

STUDY OF TECHNIQUES FOR INTELLIGENT TRAFFIC CONTROL SYSTEM

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ABSTRACT

Increase in population is a known fact which is leading to increase in traffic. The problem of traffic congestion is becoming serious day after day. The need of the hour is to have an automated or intelligent traffic light system, which can resolve the problem of traffic congestion. In order to resolve this problem, an efficient system is required to judge the present scenario at each traffic light to handle and distribute the traffic in a fast manner. Up till now a lot of research work has been done and many new methods have been evolved in order to make traffic lights intelligent.

This paper contains a literature review of the various methods applied till the present day in order to make traffic lights intelligent. Also certain issues faced by the researchers have been discussed.

Keywords: Traffic, Image Processing, Edge Detection, Image Cropping.

I INTRODUCTION

Mass event with large attendance hold in big cities, overload road infrastructure at regular intervals [1][3]. Hence for better utilization of road infrastructure it is important to manage traffic flow efficiently[4]. Most of the city traffic is controlled by sensors and cameras which shall be installed in big highways and street. A result of traffic congestion is increasing transportation cost as congestion leads to waste of fuel and time [2][5]. Traffic jams are also result of congestion and flaws or loop holes in traffic management system. Traffic load is highly dependent on time, day, season, weather. Hence it becomes difficult to be controlled on the prior recorded data sets. Therefore real time handling is required. A traffic control system with its own intelligence can solve these problems by continuously sensing and adjusting the timing of traffic lights according to the actual traffic load. The advantages of building traffic control system functioning on its own intelligence reduces congestion, reduction in operational cost, increase in capacity of road infrastructure, traffic can be regulated as per its density[6]. For more efficient management of traffic there is a need for identification and preference being given to heavy duty trucks as compared to LMVs. Unfortunately this system has not been implemented on any of the traffic lights.

II EXISTING TRAFFIC CONTROL SYSTEM

From the past decades, management of traffic has been one of the biggest issues of modernization. Researchers have followed a long way to overcome the traffic crises. Right from the very beginning of, "Manual Traffic Control" in

which man power was required to control the traffic. Depending on countries and states the traffic polices are allotted to different areas to control traffic. These men carry sign board, sign light and whistle to control the traffic. They are instructed to wear specific uniforms in order to be easily identified by the drivers[2].

After this came the traditional “Vehicle Actuated Control System” in which, lights are loaded with constant numerical value in the form of timers. The lights are automatically getting ON and OFF depending on timer value changes. The main disadvantage is that the algorithm for this control system does not change the green signal even if the traffic has already passed until the counter is complete, while not taking into account the number of vehicles waiting at red. Hence the density of the traffic does not matter[6].

Next in generation is the “Automatic Traffic Light”, which is the modified version of vehicle actuated control system with addition to timers and electrical sensors. In this technique electronic and electrical sensors are added to detect vehicles and produce signals that the time is being wasted by a green light on an empty road.

Drawbacks to these particular controlling methods:-

1. Only skilled operators can make suitable judgement and decisions because sometimes the situation is very complicated and many factors are needed to be considered.
2. The operator is under very high work load as he has to continuously take decisions and review the traffic conditions at small intervals of time.
3. Using electronic sensors to detect vehicles and produce signal takes time which wastes a lot of green light on the empty road [6][2].

The established traffic control management systems are inadequate for handling huge amount of traffic load as they are incapable of meeting the growing number of vehicles on road.

III IMAGE PROCESSING: A SOLUTION

With a perfect structural system built around computers and cameras continuously monitoring the traffic on particular roads will solve all the drawbacks in the present controlling system for traffic. This structure includes:

1. A hardware model.
2. A software model[7][8].

Image processing systems are becoming widely popular due to easy availability of powerful personnel computers, large memory devices, graphic software and many more. These technologies are used for enhancing images taken from the cameras set at traffic lights. Using these techniques and the structure built a flexible traffic light controller can be created which shall take traffic density, moving time and type of vehicles on the signal into account[6].

This type of system detects vehicles through images instead of using electronic sensors embedded in a pavement. The camera installed alongside the traffic light captures images. The images are then analysed using digital image processing for vehicle detection according to which the road traffic light can be controlled[9].

Using image processing there are several methods which can be used in order to make traffic lights intelligent. They are viz. edge detection, image cropping, background subtraction, object tracking, speed calculation.

The basic steps involved in using digital image processing for solving these problems are:

1. **Image Acquisition:** It is done with the help of camera installed at the traffic light which is a two

dimensional function $f(x,y)$, where x and y are plane coordinates. The amplitude of the image at any point is called its intensity. We need to convert these x and y values to finite discrete values to form a digital image. We need to convert the analog image into a digital image to process it through digital computer.

2. **RGB to Gray conversion:** Images of the road are captured. RGB to Gray conversion is done on the progression of captured images[9]. The reason behind why coloured images are often stored in gray scale is, in RGB format there are three separate image matrices storing amount of red, amount of green, amount of blue in each pixel, whereas in gray scale we do not differentiate how much we emit of different colours, we emit the same amount in every channel. This particular function of conversion can be easily done using MATLAB.



Fig. 1: RGB to Gray conversion [2]

3. **Image Enhancement:** The acquired image in RGB is first converted into Gray. Now we want to bring our image in contrast to background so that the appropriate threshold level may be selected while binary conversion is carried out. This calls for image enhancement techniques. The objective of enhancement is to process an image so that result is more suitable than the original image for the specific application[9]. Image enhancement alters the visual impact that the image has on the interpreter in a fashion that improves the information content.
 - a. Contrast enhancement
 - b. Intensity, Hue, and Saturation transformations
 - c. Intensity slicing
 - d. Edge enhancement
 - e. Making digital mosaics
 - f. Reducing synthetic stereo images [15].

After following these steps, various methods are used as per once convenience and goals for control of traffic.

1. **Edge detection:** The methods for edge detection locate the pixels in the image that correspond to the edges of general algorithms used as Sobel, Prewitt, Roberts, Log, Zero-cross, Canny. These edge finding methods have been incorporated into MATLAB as predefined functions[9]. Edge detection can be divided into five cases as per quantitative evaluation of performance.
 - a. Good Detection: There should be minimum number of false edges. Threshold should be high enough leading to less false edges.

- b. Noise sensitivity: Certain acceptable noise environment does not affect the detected edges.
- c. Orientation Sensitivity: The operator not only detects the edge magnitude but also its orientation.
- d. Good Localization: The edge location must be reported as closed as possible to the location.
- e. Speed and Efficiency: The algorithm should be fast enough to be useable in an image processing system. An algorithm that allows recursive implementation or separately processing can greatly improve efficiency[6].

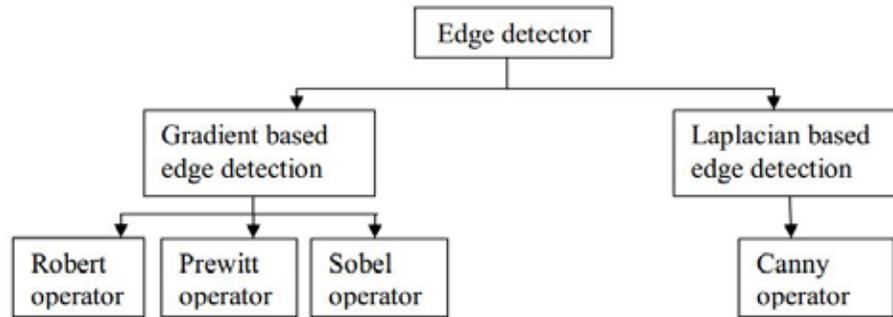
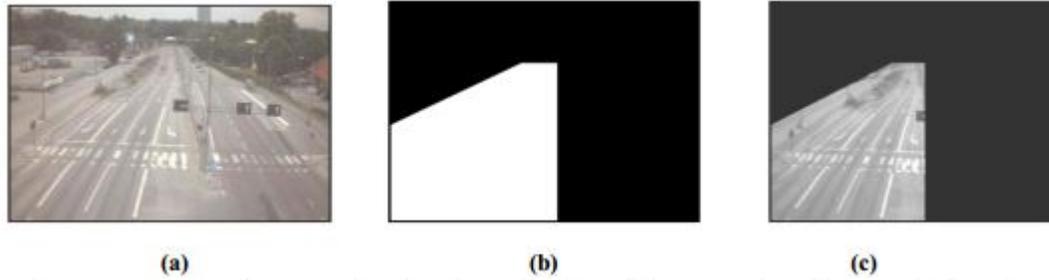


Fig.2: Different edge detection technique [6]



Fig. 3: Edge detected Picture from MATLAB

2. **Image Cropping:** This step is done to select the targeted area using image cropping algorithms in MATLAB. Using this we can separate the region of the road where vehicles are present. Hence forth all background information is excluded. For image cropping we have to use a reference image of the same area which is to be cropped. Binary image of the same dimension is created with only the required area shaded white and then multiplication of the reference image with the white image results in the final desired target area[4].



**Fig.4: (a) Reference Image taken from the Live Video from [10],
(b) Defining the region of interest, (c) Selection of the target area [4]**

3. **Background Subtraction:** Subtract cropped image of scene from the Region of interest to get the area occupied by the vehicle. This can be achieved by applying ANDing operation to the image and the region of interest. The logic is structured generated by asphalt image in Region of Interest and the change structure due to occupied vehicle[9]. This technique on a large scale is efficient in calculating the density of traffic on a road and this density is further used for comparison between different roads on a crossroad.

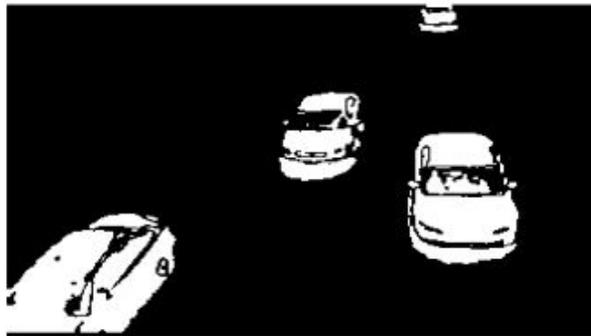


Fig.5: Background subtraction [9]

4. **Object tracking:** objects are detected frame by frame in a video. It is a crucial part of smart surveillance systems since without object tracking the system could not extract cohesive temporal information about objects[11].

Vehicle tracking can be done using the method named as contour extraction. This type of extraction consists of steps including gamma correction and background masking. The masking algorithm is as follows:

$$N(P) = M(P) \times V(P)$$

This type of masking must be applied to each RGB image separately[7].

5. **Speed Calculation:** After tracking each object in a video we can save the frame number that the object entered the scene(f_0) and also the frame object left the scene. Speed calculation can be held out by calculating the number of frames consumed by object to pass by the scene, since we know that the duration of each frame, we can calculate the total time taken by object to pass by the whole scene. Hence forth giving the vehicles speed[11][12].

IV RELATED RESEARCH

The theme is to control the traffic by determining the traffic density on each side of the road and control the traffic signal intelligently by using the density information. The paper[4] presents the algorithm to determine the number of vehicles on the road. The density counting algorithm works by comparing the real time frame of live video by reference image and by searching vehicle in the Region of Interest. In this technique in order to deal with noises added due to different lightening conditions at different times of the day, a set of reference images have been stored at different time slots of the day. The system cycles through these reference images according to the current time of the day.

As per SabyasanchiKanojia, image processing techniques and wireless communication networks can avoid traffic congestion for day time sequences efficiently. This particular method uses ZIGBEE protocol to wirelessly transmit the information of the road scene. This information will be displayed nearby the roads which can help people by providing pre knowledge of traffic jams and congestions. Thus this traffic jam congestion detection method is based on various techniques: change detection, image processing and incorporation of prior information such as traffic model and road network. This method, after analysing the density of traffic, manipulates the timer for green light as per the density on each road[5].

Another technique for traffic management at crossroad was given in the paper[2] which uses surveillance cameras and electronic sensors in order to find out the number of vehicles. The basic technique is background subtraction. Here an image of the road without any traffic is stored in the processor and then its comparison is done with the real time image. The less the image is matched the more is the traffic on the road. Hence the green light is ON for a longer period of time. Edge detection technique is used for image matching. Canny edge detector is used as this is the most efficient one and can further be used for contour tracing. After detecting the edges and subtracting the background, number of vehicles on the road can be calculated.

In [16] the drawbacks of infrared and radio frequency were resolved as the basic requirement of these systems is, a transmitter circuit has to be installed at every traffic signal. The algorithm was inspired by YUN-CHANG[13] who used artificial intelligence(AI) for traffic control using fuzzy mapping. In [1] colour detection and coordinate analysis of the detected colour has been used. The colour detection for various UGVs was used which generated a stop signal at the traffic light whenever traffic on the other road was found more dense. This algorithm had the most optimum execution time.

Another algorithm for intelligent traffic control unit was given in [9]. Here Pallavi gave a technique for the use of traffic density for controlling the lights by edge detection. Here binary images with pixels detected are used by common operators Sobel and Laplace. After edge detection the matching is done on the bases of edges in the image with the reference image stored in the processor. Depending upon the percentage of matching the timer for green and red light is controlled.

A very different system was built by Ryan and Guohui Zhang, where object tracking was done on the bases of vehicle length in a video frame. They followed Video based Vehicle Detection and Classification (VVDC). They made the algorithm/technique which corrected the 97% truck count error and brought it down to 9%. Hence this made the traffic control system efficient by taking the size of vehicle in to account. The bigger vehicles were found

on the road, the greater time was allotted to them for crossing the traffic light [14].

V INFERENCES DRAWN AND DISCUSSIONS

Considering all the literature studies above, it has become clear that traffic is proportionally increasing with the increase in population. Traffic congestion being the most difficult problem to be dealt with. There have been several studies and new techniques have been evolved for tackling this problem. All these methods follow the same methodology to some extent. The methodologies are as follows:

- Image Acquisition
- Image Preprocessing
- Image Cropping/background subtraction
- Edge Detection
- Calculation of Density

The overall efficiency and effectiveness of the technique depends upon the methodology being followed. Image cropping/background subtraction is a very crucial stage and hence many techniques have been found to obtain a proper subtracted image. This is because the preciseness of the extracted feature will majorly depend on the quality of the cropped image.

Several techniques like edge detection, counting of edges, vehicle tracking, object identification, speed calculation and colour detection are being implemented for an optimum use of traffic lights. These algorithms do take care of the time and fuel being wasted at the traffic signal. Hence by the use of these techniques traffic lights are being made intelligent, as they operate taking the traffic scenario at that particular time. Artificial intelligence and fuzzy mapping with the help of data sets is used for taking the record of traffic density at different times, weather and particular days of the year.

From all the literature studies, it was observed that all the authors emphasize on designing a system that can be employed for intelligent traffic surveillance system, and at the same time follow the methodology to obtain a robust system. Accuracy and precision is still a problem and more research need to be done in this field.

VI CONCLUSION

From the complete literature survey, it can be concluded that no matter whatever methodology is being employed by the author, the main focus is to use a precise and correct segmentation technique. Many techniques have been developed to make traffic light intelligent. Image processing has done a major contribution in this field by making the traffic lights take decisions on a real time basis.

Even after so many techniques, problems are still faced when it comes to congestion and problems in image acquisition. Many times there are certain noises which can distort the images, leading to wrong decision by the traffic light. Researchers are still looking for technique which can help to develop a robust, fully automated traffic control system which can be efficiently used for controlling congestion and traffic jams on the road infrastructure.

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IMPROVED CLUSTER HEAD SELECTION USING FUZZY LOGIC IN WIRELESS SENSOR NETWORKS

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ABSTRACT

Energy efficiency is a key issue in the design of wireless sensor networking systems because each sensor node carries power source of limited capacity and cannot be easily replaced. Despite significant advancements in wireless sensor networks (WSNs), energy conservation remains one of the most important research challenges. In designing the Wireless Sensor Networks, the energy is the most important consideration because the life time of the sensor node is limited by the battery of it. This paper deals with study and analysis of simulation the investigating power consumption in wireless network and investigating the possible way to reduce the power consumption at Base Station. To overcome this demerit many research approaches have been done. The clustering is the one of the representative approaches. Proper organization of nodes (clustering) is one of the major techniques to expand the lifespan of the whole network through aggregating data at the cluster head. The cluster head is the backbone of the entire cluster. To achieve high energy efficiency, a typical approach is to cluster the sensor nodes in some way so that energy is conserved. In this paper, a fuzzy logic approach to cluster-head election is proposed based on four descriptors –remain energy, neighbor distance, concentration and centrality. Simulation shows that depending upon network configuration; increase lifetime can be accomplished as compared to other probabilistic model proposed for selecting the nodes as cluster-heads.

Keyword: Clustering, Cluster head Selection, Fuzzy Logic, LEACH, Wireless Sensor Networks

I. INTRODUCTION

Recent developments in wireless communication Technologies have enabled wireless Sensor Network A Wireless Sensor Network (WSN) regularly checks physical or environmental conditions and sends the collected data to a Base Station (BS) through network. Wireless sensor network (WSN) is composed of a large number of sensor nodes that are connected to each other to perform specific tasks .Recent developments in wireless communication technologies have enabled Wireless Sensor Networks(WSNs) to be deployed for many applications such as unexpected event detection and disaster relief operations. The Wireless Sensor Networks(WSNs) consist of a large number of small and cheap sensor nodes that have very limited computation capability, energy and storage. They usually monitor some area, collect data and report to the base station. Recently, due to the achievement in low-power digital circuit and wireless communication, many applications of

the WSNs are developed and already it is used in military object, habitat monitoring and object tracking[1][3]. Moreover, the WSN is one of the most important research areas to provide context aware services in the ubiquitous computing environment[8]. There are various challenges in wireless sensor networks because of its special features. The most challenging aspect of such networks is they are energy resource-constrained and that energy cannot be replenished. This limitation makes it essential for developed protocol to improve the performance of such networks by conserving energy and consequently increasing the network's lifetime. Designing the WSNs is very difficult because the sensor nodes have limited computation capability, limited power and small memory size[7]. To overcome energy waste energy in a WSN, as surveyed in[4] many experiments proved that cluster-based WSN routing protocols excel network topology management and energy minimization. In fact, clustering methods by aggregating data into single paths is increasing the efficiency of required energy and also accuracy of communication. In these factors, the energy consumption is the most important one because the battery is not changeable if once the sensor nodes are deployed. The energy is also the major consideration in designing the routing of the WSNs.

There are diverse applications of intelligent techniques in wireless networks [4]. **In this paper**, We use a fuzzy system with appropriate inputs to overcome the weakness of LEACH. Fuzzy logic control is capable of making real time decisions, even with incomplete information. Conventional control systems rely on an accurate representation of the environment, which generally does not exist in reality. Fuzzy logic systems, which can manipulate the linguistic rules in a natural way, are hence suitable in this respect. Moreover it can be used for context by blending different parameters - rules combined together to produce the suitable result. a fuzzy logic approach to cluster-head election is proposed based on **four** descriptors The inputs that we consider in the fuzzy system are: **neighbors distance, centrality, energy remaining, and concentration** .

These parameters are not so closely related and can easily work with these heterogeneous parameters by Using fuzzy logic. Also a fuzzy system does not need much computational complexity; consequently it is suitable for WSN. Simulation shows that depending upon network configuration a substantial increase in network lifetime can be accomplished as compared to probabilistically selecting the nodes as cluster-heads using only local information.

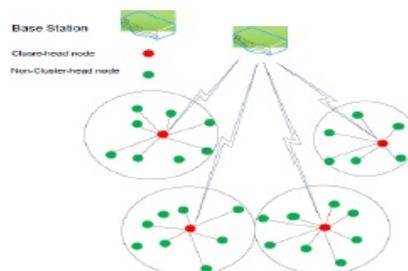


Figure 1. WSN architecture

The rest of this paper is organized as follows. In section 3, LEACH will be briefly discussed and one of the cluster head election mechanisms that use the fuzzy logic will be introduced. In section 4, we define the base model of WSNs. In section 5, the proposed Fuzzy based cluster head election mechanism will be introduced. In section 8, we evaluate our mechanism compared with LEACH by simulation. Finally, in section 9, we will summarize our paper and discuss about future research.

II. RELATED WORK

In this section some of the recent clustering approaches are explained. A typical WSN architecture is shown in Figure 1. The nodes send data to the respective cluster-heads, which in turn compresses the aggregated data and transmits it to the base station.

For a WSN we make the following assumptions:

- The base station is located far from the sensor nodes and is immobile.
- All nodes in the network are homogeneous and energy constrained.
- Symmetric propagation channel.
- Base station performs the cluster-head election.
- Nodes have location information that they send to the base station with respective energy levels
- Nodes have little or no mobility

III. LEACH

The first well known protocol developed by Heinzelman et al is LEACH (Low Energy Adaptive Clustering hierarchy with Deterministic Cluster-Head Selection) [1]. LEACH [1] is one of the clustering mechanisms to achieve the energy efficiency in the communication between sensor nodes. In each round, sensor nodes elect itself as a cluster head based on probability model. To become a cluster head, each node n chooses a random number between 0 and 1. If the number is less than the threshold $T(n)$, the sensor node elects itself as a cluster head and advertises this fact to other nodes around the cluster head. The nodes that receive this message calculate the distance between the cluster head and itself and send a join-message to the closest one of the cluster heads to form a cluster. The node becomes the cluster-head for the current round.

The Threshold is set at:

$$T(n) = \frac{p}{1 - p \times (r \bmod \frac{1}{p})} \text{ ,if } n \in G$$

$$T(n) = 0 \text{ ,otherwise} \quad (1)$$

Equation (1) defines the $T(n)$ where p is the requested ratio of the cluster heads in the WSNs and r is the count of current round. The G is the set of sensor nodes that were not elected as a cluster head in last $1/p$ rounds. According to Equation (1), every sensor node elects its self as a cluster head only once during $1/p$ rounds. In this way, The energy concentration on cluster heads is distributed.

Several disadvantages are there for selecting the cluster-head using only the local information in the nodes.

However, LEACH has some critical points.

1. LEACH depends on only the probability model. Each node probabilistic decides whether or not to become the cluster-head, there might be cases when two cluster-heads are selected in close vicinity of each other increasing the overall energy depleted in the network.
2. Each node has to calculate the threshold and generate the random numbers in each round, consuming CPU cycles.

3. LEACH does not consider the energy remains of each node so the nodes that have relatively small energy remains can be the cluster heads. This makes the network lifetime be shortened.
4. The number of cluster-head nodes generated is not fixed so in some rounds it may be more or less Than the preferred value.
5. The cluster head may be located in the edge of the network or in the place where the node density is very low. In this case, Many nodes in that cluster inefficiently consume energy in communicating with the cluster head.
- 6 the distance can be measured based on the wireless radio signal power.
- 7 Once deployed, the nodes dose not move.
- 8 The base station is located in the center of the WSNs.

IV. BASIC SYSTEM MODEL

The basic system model of this paper is depicted in Figure1. Each sensor node sends the sensed data to its cluster head. The cluster head aggregates the collected data and transmits the aggregated information to the base station.

This operation is general in the WSNs. Here are some assumptions for our mechanism.

- The WSNs consist of the homogeneous sensor nodes.
- The distance can be measured based on the wireless Radio signal power.
- Once deployed, the nodes dose not move.
- All sensor nodes have the same initial energy.
- The base station is located in the outside of the WSNs.

V. CLUSTER-HEAD ELECTION USING FUZZY LOGIC#

From the above defects of LEACH, we can find that an efficient cluster head election mechanism should not depend only on the probability. To achieve high energy efficiency, gathering and calculating other information that could affect the energy consumption may occur heavy overhead. Recently, Gupta [2] proposed that the overhead of cluster head election may be highly reduced by using fuzzy logic. Similarly In our proposed mechanisms four fuzzy variables (remain energy, Neighbor distance, concentration and centrality) were used for fuzzy if-then rule. These variables are defined like follow.

- Remain Energy - energy level available in each node
- Concentration - number of nodes present in the local distance r vicinity
- Centrality - a value which classifies the nodes based the energy concentration on cluster heads is distributed.
- Neighbor distance -the sum of distances between the node and the nodes which is within r distance

In other fuzzy logic mechanisms the base station collects the energy and location information from all sensor nodes and elects the cluster heads using fuzzy if-then rule according to the collected fuzzy variables. They probed that fuzzy logic can prolong the network life time efficiently. However, this mechanism has some demerits.

- This operation may be very complex because The base station has to collect information of all Sensor nodes Which produce more overhead.

VI. FUZZY LOGIC CONTROL

Fuzzy logic (FL) is defined as the logic of human thought, which is much less rigid than the calculations computers generally perform. Fuzzy Logic offers several unique features that make it a particularly good alternative for many control problems. It is inherently robust since it does not require precise, noise-free inputs and can be Programmed to fail safely [11, 12]. The model of fuzzy logic control consists of a fuzzifier, fuzzy rules, fuzzy inference engine, and a defuzzifier. We have used the most commonly used fuzzy inference technique called Mamdani Method [G 8] due to its simplicity. The process is performed in four steps:

- Fuzzification of the input variables energy, concentration and centrality - taking the crisp inputs from each of these and determining the degree to which these inputs belong to each of the appropriate fuzzy sets.
- Rule evaluation - taking the fuzzified inputs, and applying them to the antecedents of the fuzzy rules. It is then applied to the consequent membership function (Table 1).
- Aggregation of the rule outputs - the process of Unification of the outputs of all rules.
- Defuzzification - the input for the defuzzification process is the aggregate output fuzzy set *chance* and the output is a single crisp number.

The fuzzy system used in the inference engine of the expert system is the Mamdani fuzzy system. The Mamdani fuzzy system is a simple rule-based method which does not require complicated calculations and which can employ the IF...THEN... rules to control systems. Mamdani was the person who used the fuzzy method for the first time to study the process of controlling steam machine. Since then, this method has been in use and has acquired a special status[7]. All the rules in the rule-base are processed in a parallel manner by the fuzzy inference engine. Any rule that fires contributes to the final fuzzy solution space. The inference rules govern the manner in which the consequent fuzzy sets are copied to the final fuzzy solution space. Example, techniques are MIN-MAX and fuzzy adaptive method. The defuzzifier performs defuzzification on the fuzzy solution space. That is, it finds a single crisp output value from the solution fuzzy space. Some of common defuzzification techniques are: Center of Area (COA), Center Of Gravity (COG), Extended Center of Area (ECOA), Mean of Maxima (MeOM) and etc. In this paper we use COA method for defuzzification [6].

VII. THE PROPOSED MECHANISM

In this section, we introduce CHEF which uses fuzzy if-then rule to maximize the lifetime of WSNs. this is similar to the [6] but uses the **neighbor cluster head election mechanism** that the base station does not need to collect information from all nodes.

In our opinion a central control algorithm in the base station will produce better cluster-heads since the base station has the global knowledge about the network. Moreover, base stations are many times more powerful than the sensor nodes, having sufficient memory, power and storage. In this approach energy is spent to transmit the

location information of all the nodes to the base station (possibly using a GPS receiver). Considering WSNs are meant to be deployed over a geographical area with the main purpose of sensing and gathering information.

The fuzzy system inputs are crisp numbers that converted to the fuzzy values by membership functions. The nodes simply determine these input values. The nodes is aware of Neighboring nodes and their distance, As soon as one sending and receiving data.

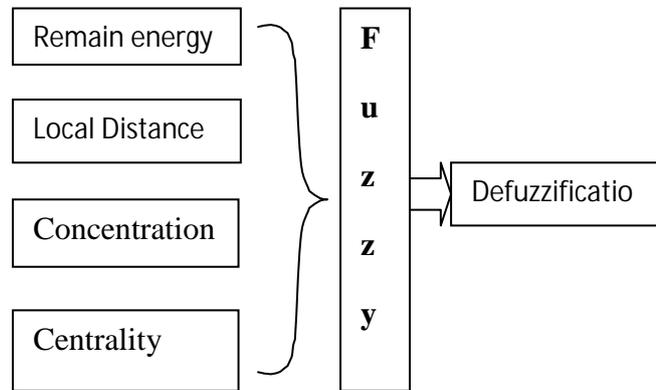


Figure 2. fuzzy Cluster Head Election system

Fuzzy System(FIS)calculates a chance using fuzzy if-then rule. The bigger chance means that the node has more chance to be a cluster head. To compute a chance, we will use two fuzzy variables - energy and local distance. Figure 3 and Equation(3) describes how the local distance is calculated. The sensor node A can calculates a chance from the variable energy which is the energy remains of the node A and the variable local distance which is the sum of distances between then node A and the nodes which is within r distance.

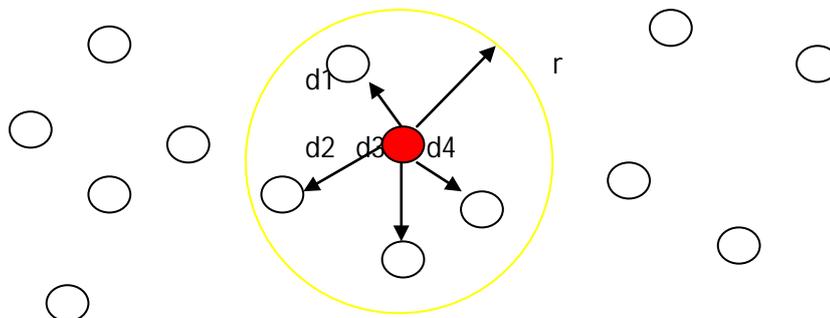


Fig.3 Distances between the node A and other nodes within r

$$\text{Local Distance} = d1 + d2 + d3 + d4 \quad (3)$$

The r is the average radius of the preferred cluster. Equation(4) shows how we can calculate it. The n is the total number of sensor nodes in the WSNs.

$$r = \sqrt{\frac{\text{area}}{\pi \times n \times p}} \quad (4)$$

Based on the Above fuzzy variables, we can define a fuzzy if-then rule like Table I. The detailed the fuzzy sets of remain energy, local distance, concentration and centrality we obtain chance of selecting a cluster head are described in Figure4.

During defuzzification, it finds the point where a vertical line would slice the aggregate set *chance* into two equal masses. In practice, the COG (Center of Gravity) is calculated and estimated over a sample of points on the aggregate output membership function, using the following formula:

$$COG = \left(\frac{\sum \mu_a(x) * x}{\sum \mu_a(x)} \right) \quad (4)$$

where, $\mu_a(x)$ is the membership function of set A.

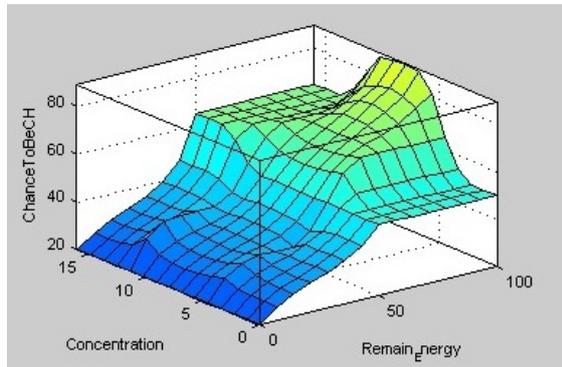
7.1 Fuzzy Logic Membership Functions and Rules

The advantage of fuzzy system is the ability to cope with linguistic uncertainty. Following are main rules used to obtain chance of selecting CH. now we use fuzzy inference method to determine output from inputs..some rules that mamdani method uses them are listed in table I. The fuzzy rule base currently includes rules like the following: if the *energy* is *high* and the neighbor distance is *close* , *concentration* is *high* and the *centrality* is *VHigh* then the node's cluster-head election *chance* is *very large*.

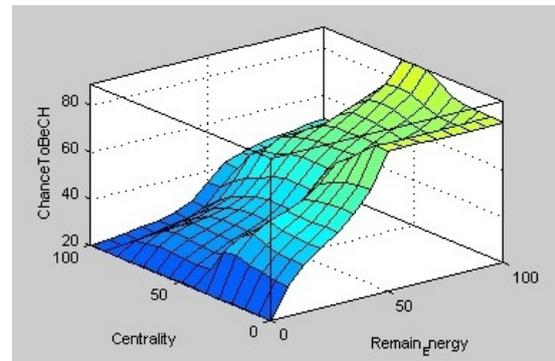
Table.1 Some fuzzy Rules

Energy	Neighbors Distance	Concentration	Centrality	Chance to be CH
High	Close	High	Close	VHigh
Medium	Far	Low	Close	VLow
High	Adequate	High	Medium	High
Low	Close	Low	Close	Low
Medium	Far	Medium	Far	Low
Medium	Adequate	Medium	Medium	Medium
Low	Adequate	High	Close	Medium
Medium	Close	Low	Close	Low
High	Far	Medium	Far	Medium
Medium	Adequate	Low	Close	Low
Low	Far	High	Close	Low
Low	Close	Low	Medium	Medium
High	Adequate	Low	Close	Medium
Low	Close	High	Far	VLow
Medium	Close	Medium	Far	Low
High	Far	Medium	Medium	Medium
Low	Far	Medium	Far	VLow
High	Close	Low	Medium	High
Medium	Adequate	High	Close	Medium

With the help of above rule we draw following graph



(a) concentration and energy remaining



(b) centrality and energy remaining

Fig 4 Comparison of the Surfaces

VIII. SIMULATION RESULTS

We use of Matlab [11] for simulations of our network. This simulation shows that energy remaining in cluster node. Also shows difference between proposed method and LEACH and other fuzzy system in energy consumption. Consider that the proposed method consumes less energy than other method and thus the network lifetime increased. It is clear from fig 5 that our proposed method does work well as compare to other method.

To compare with LEACH and proposed method, the networks that have an area of 100×100 (which varies in each run)and with fuzzy logic we selected proper cluster head . The coordinate of the BS is (10,50) and the energy parameters are shown in fig 5.

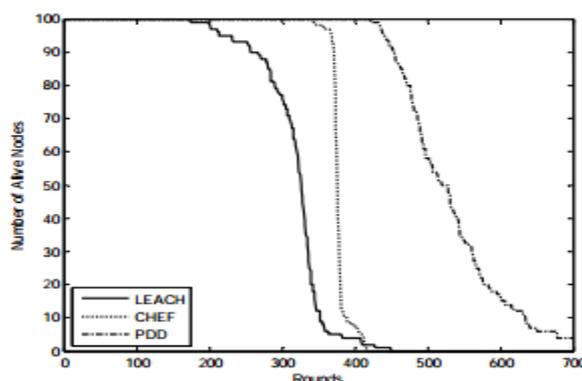


Fig.5 The Comparison of alive nodes given the same initial energy

IX. CONCLUSION

Our aim of doing this research is to achieve an Optimal energy efficiency, approach for clustering in WSN. the energy is the major factor in designing the WSNs. LEACH is the representative one. LEACH uses the probability model to distribute the concentrated energy consumption of the cluster heads. However, it only

depends on the probability model and the energy efficiency is not maximized. This paper has discussed a novel approach for cluster-head election for WSNs. This method has less computational complexity because uses of fuzzy logic. Since all operations for cluster formation are done locally a large amount of energy is saved and speed of cluster formation is increased. Moreover, this method is extremely robust because using appropriate input for the fuzzy system. We propose an efficient clustering approach by combination good features of LEACH approach and fuzzy logic. This method works better than other clustering approaches .a network with real time data as input to fuzzy system of nodes can be tested in the future with further experiments.

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EXPERIMENTAL STUDY ON FLEXURAL BEHAVIOUR OF FIBER REINFORCED GEOPOLYMER FERROCEMENT FOLDED PANEL

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ABSTRACT

Ferrocement is a highly adaptable construction material and acquire high performance characteristics, particularly in cracking, strength, ductility, and impact resistance. The ferrocement reinforcement is uniformly distributed in both direction and closely spaced through the thickness of the section. There is abundant scope for mass production and standardization together with the economy in construction. Ferrocement is appropriate for low-cost roofing, precast units and manhole covers. It is also used for the construction of domes, water tanks, boats, silos and folded plates. Geopolymer is an innovative revolutionary green material. An experimental investigation on ferrocement folded panel with geopolymer mortar and polypropylene fiber has been conducted for various mix proportions and fiber ratio. The results show that the flexural strength of the folded panel increased with the addition of fiber and also concluded that the addition of fibers increased the ductility and decreased the crack development and spilling of cement matrix.

Key Words: Fiber, Ferrocement, Folded Panel, Geopolymer Mortar,

I. INTRODUCTION

Geopolymers are a class of new binder generally manufactured by activating an alumino silicate source material in a highly alkaline medium. For the production of concrete-the most widely used construction material in the world, Ordinary Portland Cement (OPC) is the main ingredient used which is among the most energy intensive construction material and whose production is for an increase of 3% annually [1]. The production of OPC releases large amount of carbon dioxide (CO₂) to the atmosphere that significantly contributes to greenhouse gas emissions. One ton of CO₂ is released into the atmosphere for every ton of OPC produced [2]. Therefore, there is a need to find an alternative type of binder to produce more environmentally friendly mortar. A promising alternative is the replacement of cement with by product material such as fly ash.

Ferrocement is a highly adaptable form of reinforced concrete. Ferrocement is a building material together of a relatively thin layer of concrete, covering such reinforcing material as steel wire mesh. The ferrocement has unique properties such as good tensile strength, toughness, water tightness, fire resistance, resistance to cracking.

II. EXPERIMENTAL STUDY

2.1 Material Characterization

2.1.1 Fly ash

Fly ash of Class-F obtained from the Tuticorin Thermal Power Plant is used throughout this study. The chemical composition of the fly ash, as determined by X-ray fluorescence analysis is given below.

Table 1: Chemical Compositions Fly Ash

S. No.	Characteristics	% by mass
1	Silicon di Oxide (SiO ₂) plus Aluminium Oxide (Al ₂ O ₃) plus Iron Oxide (Fe ₂ O ₃)	95.95
2	Silica (as SiO ₂)	59.71
3	Magnesium Oxide (as MgO)	106
4	Total Sulphur as sulphur tri Oxide (Na ₂ O)	Nil
5	Available Alkalis as sodium Oxide (Na ₂ O)	0.63
6	Loss on Ignition	0.91
7	Moisture	0.32
8	Calcium Oxide as CaO	0.50

2.1.2 Fine Aggregate

Sand obtained from Trichy River passing through IS Sieve of 4.75mm and having a Fineness Modulus 2.80 and Specific Gravity 2.62 conforming to IS 383-1971 Zone II is used in this study.

2.1.3 Water

Specified amount of extra water was used in the mixing. The ordinary Potable water was available in the concrete laboratory used for the purpose.

2.1.4 Super Plasticizer

Super plasticizer-Conplast SP430 from FOSROC is used to improve the workability of fresh mortar.

2.1.5 Fiber

Recron 3s was used in this study for making the fiber reinforced Geopolymer folded panel. Recron 3s fiber has more advantages, such as increased ductile property, reduction in water permeability, and increased in flexibility, high Melting point. Low cast and easily disperses in the cement matrix. Table: 2 shows the properties of Polypropylene Fiber (Recron 3s).



Fig: 1 Polypropylene Fiber (Recron 3S)

Table 2 Properties of Polypropylene Fiber (Recron 3S)

S. No.	Properties	Specifications
1	Effective Diameter	10 μ - 1.0 mm
2	Length	6 – 12 mm
3	Specific Gravity	0.91 Kg/m ³
4	Water Absorption	Less than 0.45 %
5	Melting Point	Not less than 160 C
6	Aspect Ratio	12

2.1.5 Skeletal Steel

The skeletal steel of 6mm dia Mild Steel @ 100mm c/c both in transverse and in longitudinal direction is used.

The ultimate tensile strength of mild steel is 472 N/mm².

2.1.6 Wire Mesh

G.I. Wire Mesh with hexagonal openings of size 12mm and wire thickness of 1.29 mm (20gauge) was used.

2.1.7 Sodium Hydroxide (NaOH)

The properties of Sodium Hydroxide are described below:

Assay (Purity)	=	97%
Carbonate(Na ₂ CO ₃)	=	2%
Chloride (cl)	=	0.01%
Sulphate (SO ₄)	=	0.05%
Lead (pb)	=	0.001%
Iron (Fe)	=	0.001%
Potassium (K)	=	0.1%
Silicate (Sio ₂)	=	0.05%
Zinc (Zn)	=	0.02%

2.1.8 Sodium Silicate (Na₂ SiO₃)

Sodium Silicate, usually known as “water glass” or “liquid glass”, is well-known due to wide commercial and industrial applications. It is mostly composed of oxygen-silicon polymer backbone lodging water in molecular matrix pores. Sodium silicate products are manufactured as solids or thick liquids, depending on proposed use.

2.2 Geometry of Folded Ferrocement Panel

The geometry of ferrocement panel is folded shape with dimensions of 1000 mm x 400 mm x 30 mm. The reference number and designation of the panels are given in Table 6. The panels are constructed using the conventional ferrocement materials, which is composed of Geopolymer Mortar and Hexagonal Wire Mesh along with skeletal steel. Fig 2 & Fig 3 shows the geometry and cross-sections of folded panel.

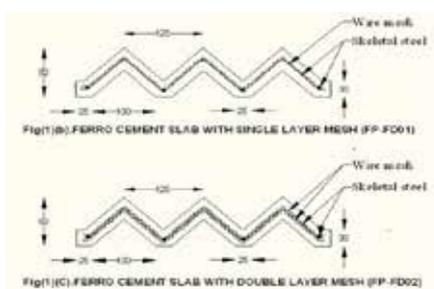


Fig: 2 Cross Sections of Folded Panel

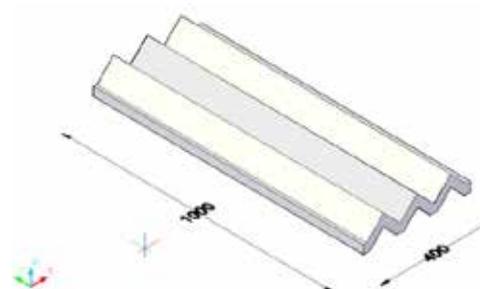


Fig: 3 Geometry of Folded Panel

2.3 Mix Proportions

Table: 3 Mix Proportions for Geopolymer Mortar

Materials	Percentage of Polypropylene fiber	
	0.0%	0.4%
Fly Ash: Fine Aggregate	1	1
Super plasticizer (1% of Fly-ash)	1	1
Fly ash/Alkaline Solution	0.45	0.45
NaOH:Na ₂ SiO ₃	1:1	1:1
Molarity of NaOH	8M	8M

2.4. Preparation of Control Specimens

Geopolymer Mortar cubes of size 70.6mm × 70.6 mm× 70.6 mm were cast to characterize strength of the mortar using the mix proportions as described in Table:3 and then cured @70° C for 24 hours in the heat curing chamber [3].



Fig. (4) Control specimens

2.5 Casting and Curing of Folded Panels

The required geometry of the folded panel was made using steel mould fabricated to match the shape and size. Each sample was cast after fixing the required wire mesh and meshes in its proper position in the mould [4]. For the panels with single wire mesh, the mesh was placed at mid depth of the panel and the mortar mix was prepared using Sand-Fly ash ratio and Alkaline Solution-Fly ash ratio by weight of 1:1 and 0.45, respectively. After 24 hours from casting, the samples are removed from the mould and the cured in 24 hours



Fig: 5 Reinforcement Details Of Panel



Fig:6 Curing Of Panel In Heat Chamber

III. TESTING OF FOLDED PANELS

After curing, the slabs are tested under loading frame. The load was applied by means of a load cell 20T. The specimens were tested by simulating simply supported conditions. The load was applied as two symmetrically arranged concentrated line loads. Loading was applied using a Hydraulic Jack and LVDT was fixed at central bottom to measure the deflection. The slabs were painted using whitecem to help in tracing the cracks. The test setup of the tested trough panel is shown in figure. The load is applied in small increments and simultaneously the deflection at the center of the panel was recorded during the loading process up to failure. The deflection at the mid span is measured by LVDT (0 to 50mm). Cracking was carefully checked throughout the loading process and the corresponding cracking load is also noted. The test results were interpreted using Universal Digital Data Acquisition System interface with PC and Application Software.



Fig: 7 Loading Setup



Fig 8. During Application of Load

IV. RESULTS AND DISCUSSION

Table 4 Designation of Panels

S. No.	Specimen ID	Description
1	GFP-FD-01	Geopolymer Ferrocement Panel with single layer Mesh
2	FRGFP-FD 01	Fiber reinforced-Geopolymer Ferrocement Panel with single layer Mesh

Fig.9 shows Load Vs Deflection of Geopolymer Folded Panels of without (GFP-FD-01) and with fiber (FRGFP-FD 01). From that, GFP-FD-01 specimen was deflected suddenly without any caution [7]. The first crack was formed under the load. The time taken to first crack to ultimate failure is too short. So the failure of the specimen was rapidly. In FRGFP-FD 01 the specimen was deflected after the sufficient formation of cracks [8]. The first crack also was formed under the load and the elapsed time between failures to ultimate is too long. The above failure of the specimen was restricted by evenly distributing the fiber in tension zone. Table: 5 & Table: 6 shows Load Vs Deflection of the specimens.

Table.7 & 8 shows the Stiffness of Geopolymer Folded Panels of without (GFP-FD-01) and with fiber (FRGFP-FD 01). From the Fig. 10, the Stiffness of the GFP-FD-01 specimen was higher than the FRGFP-FD 01. Because of fiber has the resilient property, due to that the stiffness of the matrix was good. Table 9 &10 shows the Ductility of Geopolymer Folded Panels of without (GFP-FD-01) and with fiber (FRGFP-FD 01). From Fig: 11 the Ductility of the GPF2A specimen was higher than the GFP-FD-01. Because of the introduction of fiber in FRGFP-FD 01.

Table 5 Load Vs Deflection

of GFP-FD-01

S.No	Load (KN)	Deflection (mm)
1	0	0.1
2	1	0.5
3	1.5	0.6
4	2.3	0.9
5	2.8	1.1
6	3.5	1.2
7	4.0	1.4
8	4.3	1.7
9	4.8	1.9
10	5.0	2.2
11	5.3	2.4
12	5.8	2.7
13	6.0	3.0
14	6.4	3.3
15	6.8	3.9
16	7.0	4.6
17	6.7	5.0
18	6.6	7.1
19	6.3	7.9
20	5.8	33.9
FCL		6.0
UL		7.0

Table: 7 Load Vs Stiffness

of GFP-FD-01

S.No	Load Sequence	Stiffness (KN/mm)
1	1	2.91
2	2	2.85
3	3	2.52
4	4	2.27
5	5	2.2
6	6	2.14
7	7	2
8	8	1.9
9	9	1.74
10	10	1.66
11	11	1.52
12	12	1.34
13	13	1.22
14	14	1.07
15	15	0.97
16	16	0.92
17	17	0.91
18	18	0.86

Table: 6. Load Vs Deflection

of FRGFP-FD 01

S.No	Load (KN)	Deflection (mm)
1	0	0.1
2	0.4	1.4
3	0.6	2.8
4	1.2	3.8
5	1.6	4.5
6	2.1	5.6
7	2.3	6.9
8	3	8.0
9	3.4	10.7
10	4.2	13.2
11	4.8	14.6
12	5.6	15.9
13	6.1	17.3
14	6.4	18.8
15	6.9	20.6
16	7.5	22.1
17	7.9	23.5
18	8.6	25.3
19	9.6	29.9
20	8.2	35.7
21	8.1	38.9
22	6.87	49.3
FCL		3.0
UL		9.6

Table: 8 Load Vs Stiffness

of FRGFP-FD 01

S.No	Load Sequence	Stiffness (KN/mm)
1	1	0.38
2	2	0.36
3	3	0.35
4	4	0.34
5	5	0.33
6	6	0.30
7	7	0.27
8	8	0.23
9	9	0.19
10	10	0.16
11	11	0.15

**Table: 9 Load Vs Ductility
For GFP-FD-01**

S.No.	Load Sequence	Ductility
1	1	0.03
2	2	0.15
3	3	0.18
4	4	0.27
5	5	0.33
6	6	0.36
7	7	0.42
8	8	0.51
9	9	0.57
10	10	0.66
11	11	0.72
12	12	0.81
13	13	0.9
14	14	1
15	15	1.18
16	16	1.27
17	17	1.39
18	18	1.51
19	19	1.6
20	20	1.81
21	21	2.03
22	22	2.15
23	23	2.21
24	24	2.3

**Table: 10 Load Vs Ductility
For FRGFP-FD 01**

S.No.	Load Sequence	Ductility
1	1	0.18
2	2	0.35
3	3	0.56
4	4	0.86
5	5	1
6	6	1.34
7	7	1.65
8	8	1.98
9	9	2.16
10	10	2.58
11	11	2.93
12	12	3.73
13	13	4.86
14	14	5.36
15	15	5.58
16	16	6.16

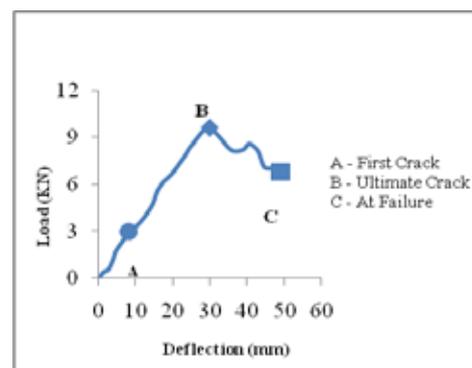
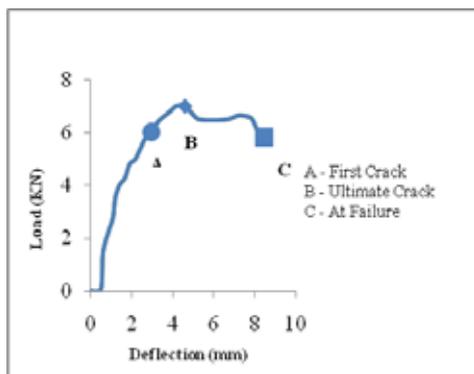
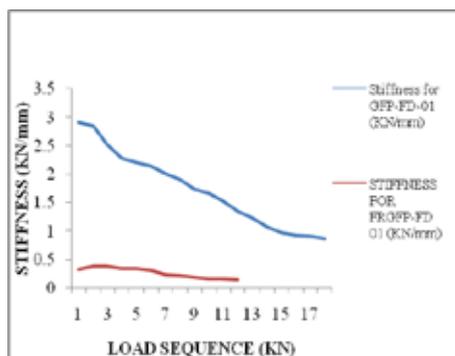
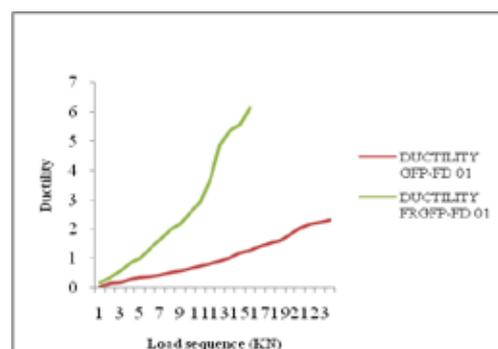


Fig:9 Load Vs Deflection Curve for GFP-FD 01 & FRGFP-FD 01



**Fig: 10 Load Vs Stiffness Curve for
GPF-FD 01 & FRGFP-FD 01**



**Fig: 11 Load Vs Ductility Curve for
GPF-FD 01 & FRGFP-FD 01**

V. CONCLUSIONS

Based upon the Experimental test results of geopolymer folded panel without and with fiber the following can be stated.

1. Flexural strength of Geopolymer Folded Panel with Fiber is more when compared with Geopolymer Folded Panel of without fiber.
2. The ductility of Geopolymer Folded Panel with Fiber is increased because of introduction of fiber in the mix..
3. The mode of failure is changed from sudden failure as exhibits in Panels without fiber because of introduction of fiber in the mix and allows sufficient time before failure after yielding.

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BIOGRAPHICAL NOTES

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TEXTILES IN SPORTS

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ABSTRACT

Technical textiles enable the production of materials which are stronger, breathe like skin, waterproof like rubber and at the same time eco – friendly and highly economical. The revolutionary new textiles used in sports and leisure industry are popularly known as sports textiles. Today sports demand high performance equipment and apparel. In recent years, development in active sportswear fabrics has been progressing to perform high functions and to achieve comfort. The sports textiles sector includes specialist apparel for specific sports each with its own particular functions. The sportswear manufacturing textile industries not only keep their eyes on market diversification for fibrous materials but also on textile science and technology. The use of innovative textile science and technology in the manufacturing of sports and leisurewear fabrics is continuously enhancing day by day to fulfil the requirements for athletics and leisure activities for their better performance in the sports. The performance requirements of many sports goods often demand widely different properties. The contributing factors for developing active sportswear fabrics are: polymer science, fibre science, production techniques, lamination and finishing techniques to obtain sophisticated fibre, modified structure of yarns and fabrics. This paper emphasis on the literature related to fibreproperties and workings done in development of sportswear have been reviewed.

Keywords: *Applications, Fabrics, Sports wear, Technical textiles*

I. INTRODUCTION

Health is state of complete physical, mental and social well being and not merely the absence of disease or infirmity. Regular Physical activity has a positive impact on major health risk factors, such as high blood pressure, high cholesterol, obesity and stress. Physical activity for nations is a cost effective method to improve public health across populations. Thus participation in sports activities has increased remarkably owing to health and physical fitness. Sportswear is not just used by athletes while performing, but is becoming a major part of everyday clothing during morning walks, jogging, yoga, stretching exercises and daily fitness activities because of quality comfort of sports clothing. It has been reported that only 30% of the sportswear manufactured is utilized by active sports person ⁽¹⁾. Selection of fibres or fabrics for manufacturing active sportswear is one big factor influencing performance, efficiency, ensuring protection, and physical comfort. Technological developments have lead sportswear to a state of virtual insanity.

The sports textiles sector includes specialist apparel for specific sports each with its own particular functions. The performance fibres, yarns, fabrics and finishes developed for this specialist sector are increasingly

transferring to the mass market in the high street. The performance requirements of many sports goods often demand widely different properties from their constituent fibres and fabrics, such as barrier to rain, snow, cold, heat and strength and at the same time these textiles must fulfill the consumer requirements of drape, comfort, fit and ease of movement⁽²⁾. Among the contributing factors responsible for successful marketing of functional sportswear has been made in the fibre and polymer sciences and production techniques for obtaining sophisticated fibre, yarns and fabrics

II. PROPERTIES OF SPORTS TEXTILE

1. Sports textile must have comfort ability, easy to wear, easy handling.
2. Sports textiles fabrics have a very high electrical conductivity, so they can permit the effectual dissipation of electrical charge.
3. It should be light as best as possible.
4. Filaments fabrics are made highly effecting in moisture management & thus they can wick the moisture as known as sweat away from the body & keeps body dry.
5. Sports textile should have good perspiration fastness.
6. As this sports fabric has a special property well known as heat conductivity make possible to feel the user cooler in summer & warmer in winter.
7. Garments manufactured from sports textiles fabrics, keeps the normal stability of body comfort, because these fabrics are ultra-breathable, fast drying and possess outstanding moisture managing properties, which rapidly wick moisture away from the body.
8. These garments are also very less in weight & feature elasticity properties, which provides immense comfort and independence of movement.
9. Keeping a normal level of bacteria on the skin offers a high level of comfort and personal hygiene, especially during athletic activities.
10. Sports textiles fabrics remove UVA and UVB rays that are dangerous to the skin, and guarantees an improved level of defense compared to the majority general natural and man-made fibres.
11. It also provides superior strength and durability.
12. The athletics & the leisure activities for their better performance in the sports.

III. REQUIREMENT OF ACTIVE SPORTSWEAR

Functional Properties

Active sportswear requires super lightweight, low fluid resistance, super high tenacity and stretch ability. Critical features include thermal retention, UV resistance, cooling capacity, sweat absorption and fast drying, vapour permeability, water proofing to provide relaxation without fatigue.

Aesthetic properties

Sensitivity of softness, surface texture, handle, luster, colour variation, transparency and comfort in sports wear are important factors.

Protection: From wind water and adverse weather

Insulation: Protection from cold

Vapour Permeability: To ensure that body vapour passes outward through all layers of the clothing system.

Stretch: To provide the freedom of movement necessary in sports⁽³⁾.

IV.CHARACTERISTICS OF SPORTSWEAR

- Optimum heat and moisture regulation
- Good air permeability
- Wick ability
- Dimensional stability even after wet
- Durable
- Easycare and Light weight
- Soft and pleasant touch and produces cooling effect.

V. TYPES OF FIBRE USED IN SPORTS WEAR

Polyester: Polyester has outstanding dimensional stability and offer excellent resistance to dirt, alkalies, decay, mold and most common organic solvents. Excellent heat resistance or thermal stability is also an attribute of polyester. It is the fibre used It is the fibre used most commonly in base fabrics for active wear because of its low moisture absorption, easy care properties and low cost. Polyester is essentially hydrophobic and does not absorb moisture. However, most polyester used in base layer clothing is chemically treated so that they are able to wick moisture.

Polypropylene: Polypropylene cannot wick liquid moisture. However, moisture vapour can still be forced through polypropylene fabric by body heat. Polypropylene has the advantage of providing insulation when wet it can melt at medium heat in home dryers. Polypropylene is claimed to be a proved performer in moisture management due to its hydrophobic nature and has very good thermal characteristics, keeping the wearer warm in cold weather and cold in warm weather⁽⁴⁾.

Nylon: Nylon fibre characteristic include lightweight, high strength and softness with good durability. Nylon also quickly when wet. Nylon is good fabric choice when combined with PU coatings. Nylon has a much higher moisture regain than polyester and therefore has better wicking behavior. It is most often used in tightly woven outerwear, which can trap heat because of low air permeability. It is also used in more breathable knitted fabrics, where it can perform well.

Cotton: Cotton garments provide a good combination of softness and comfort. However, cotton is not recommended for use in base layer clothing because of its tendency to absorb and retain moisture. When wet, cotton garments cling to the skin causing discomfort. During SASMIRA's trials for wicking of cotton treated with hydrophobic finishes showed good wicking properties⁽⁵⁾.

Viscose Rayon: The viscose rayon is not preferred next to skin as it holds water (13 % moisture regain) in sportswear. The outer layer of knitted hydrophilic portion of the twin layer Sportswear can be of viscose rayon, which absorbs 2-3 times more moisture than cotton. The wicking behavior improves by incorporation of some hydrophobic finishes.

5.1. Special Fibres

Hygra 20 : Unitika Limited has launched Hygra, which is a sheath core type filament yarn composed of fibre made from water absorbing polymer and nylon. The water-absorbing polymer has a special network structure that absorbs 35 times its own weight of water and offers quick releasing properties that the conventional water absorbing polymer cannot do. Hygra also has superior antistatic properties even under low wet conditions. The main apparel applications include sportswear like athletic wear, skiwear, golf wear etc.

Killat N23: Killat N from Kanebo Ltd is a nylon hollow filament. The hollow portion is about 33 per cent of the cross section of each filament due to which it gives good water absorbency and warmth retentive property. The manufacturing technology of Killat N is very interesting. The yarn is spun as bicomponent filament yarn with soluble polyester copolymer as the core portion and nylon as the skin portion.

Lycra25: Lycra, a truly synthetic fibre of long chain polymer composed of at least 85% segmented polyurethane, finds wide range of end users such as swimwear, active sportswear, floor gymnastics because of its comfort and fit²⁰. Adding Lycra to a fabric gives it stretch and recovery, particularly in gymnastics and swimwear where body skin flexing and stretching are inevitable. Lycra T-9026 requires still effort for the same extensibility.

Dacron: 4-Channel Polyester a generic term for a high performance four channel fibre engineered to move moisture and speed the evaporation of perspiration. It is a superior fabric for wicking action, drying time, moisture absorption and transport.

5.2 Regenerated fibres for Sportswear

Tencel: Tencel is the generic name of Lyocell. Lyocell is a natural, manmade fibre produced in an environment-friendly process from wood pulp that has become popular in clothing. The moisture management of tencel is unique when compared to synthetic fibres and allows for peak performances in sports. The excellent moisture absorption is perfect for the skin and thus guarantees well being at a very high level.

Bamboo: Bamboo fabrics are made from pure bamboo fibre yarns which have excellent wet permeability, moisture vapour transmission property, soft hand, better drape, easy dyeing, splendid colours. It is newly founded, great prospective green fabric ⁽⁶⁾. Bamboo fibre has a unique function of anti bacteria, which is suitable to make underwear, tight t- shirt and socks. Its anti – ultraviolet nature is suitable to make summer clothing.

Soybean: soybean protein contained in the fibre remakes a superior, soft hand endowed with both moisture absorbency and permeability, which makes best application in knits and innerwear. Finishes with an antibacterial agent, health-care functionalities are also given. It has great potential in its use in high-grade knits and innerwear ⁽⁷⁾.

VI. CONCLUSION

Sportswear manufacturers have intensified competition in the pursuit of functions. During these recent several years, sportswear has taken on a new look as lifestyle wear. Accordingly, function required for sportswear on the whole has changed to meet these requirements. The demand of the times is functions with comfort in mind.

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IMAGE ENHANCEMENT TECHNIQUE USING HSI SPACE

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ABSTRACT

Image enhancement is an important technology for image processing. A new method of color image segmentation is proposed in this paper. It's based HSI space and has the advantage over those based on the RGB space. Both the hue and the intensity components are fully utilized. In this paper we use the HSI color space as an alternative to RGB space. The HSI space considers the image as a combination of the components: hue, saturation and intensity and Utilized in image processing, the new method has got a good performance.

In this paper we use the HSI color space as an alternative to RGB space. The HSI space considers the image as a combination of the components: hue, saturation and intensity. In this paper we propose to design a chromatic filter in order to obtain improvements in the enhancement of medical images. In image processing systems it is usual specify colors in a form compatible with the hardware used. The RGB color model, where is computationally convenient, is not very useful in the specification and color recognition. The human being does not recognize a color by having an amount of red, green or blue components, but uses attributes perceptual of hue, saturation and intensity. There are many applications whether on synthesis of the objects or computer graphic images require precise segmentation. Image enhancement means to enrich the perception of images for human viewers. The RGB color model, where is computationally convenient, is not very useful in the specification and color recognition. The human being does not recognize a color by having an amount of red, green or blue components, but uses attributes perceptual of hue, saturation and intensity.

Keywords: *Color Image Segmentation, HSI Space, RGB space, color model*

I. INTRODUCTION

There is a large number of color spaces commonly used in image processing and machine vision. The most popular system is RGB, an additive color model in which proportions of red, green, and blue are mixed to form other colors. RGB is widely used in graphics and for CRT display, but it is often difficult to use. An alternative to RGB is HSI (Hue-Saturation-Intensity). In HSI, "Hue" refers to color produced by different wavelengths of light. "Saturation" is the measure of a pure hue in a color: red and pink are similar hues but have different saturation. "Intensity" is the measure of the amount of light reflected or emitted from an object. HSI exists in many forms: HSV (value), HCI (Chroma), and many others. Since HSI is based on linear transforms from RGB, it has similar weaknesses as RGB (e.g., device dependence). However, HSI is generally easier to use because it more closely matches human perceptual response to color, i.e., what artists think of as tint, shade, and tone. The color image processing is motivated by two important factors, by a similarity to human vision, fully chromatic, and second, by the increasing of the information that the chromaticity contributes to the analysis of images. An image with high contrast and brightness is called fine quality image while a poor quality image is identified by

low contrast and poorly defined boundaries between the edges. Image enhancement can be considered as transformation of poor quality image into good quality image to make its meaning clearer for human perception or machine analysis. With the consideration of the characteristics of each object composing images in MPEG4, object-based segmentation cannot be ignored. Nowadays, sports programs are among the most popular programs, and there is no doubt that viewers' interest is concentrated on the athletes. Therefore, demand for Image segmentation of sport scenes is very high in terms of both visual compression and image handling using extracted athletes.

Color spaces provide a method for specifying, ordering and manipulating colors. Usually it is determined by a base of n vectors whose linear combinations generate all elements of the space. There are numerous color spaces among which we can mention the gray scale, which is one dimensional space, the planes RG, GB and BR, which are two-dimensional spaces and the spaces RGB (Red, Green and Blue), HSV (Hue, Saturation, Value), HSI (Hue, Saturation, Intensity) and YIQ, which are three-dimensional spaces [3-4]. There are many algorithms used for image segmentation, and some of them segmented an image based on the object while some can segment automatically. Nowadays, no one can point out which the optimal solution is due to different. A similarity close measure was used to classify the belonging of the pixels, and then used region growing to get the object. Unfortunately, it required a set of markers, and if there is an unknown image, it is hard to differentiate which part should be segmented. In this paper Image segmentation we be introduce using HSI Function. The morphology and color based image segmentation method is proposed. By setting a threshold based on the pixel value of the hue, saturation, and intensity (H, S, I) separately, these color information of the object can represent the parts with the image close to these color information. The character of HSI is used to analyze color because they are the three components of the original color. Since the hue, saturation, and Intensity are independent of one another, we can use them to process the image separately without worrying the correlation of them. On the other hand, if the character of RGB is used instead, the color of the segmented results will change correspondingly when a few pixel values are changed. In this paper, we propose a new algorithm segmenting color images in *HSI* space. *HIS* color representation is compatible with the vision psychology of human eyes, [3] and its three components are relatively independent.

II. EXPERIMENTAL APPROACH

The RGB color model is an additive system in which each color is defined by the amount of red, green, and blue light emitted. In the RGB scheme, colors are represented numerically with a set of three numbers, each of which ranges from 0 to 255. White has the highest RGB value of (255, 255, 255) while black has the lowest value of (0, 0, 0). This is consistent with the additive nature of the RGB system, since white light is the presence of all colors of light, and black is the absence of all light. There are other three-parameter representations of colors. One such system is the HSI color model, which encodes colors according to their **H**ue, **S**aturation, and **I**ntensity. The HSI model is used by some graphics programs and color monitors as an alternative to, or alongside the RGB representation. In the HSI system, the hue of a color is its angle measure on a color wheel. Pure red hues are 0° , pure green hues are 120° , and pure blues are 240° . (Neutral colors--white, gray, and black--are set to 0° for convenience.) Intensity is the overall lightness or brightness of the color, defined numerically as the average of the equivalent RGB values. The HSI definition of saturation is a measure of a color's purity/grayness. Purer colors have a saturation value closer to 1, while grayer colors have a saturation value closer to 0.

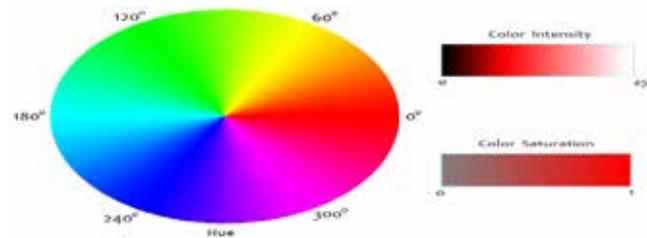


Figure 1. HSI Model

The HSI model defines a color model in terms of its components. This space has the ability to separate the intensity of the intrinsic information of color, which refers to the hue and saturation. This model is suitable for processing images that present lighting changes this is due to the fact that the colors of the environment are distinguishable from each other through the hue component.

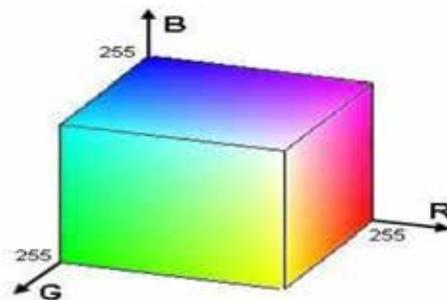


Figure 2. RGB model representation

The most common way of representing the HSI model is a double cone, as shown in figure 2. The center of the double cone is a circumference divided into equal size angles. Therefore, the value of the hue component describes the color by its wavelength, and takes values between 0 and 2π , with 0 representing the red, $2\pi/3$ representing the yellow and $4\pi/3$ representing the green. The distance from the center to the outside of the circumference represents the color saturation and takes values between 0 and 1. Saturation refers to the mix of color with white light. Finally, the axis through the two cones corresponds to the intensity component. This will have a value between 0 (black) and 1 (white) and indicates the amount of light present in a color. Removing a small circumference of the figure formed by two cones, colors close to an intensity of 1 are lighter than those close to zero. When the saturation component is close to 0, colors only reflect a change between black and white. When this component is close to 1, the color will reflect the true value represented by the hue.

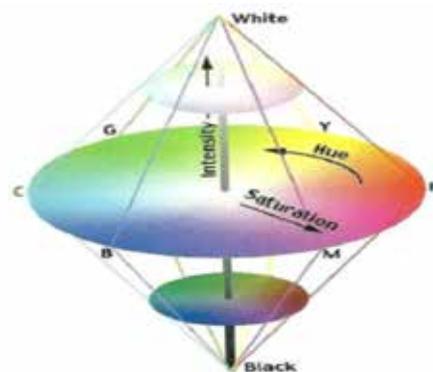


Figure 3: HSI model representation, the letters R, Y, G, C, B, M refer to = Red, Yellow, Green, Cyan, Blue and Magenta respectively.

The spaces that represent the color in terms of hue, saturation and intensity, allow an intuitive description of the colors. The transformation of RGB space to HSI space is the conversion of a Cartesian coordinate system to

another in cylindrical coordinates, where the color is specified in terms of hue, saturation and intensity. A good representation of color must use norm or distance to make that the chromatic and achromatic components are independents. The equations that establish the change of coordinates between the components of both color spaces, using the semi-norm max-min, are given by:

Suppose R, G, and B are the red, green, and blue values of a color. The HSI intensity is given by the equation now let m be the minimum value among R, G, and B. The HSI saturation value of a color is given by the equation

$$S = 1 - m/I \quad \text{if } I > 0, \text{ o}$$

$$S = 0 \quad \text{If } I = 0.$$

To convert a color's overall hue, H, to an angle measure, use the following equations:

$$H = \cos^{-1}[(R - \frac{1}{2}G - \frac{1}{2}B)/\sqrt{R^2 + G^2 + B^2 - RG - RB - GB}] \quad \text{If } G \geq B$$

$$H = 360 - \cos^{-1}[(R - \frac{1}{2}G - \frac{1}{2}B)/\sqrt{R^2 + G^2 + B^2 - RG - RB - GB}] \quad \text{If } B > G$$

The inverse cosine output is in degrees.

$$\left\{ \begin{array}{l} I = 0.23 \times R + 0.715 \times G + 0.072 \times B \\ S = \max R, G, B - \min R, G, B \\ \theta = \arccos \left(\frac{2 \times R - G - B}{2[R^2 + G^2 + B^2 - RG + RB + GB]} \right)^{1/2} \\ H = \begin{cases} 360 - \theta & \text{if } B > G \\ \theta & \text{if } B \leq G \end{cases} \end{array} \right.$$

the three components of HSI representation, the most important ones are H and I. Good color segmentation algorithms should consider both.[2] In some cases, because of the occlusion and the variation of the projected light intensity, the brightness of the same object surface is not uniform. However, the hue values determined by the reflective property of the object surface are relatively stable. [2] While in some other cases, the color intensities of different objects are more distinguishable among different objects. Our approach is to obtain color information of the target image and boundary extraction separately and simultaneously. We apply the character of HSI to acquire the information of the pixels of the target image. The proposed algorithm for the selective chromatic filter has the following steps:

- First we extract the color of interest of the original image using manual selection. The algorithm select the correspondent color code on the matrix H (a value between zero and one).
- Based on the selected color and allowing a range of tones above and below it (color band pass filter), a mask with the image pixels that are within that range is obtained.
- Use the hue, saturation and intensity to get color information.
- At last, this mask is applied to get darker the pixels which colors are outside the filter passband in the intensity component

In HSI color representation, I component represents intensity, H component represents hue and S component represents saturation. To convert RGB representation to HSI representation, first compute

$$\begin{bmatrix} Y \\ C_1 \\ C_2 \end{bmatrix} = \begin{bmatrix} 1/3 & 1/3 & 1/3 \\ 1 & -1/2 & -1/2 \\ 0 & -\sqrt{3}/2 & \sqrt{3}/2 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix} \quad (1)$$

Then *HSI* values can be given as:

$$I = Y, S = \sqrt{C_1^2 + C_2^2}$$

$$H = \begin{cases} \text{Arc cos}(C_2/S) & C_1 \geq 0 \\ 2\pi - \text{Arc cos}(C_2/S) & C_1 < 0 \end{cases} \quad (2)$$

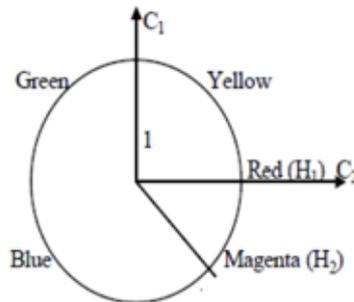


Figure 4: RGB to HSI

As shown in the Fig 2.1, in the C_1 - C_2 two-dimensional space, a point on the unit circle corresponds to one color. Starting from C_2 axis and going counterclockwise along the unit circle to another point on the unit circle, the positive angle ($\hat{I} [0,2\pi)$) you experienced is just the hue value of the color. For $H_1 = 0$ (red) and $H_2 = 5\pi/3$ (Magenta), the difference of hue values are quite large ($H_2 - H_1 = 5\pi/3$). However, if we start from H_1 and go clockwise along the unit circle to H_2 , the absolute value of the angle experienced ($-\pi/3$) is not that large since a shortcut is taken. This example demonstrates the effect of the cyclic property (with a period of 2π) of hue component. One point worth noticing is that the H component is a value of angle and it displays a special cyclic property.

III. TESTING

To compare the quality of filtering in HSI space with respect to RGB space, we performed the same filtering, but now on each matrix of RGB space, red, green and blue. The final mask results the combination of a logic and function applied to the individual masks obtained. This chromatic filtering is more restrictive in RGB space because there is a high degree of correlation between the RGB components. Hue becomes the attribute of a visual sensation according to which an area appears to be similar to one of the perceived colors: red, yellow, green, and blue, or to a combination of two of them. Intensity becomes the total amount of light passing through a particular area and Saturation becomes the colorfulness of a stimulus relative to its own brightness. Brightness and colorfulness are absolute measures, which usually describe the spectral distribution of light entering the eye, while lightness and Chroma are measured relative to some white point, and are thus often used for descriptions of surface colors, remaining roughly constant even as brightness and colorfulness change with different illumination. Saturation can be defined as either the ratio of colorfulness to brightness or of Chroma to lightness. More precisely, both hue and Chroma in this model are defined with respect to the hexagonal shape of the projection. The *Chroma* is the proportion of the distance from the origin to the edge of the hexagon. In the lower part of the diagram to the right, this is the ratio of lengths OP/OP' , or alternately the ratio of the radii of the two hexagons. This ratio is the difference between the largest and smallest values among R , G , or B in a color. To make our definitions easier to write, we'll define these maximum and minimum component values as M and m , respectively.

$$M = \max(R, G, B)$$

$$m = \min(R, G, B)$$

$$C = M - m$$

To understand why Chroma can be written as $M - m$, notice that any neutral color, with $R = G = B$, projects onto the origin and so has 0 Chroma. Thus if we add or subtract the same amount from all three of R , G , and B , we move vertically within our tilted cube, and do not change the projection. Therefore, the two colors (R, G, B) and $(R - m, G - m, B - m)$ project on the same point, and have the same Chroma. The Chroma of a color with one of its components equal to zero ($m = 0$) is simply the maximum of the other two components. This Chroma is M in the particular case of a color with a zero component, and $M - m$ in general. The hue is the proportion of the distance around the edge of the hexagon which passes through the projected point, originally measured on the range $[0, 1)$ but now typically measured in degrees $[0^\circ, 360^\circ)$. For points which project onto the origin in the chromaticity plane (i.e., grays), hue is undefined. Mathematically, this definition of hue is written

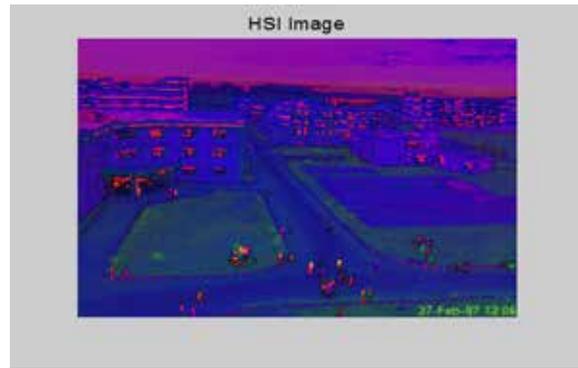
$$H' = \begin{cases} \text{undefined,} & \text{if } C = 0 \\ \frac{G-B}{C} \bmod 6, & \text{if } M = R \\ \frac{B-R}{C} + 2, & \text{if } M = G \\ \frac{R-G}{C} + 4, & \text{if } M = B \end{cases}$$

$$H = 60^\circ \times H'$$

The characters of HSI (hue, saturation, and intensity) are also applied to segment the image. Only the information of the pixels with similar HSI character to the foreground image would be kept. In order to apply the characters of HSI to segment the image, partial images of the foreground image is cut to calculate the average value of the hue, saturation, and intensity, and then the deviation of the HSI value is set to create different ranges of the hue, saturation, and intensity. Afterwards, the HSI value of every pixels of the image is examined. Only the information of the pixel whose HSI value falls in the range will stay. Otherwise, its information will be set to zero. By applying the character of HSI to image segmentation, we can obtain all the information of the pixel whose HSI value is similar to that in foreground images. The approximate color information of pixels and the information of boundaries are acquired. To combine both of the information, we get the union of the results from the above two steps so the result from different methods would be combined. The reason why we get the union of the results instead of the intersection is we only got partial images from the two different methods mentioned above. So only by getting the union of them can we get an image that is more close to the target image which we want to segment out from the entire image.

IV. DISCUSSION AND RESULT

First of all, the target image must be known. Since the method which applies HSI to image segmentation is to cut the partial images of HSI and calculate the HSI values, so the target image must be known. Second, the target image must have clear vision instead of blurred image. Other than applying the character of HSI to the image segmentation, another method applied to segment the image is to use the Matlab.



There are some failures of extracting the target image. Due to the clearness of both the foreground and the background images, we have problem extracting only the boundaries of the foreground image. Another limitation of our algorithm is that the appendages of the target image cannot cross over each other. When the appendages of the target image cross over each other, the boundaries of the appendages would make a closure. In other words, when we perform the Matlab “edge” and “imfill” commands later, the background image which resides within the closure of the boundaries of the appendages would be considered as part of the foreground image so their pixel information would be passed to the segmented image.

V. CONCLUSION & FUTURE WORK

Due to the clearness of both the foreground and the background images, we have problem extracting only the boundaries of the foreground image. Another limitation of our algorithm is that the appendages of the target image cannot cross over each other. When the appendages of the target image cross over each other, the boundaries of the appendages would make a closure. First of all, an interpolation algorithm needed to be developed. Since the Matlab “edge” command can only extract the approximate boundaries, the interpolation algorithm is necessary to connect the disconnected boundary line segments. Moreover, other than using the character of HSI to extract the image, it will be helpful to use other characters to extract the image so the segmented pixel information of the target image will be more solid.

Even though the character of HSI extracts most of the color information of the target image, it also extracts the pixels in the background image whose HSI value fall in the setting range. Therefore, if we can come up with other character to segment the image, we should be able to remove part of the noise but keep the completeness of the target image in the mean time. In addition, a more powerful algorithm of noise removal needs to be developed. With our current algorithm of noise removal, it does remove most of the noise from the background image. However, it has its own limitation and flaws. Since the dilation is performed in order to connect the disconnected boundary line segments, so the background image surrounding the target image will also be extracted while they actually should be eliminated. This noise relates to the disconnected boundary line segments. Therefore, if we can develop a more powerful interpolation algorithm, we would not have to perform dilation to connect the disconnected boundary line segments and the background image surrounding the target image will not be extracted. Furthermore, the Matlab “edge” command will also extract edge the background image which has clear vision and cannot be eliminated, so a more powerful algorithm of noise removal would improve the accuracy of image segmentation. To reduce the noise in the image we further use fuzzy system in coming days

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PARTITIONING DATA TO INCREASE WEBSITE VISIBILITY ON SEARCH ENGINE

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ABSTRACT

Currently in search engine, users unable to get exactly appropriate result. It takes long time to generate result to the user. In terms of cost its overhead by getting data. Getting a higher number of data results in a higher overhead. In our search result loss of unwanted information. So we partition the data and retrieving the result based on user level. Users have to specify their user level. Search engine will returned the result based on the user level and key word. The main scope of the project is get accurate search result to the user. So we can get the expected result and it will be reduced time to our search document. It can reduce the unwanted data. In this paper we first formally introduce Term Partitioning as a new optimization problem. Then we get the process of relevant search web links. It may easier to get our search result easier. And each web link shown by a ranking process.

Key Terms: Search Engine, Indexed Pages, Crawlers, SEO, SERP, Horizontal Partitioning

I. INTRODUCTION

Search engine optimization is a process of affecting the visibility to the user on a webpage in a search engine that gives a organic search results. In a search engine that can include image search, local search, video search, academic search, news search and industry specific vertical search engines. In search engine, we get higher ranking on the search result page and more frequently link appears in the search result list, most of the users can get these kind of methodology in a search engines. . WWW users and content providers give optimizing sites for search engines in the mid-1990s, as the first search engines were on the early Web. All the web users needed to do submit the address of a page, or URL, to the various engines which would post a "spider" to "crawl" that page, extract links to other pages from it, and return information found on the page to be indexed. The operation calls for a search engine spider downloading a page and storing it on the search engine's own server, where a second plan, recognized as an indexer, extracts various information about the page, such as the words it checks and where these are settled, as well as any weight for specific words, and all links the page contains, which are then put into a scheduler for crawling at a later appointment. The network creates new challenges for data recovery. The amount of data on the web is maturing rapidly, as considerably as the number of new users inexperienced in the artistic production of web research. People are likely to surf the network using its link graph, often beginning with high quality human maintained indices such as Yahoo! Or with search engines. Human maintained lists cover popular topics effectively but are subjective, expensive to build and maintain, slow to amend, and cannot cover all issues. Automated search engines that rely on keyword matching usually return too many low quality matches. To build things worse, some advertisers attempt to earn people's attention

by calling for measures meant to mislead automated search engines. We have established a large-scale search engine which addresses many of the problems of systems. It makes especially heavy use of the additional structure present in hypertext to provide a good deal higher quality search solutions.

1.1. Relationship and methods in search engine

The existing leading search engines like Google, Bing, Yahoo!. From that most of the search engines use crawlers to find pages for their algorithmic search results then they are applying the indexing operation. Pages that are linked from other search engine indexed pages do not necessitate to be taken because they are set up automatically. And to bring the network links they use the red worms. Search engine crawlers may look at a number of different factors when crawling a website. Not every page is indexed by the search engines.

Search engine optimization is ever shifting and evolving, and then it's important to save up with optimization trends and techniques. In the previous articles in our SEO series we dealt with the bedrock of search engine optimization as well as some tips & tricks of the craft. We will explore more advanced techniques and reveal why they are significant. Be warned though, this is the stuff that can get very time consuming and the consequences are likely to be less spectacular. Even so, the effort may bump your ranking just enough to propel you off the second page to the always coveted top ten and first page.

In this paper we are using a partitioning technique in that we can be used of horizontal partitioning is a database design principle whereby rows of a database table are taken separately, instead than being split into columns (which is what normalization and vertical partitioning do, to differing extents). Each partition forms part of a shard, which may in turn be located on a separate database server or physical position.

On that point are numerous advantages of the horizontal partitioning approach. Since the tables are split up and dispersed into multiple servers, the total number of courses in each table in each database is scaled down. This cuts down the index size, which generally improves search performance. A database shard can be located on separate hardware, and multiple shades can be located on multiple cars. This enables a distribution of the database over a heavy number of machines, which entails that the database performance can be broadcast out over multiple machines, greatly improving operation. In accession, if the database shard is based on some real-world, segmentation of the data (e.g., European customers v.v. American customers) then it may be possible to infer the appropriate shard membership easily and automatically, and query only the relevant shard.

1.2 Need for Study

This report analyses the search engine algorithms and ranking principle, we hashed out the situation structure, keywords, single-page optimization, and search engine penalties. In add-on, search engine optimization techniques developed in late years, which have a really significant function in the corporate internet site ranking. We use some search engine optimization technology applications to discuss this increasing technology. Due to Webmasters and content providers began optimizing sites for search engines in the mid-1990s, as the first search engines were cataloguing the early Web. Initially, all webmasters needed to serve was to submit the address of a page, or URL, to the various engines which would post a "spider" to "crawl" that page, extract links to other pages from it, and return information found on the page to be indexed. The operation calls for a search engine spider downloading a page and storing it on the search engine's own server, where a second plan, recognized as an indexer, extracts various information about the page, such as the language. It checks and where these are

settled, as well as any weight for specific words, and all links the page contains, which are then put into a scheduler for crawling at a later appointment.

II. RELATED WORK

"How to Use Search Engine Optimization Techniques to Increase Website Visibility". [1] What contributes to search engine rankings? And what can web content creators and webmasters do to create their content and sites easier to find by audiences using search engines? Key concepts: Search engine rankings are shaped by three classes of participants: search engine companies, programmers and search engine optimization practitioners, and search engine users. Key lessons: By using three key lessons, professional communicators can create it more comfortable for audiences to get their web content through search engines: (1) consider their web content's audiences and website's competitors when analyzing keywords; (2) insert keywords into web text that will appear on search engine results pages, and (3) involve their web content with other websites and web content creators. Implications: Because successful search engine optimization requires considerable time, professional communicators should progressively apply these lessons in the sequence presented in this tutorial and should keep up to date with frequently changing ranking algorithms and with the associated changing practices of search optimization professionals.

"Worst practices in search engine optimization"[5]. Many online companies have become aware of the importance of ranking well in the search engines. A recent article reveals that 62% of search engine users click only on answers that appear on the first search engine results page (SERP) and less than 10% of users click on results that appear. In parliamentary law to rank comfortably in the SERPs companies have commenced to utilize search engine optimization techniques (SEO). That is, they manipulate the site's content and meta tags, as well as endeavour to attract incoming links from other websites. Nevertheless, certain SEO techniques directly violate the guidelines published by the search engines. While the specific guidelines vary a bit, they can all be summarized up as: show the same content to search engines as you present to users.

"Comparing rankings of search results on the web"[2] In this report we introduce a number of bills that compare rankings of search engine results. We use these amounts to five questions that were monitored daily for two periods of 14 or 21 days apiece. Rankings of the different search engines (Google, Yahoo! and Teoma for text searches and Google, Yahoo! And Pic search for image searches) are compared on a everyday basis, in addition to longitudinal comparisons of the same engine for the same query over time. The answers and rankings of the two points are compared as well.

"Standard parameters for searching behaviour in search engines and their empirical evaluation" [6] Search engines have become the most significant medium for Internet users to find pages on the WWW. They assist clients to decrease their information overload, and heighten the sales of commercial sites in different ways. For these reasons, the exploration of and changes in (human) online searching behaviour has become a topic of especial importance. This theme will help search engine and website administrators and developers to monitor online searching behaviour properly and to derive strategies from the information gathered. We define standard parameters against which search engines can be quantified and compared. These parameters as well reflect the online searching behaviour of search engine users.

"Analyzing Google rankings through search engine optimization, data"[3] The report gives the outcomes of a study into 50 highly optimized web pages that were produced as part of a Search Engine Optimization

competition. The work concentrates on the most popular techniques that were employed to rank highest in this rivalry, and includes an analysis on the use of Page Rank, number of pages, number of in-links, domain age and the role of third party sites such as directories and social bookmarking websites. A separate study was formed into 50 non-optimized web pages for comparing. The report offers insight into the techniques that successful Search Engine Optimizers use to secure a page ranks highly in Google.

"The issue of user intent on the stability of search engine results"[4] Previous work has demonstrated that search engine queries can be sorted according to the purpose of the searcher (i.e., why is the user searching, what specifically do they signify to execute). In this clause, we report an experiment in which four sets of queries, each set representing different user intent, are repeatedly submitted to three search engines over a period of 60 days. Employing a variety of measurements, we identify the overall stability of the search engine results recorded for each group.

2.1 Search Engine Optimization

Webmasters and content providers began optimizing sites for search engines in the mid-1990s, as the first search engines were cataloging the early Web. Initially, all webmasters needed to serve was to submit the address of a page, or URL, to the various engines which would post a "spider" to "crawl" that page, extract links to other pages from it, and return information found on the page to be indexed. Keyword research is the cognitive operation of finding out which keyword phrases people are using to lookup for the products or services you offered.

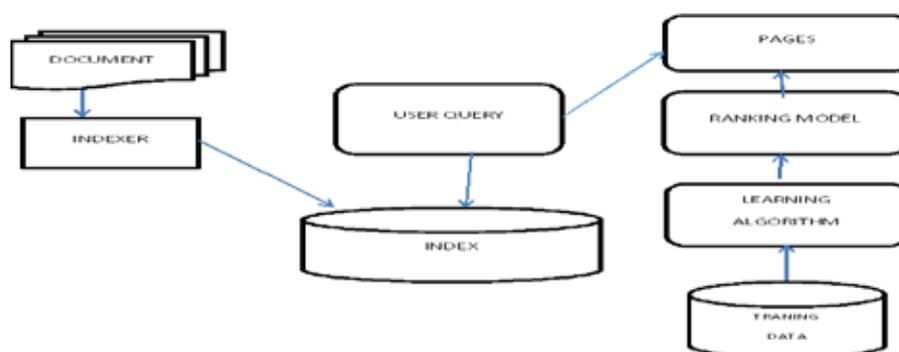


Fig 1 Basic architecture of search engine optimization

Keyword research also involves determining which keywords are most relevant to your website: there is a big difference between optimizing a website for keywords that are currently bringing traffic to your website and optimizing for keywords that are better suited for your website.

Keyword research is a relatively complex procedure that calls for multiple tools to provide quality keyword phrases and data on their relative popularity and expected effectiveness. Taking keyword research should be the beginning point for anyone interested in SEO for their internet site. Because SEO is a process, there are no guarantees of immediate success. But we will guarantee that without conducting effective and thorough

keyword research, subsequent attempts at optimizing a website or page for search engines will be far less efficient.

Process includes following steps:

- Determine the composition and scope of the client's business or establishment. We have interviews with the client and review their existing web site to better interpret the client organization's products and services.
- Discover new keywords, We generate new keywords based on synonyms, semantically related terms, and tangential phrases.
- Evaluate the list of keywords. Using SEO tools and supporting data, we evaluate the intensity of the generated keywords.
- Pare down and select a final list of keywords. We narrow down the list of keywords based on their relevancy, the client's specifications, and important metric data relating to those terms. At the final stage of the keyword research process, we'll supply you with a detailed report that includes an executive summary of our determinations, our recommendations for keyword phrases to optimize your situation for, supporting data, analysis of the data, and suggestions for next steps.

2.2 Disadvantages in Existing System

It requires long time to generate answers to the user. In conditions of cost its overhead by getting data. Getting a highest number of data results in a higher overhead. In our search results loss of undesirable information. Temporary disconnections are possible, hence additional mechanisms are needed.

Every search engine uses different complex mathematical patterns to generate search results. The consequences for a specific query are then exhibited on the SERP. Search engine algorithms consider the key elements of a web page, including the page title, content and keyword density, and come up with a ranking for where to put the results along the pages.

III. SYSTEM ARCHITECTURE DESIGN

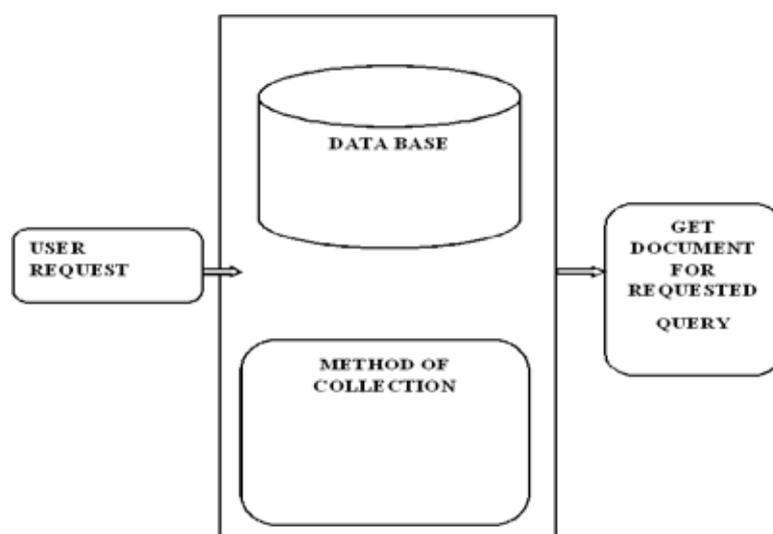


Fig 2 System Architecture Design

3.1 Detailed Description

Currently in search engine, users unable to get exactly appropriate result. So we partition the data based on user level. Hence we can reduce users search accuracy & time and also search engine running time. The advantages of the proposed system are its help's to retrieve the related data easier. Then retrieve the data short span of time. They can apply to make it easier for audiences to find their web content and websites in our search engine.

In this paper search engine partitioning the data to increase the website visibility.

Partitioning levels

•Beginner level

•Expert level

After process of user level selection then user enters the query then its enters into the process of

1. Data Base
2. Method of document collection

Before get content out of your MySQL database, you must know how to establish a connection to MySQL from inside a PHP script. To perform basic queries from within MySQL is very easy. This article will show you how to get up and running.

Let's get started. The first thing to do is connect to the database. The function to connect to MySQL is called my sql connect. This function returns a resource which is a pointer to the database connection. It's also called a database handle, and we'll use it in later function

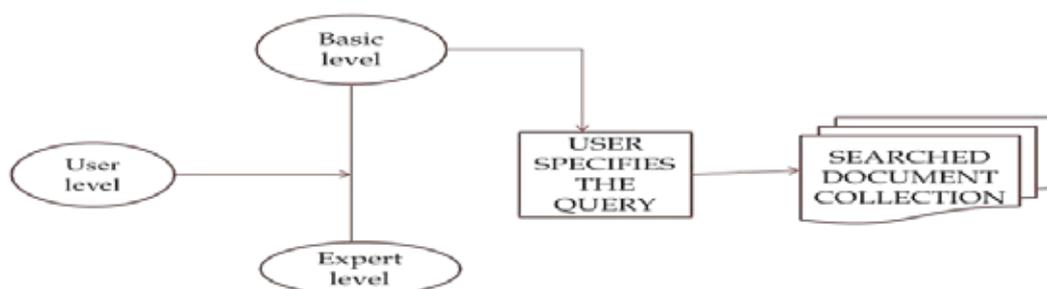


Fig 3 Selecting user level

Then we get the process of relevant search web links. It may easier to get our search result easier. And each web link shown by a ranking process.

IV. ALGORITHM FOR RANKING PROCESS

In the HITS algorithm, the first step is to retrieve the most relevant pages to the search query. This set is called the root set and can be obtained by taking the top n pages returned by a text-based search algorithm. A base set is generated by augmenting the root set with all the web pages that are linked from it and some of the pages that link to it. The web pages in the base set and all hyperlinks among those pages form a focused sub graph. The HITS computation is performed only on this focused sub graph. According to Kleinberg the reason for constructing a base set is to ensure that most (or many) of the strongest authorities are included.

Authority Update: Update each node's Authority score to be equal to the sum of the Hub Scores of each node that points to it. That is, a node is given a high authority score by being linked from pages that are recognized as Hubs for information.

Hub Update: Update each node's Hub Score to be equal to the sum of the Authority Scores of each node that it points to. That is, a node is given a high hub score by linking to nodes that are considered to be authorities on the subject.

V. CONCLUSION AND FUTURE WORK

An information provider wishes to dispatch specific information to the user. Through a user level, we designed the SEO process which selects “levels” and lets them act as data broadcasters within a region of interest. So, the user can get the appropriate result easier. We also showed that a significant further increase in performance can be achieved by efficiently managing by a user of the content.

Now I did the process of study based process only in my search engine. My future work is to built SEO partitioning process for all knowledge based process and interested to put on this process in android. In the future more granular partitioning of data can be implemented. By making use of learning algorithms search engine can designed to learn users level using the users searching pattern.

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A STUDY OF FACTORS AFFECTING EMPLOYEE ENGAGEMENT IN IT INDUSTRY

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ABSTRACT

The paper deals with the factors which influence employee engagement. This paper is based on the reviews of the previous old papers. The paper is based on the secondary data .The source of the information has been taken from the previous articles, journals, text books on the employee engagement. The descriptive method is used to explain the factor of employee engagement. The paper focuses only the factors like motivation, reward system, appreciation and support from co-staff at work place Reorganization, and Leadership behavior at work place. .

Key Words: *Employee engagement, Feedback, communication, leadership, recognition*

I. INTRODUCTION

Employee engagement is associated with the level of involvement of an employee at work place and level of interest in the work. It is further concerned with the mind set of an employees and focus on employees attitude (positive and negative) . The level of engagement also affect to productivity, performance, retention and employees satisfaction at work place. Today each and every organization wish to retain employees, just to recruit the right personnel is not important but also it is equally important to retain and use his full potential for the development of an organization. Employee engagement is an important aspect in competitive world because 100% utilization of human resources is must for the attainment of organization vision, mission and goals.

This is the only medium by which an organization can develop the base of satisfied customers and increase the productivity of the firm.

The challenge today is not just retaining talented people, but fully engaging them, capturing their minds and hearts at each stage of their work lives. Employee engagement has emerged as a critical driver of business success in to day's competitive marketplace. Further, employee engagement can be a deciding factor in organizational success. Not only does engagement have the potential to significantly affect employee retention, productivity and loyalty, it is also a key link to customer satisfaction, company reputation and overall stakeholder value. Employee engagement is a complex concept, with many issues influencing engagement levels. Consequently, there are many pathways to foster engagement, with no one „kit“ that fits all organizations. While each company may define employee engagement differently, ultimately, the key to effective engagement will be rooted in the flexibility of approach most appropriate for each individual firm.

II. LITERATURE REVIEW

Thiagarajan B & Renugadevi V (2011), conducted research on “An empirical investigation on Employee Engagement Practices in Indian BPO Industries”, and the purpose of this research article is to introduce

employee engagement and key research on engagement related factors in BPO Industries in India. The author conducted a literature search on employee engagement and interviews with 126 executives. Career development, performance appraisal and motivation factors are connected to employee engagement.¹ The implications are that leaders should be educated on engagement, career development opportunities are particularly important and that performance improvement should champion work life balance, these practices are useful to increase engagement. In today economic downturn situation, organization started to look into its people asset –internal employee so that they can utilize the human asset to sustain the competitiveness in the industry. Employees who are engaged in their work and committed to their organizations give companies crucial competitive advantages - including higher productivity and lower employee turnover (Swathil S ,2013)).²

Employee engagement is concerned with employee commitment towards job responsibility allocated to him. This is the feeling which is associated with willingness to do something either for own development or for the development of an organization and to achieve the success for both. Kahn (1990) was the first researcher to posit that engagement means the psychological presence of an employee when executing his organizational task. Kahn tried to discover the psychological Circumstances essential to justify moment of individual engagements and individual disengagements amid employees in diverse conditions at work.³ Since then the term has been variously defined by scholars. Employee Engagement is the positive feeling that employees have towards their jobs and also the motivation and effort they put into it (Macey & Schneier, 2008)⁴. Engagement goes beyond satisfaction and commitment. To be fully engaged is to be involved in and enthusiastic about one's work (Falcone, 2006)⁵.Schaufeli and Bakker (2003)⁶, also Schaufeli, Salanova, GonzalezRomaand Bakker (2001), who view engagement at work as an antipole to burnout, define work engagement as follows: 'Engagement is a positive, fulfilling, work related state of mind that is characterized by vigor, dedication, and absorption as quoted by Malavika Desai⁷ .

Employee engagement is a major factor contributing to organizational productivity, performance and long term survival. (Nowack 2006)⁸. Organization with highly engaged employees attend to show better productivity (Woodruffe, 2006).⁹

III. ANALYSIS OF FACTORS AFFECTING EMPLOYEE'S ENGAGEMENT

Past study reveals that there are various factors which effect the employee's engagement at work such as nature of job, appreciation, empowerment, training and development, work culture, team spirit, compensation as per job profile, transparent performance appraisal, Job safety and supportive environment and last but not the least leadership style at work place

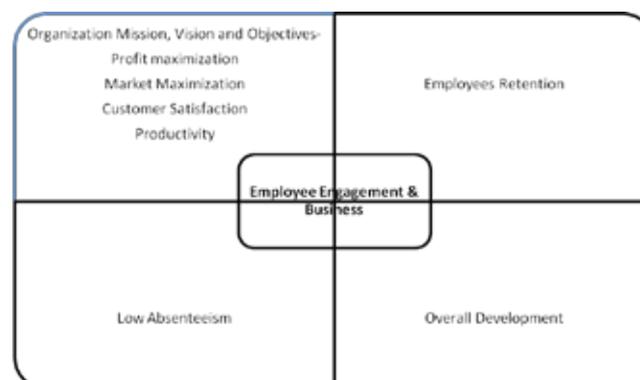


Fig.1 Employees Engagement and Organization Output

IV. LIMITATION OF PRESENT STUDY

It is important to note the limitations of the present study. The chief shortcoming is that the study is based on secondary data and model is also based on literature review. This is important to explore the depth of the study by considering primary data. However findings provide an overview of concerned topic and emphasis on the factors accountable for employee's engagement.

V. CONCLUSION

Employee engagement is an employee's emotional dedication to an organization; it takes into account the amount of unrestricted attempt of an employee towards the organization. The present study is an attempt to identify the factors which are accountable for employees' engagement at work which includes training and development, work culture, leadership style and nature of job.

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A SURVEY ON LOCATION BASED RECOMMENDER SYSTEM

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ABSTRACT

Traditional recommender systems neither consider item location nor user location to recommend the items to the users. In online purchasing, Feedback Based Location Aware Recommender System (FBLARS) provides recommendation considering both user location as well as item location. FBLARS recommends items to the users in such a way that it maximizes system scalability and quality of recommendation. FBLARS exploits item locations in a manner that avoids exhaustive access to all spatial items. User need not to travel a long distance to get the items of their choice as FBLARS provides items that are nearer to the user location. FBLARS is based on the item based collaborative filtering, which is more efficient than the user based collaborative recommendations. Item based collaborative filtering uses model based approach.

Keywords- Rating, items, FBLARS, Location, Recommender System

I. INTRODUCTION

Recommender systems are software tools that provide suggestions of useful items to a user. Collaborative filtering is the most widely adaptive method by many of the recommender system. It analyzes previous community opinions to find correlations of similar users and items to suggest k personalized items, like movies, to the querying user u . Recommender systems provide suggestions relate to various decision-making processes, such as which items to buy, which music to listen to or which online news to read . “Item” is the general term used to denote what the system recommends to users. A recommender system normally focuses on a particular type of item and accordingly the design, the graphical user interface and the core recommendation technique used to generate the recommendation are all customized to provide useful and effective suggestions for that specific type of item. Traditional recommender systems neither consider item location nor user location. FBLARS is a location based recommendation system gives recommendation by considering following parameters[1]

- (user, uloc, ratings, item) where uloc is user location.
- (user, rating, item, iloc) where iloc is the location of item.
- (user, uloc, rating, item, iloc) .

II. RELATED SURVEY

G.Adomavicius and A.Tuzhilin[1] have reported that existing recommendation techniques assume ratings that are represented by the triple (*user, rating, item*) which are ill-equipped to produce location aware recommendations.

N. Belkin and B. Croft[2] have stated that the content-based approach to recommendation has its roots in information retrieval and information filtering research. Majority of existing approaches of recommender system focus on factors like individual persons choice of item, group community opinions. They do not consider contextual information like location of user. This was possible using the technique named as collaborative filtering (CF) which is based on past group community opinions for user and item and correlates them to provide results to the user questions/queries.

Bradul Sarwar[8] has reported that item based algorithms provide better quality of recommendation than user based recommendation. Item based collaborative filtering provides scalable and quality recommendation than the user based collaborative filtering.

Mahmood, T., Ricci, F[7] have reported that

Demographic systems recommends items based on the demographic profile of the users. Many Web sites adopt simple and effective personalization solutions based on demographics. For example, users are dispatched to particular Web sites based on their language or country.

III. METHODS

3.1 Content-Based Filtering

The Content-based filtering is used in information Retrieval[6] and information filtering [3]. Because of the advancements made by the information retrieval and filtering communities and because of the importance of several text-based applications, many current content-based systems focus on recommending items containing textual information, such as documents and Web sites (URLs). The information retrieval[1] is based on the user profiles that contain information about users' tastes, preferences and needs. The architecture of content based filtering is as shown in the Fig 1.



Fig 1: Architecture of Content based Filtering

3.2 Collaborative Filtering

The idea of Collaborative Filtering is to find users in a community that share appreciations. If two users have same or almost similar rated items in common, then they have similar tastes[10]. Such users build a group or a so called neighbourhood. A user gets recommendations to those items that he/she not rated before, but that were already positively rated by users in his/her neighbourhood [4]. The working of Collaborative Filtering is shown in Fig 2.

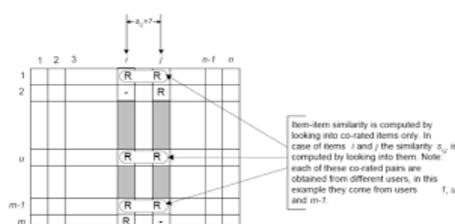


Fig 2: Collaborative Filtering process

Two main approaches are [8]:

- Memory-based
- Model-based

3.2.1 Memory Based

This method uses the matrix of user ratings for items of the entire database to find users that are similar to the active user, and use their preferences to predict ratings for the active user. It utilizes the entire user-item database to generate a prediction and adopts statistical techniques to find the neighbors i.e., Nearest-Neighbor.

3.2.3 Model Based

This method extracts some information from dataset and uses that as a “model” to make recommendations without having to use complete dataset every time. It first develops a model of user ratings. Then computes the expected value of a user prediction, given his/her ratings on other items. To build the model – Bayesian network (probabilistic), clustering (classification) and rule-based approaches (association rules between co-purchased items) are used. The figure below provides an example for item based collaborative filtering.

IV. HYBRID FILTERING

Hybrid filtering combines collaborative and content-based methods, which helps to avoid certain limitations of content-based and collaborative systems [9].

V. CONCLUSION

Item based collaborative filtering method is used to produce recommendations to the users. The item based collaborative filtering looks into the set of items the target user has rated and computes how similar they are to the target item and then selects k most similar items. Prediction is computed by taking a weighted average on the target user's ratings on the most similar items.

FBLARS is different from traditional recommender system as it deals with three main parameters of location ratings like-

- user, user location, item, rating
- user, item, item location, rating
- user, user location, item, item location, rating.

FBLARS uses partitioning and travel penalty methods for supporting spatial ratings for items to be recommended. Both the techniques can be combined together to build an efficient, scalable and better quality system.

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STAND ALONE SOLAR TRACKING SYSTEM

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ABSTRACT

The development of affordable, inexhaustible and clean solar energy technologies has longer-term benefits. It will increase countries energy security, enhance sustainability, reduce pollution, lower the costs of mitigating global warming, and keep the fossil fuel prices lower. Solar energy is one such reliable source of energy which is abundant in energy. Solar Photovoltaic panels are used to collect solar energy and convert it into electrical energy. But these photovoltaic panels are inefficient as they are fixed only at a particular angle and position. This inefficiency can be decreased by designing a solar tracker system which changes its position automatically in accordance with the sun's movement.

The objective of this research is to track the sun and rotate the solar panel accordingly to receive sunlight to the fullest extent always during the day and use of PWM or ON - OFF charge controller. This work is on solar panel using tracking mechanism. Here tracking system provides a power gain of 14 -16% compared to fixed panel. Here a single axis tracker and fixed system is used with PWM charge controller and vice – versa.

Keywords: Charge controller, Photovoltaic, Pulse width Modulation (PWM), solar tracker,

I. INTRODUCTION

The energy consumption in the world is increasing greatly owing to the growing population, and to increasing energy consumption per capita. This high energy consumption is associated with a high life quality and living standards. Due to this fact the energy price and availability and the potential threat of global climate changes, there is a great motivation to use energy from renewable sources such as solar energy. In developing countries, there are many places and areas where there is still no availability of electricity. Although wires are running to the places there is still no guarantee of power supply for the whole day. Lighting in village is still a big problem. Solar energy is non- depleting gift from the nature to the mankind [1]. The most commonly used renewable energies are photovoltaic sources and wind generators. Solar energy is converted directly to power without intermediate production of heat [2]. Solar cells are used to heat water and PV cells to produce electricity. A number of methods of how to track the maximum power point of a PV module have been proposed to solve the problem of efficiency. They would include direct methods like Solar Tracking. Solar tracking is used to minimize the angle of incidence between the sunlight and the panels. Sun-tracking has proven to be an effective way to increase the gain of solar panels. As compared with a traditional fixed panel, the extra benefits from tracking the sun were about 15-30% in the collectible radiation or output power. Instead, a solar panel is mounted at fixed optimal angle for whole year. But in order to improve the performance of the system, it is desirable to do sun tracking. In Single axis tracking the panel is rotated on a single axis only, while the dual axis is rotated along two axes. Dual-axis tracked panels performed best in term of the solar gain, but a complicated

tracking system is required. Thus, single-axis tracking systems were technically and economically more attractive in practical applications of non-concentrating solar devices [3 4 5 6]. This is achieved by mounting the solar panels on a single axis mounting mechanism. A stand-alone system requires the battery bank to store the photovoltaic energy and is suitable for low-power system. Hence for this project Solar panels is facing true south. And for this project as latitude of the Hubli location (15.36 N degree), Karnataka is considered. [2].

This chapter gives information about Tracking Mechanism and Fixed Position, PWM charge controller, battery using as Load. Still if tracking is not affordable Solar panel at fix position at particular slope angle using PWM charge controller can extract maximum amount of power as it tracks the maximum power and voltage and efficiently charge the battery.

II. SOLAR PHOTOVOLTAIC ARRAY

It is known that solar cells are made up of silicon. The solar cells contain a junction between two different materials across which it has a 'built-in' electric field. When light is absorbed by the solar cell, it creates mobile electrons and holes.

This electrons and holes flow in opposite directions across the junction. In this manner the flow of absorbed photons is then converted into a flow of DC power from the illuminated cell. The solar cell is made up of a large area of p-n junction made from silicon. Usually the solar cells are made by diffusing an n-type dopant into one side of a p-type wafer (or vice versa).

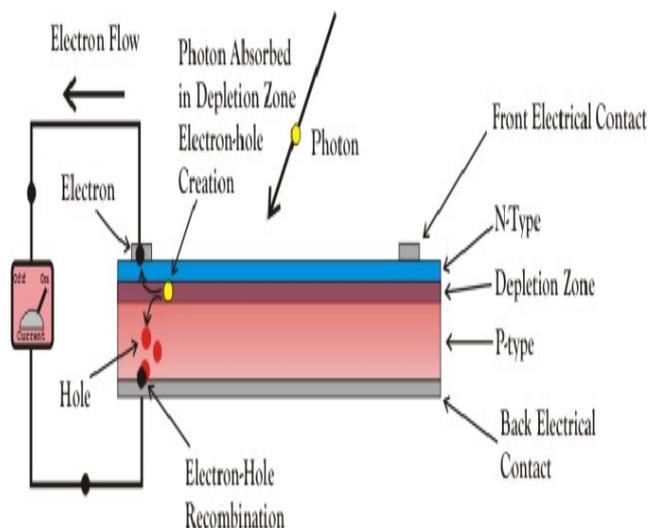


Fig 2.1 Solar Cell

A Brief description of the components used for Balance of System.

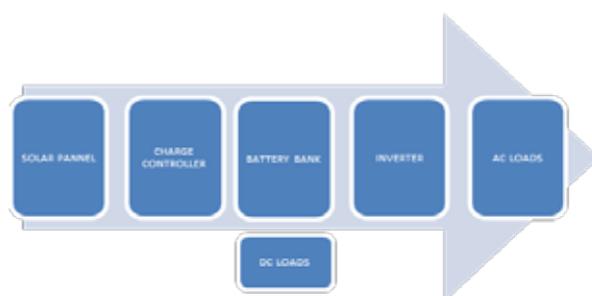


Fig 2.2 Components used for Balance of system

PV module – converts sunlight into DC electricity.

Solar charge controller :

It regulates the voltage and current coming from the PV panels going to battery and prevents battery overcharging and prolongs the battery life. There are different types of charge controller available such as Analog Series/Shunt mode charge controller, ON/OFF charge controller, Pulse width modulation technique based charge controller.

Inverter : It converts DC output of PV panels or wind turbine into a clean AC current for AC appliances or fed back into grid line.

Battery: It stores energy generated from the solar panel and supplying power to the electrical appliances when there is a demand.

Load Load can be electrical appliances such as lights, radio, TV, computer, refrigerator, etc.

III. EXPERIMENTAL SETUP & METHODOLOGY

Here two solar panels are used. Measurement was taken from the two PV panels, one is fixed PV panel and other panel is equipped with single axis tracking. The Solar module is connected to Charge controller and Battery.



Fig. 3.1 Single axis tracker with Charge controller and battery.

So for this project the panel is placed equal to latitude of the Hubli city 15.36 N degree (15° 00).

IV. METHODOLOGY

For any given day, it is necessary to calculate the sunrise and sunset times to determine the hours of sunshine that is received on that day. This is given by the equation for the sunrise/sunset hour angle. Then use the equation for the Sunrise/sunset hour angle on a horizontal surface.

$$w_s = \cos^{-1}(-\tan(f) \tan d) \quad (2)$$

For an inclined surface and facing south,

$$w_s = \cos^{-1}(-\tan(f - b) \tan d) \quad (3)$$

Knowing the time the sun rises and sets, the tracking angle, for each half an hour of the day can be calculated using above equations. The solar panel should be set at the angle that allows the most sunlight to fall on it. At solar noon, when the sun is at its highest positioning the sky, the solar panel should be at zero degrees to the horizon. For this type of tracking, the solar panel receives much of their solar radiation early in the morning and in the late afternoon. At noontime, the irradiance is equal to that of a fixed horizontal surface.

V. RESULTS AND DISCUSSION

In the chapter Comparison of power benefit and tracking efficiency, Battery Voltage & Battery Current between Single axis position (Panel 1) and fixed position (Panel 2) with respect to time with PWM controller is done. Here Panel 1 is single axis tracking and Panel 2 is fixed position.

Case 1: Fixed Solar Panel and Single Axis Tracker using PWM charge controller.

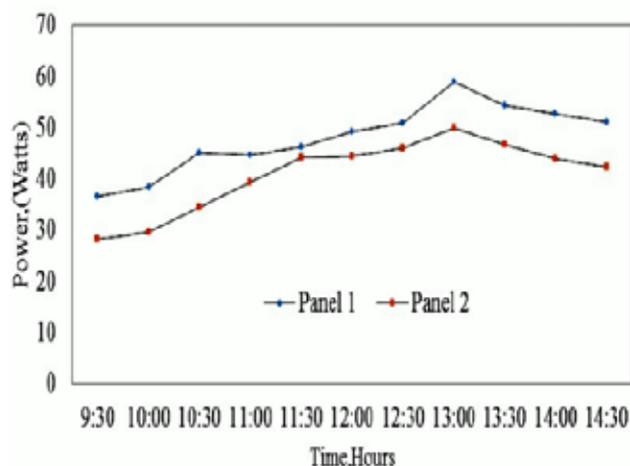


Figure 5.1 Power Graph for Fixed vs. tracking

Figure 5.1 depicts the comparison between power generations of Panel 1 and Panel 2 degree. The results show that the maximum power generated by panel 1 is 58.917W and 54.302W at 1:00pm and 1:30pm respectively and maximum power generated by the panel 2 is 49.896W and 46.818W at 1:00 pm and 1:30pm respectively.

Performance of the fixed was almost same compared to tracking at noon. It could be reasoned that both of the PV panels almost faced the same direction, but a slight difference of angle. The Average generated power output for the fixed and tracking systems were 40.833W and 48.00W respectively.

Therefore an extra yield of $(48.00 - 40.833) / 40.833 * 100 = 17.56\%$ power was obtained by tracking system. Hence the extra power gain of the tracking system is 17.56%.

We can see that power produced by both the panels have similar characteristics at noon rather compared to morning or late afternoon.

Case 2: Comparison Battery voltage Versus Time between panel 1 and 2 PWM controller.

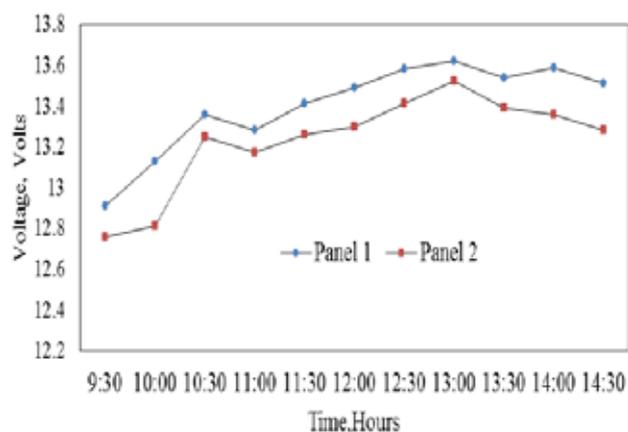


Fig 5.2 Battery Voltage curves for Panel 1 and Panel 2

Above figure 5.2 shows the graph of Battery voltage versus time using PWM, that both the curves of panel voltage go hand in hand and are proportional increasing or decreasing according to available insolation and also the controller matching the source and the load impedance.

As the array is connected directly to the battery bank the array output voltage is ‘pulled down’ to the battery voltage. It is observed that when using PWM controller it rarely operate at the V_{mp} (Maximum voltage) of the solar panel. Here the voltage of tracking PWM seems to be higher than that of fixed arrangement.

Case 3: Comparison of panel 1 and 2 Battery current Versus Time PWM controller.

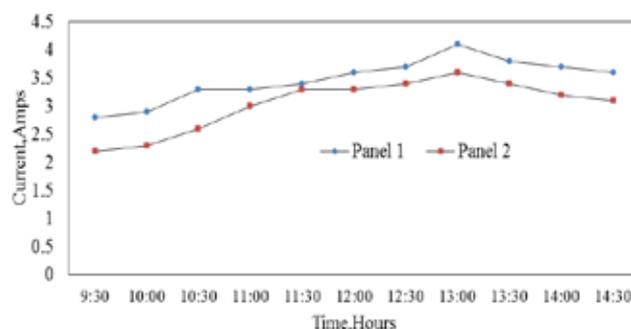


Fig 5.3 Battery current curves for Panel 1 and Panel 2

Above figure 5.3 shows the graph of Battery current versus time using PWM, that both the curves of panel current go hand in hand and are proportional increasing or decreasing according to available insolation and also the controller matching the source and the load impedance.

It is observed using PWM controller the solar panel rarely operate at the V_{mp} . (Maximum voltage) PWM regulators do not “boost” the amount of charging current by converting excess input voltage into amperage. This means that the input current from the solar array will be equal to the output current delivered to the battery. Here the current of tracking PWM seems to be higher than that of fixed arrangement.

TABLE 1: Comparison of tracking and fixed using PWM Controller

Slope Angle	PWM	
	Tracking System (Average power)	Fixed system (Average power)
15 degrees	48.00 Watts	40.83 Watts

Firstly the extra power yield PWM controller using tracking and fixed at indicates that the average power yield by Tracking with PWM is 48.00 W and average power yield by Fixed with PWM is 40.83 W, So Maximum Power Point

Yield by Tracking with PWM controller is about 17.56% more power.

VI. CONCLUSION

The following conclusions were drawn based on the experimental work,

1. The experiment conducted on tracking, fixed with PWM controller at collected maximum energy from the solar panel.

2. Power gain at slope angle 15 degree using Tracking with PWM controller is 17.56% more than fixed panel.
3. The average Current gain using Tracking with PWM controller is 13.23% compared to fixed panel with PWM.
4. The use of PWM with single axis tracking produces more power than fixed panel with PWM controller.
5. The proposed single axis tracking it was observed that 14%-16% higher power gain was realized than the fixed system.
6. It was observed that current and power characteristics between the tracking and fixed system exhibit similarity, therefore Power extracted from the panel depends on insolation and current depends upon power.
7. Here in PWM controller output voltage or current is neither boosted nor adjusted to battery voltage it only charges the battery with a constant rate even if excess power is available at input side.

VII. FUTURE SCOPE

The future scope could be the use of latest Controller which is available in the market i.e. MPPT (Maximum Power point tracker) or can be Designed using various MPPT algorithm which is embedded into Microcontroller which can be used to extract maximum energy from the solar panel and improve the efficiency of battery and the Balance of system.

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BIOGRAPHY

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WIDEBAND MONOPOLE/DIELECTRIC RESONATOR ANTENNA - A REVIEW

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ABSTRACT

Several wideband antennas are presented for either wireless application. This paper presents the performance of a simple monopole antenna loaded with an annular dielectric resonator as a wideband transmitting/receiving antenna. By adjusting the length of the monopole and load arm, a 10-dB bandwidth of 94% is achieved while maintaining monopole-like radiation pattern, which covers UWB application. The simulated result for return loss is verified with the measured data from a prototype antenna.

Keywords: Dielectric Resonator Antenna (DRA), Monopole, Wideband Antennas.

I. INTRODUCTION

Since 1970's, dielectric resonators (DR) have led to miniaturizations of active and passive microwave components, such as oscillators and filters. In a shielded environment, the resonators build with DRs can reach the unloaded Q factor of 20,000 at frequencies between 2 and 20 GHz. The principle of dielectric resonator operations is understood by studying electromagnetic energy vector distributions on a dielectric resonator structure. In the past, DRs were usually treated as an energy storage device rather than as a radiator or antenna. When a dielectric resonator is not entirely enclosed by a conductive boundary, it can radiate and turns to be an antenna. Although DRs were found to radiate many years ago, the idea of using DR as an antenna was not widely accepted until the original paper on cylindrical dielectric resonator antenna (DRA) was published in 1983. Subsequently, there were numerous studies and researches on the various applications of the DRAs. In 2005, Lapierre *et al.* proposed a hybrid of a quarter-wave monopole antenna and an annular dielectric resonator antenna to achieve wideband characteristics. This paper serves as an extension of the previous work the key considerations from the paper was the interaction between the dielectric and the monopole. The following sections will discuss on the pertinent points of the proposed paper and the improvement of the design using the two inner cavities. The DRA is an antenna that makes use of a radiating mode of a dielectric resonator (DR). It is a 3-dimensional device of any shape, e.g., hemispherical, cylindrical, rectangular, triangular etc. figure 1 shows the various shapes of DRAs^[1].

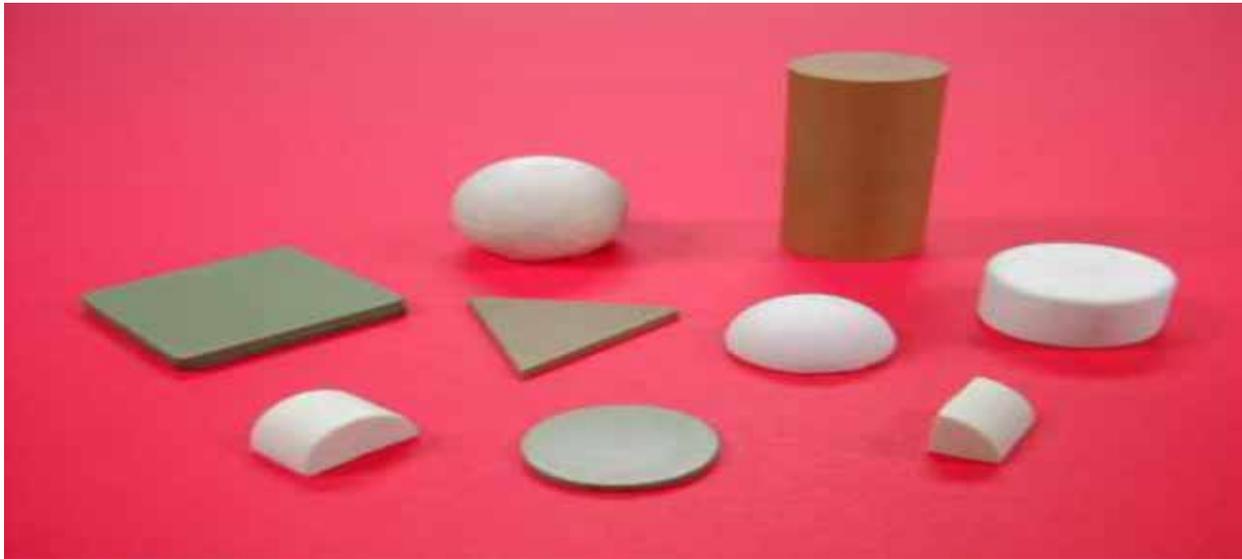


Figure 1. DRAs of various shapes ^[1]

As the future of wireless communication steers toward broadband and dual band applications the use of a basic monopole antenna is becoming less suitable. To meet the emerging broadband services a monopole antenna must improve its bandwidth characteristic and provide the same level of simplicity while maintaining its omnidirectional pattern. A proposed new design involves the use of a monopole antenna loaded with an annular ring dielectric resonator antenna (DRA) operating in the $TM_{01\delta}$ mode. In this arrangement both antennas produce a uniform horizontal coverage pattern ^[2].

II. WIDEBAND OPERATION

When a single shaped DRA operates in a fundamental mode, its bandwidth is typically below 10%. The research of the wideband DRA was first experimentally carried out in 1989 by Kishk, who stacked two different DRAs on the top of one another to obtain a dual resonance operation. Since then other wideband DRAs using stacking methods have been reported. Alternatively, coplanar parasitic DR elements were placed beside the DRA to achieve wideband operation were reported. Recently, various bandwidth enhancement techniques have been developed for DRAs, such as co-planar parasitic DRAs, stacked DRAs, and deformed DRAs. More recently, proposed a disc-ring DRA by combining one smaller cylindrical DR and one larger annular-ring DR concentrically together to achieve a 45% impedance bandwidth. In the above mentioned wideband techniques, most cases are devoted to producing broadside radiation patterns ^[3].

As cylindrical DRA, the initial value of dielectric constant of DRA is 10. Length of the monopole keep changing with the size and permittivity of the DRA and the size of the ground plane. The feeding technique being use is monopole and also change the monopole shape to get better bandwidth. Graph separates three parts of frequency versus S_{11} parameters. They are, first part is related to DRA permittivity, second part is define to E-field of DRA and

third part specifies monopole length. With the accurate dimensions of the monopole and the annular DRA antenna is able to achieve a wideband response ^[4].

As hemispherical/conical DRA, the dielectric constant value is 10. Considering the operating bandwidth hybrid monopole DRAs explored in this communication are the most enhanced. Further research should be done to get a wide range of applications starting from wideband EM sensor to UWB communication. The feeding technique been used is monopole. The frequency range was 6.5GHz which changes to 23.5GHz. Bandwidth increases to 126% ^[5].

The design of rectangular DRA (Dielectric Resonator Antenna), initial value of dielectric constant of DRA is 9.2. For better bandwidth performance the probe feed stack DRA applied to techniques, the DRA has a wider bandwidth and a better impedance matching within the FCC (Federal Communications Commission) UWB band. In this paper frequency has been achieved to 11.6GHz from 3GHz. The coaxial technique has been used. The bandwidth is 117.80%. Dielectric constant is maintained 10. The hybrid DRA consists of three elements, quarter wave length monopole dielectric resonator antennas of dielectric constant and a rectangular parasitic element. Return loss frequency is 7.6 to 14.6GHz. Relating to the frequency bandwidth improves to 118.98% as a result. Two-segments compact dielectric resonator antenna for UWB applications ^[6].

III. EXCITATION TECHNIQUES TO DRA

The operational mode depends on the method of excitation of the dielectric resonator antenna. The coupling mechanisms significantly affect the resonant frequency and radiation Q -factor of a dielectric resonator antenna. There are many different techniques which have been used and adopted in the past. These include coaxial probe, aperture coupling with a microstrip feedline, aperture coupling with a coaxial feedline, waveguide coupling with a microstrip feedline, direct microstrip feedline, coplanar feed, soldered through probe, slot line, conformal strip and direct image guide. Some of the excitation methods are shown in Figure 2.

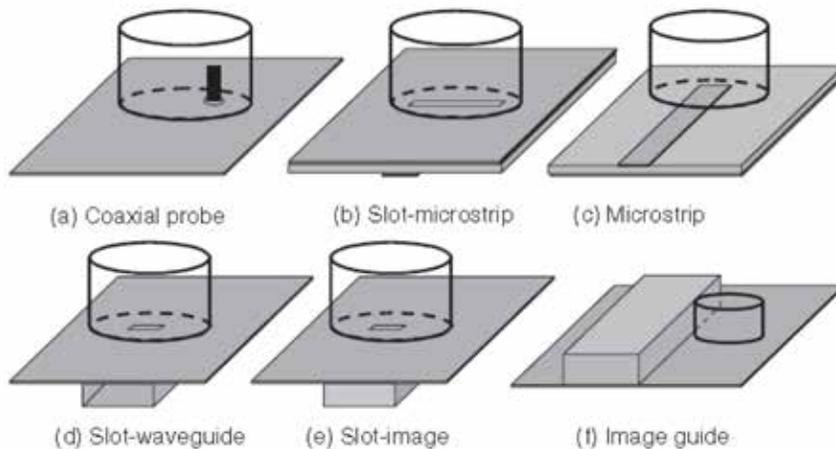


Figure 2. Different excitation methods for dielectric resonator antennas ^[1]

To couple to the aperture different shapes can be used such as a narrow slot, cross or C-shaped cut in the ground plane. These shapes can be fed by a microstrip line or a coaxial feedline beneath the aperture cut or the ground plane on the surface of the waveguide. In this way, the behaviour of the aperture is like a magnetic current which runs parallel to the length of the slot and excites the magnetic field of the dielectric resonator antenna. If the aperture size is adjusted or the dielectric resonator antenna is moved with respect to the aperture, the coupling level can be adjusted. The feeding network is kept below the ground plane which gives the advantage of avoiding spurious radiation. Moreover, slot aperture is widely used for integrating the dielectric resonator with the printed feed structure. The use of coplanar waveguides in exciting the dielectric resonator appears to be highly useful because they enable easy coupling with MMICs. This helps to adjust the coplanar level and the position of the dielectric resonator over the coplanar structure. Impedance tuning can also be adjusted by adding a stub, slot, or loop at the end of the coplanar line, although the coplanar line and the coplanar loop work alike. In this way, the operational mode can be selected by changing the position of the dielectric resonator over the loop.

The dielectric image waveguide excitation method offers advantages over the microstrip line methods because it does not suffer from conductor losses even at millimeter wave frequencies. Usually the coupling is small between the dielectric resonator and the guide but it can be adjusted or increased by operating the guide closer to the cutoff frequency. This method is similar to the waveguide but this kind of excitations can be found in many applications, especially in series-fed linear dielectric resonator antenna arrays.

In excitation through coaxial probe feed, the pin of the coaxial transmission line is extended through the ground plane. This acts as an electric current running vertically through the dielectric resonator antenna. The strength of the coupling depends on the length of the probe and different modes can be activated by changing the location of the probe, depending on what mode is desired. Another advantage of this method is that the antenna is directly connected to the circuit of 50Ω characteristic impedance without any matching network.

The other method for excitation is the microstrip method which is the simplest method to activate the dielectric resonator antenna. The microstrip line is printed on the same substrate which is directly connected to the dielectric resonator antenna. By altering the permittivity of the substrate and by changing the distance to the dielectric resonator antenna, the level of the coupling can be adjusted. For wider bandwidth the permittivity should be kept low but this requires better coupling. Microstrips are easy to fabricate and it is also cost effective because the feedline is printed on the substrate but the disadvantage of microstrip is the limitation in polarization, as the polarization of an array is dedicated to the orientation of the microstrip line.

If both a coaxial probe and a microstrip line are used simultaneously, it gives the opportunity of exciting different modes simultaneously. By placing two microstrip lines near the antenna, two different modes can be excited ^[1].

IV. ANTENNA CONFIGURATION

Figure. 3 shows the antenna geometry, the antenna is a hybrid, consisting of a thin monopole and an annular DRA, both sharing the same axial reference, and mounted on a finite ground plane. In this arrangement, the quarter-wave monopole is designed to resonate at the lower end of the frequency band while the DRA is designed to have a

resonance near the upper end of the required spectrum. The two resonant frequencies are chosen so that a minimum return loss of 10 dB is maintained over the operating bandwidth.

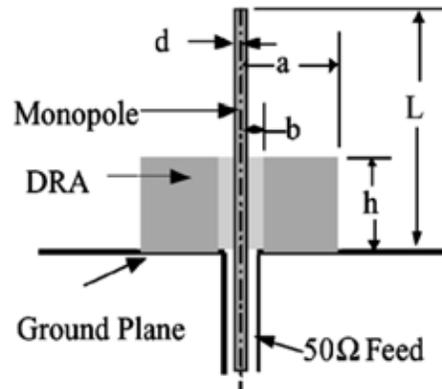


Figure 2. Cross section of the cylindrical monopole-DRA antenna ^[7]

V. SIMULATION RESULTS

There are a number of parameters that influence the general behaviour of this hybrid configuration; these include the length of the monopole, the size and permittivity of the DRA, and the size of the ground plane. The most critical in achieving the proper response was found to be the DRA aspect ratio h/a . For the selected $TM_{01\delta}$ resonance, this ratio controls the location of the loading effect, which in turn provides an impedance bandwidth bridge between the two resonators. Using Ansoft high frequency structure simulation (HFSS), shows the impact of using two different DRA heights to achieve a wide bandwidth response. Adjusting the height of the DRA significantly improves the mid-band impedance match, with no appreciable change in the monopole resonance frequency and only a small change in the DRA resonance.

A general design procedure for achieving broadband performance is as follows:

- 1) The resonant frequency of the DRA $TM_{01\delta}$ mode should be chosen approximately 2.2 times the resonance frequency of the calculated $\lambda/4$ monopole.
- 2) The height required to position the second resonance in the center of the bandwidth is a function of the permittivity of the material and the outer radius of the DRA. For a DRA of $\epsilon_r = 10$, a ratio h/a of 1.0 is used as starting point.
- 3) A small air gap should exist between the monopole and the inner radius of the annular DRA. A spacing of about $\lambda_L/100$ (lower operating frequency) between the DRA and the monopole is sufficient. Any larger spacing will result in increasing the antenna size without any additional value.

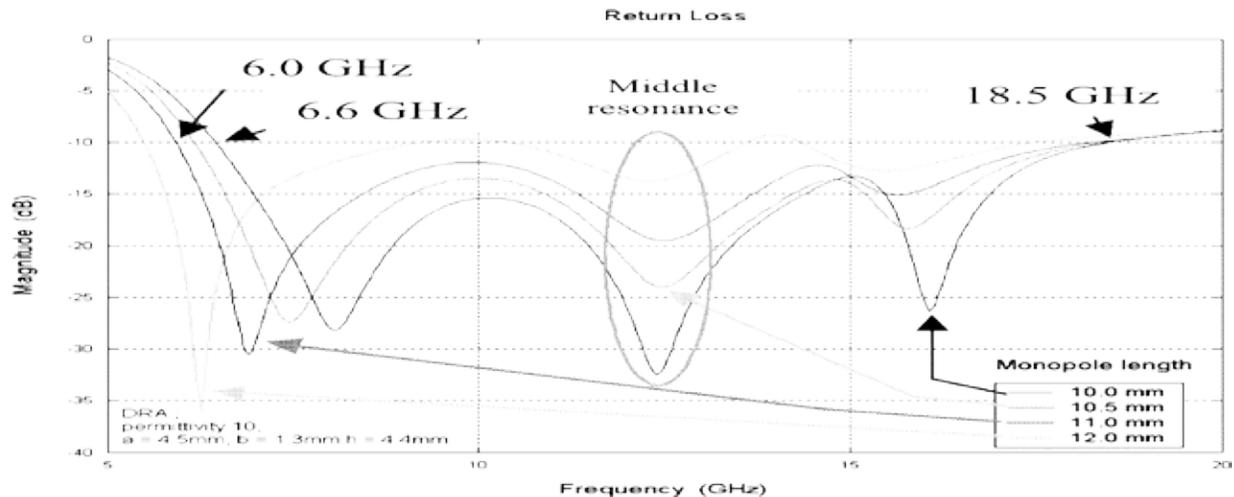


Figure 3. Return loss of the monopole DRA [7]

Using these guidelines as a starting point, the dimensions are adjusted to optimize the bandwidth response. The easiest parameter to adjust is the monopole length, for a fixed DRA design. Typical results are presented in Figure 3. It shows the return loss of the baseline DRA ($b = 1.3$ mm, $a = 4.5$ mm, $h = 4.4$ mm, $\epsilon_r = 10$, ground plane radius 40 mm) coupled with monopole of different length. The simulations show that a -10 dB bandwidth.

VI. CONCLUSION

This paper presents the wideband performance of a hybrid antenna consisting of a thin monopole and an annular DRA as transmit and receive antenna. It can be concluded from this paper that the use of simple monopole has increased the operating bandwidth appreciably without making any major compromise in the performance in terms of cross-polarization pick up. Further work is underway in trying to design an ultra-wideband transmit and receive antenna system using simple monopole/DRA antenna.

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