctness of shared information in the cloud. With shared information, when a user did some changes in a block, she also needs to calculate a new signature for the changed block. Due to the modifications from different users, different blocks are signed by different users.

For security reasons, once a user leaves the cluster or misbehaves, this user should be revoked from the cluster. As a result, this revoked user ought to not be able to access and modify shared information, and also the signatures generated by this revoked user aren't any longer valid to the cluster. Therefore, though the content of shared information isn't modified throughout user revocation, the blocks that were antecedently signed by the revoked user still have to be compelled to be re-signed by associate degree existing user within the cluster. As a result, the integrity of the whole information will still be verified with the general public keys of existing users solely. Since shared information is outsourced to the cloud and users not store it on native devices, an easy methodology to re-compute these signatures throughout user revocation (as shown in Fig. 1) is to raise associate degree existing user (i.e., Alice) to 1st transfer the blocks antecedently signed by the revoked user (i.e., Bob), verify the correctness of those blocks, then re-sign these blocks, and eventually transfer the new signatures to the cloud. However, this undemanding methodology could value the present user an enormous quantity of communication and computation resources by downloading and confirmatory blocks, and by pre-computing and downloading signatures, particularly, once the quantity of re-signed blocks is sort of massive or the membership of the cluster is usually dynamic. To create this matter even worse, existing users could access their information sharing services provided by the cloud with resource restricted devices, like mobile phones, that any prevents existing users from maintaining the correctness of shared information expeditiously throughout user revocation

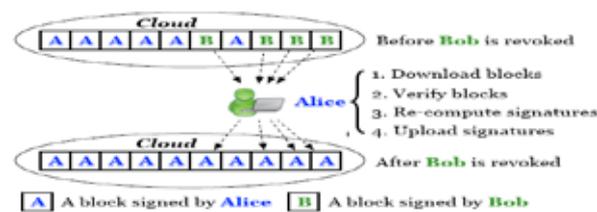


Fig.1. Alice and Bob share information in the cloud. When Bob is revoked, Alice re-signs the blocks that were previously signed by Bob with her private key

In this work, we propose Panda, a novel public auditing mechanism for the integrity of shared information with efficient user revocation in the cloud. In our mechanism, by utilizing the idea of proxy re-signatures, when a user in the cluster is revoked, the cloud is able to resign the blocks, which were signed by the revoked user, with a re-signing key (as presented in Fig. 2).

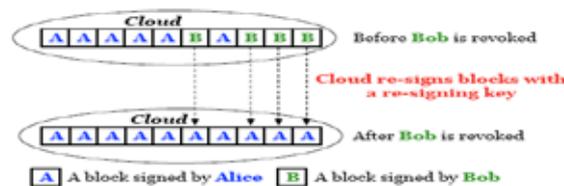


Fig.2. When Bob Is Revoked, the Cloud Re-Signs the Blocks That Were Previously Signed By Bob with a Resigning Key

As a result, the potency of user revocation is often considerably improved, and computation and communication resources of existing users are often simply saved. Meanwhile, the cloud, that isn't within the same sure domain with every user, is just able to convert a signature of the revoked user into a signature of associate degree existing user on identical block, however it cannot sign absolute blocks on behalf of either the revoked user or associate degree existing user. By coming up with a brand new proxy re-signature theme with nice

properties that ancient proxy resignatures don't have our mechanism is usually able to check the integrity of shared information while not retrieved the whole information from the cloud.

II. OVERVIEW

Based on the new proxy re-signature theme and its properties, we tend to currently gift Panda — a public auditing mechanism for shared info with economical user revocation. In our mechanism, the initial user acts because the cluster manager, United Nations agency is in a position to revoke users from the cluster once it's necessary. Meanwhile, we tend to enable the cloud to perform because the semi-trusted proxy and translate signatures for users within the cluster with resigning keys. As emphasized in recent work for security reasons, it's necessary for the cloud service suppliers to storage info and keys severally on completely different servers within the cloud in follow. Therefore, in our mechanism, we tend to assume the cloud includes a server to store shared info, and has another server to manage resigning keys. To confirm the privacy of cloud shared info at identical time, extra mechanisms are often used. The small print of often used. The small print of protective info privacy is out of scope of this project. The most focus of this project is to audit the integrity of cloud shared info.

To build the whole mechanism, another issue we'd like to think about is the way to support dynamic info throughout public auditing. as a result of the computation of a signature includes the block symbol, standard strategies — that use the index of a block because the block symbol (i.e., block my is indexed with j) — don't seem to be economical for supporting dynamic information specifically, if one block is inserted or deleted, the indices of blocks that once this changed block are all modified, and therefore the modification of these indices needs the user to re-compute signatures on those blocks, although the content of these blocks don't seem to be modified. A protagonist will use a signer symbol to differentiate that secret's needed throughout verification, and therefore the cloud will utilize it to see that re-signing secret's required throughout user revocation.

III. LITERATURE SURVEY

Qian Wang, Cong Wang, Jin Li, Kui Ren, and Wenjing Lou, "Enabling Public Verifiability and data Dynamics for Storage Security in Cloud Computing" [3], Cloud Computing has been pictured because the next-generation design of IT Enterprise. It moves the applying software package and info bases to the centralized massive information centers, wherever the management of the data and services might not be totally trustworthy. This distinctive paradigm brings regarding several new security challenges, that haven't been well understood. This work studies the matter of making certain the integrity of data storage in Cloud Computing.

The support for info dynamics via the foremost general kinds of info operation, like block modification, insertion and deletion, is additionally a major step toward utility, since services in Cloud Computing don't seem to be restricted to archive or backup info solely. whereas previous works on making certain remote info integrity typically lacks the support of either public verifiability or dynamic info operations, this work achieves each. we have a tendency to initial determine the difficulties and potential security issues of direct extensions with totally dynamic info updates from previous works then show the way to construct a chic verification theme for seamless integration of those 2 salient options in our protocol style. above all, to realize economical info dynamics, we have a tendency to improve the Proof of Irretrievability model [by manipulating the classic

Merkle Hash Tree (MHT) construction for block tag authentication. intensive security and performance analysis show that the projected theme is very economical and demonstrably secure.

Yan, Zhu, Huaixi Wang, Zexing Hu, Gail-Joon Ahn, Hongxin Hu, Stephen S. Yau, “Dynamic Audit Services for Integrity Verification of Outsourced Storages in Clouds”[4], A dynamic audit service for verificatory the integrity of untrusted and outsourced storage. Our audit service, made supported the techniques, fragment structure, sampling and index-hash table, will support obvious updates to outsourced info, and timely abnormal detection. additionally, we have a tendency to propose associate degree economical approach supported probabilistic question and periodic verification for rising the performance of audit services. Our experimental results not solely validate the effectiveness of our approaches, however additionally show our audit system encompasses a lower computation overhead, still as a shorter further storage for audit meta info.

IV. PROBLEM STATEMENT

Problem statement is, if the cloud might possess every user’s personal key, it will simply end the re-signing task for existing users while not asking them to transfer and re-sign blocks. However, since the cloud isn't within the same trustworthy domain with every user within the cluster, outsourcing each user’s personal key to the cloud would introduce vital security problems.

Another necessary downside we want to contemplate is that the re-computation of any signature through signature throughout user revocation mustn't have an effect on the foremost engaging property of public auditing — auditing data integrity publically while not retrieving the complete data. Therefore, the way to with efficiency scale back the many burden to existing users introduced by user revocation, and still permit a public supporter to ascertain the integrity of shared data while not downloading the complete data from the cloud, could be a difficult task.

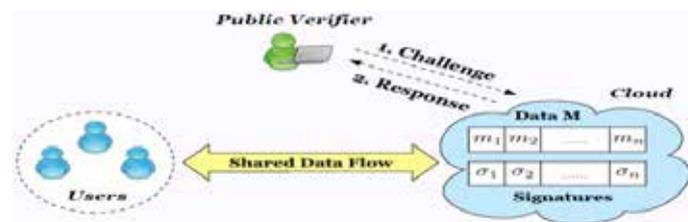


Fig.3. The system model includes the cloud, the public verifier, and users.

4.1 System and Security Model

As illustrated in Fig. 3, the system model during this project includes 3 entities: the cloud, the general public voucher, and users (who share information as a group). The cloud offers information storage and sharing services to the cluster. The general public voucher, like a consumer WHO would love to utilize cloud information for specific functions (e.g., search, computation, information mining, etc.) or a third-party auditor (TPA) WHO will offer verification services on information integrity aims to visualize the integrity of shared information via a challenge-and response protocol with the cloud. Within the cluster, there's one original user and variety of cluster users. The initial user is that the original owner of information. This original user creates and shared information with different users within the cluster through the cloud. Each the initial user and cluster users are ready to access, transfer and modify shared data. Shared information is split into variety of blocks. A user within the cluster will modify a block in shared information by performing arts associate insert,t, delete or update operation on the block.

4.2 Alternative Approach

Permitting each user within the cluster to share a standard cluster personal key and sign every block with it, is additionally a doable thanks to defend the integrity of shared information. However, once a user is revoked, a brand new cluster personal key has to be firmly distributed to each existing user and every one the blocks within the shared information need to be re-signed with the new personal key that will increase the quality of key management and reduces the potency of user revocation.

V. EXISTING SYSTEM

An existing system the file transferred in cloud that not signed by user in anytime of upload. In order that integrity of shared information isn't attainable in existing system. However, since the cloud isn't within the same sure domain with every user within the cluster, outsourcing each user's personal key to the cloud would introduce important security issue. Shared info is outsourced to the cloud and users not store it on native devices, a simple technique to re-compute these signatures throughout user revocation is to raise Associate in Nursing existing user to initial transfer the blocks antecedently signed by the revoked user verify the correctness of those blocks, then re-sign these blocks, and eventually transfer the new signatures to the cloud.

VI. PROPOSED SYSTEM

In this work, our proposed system may lie to verifiers about the incorrectness of shared information in order to save the reputation of its information services and avoid losing money on its information services. In addition, we also assume there is no collusion between the cloud and any user during the design of our mechanism. Generally, the incorrectness of share information under the above semi trusted model can be introduced by hardware/software failures or human errors happened in the cloud. Considering these factors, users do not fully trust the cloud with the integrity of shared information.

6.1 System Architecture

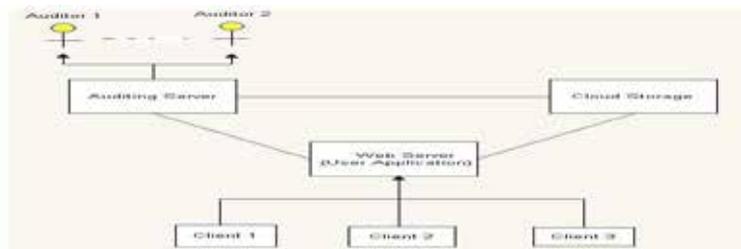


Fig.4 Architectural Diagram

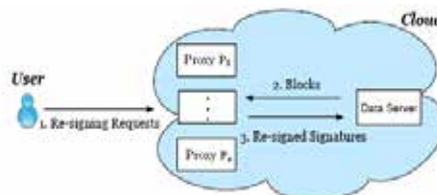


Fig. 5 Multiple Re-Signing Proxies in the Cloud

Multiple proxies belong to the same cloud, but store and manage each piece of a re-signing key independently (as described in Fig. 5). Since the cloud needs to store keys and information separately, the cloud also has

another server to store shared information and corresponding signatures. In Panda!, each proxy is able to convert signatures with its own piece, and as long as t or more proxies (the majority) are able to correctly convert signatures when user revocation happens, the cloud can successfully convert signatures from a revoked user to an existing user.

VII. CONCLUSIONS

In this work, we tend to plan a brand new public auditing mechanism for shared data with economical user revocation within the cloud. once a user within the cluster is revoked, we tend to enable the semi-trusted cloud to re-sign blocks that were signed by the revoked user with proxy re-signatures. Additionally, a public friend is usually ready to audit the integrity of shared data while not retrieving the whole data from the cloud, though some a part of shared data has been re-signed by the cloud. Moreover, our mechanism is in a position to support batch auditing by valedictory multiple auditing tasks at the same time.

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STATISTICAL ANALYSIS FOR REGENERATING THE ENERGY FROM BUILDING LIFT

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ABSTRACT

The intention of this specification is to set out the standard of require for lift installations. All lifts shall be robust, reliable and shall meet the department users' requirements and expectations. Lift installation must comply with all current regulations, including Building Regulations. The appointed Design Consultant will be responsible for traffic analysis to provide the most suitable lift solution, including items such as size of lift car, contract load, type of load and its associated safety features, speed, number of passengers etc. Major Modernization is a reasonably straight forward exercise in that, with the exception. It may be possible to increase the lift speed which would reduce travel time between floors. However, this is govern by strict lift regulations and is only possible where the clear headroom at the top of the lift well and the pit depth at the bottom of the lift well are sufficient to allow this. The clauses in this part of the Specification cover all items which are generally standard in this type of installation, while the Particular specification covers the materials and method to be used in the Works.

The following clauses apply equally to new lift installations, major modernization and refurbishments. Where existing installations do not comply with these standards they shall be brought up to date as far as is reasonably practicable. Any remaining sections of the existing installations that do not comply with this specification shall be highlighted and drawn to the attention. In the existing system the new design is used for converting unutilized mechanical energy into electrical energy and it is compactly fitted into headroom. This new design is specific to the regenerate the electrical energy from mechanical energy of the lift which is stored in battery and it will use whenever the light is off This design is easily compile with the existing system this design content two rolling part and a reciprocating part which is used to convert circular motion into reciprocating motion and vice versa. The lift is moving up and down that's the mechanical energy converts that's specific system into electrical energy.

Keywords: Electrical Energy, Reciprocating, Rolling.

I. INTRODUCTION

An elevator system, elevator providing a self generating power source. The system converts kinetic energy of an elevator cab movement into electrical energy used to regulate the speed of descent. The elevator system can be

structured in numerous ways and includes either a generator or a motor in generator mode, driven by a system to the elevator cab. The present invention relates to a self-powered for elevator systems. More particularly, the present invention pertains to the use of the kinetic energy of an elevator cab movement to generate electrical energy to regulate the speed level.

II. BACKGROUND OF THE INVENTION

Elevator systems and controls for such systems are known in the art. Such systems and controls use a wide variety of designs to achieve numerous objectives, and the basic principle of balancing an elevator cab against assembly driven by a motor. For years, building designers and code authorities have recognized the necessity of emergency power in buildings to ensure that elevator cabs. Moreover, most elevator systems currently require building power distribution systems to provide transfer switches and emergency feeders for elevators and main distribution emergency switchboards and emergency generators sufficiently large to cover elevator loads, all of which result in additional costs and inefficiencies. Thus, it would be advantageous to have an elevator system that during a power outage or any other occasion when needed accomplishes the controlled descent of the elevator cab without a battery or fossil fuel based generator to drive the elevator motor, but rather accomplishes the initial descent of the elevator cab due to gravitational forces and the heaviness of the elevator cab relative to an attached counterweight, and which then converts kinetic energy of the movement elevator cab into electrical energy used to control the speed of descent of the elevator cab.

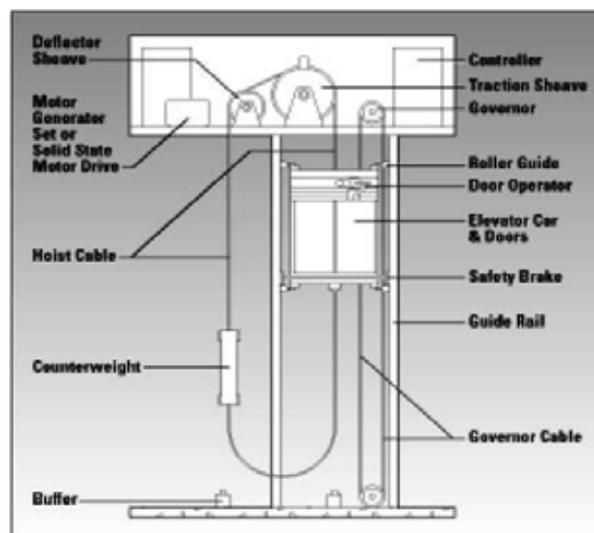


Figure 1: Basic Diagram of Building Lift

III. PROPOSED SYSTEM

The invention and the preferred modes of use will best be understood by reference to the following detailed description of an illustrative embodiment. A control block diagram of a self generating elevator emergency power source for an elevator system using a reciprocating and an electrical generator. A control block diagram of self generating elevator emergency power source for an elevator system using a reciprocating and an elevator motor in generator mode.

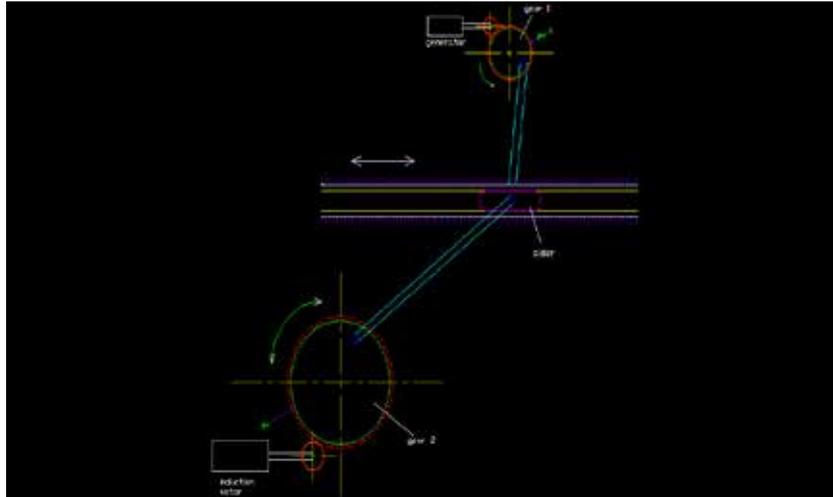


Figure 2: Proposed Mechanism

IV. DETAILED DESCRIPTION

The present invention is based on utilizing the kinetic energy of an elevator cab movement due Reciprocating action of the elevator cab. The movement elevator cab attached to a mechanical system of shafts and pulleys drives either a separate generator or an elevator motor operating in generating mode, converting the kinetic energy of the movement elevator cab into electrical energy. The torque generated by a separate generator or elevator motor in generating mode is directed against torque produced by movement elevator cab and when controlled, a controllable speed of descent to a preset or selected floor can be achieved which provides braking power for a controlled speed of descent to a preset or selected floor, comprising: an a building distribution system electrical supply panel, an elevator controller with an integral battery to support control during power loss or interruption, an electrical drive motor, a load bank, a thiristor or transistor switch or similar operative device, a summing device to sum all control signals and to generate a resultant control signal, a tachogenerator speed feedback device, a dedicated emergency descent controller with pulse width modulation (PWM) output, a mechanical system of shafts and pulleys and respectively, an elevator cab, an alternating or direct current electrical generator, a cable, a permanent counterweight, a detachable counterweight, electrically held spring release locks, detachable counterweight free fall catchers, elevator brakes, a counterweight rail system, and an elevator cab rail system.

The elevator controller with an integral battery to support control during power loss receives power from a building distribution system via the electrical power supply panel. The elevator controller drives the elevator drive motor. The elevator drive motor is connected to the elevator cab via the mechanical system of shafts, pulleys and drives the elevator cab up and down guided by the elevator cab rail system. The elevator controller also is connected to electrically held spring release locks. The bottom part of the spring release locks is coupled to the detachable counterweight, and the top part of the spring release locks is coupled to the permanent counterweight, such that when the permanent counterweight and detachable counterweight come together the locking mechanisms of the spring release locks on each of the two counterweights and engage and thereby join the permanent counterweight and detachable counterweight together to act as a single counterweight. Both the permanent counterweight and the detachable counterweight are guided by a counterweight rail system. Free fall catchers are coupled to the detachable counterweight. When the spring release locks are engaged during normal

operation, the spring release locks lock the permanent counterweight to the detachable counterweight, comprising the total weight offsetting the weight of the elevator cab through the connecting cable and counterweight pulley system.

When the elevator controller senses a power loss in the electrical supply panel, the elevator controller cuts off control voltage to the electrically held spring release locks, causing the spring release locks to disengage the detachable counterweight from the permanent counterweight upon detachment, the detachable counterweight descends under its own weight until the speed of the detachable counterweight exceeds a preset value, at which point the free fall catchers stop the descent of the detachable counterweight by clamping onto the counterweight rail system. The elevator controller is also connected to the elevator brakes, and when the elevator controller senses a power loss in the electrical supply panel, the elevator controller causes the elevator brakes to be released and held in a released position.

Due to the heavier weight of the elevator cab relative to the permanent counterweight, and due to the elevator brakes being held in the released position, the elevator cab begins movement under its own weight after detachment of the detachable counterweight. The movement elevator cab is connected to the alternating or direct current electrical generator through the cable, and mechanical system of shafts and pulleys and respectively, and the descent of the elevator cab thereby causes the cable to rotate the counterweight pulley, thereby through the mechanical system of shafts and pulleys driving the electrical generator. The alternating or direct current generator is connected to the load bank via the thiristor or transistor switch or similar operative device. The dedicated emergency descent controller with pulsewidth modulation (PWM) output is connected to the thiristor or transistor switch or similar operative device, and thereby regulates the generator current through the load bank.

The elevator controller directs the elevator drive motor to rotate the counterweight pulley to raise the elevator cab and correspondingly cause the attached permanent counterweight to descend until the top half of the release locks coupled to the bottom of the permanent counterweight engages the top half of the release locks coupled to the top of the detachable counterweight, at which point the release locks engage and thereby couple the permanent counterweight to the detachable counterweight, restoring the elevator system to normal operation.

In an alternative embodiment, an elevator system, instead of using the electrical generator of to generate electrical energy during power loss or interruption, the system uses the elevator drive motor with a motor mode operation switching contactor. The elevator controller is connected to the motor mode operation switching contactor.

In an alternative embodiment, an elevator system, instead of using the electrical generate electrical energy during power loss or interruption, uses the elevator drive motor with a motor mode operation switching contactor. Further, rather than using the detachable counterweight with release locks and free fall catchers, the system uses the permanent counterweight that is lighter than the elevator cab so that when the elevator controller after sensing power loss directs that the elevator brakes release and be held in a released position, the elevator cab begins movement due to its heaviness relative to the permanent counterweight.

In another embodiment of the invention, a retrofit kit can be installed in existing elevator systems to accomplish an elevator system. The retrofit kit is comprised of a replacement counterweight consisting of a permanent counterweight joined to a detachable counterweight with free fall catchers through electrically held spring release locks or other like devices. The top half of the spring release locks is coupled to the bottom of the permanent counterweight, and the bottom half of the spring release locks is coupled to the top of the detachable

counterweight. The retrofit kit includes a small battery for the elevator controller to support control during power loss, which battery is integral to the elevator controller. The retrofit kit further includes an alternating or direct current electrical generator, the output of which is connected to the load bank via the thyristor or transistor switch or similar operative device. The retrofit kit includes a dedicated emergency descent controller with pulsewidth modulation (PWM) output connected to the thyristor or transistor switch or similar operative device, which thereby regulates the generator current through the load bank.

In an alternative embodiment, a retrofit kit can be installed in existing elevator systems to accomplish an elevator system. A difference between the elevator retrofit kit based and the elevator retrofit kit based is that instead of being comprised of the electrical generator to generate electrical energy during power loss or interruption, the retrofit kit is comprised of the elevator drive motor with the motor mode operation switching contactor. When installed, the retrofit kit functions in a manner consistent with the elevator system described.

In yet another embodiment, a counterweight device is comprised of the permanent counterweight and the detachable counterweight with free fall catchers, the permanent counterweight and detachable counterweights being coupled together by electrically held spring release locks or other like devices when the locks are engaged. The bottom part of the spring release locks is coupled to the detachable counterweight, and the top part of which spring release locks is coupled to a permanent counterweight.

When the permanent counterweight and detachable counterweight come together, the locking mechanisms of the spring release locks on each of the two counterweights engage and thereby join the permanent counterweight and detachable counterweight together to act as a single counterweight. Both the permanent counterweight and the detachable counterweight are guided by the counterweight rail system. Free fall catchers are coupled to the detachable counterweight. A power loss to the electrically held spring release locks, whether by direction of an elevator controller or otherwise, causes the spring release locks to disengage. Upon detachment, the detachable counterweight descends under its own weight until the speed of the detachable counterweight exceeds a preset value, at which point the free fall catchers stop the descent of the detachable counterweight by clamping onto the counterweight rail system. After return of normal power and upon the permanent counterweight being lowered to the detachable counterweight, or upon the detachable counterweight being raised to the permanent counterweight, the electrically held spring release locks engages and thereby couples the permanent counterweight to the detachable counterweight.

Although the invention has been described with reference to specific embodiments, this description is not meant to be construed in a limiting sense. Various modifications of the disclosed embodiments as well as alternative embodiments of the invention will become apparent to persons skilled in the art upon reference to the description of the invention. It is therefore contemplated that the appended claims will cover any such modifications or embodiments that fall within the true scope of the invention. In the existing system the new design is used for converting unutilized mechanical energy into electrical energy and it is compactly fitted into headroom. This new design is specific to the regenerate the electrical energy from mechanical energy of the lift which is stored in battery and it will use whenever the light is off This design is easily compile with the existing system this design content two rolling part and a reciprocating part which is used to convert circular motion into reciprocating motion and vice versa. The lift is moving up and down that's the mechanical energy converts that's specific system into electrical energy.

V. STATISTICAL ANALYSIS

Building characteristics – such as Net Lettable Area (NLA), occupancy hours, building height, fire stairs accessibility and building quality (PCA grade). This information was provided by the building facility managers.

Lift characteristics – such as hoist mechanism, drive type, rise height, floors serviced and other technology related information. This information was provided by the lift contractors, which was usually the equipment manufacturers or vendors.

Metered building and lift energy consumption – This was a mix of third party utility metered data, on site sub metered data and temporary logging.

The Hypothetical Model Occupied and Lift Floors are directly related to building size for this reason, they are good first order indicators for the scale of lift services provided by the base building and likely its energy consumption.

Energy = Total work of lift system + Total standby losses..... [Eqn 1]

Where the total work of the lift system can be approximated by the total distances lifts

(i.e. work = displacement*force)

assumption is made based on the findings of the project that working lift energy consumption trip is dominated by the flat peak lift motion (up trip) and not of the short acceleration/deceleration windows challenge is then to find a method to estimate the whole lift system workload using relationship.

Total work of the lift system = Σ (no. of trips by lift * distance travelled per by lift)..... [Eqn 2]

An important assumption can be made here that the average number of trips per lift constant throughout the office assumption is based on the premise that designed to service a fixed level of NLA per lift car Total NLA vs. The sample data can be used to reliably estimate that on average there is 1 lift car servicing every 2,500m of NLA. Furthermore, the data correlation between number of occupants and NLA (R² =0.85), indicating that NLA is a good predictor for the expected number of building occupants. Useful conclusion here is that in design, the average number of building occupants serviced (and the average number of trips each lift) over the course of a year comparable, Equation 2 is therefore equivalent to,

Total work of the lift system=a * Σ (distance travelled per trip per lift)

Where a is a constant (e.g. average number of trips per year)

To simplify matters further, the sum of distances travelled per trip per lift can be represented by the total Lift Floors of the building (defined earlier),i.e.

Total work of the lift system= a * Lift Floors..... [Eqn 3]

The total standby losses are largely dependent on the number of lift motors. Since NLA is directly proportional to the number of lifts

Total standby losses = b * no. of lifts

Total standby losses = b * NLA..... [Eqn 4]

Where b is a constant, By combining equations 3 and 4, the total energy consumption of a lift system is given by,

Energy = a * Lift Floors + b * NLA

The equation 5 presents the model numerically

Annual Lift Energy (kWh) = 528 * Lift Floors + 5.47 * occupied NLA (m²)..... [Eqn 5]

VI. CONCLUSION

Various modifications of the disclosed embodiments as well as alternative embodiments of the invention will become apparent to persons skilled in the art upon reference to the description of the invention. It is therefore contemplated that the appended claims will cover any such modifications or embodiments that fall within the true scope of the invention.

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ANONYMOUS AUTHENTICATION AND SECURE DATA STORAGE USING DECENTRALIZED ACCESS CONTROL SCHEME

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ABSTRACT

The new suburbanised access management theme for secure knowledge storage in clouds that supports anonymous authentication. Within the planned theme, the cloud verifies the genuineness while not knowing the user's identity before storing knowledge. The theme conjointly has the accessorial feature of access management within which solely valid users can measure and able to decipher the hold on info. The theme prevents replay attacks and supports creation, modification, and reading knowledge hold on within the cloud. we have a tendency to conjointly address user revocation. Moreover, our authentication and access management theme is suburbanised and strong, not like different access management schemes designed for clouds that square measure centralized. Cloud storage provides a extremely out there, simply accessible and cheap remote knowledge repository to purchasers who cannot afford to take care of their own storage infrastructure. Whereas several applications of cloud storage need security guarantees against the cloud supplier (e.g., storage of high-impact business knowledge or medical records), most services cannot guarantee that the supplier won't see or modify shopper knowledge. this can be mostly as a result of this approaches for providing security (e.g., encoding and digital signatures) diminish the utility and/or performance of cloud storage. User privacy is additionally needed so the cloud or different users don't grasp the identity of the user. The validity of the user who stores the info is additionally verified.

Keywords: Access Control, Authentication, Cloud Storage, Digital Signature, Valid Users.

I. INTRODUCTION

Cloud computing could be a quick growing paradigm during which computing resources area unit provided as services over the net and users will access the resources supported their payments. Analysis in cloud computing is receiving plenty of attention from each educational and industrial worlds. In cloud computing, users will source their computation and storage to servers (also known as clouds) victimization web. This frees users from the hassles of maintaining resources on-site. Clouds will offer many styles of services like applications (e.g., Google Apps, Microsoft online), infrastructures (e.g., Amazon's EC2, Eucalyptus, Nimbus), and platforms to assist developers write applications (e.g., Amazon's S3, Windows Azure). abundant of the info hold on in clouds is very sensitive, for instance, medical records and social networks. Security and privacy area unit therefore vital problems in cloud computing.

An area wherever access management is wide being employed is health care. Clouds area unit being employed to store sensitive data regarding patients to modify access to medical professionals, hospital workers,

researchers, and policy manufacturers. it's vital to manage the access of knowledge so solely approved users will access the info. Access management is additionally gaining importance in on-line social networking wherever users (members) store their personal data, pictures, videos and share them with designated teams of users or communities they belong to. Access management in on-line social networking has been studied and such information area unit being hold on in clouds and its vital that solely the approved users area unit given access to those data.

Sahai and Waters[7] introduced attribute-based encoding (ABE) as a brand new suggests that for encrypted access management. In Associate in Nursing attribute-based encoding system ciphertexts aren't essentially encrypted to 1 explicit user as in ancient public key cryptography. Instead each users' personal keys and ciphertexts are going to be related to a group of attributes or a policy over attributes. A user is in a position to decode a ciphertext if there's a "match" between his personal key and therefore the ciphertext. In their original system Sahai and Waters conferred a Threshold ABE system during which ciphertexts were labeled with a group of attributes S and a user's personal key was related to each a threshold parameter k and another set of attributes S_0 . so as for a user to decode a ciphertext a minimum of k attributes should overlap between the ciphertext and his personal keys. one in every of the first original motivations for this was to style Associate in Nursing error-tolerant (or Fuzzy) identity-based encoding theme that might use biometric identities.

The primary disadvantage of the Sahai-Waters [7] threshold ABE system is that the edge linguistics aren't terribly communicative and so area unit limiting for coming up with a lot of general systems. Goyal et al. introduced the thought of a lot of general key-policy attribute-based encoding system. In their construction a ciphertext is related to a group of attributes and a user's key is related to any monotonic tree access structure. the development of Goyal[7] et al. is viewed as Associate in Nursing extension of the Sahai-Waters[7] techniques wherever rather than embedding a Shamir secret sharing theme within the personal key, the authority embeds a lot of general secret sharing theme for monotonic access trees. As a lot of sensitive information is shared and hold on by third-party sites on the net, there'll be a requirement to encode information hold on at these sites. One disadvantage of encrypting information, is that it is by selection shared solely at a coarse-grained level. In many distributed systems a user ought to solely be able to access information if a user posses an exact set of credentials or attributes. Currently, the sole technique for implementing such policies is to use a trusty server to store the info and mediate access management. However, if any server storing the info is compromised, then the confidentiality of the info are going to be compromised.

The main aspects of the paper area unit as follows:

- 1) Distributed access management of knowledge hold on in cloud so solely approved users with valid attributes will access them.
- 2) Authentication of users UN agency store and modify their information on the cloud.
- 3) The identity of the user is shielded from the cloud throughout authentication.
- 4) The design is redistributed, which means that there is many KDCs for key management.
- 5) The access management and authentication area unit each collusion resistant, which means that no 2 users will interact and access information or demonstrate themselves, if they're severally not approved.
- 6) Revoked users cannot access information when they need been revoked.
- 7) The projected theme is resilient to replay attacks. A author whose attributes and keys are revoked cannot write back stale data.
- 8) The protocol supports multiple browse and pen the info hold on within the cloud.

9) The prices area unit akin to the prevailing centralized approaches, and therefore the high priced operations area unit principally done by the cloud

II. RELATED WORK

Our projected privacy protective documented access management theme makes use of use 2 protocols ABE(Attribute primarily based Encryption) and ABS (Attribute primarily based Signing).While obligatory Access Controls (MAC) square measure applicable for construction secure military applications, Discretionary Access Controls (DAC) square measure usually perceived as meeting the safety process wants of business and civilian government. The paper[11] argues that reliance on DAC because the principal technique of access management is unwarranted and inappropriate for several industrial and civilian government organizations. The paper describes a sort of non-discretionary access management role-based access management (RBAC)[5] that's a lot of central to the secure process wants of non-military systems than DAC.

This paper[4], supported the identity-based graded model for cloud computing (IBHMCC) and its corresponding secret writing and signature schemes, given a brand new identity-based authentication protocol for cloud computing and services. Through simulation testing, it's shown that the authentication protocol is additional light-weight and economical than SAP, specially the additional light-weight user aspect. Such benefit of our model with nice quantifiability is incredibly suited to the huge scale cloud Attribute primarily based secret writing (ABE)[7] determines coding ability supported a user's attributes. during a multi-authority ABE[9] theme, multiple attribute-authorities monitor totally different sets of attributes and issue corresponding coding keys to users, and encryptors will need that a user get keys for applicable attributes from every authority before decrypting a message.

III. SYSTEM ARCHITECTURE

Consider the subsequent situation: A student, Alice, desires to send a series of reports concerning some malpractices by authorities of University X to any or all the professors of University X, analysis chairs of universities within the country, and students happiness to Law department all told universities within the province.

Alice needs to stay anonymous whereas business all proof of malpractice. She stores the knowledge within the cloud. Access management is vital in such case, so solely licensed users will access the information. Alice will shield the information in encrypted format and while not knowing the cryptography key no one will access the information. it's conjointly necessary to verify that the knowledge comes from a reliable supply. the issues of access management, authentication, and privacy protection ought to be resolved at the same time.

We propose our privacy protective documented access management theme. per our theme a user will produce a file and store it firmly within the cloud. This theme consists of use of the 2 protocols ABE(Attribute primarily based Encryption) and ABS (Attribute primarily based Signing). There square measure 3 users, a creator, a reader and author. Creator Alice receives a token γ from the trustee, UN agency is assumed to be honest. A trustee may be somebody just like the centralized UN agency manages welfare numbers etc. On presenting her id (like health/social insurance number), the trustee offers her a token γ . There square measure multiple KDCs (here 2), which might be scattered. as an instance, these may be servers in several components of the globe. A

creator on presenting the token to 1 or a lot of KDCs receives keys for encryption/decryption and signing language.

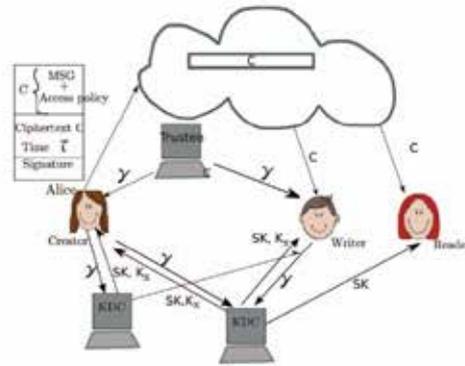


Fig. 1. A Secure Cloud Model

The model consists of 3 users a creator, a reader and a author. Creator Alice receives a token γ from the trustee, WHO is assumed to be honest. A trustee is somebody just like the federal WHO manages social welfare numbers etc. On presenting her id (like health/social insurance number), the trustee offers her token γ . There multiple KDCs (here 2), which may be scattered. parenthetically, these is servers in several elements of the planet. A creator on presenting the token to 1 or a lot of KDCs receives keys for encryption/decryption and linguistic communication. within the fig SKs square measure secret keys given for cryptography, Kx square measure keys for linguistic communication. The message seasoning is encrypted below the access policy X. The access policy decides WHO will access the information hold on in cloud.

The creator decides on a claim policy Y, to prove her genuineness and signs the message underneath this claim. The ciphertext C with signature is c, and is shipped to the cloud. The cloud verifies the signature and stores the ciphertext C. once a scanner desires to read, the cloud sends C. If the user has attributes matching with access policy, it will decode and obtain back original message. Write yield within the same method as file creation. By designating the verification method to the cloud, it relieves the individual users from time overwhelming verifications. once a scanner desires to read some knowledge hold on within the cloud, it tries to decode it exploitation the key keys it receives from the KDCs. If it's enough attributes matching with the access policy, then it decrypts the knowledge hold on within the cloud

IV. REAL LIFETIME EXAMPLE

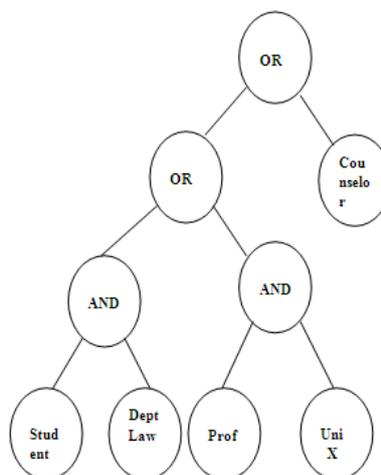


Fig. 2. Example of Claim Policy

We currently return the matter we tend to explicit within the introduction. we'll use a relaxed setting. Suppose Alice could be a student and needs to send a series of reports regarding malpractices by authorities of University X to all or any the professors of University X, analysis chairs of universities X,Y,Z and students happiness to Law department in university X. She needs to stay anonymous, whereas business enterprise all proof. All data is hold on within the cloud. it's necessary that users shouldn't be able to understand her identity, however should trust that the knowledge is from a legitimate supply. For this reason she additionally sends a claim message that states that she "Is a law student" or "Is a student counselor" or "Professor at university X".

The tree comparable to the claim policy is shown in Figure 2. The leaves of the tree consists of attributes and also the intermediary nodes consists of Boolean operators. during this example the attributes are "Student", "Prof", "Dept Law", "Uni X", "Counselor". The on top of claim policy will be written as a Boolean operate of attributes as ((Student AND Dept Law) OR (Prof AND Uni X)) OR (Student Counselor). Boolean functions also can be delineate by access tree, with attributes at the leaves and AND (\wedge) and OR (\vee) because the intermediate nodes and root. Boolean functions will be reborn to LSSS matrix as below: Let $v[x]$ be oldsters vector. If node $x=AND$, then the left kid is $(v[x]|1)$, and also the right kid is $(0,\dots,1)$. If $x=OR$, then each kids even have unchanged vector $v[x]$. Finally, pad with 0s before, specified all vectors are of equal length. The proof of validity of the formula is given in [13]. exploitation this formula, the span program for this policy is

$$M = \begin{pmatrix} 1 & 1 \\ 0 & -1 \\ 1 & 1 \\ 0 & -1 \\ 1 & 0 \end{pmatrix}$$

An assignment $v=(v1, v2, v3, v4, v5)$ satisfies this span program if $vM = (1, 0)$. The cloud ought to verify that Alice so satisfies this claim. Since she could be a pupil, $v=(1, 1, 0, 0, 0)$ and could be a valid assignment. As a legitimate user she will be able to then store all the encrypted records underneath the set of access policy that she has determined. The access policy just in case of Alice is ((Prof AND Uni. X) OR (Research Chair AND ((Uni X OR Uni Y) OR Uni Z)) OR ((Student AND Dept Law) AND Uni X).

Later once a legitimate user, say Bob needs to change any of those reports he additionally attaches a group of claims that the cloud verifies. let's say, Bob could be a analysis chair and may send a claim "Research chair" or "Department head" that is then verified by the cloud. It then sends the encrypted information to the Bob. Since Bob could be a valid user and has matching attributes, he will decipher and find back the knowledge. If Bob needs to browse the contents while not modifying them, then there's no ought to attach a claim. He are able to decipher on condition that he's a academic in University X or an exploration chair in one among the schools X,Y,Z or a student happiness to Department of Law in university X.

The students will have credentials from the university and conjointly a department. ab initio Alice goes to a trustee to illustrate the Canadian health service and presents her a insurance variety or agency presents her a welfare variety. Either or each of those trustees will offer her token $(s)\gamma=(u,Kbase,K0,\rho)$. With the token she approaches the KDCs within the university X and department D and obtains the key keys for cryptography and for keys Kx and Kentucky for sign language the assess policy. she will conjointly access the general public keys APK [i] of alternative KDCs. the whole method is carried on within the following way: A. Data Storage in

clouds. Let the info be denoted by msg , X is that the access policy- ((Prof AND Uni. X) OR (Research Chair AND ((Uni X OR Uni Y) OR Uni Z)) OR((Student AND Dept Law)AND Uni X) Alice encrypts the info and obtains the ciphertext $C=Enc(MSG,X)$. Alice jointly decides on a claim policy Y that is shown in Figure two. From the matrix, $v=(1,1,0,0,0)$ will be calculated. The values of $Y, W, S1, S2, S3, S4, S5, P1, P2$ will be calculated. $\mu=H(MSG||Y)$. this time stamp τ is hooked up to the ciphertext to stop replay attacks. The signature σ is calculated as $ABS.Sign$. The ciphertext $c=(C,\tau,\sigma,Y)$ is then send to the cloud. The cloud verifies the signature using the perform $ABS.Verify$ as given in Equation (11). If Alice has valid credentials then the ciphertext (C,τ) is keep, else it's discarded.

Suppose Bob desires to access the records keep by Alice. Bob then decrypts the message sooner exploitation his secret keys exploitation perform $ABE.Decrypt$. Writing return like file creation. it's to be noted that the time τ is additional to the information in order that though Bob's credentials area unit revoked, he cannot write stale information within the cloud.

V. CONCLUSION

The work presents the information of cloud security access. the prevailing system doesn't give the users with the authorization and secret writing techniques of secured storage in cloud. we have a tendency to propose a decentralised model that keeps the anonymous believability of the user. The cloud doesn't grasp the identity of the user WHO stores info, however solely verifies the user's credentials. Key distribution is completed during a decentralized manner.

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AN EXPERIMENTAL STUDY ON PILE CAPS IN FLEXURE AND SHEAR

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ABSTRACT

Pile caps are essential structural elements between the stanchions and group of foundation piles. Though the design of pile caps for tensile forces in the bottom of pile cap either by flexure theory or by truss analogy are established and present no problems. Similarly two way (punching) shear on pile caps is also designed routinely. But bending shear occurring on pile caps presents problems. National design codes also have been changing provisions for shear. Present IS 456-2000 has specifications for identification of shear force on pile caps that are different from those of predecessor code IS 456-1978, The present investigation examines by tests the shear provisions of pile cap beams and slabs, of the present IS code. The test results confirm the IS 456-2000 provisions.

Key words: crack width, deflection, flexure, shear, beams

I. INTRODUCTION

In deep foundations, pile cap constitutes a principal structural item, transferring stanchion load to the piles below it. Pile cap covers generally a single pile, two piles, three piles, four piles or a cluster of piles. The structural element, pile cap has to be proportioned for flexure, beam shear, punching shear. Piles are used in adverse situations such as marine clays, river beds, coastal stretches in sea beds. High water tables, surface water, deep water depths present problems in casting pile caps. Pile caps have to be designed for punch shear, beam shear and bending moment or tensile force. To counter design problems encountered with two way shear (punching shear), pile cap depth may be encased or a pedestal between the stanchion and pile cap may be provided as stanchion dimensions are predetermined and remain unaltered. The tensile forces generated at the bottom of pile cap are resisted by provision of longitudinal reinforcement at the bottom of pile cap. This reinforcement can be proportioned by the two methods available. These are truss analogy or standard bending theory.

These two methods present no problems and are straight forward, differing only in the detailing of reinforcement. The third and final item for design is beam shear which presents some problems in design. To suppress shear problem, shear stress can be kept under control by encasing pile cap depth. But size increase presents problems in the management of large quantities of concrete not only in normal circumstances but more so in the presence of water. Incorporation of shear reinforcement helps in the reduction of pile cap size on one hand but becomes problematic in the fabrication of shear reinforcement.

Codal specifications for shear design of pile caps vary in different national codes. IS 456-2000 specifies in 34.2.42 that in computing the external shear, on any section through a footing supported in piles, the entire reaction from any pile of diameter D_p whose centre is located $D_p/2$ or more outside the critical section shall be

assumed as producing shear on the section, the section from any pile whose centre is located $D_p/2$ or more inside the section shall be assumed as producing no shear on the section. For intermediate positions of the pile centre, the portion of the pile reaction to be assumed as producing shear on the section shall be based on straight line interpolation between the full at $D_p/2$ outside the section and zero value at $D_p/2$ inside the section. Specification 32.2.4 defines the critical section referred above. The footing acting essentially as a wide beam with a potential diagonal crack extending in a critical section further condition shall be assumed as a vertical section located from the face of the column or pedestal shall be at a distance equal to the effective depth of footing or pile cap for footings on piles.

But the earlier code IS 456-1978 differs from the current code in defining the critical section from the face of column. Contrary to the present code, earlier code defines that this critical section from the face of column, pedestal or wall is at a distance equal to the effective depth of footing in case of footings on soils, and a distance equal to half the effective depth of footing for footings on piles.

ACI 318-08 specifies computation of shear on piles in 15.5.4.1 and 15.5.4.2

Entire reaction from any pile with its center located $d_p/2$ or more outside the section shall be considered as producing shear on that section. Reaction from any pile with its center located $d_p/2$ or more inside the section shall be considered as producing no shear on that section.

II. LITERATURE REVIEW

Perry Adebare and Luke Zhou (1996) in their paper Design of Deep pile cap by Strut and Tie Method comparisons with results from 48 pile cap tests demonstrate that the one way shear design provisions of the present ACI Building Code are excessively conservative for deep pile cap and that the traditional flexural design procedures for beams and two-way slabs are unconservative for pile caps. Flexural design can best be accomplished using a simple strut and tie model and test results demonstrate that the longitudinal reinforcement should be concentrated over the piles as suggested by strut and tie models. A simple shear design procedure is proposed in which maximum bearing stress is considered the best indicator of “shear strength” for deep pile caps. The maximum bearing stress that can be applied without causing splitting of compression struts within pile caps depends on the amount of confinement, as well as the aspect ratio of compression struts. The influence of confinement is more gradual than suggested by the ACI code bearing strength provisions.

Eswara Rao (1997) in his thesis Behaviour of R.C.C Pile caps with steel Fibres studied the behavior of reinforced concrete pile caps with and without fibres. He concluded from his experimental work that pile cap with fibres failed at higher ultimate load. The crack width and deflections are also found to be reduced with fibres in pile caps. He also concludes that when shear span to depth ratio is around 1.68, both bending theory and truss theory gave similar results. He observes that steel reinforcement required from truss theory is more than that required from beam theory.

Murty et al (1997) in their paper on Reinforced Cement Concrete Pile cap in shear discussed the design of a pile cap for flexure and shear. The general features and related aspects are discussed in their paper. Various Code provisions are discussed with reference to shear.

Masahiro Shirato et al (2002) in their paper proposed a design methodology for ultimate shear strength of pile caps subject to various stresses, based on experiments and numerical analyses. First, they determined an evaluation equation for shear strength of pile caps with compressive piles. Second, they clarified the shear resistance mechanism of pile caps with pull-out piles, and confirmed to be able to apply the determined

evaluation equation to those with pull-out piles by modifying the setting of shear span. The proposed methodology was introduced into the current version of the Japanese specifications for Highway Bridges (March 2002).

Gupta (2003) he studied on the Analysis and Design of Piles in a group. Most of the methods available for analysis of piles as given in standard books and Indian codes are for single pile. The behavior of pile under combined axial and lateral loads is not defined in codes and in general literature. Most of the design engineers are designing piles based on length of fixity charts given in IS2911 part-1. The method of calculation of bending moment of piles is discussed in detail in their paper and results are supported by finite element analysis on computers.

Saeed Ahmad et al (2009) in their paper Evaluation of the Shear strength of four pile caps using Strut and Tie Model (STM). Strut and Tie model has been widely used for the design of distributed region and non flexural members in RC structures. Pile cap is typically a distributed region with small length to depth ratio, hence ordinary flexural theory for beams cannot be applied to it. In this research, six pile caps were designed for certain theoretical ultimate loads on the basis of STM. These pile caps were tested on four simply supporting piles. Loads were applied at the centre of pile cap. The experimental values were compared with the theoretical capacities of the pile caps on the basis of STM. It has been observed that STM has provided a reliable solution for predicting the shear strength of the four pile caps and the experimental values full very close to the theoretical values based on STM.

III. METHODOLOGY

3.1 Fabrication of Test Specimens

The form work for casting the specimens was made with masonry with concrete blocks. The steel grills were placed in the form work with the concrete designed for M30 grade. The concrete was prepared with concrete mixer available in the laboratory. The concrete was poured in the forms and vibrated with a needle vibrator. After 24 hours, the specimens were demoulded and curing started. At the termination of curing the specimens were prepared for testing. The pile supports were 17 cm and 20 cm circular in section. The specimens were loaded by a hydraulic jack of 1000kN capacity and the load was measured by a 1000kN proving ring. The deformation response of the member was recorded by a dial gauge and a crack width meter. A dial gauge with a least count of 0.01mm was used for measuring transverse deflections. A crack width meter with a least count of 0.01mm was utilised. At each load increment, transverse load was noted. The crack formation was noticed and was noted on the pile cap. Maximum crack was measured and noted. Transverse deflection at the mid span of the specimen was noted. About 20 load increments were needed to reach ultimate strength of the member loading continued beyond the ultimate load. Pile cap beam PB1 failed in shear. Pile cap beam PB2 failed in flexure. Principal test results are tabulated in Table 7. Comparison of test results and theoretical results are shown in Table 8. The photographs of tested specimens PB1 and PB2 are given in plates 1, through 4.

3.2 Pile Cap

Pile cap is defined as a concrete block cast on the head of a pile, or a group of piles, to transmit the load from the structure to the pile or group of piles. The individual piles are spaced and connected to the pile cap. The pile cap distributes the applied load to the individual piles which, in turn, transfer the load to the bearing ground.

External pressures on a pile are likely to be greatest near the ground surface. Ground stability increases with depth and pressure. The top of the pile therefore, is more vulnerable to movement and stress than the base of the

pile. Pile caps are thus incorporated in order to tie the pile heads together so that individual pile movement and settlement is greatly reduced. Thus stability of the pile group is greatly increased. The functions of a pile cap are

1. To distribute a single load equally over the pile group and thus over a greater area of bearing potential.
2. To laterally stabilize individual piles thus increasing overall stability of the group.
3. To provide the necessary combined resistance to stresses set up by the super structure and/or ground movement. Little or no test results are reported on pile caps to date. However, several hand books and codes of practice provide guidance for design of pile caps.

3.3 Design of Pile Cap

Pile caps are used to transmit column loads to the pile foundation. The dimension of the pile cap is based on the fact that the actual final position of piles can be in construction up to 10 cm out of line from the theoretical center lines should be made very large to accommodate this deviation. In practice, pile caps are extended as much as 15 cm beyond the outer face of the piles. The important parameters in design of pile caps are:

- ✓ Shape of pile cap
- ✓ Depth of pile cap
- ✓ Amount of steel to be provided
- ✓ Arrangement of reinforcement

3.4 Modes of Cracking

3.4.1. Flexural Cracks

In reinforced concrete beams of usual proportions, subjected to relatively high flexural stresses f_y and low shear stresses τ , the maximum principal tensile stress is invariably given by the flexural stress f_y max in the outer fiber at the peak moment locations, the resulting cracks are termed flexural cracks. These are controlled by the tension bars.

3.4.2. Web - Shear Cracks or Diagonal Tension Cracks:

In short span beams which are relatively deep and have thin webs and are subjected to high shear stresses τ and relatively low flexural stresses f_y , it is located at the neutral axis level at an inclination $\theta = 45^\circ$, the resulting cracks are termed web shear cracks or diagonal tension cracks. Shear reinforcement is required to prevent the propagation of these cracks.

3.4.3. Flexure – Shear Cracks

When a flexural crack occurs in combination with a diagonal tension crack, the crack is referred to as flexure-shear crack. In such a case, it is the flexural crack that usually forms first, and due to the increased shear stresses at the tip of the crack, this flexural crack extends into a diagonal tension crack.

3.4.4. Secondary Cracks

When the inclined crack propagates along the tension reinforcement towards the support, such cracks are referred to as secondary cracks or splitting cracks.

3.4.5. Dowel Forces in Bars

When cracks are attributed to the wedging action of the tension bar deformations and to the transverse 'dowel forces' introduced by the tension bars functioning as dowels across the crack, resisting relative transverse displacements between the two segments of the beam.

3.5 Modes of Failure for a Pile Cap

The modes of failure for a pile cap include

- Crushing of the concrete under the column or over the pile.
- Bursting of the side cover where the pile transfers its load to the pile cap.
- Yielding of the tension reinforcement.
- Anchorage failure of the tension reinforcement.
- Two-way shear failure where the cone of material inside the piles punches downward.

IV. EXPERIMENTAL INVESTIGATION

4.1 General

This chapter deals with the experimental programme particulars. The materials used, concrete mix details, formwork, casting procedure, preparation of specimens, cover details and testing procedure are explained in detail.

4.2 Experimental Programm

To investigate the provisions of IS 456-2000, relative to shear design, an experimental programme has been under taken. The investigation comprises testing of two pile cap beams. Pile cap beams are supported by two piles.

In the two pile cap beams PB1 and PB2, one beam is designed such that pile contributes shear force on the pile cap. In the second pile cap beam, pile does not contribute shear on the pile cap. These designs are made as per the code IS 456-2000 .The details of pile cap beams are furnished in Table1. The preliminary designs of pile cap beams are furnished in Appendix A. Mechanical properties of steel reinforcement are given in Table 3

4.3 Materials

The properties and specifications of various materials used in the preparation of test specimens are as follows.

4.3.1Cement

The cement used for the investigation was ACC Portland slag cement. The cement is fresh and is of uniform color and consistency. It is free from lumps and foreign matter. The results of the tests on cement are listed in Table 1. Initial setting time observed is 140 minutes and final setting time is 318 minutes, specific gravity is 3.13 .

Table 1: Properties of Cement

Properties	Test Values	Standard values (IS 8112:1989)
Specific gravity	3.13	
Standard consistency (percent)	31	
Initial setting time (min)	140	>30
Final setting time (min)	318	<600
Fineness of cement (percent)	10	10

4.3.2 Fine Aggregate

The fine aggregate used in the present experimental programme is river sand confirming to zone-II as per 383:1970. It is clean, inert and free from organic matter, silt and clay. The physical properties of sand are given in Table 2

Table 2: Properties of Fine Aggregate

Properties	Test values
Specific gravity	2.61
Bulk density (gm/cc)	1.46
Fineness modulus	2.53

4.3.3 Coarse Aggregate

The coarse aggregate used, was from an established quarry satisfying the requirements of IS 383:1970. In this experimental programme aggregates of 20 and 10 mm size used. The coarse aggregate used, satisfied the standard values, as per sieve analysis. All the parameters specific gravity, bulk density, water absorption and fineness modulus were determined. The material properties of aggregates are summarized in Table 3.

Table 3: Material Properties of Aggregates

Physical properties	Test values
Specific gravity	2.81
Bulk density (Loose) gm/cc	1.38
Bulk density (Rodded) gm/cc	1.60
Water Absorption percent (%)	0.5
Fineness Modulus	5.96
Impact value (%)	24

4.3.4 Water

The water used for cement mixing was potable water collected from the laboratory taps. Water from same source was used for curing the specimens.

4.3.5 Steel reinforcement

The steel reinforcement was tested in the laboratory for its strength . High strength deformed bars (HYSD) are used. The properties of steel are given in Table 4.

Table 4: Properties of Steel

Grade of steel Reinforcement	Diameter of Bar (mm)	Yield stress (N/mm ²)	Ultimate stress (N/mm ²)
Fe 500	8	500	630
Fe 500	12	520	650
Fe 500	16	550	680

4.4 Test Specimen

There are two pile caps in this investigation. The two pile caps are provided with 20 mm cover. The two pile caps are designated as PB1 & PB2

A measure of the compressive strength and split tensile strength of concrete was obtained by testing 150×150×150 mm cubes, 150 mm diameter and 300 mm height cylinders respectively.

4.5 Cover Details

Cover of 20 mm is provided for all four pile caps. Mortar briquettes of (70mm ×40mm×20mm) were cast and used as cover blocks. They were cast with 1:3 cement mortar and cured before being used.

4.6 Concrete Mix Design

The nominal grade of concrete used in this experimental program are M20 & M30. The mix design is based on strength criteria and durability criterion suitable for severe environment. The mix design procedure is adopted according to IS 10262-1982. M30 mix design procedure was adopted for all the pile caps and M20 mix design was adopted for circular beams. The mix proportions by weight were finalized after some trial mixes. The water cement ratio were kept as 0.55 & 0.43 for M20 & M30 respectively.

4.6.1 Mix Design Procedure for M20 Grade Concrete

(As per IS 10262:1982)

(a)	Characteristic compressive strength required in the field at 28 days (MPa)	20
(b)	Maximum size of aggregate (mm)	20
(c)	Degree of Workability (specified) mm (slump)	50 to 75
(d)	Degree of quality control	good
(e)	Type of exposure	Moderate

4.6.2 Test Data for Materials

(a)	Cement used	ACC Portland slag
(b)	Specific gravity of cement	3.13
(c)	Specific gravity of Coarse aggregate – 20 mm	2.81
	Coarse aggregate – 10 mm	2.78
	Fine aggregate	2.61
(d)	Sand corresponds to zone	II
(e)	Target mean strength of concrete	$20+1.65 \times 4 = 26.6 \text{MPa}$
(f)	Selection of W/C ratio corresponding to the above strength	0.55

	requirement	
(g)	Selection of water per cubic m	175
(h)	Fine aggregate percentage selected in total aggregate.	37%

Adjustment in water and sand change in condition	Adjustment required in water percent	0% sand in total aggregate
For decrease in W/C ratio by	-	- 1.0 %
For sand conforming to zone – II	-	
Total	-	- 1.0 %
Therefore required sand content as percentage of total aggregate by absolute volume	37 – 1 = 36 %	
Required water content	175 liters	

4.6.3 Determination of Cement Content

Water-cement ratio	=	0.55
Water	=	175 liters
Cement	=	318 Kgs

This cement is adequate for Severe exposure conditions.

4.6.4 Determination of Fine Aggregate

$$V = [W + (C/S_c) + (1/p) \times (f_a / S_{fa})] \times 1/1000$$

$$0.98 = [175 + (318/3.13) + (1/0.36) (fa/2.61)] \times (1/1000)$$

$$f_a = 661 \text{ Kgs}$$

4.6.5 Determination of coarse Aggregate

$$V = [W + (C/S_c) + (1/(1-p))(C_a/S_a)] \times 1/1000$$

$$0.98 = [(175 + (318/3.13) + (1/0.64) (C_a/2.80))] \times 1/1000$$

$$C_a = 1260 \text{ Kgs}$$

4.6.6 Mix proportions by weight (with ACC Portland slag cement)

Water	:	Cement	:	F.A	:	C.A (20+10)
175	:	318	:	661	:	1260
0.55	:	1.00	:	2.08	:	3.96

4.7 Mix Design Procedure for M30 Grade Concrete

(As per IS 10262:1982)

(a)	Characteristic compressive strength required in the field at 28 days (MPa)	30
(b)	Maximum size of aggregate (mm)	20
(c)	Degree of Workability (specified) mm (slump)	50 to 75
(d)	Degree of quality control	good
(e)	Type of exposure	Moderate

4.7.1 Test data for Materials

(a)	Cement used	ACC Portland slag
(b)	Specific gravity of cement	3.13
(c)	Specific gravity of	
	Coarse aggregate – 20 mm	2.81
	Coarse aggregate – 10 mm	2.78
	Fine aggregate	2.61
(d)	Sand corresponds to zone	II
(e)	Target mean strength of concrete	30+1.65×4 = 36.6MPa
(f)	Selection of W/C ratio corresponding to the above strength requirement	0.43
(g)	Selection of water per cubic m	170
(h)	Fine aggregate percentage selected in total aggregate.	37.4%

Adjustment in water and sand change in condition	Adjustment required in water percent	0% sand in total aggregate
For decrease in W/C ratio by	-	- 3.4 %
For sand conforming to zone – II	-	
Total	-	- 3.4 %
Therefore required sand content as percentage of total aggregate by absolute volume	37.4 – 3.4 = 34 %	
Required water content	170 liters	

4.8 Determination of Cement Content

Water-cement ratio = 0.43
 Water = 170 liters
 Cement = 395 Kgs

This cement is adequate for Severe exposure conditions.

4.9 Determination of Fine Aggregate

$$V = [W + (C/S_c) + (1/p) \times (f_a / S_{fa})] \times 1/1000$$

$$0.98 = (170 + (395/3.13) + (1/0.34) (f_a/2.61) \times (1/1000)$$

$$f_a = 607 \text{ Kgs}$$

4.10 Determination of coarse Aggregate

$$V = [W + (C/S_c) + (1/(1-p))(C_a/S_a)] \times 1/1000$$

$$0.98 = [(170 + (395/3.13) + (1/0.66) (C_a/2.8)] \times 1/1000$$

$$C_a = 1264 \text{ Kgs}$$

4.11 Mix proportions by weight (with ACC Portland slag cement)

Water : Cement : F.A : C.A (20+10)
 170 : 395 : 607 : 1264
 0.43 : 1.00 : 1.54 : 3.2

4.12 Casting of Pile Cap

4.12.1 Formwork:

The bed for casting pile caps was prepared with lean concrete mix and the surface was made smooth without any undulations. Masonry moulds were used for casting the pile caps. The moulds were made of bricks and plastered with mortar. The inner dimensions of the moulds were equal to the dimensions of the four pile caps.

4.12.2 Preparation of Specimen

The moulds were oiled before casting the pile caps. Reinforcement cage was placed in position in the mould and then cover blocks were placed to maintain a cover of 20 mm. The materials are weigh batched. Concrete mixer was used for mixing concrete. After placing concrete in the moulds, needle vibrator was used for vibration. The top surface was smoothed with a trowel. Simultaneously from each pile cap mix corresponding cubes and cylinders were casted.

4.12.3 Curing

The beams were cured for 28 days uniformly by wet gunny bags. Cubes and cylinders were also cured for 28 days in a water tank.

4.12.4 Demoulding

After 28 days, the brick moulds were manually broken and the pile caps were separated.

4.13 Test Details

Testing of four pile caps and three circular beams were done at 28 days..The fig shows a general view of typical specimen and loading arrangements.

4.13.1 Measurement of Deflection

The deflections were measured at pile cap mid span by a dial gauge whose least count was 0.01 mm. It could record a maximum deflection of 50 mm. The dial gauge was mounted on a frame firmly, touching the bottom face of the pile cap.

4.13.2 Measurement of Crack Width

Crack widths were measured for all pile caps using a hand-held microscope. The instrument could measure a maximum width of 10 mm and a minimum width of 0.05 mm.

4.14 Procedure for Testing

The pile caps and circular beams were placed in position in the loading frame manually. Prior to testing glass pieces of size 2 cm × 2 cm were fixed at the center of the bottom surface of the pile cap where deflections are measured. Each pile cap and circular beam was tested to failure by applying loads in a series of increments. It took about a quarter minute for increasing the load after which it was held constant, while deflections and crack widths were measured and cracks marked. The holding period after each increment varied for two to four minutes. Smaller increments of loads were used as cracking and failure loads were approached. In all instances load application was continued well beyond the stage at which peak values of strength were observed. Usually 25 to 30 increments were used to failure and the entire test took about 1½ hrs.

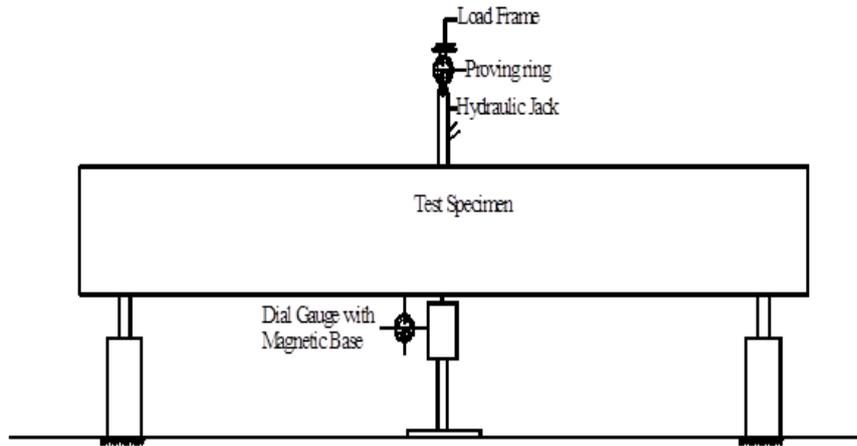


Fig. 1: Test Set Up

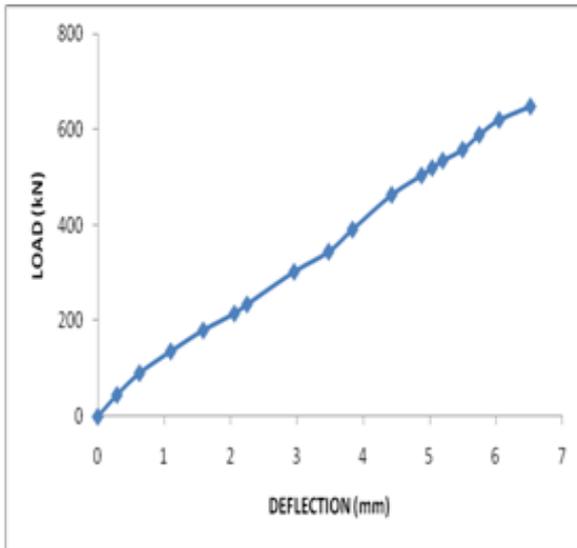


Fig. 2: Load-deflection curve of beam PB1

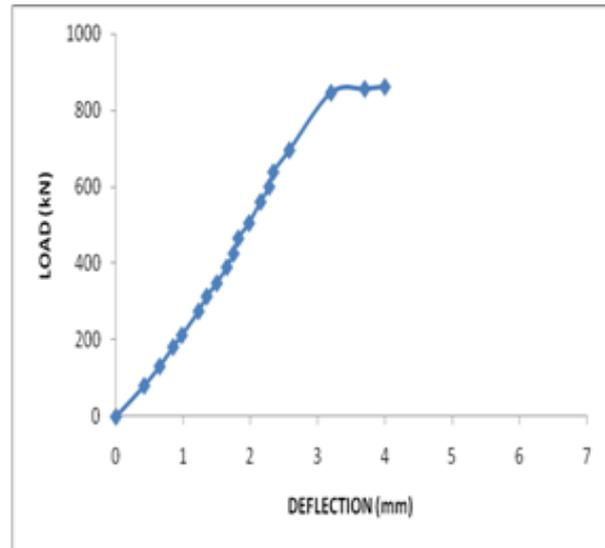


Fig. 3: Load-deflection curve of beam PB2

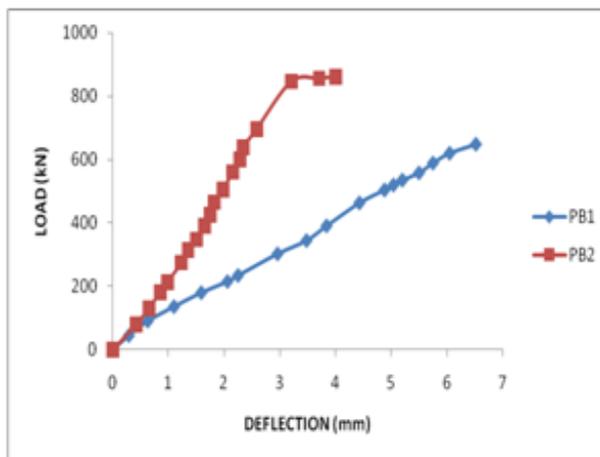


Fig. 4: Load-deflection curve of beams PB1, PB2

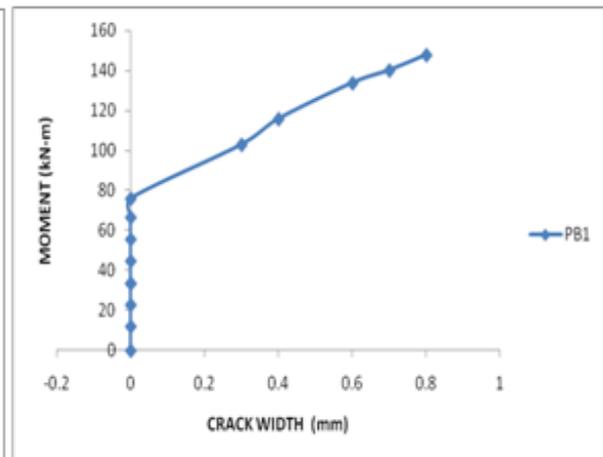


Fig. 5: Moment Crack width curve of beam PB1

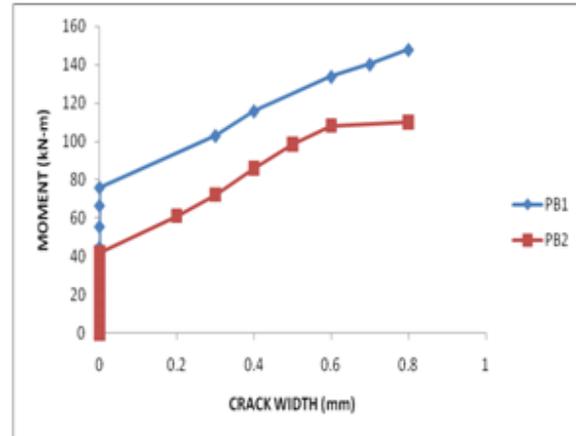
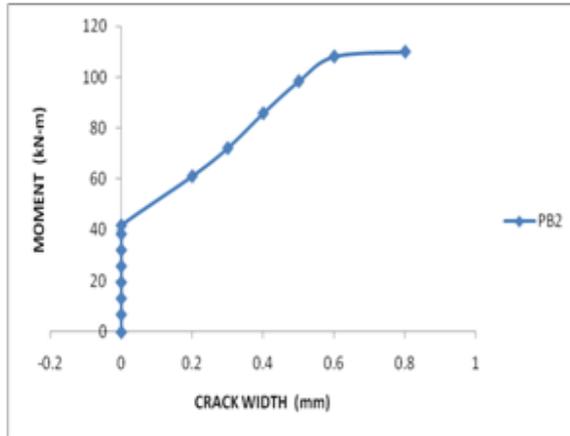


Fig. 6: Moment Crack width curve of beam PB2 Fig. 7: Moment Crack width curve of beams PB1, PB2



Fig. 8: Plate 1: Front view of PB1



Fig. 9: Plate 2: Front view of PB1



Fig. 10: Plate 3: Front view of PB2



Fig. 11: Plate 4: Reinforcement cage of PB2

V. PRELIMINARY DESIGNS

5.1 Size of Pile Cap

PB1:- 122 x 50 x 33.6cm

Grade of concrete = M30

Grade of steel = Fe 500 grade

Theoretical stanchion load = 350kN

Shear force (V) = 350/2 = 175 kN

Maximum Bending Moment = 175 × 39.5
= 69.1 kNm

$$M/bd^2 = (69.1 \times 1.5 \times 10^3) / (50 \times (31)^2) = 2.16$$

From Table 56 of SP 16

$$= (0.544 / 100) \times 50 \times 31$$

$$= 8.43 \text{ cm}^2$$

$$= 8 - 12 \text{ mm } \emptyset \text{ are used}$$

Shear force (V) = 175 kN

Shear stress = (175000) / (500 × 310) = 1.12 N / mm²

PB2:- 86 x 55 x 33.6cm

Grade of concrete = M30

Grade of steel = Fe 500 grade

Theoretical load = 550 kN

Shear force (V) = 550/2 = 275 kN

Maximum Bending Moment = 275 × 0.1965
= 54 kNm

$$M/bd^2 = (54 \times 1.5 \times 10^3) / (50 \times (31)^2) = 1.69$$

From Table 56 of SP 16

$$= (0.421 / 100) \times 50 \times 31$$

$$= 6.53 \text{ cm}^2$$

$$= 6 - 12 \text{ mm } \emptyset \text{ are used}$$

Shear force (V) = 275 kN

Shear stress = (275000) / (500 × 310) = 1.77 N / mm²

Table5:- Properties of Test Specimens Pile Cap Beams

Specimen label	Depth (mm)	Width (mm)	Span (mm)	Total length (mm)	Compressive Strength of concrete (N/mm ²)		Split tensile strength of concrete (N/mm ²)
					7days	28days	
PB1	336	500	947	1220	32.5	42.6	2.54
PB2	336	500	550	860	32.5	44.4	2.54

Table6:- Mechanical Properties of Steel Reinforcement

S.No.	Diameter (mm)	Yield strength (N/mm ²)	Ultimate strength (N/mm ²)
1	8	500	630
2	12	520	650

Table7:- Principal Test Results of Pile Cap Beams

Specimen label	Load at first crack (kN)	Ultimate load (kN)	Ultimate moment (kN- m)	Service load (kN)	Service moment (kN- m)	Deflection At first crack (mm)	Deflection At service Load (mm)	Deflection at ultimate load (mm)	Crack width at service load (mm)	Crack width at ultimate load (mm)	Failure mode
PB1	462.72	647.26	154.57	431.5	103.04	4.43	4.34	6.52	0.3	0.8	Shear
PB2	405.06	860.76	108.3	573.84	72.2	1.65	2.46	4	0.3	0.8	Flexure

Table8:- Theoretical Load and Experimental Load of Pile Cap Beams

specimen label	Experimental results			Theoretical results			Ratio
	Stanchion load	Bending moment (KN-m)	Shear force (kN)	Stanchion load	Bending moment (KN-m)	Shear force (kN)	$\frac{\text{Experimental B.M}}{\text{Theoretical B.M}}$
PB1	350	69.1	175	647.26	127.83	323.63	1.5
PB2	550	46.75	275	860.72	72.72	427.75	1.57

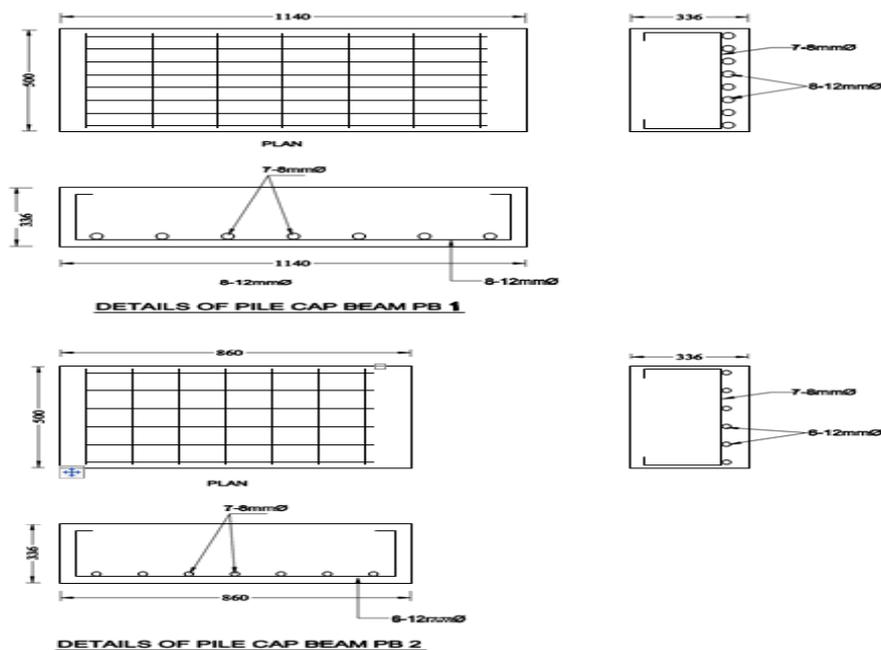


Fig. 12: Detailing Of Pile Cap Beams

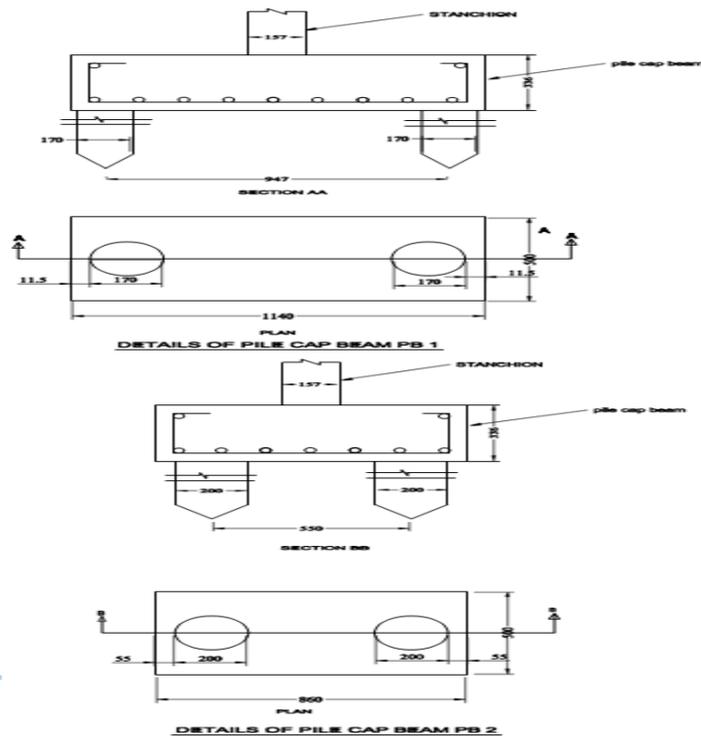


Fig. 13: Pile Cap Setup

VI. DISCUSSION OF TEST RESULTS

The load of first crack for pile cap beam PB1 was 462.72kN; this was 71% of ultimate load. PB1 recorded initial crack at 405.6kN which was 47% of ultimate load. The crack width at service load was 0.3mm for PB1 and PB2 respectively. The transverse deflections were 4.34mm and 2.46mm at service load for PB1 and PB2 respectively. The pile cap beam PB1 failed in shear. Pile cap beam failed in flexure as per IS 456-2000.

VII. CONCLUSION

From the test results for pile cap beams it is concluded that the results obtained for shear force are in accordance with IS code provisions

Based on the test results, it can be concluded that circular beams can be designed to fail in bending with the provision rectangular stirrups. The tests conducted are highly preliminary requiring additional tests for adequate information on flexural and shear failures of circular beams with line flexural reinforcement in the tension zone.

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BINARY SEQUENCE GENERATION FOR SANSKRIT PHONETIC SOUNDS

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ABSTRACT

The Pattern generation and Analysis is the technique of recognizing an object say, a target in combat space. The combat space T consists of targets of three types

- i) Wanted Targets W ii) Rejected Targets R iii) Unknown Targets U

So that $T = W \cup R \cup U$

The description of object is called pattern. Characterization of pattern class by common properties shared by all of its members is another basic concept used in design of an pattern recognition system. Main objective of this approach is to determine common properties from finite set of samples patterns and to examine a new pattern for a suitable switch. In signal processing, the role of input is vital to recognize objects. The input to the digital computer refers to any data or instructions entered into the memory. Data is a set of meaningful perceptual observations about an entity expressed in numerical, alphabetical, graphical or mixed form. While Instructions refer to a set of action commands issued to CPU to tell a computer how to perform the tasks necessary to process data into information. Digital computer can accept the input via written/typed form through keyboard or the spoken/audio form through microphone. A great deal of work has been done in evaluating speech as a means of computer input. The present paper suggests the rhythmic syllable arrangements in various poetic meters as a means of audio input, directly producing binary code. Such binary syllable arrangement has been envisaged by Pingalacharya [1]. His Chhandas Shastra or science of poetic meters in Sanskrit is a well known classical treatise on Prosody. It deals with the rhythmic syllable arrangements in various poetic meters. According to Chhandas Shastra [2] every pronounced letter is either "Laghu" or Short [0] and "Guru" or Long [1] and each poetic meter is based on their fixed sequence [3]. Hence desired binary input sequence could be produced merely by utterance of corresponding syllables. Case studies of over 15 sets of such voice samples by male/female/child candidates were conducted and the resulting binary sequences are presented with corresponding accuracies.

Keywords: Combat space, Frequency-domain, Patterns, Time-domain, Thresholding.

I INTRODUCTION

The science of Sanskrit poetics [5] describes well developed encoding mechanism for phonetic-meters. The phoneme [6] can be described as the smallest segmental unit of sound employed to form meaningful contrasts between utterances of any language syllables. It is regarded as an abstraction of a set of speech sounds (phones) which are perceived as equivalent to each other in that language. Such phonetic order holds special importance in poetry, as it differentiates between various poetic meters. The Chhandas Shastra or science of poetic meters in Sanskrit as envisaged by Pingalacharya [1] is a well known classical treatise on Prosody. It deals with the rhythmic syllable arrangements in various poetic meters. According to Chhandas Shastra [2] every pronounced letter is either “Laghu” or Short and “Guru” or Long and each poetic meter is based on their fixed sequence [3]. Such sequence is symbolically represented by ‘S’ for long and ‘I’ for short syllable in classical Sanskrit literature. Replacing S (long) by 1 and I (Short) by 0 results in binary sequence corresponding to a poetic meter which can be identified using standard pattern recognition methods [4]. The science of Sanskrit poetics [5] describes well developed encoding mechanism for phonetic-meters. The phoneme [6] can be described as the smallest segmental unit of sound employed to form meaningful contrasts between utterances of any language syllables. It is regarded as an abstraction of a set of speech sounds (phones) which are perceived as equivalent to each other in that language. Such phonetic order holds special importance in poetry, as it differentiates between various poetic meters. Pingalacharya grouped three syllables as triplets according to their long- short combinations in 8 possible permutations. The striking resemblance with corresponding 3 bit binary sequence may be noticed as follows:

Sr.No	Long (L)/ Short (H)	Classical Representation	Symbolic	Binary equivalent	Gana-Symbol Sanskrit- mnemonic	English Equivalent
1	LLL	SSS		000	<i>na-gaṇa</i>	Tribrachys
2	LLH	SSI		001	<i>ta-gaṇa</i>	Anti-bacchius
3	LHL	SIS		010	<i>ra-gaṇa</i>	Amphimacer
4	LHH	SII		011	<i>bha-gaṇa</i>	Dactylus
5	HLL	ISS		100	<i>ya-gaṇa</i>	Bacchius
6	HLH	ISI		101	<i>ja-gaṇa</i>	Amphibrachys
7	HHL	IIS		110	<i>sa-gaṇa</i>	Anapaestus
8	HHH	LIH		111	<i>ma-gaṇa</i>	Molussus

Table 1: Grouped syllable-triplets.

The method of identifying a short or long syllable is simple. A syllable can be short (laghu) or long (guru) according to whether its vowel itself is short or long. Also, a short vowel can become long when it is followed by anusvaaram (am) or visargam(aH). Moreover, if a conjunct consonant (i.e, a half consonant, one that is not attached to any vowel - called samyuktaakshara in Sanskrit)[8] follows a short or a long vowel, the whole syllable is considered Long. The present paper carries out such identifications of phonetic meters by standard binary pattern recognition process. A binary tree to categorize phonetic input into long and short syllables is described here. Initially all the syllables are assumed to be Short thus producing binary sequence of all 0's. Next the six tests for determining Long syllable are applied sequentially and accordingly the 0's in the binary sequence are changed to 1's. This produces the correct binary sequence for the corresponding poetic meter which is then identified by pattern recognition method. One of the most basic measurements in perception is the measurement of threshold. The threshold measures how strong a stimulus must be before it can be detected or how different two stimuli must be before they can be discriminated from one another. Thresholds are of interest for several reasons. Threshold measurements are often used to reason about the nature of sensory processing. **Audio signal processing**, sometimes referred to as **audio processing**, is the intentional alteration of auditory signals, or sound, often through an **audio effect** or effects unit. As audio signals may be electronically represented in either digital or analog format, signal processing may occur in either domain. Analog processors operate directly on the electrical signal, while digital processors operate mathematically on the digital representation of that signal. Audio signals are sound waves—longitudinal waves which travel through air, consisting of compressions and rarefactions.

1.1 Identifying the Syllable Sequence

The method of identifying a short or long syllable (in phonetically based any Indian language) is simple. A syllable can be short (laghu i.e 0) or long (guru i.e. 1) according to whether its vowel itself is short or long. Alternatively, a short vowel can become long when it is followed by anusvaaram (am) or visargah(aH). Moreover, if a conjunct consonant (i.e. a half consonant, one that is not attached to any vowel - called samyuktaakshara in Sanskrit)[8] follows a short vowel, the previous syllable is considered Long. The present paper extends the method of such identifications of phonetic meters by standard binary pattern recognition process. A binary tree to categorize phonetic input into long and short syllables is described here. Initially all the syllables are assumed to be Short thus producing binary sequence of all 0's. Next the six tests for determining Long syllable are applied sequentially and accordingly the 0's in the binary sequence are changed to 1's. This produces the correct binary sequence for the corresponding poetic meter which is then identified by pattern recognition method.

The syllable arrangement is recorded and represented visually as a waveform. Here is a waveform of a spoken phrase. Note the frequent changes in wavelength, amplitude, and frequency.



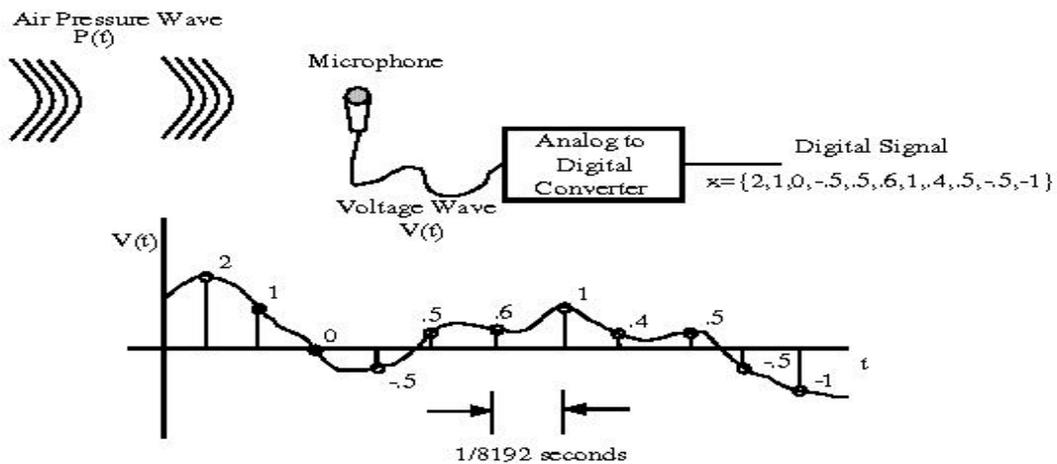
Waveform of a spoken phrase

Quantization, analog-to-digital conversion and thresholding are carried out to generate the binary sequence. The wave files are converted and stored as binary numbers using MATLAB function in a bit file.

II PROCEDURE AND EXPERIMENTAL SET UP

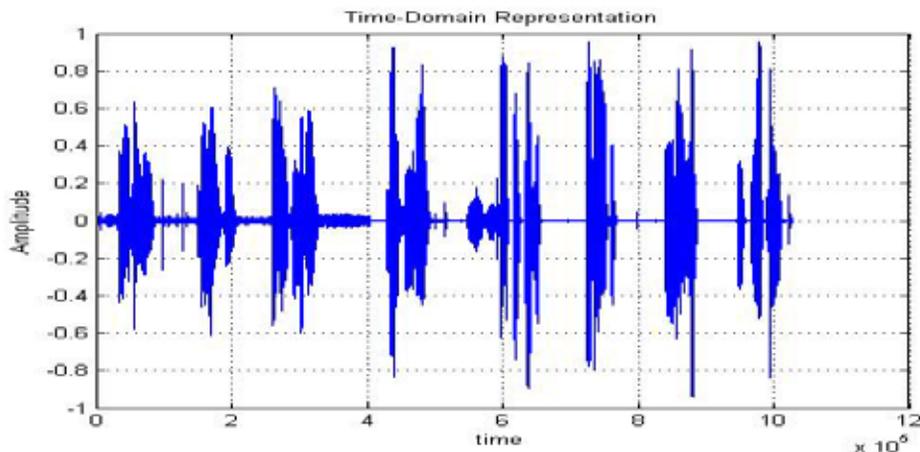
A standard high quality audio recording system is set up to record selected groups of syllable arrangements pronounced by number of candidates drawn from male, female, children, young and old persons. They are asked to repeat same group of syllable which are recorded via audio system to form the audio file. Digital Audio recording technology encode an audio signal in digital form via an analog to digital converter (ADC)[9]. The pronounced syllables are made available in data files by the system. An **audio file format** [11] stores digital audio data on a computer system. Raw Bit-Stream format is also available in this file which is used as input to our system.

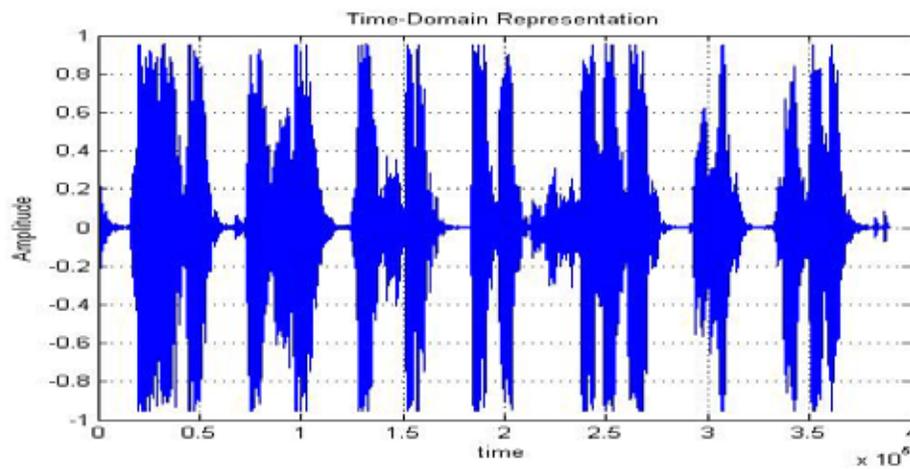
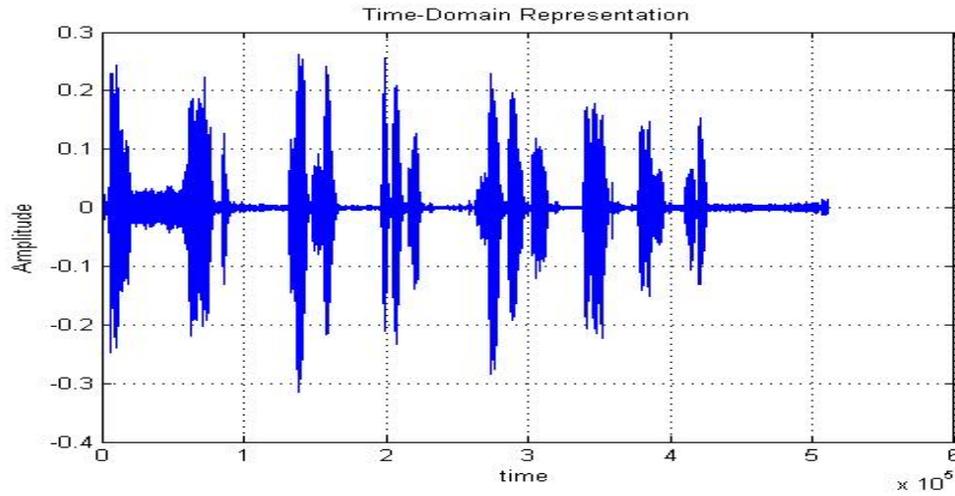
What is digital sound data?



III EXPERIMENTAL WORK

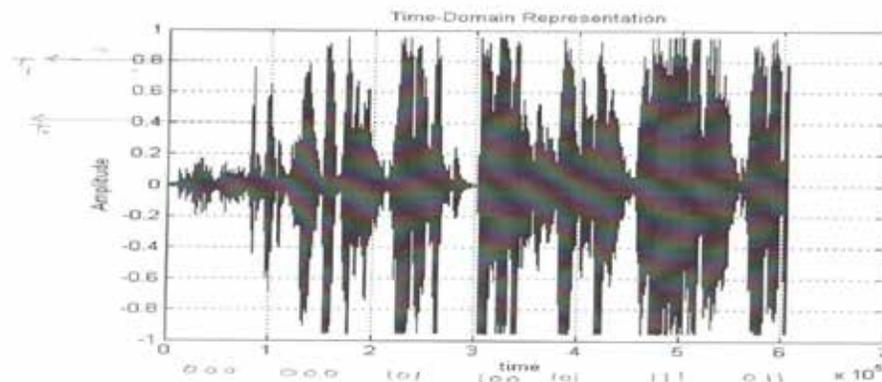
This picture shows where the signal corresponds to Long and Short syllable over time. Time Domain representations of Sound Waveforms are as follows:-





3.1 Time Domain Representations of Training Samples

From the number of phonetic samples collected from over 15 candidates ,the sequence of LAGHU or SHORT(0) and GURU or LONG(1) was generated using MATLAB wave function. The result of thresholding of the waveforms or two out of 15 samples is as follows:-



The corresponding binary sequences resulting from the thresholding of above waveforms are given in the following table :-

Sample	Word 1	Word 2	Word 3	Word 4	Word 5	Word 6	Word 7	Word 8
1	000	100	101	000	100	000	000	111
2	000	001	010	011	100	101	110	111
3	000	000	101	100	101	111	011	111
4	000	000	000	101	110	110	011	011
5	000	100	101	000	100	000	000	111
6	000	001	010	011	100	101	110	111
7	000	000	101	100	101	111	011	111
8	000	000	101	100	101	111	011	111
9	000	100	101	000	100	000	000	111
10	000	001	010	011	100	101	110	111
11	000	000	101	100	101	111	011	111
12	000	001	010	011	100	101	110	111
13	000	100	101	000	100	000	000	111
14	000	001	010	011	100	101	110	111
15	000	001	010	011	100	101	110	111

Binary sequences resulting from the thresholding of waveforms

IV RESULTS AND CONCLUSIONS

From the above experiment a pattern of 0 and 1 waveform was created by applying the suitable Threshold. Recording mechanism, training samples , Phonetic signatures, Generalized envelope for syllable and thresholding

are the the important parameters which decides the accuracy of produced binary code. Though the overall accuracy is somewhat low due to low grade audio

recording ,it attempts to establish the basic idea of providing audio input via rhythmic syllable arrangement. From the above table it is found that pattern of 0 and 1 waveform was created by applying the suitable Threshold. These binary sequences for all the samples were almost same whether it is pronounced by male, female, child or elder person, making speaker independent phonetic input for the our machine.

V FUTURE SCOPE

Besides, the mathematical interpretations of science of poetic meters, given by Halaayudha, report evaluation of various variants of patterns of binary sequences which bear striking resemblance with schema and fitness function of **Genetic Algorithms**[10][13]. It is well known that Genetic algorithm is a search technique used in computing to find possibly an exact or approximate solution to multi-parameter optimization problems. It was purposed and developed in 1960 by John Holland at university of Michigan. The critical comparative study initiated in the present paper suggests that there is scope to carry out innovative research & development through suitable amalgamation of the two fields.

NOMENCLATURE

L	Laghu
G	Guru
0	Short
1	Long

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