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ANALYSIS AND EXECUTION OF ROAD WORKS

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Abstract: Road Transport is vital to India's economy. It enables the country's transportation sector contribute 4.7 percent of India's gross domestic product, in comparison to railways that contributed 1 percent, in 2009-2010, despite railways handling of passenger and pure cargo. Road transport has gained in importance over the years despite significant barriers and inefficiencies in inter-state freight and passenger movement compared to railways and air. The government of India considers road network as critical to the country's development, social integration and security needs of the country. India's road network carries over 65 percent of its freight and about 85 percent of passenger traffic. Indian road network is administered by various government authorities, given India's federal form of government. National highways connect capitals, important places, ports and places of strategic importance of various states. Though national highways account for only 2% of the total road length, they carry nearly 1/3 of the total traffic. Flexible pavement is composed of a bituminous material surface course and underlying base and sub base courses. The bituminous material is more often asphalt whose viscous nature allows significant plastic deformation. Most asphalt surfaces are built on a gravel base, although some 'full depth' asphalt surfaces are built directly on the sub grade. Depending on the temperature at which it is applied, asphalt is categorized as hot mix asphalt (HMA), warm mix asphalt, or cold mix asphalt. Flexible Pavement is so named as the pavement surface reflects the total deflection of all subsequent layers due to the traffic load acting upon it. The flexible pavement design is based on the load distributing characteristics of a layered system. It transmits load to the sub grade through a combination of layers. Flexible pavement distributes load over a relatively smaller area of the sub grade beneath. The initial installation cost of a flexible pavement is quite low which is why this type of pavement is more commonly seen universally. However, the flexible pavement requires maintenance and routine

repairs every few years. Highway surveys involve the location of alignments and computation of volumes materials that must be added, removed, or moved. It initially requires a topographic survey of the site. For large projects, photographic method will be used to develop the base map. The base map is used by surveyors and other professional to create a base plan for the project. After the alignment has been established, the quantities of earth that must be added or removed are computed. The goal of most projects is to minimize the hauling distances of the earth. This is done using mass diagrams. Eventually surveyor's layout the elevation and slope of the various sub-grades, base, and top coat materials. The end result is a smooth alignment with smooth transitions from straight to curved sections allowing for safe public transportation.

1. INTRODUCTION AND LITERATURE REVIEW

National Highway 5 (NH-5) is a major National Highway in India that runs along India's east coast through the states of Orissa, Andhra Pradesh and Tamil Nadu. The northern terminal is at Jharpokharia in Orissa and the southern terminal is at Chennai in Tamil Nadu. NH 5 is a part of the golden quadrilateral project undertaken by National Highways Development Project. Under the new national highway numbers NH 5 is renamed as NH 16. NH 5 runs for a distance of 1533 km. In Tamil Nadu NH 5 starts from Chennai and shortly enters Andhra Pradesh from Gummidipundi. In Andhra Pradesh, it passes through most of the coastal towns in nine coastal districts including Nellore, Ongole, Chilakaluripet, Guntur, Vijaywada,Eluru, Tanuku, Rajahmundry, Tuni , Visakhapatnam, Srikakulam, Tekkali and Palasakasibugga. In Orissa, it passes through Baipada, Balasore, Bhadrak, cuttack, Bhubaneswar and Berhampur. Our project is on Six Laning of Chilakaluripet - Nellore section of NH 5 from km 1182.802 to km 1366.547 (approx. length-

183.620 km) in the state of Andhra Pradesh under NHDP to be executed as BOT project on DBFOT pattern. The project was awarded to M/s. KMC-BSCPL JV. BSCPL share is 50 %.

During the preliminary design stage, issues such as intersection layout and the chosen design standards are addressed. Horizontal and vertical alignments and junction layout are broadly determined. At the completion of this stage, the design should be well enough established so that, if necessary, decisions can be made about land acquisition. At the detailed design stage, the more specific design issues are addressed. For example, geometric design, signing schemes, roadside equipment such as lighting, and line marking plans are looked at in relation to operation of the safety and safety of all road users. Before opening, a site inspection should be conducted to ensure previous concerns have been addressed and to identify any hazardous conditions that may not have been apparent from the plans. It is advisable to do this under different conditions such as darkness and bad weather and from the perspective of all road users, including pedestrians and cyclists (Austroads, 2002). The safety audit of exiting roads, referred as the road safety review, is different from the safety audit of projects or schemes and is treated separately (Appleton, 2001). The RSR process is discussed in further detail later in this report. The following section describes international experience with the RSA process

2. METHODOLOGY

Approach and methodology mainly consist of quantitative and qualitative tools and techniques. The study was conducted in two phases.

PHASE – I: PRE-SURVEY ACTIVITIES Collection and review of project literature This phase intends to familiarize with the concerned and important stakeholders to identify and collect the available literature and to scope the activities. This JV 4 Construction and Up-gradation of NH-131A from Km 6.000 near Narenpur to Km 55.000 near Purnea in Bihar to 4 lane Standard Draft Feasibility Report Social Impact of Assessment & Resettlement of Action Plan involved two-pronged approach (a) discussions with Project Implementing authorities and other concerned, b) collection of available relevant project literature. Consultations were held with concerned revenue officials to establish the ownership of land. Literature review and consultations formed the basis for identification of key stakeholders. Rapid reconnaissance survey to familiarize field activities In addition to review

and consultations, rapid preliminary field visits were conducted as part of ground truthing exercise. It provided the elementary idea about field research preparation and also helped for pilot testing of questionnaires and checklists. Scoping and Other Pre-survey Activities Both the review and rapid reconnaissance survey helped in finalizing the study instruments and inception report detailing the final methodology and work plan.

PHASE II: SURVEY ACTIVITIES (a) Identification of Structures For widening and improvement of existing alignment the social team conducted an identification of structures within 60 of propossed ROW. Prior to initiation of physical identification of the structures, detailed discussions were held with concerned officials to collect information on ownership of land and ROW. The database will be used later to identify structures coming within proposed ROW. All the affected properties belonging to titleholders shall be incorporated in Final Feasibility Report. The required volume of land and structures with location, size, geometry, type of construction, name of the owner(s), address etc. shall also be covered. Consultation The consultations were undertaken with residents and shopkeepers for dissemination of information about the alignments and the need of the elevated corridor. The consultations with road useres and dwellers assist in finalizing various issued related to widening of the road with service roads, paved shoulder and possible realignments etc. Qualitative Survey Qualitative surveys are conducted for evaluation of both affected population and implementation capacities. The qualitative survey includes focus group discussions and in depth interviews with various sections of people such as women, knowledgeable persons and community leaders to elicit their expectations and suggestions, which will support and provide additional information collected through quantitative survey. Assessment of Livelihood Losses The study makes an attempt to identify people losing their livelihood directly or indirectly. The consultative process pave the way to develop rehabilitation strategies that helps for income generation and other remedial and restoration measures. Research Tools and Instruments Various social research tools are employed to ensure that, all issues related to the study need to be adequately addressed so that a meaningful package of deliverables can be developed. The entire exercise shall be carried out through an appropriate mix of social research techniques including desk research through review of information, concerned government departments and project authorities. Structured and semi-structured interviews, group discussions with the affected people and relevant government agencies, line departments and community will be undertaken. The study uses various instruments

to collect information for the different stakeholders involved in the project. The above tasks are planned to flow in a manner that will complete the project in line with the NHAI. Each of the above tasks is briefly discussed in the above sections to demonstrate consultants understanding the project required.

3. EQUIPMENTS

Site clearing of trees, vegetation, undergrowth, bushes and minor structures are carried out by dozers and or hydraulic excavators. Trees that cannot be felled by the aforesaid equipment shall be felled by using saws. Major structures that cannot practically be cleared by hydraulic excavators and/or dozers, these demolitions can be carried out using pneumatic tools, explosives and/or other specialized equipment depending on the size and type of structures. Before commencing explosive demolition all necessary permits and licenses will be obtained and a blasting plan detailing the size of charges, locations of holes, system of detonation and safety precaution will be forwarded to the engineer together with the request sheets. Machinery used: i. Excavator – J.C.B. or Hitachi EX 100 for bulk excavation, loading on trucks and slope trimming. ii. Dump truck – For transporting cut materials from the cut area. iii. Bulldozer – ripping & loosening of earth and rock mixed soil etc. iv. Grader for trimming to final level and maintaining the surface parallel to the finished grade line.

4. TEST

The in situ dry density of soil in the embankment/sub grade must be tested to check the degree of compaction in the field. The field density of soil can be determined popularly by 1. Core cutter and 2. Sand replacement methods. Weight of the soil obtained in the core cutter of known volume is determined; moisture content is assessed and dry density is calculated. In sand replacement method pre-calibrated density of sand is used to measure the volume of pit dug out from the sub grade and the moisture content is assessed. Knowing the weight and volume of excavated soil and moisture content the field density can be calculated which should not be less than 95% and 97% of proctor's density for embankment and sub grade respectively. Nuclear gauges are being used to measure the field density of soils, the principle being gamma rays emitted into the soil and number of rays returned and counted on a scalar. A low gamma ray count indicates high density and vise versa. California bearing ratio (CBR) of soils: Load carrying capacity of soil is measured from penetration resistance i.e. test conducted on compacted specimen and expressed as per percentage of a standard crushed rocks specimen and called as CBR of Soil. CBR 100 Percent (viz) Load of 1360 kg to drive cylindrical plunger of 19.30 sqcms to a distance of 0.250 mm at the rate of 0.125 mm per

minute. Type of Soils CBR Gravel and sand mixtures 20-90 Sand and Silt mixtures 10-40 Sand and clay mixtures 15-40 Inorganic silt & clay 5-15 Organic silt & clay 3-8 Granular sub base: This is being practiced to act as transition zone between hard base courses and sub-grade as well a drainage layer to drain pout the seepage water from base courses and avoid capillary water from sub-grade. The CBR requirement for sub base layer is not less than (15) percent. The Material to be used for the work shall be natural sand, moorum, gravel, Crushed Stone or combination of these. The material shall be non-plastic i.e. plasticity index of material passing 425 micron sieve shall be less than (6) and liquid limit less than 20 percent. If thickness of layer does not exceed 100 mm a smooth wheeled roller of 8 to 10 tons weight may be used. For compacted single layer of 225mm the compaction shall be done with the help of a vibratory roller of 8 to 10 tons weight with plain drum or pad foot drum. Rolling shall commence at the lower edge and proceed towards upper edge longitudinally for portions having unidirectional cross fall and super elevation. Rolling shall commence at edges and progress towards the center for portions having cross fall on both sides. The Speed of the roller shall not exceed 5 kms per hour. Rolling shall be continued till the density achieved is at least 98% of the maximum dry density for the material as per IS 2720 (Part 8). Water bound macadam base: The basic need of WBM base is to distribute the load over a soft sub-grade in such a way that there will be no sinking of the road crust into the sub-grade. WBM is constructed with hard and soft metals called aggregates obtained from breaking/crushing of rocks. The aggregates spread in layers are interlocked by rolling and bonding together with screenings, blinding material and water. Road aggregates: These have to bear the stresses due to the wheel loads and hence they should possess sufficient strength to resist crushing. They should be hard enough to resist wear due to abrasive action of traffic. The aggregates in the pavement are also subjected to impact hence toughness is another desirable property of aggregates. The stones used should be durable and resist disintegration due to action of weather, this property is called soundness. The following are the most commonly available rocks in India from which road aggregates can be obtained.

5. Conclusion

India„s economic growth plan of over 6% per annum for the next 20 years will, to a great extent, depend on an efficient road infrastructure, not only national highways but other roads too, including link roads for rural connectivity, which can provide fast movement of goods and people with safety and economical cost to the user. government of India has drawn up Pradhn Mantri gram Sarak Yojana(PMGSY) for implementation of rural

connectivity. it is estimated that in the next 7 years, road works under PMGSY worth Rs. 1,20,000 crores are to be constructed . Since road pavements are an important part of these projects, costing about 50% of the investment , a careful evaluation of the alternatives is necessary to make the right choice on a rational basis, which may be comparatively more beneficial to the nation

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TIME IMPACT ANALYSIS OF CONSTRUCTION PROJECTS USING PRIMAVERA

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Abstract—Delay is one of the most common problems in the construction industry. At the time of bidding contractors plan tasks and assign resources according to the site visits, the information given in the contract and specifications related with the project. However, as the project progresses some conditions of the work may change. These changes may affect originally planned means and methods. Finally, the affected activities cause the project total cost and duration to increase. In construction projects, if not managed properly in accordance with the contract, changes are likely to result in claims between the project participants. In this study, a delay analysis methodology which is based on time impact analysis is proposed. The aim of this methodology is to quantify impacts of work changes on the schedule and identify the responsible parties for these changes. The proposed methodology comprises of 3 steps: identification and quantification of delays, allocation of these delays to responsible parties and to calculate overall impact of changes on time. The major benefits of this methodology are; a) its ability to handle and quantify changes in a step by step procedure b) it helps decision makers to give reliable decisions by monitoring the impact of changes during the project"s life cycle. Construction professionals may use it to apportion impact of changes in a systematic and reliable way. An application of this methodology on a project demonstrates the superiority of the process in explaining the dynamic nature of changes and in apportioning the impacts between different parties in a systematic way

1. INTRODUCTION

The construction industry mainly caters to the need of providing shelter, harnessing energy and creates public access. The basic human needs have not changed over time even though the process and environment in which designer or constructor operate have become increasingly more complicated. Rapidly escalating technology has made challenging construction possible which were impossible to imagine in the previous generations. India is the one of the developing countries which is concentrating in the development of the new buildings and at the same time maintaining all existing building. The government is spending a lot of money for the new infrastructure works especially schools, hospitals, universities and low cost housing projects. With this investment, many contracting companies are being set up. At the same time multinational companies are looking forward in exploring the construction industry in India. By looking for the expenditure of the construction industry, the project management profession is being very valuable for the construction companies in order to make sure the projects can be completed successfully. The project management knowledge becomes the critical part in the project because it contains the knowledge in controlling the cost, scheduling, and resources. In this Project Management field, project manager plays very important role in the construction project. Project management professionals are responsible for ensuring the project completes successfully, thus it is important for them to have experience and knowledge in Project Management techniques.

Case Study:
The project"s name is ORCHID VILLA, situated in Abids, Hyderabad.
 M/s EDGE CONSULTING ENGINEERING SOLUTIONS, India is the project management consultants and M/s SK Constructions and Co. is the contractor for the building project.
Project Details:
Name of the project : ORCHID VILLA Total Site area : 500 sq meters
Built up area : 310 sq meters
Number of Floors : Ground + First Total Project Duration : 12 Months Civil works Duration : 8 Months
Cost of the Project : 26 Lakhs INR

2. PROJECT DRAWINGS
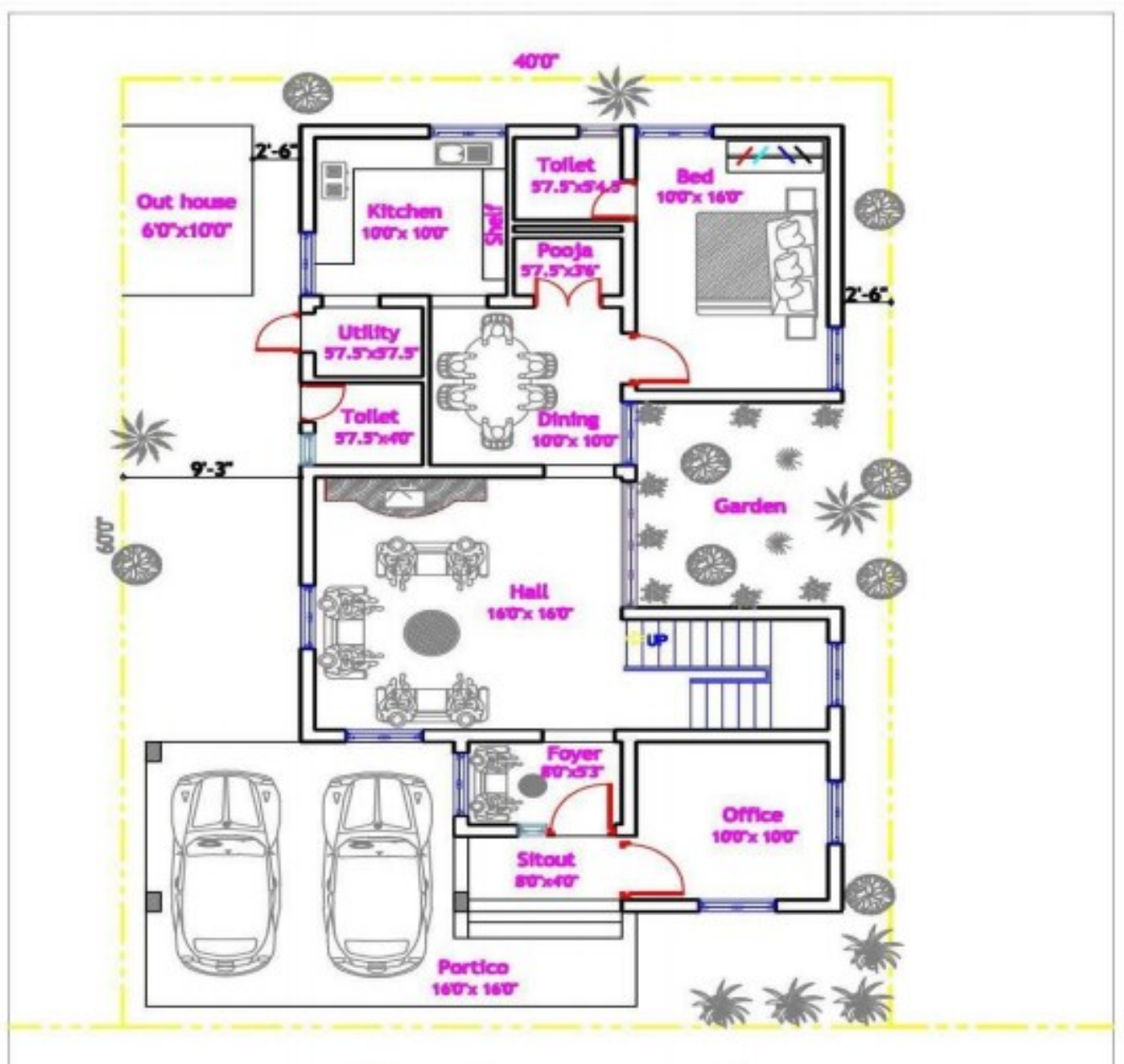
3. DATA ANALYSIS OF CASE STUDY

Project Schedule: Firstly, the project schedule was prepared by the EDGE CONSULTING ENGINEERING SOLUTIONS (Project Management Consultancy) according to the client''s objective and requirements at the time of bidding process.

The total project duration was 210 days (includes inception stage to completion stages).

The schedule contains different types of activities with different durations based on their nature of work and quantities calculated from drawings

PLANNED CONSTRUCTION SCHEDULE

Schedule Variance (SV): it is the difference between the earned value (BCWP) and the planned budget cost (BCWS).

SV = BCWP – BCWS; SV > 0 indicates ahead of sche

Cost Variance (CV): it is the difference between the actual cost (ACWP) and the earned value or the budget cost (BCWP).

CV = BCWP – ACWS; CV > 0 indicates cost saving

Figure 5.4: Schedule variances showing Delay   Figure 5.5 Resources
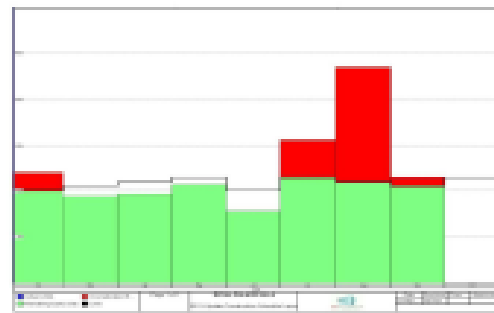
4. CONCLUSION

Construction schedule delays in a project can cause major problems for contractors and owners, resulting in costly disputes, controversial issues and adverse relationships between all the project participants. As Arditi et al. (1985) point out, the most important causes of delays in public projects of Turkey are shortage of resources, financial difficulties and organizational deficiencies of public agencies and contracting companies, delays in design work, large quantities of extra work and frequent change orders. In the case of the project analyzed in this study, the causes of the delayed events can be listed as follows:

1. Organizational deficiencies of the owner in approval of materials & drawings.

2. The lack of experience of the contractor in organizing concrete subcontractors, problems in material procurement,

3. Unforeseeable weather conditions,

4. Shortages of qualified employees of the contractor.

5. Delays in choice of material and the subcontractor

6. Delays in choice of material and the subcontractor for paving tiles of the pool area,

7. Delays in the approval for drawings & materials by the reason for selecting the Time Impact Analysis (TIA) method was that it can display the progress of construction works step by step with the help of PRIMAVERA® software. The main advantage of this method is that the situation of construction on the updated dates could be pictured clearly. It is important for the delay analysis to be able to reflect the actual process of the construction in order to reach an accurate analysis of construction schedule delays. The delayed events are entered into the as-planned schedule respectively to see the changes on the project. Therefore, this analysis method is the most realistic. On the other hand, the most important constraint of TIA method is that the available records, related data and as-planned schedule should be accurate in order to obtain accurate and clear results; otherwise, the analysis will be incorrect. Another drawback of the method is that the
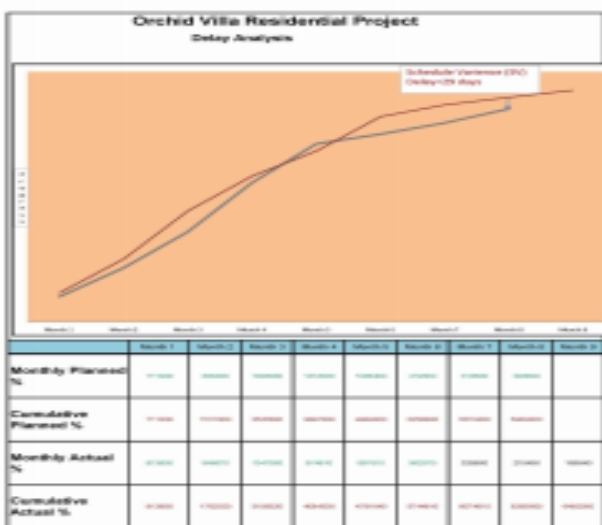
analysis of concurrent delays is difficult in terms of understanding the net portion of the liability. Despite these drawbacks. This selected method is the most reliable as recommended by many researchers and the best technique for determining amount of time extension caused by construction schedule delays.

Based on this study

some general recommendations are presented here, which could also have been useful in minimizing or avoiding the impacts of the construction delays in the project analyzed.

¬ The design of the project should be finalized with all details before tendering the work so as to avoid change orders by the owners.

¬ Owner should allocate sufficient time and adequate finances for the design stage of the project.

¬ The selection of the contractor should be done through a pre-qualification of the firms.

¬ The owners should mobilize all resources and get the necessary permissions before signing the contract.

¬ The contract should include clauses of incentive for early completion. 80

¬ The schedule should be prepared and agreed over by both the contractors and the consulting companies.

¬ The contractor should employ qualified work teams and provide in-house worker training in order to improve managerial and technical skills.

¬ The contractor should also have a project manager in his team to check the progress of work and ensure timely delivery of materials.

¬ The last but most important issue is to establish a healthy communication between all parties in order to solve problems in a timely manner.

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ESTIMATING THE RUNNING COSTS OF COMMERCIAL BUILDINGS: ARTIFICIAL NEURAL NETWORK MODELING

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Abstract Running costs of a building is a substantial share of its total life-cycle cost (LCC) and it ranges between 70-80% in commercial buildings. Despite its significant contribution to LCC, investors and construction industry practitioners tend to mostly rely on construction cost exclusively. Though the early stage estimation of running costs is limited due to the unavailability of historical cost data, several efforts have been taken to estimate the running costs of buildings using different cost estimation techniques. However, the prediction accuracy of those models is still challenged due to less quality and amount of data employed. This study, therefore, developed an artificial neural network (ANN) model for running costs estimation of commercial buildings with the use of building design variables. The study was quantitively approached and running costs data together with 13 building design variables were collected from 35 commercial buildings. The ANN model developed resulted in a 96.6% perfect correlation between the running cost and building design variables. The testing and validation of the model developed indicate that there is greater prediction accuracy. These findings will enable industry practitioners to make informed cost decisions on implications of running costs in commercial buildings at its early stages, eliminating excessive costs to be incurred during the operational phase.

Keywords: Cost modeling, Operations cost, Maintenance cost, Building design variables, Decision-making, LCC.

1. INTRODUCTION

Usually, costs incurred during the operational phase of a building responsible for a substantial share of its Life Cycle Cost (LCC). Some buildings have inherently higher running cost than others, such as commercial buildings. For example, the running costs of commercial buildings account for over 69% of the total LCC (Wang et al. 2014). Similarly, Wong et al. (2010) revealed that the running cost of an office building varies between 72 to 81% of its total LCC. Despite its contribution to the LCC structure, often running cost is given less focus in investment decision making and investors tend to mostly rely on initial cost alone.

A recent study on the review of existing models for LCC estimation revealed that there is no simple model for estimating the running cost of buildings to date (Krstić and Marenjak 2017). The application of available methods and models for the running cost estimation of buildings are also limited to the later stage of building life cycle as these models require an extensive set of operational cost data (Krstić and Marenjak 2017). For example, Al-Hajj and Horner (1998) have presented a running costs model for institutional buildings, with eleven cost elements and to an accuracy of 1.13%. Similarly, Kirkham et al. (2002) and El-Haram et al. (2002) have developed WLCC models for hospital buildings where cost components such as facilities management costs, energy costs, maintenance costs, residual costs, and discount rate were determinants of WLCC. Early-stage supportive running cost estimation models are therefore essential as it provides implications of costs to be incurred during the operating phase of buildings at early design stages of building constructions.

Estimation of cost of a product, system, or service based on its determinants is a well-known and approved method for cost estimation over the years. For example, Kirkham et al. (1999) have developed an energy cost model for sports centres based on building design variables such as the number of users and floor area. However, Krstić and Marenjak (2017) stressed that these models are not based on adequate historical cost records and not based on the available cost structure, rather than standard cost structure. Authors further indicate that the models developed so far ignore some important factors

such as the age, location, level of occupancy, and standards of operation.

Deciding through which type of building to include in a forecasting model is not the only problem. The choice of modelling technique is also important (Boussabaine *et al.* 1999). Among the statistical approaches, regression techniques deserve attention due to relative ease of implementing and requirement of less computational power than other statistical approaches (i.e. genetic algorithms, neural networks, support vectors machine) (Fumo and Biswas 2015). However, the application of purely parametric cost estimation methods is limited due to the lack of reliable historical cost data and building design variables, which have a direct influence on its LCC. In contrary, Boussabaine *et al.* (1999) opined that statistical models have been used for some time but in present, artificial intelligence is proposed as a more reliable and accurate modelling technique. Providing professionals with accurate forecasting techniques will enable them to make informed and reliable estimates of likely running cost in commercial buildings, as well as other forms of buildings. Therefore, this study introduces an early-stage supportive running cost estimation model for commercial buildings with use of the artificial neural network (ANN) modelling.

2. RESEARCH METHODS

The research was primarily approached quantitatively to develop early-stage supportive running cost estimation models for commercial buildings with the use of ANN modelling. The documents including architectural drawings, bills of quantities, historical cost records, and monthly utility bills were reviewed to collect the required data. The case buildings selected for the study was limited to 35 out of the population of 117 commercial buildings, which were recorded in Sri Lanka due to the time constraints and limited access to cost data. Generally, a sample size of more than 30 at 5% confidence level is sufficient for many types of research. Though it is said that a big sample of data is required to run an ANN, an ANN tool including a particular training-validation-test procedure for small datasets has been developed some years ago and recently refined in order to obtain not only realistic regression laws, but also reliable ones (One can refer to Pasini and Potestà (1995) and Pasini *et al.* (2001) for the fundamentals of this tool) (Pasini 2015). Accordingly, the commercial buildings selected for the study consists of 49% of office buildings and 37% of banks while remaining include educational institutes, retails, and multi-purpose (i.e. hotel + apartment) buildings. Further, a majority of the selected buildings (63%) consists of three to 12 while remaining 26% and 11% are 13 to 25 and above 25 storied buildings respectively.

Based upon statistical pre-analysis, 13 variables (i.e. building design variables), which are quantitative in nature and convertible (nominal data) were selected for predicting the running cost of commercial buildings. The influence of variables on the running cost and ease of availability of data were the primary factors in the selection of the variables. Further, the running cost data were collected in accordance with the standards of BCIS, BS ISO 15686-5:2008 standard, and NRM3, for three consecutive financial years: 2014, 2015, and 2016.

Initially, the collected dataset was subjected to the 'Multiple imputation" technique to impute the missing values within the data set. Next, the target variable was normalized using the gross internal floor area and obtain the normalized target variable called running cost/sq. ft. The ANN model was developed with the aid of Neural Designer machine learning software and the Feedforward neural network with backpropagation training was administered as it is commonly used with linear activation function. Finally, the prediction accuracy of the developed model was evaluated with use of the mean absolute percentage error (MAPE) and Theil's U value.

3. DATA ANALYSIS AND FINDINGS

In order to proceed with the neural network analysis, there are three basic assumptions to be satisfied. Firstly, both dependent and independent variable s should be the continuous form of data. In this study, the dependent variable, which is running costs/sq. ft and independent variables including working days/week, working hours/day, building age, GIFA, net floor area, circulation area, height, number of floors, window area, Window-to-Floor-Ratio, and number of occupants are scale data. In addition, two dummy variables namely, the grouping of buildings (1=Detached, 2=Attached), and type of structure (1=Concrete, 2=Steel, 3=Pre-fabricated) were added to the analysis to represent the nominal data collected. Therefore, satisfied the first assumption. Next, the Shapiro-Wilk normality test was conducted to explore the normal distribution of residual values. As observed from Table 1, the significance of the standardized residual (ZRESI) is greater than 0.5 indicates that the ZRESI is normally distributed.

Table 1. Test of normality: Shapiro-Wilk.

	Statistic	df	Sig.
Standardized Residual	0.954	30	0.211

Next, the relationship between the dependent variable and the independent variables are needed to be linear, both for each independent variable and globally. Accordingly, a scatterplot analysis was conducted between each independent variable and the dependent variable and the charts derived are presented in Figure 1. As shown in the scatterplot matrix, five continuous independent variables namely GIFA, NFA, CA, building height, and the number of floors out of 11 have strong

linear relationships with the dependent variable: running cost. Although other six independent variables don't represent strong linear relationships with the dependent variable as the points are more scattered and it is observed that the points are trying to gather along the diagonal. Therefore, it is concluded that all the independent variables have linear relationships with the dependent variable, thus satisfied the third assumption. As shown in the scatterplot matrix, five continuous independent variables namely GIFA, NFA, CA, building height, and the number of floors out of 11 have strong linear relationships with the dependent variable: running cost. Although other six independent variables don't represent strong linear relationships with the dependent variable as the points are more scattered and it is observed that the points are trying to gather along the diagonal. Therefore, it is concluded that all the independent variables have linear relationships with the dependent variable, thus satisfied the third assumption.
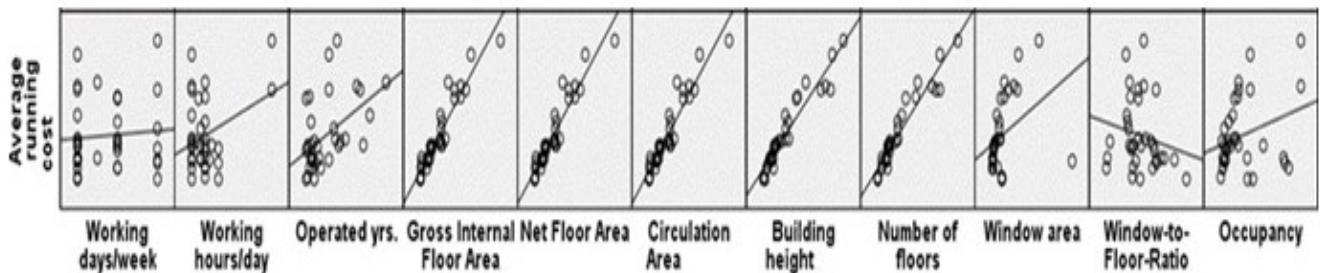
Figure 1. The relationship between the running cost and building design variables.

The Artificial Neural Network Model for Running Cost Estimation of Buildings

Initially, the pretreated data (with multiple imputation and normalization) was input to the "Neural Designer" software and the data set consists of 35 instances was itself divided into three types of instances such as 60% of training instances, 20% of selection instances, and 20% of testing instances. Next, the data set was further pretreated by setting all instances, which includes constant variables, repeated variables and univariate outliers and multivariate outliers as unused instances. Fortunately, the results derived indicate that there are no any constant or repeated variables in the data set and only 2 instances were set as unused due to outliers. Then, the neural network was developed and it represents the predictive model. Accordingly, the size of the scaling layer is 13, the number of inputs. The scaling method for this layer is the "MinimumMaximum". Further, the neural network was designed with three layers. Table 2 depicts the size of each layer and its corresponding activation function. The architecture of this neural network can be written as 13:10:7:1.

Table 2. The summary of the neural network.

	Input number	Neurons number	Activation function
1	13	10	Linear
2	10	7	Linear
3	7	1	Linear

The statistics of the parameters shown in Table 3 depict information about the complexity of the model. In general, it is desirable that all minimum, maximum, mean and standard deviation values are not very big as shown for the developed model.

Table 3. Parameters statistics of the natural network model.

	Minimum	Maximum	Mean	Deviation
Parameters	-0.990295	0.990173	-0.0601779	0.57255

The loss index plays an important role in the use of a neural network. It defines the task the neural network is required to do and provides a measure of the quality of the representation that it is required to learn. The normalized squared error (NSE) is used here as the error method. If the NSE has a value of unity then the neural network is predicting the data 'in the mean', while a value of zero means a perfect prediction of the data. In this network, the NSE is 3.28.

The procedure used to carry out the learning process is called training (or learning) strategy. The quasi-Newton method was applied as the training strategy of the neural network in this study in order to obtain the best possible loss. It is based on Newton's method but does not require calculation of second derivatives. Instead, the quasi-Newton method computes an approximation of the inverse Hessian at each iteration of the algorithm, by only using gradient information. Accordingly, the initial value of the training loss is 3.18746, and the final value after 230 iterations is 0.00238913 whereas the initial value of the selection loss is 5.59346, and the final value after 230 iterations is 0.208116.

A standard method to test the loss of a model is to

perform a linear regression analysis between the scaled neural network outputs and the corresponding targets for an independent testing subset. This analysis leads to three parameters for each output variable. The first two parameters, a and b, corresponding to the y-intercept and the slope of the best linear regression relating scaled outputs and targets. The third parameter, R^2, is the correlation coefficient between the scaled outputs and the targets. If we had a perfect fit (outputs exactly equal to targets), the slope would be 1, and the y-intercept would be 0. If the correlation coefficient is equal to 1, then there is a perfect correlation between the outputs from the neural network and the targets in the testing subset. Accordingly, Table 4 lists the linear regression parameters for the scaled output running cost/sq. ft.

Table 4. The linear regression parameters for the scaled output running cost/sq. ft.

Regression parameters	Value
Intercept	-0.0355
Slope	1.14
Correlation	0.966

The mathematical expression represented by the neural network inputs working days/week, working hours/day, attached/detached, age, gross internal floor area, net floor area, circulation area, height, no. of floors, type of structure, window area, window to floor ratio and occupancy to produce the output Running cost/sq. ft. For function regression problems, the information is propagated in a feed-forward fashion through the scaling layer, the perceptron layers and the unscaling layer.

Model Testing

The purpose of model testing is to evaluate the performance of the developed ANN model in estimating a functional form that relates the design variables of commercial buildings to the running cost. Table 5 presents the prediction accuracy of the developed ANN model with use of the MAPE and Theil's U statistic, which commonly used to measure the performance.

Table 5. Results of test statistics for model accuracy.

Test	ANN
MAPE	-4.9%
Theil's U value	0.049

As shown in Table 5, the average MAPE of the ANN model is -4.9%, indicates that the ANN model has been achieved a high accuracy. The Theil's U value for the ANN model is 0.049 (where the U value indicates greater accuracy as U→0). Further, the neural network model recorded a correlation of 0.966, this accuracy is better than that recorded by the so far developed parametric regression models for LCC estimation.

4. CONCLUSIONS

The paper has highlighted the importance of different modelling techniques for predicting cost to be incurred during the operation phase of buildings particularly, commercial. The level of MAPE for the ANN model can be considered acceptable in most real applications, depending on the phase of application of the model. It is clear from this limited experiment that ANN was able to extract a functional form (i.e., a function) that represents the problem under investigation. The study has also shown that ANN models may prove as a good alternative to parametric cost modelling. Within the limits of this study, ANN models have been shown to be able to model data that strongly exhibit noise and achieve reasonable accuracy.

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"MIX DESIGN OF CONCRETE BY BIS METHOD"

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ABSTRACT The quality of concrete in a structure is determined not only by the proper selection of its constituents and their proportions, but also by appropriate techniques in the production, transportation, placing, compacting, finishing, and curing of the concrete of the actual structure, often at a job site..Although these processes have an impact on the actual quality of concrete
In order to obtain a strong, durable and economical concrete mix, it is necessary to understand the characteristics and behavior of the ingredients

1. INTRODUCTION

Concrete is the most widely used man-made construction material. It is obtained by mixing cement, water and aggregates (and sometimes admixtures) in required proportions. The mixture when placed in forms and allowed to cure becomes hard like stone. The hardening is caused by chemical action between water and the cement and it continues for a long time, and consequently the concrete grows stronger with age. The hardened concrete may also be considered as an artificial stone in which the voids of larger particles (coarse aggregate) are filled by the smaller particles (fine aggregate) and the voids of fine aggregates are filled with cement. In a concrete mix the cement and water form a paste called cement water paste which in addition to filling the voids of fine aggregate acts as binder on hardening, thereby cementing the particles of the aggregates together in a compact mass.

The strength, durability and other characteristics of concrete depend upon the properties of its ingredients, on the proportions of mix, the method of compaction and other controls during placing, compaction and curing. The popularity of the concrete is due to the fact that from the common ingredients, it is possible to tailor the properties of concrete to meet the demands of any particular situation. The advances in concrete technology have paved the way to make the best use of locally available materials by judicious mix proportioning and proper workmanship, so as to produce concrete satisfying performance requirements.

2. CONSTITUENTS OF CONCRETE

The constituents of modern concrete have increased from the basic four (Portland cement, water, stone, and sand) to include both chemical and mineral admixtures. These admixtures have been in use for decades, first in special circumstances, but have now been incorporated in more and more general applications for their technical, and at times economic benefits in either or both fresh and hardened properties of concrete.

The main constituents of concrete are:
(i)   Cement
(ii)   Aggregates
(iii)   Water
(iv)   Admixtures

CEMENT

Cement is a well-known building material and has occupied an indispensable place in construction works. There is a variety of cements available in the market and each type is used under certain conditions due to its special properties. The cement commonly used is portland cement, and the fine and coarse aggregates used are those that are usually obtainable, from nearby sand, gravel or rock deposits. In order to obtain a strong, durable and economical concrete mix, it is necessary to understand the characteristics and behaviour of the ingredients

GROUND FLOOR FRAMING PLAN
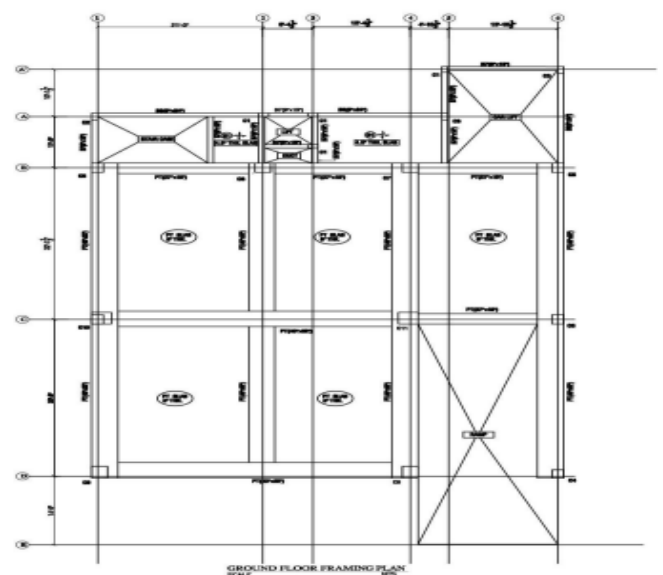
AGGREGATES

Aggregate was originally viewed as an inert, inexpensive material dispersed throughout the cement paste so as to produce a large volume of concrete. In fact, aggregate is not truly inert because it's physical, thermal and, sometimes, chemical properties influence the performance of concrete, for example, by improving its volume stability and durability over that of the cement paste. From the economic viewpoint, it is advantageous to use a mix with as much aggregate and as little cement as possible, but the cost benefit has to be balanced against the desired properties of concrete in its fresh and hardened state.

WATER

Water is needed for the hydration of cement but not all is used up for this purpose. Part of this added water is to provide workability during mixing and for placing.

Generally, cement requires about 3/10 of its weight of water for hydration. Hence the minimum water-cement ratio required is 0.35. But the concrete containing water in this proportion will be very harsh and difficult to place. Additional water is required to lubricate the mix, which makes the concrete workable. This additional water must be kept to the minimum, since too much water reduces the strength of concrete. The water-cement ratio is influenced by the grade of concrete, nature and type of aggregates, the workability and durability.

ADMIXTURES

BS 2787: 1956 'Glossary of term for concrete and reinforced concrete' gives the following definition for the term 'admixture', with 'additive' given as an alternative term with the same definition:

'A material other than coarse or fine aggregate, cement of water added in small quantities during the mixing of concrete to produce some desired modification in one or more of its properties'.

3. FACTORS AFFECTING THE CHOICE OF MIX PROPORTIONS

The various factors affecting the mix design are:

1. Compressive strength

It is one of the most important properties of concrete and influences many other describable properties of the hardened concrete. The mean compressive strength required at a specific age, usually 28 days, determines the nominal water-cement ratio of the mix. The other factor affecting the strength of concrete at a given age and cured at a prescribed temperature is the degree of compaction. According to Abraham's law the strength of fully compacted concrete is inversely proportional to the water-cement ratio.

2. Workability

The degree of workability required depends on three factors. These are the size of the section to be concreted, the amount of reinforcement, and the method of compaction to be used. For the narrow and complicated section with numerous corners or inaccessible parts, the concrete must have a high workability so that full compaction can be achieved with a reasonable amount of effort. This also applies to the embedded steel sections. The desired workability depends on the compacting equipment available at the site.

3. Durability

The durability of concrete is its resistance to the aggressive environmental conditions. High strength concrete is generally more durable than low strength concrete. In the situations when the high strength is not necessary but the conditions of exposure are such that high durability is vital, the durability requirement will determine the water-cement ratio to be used.

4. Maximum nominal size of aggregate

In general, larger the maximum size of aggregate, smaller is the cement requirement for a particular water-cement ratio, because the workability of concrete increases with increase in maximum size of the aggregate. However, the compressive strength tends to increase with the decrease in size of aggregate.

IS 456:2000 and IS 1343:1980 recommend that the nominal size of the aggregate should be as large as possible.

4. RESULTS AND CONCLUSION

DESIGN EXAMPLE

Design concrete mix of characteristic strength (f_{ck}) M-30, type of cement is ordinary portland cement, fine aggregate natural river sand confirming to grading zone II of table 4 of IS 383-1970.

Coarse aggregate-crushed (angular) of 20mm maximum size confirming to IS 383 code requirements. Specific gravities of cement, sand and coarse aggregate are 3.14, 2.63 and 2.61 respectively.

Type of exposure – mild

Degree of quality control – very good

Degree of workability – 0.80.

Design procedure:

1. Target mean strength

The target mean strength ft is calculated assuming the degree of control as very good and the value of standard deviation for grade M-30 is 5.0

$$f_t = f_{ck} + ks$$

Assuming 5% of results to be below the characteristic strength, the value of k from table is 1.65 as per IS 10262 code

$$f_t = 30 + (1.65 \times 5.0) = 38.25 \text{ Mpa}$$

2. Selection of water/cement ration

The preliminary free water/cement ratio by weight corresponding to the target mean strength at 28 days for different mixes is selected for strength from the table of code

For strength w/c = 0.39

For durability requirements the maximum water/cement ratio for moderate exposure for plain concrete = 0.70
Hence lower value of w/c ratio is selected.

3. Air content

From table of IS code for a nominal maximum size of 20mm aggregate, the entrapped air is 2 % of volume of concrete.

4. Water content and fine to total aggregate ratio.

For a nominal maximum size of 20mm aggregate from table of IS code for concrete of grade upto M-35, the water content for mix M-30 is 186.kg/m^3 of concrete and the sand as percentage of total aggregate by absolute volume is 35.

Adjustment of values in water content and sand percentage

From table of IS code of adjustment of values in water content and sand percentage for other conditions adjustments are made for water content percent and percent sand in total aggregate.

Change in condition	Adjustments required in	
	Water content percent	Percentage sand in total aggregate
For decrease in water/cement ratio (0.60-4.39) = 0.21 No correction since compacting factor.	0	-4.2%

1. Final water content after adjustments
` Water content required is = (180+0) = 186 kg/m^3.
2. Determination of cement concrete
w/c = 0.39
water content = 186 kg/m^3.
Cement content (C) = water content/0.39 = 186/0.39 = 476.92 kg/m^3.
3. Check for minimum cement content
From IS 456 : 2000 the minimum cement content required for durability for plain concrete under mild exposure conditions is 220 kg/m^3. The values of cement content for all the three grades is greater than this minimum value.
4. Determination of coarse and fine aggregate content

f entrapped air for 20mm maximum size aggregate from IS code is 2%. For this fine aggregate is calculated as

$$V = \left[W + \frac{C}{S_c} + \frac{1}{P} \frac{f_a}{S_{fa}} \right] \times \frac{1}{1000}$$

$$0.98m^3 = \left[186 + \frac{476.92}{3.14} + \frac{1}{0.308} \frac{f_a}{2.63} \right] \times \frac{1}{1000}$$

$f_a = 520.14 \, kg/m^3.$

Coarse aggregate required is calculated as

$$V = \left[W + \frac{C}{S_c} + \frac{1}{1-P} \frac{C_a}{S_{ca}} \right] \times \frac{1}{1000}$$

$$0.98m^3 = \left[186 + \frac{476.92}{3.14} + \frac{1}{1-0.308} \frac{c_a}{2.61} \right] \times \frac{1}{1000}$$

$c_a = 1156.38 \dfrac{kg}{m^3}.$

5. Total quantities of ingredients and mix proportions are:

Mix	Cement	Fine aggregate (kg)	Coarse aggregate (kg)	Water (kg)
M-30	476.92	520.14	1156.38	186.0

Mix proportions

Mix	Cement	F.A	C.A	Water
M-30	1	1.09	2.42	0.39

Conclusions

✓ This study provides design of concretemix i.e., proportioning concrete mixes as per the requirements using the concrete making materials including other supplementary materials identified for this design of concrete mix. The proportioning is carried out to achieve specified characteristics at specified age, workability of fresh concrete and durability requirements.

✓ The concrete mix design by BIS method is applicable for ordinary and standard aconcrete grades only.

All requirements of IS 456 are so far satisfied for the concrete mix design and designed concrete mix.

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STRUCTURAL ANALYSIS OF MULTISTORY BUILDING OF DIFFERENTSHEAR WALLS LOCATION AND HEIGHTS

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Abstract Abstract: Shear walls are structural systems which provide stability to structures from lateral loads like wind, seismic loads. These structural systems are constructed by reinforced concrete, plywood/timber unreinforced masonry, reinforced masonry at which these systems are sub divided into coupled shear walls, shear wall frames, shear panels and staggered walls. The present paper work was made in the interest of studying and analysis of various research works involved in enhancement of shear walls and their behaviour towards lateral loads. As shear walls resists major portions of lateral loads in the lower portion of the buildings and the frame supports the lateral loads in the upper portions of building which is suited for soft storey high rise building, building which are similar in nature constructed in India, As in India base floors are used for parking and garages or officers and upper floors are used for residential purposes.
Keywords: Multistory building (G + Structure), Shear wall, STAAD. Pro etc.

1. INTRODUCTION

In structural engineering, a shear wall is a structural system composed of braced panels (also known as shear panels) to counter the effects of lateral load acting on a structure. Wind and seismic loads are the most common loads that shear walls are designed to carry.Shear walls resist in-plane loads that are applied along its height. The applied load is generally transferred to the wall by a diaphragm or collector or drag member. They are built in wood, concrete, and CMU (masonry).

Shear walls must provide the necessary lateral strength to resist horizontal earthquake forces. When shear walls are strong enough, they will transfer these horizontal forces to the next element in the load path below them. These other components in the load path may be other shear walls, floors, foundation walls, slabs or footings.
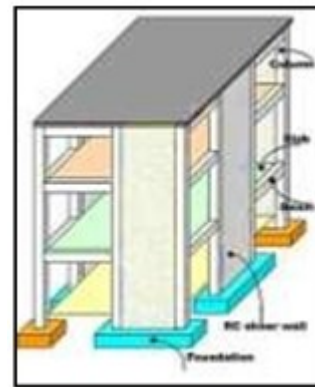
Fig 1.1: Shear wall

Shear walls also provide lateral stiffness to prevent the roof or floor above from excessive side-sway. When shear walls are stiff enough, they will prevent floor and roof framing members from moving off their supports. Also, buildings that are sufficiently stiff will usually suffer less nonstructural damage.

The strength of the shear wall depends on the combined strengths of its three components: lumber, sheathing and fasteners. Later in this section you will learn how each component affects the strength and how strength is lost by improper installations. When all of the components are properly in place, the shear wall can provide its intended strength. For shear wallsheathing, the 1994 Uniform Building Code (UBC) permits the use of gypsum wallboard, cements plaster, fiberboard, wood particleboard, plywood and oriented strand board. Previous editions of the UBC also allowed wood lath and plaster, horizontal and diagonal sheathing for shear walls. All of these sheathing materials provide different strengths. The UBC shows these strengths in pounds per foot of wall length. Fasteners for shear wall construction may bestaples, screws or nails. Denser lumber species provide stronger fastener strengths. Values for shear wall strengths assume a dense lumber species like douglas fir-larch or southern pine. Thicker framing members also increase wood structural panel sheathing strengths.

How Shear Walls Provide Stiffness

The stiffness of the shear wall, just like its strength, depends on the combined stiffness of its three components: lumber, sheathing and fasteners. The size and grade of end stud(s), thickness and grade of sheathing, and the sheathing fastener diameter determine how flexible a wood shear wall will be. When present, holdown devices also contribute to the overall stiffness of the shear wall. If holdown devices stretch or slip, the top of the shear wall will move horizontally. This horizontal movement adds to the movement allowed by the lumber, sheathing and fasteners. Any additional movement from the holdown will reduce the effective stiffness of the shear wall.

Stiffness and Aspect Ratios

Shear walls provide stiffness in large part by the ratio of their height to width. Long short walls are stiffer than tall narrow ones. For a wall of constant height, the stiffness will grow exponentially as the wall length increases. To help control stiffness, the UBC requires a minimum wall length for any given wall height. This allowable dimension ratio changes for each type of sheathing material and its construction. Wood structural panels can have smaller shear wall lengths than cement plaster or gypsum wallboard. When this sheathing is fastened at all of its edges.
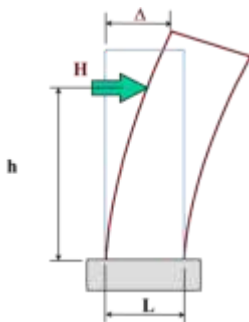
Fig 1.2: Lateral Stiffness of Shear wall Advantages of shear wall:

(1) Sound reducing: Land for home building is becoming scarce and homes are being built closer together and near noise sources like highways, railways and airports. Concrete homes have attractive sound-reducing qualities to provide the kind of quiet comfort buyers look for in a home.

(2) Cost saving: Purchasers and developers will reap the benefits of concrete construction, including good acoustic performance, excellent fire resistance, high thermal mass and low maintenance, all achieved within budget. Conventional structural design emphasizes rebar component with minimum concrete frame. This type of reinforce concrete structure emphasizes very heavy rebar design. Conventionaldesign remains infilling with brick walls of which require a lot of skill workers for brick lying and plastering. That gives cost savings in material, time and money and eliminating waste etc Mortar, Timber form, Steel reinforcement, Bricks, Plastering, Sand, Cement...

(3) Good appearance: Wood will decay when there is too much moisture. That presents particularly when it is in contact with the ground. Meanwhile a carpenter uses a lot of nails to make the structural parts of wood built forms. Fasteners, including nails, are the weakest part of any construction joint. Meanwhile, the potential failures of wood formwork, it represents a great hazard to workers working around and on it. Unskilled workers always over secure the wood forms. Too many nails will weaken lumber, and increase difficulty of removing the forms, and reduce the usage of the plywood and timbers.

(4) Greater control of accuracy and workmanship: With the durable, each successive home built is as high quality as the first. When you build a house using pre-engineering, it offers greater control of accuracy and workmanship during construction. This result in a higher quality structure compared to the conventional method using a lot of timber formwork. The quality of timber formwork very much depends on the individual skills of workers of which made the quality of each home built different. With the shortage of available skill labors in today construction market, selecting the right forming equipment becomes even more important.

(5) Superb concrete finish, quality improvement: Have all the value and benefit of concrete. Quality is enhanced despite the speed of construction. The precise, even steel face of PCG SYSTEMS creates a smooth, high quality finish capable of receiving direct decoration with the minimum of preparation (a level of 1 to 10mm thick skim coat is required). This reduces the requirement for finishing trades, thus providing additional cost savings and speeding the entire process

(6) Lesser water seepage problem: Water seepage through external walls was found to be a common defect faced by homeowners. The survey findings also showed that the use of single layer brick wall is the most common cause of water seepage through external walls. Almost 90% of the water seepage occurred through cracks in the plastered brick walls. In general, water seepage through external walls occurred within the first five years of building completion. Water seepage through the external walls is unacceptable to the occupants.

(7) Fire resistance: Fire can endanger the lives of everyone in the family and destroy those things that cannot be replaced. Insurance companies recognize concrete as being safer than any other method of

construction when fire threatens a home. Living in a concrete home can ultimately bring peace of mind for homeowners concerned about fire.

(8)   Strong, solid, rigid, durable and low maintenance: One of the key benefits of building with concrete is that it is durable and easy to maintain. Concrete and cement based products form a solid, durable that resists rot, pests and wild fires. Buying a home is typically the biggest investment we will ever make. If that home is constructed with concrete walls, our investment is naturally protected from the structural damage that can be caused by the effects of nature. As the owner of a concrete home, we will benefit from lowest annual maintenance and energy costs while living in a home that provides a secure haven for our family.

2. METHODOLOGY

In this chapter a multistory building has been modelled and analyze with considering all loads like Dead load, Live load, Wind Load as per as IS standard and Seismic load as per as IS standard.

The structure details takes from reference is given in table 2.1 is placed in below.

Table 2.1: The structure details takes from reference Case-I, II & III

Young"s modulus of M20 concrete, E	$2.8 \times 10^7 kN/m^2$
Grade of concrete	M20
Grade of steel	Fe 415
Density of Reinforced Concrete	$25 \, kN/m^3$
Modulus of elasticity of brick masonry	$2100 \times 10^3 kN/m^2$
Density of brick masonry	$20 \, kN/m^3$
No of storey	G+10, G+20 & G+26
Beam size	0.3m x 0.3 m (G+10) 0.35m x 0.35m (G+20) 0.4m x 0.4m (G+26)
Column size	0.45 m x 0.45m (G+10)
	0.5m x 0.5m (G+20) 0.6m x 0.6m (G+26)
Shear wall thickness	0.2 m
Height of all storey	33m (G+10) 63m (G+20) 81m (G+26)
Height of each floor	3.5m
Earthquake Zone	II

Damping Ratio	5%
Importance factor	1
Type of Soil	Medium
Type of structure	Special Moment Resisting Frame
Response reduction Factor	5

Finite Element Method (FEM)

The finite element method (FEM) (its practical application often known as finite element analysis (FEA)) is a numerical technique for finding approximate solutions to partial differential equations (PDE) and their systems, as well as (less often) integral equations. In simple terms, FEM has an in built algorithm which divides very large problems (in terms of complexity) into small elements which can be solved in relation to each other. FEM solves the equations using the Galerkin method with polynomial approximation functions. The solution is obtained by eliminating the spatial derivatives from the partial differential equation. This approximates the PDE with

• A system of algebraic equations for steady state problems

• A system of ordinary differential equations for transient problems.

These equation systems are linear if the corresponding PDE is linear and vice versa. Algebraic equation systems are solved using numerical linear algebra methods. The ordinary differential equations that arise in transient problems are numerically integrated using techniques such as Euler's method or the Runge-Kutta method.

In solving   PDE"s, the major problem is to create an equation that approximates the equation to be analyzed, but is numerically stable, meaning that errors in the input and intermediate calculations do not accumulate and cause the resulting output to be meaningless. There are many ways of doing this, which have their respective pros and cons.

STAAD.Pro

STAAD or (STAAD.Pro® V8i) is a structural analysis and design computer program originally developed by Research Engineers International in Yorba Linda, CA. In late 2005, Research Engineers International was bought by Bentley Systems. It is the   World"s #1 Structural Analysis and Design Software. The analysis is done in a numerical way by the STAND.PRO program, a finite element package, which enables us to solve the linear and the nonlinear PDE"s and thus the modulus of elasticity of the beam material is obtained . STAND.PRO

is modeling and analysis software which helps in the modeling and analysis of required models, a FEM tool. It is used to analyze complex problems in mechanical structures, thermal processes, electrical fields, magnetics, and computational fluid dynamics. STAND.PRO provides a rich graphics environment, which is used to display results of analysis that re performed.

STAAD.Pro is a comprehensive and integrated finite element analysis and design offering, including a state-of-the-art user interface, visualization tools, and international design codes. It is capable of analyzing any structure exposed to static loading, a dynamic response, soil-structure interaction, wind, earthquake, and moving loads. STAAD.Pro V8i is the premier FEM analysis and design tool for any type of project including towers, culverts, plants, bridges, stadiums, and marine structures. Advanced Analysis and Design .With an array of advanced analysis capabilities including linear static, response spectra, time history, cable, and pushover and non-linear analyses, STAAD.Pro V8i provides your engineering team with a scalable solution that will meet the demands of your project every time. STAAD.Pro V8i will eliminate the countless man-hours required to properly load your structure by automating the forces caused by wind, earthquakes, snow, or vehicles. In addition, no matter what material you are using or what country you are designing your structure for, STAAD.Pro V8i can easily accommodate your design and loading requirements, including U.S., European (including the Euro codes), and Nordic, Indian, and Asian codes. Even special codes like AASHTO, ASCE 52, IBC, and the U.S. aluminum code can be catered to.

STAAD Pro Solution Steps
Methods of Analysis:
A. Edit Commands Lines Method
B. Graphical Method
1. Modeling
2. Loading
3. Analyzing
Elastic Analysis P-Delta Analysis
Buckling Analysis Cable Analysis
4. Reading Results
Tables results Graphical results

3. MODELLING AND ANALYSIS IN STAAD.PRO
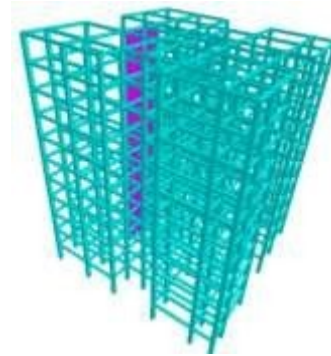
Fig 3.1: G+10 RCC Shear Wall Structure with different shear wall location

The above figure 3.1 has been shows that multistory building structure frame G+10 has been modelled in STAAD.Pro design and analysis software with given material properties and specifications.
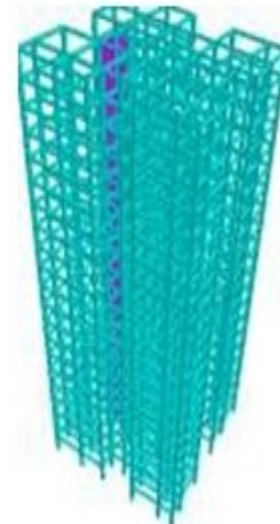
Fig 3.2: G+20 RCC Shear Wall Structure with different shear wall location

The above figure 3.2 has been shows that multistory building structure frame G+20 has been modelled in STAAD. Pro design and analysis software with given material properties and specifications.

Fig 3.3: G+26 RCC Shear Wall Structure with different shear wall location

The above figure 3.3 has been shows that multistory building structure frame G+26 has been modelled in STAAD.Pro design and analysis software with given material properties and specifications.

Support and Load cases in STAAD.Pro

In this topic all structure member are configure respective cases like support, load cases etc. The below figure 3.4 has been shows that multistory building structure frame of G+10, G+20 and G+26 with considering fixed support at ground as foundation of column structure.
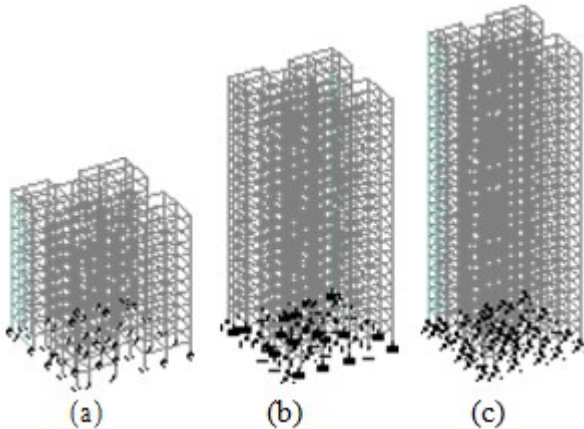
Fig 3.4: (a), (b) & (c) G+10, G+20 & G+26 RCC Shear Wall Structure with fixed support (Let us assumed as foundation of column)

Load Case-I: Dead Load
Load Case-II: Live Load (   )
Load Case-III: Wind Load (As per as SI Indian Standard)

Various Result obtained in STAAD.Pro
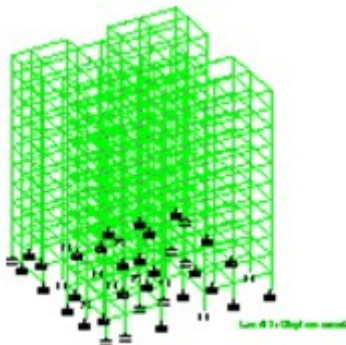
Fig 3.5: Nodal Displacement in G+10 RCC Structure with shear wall
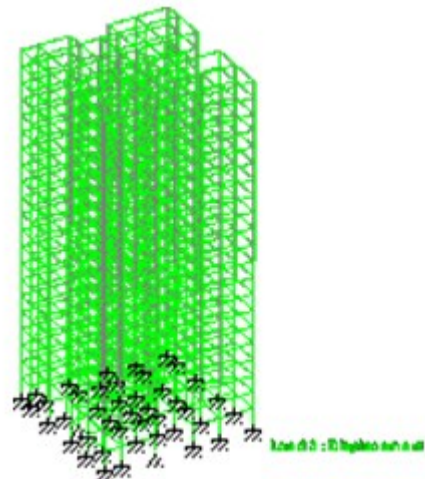
Fig 3.6: Nodal Displacement in G+20 RCC Structure with shear wall
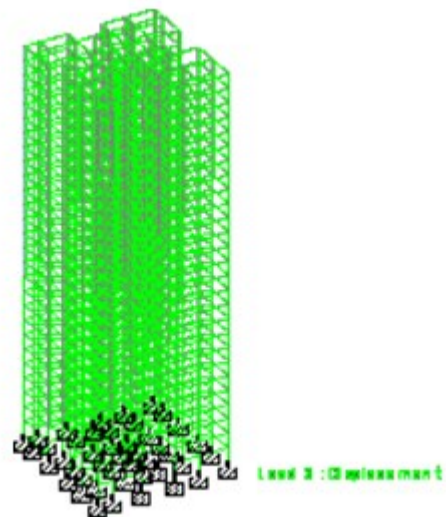
Fig 3.7: Nodal Displacement in G+26 RCC Structure with shear wall

The above figure 3.7 has been shows that the nodel displacement of the beam and column at each nodes in multi storey building.
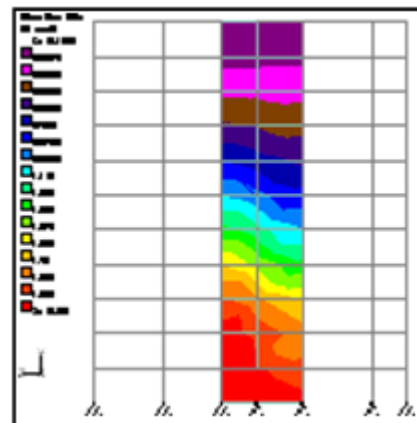
Fig 3.7: Stress generated in Shear wall in G+10
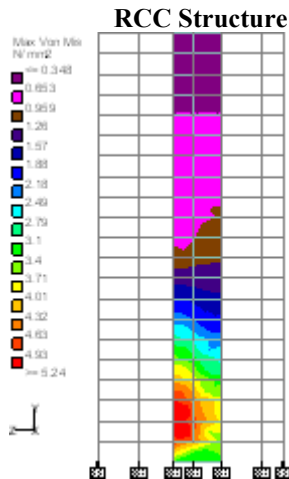
RCC Structure

Fig 3.9: Stress generated in Shear wall in G+20 RCC Structure
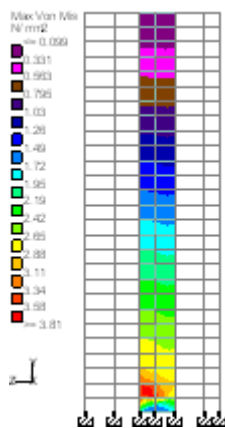
Fig 3.10: Stress generated in Shear wall in G+26 RCC Structure

The above figure 3.8, 3.9 & 3.10 indicates that the Maximum Von miss stress generated in shear wall at different load condition.

3. RESULT & DISCUSSION

The structure analysis of all the frames models that includes different location of shear walls has been done by using software STAAD.Pro and the results are shown below. The parameters which are to be studied are inter-storey drift, base shear and lateral displacement.

Location of shear wall
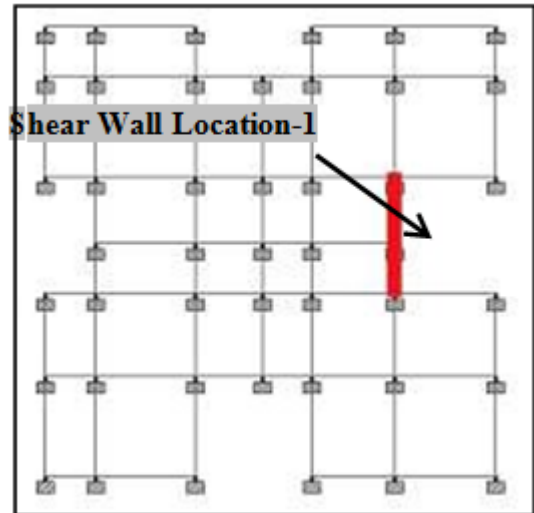
Fig 4.1: Location-1 of shear wall
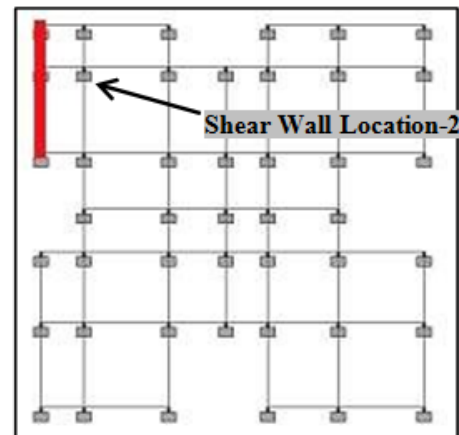
Fig 4.2: Location-2 of shear wall

The above fig 4.1 & 4.2 has been shows that the different shear wall location in different multistory building structure (G+10, G+20 & G+26).

The structure analysis of all the frames models that includes different location of shear walls has been done by using software STAAD.Pro and the results are shown below. The parameters which are to be studied are inter-storey drift, base shear and lateral displacement.

Table 4.1: Maximum Von Miss Stress in shear wall at location
1 & 2 due Load case 1

Load Case	Building Structure	Maximum $\left(\frac{N}{mm^2}\right)$ Location 1	Maximum $\left(\frac{N}{mm^2}\right)$ Location 2
LC 1	G+10	1.25742	1.36362
LC 1	G+20	2.81632	2.94763
LC 1	G+26	3.80801	3.88496

Table 4.2: Maximum Von Miss Stress in shear wall at location 1 & 2 due Load case 2

Load Case	Building Structure	Maximum $\left(\frac{N}{mm^2}\right)$Location 1	Maximum $\left(\frac{N}{mm^2}\right)$ Location 2
LC 2	G+10	0.981865	0.372493
LC 2	G+20	2.09846	1.00182
LC 2	G+26	2.39742	1.25766

Table 4.3: Maximum Von Miss Stress in shear wall at location 1 & 2 due Load case 3

Load Case	Building Structure	Maximum $\left(\frac{N}{mm^2}\right)$ Location 1	Maximum $\left(\frac{N}{mm^2}\right)$ Location 2
LC 3	G+10	2.06473	1.85379
LC 3	G+20	5.23674	6.21295
LC 3	G+26	6.02281	7.58716
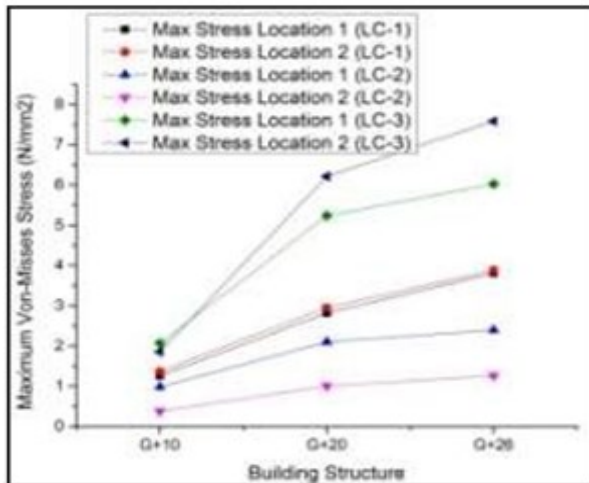
Graph 4.1: Maximum Von-Mises Stress generated in multistory building structure (G+10, G+20 & G+26) shear

Graph 4.2: Graph plotted between deflections on building structure due to load considerations at different modes.

- Also in graph 5.2 we have discussed that the deflection, drift generated in building structure (G+10, G+20 & G+26) are plotted between modes.
- In this graph indicates that deflection on structure is increased at location 2 at increasing the height of structure but deflection of location
1 structure is also increases when height is increased but location 2 deflection is more as compare to location 1 structure.
- In above and after analysis have done we discussed or concluded that the location 1of shear wall is best because in this wall the stress distribution and deflection in wall is less as compare to location 2.

4. CONCLUSION & FUTURE SCOPE

- In this project it is concluded that the G+10 structure shear wall is generated less value of von-misses stress

wall in different locations
- The above figure 5.1 and (also in figure 4.14, 4.15 & 4.16) has been indicate that the stress development and stress distribution in shear wall due to different load conditions in different location of shear wall.
- In above figure 5.1 indicating that the maximum stress generated in shear wall in different height or locations in form of color.
- The color red and blue is shows that the maximum stress of shear wall at location 1 & 2. In location 1 at load case 1 the stress is decreases while increasing building height and at location 2 is also as same location 1 but location 2 stress is more than the location 1 as shown in figure 5.1.
- Also remain results are same. Hence the location 1 of shear wall is more efficient.

and deformation on structure at location 1 as compare to location 2.
- Also it is concluded that in the G+20 structure shear wall is generated less value of von-misses stress and less deformation on structure at location 2 as compare to location 1.
- Also it is concluded that the G+26 structure shear wall is generated less value of von-misses stress and less deformation on structure at location 1 as compare to location 2.
- In result and discussion section it is concluded that if height of structure is simultaneously increases of location 1 & 2. The deformation of structure G+10 at location 1 is less approx. 8.03% as compare to location 2.
- Also it is concluded that if height of structure is simultaneously increases of location 1 & 2. The deformation of structure G+20 at location 1 is less

approx. 6.56% as compare to location 2.

• Also it is concluded that if height of structure is simultaneously increases of location 1 & 2. The deformation of structure G+26 at location 1 is less approx. 5.335% as compare to location 2.

• Overall conclusions is that deflection of the multi-story building structure of location 2 is more as compare to location 1 for G+10,G+20 and G+26 (approx. 6% less in overall deflection in location 2). Hence the location 1 shear wall is best for future construction.

• Also as above the result is that the stress and deflection or deformation of shear wall structure is increasing but also to see the only shear wall location 2 is more as compare to location 1. It is decreased the efficiency of the structure.

• From finally at above results or conclusion is that the location 1 is more efficient and in future we adopt the location of shear wall (location 1).

  • We have also find out the manually calculation of all cases is more time consumable as see in reference paper both manually and software based are calculated but we have concluded and obtained results approximately. So used of software is affordable.

  •

FUTURE SCOPE

• As per analysis, it is concluded that displacement as well as its stress also at different level in multistoried building with shear wall is comparatively lesser as compared to R.C.C. building Without Shear Wall. So now a day we can adopt with shear wall at analyzed and optimized location.

• Less obstruction will be there because of reduced size of column and provision of shear wall.

• It is concluded that building with shear wall is constructed in lower cost as compared to structure without shear wall.

• STAAD.Pro becomes more and more critical in the analysis of engineering & scientific problems.

• These facilities for the implementations of more effective & professional engineering software so we can adopt software as compare to manual.

It should be affordable to promote their wide spread usage amongst civil

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Design & Analysis of Multi-Storied Building using Sap 2000

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Abstract—The technique of sensor fusion addresses the issues relating to the optimality of decision making in the multiple-sensor framework. The advances in sensor fusion enable to perform intrusion detection for both rare and new attacks. This project discusses this assertion in detail, and describes the theoretical and experimental work done to show its validity. The attack-detector relationship is initially modeled and validated to understand the detection scenario. The different metrics available for the evaluation of intrusion detection systems are also introduced. The usefulness of the data set used for experimental evaluation has been demonstrated. The issues connected with intrusion detection systems are analyzed and the need for incorporating multiple detectors and their fusion is established in this work. Sensor fusion provides advantages with respect to reliability and completeness, in addition to intuitive and meaningful results. The goal for this work is to investigate how to combine data from diverse intrusion detection systems in order to improve the detection rate and reduce the false-alarm rate. The primary objective of the proposed project work is to develop a theoretical and practical basis for enhancing the performance of intrusion detection systems using advances in sensor fusion with easily available intrusion detection systems. This project introduces the mathematical basis for sensor fusion in order to provide enough support for the acceptability of sensor fusion in performance enhancement of intrusion detection systems.

Keywords: What is sap 2000, Types of load considered, Fundamental natural period, Dynamic analysis, Analysis of load, Structure and support, Beam design, Column design.

1. INTRODUCTION

The principle objective of this project is to analyze and design a multistoried building [G + 3 (3 dimensional frame)] using SAP 2000. The design involves load calculations manually and analyzing the whole structure by SAP 2000. The design methods used in SAP 2000 analysis are Limit State Design conforming to Indian Standard Code of Practice. SAP 2000 features a state-of-the-art user interface, visualization tools, powerful analysis and design engines with advanced finite element and dynamic analysis capabilities. From model generation, analysis and design to visualization and result verification, SAP 2000 is the professional's choice. Initially we started with the analysis of simple 2 dimensional frames and manually checked the accuracy of the software with our results. The results proved to be very accurate. We analyzed and designed a G + 3 storey building [2-D Frame] initially for all possible load combinations [dead, live, wind and seismic loads].

Our project involves analysis and design of multistoried [G+3] using a very popular designing software SAP 2000. We have chosen SAP 2000 because of its following advantages:

- Easy to use interface.
- Conformation with the Indian Standard Code.
- Versatile nature of solving any type of problem
- Accuracy of the solution.

The design of the building is dependent upon the minimum requirements as prescribed in the Indian Standard Codes. The minimum requirements pertaining to the structural safety of buildings are being covered by way of laying down minimum design loads which have to be assumed for dead loads, imposed loads, and other external loads, the structure would be required to bear. Strict conformity to loading standards recommended in this code, it is hoped, will not only ensure the structural safety of the buildings
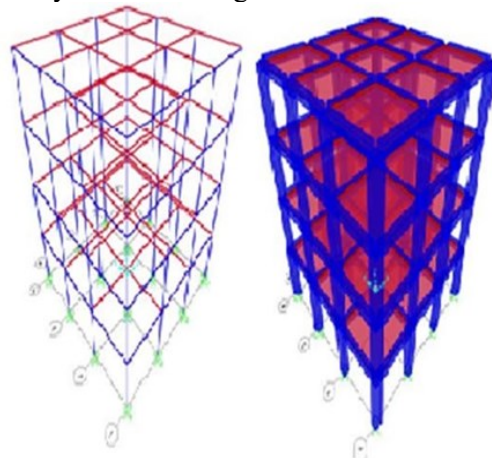
2. BRIEF LITERATURE REVIEW:

- **ABOUT SAP 2000:** Our project involves analysis and design of multistoried [G + 3] using a very popular designing software SAP 2000**.**

SAP 2000 CONSISTS OF THE FOLLOWING:

- *The SAP 2000 Graphical User Interface*: It is used to generate the model, which can then be analyzed using the SAP 2000 engine. After analysis and design is completed, the GUI can also be used to view the results graphically.

- *The SAP 2000 analysis and design engine:* It is a general- purpose calculation engine for structural analysis and integrated Steel, Concrete, Timber and Aluminium design. To start with we have solved some sample problems using SAP 2000 and checked the accuracy of the results with manual calculations. The results were to satisfaction and were accurate. In the initial phase of our project we have done calculations regarding loadings on buildings and also considered seismic and wind loads.
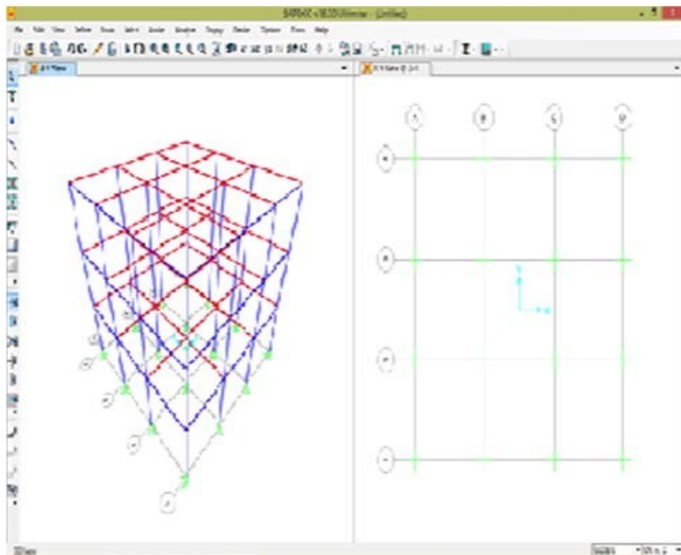
3. LOADS CONSIDERED:

- **DEAD LOADS:** Self weight of the structures & all the structural components.

- **IMPOSED LOADS:** Culmination of all transverse loading actions which the structure is designed to subject, apart from dead loads & lateral loading effects.

- **WIND LOAD:** Generally caused due to lateral wind pressure which the structure is subjected. Becomes more & more pronounced with elevation in the structure, like tall multi story buildings, high-tension towers, etc.

4. SEISMIC LOAD:

- Design Lateral Force: Initially computed for the structure as a whole & then distributed to various floor levels, hence forth segmented seismic force is obtained from individual lateral load resisting element depending on floor diaphragm action

- Design Seismic Base Shear: The total design lateral force or design seismic base shear (V_B) along any principal direction shall be determined by the following expression: $V_B = A_h W$

- Dynamic Analysis of Seismic Loads: Dynamic analysis shall be performed to obtain the design seismic force, and its distribution to different levels along the height of the building and to the various lateral load resisting elements, for the following buildings:

a) **Regular buildings-**Those greater than 40 m in height in Zones IV and V and those Greater than 90 m in height in Zones II and 111.

b) **Irregular buildings–** All framed buildings higher than 12m in Zones IV and V and those greater than 40m in height in Zones 11 and III.

FUNDAMENTAL NATURAL PERIOD:

The approximate fundamental natural period of vibration (T,), in seconds, of a moment resisting frame building without brick in the panels may be estimated by the empirical expression:

Ta=0.075 h0.75 for RC frame building Ta=0.085 h0.75 for steel frame building

Where, h = Height of building, in m. This excludes the basement storeys, where basement walls are connected with the ground floor deck or fitted between the building columns. But it includes the basement storeys, when they are not so connected. The approximate fundamental natural period of vibration (T,), in seconds, of all other buildings, including moment-resisting frame buildings with brick lintel panels, may be estimated by the empirical Expression:

$T = .09 H / \sqrt{D}$ Where,

h= Height of building d= Base dimension of the building at the plinth level, in m, along the considered direction of the lateral force.

5. DYNAMIC ANALYSIS:

Dynamic analysis shall be performed to obtain the design seismic force, and its distribution to different levels along the height of the building and to the various lateral load resisting elements, for the following

➢ **Buildings:**

a) **Regular buildings -** Those greater than 40 m in height in Zones IV and V and those Greater than 90 m in height in Zones II and 111.

b) **Irregular buildings –** All framed buildings higher than 12m in Zones IV and V and those greater than 40m in height in Zones 11 and III.

6. TYPES OF STRUCTURE:

SAP 2000 is capable of analyzing and designing

structures consisting of frame, plate/shell and solid elements. Almost any type of structure can be analyzed by SAP 2000, viz, SPACE, PLANE, TRUSS, FLOOR.

SUPPORTS:
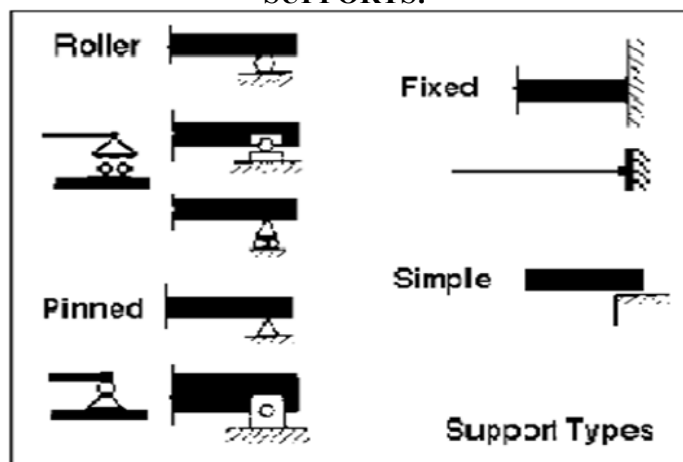
LOADS:

7. ANALYSIS OF LOADS USING SAP 2OOO:

• **Joint loads:** Joint loads, both forces and moments, may be applied to any free joint of a structure. These loads act in the global coordinate system of the structure. Positive forces act in the positive coordinate directions. Any number of loads may be applied on a single joint, in which case the loads will be additive on that joint.

• **Area/Floor load:** Many times a floor (bound by X-Z plane) is subjected to a uniformly distributed load. It could require a lot of work to calculate the member load for individual members in that floor.

• However, with the AREA or FLOOR LOAD command, the user can specify the area loads (unit load per unit square area) for members. The program will calculate the tributary area for these members and provide the proper member loads. The Area Load is used for one way distributions and the Floor Load is used for two way distributions.

• **Fixed end member load:** Load effects on a member may also be specified in terms of its fixed end loads. These loads are given in terms of the member

coordinate system and the directions are opposite to the actual load on the member. Each end of a member can have six forces: axial; shear y; shear z; torsion; moment y, and moment.

Seismic Load Generator: The SAP 2000 seismic load generator follows the procedure of equivalent lateral load analysis. It is assumed that the lateral loads will be exerted in X and Z directions and Y will be the direction of the gravity loads. Thus, for a building model, Y axis will be perpendicular to the floors and point upward (all Y joint coordinates positive). For load generation per the codes, the user is required to provide seismic zone coefficients, importance factors, and soil characteristic parameters. Instead of using the approximate code based formulas to estimate the building period in a certain direction, the program calculates the period using Raleigh quotient technique. This period is then utilized to calculate seismic coefficient C. After the base shear is calculated from the appropriate equation, it is distributed among the various levels and roof per the specifications. The distributed base shears are subsequently applied as lateral loads on the structure. These loads may then be utilized as normal load cases for analysis and design.
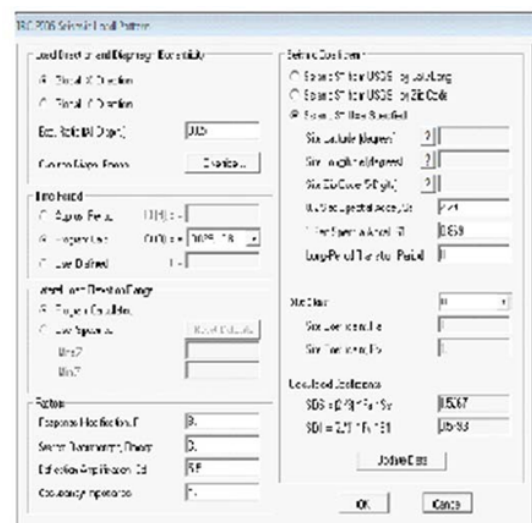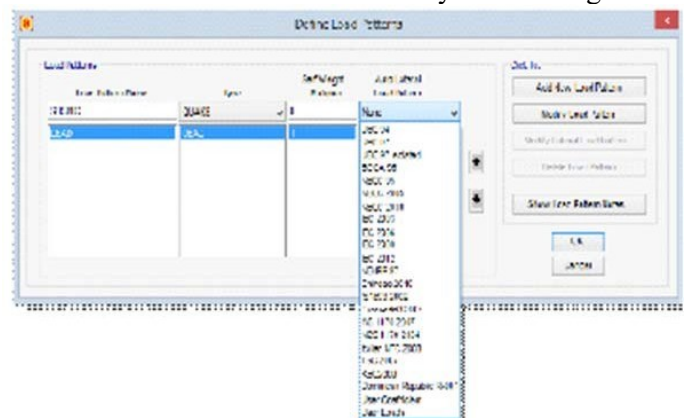
8. BEAM DESIGN:

Beams are designed for flexure, shear and torsion. If required, the effect of the axial force may be taken into consideration. For all these forces. All active beam loadings are prescanned to identify the critical load cases at different sections of the beams. For design to be performed as per IS: 13920 the width of the member shall not be less than 200mm. Also the member shall preferably have a width-to depth ratio of more than 0.3.

A brief overview of the steel design-check procedure is as follows:

a)   Specify the design code to be used through the Design > Steel Frame Design > View/Revise Preferences menu.

b)   Review the load combinations that will be used for design, making changes if necessary, through the Design
> Steel Frame Design > Select Design Combos menu.

c)   Run the design by selecting the Design > Steel Frame Design > Start Design/Check of Structure option. Please note that analysis must be run prior to design.

d)   Review the design results either graphically, by right- clicking on a member for more detailed information, or in tabular format by selecting the Display > Show Tables > Design Data option.

9. PROCEDURE OF RCC BEAM DESIGN: Define:

Define > Material Create, Modify fy = fys =60 Ksi, fi"= 4 ks
Define > Frame sections.
Add rectangular section.
Name = B 15 * 12, Depth = 15m,
Width = 12" Reinforcement, click Beam bottom.
Clear cover top = Bottom = 2.5" Define> load   cases, add   live load. Define > add default combo. Check concrete & convert to user editable boxes.
Select beams
Assign:
Assign > frame Frame section, select B15* 12.
Select> get previous select.
Assign > frame load   Distributed. Load   cases   = dead, Load = 0.02.
Select > get previous select
Assign > frame load   Distributed. Load case = live, Load= 0.0 6
Analyze > analysis case. x-z plane Save model.
Analysis:
Analyse> Run analysis Select model,
Click do not run,   Click "Run".
Design > deformed shape, select DCON2. Display > show forces/stress.   Select UDCON2,
Select F22, it gives such values.   Uncheck   fill,

Check show values.
Display > show forces/stresses,
Select m^{3}3. It gives banding moment values.
By clicking right button of mouse on any member, a window opens showing full details of shear, moment & deflation of that member.
Display >show forces/stress Joints.
Select UDCON2, this gives Joint reaction.

10. COLUMN DESIGN:

Columns are designed for axial forces and biaxial moments per IS 456:2000. Columns are also designed for shear forces

All major criteria for selecting longitudinal and transverse reinforcement as stipulated by IS: 456 have been taken care of in the column design of SAP 2000. However   following clauses have been satisfied to incorporate provisions of IS 13920: 1 the minimum grade of concrete shall preferably be M20

a)   Steel reinforcements of grade Fe415 or less only shall be used

b)   The minimum dimension of column member shall not be less than 200 mm. For columns having unsupported length exceeding 4m, the shortest dimension of column shall not be less than 300 mm.

c)   The ratio of the shortest cross-sectional dimension to the perpendicular dimension shall preferably be not less than 0.

d)   The spacing of hoops shall not exceed half the least lateral dimension of the column, except where special confining reinforcement is provided.

e)   Special confining reinforcement shall be provided over a length lo from each joint face, towards mid span, and on either side of any section, where flexural yielding may occur. The length lo shall not be less than a) larger lateral dimension of the member at the section where yielding occurs, b) 1/6 of clear span of the member, and c) 450 mm.

f)   The spacing of hoops used as special confining reinforcement shall not exceed ¼ of minimum member dimension but need not be less than 75 mm nor more than 100 mm.
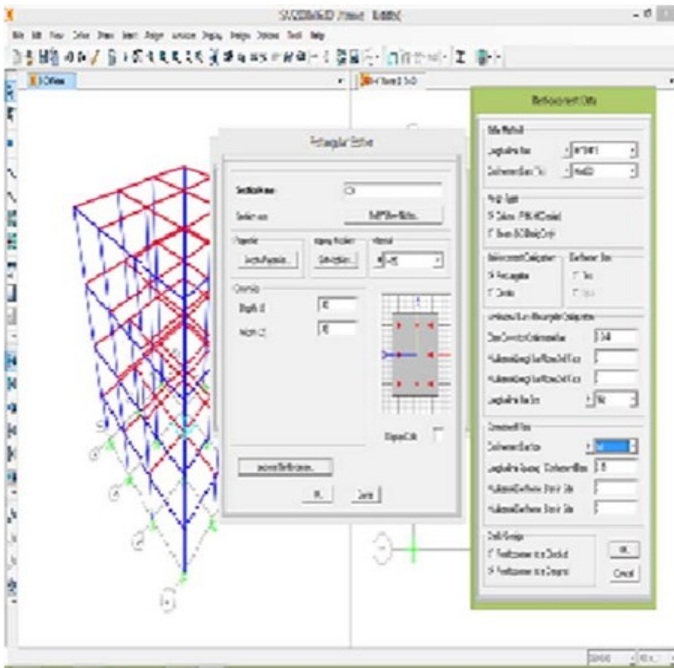
11. CONCLUSION:

- Structural analysis comprises the set of physical laws and mathematics required to study and predicts the behavior of structures. To perform an accurate analysis a structural engineer must determine such information as structural loads, geometry, support conditions, and materials properties.

- In times to come, the two models namely gravity load model and earthquake load model will be compared to analyze their individual efficiency and feasibility in the modern civil engineering domain. The more accurate model will be taken into consideration. Therefore, a minute analysis and a perfect design will play a key role in the success of this project.

- Other than that an additional suite of advanced analysis features are available to users engaging state-of-the-art practice with nonlinear and dynamic consideration. Created by engineers for effective engineering, SAP2000 is the ideal software tool for users of any experience level, designing any structural system. Integrated modeling templates, code-based loading assignments, advanced analysis options, design-optimization procedures, and customizable output reports all coordinate across a powerful platform to make SAP2000 especially useful for practicing professionals. SAP2000 is also an excellent medium for education.

12. ACKNOWLEDGEMENT:

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EXPERIMENTAL STUDY AND THE EFFECT OF ALKALI TREATMENT WITH TIME ON JUTE POLYESTER COMPOSITES

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ABSTRACT: The main aim of the work is the treatment that is to be given to enhance the surface properties of the fibers in view of obtaining better interfacial reaction between the matrix and the fiber of the composite, which in turn enhances the mechanical properties of the laminate on the whole. The work also focuses on the effect of alkaline solution treatment on the fibers. Numbers of laminates are prepared with different soaking time to be able to subject them to various test methods.
Key words: Alkali treatment, Natural fiber, laminate

INTRODUCTION

Currently, many research projects are devoted to the utilization of cellulose-based fibers as reinforcement for plastics. However, these fibers are mainly composed of cellulose, hemi- cellulose, and lignin. In order to expand the use of cellulose-based fibers for composites, it is useful to have the information on fiber characteristics and factors which affect performance of the fibers P. J. Roe, M. P. Ansell in (1985),

[1] studied the behavior of the jute fiber. Raw jute fiber has been incorporated in a polyester resin matrix to form uni- axially reinforced composites containing up to 60 vol % fiber. The tensile strength and Young's modulus, work of fracture determined by Charpy impact and inter-laminar shear strength have been measured as a function of fiber volume fraction. Derived fiber strength and Young's modulus were calculated. Polyester resin forms an intimate bond with jute fibers up to a volume fraction of 0.6, above which the quantity of resin is insufficient to wet fibers completely. He compared properties of jute and glass fibers, and on a weight and cost basis jute fibers are seen in many respects to be superior to glass fibers as a composite reinforcement. Jute fiber forms an intimate bond with polyester resin, and can fully or partially replace glass fiber without entailing the introduction of new techniques of composite fabrication. A.K. Mohanty, Mubarak A. Khan, G. Hinrichsen in (1998),[2] investigated on surface modifications of two varieties of jute fabrics, i.e. hessian

cloth (HC) and carpet backing cloth (CBC), involving de waxing, alkali treatment, cyanoethylation and grafting, were made with a view to their use as reinforcing agents in composites based on a biodegradable polymeric matrix,Dipa Ray, B.K.Sarkar, A.K.Rana and N.R .Bose in (2001),[3] investigated the effect of alkali treatment of 5% alkali (Noah) solution for 0, 2, 4, 6 and 8 h at 30°C. Joung-Man Park, Son Tran Quang, Byung-Sun Hwang, K. Lawrence De Vries in (2005),[4] investigated on interfacial evaluation of the untreated and treated Jute and Hemp fibers reinforced different matrix polypropylene-maleic anhydride polypropylene copolymer (PP-MAPP) composites by micromechanical technique combined with acoustic emission (AE) and dynamic contact angle measurement.

Thi-Thu-Loan Doan, Hanna Brodowsky Edith Mader in (2006),[5] studied the thermal, dynamic mechanical and aging behavior are critical issues for the application of jute/polypropylene composites.

H.M.M.A. Rushed, M. A. Islam and F. B. Rizvi in (2006),[6] experimented on natural fibers such as flax, hemp, jute, kenaf. In the research work, jute fiber reinforced polypropylene matrix composites were developed by hot compression molding technique with varying process parameters, such as fiber condition (untreated and alkali treated), fiber sizes (1, 2 and 4 mm) and percentages (5%, 10% and 15% by weight). An attempt was made by U. S. Ishiakul, X. Y. Yang, Y.W. Leong, H. Hamada, T. Semba, and K. Kitagawa in (2007),[7] at increasing both toughness and rigidity by simultaneous toughening and reinforcement.

E. Sinha1,S.K. Rout P.K. Barhai in (2007),[9] all together treated the jute fibers with argon cold plasma for 5,

10 and 15 min. Structural macromolecular parameters of untreated and plasma treated fibers were investigated using small angle X-ray scattering (SAXS), and the crystallinity parameters of the same fibers were determined by using X-ray diffraction (XRD). K. Sabeel Ahmed, S. Vijayaranga in (2008),[10] investigated on the effect of stacking sequence on tensile, flexural and

inter laminar shear properties of untreated woven jute and glass fabric reinforced polyester hybrid composites experimentally.

2. METHODOLOGY
A.Materials and Methods
The materials used in this work are: Jute Fibers, Sodium Hydroxide (Noah), Polyester Resin, Methyl ethyl ketone peroxide (MEKP)(used as catalyst) commonly called Hardener (K6).
A. Pre Treatment
A bunch of the clean fibers was taken to investigate the effect of time of alkali treatment on the weight of the fiber for each treatment time. After soaking the fibers for 8, 16 and 24 hours in alkali solution the weight of the fibers were recorded using the electronic balance

Fig.1. Pretreatment (Alkali Noah) of the fibers
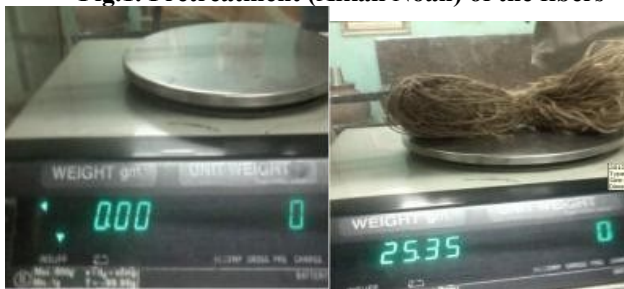
Fig.2. Weight of the fiber

The Jute fibers bags were washed with water to remove the contaminants and adhering dirt and were soaked in water for 48h. Thereafter, they were air dried at room temperature. After the jute fibers were completely dried the fibers were soaked in 10% Noah solution at ambient temperature and were air dried thoroughly at room temperature without destroying the fibrils. The jute bags after the treatment were cut into layers of 300mm x 300mm to make the laminates

Fig.3. Pretreatment (Alkali Noah) of the fibers and the jute material

B. Testing of Specimens Tensile test:

Tensile test:
The tensile test is generally performed on flat specimens. During the test a uni-axial load is applied through both the ends of the specimen. The ASTM standard test method for tensile properties of fiber resin composites has the designation D 3039-76. The length of the test section is 120 mm approximately. The tensile test is performed in the universal testing machine (UTM) 1195 and results are analyzed to calculate the tensile strength of composite samples.

Fig.4. Specimen under tensile test

Flexural Test:
The short beam shear (SBS) tests are performed on the composite samples at room temperature to evaluate the value of flexural strength (FS). It is a 3-point bend test, which generally promotes failure by inter-laminar shear. The SBS test is conducted as per ASTM standard (D2344- 84) using the same UTM. Span length of 21 mm was maintained. The flexural strength (F.S.) of any composite specimen is determined using the following equation.

Fig.5.Specimen under the 3 point bending test

The equation to calculate flexural strength is,

$$F.S = \frac{3PL}{2bt^2}$$

Where P is the load applied, L is the span length, b is the width and t is the thickness of the specimen.

Impact Test:
Un-notched Izod impact test was carried on the specimens with the required dimensions of the different fiber treatments and the fracture toughness values were recorded.
The test is a low velocity impact test.
I = K/A , where K is the energy absorbed and A is the area and values were recorded in J/cm^2

$$\vartheta_{12} = E_f\vartheta_f + V_m\vartheta_m$$

$$E_{22} = \frac{E_f(E_fV_m + E_mV_f)}{E_m}$$

C.   Equations for the evaluation of the experimental results:
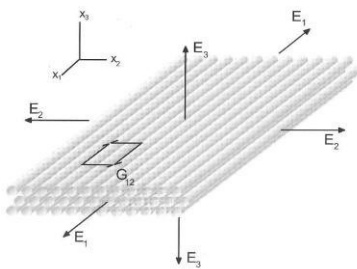
Fig.6. Representation of the Elastic properties of the composite laminate

According to Rule of mixtures assuming no voids in the composite laminate $V_f + V_m = 1$

Where V_f is volume fraction of the fiber

$$V_f = \frac{\rho_m w_f}{\rho_f w_m + \rho_m w_f}$$

Where V_f is the volume fraction of the fiber, ρ_m is the density   of the matrix, ρ_f is the density of the fiber, w_f of the fiber, w_m is the weight of the matrix. $\sigma_c = \sigma_f V_f + \sigma_m V_m$

$Where\ \sigma_c$ The tensile strength of the composite, σ_f is the tensile strength of the fiber, σ_m is the tensile strength of the matrix. $E_c = E_m V_m + E_f V_f$

Where E_c is the Young's modulus of the composite, E_m is the   Young's   modulus of the matrix, E_f is the Young's modulus of the   fiber, V_m is the volume fraction of the matrix, V_f is volume fraction of the fiber.

Elastic properties of Orthotropic Lamina:
The number of independent elastic constraints required to characterize anisotropic and orthotropic materials are 21 and 9 respectively. For an orthotropic material, the 9 independent elastic constants are $E_{11}, E_{22}, E_{33}, G_{12}, G_{13}, G_{23}, \vartheta_{12}, \vartheta_{13}$, and ϑ_{23}
Elastic properties of the continuous fiber lamina are calculated from the following equations:
Longitudinal Modulus:, $E_{11} = E_f V_f + E_m V_m$

And Major Poisson's ratio by the formula,

The Transverse modulus is calculated by the formula,

Minor Poisson's ratio is calculated by the formula,
$$\vartheta_{21} = \frac{E_{22}}{E_{11}}\vartheta_{12}$$
Shear   modulus   is   calculated   by   the   formula,
$$G_{12} = G_f V_m + G_m V_f$$
The following properties are to be noted from the above equations
• The longitudinal modulus E_{11} is always greater than the transverse modulus E_{22}.
• The fiber contributes to the development of the longitudinal modulus, and the matrix contributes to the development of transverse modulus.
• The major Poisson's ratio ϑ_{12} is always greater than the minor Poisson's ratio ϑ_{21}.Since the Poisson's ratio is related by the equation only, can be considered independently.
• As in the case of E_{22}, the matrix contributes more to the development of G_{12} than the fibers
• Four   independent   elastic   constants namely, E_{11} ,ϑ_{12},andϑ_{12} are required to describe the in
plane elastic behavior of a lamina. The ratio $E_{11}\ E_{22}$ is often considered a measure of orthotropic.
The above equations are derived using the simple mechanics of the material approach along with the following assumptions.
➢ Both fibers and matrix are linearly elastic isotropic materials.
➢ Fibers are uniformly distributed in the matrix.
➢ Fibers are perfectly aligned
➢ There is perfect bonding between fibers and matrix
➢ The composite lamina is free of voids
Elastic isotropic lamina:
From the mechanics of materials the Cartesian strains resulting from a state of plane stress is represented by the following equations:

$$\sigma_z = \tau_{xz} = \tau_{yz} = 0 \qquad \varepsilon_x = \frac{1}{E}(\sigma_x - \vartheta\sigma_y)$$,
$$\varepsilon_y = \frac{1}{E}(\sigma_y - \vartheta\sigma_x)\ ;\ \gamma_{xy} = \frac{1}{G}\tau_{xy}$$
In an isotropic material, considering plane stress, there is a strain   also   in   z   direction   due   to Poisson's effect, $\varepsilon_z = -\vartheta(\sigma_x + \sigma_y)$
This strain component will be ignored. In this relation there are three elastic components. These are Young's E, Poisson's ratio ϑ and shear modulus G
$$(\sigma_x = \tau_{xz} = \tau_{yz} = 0)$$

$$\begin{Bmatrix} \varepsilon_x \\ \varepsilon_y \\ \gamma_{xy} \end{Bmatrix} = \begin{bmatrix} \frac{1}{E} & \frac{\vartheta}{E} & 0 \\ \frac{-\vartheta}{E} & \frac{1}{E} & 0 \\ 0 & 0 & \frac{1}{G} \end{bmatrix} \begin{Bmatrix} \sigma_x \\ \sigma_y \\ \tau_{xy} \end{Bmatrix}$$

$$S'_{66} = \frac{1}{G_{xy}} = 2(2S_{11} + 2S_{22} - 4S_{12} - S_{66})sin^2\theta cos^2\theta + S_{66}sin^4\theta + cos^4\theta$$

The stiffness matrix $[Q]$ can be formulated as follows $[S]$ represents the compliance matrix relating strains to known stresses. The inverse of the compliance matrix is called stiffness matrix, which is used in relating stresses and strains. Thus, the stiffness matrix $[Q]$ for an isotropic lamina is:

$$[Q] = [S^{-1}] = \begin{bmatrix} \frac{E}{1-\vartheta^2} & \frac{\vartheta E}{1-\vartheta^2} & 0 \\ \frac{\vartheta E}{1-\vartheta^2} & \frac{E}{1-\vartheta^2} & 0 \\ 0 & 0 & G \end{bmatrix}$$

Stiffness Matrix for orthotropic lamina:
In the same as above, by arranging equations in matrix form, the stress strain relation can be written as given below

$$\begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \end{Bmatrix} = \begin{bmatrix} S_{11} & S_{12} & 0 \\ S_{21} & S_{22} & 0 \\ 0 & 0 & S_{66} \end{bmatrix} \begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \tau_{xy} \end{Bmatrix} = [S]\begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \tau_{xy} \end{Bmatrix}$$

Where $$S_{11} = \frac{1}{E_{11}}$$

$$S_{12} = S_{21} = \frac{\vartheta_{12}}{E_{11}} = \frac{\vartheta_{21}}{E_{22}} \quad S_{22} = \frac{1}{E_{22}} \quad S_{66} = \frac{1}{G_{12}}$$

The $[S]$ matrix is called the compliance matrix for a special orthotropic lamina. Inverting the above equation we can write the stress strain relation for a special orthotropic lamina as:

$$\begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \tau_{xy} \end{Bmatrix} = \begin{bmatrix} Q_{11} & Q_{12} & 0 \\ Q_{21} & Q_{22} & 0 \\ 0 & 0 & Q_{66} \end{bmatrix} \begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \end{Bmatrix} = [Q]\begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \end{Bmatrix}$$

Where $[Q]$ represent he stiffness matrix for especially orthotropic lamina. Various elements in the $[Q]$ matrix are

$$[Q_{11}] = \frac{E_{11}}{(1 - \vartheta_{12} * \vartheta_{21})} \qquad [Q_{22}] = \frac{E_{22}}{(1 - \vartheta_{12} * \vartheta_{21})}$$

$$[Q_{12}] = [Q_{21}] = \frac{\vartheta_{12} E_{22}}{(1 - \vartheta_{12} * \vartheta_{21})} = \frac{\vartheta_{21} E_{11}}{(1 - \vartheta_{12} * \vartheta_{21})}$$

$$[Q_{66}] = G_{12}$$

General Stiffness Matrix for Orthotropic Lamina (θ≠0° or 90°):
The Stress-Strain relation for a general orthotropic lamina can be expressed in the matrix notation as

$$\begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \end{Bmatrix} = \begin{bmatrix} S'_{11} & S'_{12} & S'_{16} \\ S'_{21} & S'_{22} & S^2_{26} \\ S'_{16} & S'_{26} & S'_{66} \end{bmatrix} \begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \tau_{xy} \end{Bmatrix} = [S']\begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \tau_{xy} \end{Bmatrix}$$

$$S'_{11} = \frac{1}{E_{xx}} = S_{11}cos^4\theta + (2S_{11} + S_{66})sin^2\theta cos^2\theta + S_{22}sin^4\theta$$
,

On inverting the stress-strain relations for the general orthotropic lamina can be written as

$$\begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \tau_{xy} \end{Bmatrix} = \begin{bmatrix} Q'_{11} & Q'_{12} & Q'_{16} \\ Q'_{21} & Q'_{22} & Q'_{26} \\ Q'_{16} & Q'_{26} & Q'_{66} \end{bmatrix} \begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \end{Bmatrix} = [Q']\begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \end{Bmatrix}$$

Where $[Q']$ represents the stiffness matrix for the lamina, various elements in $[Q']$ are expressed in terms of the elements in the $[Q]$ matrix as

$$\bar{Q}_{11} = Q_{11}cos^4\theta + Q_{22}sin^4\theta + (2Q_{12} + 4Q_{66})cos^2\theta sin^2\theta$$
$$\bar{Q}_{12} = (Q_{11} + Q_{22} - 4Q_{66})cos^2\theta sin^2\theta + Q_{12}(cos^4\theta + sin^4\theta)$$
$$\bar{Q}_{22} = Q_{11}sin^4\theta + Q_{22}cos^4\theta + (2Q_{12} + 4Q_{66})cos^2\theta sin^2\theta$$
$$\bar{Q}_{66} = (Q_{11} + Q_{22} - 2Q_{12} - 2Q_{66})cos^2\theta sin^2\theta + Q_{66}(cos^4\theta + sin^4\theta)$$
$$\bar{Q}_{16} = (Q_{11} - 2Q_{66} - Q_{12})cos^3\theta sin\theta - (Q_{22} - Q_{12} - 2Q_{66})cos\theta sin^3\theta$$
$$\bar{Q}_{26} = (Q_{11} - 2Q_{66} - Q_{12})cos\theta sin^3\theta - (Q_{22} - Q_{12} - 2Q_{66})cos^3\theta sin\theta$$

From the above system of equations the following properties of the materials could be inferred.
Elements S_{16} and S_{26} in the $[S]$ matrix or Q_{16} and Q_{26} in the $[Q]$ matrix represent extension shear coupling. From the above equations it appears that there are 6 elastic constants that govern the stress- strain behavior of the lamina. However closer examinations of these equations indicate that and are linear combinations of four basic elastic constants, namely, S'_{11}, S'_{12} S'_{22}, S'_{66} and therefore are not independent. Elements in both the $[S']$ and $[Q]$ matrices are expressed in terms of the properties in the principal material directions, namely, E_{11}, E_{22}, G_{12} ϑ_{12}
which can either experimentally determined or predicted approximately from the constituent properties using the equations.

3. RESULTS AND DISCUSSION
Composite laminates have been prepared with the same volume fraction of the fiber for all the laminates and have been tested by cutting them into required dimensions to perform tests. All the tests have been performed on the specimens and results obtained from the experiments have been tabulated and graphed.
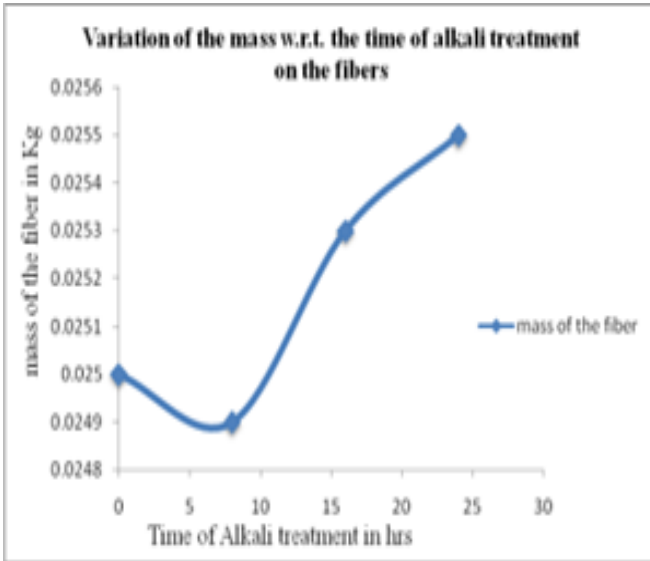
Fig.7. Time of Alkali treatment Vs Mass of the Fiber
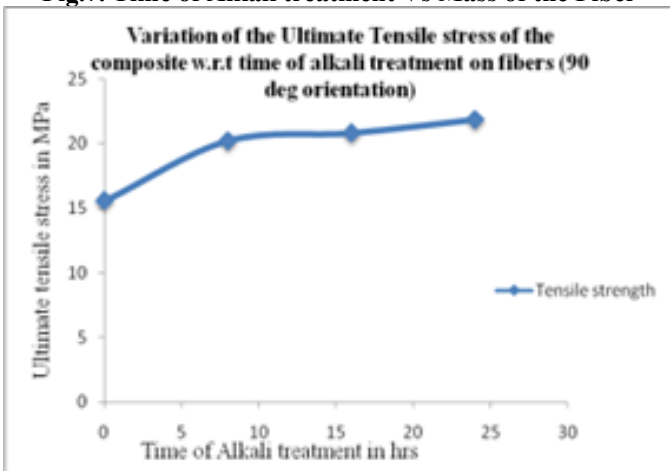
Fig.8. Ultimate stress of the composite (90 deg) Vs Time of alkali treatment

Fig.9.Stress of the composite (45 deg) Vs Time of alkali Treatment
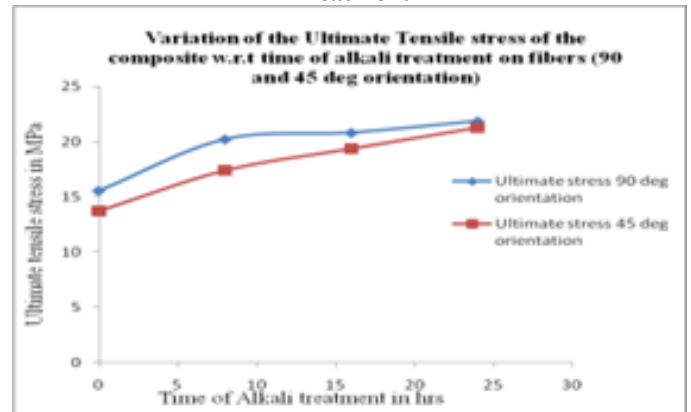
Fig.10.Ultimate stress of the composite (90 deg and 45 deg) Vs Time of alkali treatment

From the Fig.9 we can conclude that the there is a gradual change in the value of ultimate stress of the composite between 0 to 8, 8 to 16 and 16 to 24 hours of treatment which is unlike the change in 90 deg orientation of the composite. From the Fig.10.we can conclude that for all the time intervals of the treatments given to the fiber, the value of ultimate stress of the composite for 90 deg(blue curve) orientation of the fiber is higher when compared to 45 deg (red curve) orientation. And we can also see that both the curves converge at 24 hours of treatment of the fiber.
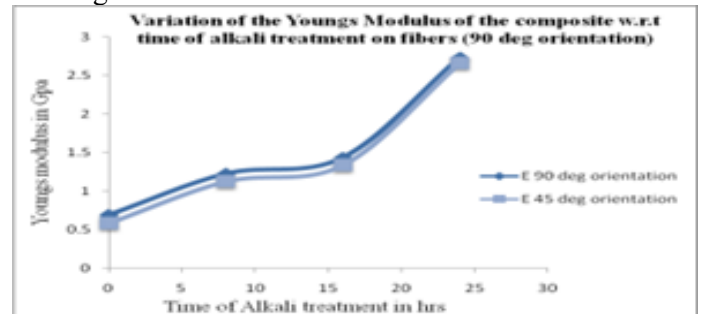
Fig.11. Young's Modulus Vs Time of alkali treatment

The fig 7 shows the change in the mass of the fiber with the change in the hours of treatment .In this graph we see that the there is a decrease in the fiber mass after 8 hours of alkali treatment and it increases after 24 hours of alkali treatment.

Tensile test:
The fig 8 gives the information that there is a very little change between 8 and 16 hours of treatment of the fiber; however there is a considerable change in the ultimate stress between 0 and 8 hours of alkali treatment.

Fig.12. Strain of the composite Vs Time of alkali treatment

The Fig.11 shows the value of Young's modulus of the composite in the both orientations (90 deg and 45 deg). From the graph we can say that the Young's modulus for the both the orientations of the fiber in the composite at are almost equal.

From the Fig.12 it's clear that in composites of both the orientation of the fiber the strain increases as the time of alkali treatment increases. It is drastic in the 45 deg fiber oriented composite where as we do not see that in 90 deg fiber oriented composite and it does not follow a regular pattern

The flexural test and Impact test:

The fig 13 shows that the flexural strength of the composite w.r.t time of alkali treatment from 0 to 24 hours is increasing in 90 deg orientation of the fiber. Flexural strength value remains close between 8 hours and 16 hours of treatment of the fiber and then increase between 16 to 24 hours.

Fig.13. Flexural Strength Vs time of alkali treatment (90 deg Orientation)
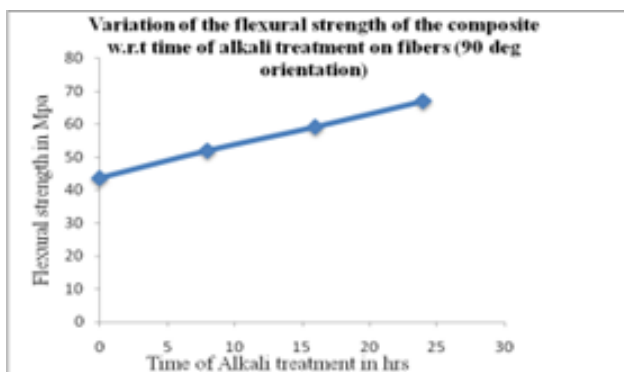
Fig.13. Flexural Strength Vs time of alkali treatment (90 deg Orientation)
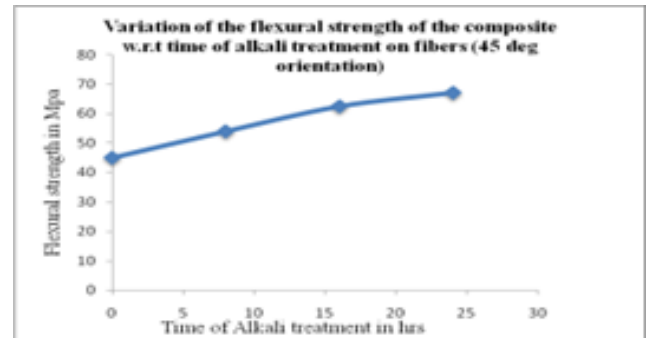
Fig.14. Flexural Strength Vs time of alkali treatment (45 deg Orientation)

The fig 14 shows the Flexural strength value remains close between 8 hours and 16 hours of treatment of the fiber and then increase between 16 to 24 hours of treatment of the fiber and there is also an increase seen between untreated and 8 hours of alkali treated fiber.
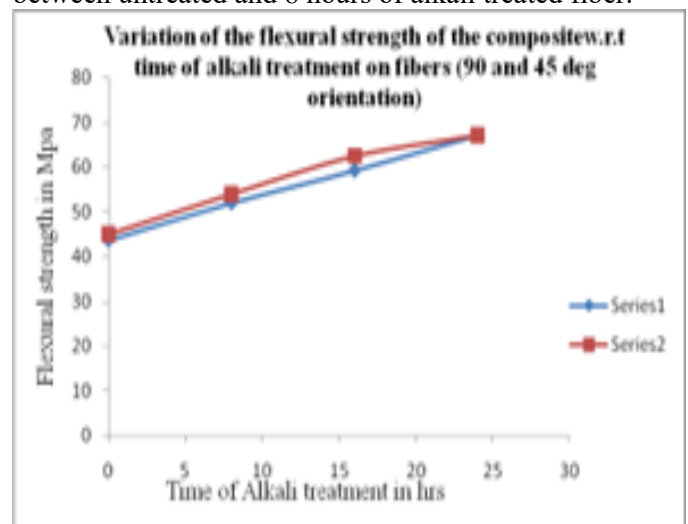
Fig.15. Flexural Strength Vs time of Alkali treatment (90and 45 deg)
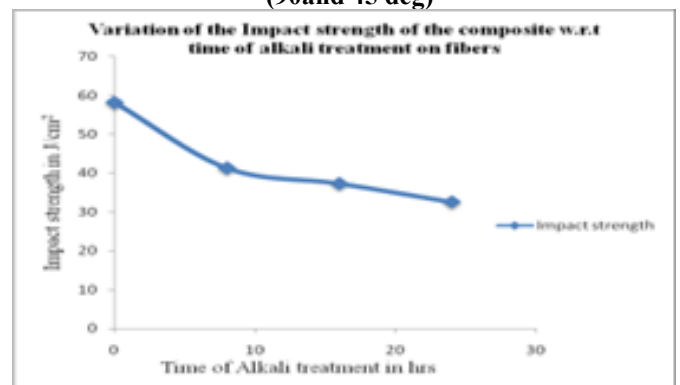
Fig.16. Impact Strength Vs time of Alkali treatment

From the fig 16 we see that the red curve by passes that blue one which means that the flexural strength at the 16 hours of treatment of the fiber in both orientations is same and the flexural strength is higher for the 45 deg

orientation of the

fiber at 24 hours of fiber treatment than that in 90 deg orientation of the fiber.The above Figure Gives the information about the impact strength of the jute fiber composite between 0 to 24 hours of treatment .We see that the impact strength gradually decreases between untreated to the 24 hours treated jute fiber composite.

4. CONCLUSIONS

- The alkali treatment given to the fibers with the different time intervals first resulted in decrease in the weight of the fiber and then the weight increased between 16 hours of treatment and 24 hours of treatment.

- The initial decrease in the weight of the fiber could be attributed to the decrease in the hemicelluloses and lignin. The increase in weight after 16 hours of treatment could be because of the regain of the same contents as the fibers are treated for longer duration.

- Rougher surface area and increased surface area of the chemically treated fibers facilitated better interaction between the fiber and the matrix. Thus composite laminate prepared with the chemically modified fibers showed better tensile and flexural properties.

- The composite laminate prepared with the 16 hours alkali treated fibers can be used where weight of the of the material is of concern.

- There was a drop in the strain value between the laminates prepared with the untreated and the treated jute fiber which gives an indication that exposing the fibers to the alkali solution for longer duration could result in making the fibers brittle.

- It is observed that the impact strength of the laminates decreased with the increasing hours of alkali treatment of the fibers, which could be because of the strong fiber/matrix adhesion that hinders the energy absorption mechanisms, such as de-bonding and fiber pull out.

- Composites fabricated from the natural fiber can be used where they are subjected to lower values of loads as in house hold appliances.

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FRICTION STIR WELDING OF DISSIMILAR AA2014 AND AA6061 ALUMINIUM ALLOYS

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Abstract: Friction Stir Welding (FSW) is a solid state joining technique which is universally used for joining of aluminium alloys in marine, aerospace, automotive and many other applications of commercial importance. In this present study, the effect of FSW parameters on the weldability of dissimilar aluminium alloys such as AA2014 and AA6061 were investigated. The two plates were aligned perpendicular to the rolling directions and the welding was carried out. The main objective of the experiment is to find out the maximum tensile strength. The experiments were conducted on a milling machine. Three factor three levels Central-Composite matrix in Response Surface Methodology (RSM) is employed to carry out the experimental investigation. The "Design Expert 8.0", software was used for regression and graphical analysis of data collected. ANOVA was used to check the validity of the model. A designed FSW experiments were carried out to get a high strength welding by controlling the rotational, welding speed and tool pin diameter. The tensile tests were carried under tension at room temperature in order to analyze the mechanical response
Keywords;.Response Surface MethodologyMaximum tensile strengthDesign Expert 8.0ANOVA

1: INTRODUCTION
1.1Introduction of the Friction Stir Welding Technique
In Today's modern world there are different welding techniques to join metals. They range from the conventional oxyacetylene torch welding to laser welding. The two types of welding can be divided as fusion welding and pressure welding.

The fusion welding process involves bonding of the metal in the molten stage and may need a filler material if required such as a consumable electrode or a spool of wire. Some processes may also need an inert ambience in order to avoid oxidation of the molten metal. A flux material or an inert gas shield in the weld zone protects weld pool to avoid defects. Examples of fusion welding are metal inert gas welding (MIG), tungsten inert gas welding(TIG) and laser welding. There are many disadvantages in the welding techniques where the metal is heated to its melting temperatures and let is solidify to form the joint. The melting and solidification causes the mechanical properties of the weld in some cases to deteriorate such as low tensile strength, fatigue strength and ductility. The disadvantages also include porosity, oxidation, micro segregation, hot cracking and other microstructural defects in the joint. The process also limits the combination of the metals that can be joined because of the different thermal coefficients of expansion.

The solid state welding is the process where coalescence is produced at temperatures below the melting temperatures of the base metal without any need for the filler material or any inert ambience in many cases. Examples of solid state welding are friction welding, explosion welding, forge welding, hot pressure welding and ultrasonic welding. The three important parameters time, temperature and pressure individually or in combinations produce the join in the base metal. As the metal in solid state welding does not reach its melting temperatures, there are fewer defects caused due to the melting and solidification of the metal. In solid state welding the meals being joined retain their original properties as melting does not occur in the joint and the heat affected zone (HAZ) is also very small compared to fusion welding techniques where most of the deterioration of the strength and ductility begins. Dissimilar metals can be joined with ease compared to fusion welding.

Friction stir welding (FSW) is an advanced friction welding process. The conventional friction welding is done by moving the parts to be joined relative to each other along a common interface also applying compressive forces across the joint. The frictional heat generated at the interface due to rubbing softens the metal and the soft metal gets extruded due to the compressive forces and the joint forms in the clear material, the relative motion is stopped and compressive forces are increased to form a sound weld before the weld is allowed to cool.

FSW is also a solid state welding processes, this remarkable up gradation of friction welding was invented in 1991 in The Welding Institute (TWI). The process starts with clamping the plates to be welded to a backing plate so that the plates do not fly away during the welding process. A rotating wear resistant tool is plunged on the interface between the plates to a predetermined depth and moves forward in the interface between the plates to form the weld.
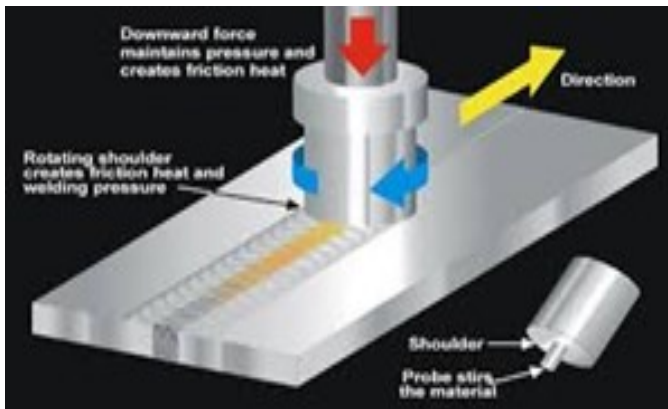
Fig.1.1: Schematic Diagram of Friction Stir Welding

The advantages of FSW technique is that it is environment friendly, energy efficient, there is no necessity for gas shielding for welding aluminium. Mechanical properties as proven by fatigue, tensile tests are excellent. There is no fume, no porosity, no spatter and low shrinkage of the metal. Joining dissimilar and previously unweldablemetals can be attempted by this unique process.

2 ALUMINIUM ALLOYS AND WELDING OF ALUMINIUM ALLOYS

Aluminium is the most abundant metal available in the earth's crust. Steel was the most used metal in 19th century but aluminium has become a strong competitor for steel in engineering applications. Aluminium has many attractive properties compared to steel as it is attractive and versatile to use. It is used extensively in aerospace, automobile and other industries. The most attractive properties of aluminium and its alloys which make them suitable for a wide variety of applications are their light weight, appearance, fabric ability, strength and corrosion resistance.

The most important property of aluminium is its ability to change its properties in a very versatile manner, it is amazing how much the properties can change from the pure aluminium metal to its most complicate alloys. There are more than a couple of hundreds alloys of aluminium alloys and many are being modified them internationally. Aluminium alloys have very low density compared to steel. It has almost one thirds the density of steel. Property treated alloys of aluminium can resist the oxidation process which steel cannot resist, it can also resist corrosion by water, salt and other factors.

There are many different methods available for joining aluminium and its alloys. The selection of the method depends on many factors such as geometry and the material of the parts to be joined, required strength of the joint, permanent or dismountable joint, number of parts to be joined, the aesthetic appeal of the joint and the service conditions such as moisture, temperature, inert atmosphere and corrosion.

Most alloys of aluminium are easily weld able. MIG and TIG are the welding processes which are used the most, but there are some problems associated with the welding process like porosity, lack of fusion due to oxide layers, incomplete penetration, cracks, inclusions and undercut but they can be joined by other methods such as resistance welding, friction welding and laser welding. When welding many physical and chemical changes occur such as oxide formation, dissolution of hydrogen in molten aluminium and lack of colour change when heated.

3: EXPERIMENTAL DETAILS

The overall experimentation can be classified as shown in fig. 3.1 in different segments
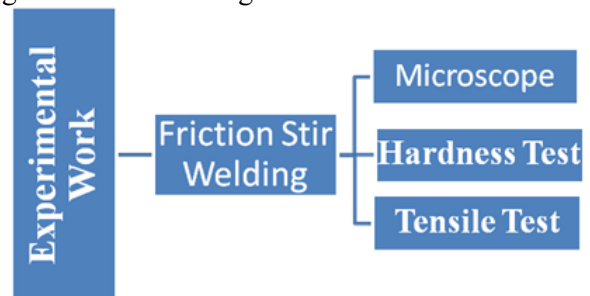
Fig.3.1: Sequence of Experimentation

These segments are again sub divided into various other categories, like the characterization techniques which were employed at every stage during the experimentation process. The experimental procedure is explained below in the sequence, all these techniques were followed.

3.1 Parent Material

2xxx Series: These alloys require solution heat treatment to obtain optimum properties; in the solution heat-treated condition, mechanical properties are similar to, and sometimes exceed, those of low-carbon steel. In some instances, precipitation heat treatment (aging) is employed to further increase mechanical properties. This treatment increases yield strength, with attendant loss in elongation; its effect on tensile strength is not as great. The alloys in the 2xxx series do not have as good corrosion resistance as most other aluminum alloys, and under certain conditions they may be subject to intergranular corrosion. Alloys in the 2xxx series are

good when some strength at moderate temperatures is desired. These alloys have limited weldability, but some alloys in this series have superior machinability.

6xxx Series: Alloys in the 6xxx series contain silicon and magnesium approximately in the proportions required for formation of magnesium silicate, thus making them heat treatable. Although not as strong as most 2xxx and 7xxx alloys, 6xxx series alloys have relatively good formability, weldability, machinability, and relatively good corrosion resistance, with medium strength. Alloys in this heat-treatable group are sometimes formed in the T4 temper (solution heat treated but not precipitation heat treated) and strengthened after forming to full T6 properties by precipitation heat treatment. Table 3.1 and 3.2 shows chemical composition of AA 2014 and AA 6061.

Table 3.1: Chemical Composition of AA 2014& AA 6061

Material	AA 2014	AA 6061
Aluminium	90.4 - 95	95.8 – 98.6
Magnesium	0.2 – 0.8	0.8-1.2
Silicon	0.5 – 1.2	0.4 – 0.8
Iron	0.7 max	0.7 max
Copper	3.9 - 5	0.04 – 0.35
Zinc	0.25 max	0.25 max
Titanium	0.15 max	0.15 max
Manganese	0.4 – 1.2	0.15 max
Chromium	0.1 max	0.15 – 0.4
Others	0.05 – 0.15	0.05

3.2 Tool Design

High speed steel (HSS) is used as a material for friction welding purpose. Almost all tools employed for this purpose are made from high speed steels. The characteristic properties of all high speed steels grades include.

• High working hardness
• High wear hardness
• Excellent toughness
• High retention of hardness and red hardness

The non-consumable tool has a circular section except at the end where there is a probe or more complicated flute; the junction between the cylindrical portion and the probe is known as the shoulder. The probe penetrates the work piece whereas the shoulder rubs with the top surface. The tool length is 150 mm and tool and shoulder diameter is 20 mm. The tool has an end tap of 3 mm diameter and a height of 4.7mm. The tool is set in a positive angle of some degree in the welding direction. The design of the pin and shoulder assembly plays a major role on how the material moves during the process.
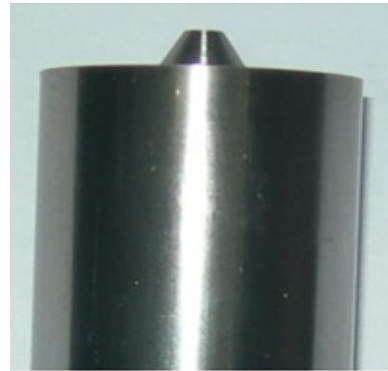
Fig. 3.2: Tool Profile
Table 3.2: Tool Design Specifications

Parameter	Length (mm)
Total Tool Length	150
Tool Diameter	20
Shoulder Diameter	20
Pin Length	4.7
Pin Minimum Diameter	3
Pin Maximum Diameter	6

3.3 Experimentation

A vertical CNC milling machine was used for friction stir welding (FSW) of dissimilar Aluminium AA 2014 & AA6061 alloy. The machine used has a maximum speed of 2000 rpm and 10-horse power. Test piece was clamped in the fixture tightly. Initially the rotating pin was inserted into a predrilled hole, which will facilitate the start-up of welding. Processing began at spindle speed of 800 rpm and travel rate of 14 inch/min. The speed was increased to 1000rpm and feed rate to 14 inch/min and again the speed was increased to 1200 rpm and feed rate of 14 inch/min and next at 16 inch / min, 18 inch/ min feed rate and 800, 1000 and 1200 rpm . The process is repeated for respected process parameters. Since tool plunge was to the extent of 3 mm and plate thickness being 3 mm, the result was one side welded plates. The plates where then subjected to mechanical testing. In the present work the influence of speed, feed on the performance of FSW such as Hardness test, tensile strength and micro structure properties.

Fig. 3.3: During Welding

Fig.3.4: Welded Specimens at different speeds and feed rate

Table 3.3: Hardware specifications of CNC Milling Machine

S.NO	HARDWARE	SPECIFICATION
1	3 axes CNC vertical milling machine	Center spinner
2	Model	Agni BMV 45
3	Spindle driver	Servo motor
4	Spindle range	10-6000 rpm
5	Tool holder	ISO 40
6	Tool	HSS
7	Horse power	10 HP

Table 3.4: Process Parameters used in Friction Stir Welding

3.4 Optical Microscopy

Optical Microscopy is the basic of all the characterization techniques which is done with the help of an optical microscope. It is also known as a light microscope as it uses visible light and a system of lenses to magnify images of small samples. This works on the principle of multiple reflections. Using a microscope is very simple. The sample is placed near the objective lens and the image is viewed at the eye piece. When the light

ray falling on the sample is reflected through the objective lens, due to multiple reflections, the image is formed at the eyepiece. Magnifications in the range of 100 X to 1000 X can be obtained from an optical microscope.

Fig.3.5: Optical Microscope

3.5 Vickers Micro Hardness Test

The friction stir welded surface specimens were subjected to micro hardness testing, using an Omni-Tech made, MVH-S-AUTO Vickers micro hardness tester. The load applied was maintained constant at 100 gm for all the samples. Hardness survey was conducted on the surface and also on the cross sectionof the processed zone. The indenter used was Vickers diamond pyramid and all the indentations made were under static loading.

The specimen surface which is being tested generally requires a fine metallographic finish. The smaller the applied load, the higher is the surface finish required. A precision microscope was used to measure the indentations. The readings were taken under the magnification of 400 X to an accuracy of $\pm$ 0.5 microns.

The Vickers hardness is given in terms of Vickers Hardness Number, which is the ratio of applied load (kgf) to the surface area of the indentation (mm2).

$$HV = \frac{2F \sin \frac{136^o}{2}}{d^2} \qquad HV = 1.854 \frac{F}{d^2} \text{ approximately}$$

Where:
F = Load in kgf
d = Arithmetic mean of two diagonals, d1 and d2 in mm
HV = Vickers Hardness.

The Vickers diamond Pyramid indenter is ground in the form of a squared pyramid with an angle of 136o between faces. The depth of indentation is about 1/7 of the diagonal length. When calculating the Vickers hardness number, both diagonals of the indentation are measured and the mean of these values is used in the above formula with the load used, to determine the value of HV.

Fig.3.6: Micro Hardness Tester

3.6 Tensile Test

Tensile strength is the maximum stress where a material can withstand while being stretched or pulled before necking, which is when the specimen cross section starts to significantly contract. It is an intense property. It does not depend on the size of the test specimen. Likely it depends upon the preparation of the specimen, surface defects, temperature of the test environment and material. Apart from this we are finding out efficiency of Friction Stir Welded joints. The tensile strength of the component is conducted on Universal testing machine, The Machine capacity is 100KN.

Fig.3.7: Universal testing machine 100KN

The universal testing machine is used to subject a material sample or structure for both tension and compression. The purpose of this experiment is to determine certain engineering properties. These properties generally deal with the yield strength, ultimate strength and failure strength of material.

Table 3.5: Technical specifications of UTM:

Capacity Up to KN	: 100
Minimum test Speed mm/min	: 0.01
Maximum test Speed mm /min	: 500
Width Preferably in the range of 1200 mm	: 1000-
Depth Preferably in the range of 600 mm	: 500-
Height Preferably in the range of 2000 mm	: 1600-
Total Crosshead Travel Preferably in the range of 1200-1400 mm	:
Total Vertical Test Space Preferably in the range of 1200-1400 mm	:
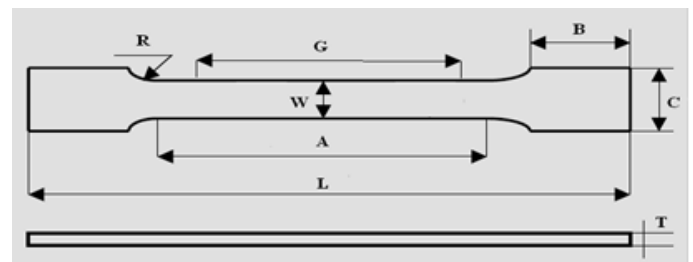
Fig .3.8: Schematic Tensile Test Specimen

4: RESULTS AND DISCUSSIONS

4.1 Microstructural Results

Optical Microscopy is the basic of all the characterization techniques which is donewith the help of an optical microscope. It is also known as a light microscope as ituses visible light and a system of lenses to magnify images of small samples. Fig shows the optical microscopic image.

a) Al 2014 & Al 6061 at 800 rpm and 18 inch/mm
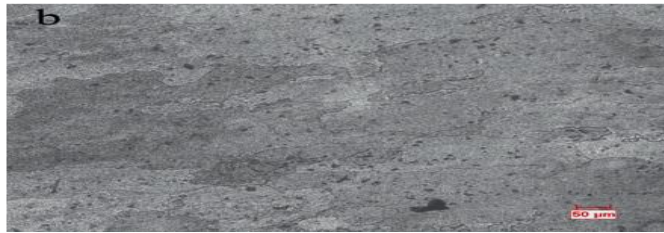
b) **Al 2014 & Al 6061 at 1000 rpm and 18 inch/mm**

a) **Al 2014 & Al 6061 at 800 rpm and 16 inch/mm**
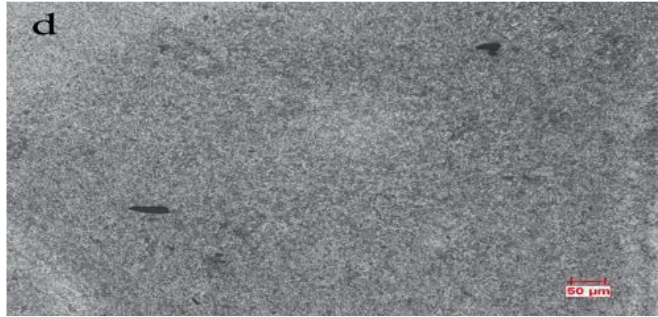
b) **Al 2014 & Al 6061 at 1000 rpm and 16 inch/mm**

c) **Al 2014 & Al 6061 at 800 rpm and 14 inch/mm**

d) **Al 2014 & Al 6061 at 1000 rpm and 14 inch/mm**

4.2 HARDNESS TEST RESULT

Vickers hardness testing on the surface of the friction stir welded specimens was performed. A load of 100 gm was applied for testing purpose. The different regions of the processed zone were selected as the locations for hardness tests. The final hardness is the average of the three indentations taken at each region.

Sl.No	Material	Spindle Speed (rpm)	Feed Rate (inch/mm)	Readings			Average
				1	2	3	
1	2014-6061	800	14	72	78	79	76
2	2014-6061	1000	14	66	62	74	68
3	2014-6061	1200	14	60	68	61	63
4	2014-6061	800	16	77	80	86	81
5	2014-6061	1000	16	69	73	80	74
6	2014-6061	1200	16	71	64	66	67
7	2014-6061	800	18	92	86	80	86
8	2014-6061	1000	18	76	85	88	82
9	2014-6061	1200	18	85	72	74	77

4.3 TENSILE TEST RESULT

Tensile strength is the maximum stress where a material can withstand while being stretched or pulled before necking, which is when the specimen cross section starts to significantly contract. It is an intense property. It does not depend on the size my of the test specimen. Likely it depends upon the preparation of the specimen, surface defects, temperature of the test environment and material. Apart from this we are finding out efficiency of Friction Stir Welded joints. The tensile strength of the component is conducted on Universal testing machine, The Machine capacity is 100KN.

S.NO	Material	Spindle speed (RPM)	Feed rate (inch/min)	UTS (MPa)	Elongation (%)	Yield stress (MPa)
1	2014-6061	800	14	166.972	12.920	145.26
2	2014-6061	1000	14	143.819	10.840	129.44
3	2014-6061	1200	14	122.567	7.753	103.56
4	2014-6061	800	16	184.388	13.840	145.03
5	2014-6061	1000	16	177.611	11.840	158.79
6	2014-6061	1200	16	114.400	8.640	112.68
7	2014-6061	800	18	206.387	17.120	194.67
8	2014-6061	1000	18	195.234	13.234	177.86
9	2014-6061	1200	18	174.974	9.367	149.65

5. CONCLUSIONS

Friction stir welding has immensely high potential in the field of thermo mechanical processing of various alloys especially the aluminium alloys. This thesis presents experimental investigation of friction stir welding of AA 2014 &AA6061. The mechanical properties and the resultant microstructure for friction stir welded AA 2014 &AA6061 were presented for different combinations of axial force, rotational and translational speeds. The correlation of mechanical properties and microstructure with the process parameters for the optimization of process is a unique approach which has been the main motivation behind this project. From the present experimental investigation the following conclusions are derived:

• Lower spindle speed (800 rpm) combined with high feed rate (18 inch/mm) results in better joint efficiency.

• Smooth surface finish can be obtained with a tool having a smooth pin.

☐ Bond integrity was better in at all conditions of spindle speed and feed rate.

☐ Tensile strength maximum of 206 mpa and elongation of 17 % is achieved .

• The tool rotation speed is the dominant parameter for tensile strength followed by the welding speed. Axial force shows minimal effect on tensile strength compared to other parameters. The interaction between tool rotation speed and welding speed has more influence comparing with other interactions on tensile strength of welded joints.

• The samples were characterized by means of tensile strength, hardness and elongation. From the investigation it is found that an increase in welding speed increases the tensile strength and increase in tool rotation speed, decreases the tensile strength.

• Increase in tool rotation speed causes more heat input which, in turn, enlarges the TMAZ and HAZ consequently, results in low tensile strength. However, increasing the weld speed reduces the heat input resulting in smaller TMAZ and HAZ which leads to greater tensile strength.

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DESIGNING THE HVAC SYSTEM FOR A SHOPPING MALL

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ABSTRACT;The objective to design Heating, Ventilation & Air conditioning (HVAC) system for a commercial Building, with simultaneously controls its temperature, humidity, cleanliness, proper distribution, noise level, heat load calculation, fresh air, exhaust, duct design, pipe design, equipment selection and layout of accessories such as indoor and outdoor unit of the project. Cooling load will be calculated on E20 form.

Indeed, today the emphasis is no more on understanding air conditioning 'products' but on creating 'solutions' and not just solutions, but 'customized solutions' that suit specific cooling needs of specific business and establishments

Every air-conditioning application has its own special needs and provides its own challenges. Airports, hotels, shopping malls, office complexes and banks need uniform comfort cooling in every corner of their sprawling spaces and activities involving computers, electronics, aircraft products, precision manufacturing, communication networks and operation in hospitals. In fact many areas of programming will come to halt, so air-conditioning is no longer a luxury but an essential part of modern living.

With reference to the building plan and requirement of the case problem air-conditioning load is estimated for seasonal conditioning. The project is carried out on "Designing the HVAC system for a Shopping Mall". To provide human comfort, it is very essential to maintain steady temperature at public places like malls.

1. INTRODUCTION

HVAC (heating, ventilating, and air conditioning; also heating, ventilation, and air conditioning) is the technology of indoor and vehicular environmental comfort. Its goal is to provide thermal comfort and acceptable indoor air quality. HVAC system design is a sub discipline of mechanical engineering, based on the principles of thermodynamics, fluid mechanics, and heat transfer. Refrigeration is sometimes added to the field's abbreviation as HVAC&R or HVACR, or ventilating is dropped as in HACR (such as the designation of HACR-rated circuit breakers). HVAC is important in the design of medium to large industrial and office buildings such as skyscrapers and in marine environments such as aquariums, where safe and healthy building conditions are regulated with respect to temperature and humidity, using fresh air from outdoors.

Ventilating or Ventilation (the V in HVAC) is the process of "changing" or replacing air in any space to provide high indoor air quality which involves temperature control, oxygen replenishment, and removal of moisture, odors, smoke, heat, dust, airborne bacteria, and carbon dioxide. Ventilation removes unpleasant smells and excessive moisture, introduces outside air, keeps interior building air circulating, and prevents stagnation of the interior air.

Ventilation includes both the exchange of air to the outside as well as circulation of air within the building. It is one of the most important factors for maintaining acceptable indoor air quality in buildings. Methods for ventilating a building may be divided into mechanical/forced and natural types.

2. LITERATURE SURVEY

2.1 Types of Air-Conditioning Systems

2.1.1 Commercial Air-Conditioning According To Applications

2.1.2 Industrial Air-Conditioning
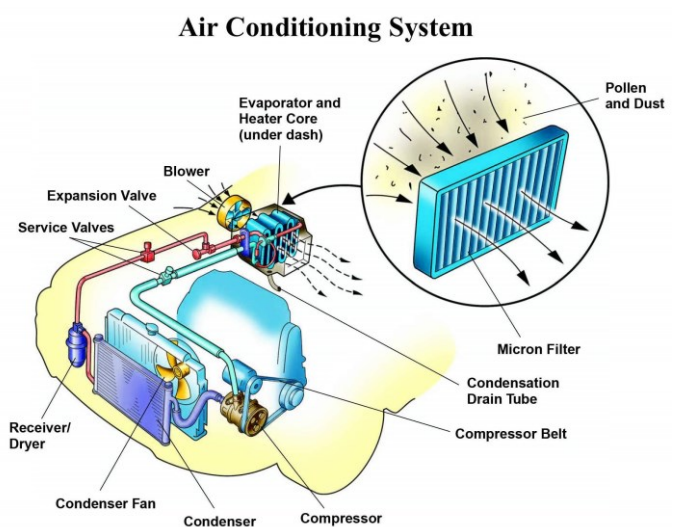
Fig 2.1: Air-Conditioning system

2.1.1 Commercial Air-Conditioning According To Application

This includes air-conditioning of multi room structure like apartments, hotels, office buildings and hospitals. Although treatment varies somewhat for these applications, the basic problems are the same.

• Individual control of room temperature is desirable.

• Cooling system should also be suitable for winter heating to eliminate duplication of risers and equipment.

• Unusual heat loads should be considered.

• Fan noise, air noise and cross talk between rooms through ductwork are undesirable.

When these requirements are considered in conjunction with loads and equipment, it is not difficult to understand why quality air-conditioning for multi room buildings are more costly per unit capacity than many other types of comfort installation.

Air-Conditioning of Multi Rooms Includes

2.1.1.1 Offices

Private offices involve problems of zoning and individual control. General offices and large open office spaces may be treated as common units but it should be recognized that it is not possible to satisfy every occupant of general office. This does not mean that the system should not be designed with proper capacity of air distribution. It does mean that the temperature, which is satisfactory to majority of occupants, may fail to please too few. Space used of conference and directors rooms requires special treatment because of wide variation in occupancy and the need for greater ventilation when occupants are smoking. It is a good practice to provide a smoke exhausts system and should be handled as separate zones.

2.1.1.2 Hospital Private Rooms

Hospital needs a special consideration as to whether or not air may be re circulated and the extent to which it may be permitted. Frequently, a 100% outside air supply is required to avoid cross contamination. In many installations it may be necessary to provide equipment and devices that can be thoroughly cleaned and sterilized.

2.1.1.3 Hotel Guest Rooms

The special features to be considered while air-conditioning hotel guest rooms. They are:

• Internal light and population is more compared to offices.

• Individual room temperature control is most desirable if not essential.

Temperature control devices should be rugged and simple to operate.

• In some cases respectively low room temperature at night are desired since this has an important bearing on equipment capacity, appropriate load estimate should be made to determine the effect on equipment size.

• Particular air should be taken to avoid drafts and noise in guest rooms.

• The toilet exhaust should be designated to equal approximately ventilation make up.

• Fan or refrigeration rooms should never be located directly above sleeping rooms. Even the best techniques for concealing noise and vibration are not completely effective in this situation.

2.1.1.4 Restaurants

Because of variation in loads, equipment's that operate economically at partial capacity are required in addition to usual hear loads from people, light and expose to outside conditions. Many restaurants have large heat gains from toasters, grill, coffeemaker and hot eatables. Sufficient outside air should be introduced through the apparatus to dilute food odors and tobacco smoke and to offset exhaust. The outdoor problem is more acute in restaurants than in most other application. Kitchen and pantries should have supply and exhaust systems that are independent of the restaurant systems.

2.1.1.5 Theaters and Auditoriums

Almost the entire cooking load in theaters and auditoriums result from the ventilation air, heat and moisture release by patrons. The sensible heat factor is always nearly too low to obtain 55% RH with conventional A/C processes unless re heat is used. The type of system used depends largely on the size of the theatre. Central equipment supplied by a water chilling plant is usually the best answer for large house and DX assembled system or elf-contained units constitute the most economical selection for the neighborhood house. Air duct is preferably accomplished by over load diffusers in order to minimize drafts, but sidewall or rare wall outlets can be successfully used where obstructions to throw are absent. Adequate return air should be taken wherever cold spots make occur, as for example from front of theatre to rear of balcony and orchestra. Fan and air noise should be reduced to an acceptable limit.

2.1.2 Industrial Air-Conditioning

There has some tendency to draw a sharp line of demarcation between systems designed for personnel comfort and those designed for process control. The distinction hardly warranted because the procedure in both instances must necessarily be identical. Special treatment may be necessary in some industrial application due to requirement of continues operation, 24 hrs a day & 7 days a week, or due to peculiar conditions of corrosion, contamination hazards, concentrated heat load or other adverse operating conditions.

It is necessary for the designer to understand the industrial process in order to minimize hazards.

Furthermore since conditions must be maintained regardless of outside weather conditions particular attention should be directed to

- Adequate installation of roof and walls.
- Adequate moisture barriers kin building construction, particularly when high
- Double glass, block or no windows where high humidity is necessary for process during winter weather.
- The use of shading screen, Venetian blinds or other means of preventing the entrance of direct sunlight.
- Adequate ceiling weights to provide space for ventilation hood, air duct and pipes.
- The evaluation of the storage effect of structure, equipment and materials in process if operation is on 24 hours bases.

Many industrial air-conditioning installations are just as necessary for providing productive working conditions for employees as for the product or process. In fact it is often desirable to depart somewhat from optimum process conditions to provide comfortable working conditions.

2.2 Types of Refrigeration Systems
2.3.1 Vapor Compression system
2.3.2 Vapor Absorption System
2.2.1 Vapor Compression system
A schematic flow diagram showing the basic components of vapor compress refrigeration system is shown in figure below some typical temperatures for air-conditioning applications are indicated. Refrigerant fluid circulates through the piping and equipment to the direction shown. There are four processes that occur it flows through the system they are as follows:
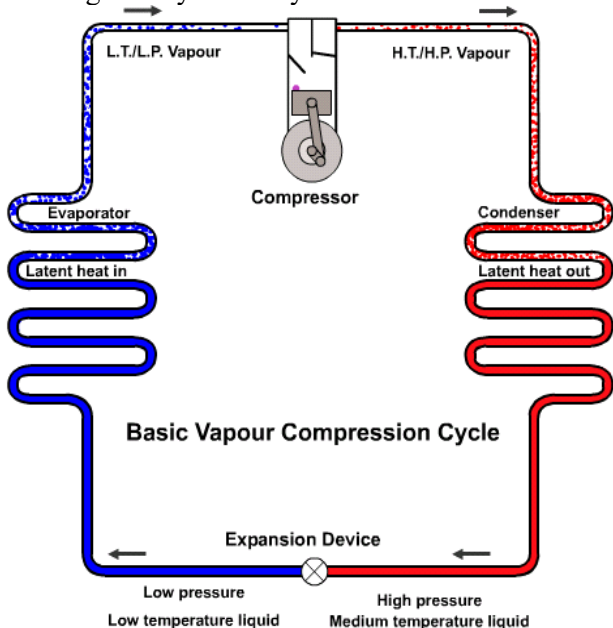
Fig.2.2: Vapor Compression Cycle

Process 1-2:

At point (1) refrigerant are in liquid state a relatively high pressure and high temperature flows to (2) through a restriction called the flow control device or expansion device. The refrigerant looses pressure going through the restriction. The pressure at (2) is low that the small portion of the refrigeration lashes into a gas. But in order to vaporize it must be gain heat (which it takes from the portion of refrigerant that did not vaporize) thus cooling the mixture and resulting in low temperature.

Process 2-3:
The refrigerant flows through a heat exchanger called the evaporator. This heat exchanger has two circuits. The refrigerants circulate in one and in the other. The fluid to be cooled is at a slightly temperature that the refrigerant, therefore heat is transferred from refrigerant producing cooling effect. Desired refrigerant boils because of the heat it receives in the evaporator. By the time it leaves the evaporator (4) it is completely vaporized.

Process 3-4:
During the evaporator, the refrigerant is a gas at a low temperature and low pressure. In order to be able to use it again, to achiever the refrigerant effect continuously, it must be brought back to the condition at (1) a liquid at a high pressure. The first step in this process is to increase the pressure of the refrigerant gas by using a compressor. Compressing the gas also result in the increasing the temperature.

Process 4-1:
The refrigerant leaves the compressor as a gas at high temperature and pressure. In order to change it to liquid, heat must be removed from it, this is accomplished in a heat exchanger called condenser. In the other circuit cooling fluid flows (air or water) at a temperature lower than the refrigerant. Heat therefore transfer from the refrigerant to the cooling fluid and as a result the refrigerant condenses to a liquid at (1) the refrigerant has returned to its initial state and is now ready to repeat the cycle of course the processes are actually continuous as the refrigerant circulates through the system.

2.2.2 Vapor Absorption System
The absorption refrigeration system is quite similar to the vapor compression refrigeration system. In the absorption refrigeration system, refrigerant is produce by evaporation of a liquid (refrigerant) in the evaporator. The difference between the two systems lies in the method of converting the refrigerant vapor back to liquid. In vapor compression system compressor and condenser are used to the conversion of refrigerant vapor (coming from the evaporator) into liquid. In the absorption system also, the condenser is used but the compressor is replaced by the combination of absorber generator.
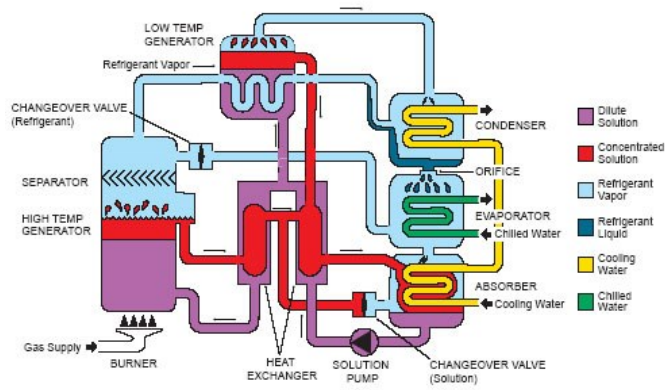
Fig.2.3: Vapor Absorption Cycle

In vapor compression system, the refrigerant vaporizes in the evaporator, absorbing its latent heat from the surrounding, the suction side of the compressor draws the refrigerant vapor from the evaporator compresses it an delivers it to the condenser were the high pressure vapor is condensed into a liquid. So we have the three components viz. evaporator, compressor and condenser. The compressor sucks vapor compresses and discharges it into the condenser. So we can say that the compressor has suction side as well as a discharge side. In the absorption system also we have the evaporator and condenser doing the same function as in the vapor compression system. The absorber does the suction function of the compressor and the generator replaces the discharge side of the compressor.

The refrigerant used in the absorption system is one whose vapor is highly soluble in another liquid or solution called absorbent. The refrigerant should be non-volatile. The absorbent containers, one containing the refrigerant (evaporator) and the other containing the absorbent (called absorber) are interconnected. The refrigerant liquid vaporizes in the evaporator. Because of strong affinity of the absorbent in the absorber, thereby reducing the vapor pressure in the evaporator allowing the refrigerant liquid to vaporize continuously in the evaporator to produce refrigerant. Thus the absorbent does the work of drawing or sucking the refrigerant vapor from the evaporator and maintains low refrigerant vapor is sent to the generator. In the generator the solution heated by means of hot water of steam coil. On getting heated by means of hot water of steam coil. On getting heated, the solution releases the refrigerant vapor, which passes into the condenser, where it is condensed. Thus the generator replaces the function of the discharge side of the compressor in vapor compression system. The refrigerant liquid from the condenser led to the evaporator there by competing the refrigeration cycle. In vapor compressor system mechanical energy is used to drive the compressor. The mechanical energy in turn is produced by the electric motor. Thus it can be seen that with absorption machine, heat energy in the form of steam or hot water is directly used. Since direct heat is comparatively cheap form of energy, heat absorption system can sometime be more economical.

As shown in figure, the absorbent and refrigerant circulating pattern differ. The refrigerant part is generator to condenser, condenser to evaporator and evaporator to absorber and from the absorber to the generator mixed with the solution.

Fig 2.9: Air cooled chiller

2. **SOFTWARE IMPLEMENTATION**
3.

There are numerous software's involved in our HVAC designing and detailing project on a commercial / Offices Tower, for calculation purposes. They are as follows:

4.1 BETA software

• By this software design of air terminal devices are done for return and supply, depending upon flow rate (cfm), noise criteria, and velocity.

• The main purpose of using this software is accuracy in dimensions and cost effective values.

Steps to be followed:

Step1: Open the software click on the air terminal device needed.

Step2: Select the product supply or return set unit system as imperial, then click on height is known then go for selection data.Step3: Enter the values of noise criteria, cfm and height, then find nearest match.

Then the dimensions of air terminal devices are known.

Fig. 4.1: BETA Industrial LLC Software
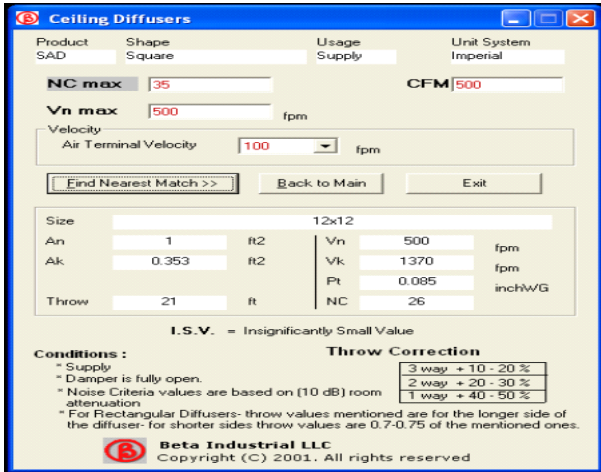
4.2: Software for calculating Ceiling Diffuser
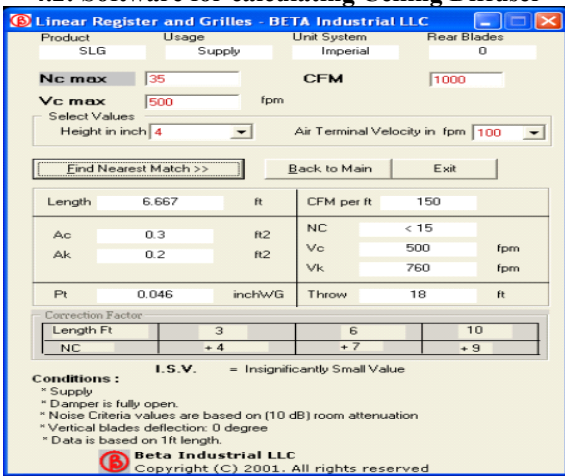
Fig 4.3: Linear Register and Grilles

4.2 McQuay Duct Sizer

McQuay duct designer is software used to design the ducts, in this method by entering the flow rate (CFM) of the room and the Friction loss, equivalent diameter of the duct is known.

By assuming the height, width of the ducts known
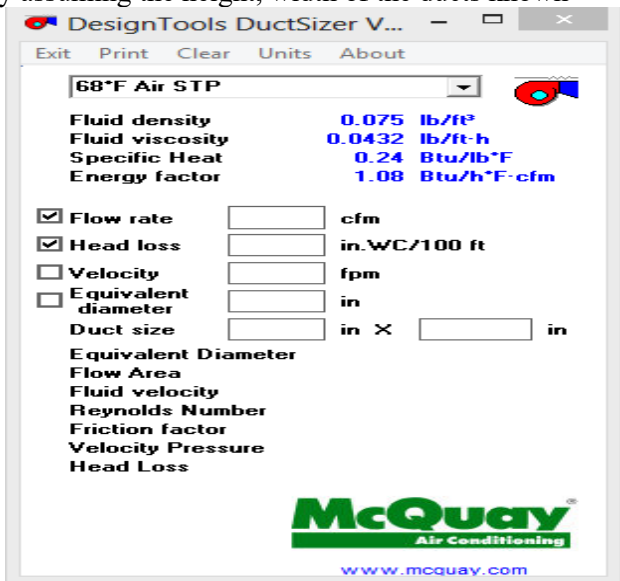
Fig 4.4: Software for Duct Designing

4.3 HAP SOFTWARE

HAP (Hourly analysis program) software is used to calculate heat load calculation of the system. By this system total tonnage of the machine that to be installed is known, by giving the inputs such as exposures present in the space, occupancy density, lighting and electrical load of the space.

Procedure for calculation is as follows:

Step1: A weather property of the location where the building is located is entered.

Step2: Schedules such as lighting, people, electrical should be prepared in project libraries.

Step3: Exposures and u values are given for wall, window and roof in project libraries.

Step4: In spaces according to the orientation of the individual room exposure of walls, windows and roofs are entered.

Step5: In system, type of machine to be installed is given in which spaces are added to each machine depending upon the requirement
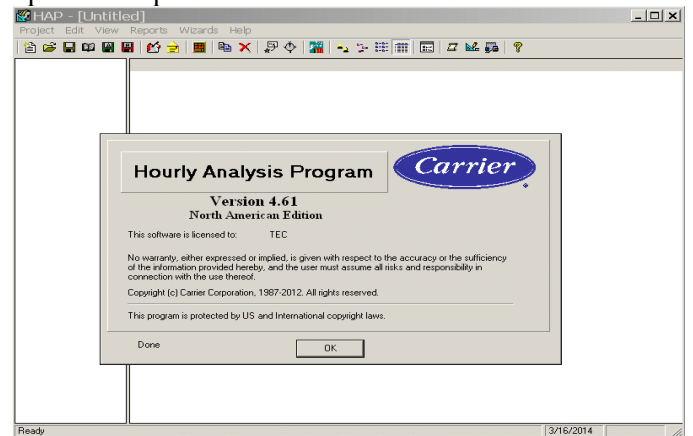
Fig. 4.5: Hap Software
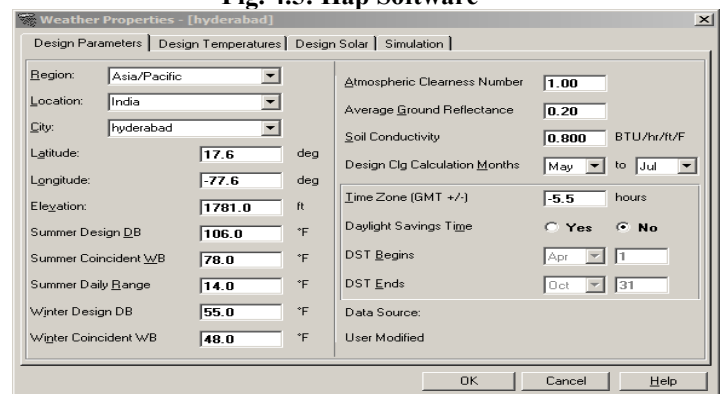
Fig.4.6: Weather condition entries [HAP]
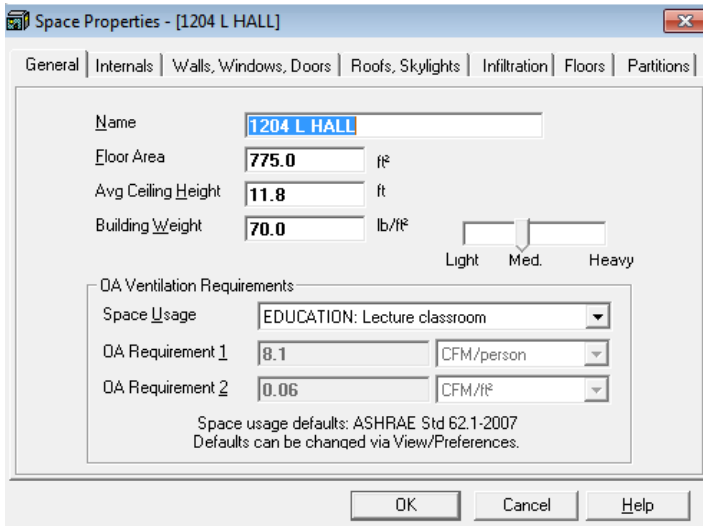
Fig 4.7: Dialog Box for Space Properties-General
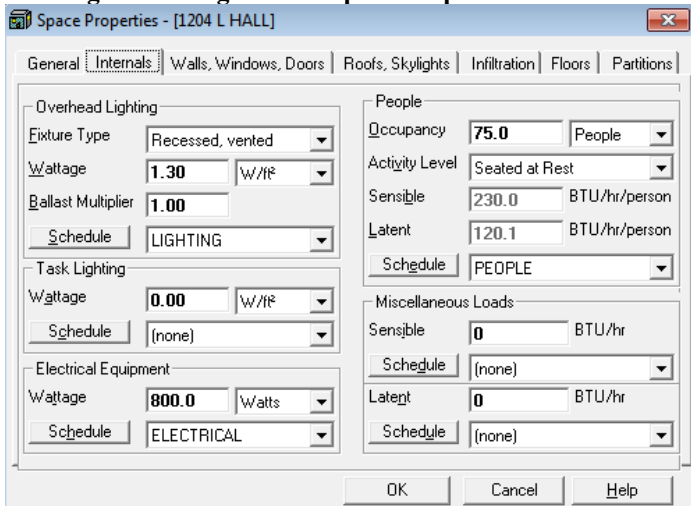
Fig 4.8: Dialog Box for Space Properties-Internals
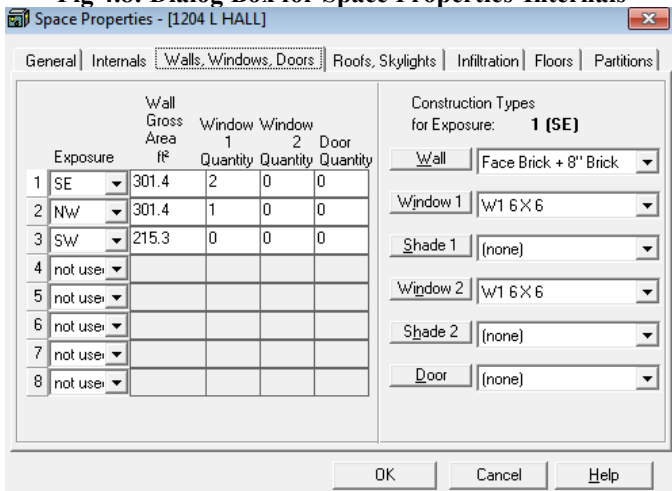
Fig 4.9: Dialog Box for Space Properties-Walls, windows and doors
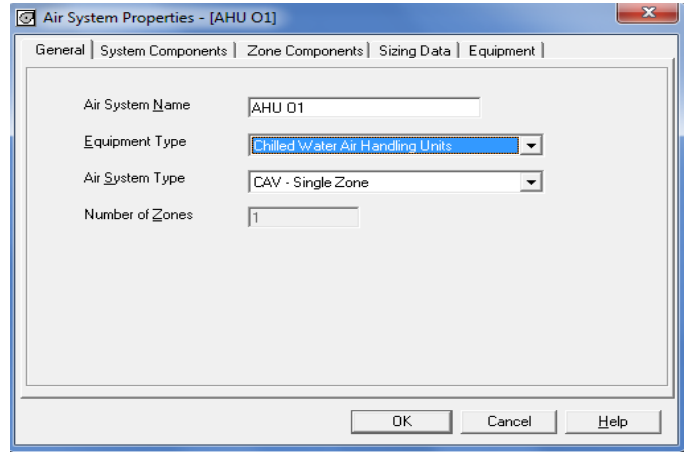
Fig4.10: Dialog box for air system properties.
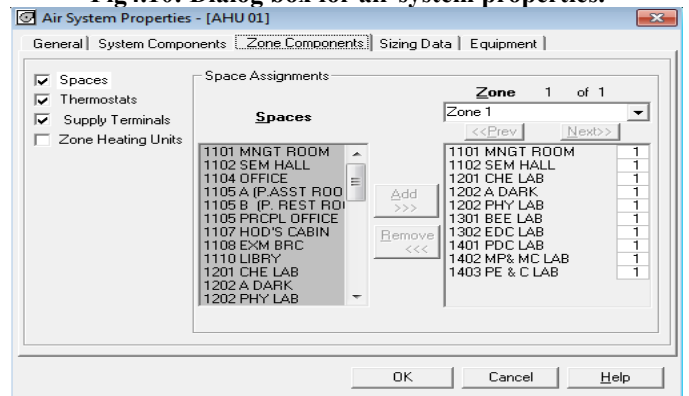
Fig 4.11: Dialog box for air system properties.

4. HEAT LOAD CALCULATION

Heat gain through Glass

1. Heat gain through conduction
 2. Heat gain through radiation

1. Heat gain through conduction

$Q = U \times A \times \Delta T$

To find ΔT for the glass through conduction= (outside temp – Inside temp)

$U = 1/\Sigma R$

$\Sigma R = R_i + (R_1 X_1) + (R_2 X_2) + \ldots\ldots\ldots + (R_n X_n) + R_o$

A = Area of glass

2. Heat gain through radiation

$Q = U \times A \times \Delta T$

To find ΔT for the glass through Radiation

Requirements:

1.   orientation of the building
2.   Latitude of city
3.   Month in which city faces summer
4.   Timing at which the heat transfer via glass is more

U = solar factor can be taken from design hand book

A = Area of glass

Heat gain through wall

To find heat gain through wall requirements are

1.   orientation of the building
2.   Timings

3.   wall thickness

$Q = U \times A \times \Delta T$

$U = 1/\Sigma R$

$\Sigma R = R_i + (R_1 X_1) + (R_2 X_2) + \ldots\ldots + (R_n X_n) + R_o$

A   = Area of wall

ΔT wall = Equivalent temperature + correction factor (from design data book)

Heat gain through Roof:

$Q = U \times A \times \Delta T$

$U = 1/\Sigma R$

$\Sigma R = R_i + (R_1 X_1) + (R_2 X_2) + \ldots\ldots + (R_n X_n) + R_o$

A   = Area of roof

ΔT = Equivalent temperature + correction factor (from design data book)

Heat gain through Partition / Ceiling/ Floor

$U = 1/\Sigma R$

$\Sigma R = R_i + (R_1 X_1) + (R_2 X_2) + \ldots\ldots + (R_n X_n) + R_o$

A   = Area

ΔT = (outside temp – Inside temp) – 5^oF

Heat gain through Lightings:

The heat given up by the lights, both incandescent and fluorescent, is not affected by the room temperature. It depends on the electricity consumed. Each watt of electricity generates 3.4. BTU/Hr.

The total wattage of incandescent lights is very close to the ratting given on the lamp. Fluorescent light however require extra power in the ballast, as an approximation the ballast consumers about 25% of rated of the fluorescent lamp.

$Q = 3.4 \times W \times B.F \times CLF$

Where:-

Q = Heat gain through lightings in BTU/hr

W = Lighting capacity in watts

3.4 = conversion factor to convert watts into BTU/hr

CLF = Cooling load factor for Lighting

BF = It is a ballast factor for lights

Note:

BF for florescent lights = 1.25

BF for Incandescent lights = 1

Heat gain through People

One of the most important sources of internal heat is people. People in the room give off both sensible heat and latent heat. The exact amount is determined by the activity of the people and the room conditions.

Some typical application are a theater or auditorium where people seated at rest give off less amount of heat than compared with the people doing physical activities like dancing excising, bowling.

The heat gain through people is composed of two parts

1.   **sensible heat (Q_s)**

2.   **latent heat   (Q_L)**

$Q_s = q_s \times n \times CLF$

$$Q_L = q_L \times n$$

Where:-

Q_s = Sensible heat gain in BTU/hr

Q_L = latent heat gain in BTU/hr

n   = no. of people

q_s = sensible heat gain per person   (from design data book)

q_L = Latent heat gain per person   (from design data book)

CLF = Cooling load factor for people

Heat Gain through Appliances

$Q_{app.} = 3.4 \times W$

$Q_{app.} = HP \times 2544.4$ (if HP is given)

Ventilation load

Some outside air is usually bought into the air-conditioned space through the mechanical ventilation equipment in door to maintain indoor air quality.

Mechanical ventilation systems for large building are usually designed and operated so that facts create a slightly positive air pressure in the building.

This will reduce or even prevent infiltration. When it is felt that building is relatively tight and pressurized, no allowance for infiltration is made, only the outside air ventilation load is included.

Equation for sensible heat gain

$Q_s = 1.1 \times CFM \times \Delta T$

Where:-

Q_s =   Sensible heat gain from ventilation, BTU/hr

CFM   =   Air ventilation flow rate, ft^3/min

ΔT =   Temperature change between indoor and outdoor, air, F

Equation for sensible heat gain

$Q_L = 0.58 \times CFM \times \Delta W$

Where:-

Q_L =   latent heat gain from ventilation, BTU/hr

CFM   =   Air ventilation flow rate, ft^3/min

ΔW =   Difference in humidity ratio

Heat Gain through infiltration

Infiltration is the un-intentional or accidental introduction of outside air into a building, typically through cracks in the building envelope and through use of doors for passage. Infiltration is sometimes called air leakage.

Equation for sensible heat gain

$Q_s = 1.1 \times CFM \times \Delta T$

Where

Q_s =   Sensible heat gain from infiltration, BTU/hr

CFM   =   Air infiltration flow rate, ft^3/min

ΔT =   Temperature change between indoor and outdoor, air,

Finding Infiltration Rate:

There are two methods used to estimate the CFM of infiltration air

➢   The crack method
➢   The air change method

4.1 Concept drawing
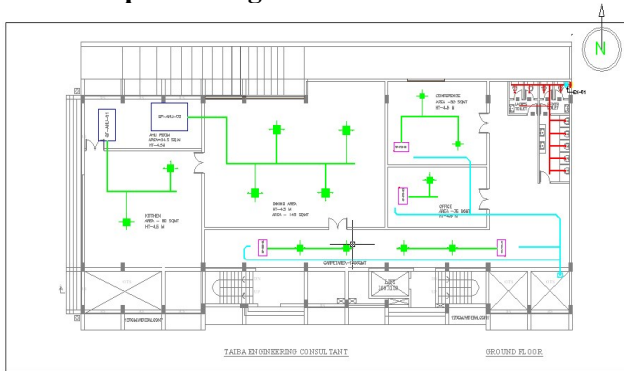
Fig 5.1 Design Drawing of Ground Floor
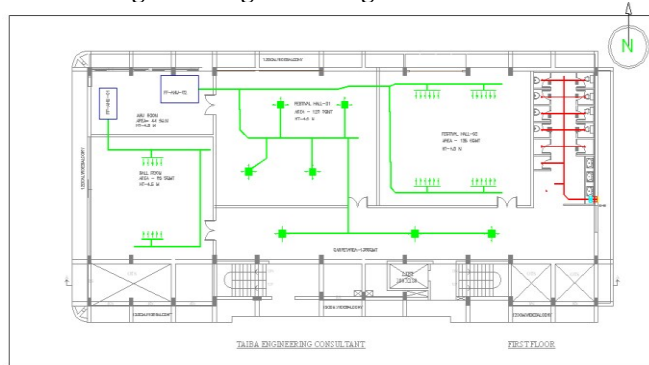
Fig 5.2: Design Drawing of First Floor
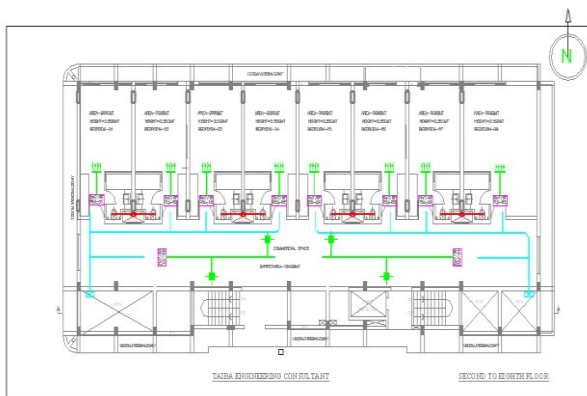
Fig 5.3: Design Drawing of 2 To 8 Floors
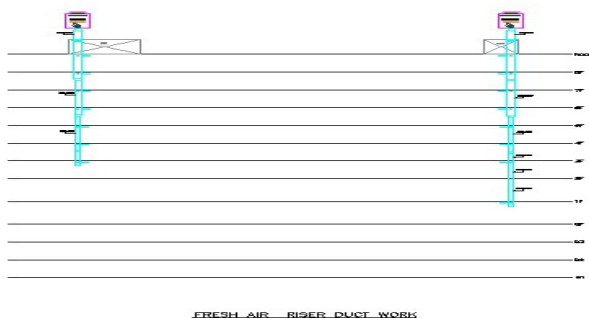
Fig5.4: Fresh Air Handling Unit Design

5. CONCLUSIONS

Based on the inputs & room data sheets and data Summary sheet the projected TONS will be calculated. To offset this load we propose to provide Air cooled Chillers with a standby option. Three will be as duty chiller while other one will be as standby.

The Air cooled Chillers and the pumps will be located in the Chiller plant room assigned for the purpose on the Roof Deck floor. The plant room will be duly ventilated. The FAN COIL UNITS' will also be located on the Roof Deck Floor.

It is proposed to incorporate a primary water distribution system in the AC system design. The Primary system will comprise of a set of Primary pumps which will circulate the water to the chillers and they will circulate the water from the chillers to the Various Zone AIR HANDLING UNITS are constant speed type. This way the pumps need not run at constant speed always and hence energy is saved.

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16. **ISHRAE** Air Guide

EXPERIMENTAL DETERMINATION OF OPTIMAL PROCESS PARAMETERS OF FRICTION WELDED JOINTS OF DISSIMILAR MATERIAL BY USING DOE

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ABSTRACT; Friction welding is used in many fields because the procedure is easily automated and it is possible to weld similar and dissimilar materials.It can be used to weld the materials which can not be welded by resistance welding due to electrical and heat conductivity. One of the biggest incentives for choosing friction welding as joining process is that it allows you to combine dissimilar materials. Other conventional welding doesn't allow the joining of different materials, but friction welding does.

Friction welding provides a strong bond without the use of bolts and/or screws or the additional of extra weight from fillers. Friction welding tends to clean the surface between the materials- removing any debris or dirt. This usually eliminates a need to prepare the two joining surfaces prior to the friction welding process.

In this research the material which is selected it cannot be weld by resistance welding and arc welding due to high conductivity and it cannot be welded by friction welding at normal working parameters due to low co-efficient of friction, but by controlling the parameters it is possible to weld with equally good tensile strength and other mechanical properties. Hence this research mainly concentrates on, The suitable friction welding parameters likeRPM, friction pressure,frictional time,and quenching medium for the material by friction welding to attain the required hardness and tensile strength.Further, statistical analysis software like minitab is used to predict the optimal process parameters for basis of taguchi analysis.

1.INTRODUCTION

Friction welding machine (FWM) were utilized in different fields in light way that methodology was effectively robotized & it was conceivable to weld relative & unmistakable materials. It tends to be utilized to weld materials which can't be welded by obstruction welding because electrical & warmth conductivity. A standout amongst other main thrusts for picking pounding welding as joining process was that it stipends combining particular materials. Other ordinary welding doesn't permit joining various materials, yet contact welding does. Contact welding gives a solid bond without utilization hooks or possibly screws or extra additional weight from fillers. Contact welding tends to clean surface between materials-expelling any garbage or soil. This all else fails disposes a need to setup 2 joining surfaces before pounding welding process.

i) sensible rubbing welding parameters for SS 431 & En-8 material by contact welding to accomplish required rigidity & hardness materials & make conceivable substitution SS 431 to a level 3/fourth shaft material, to lessen expense. material investigation has running with properties their parent metals.

2.LITERATURE SURVEY

Shubhavardhan RN [1] researched mechanical & metallurgical properties rubbing welded AA6082 aluminum mix & AISI 304stainless steel.in this paper these exceptional materials were joined by steady drive granulating welding process which consolidates shine produced using crumbling between 2 surfaces & plastic misshapening. Tests were composed with various welding process parameters. outcomes were investigated by systems for flexible test, Vickers little scale hardness test, exhaustion test, Charpy v-score impact test, & SEM-EDX (centrality dispersive X-shaft) examination to pick stages that happened amidst welding.

Ideajoints shifted with broadening pounding weight & contact time keeping upset weight & ponder time steady. joint quality expanded, & after that diminished ensuing to achieving a greatest respect, with developing granulating weight & pulverizing time. A section welds had low quality because aggregate alloying parts at joint interface. Right when thickness response layer stretched out over a major respect, joint was weak & broken at weld interface. joint was sound when there was no unbounded territory & a thin response layer shaped along whole weld interface.

A. Rajasekhar [2] researched about impact welding strategy & post weld warm medicines on microstructure & mechanical properties AISI 431 martensitic hardened steel. welding system was considered in this paper were pulverizing welding & electron shaft welding. Weld

focus in EB welding demonstrated a cast dendritic structure with ferrite sort out in Matrix un-tempered martensite. In rubbing welding, in equiaxed earlier austenite grains. In both welding outlines, post weld setting treatment acknowledged coarsening marten site which increments with increment in cementing temperature. In as-weld condition, both EB & Friction welds indicated high gauge & hardness & poor effect quality.

S.Giridharan1, TTM.Kannan2 [3] did examinations to take a g&er at about microstructure, firmness & bowing conduct IS2062 Grade C smooth steel & 316L hardened steel welded joints utilizing TIG welding process. Compelled part examination these joints were also dissected & separated & exploratory work.

Mumin Sahin [4] get some answers concerning mechanical & metallurgical arrangements at interfaces business austenitic-treated steel & copper materials welded by crushing welding. In this paper, austenitic-faultless business steel & copper materials were welded utilizing deterioration welding methodology. ideal parameters were picked up for joints. It was discovered that a piece welds show low quality relying on some aggregate alloying portions at interface inevitable result temperature rise &proximity intermetallic layers. Crumbling welding can be master at high-age rates & consequently was sensible in development. In applications where crumbling welding has supplanted other joining shapes, age rate has been expanded essentially.

Mumin Sahin [5] guided an examination to study metallurgical & mechanical properties striking metal crumbling welds (FWs) among aluminum & sort 304stainless steel. One storing up frameworks used to make parts made using obvious materials was FW procedure. Along these lines, in present examination, austenitic tempered steel & aluminum parts were joined by FW. Adaptable, exhaustion & indent impact tests were related with FW models, &outcomes were separated & those for central materials. Microstructure, essentialness dispersive X-shaft (EDX) & X-column diffraction (XRD) examination & hardness collections were facilitated on joints. It was found from microstructure & XRD examination that between metallic stages encompassed in interface which besides caused a lessening in idea joints. In this examination, turn speed was continued relentless. Their welding has a key impact in present day quality & process control, in pritable utilization vitality & differing assets, in thriving & security. By at that point, this examination will contribute for welded, brazed & bound materials.

A. Rajasekhar, G. M. Reddy [5] looked into about Influence post-weld warm pharmaceuticals on microstructure & mechanical properties AISI 431 martensitic treated steel disintegration welds. relative effects different post-weld warm pharmaceuticals (PWHTs) on microstructure & mechanical properties rubbing welded martensitic tempered steel form AISI 431 were inspected. weld microstructure involves acicular marten site in equiaxed prior austenite grains & with warm treatment, martensitic microstructure experiences coarsening. It was seen that held austenite content decays with an extension in PWHT solidifying temperature. tractable properties welds under different PWHTs were like those parent metal in specific prescriptions. Welds demonstrated higher score rigidities than parent metal in individual warmth treatment condition. Twold solidifying (670°C + 600°C) provoked most noteworthy decline in hardness. Welds showed poor impact solidness in as welded condition. adjustment in influence durability was found satisfactory in welds subjected to twold solidifying, in spite way that did not match to level parent metal at singular conditions. instrument & clarifications behind watched direct have been analyzed, relating microstructure, split features & mechanical properties.

C.H Muralimohan [6] finds out about grinding welding 6082-T6 aluminum composite to 1040 steel with different process parameters by using contact welding process.Aluminium amalgams AA 6000 game plan were being used for auto applications in view their ability to sustain by fake developing in wake forming. joining aluminum especially to various composites ends up being continuously basic. Joining aluminum to steel displayed specific metallurgical & mechanical properties & decision suitable joining methods were trying. This paper portrays contact welding 6082-T6 aluminum blend to 1040 steel by methods for a couple methodology parameters. effect grinding time & assembling weight on mechanical & metallurgical properties were surveyed. Microstructural depiction was done using optical microscopy & SEM examination. fundamental making welds was explored by ED's method. proximity Al−Fe substance species was depicted by methods for a thin layer progress zone on bond lines &centrality level pieces was apparent ly related to Fe2Al5 & FeAl intermetallic blends. flexible break welded joint occurred in 6082-T6 aluminum side near interface.

Restricted part Analysis disintegration welding process for various materials has been reviewed by a couple researchers [7-8]. T. Santos Kumar1, A. Chennakesavwereddy2 [7] facilitated an examination about welding 2024Al & AISI 1021 steel by unending drive disintegration welding. constrained part examination has been done to show determined drive

rubbing welding. technique parameters have been progressed using Taguchi strategies. temperature dispersal from transient warm examination; relative weight & directional bending from helper examination; entrance & sliding from contact examination were finished. Effect parameters on temperature apportionment, proportionate weight & total deformation was finished by using ANOVA.

Mohammed asif. M, P. Sathiya[8] investigated Finite part showing & depiction contact welding on UNS S31803 duplex solidified steel joints Solid state joining strategies were dynamically used in joining duplex tempered steel materials in view their high genuineness. Reliable drive rubbing welding was a solid state welding strategy which was used to join relative & unique materials. This joining system was depicted by short process span, low warmth data & confined warmth affected zones. diversion transforms into a basic mechanical assembly in rubbing welding because short welding cycle. A 3 dimensional non-straight restricted segment exhibit was delivered. warm history & center point shortening priles were foreseen using ANSYS, an item mechanical assembly. This numerical model was affirmed using preliminary outcomes. results show that frictional warming period method has more impact on temperature & disturbing stage has more impact on vital shortening. learning these parameters would incite streamlining information parameters & change plan & machine gadgets.

In this work SS 431 & EN-8 were picked since it can't be welded by check welding or round section welding as a result high conductivity & it can't be welded by rubbing welding at normal working parameters in view low co-gainful grinding. Regardless, by controlling parameters it was possible to weld with comparatively awesome unbending nature & other mechanical properties. Thusly this investigation primarily centers around,

3. STATISTICAL MODELLING

3.1 Importance Design Experiments (DOE):-

Extending productivity & improving quality were fundamental destinations in any business. systems for choosing how to grow effectiveness & upgrade quality were creating. They have changed from over top & repetitive experimentation interests to immense, dazzling, & keen quantifiable procedures

Plan Experiments Outline Experiments (DOE) methodology engages makers to choose in meantime individual & smart effects various factors that could impact yield results in any arrangement. DOE also gives a full learning relationship between plot segments; henceforth, it changes any standard arrangement into an energetic one. Fundamentally, DOE pins point fragile parts & unstable regions in traces that reason issues in

Yield. Originators were then prepared to settle these issues & make generous & higher yield designs prior going into age.

3.2 Goal analyses:-

• Experiments help us in underst&ing lead a (mechanical) System

• Data accumulated by efficient assortment influencing parts makes us quantitatively depict essential wonder or ponders.

goal any exploratory development was to get most extraordinary information about a system with base number arranged examinations. An exploratory program sees genuine "elements" that impact consequence test. parts may be perceived by looking sums that may impact aftereffect preliminary. most basic among these may be recognized using 2 or 3 exploratory investigations or from past experience or in perspective some basic speculation or hypothesis. accompanying thing one needs to do was to pick amount levels for each one segments. data will be amassed for these estimations parts by playing out tests by keeping up levels at these characteristics.

3.3 MATRIX EXPERIMENTS:-

A Matrix tests contains a course action examinations where setting a couple thing or process parameters to be mulled over changed beginning with one examination then onto following.

Grid tests Lattice tests were furthermore called Design tests, parameters were similarly called factors, & parameter settings were also called levels.

Directing lattice tests Leading system tests using symmetrical displays was a fundamental technique in overwhelming diagram. It gives more strong appraisals factor impacts with less preliminaries when appewered differently in relation to standard strategies, for instance, one factor at some r&om minute tests in this way, more factors can be mulled over.

A structure tests includes a course action examinations where we change settings diverse thing or process parameters. We have to think about beginning with one examination then onto following. In wake coordinating a grid investigate, data from all examinations in set brought together were destitute down to choose effects diverse parameters. Coordinating grid tests using remarkable structures called symmetrical groups, empowers effects a couple parameters to be settled viably &was a basic framework in energetic diagram.

In quantifiable Literature grid tests were called sketched out examinations &individual examinations in system attempt were now & again called runs or solutions settings also suggested as levels & parameters as factors.

3.4 Methods D.O.E:-

• Factorial

- Response surface
- Mixture
- Taguchi

3.5   Taguchi outline:-

A Taguchi Design or a symmetrical show was a methodology for laying out tests that when in doubt requires only a little measure full factorial blends. A symmetrical show infers arrangement was balanced with objective that factor levels were weighted also. Thusly, each factor can be surveyed self-sufficiently different factors, so effect one factor does not affect estimation another factor.

In hearty parameter outline, you initially pick control factors & their levels & pick a symmetrical exhibit fitting for these control factors. control factors involve internal cluster. In meantime, you decide an arrangement commotion factors, alongside a trial plan for this arrangement   components. clamor factors include external cluster.

investigation was done by running entire arrangement clamor factor settings at every blend control factor settings (at each run). reaction information from each keep running clamor factors in external exhibit were typically adjusted in succession, by variables settings for that keep running control factors in internal cluster. For a precedent, see information for break down Taguchi outline.

3.6   Types Taguchi design:-

different types Taguchi designs available were:

L4 (2**3)
L8 (2**7)
L8 (2**4 4**1)
L9 (3**4)
L12 (2**11)
L16 (2**15)
L16 (2**12 4**1)
L16 (2**9 4**2)
L16 (2**6 4**3)
L16 (2**3 4**4)
L16 (4**5)
L16 (8**1 2**8)
L18 (2**1 3**7)
L18 (6**1 3**6)
L25 (5**6)
L27 (3**13)
L32 (2**31) (first 21 columns)
32 (2**31) continued
L32 (2**1 4**9)
L36 (2**11 3**12)
L36 (2**3 3**13)
L54 (2**1 3**25)
3.7   L9 (3**3) Taguchi Design:-

L9 (3**3) Taguchi design which was considered For Analysis friction welded joint is:

Table 3.1: L9 (3□□□ Taguchi Orthogonal Matrix)

FACTORS RUNS	C1	C2	C3
1	1	1	1
2	1	2	2
3	1	3	3
4	2	1	2
5	2	2	3
6	2	3	1
7	3	1	3
8	3	2	1
9	3	3	2

3.7.1   L9 (3**3) REPRESENTS:-

- L9   9 RUNS
- 3   3 LEVELS
- 3   3FACTORS

3.7.2   3 Levels Taguchi Design:-

following were3 Levels which were considered in Taguchi design

- High   3
- Medium   2
- Low   1

4. EXPERIMENTAL PLANS

4.1   Preparation specimen:

In this work SS 431 & EN-8 were chosen since it can't be welded by obstruction welding or bend welding because high conductivity & it can't be welded by grinding welding at typical working parameters because low co-productive rubbing. This undertaking includes test think about on grating welding dis-comparative materials SS 431 & EN-8 Mild Steel. For all contact welding framework, speed Rotational will be, grinding weight were connected to parts & frictional time, producing weight & extinguishing medium wereguideline controlling factors which impact metallurgical & mechanical properties erosion welded joints. These unique joints along these lines arranged with rubbing welding procedures have been examined for elasticity, & hardness esteems. Every one examples were set up on an altered Lain MJCET Labs. power pack

& a water driven component were utilized to shift & apply contact & producing weights

4.2 Materialsused in experiment were:-

AISI 431 Martensitic Stainless Steel &EN8 Mild steel

Chemical Composition these materials was given in table below:-

Table 4.1 chemical compositionAISI 431 Martensitic stainless steel

Material	C	Si	Mn	S	P	Cr	Ni	Cu
AISI431 martensitic stainless steel	0.12-0.20	0.00-1.00	0.0-1.00	0.03	0.04	15.00-18.00	1.25-3.0	0.25

Table 4.2 chemical composition EN8D

Material	C	Si	Mn	S	P	Cr	Ni	Cu
EN8D Mild Steel	0.17-0.24	0.17-0.37	0.7-1.00	0.035	0.035	0.25	0.25	0.25

4.3 Specifications work piece:-

·	Diameter of Rod	12mm
·	Length of Rod (SS 431)	100mm
·	Length of Rod (EN-8)	150mm
·	Total length	250mm

4.4 Specifications machine:-

specifications FWM which was used for friction welded joint

·	F.W.M/c Type	FWT-12
·	Max weld area	800 mm^2
·	Min weld area	70 mm^2
·	Max bar capacity (solid dia)	16 mm
·	Min bar capacity (solid dia)	10 mm
·	Max length of rotating component	220 mm
·	Max length of non-rotating component	300mm
·	Max forge force	120kN
·	Spindle speed variable	1000-2000 RPM
·	Spindle bore depth from collet face	200mm
·	Slide stroke	350mm
·	Total connected wattage	30KVA
·	Supply voltage	400V/50HZ
·	Spindle drive	15KW
·	Control voltage	24VDC

4.5 Factors to be considered for Taguchi design matrix:-

factors considered in this experiment were friction pressure & speedwas kept constant where as Forging pressure, Quenching medium, Frictional timewas varied.

4.6 Response variables:-

response variables considered in this experiment were Tensile strength & hardness.

4.7 Experimental set up Friction welding:-

Fig. 4.1: Friction welding Machine

Figure4.2: Pressure Meter

4.8Hydraulic System for Friction Welding Machine:-

Fig. 4.3: Hydraulic System for Friction Welding Machine

Figure4.4: Hydraulic Lever o Maintain Pressure

4.9   EXPERIMENTAL PROCEDURE: -

test material was involved 12 mm width bars AISI 431 Martensitic Stainless Steel & EN-8 Mild Steel.

As per Taguchi outline, 18 examples 12mm width & 250 mm length were readied & grating welding activity was improved situation all examples on Friction welding machine. After that No. were composed on work pieces for recognizable pro.

Entered Predetermined estimations 3 factors (fashioning weight, frictional time & extinguishing medium) as indicated by Taguchi symmetrical ne2rk in to framework which was coupled to Friction welding machine.

Contact welding was performed utilizing a Continuous drive FWM in which one work piece was joined to a pivoting engine drive other was settled in hub movement framework & one work piece was turned at steady speed by engine. 2 work pieces were united under strain. At that point Rotating power was withdrawn from turning piece &weight was expanded. At point when pivoting piece stops, weld was finished. This procedure can be precisely controlled when extinguishing medium, weight & time were firmly directed. A similar procedure rehashed for add upto 9 runs.

These weld joints AISI 431 Martensitic Stainless Steel & EN-8 Mild Steel Were taken for hardness & Tensile Testing.

4.10Friction-welding factors used For 3 Levels 3 factors:-

Table 4.3: Friction welding factors for 3 levels

Levels Factors	High	Medium	Low
Forging pressure	34	32	30
Frictional time	110	100	90
Quenching medium	oil	Water	air

4.11L9 (3**3)Taguchi Orthogonal Array Design:-
L9 (3**3)Taguchi Orthogonal Array Design:-

Table 4.6: Taguchi Orthogonal Array Design L9 (3**3)

A	B	C
1	1	1
1	2	2
1	3	3
2	1	2
2	2	3
2	3	1
3	1	3
3	2	1
3	3	2

4.12 Parameter values in Taguchi Orthogonal Array:-

Table 4.6: Taguchi Orthogonal Array Design L9 (3**3)

Forging Pressure	Frictional Time (sec)	Quenching Medium
30	90	Air
30	100	Water
30	110	Oil
32	90	Water
32	100	Oil
32	110	Air
34	90	Oil
34	100	Air
34	110	Water

4.13Specimens before Welding:

Figure4.5specimens before welding

4.14Specimens after friction Welding:-

Figure4.6Specimens after friction Welding

4.15EXPERIMENT NO 1:-
4.15.1TENSILE TEST:-

In this Experiment tensile test was performed on friction welded joints AISI 431 Martensitic Stainless Steel & EN8 Mild Steel.

4.15.2EXPERIMENTAL PROCEDURE: -

PROCESS PARAMETERS	Level 1	Level 2	Level 3
Forging pressure	30	32	34
Frictional time	90	100	110
Quenching medium	Air	Water	Oil

In wake welding was performed, malleable tests were

Expt.No	Level I	Level II	Level III
1	1	1	1
2	1	2	2
3	1	3	3
4	2	1	2
5	2	2	3
6	2	3	1
7	3	1	3
8	3	2	1
9	3	3	2

done to assess elasticity   joints. ductile tests were completed on widespread testing machine with a heap cell limit   100KN at room temperature   25 degree centigrade, & a test speed 1mm/minute. test procedure includes putting test example in testing machine by one end was clasped by altering length contact welded joint by pivoting jaw securing h&le in best plate. What's more, another finish joint was clasped in best plate upper cross head. Once example was braced then test

was begun by applying load continuously. Once heap was come to extreme load erosion welded joint was broken into 2 pieces at joint .estimation extreme load was noted. What's more, a similar method was rehashed for outst&ing 8 runs. What's more, estimations   a definitive load were noted down for this 9 runs.

4.16L9 Orthogonal Array for Tensile:-
4.16.1   Friction-welding factors used For 3 Levels 3 factors:-

Table 4.3: Friction welding factors for 3 levels

Levels Factors	High	Medium	Low
Forging pressure	34	32	30
Frictionaltime (sec)	110	100	90
Quenching medium	oil	Water	air

4.16.2   Factors for DOE:-

- forging pressure   C1
- Frictional timeC2
- quenching medium C3

4.16.3   DESIGN   EXPERIMENT:-
Taguchi Design:

Type design: - 3 Level design
Taguchi Orthogonal Array Design   L9 (3**3)
No factors: 3
No runs: 9
No levels: 3
Columns L9 (3**3)

5. RESULTS & DISCUSSION
5.0EXPERIMENT NO 1:-
5.1Hardness   AISI 431 Martensitic stainless steel& EN-8:-

Hardness   AISI431 Martensitic hardened steel & En8d Mild Steel Were Calculated by taking diverse process parameters like fashioning weight frictional time & extinguishing medium & their levels, for example, level 1,level 2,level 3.individual parameters & their levels were appewered in table 5.1.

Table5.1 process parameters & their levels
5.1.1 L9Taguchi Orthogonal Array Design:-

  Table 5.2 Taguchi orthogonal array design for L9 (3^3)
above table demonstrates Orthogonal Array ne2rk L9 (3**3). In this First line demonstrates quantity variables which will be tried which were 3 for this situation. First segment demonstrates quantity Experiments that must be finished for Experiment, for this situation being 9. Alternate sections underneath demonstrate levels each factor, for this situation 3 i.e. (High-3, medium-2 & Low-1).

6. CONCLUSION

Mechanical behavior AISI 431 martensitic stainless steel & En8D after Friction welding werestudied by Taguchi design experiment &optimal value process variables for a higher hardness, tensile strength were found .& FEA Analysison specimen was carried out. &these resultswerecompwered with experimentalresults. optimal values were given in table 6.1.

optimal process parameters for tensile strength was found to be forging pressure (34mpa), frictional time (90sec), quenching medium (oil).

optimal process parameters for hardness was found to be forging pressure (32mpa), frictional time (100sec), quenching medium (oil).

main effect plots were studied using minitab stwwere for maximum tensile strength & higher hardness. Based on ANOVA highly effective parameters for tensile strengh was forging pressure & percentage contribution for tensile strength forging pressure was (40.80%). highly effective parameters for hardness was forging pressure & percentage contribution for hardness forging pressure was (35.61%).

Table 6.1 conclusion table

Mechanical properties	Process parameters		
	Forging pressure	Frictional time	Quenching medium
Brinell Hardness	32	100	oil
Tensile strength N/mm²	34	90	oil

Table 6.2 result table for Anova

Mechanical properties	Highly effective process parameters	Percentage contribution
Hardness	Forging pressure	35.61%
Tensile strength	Forging pressure	40.80%

.

Based on ANOVA highly effective parameters for hardness, tensile strength were found.percentage contribution each variable was shown in table 6.

SCOPE FOR FUTURE WORK

This research work was intended to study effect various process parameters friction welding operation on mechanical properties materials. Some mechanical properties were optimized. overall conclusions that can be drawn from this work &scope to extend this work in future werebending strength by different material &

different parameters like Rpm,frictional pressure & forging time can be studied.& also scope to extend FEA Analysison fatigue Analysis& thermal Analysisfor different materials.

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INVESTIGATION OF OPTIMUM STACKING SEQUENCE IN GLASS FIBER REINFORCED POLYMER STRUCTURES USING CLASSICAL LAMINATE THEORY

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Abstract- The popularity/usage of composites has increased recently in the aerospace, automobile and defense industries due to their lower production costs, light weight, higher fracture toughness, low thermal expansion, corrosion resistance and better control over the thermo- mechanical properties. The demand for improved performance of these structural materials makes it necessary to evaluate these materials under axial loading. Fiber-reinforced composites show strong anisotropic mechanical behavior due to their fiber orientations. These orientations cause a variety of failure mechanisms, which are more complex under axial loading conditions. In these work the stress, strain and deformation value has been evaluated to know the better understand and behavior of laminate of different unidirectional fiber orientation under plane stress conditions using MATLAB and ANSYS software. The graphical representations have been made to understand behavior of GFRP composite material.

Keywords-Matlab, Ansys, GFRP, classical laminate theory.

1. INTRODUCTION
A.   Composite Materials
Over 95% of the fibers used in reinforced plastics are glass fibers, as they are inexpensive, easy to manufacture and possess high strength and stiffness with respect to the plastics with which they are reinforced. Their low density, resistance to chemicals, insulation capacity are other bonus characteristics, although the one major disadvantage in glass is that it is prone to break when subjected to high tensile stress for a long time.

Therefore, data on the effects of moisture on retention of the mechanical properties of GFRP during long term environmental exposure are crucial for them to be utilized in outdoor applications. The environmental stress cracking characteristics of GFRP were studied using fracture mechanics samples under constant tensile load and water environment. For GFRP the characteristics of crack length as a function of exposure time. Ductile aramid fibers seemed to project the glass fiber reinforcement from stress cracking due to higher chemical resistance and complex failure mechanisms. In addition to the prediction of load transfer in the joint stress analysis was conducted to investigate the effect of bonded on the peel and shear stress distribution in the adhesive. The main objective of this work is to investigate the effects on flexural strength of GFRP composite materials subjected to hydrothermal aging and its life predication by mathematical modeling. In this work, the effects of environmental ageing on retention of flexural properties of GFRP are studied and qualitative correlation to between results from ageing and accelerated ageing is discussed [1].

2. LITERATURE SURVEY
To understand the physical changes that take place at the bonding interface between the fibres matrix, as it is of prime importance due to its link to the stress transfer, distribution of load and it also governs the damage accumulation & propagation[1]. Work describe the development and mechanical characterization of new polymer composites consisiting of glass fibre reinforcement, epoxy resin and filler materials such as TiO2 and ZnS. Experimental [2]. The classical lamination theory is very important in analysis of laminate because it will predict the stresses, strains, forces and moments relationships with reasonable accuracy. The composite materials are widely used in military aircraft, civil aircraft, space and automobile applications. ANSYS 11 software is used for analysis of composite laminate. First order shear stress deformation theory is used for the analysis of laminate in finite element technique [3]. The mechanical properties such as tensile, flexural, compression and Impact properties are studied as per ASTM standards. From the Experimental analysis, it was observed 20% ash reinforced polymer composite is having better tensile strength in comparison with other ash percentages [4]. desired properties by reducing the weight as much as possible [6]. The objective of this research was to gain a better understanding of tensile properties of epoxy resin composites reinforced with glass fiber. The effect of

fiber orientation & thickness of laminates has been investigated & experimentation was performed to determine property data for material specifications, the laminates were obtained by hand layup process. The laminates were cut to obtain ASTM standards. The test ready specimens were subjected to tensile loads on UTM machine. This research indicates that tensile strength is mainly dependent on the fiber orientation & thickness of laminated polymer composites [7]. Study is to develop optimization procedure to maximize the stiffness and minimize the weight of composite laminate subjected to in-plane loading .The design variables for optimization problem are fiber orientation angles, thickness of lamina and number of laminas. Maximum stress failure criteria are used to determine whether load bearing capacity is exceeded for a configuration generated during optimization process [8].

3. METHODOLOGY

A. Stress, Strain and Deformation Analysis of Composite Layered Laminate

The analyzed symmetric layered composite laminate has been made from four orthotropic laminas with equal thickness that had bonded together normal to their principal plane (L, T). In a symmetric laminate all above the midplane of laminate (a plane of symmetry) have the same angle as the ply in equivalent position below the midplane. By using generalized Hooke's Law in the principal material coordinates of an orthotropic lamina.The stress-strain relationships for a composite material in a linear elastic area can be written in shorthand matrix as;

$\sigma = C \varepsilon$ Or in inverted form $\varepsilon = S \sigma$ (1)

where [C] is the stiffness matrix and [S] is the compliance matrix of a lamina.

The engineering properties of an unidirectional lamina in the principal material coordinate axes (X, Y), are:

E_x– the longitudinal modulus of elasticity in the X direction,

E_y – the transverse modulus of elasticity in the Y direction,

G_{xy} – the shear modulus in (X, Y)-plane, and v_{xy} – the major Poisson's ratio.

The generalized Hooke's law for an orthotropic unidirectional lamina, Eq. (1), in the local lamina coordinates system (L, T), can be written in expressed form as:

$$\varepsilon_x = \frac{1}{E_x}\sigma_x - \frac{\square_{xy}}{E_y}\sigma_y, \varepsilon_y = -\frac{\square_{xy}}{E_x}\sigma_x + \frac{1}{E_y}\sigma_y, \gamma_{xy} =$$

$$\frac{1}{G_{xy}}\tau_{xy}, \frac{\square_{xy}}{E_x} = \frac{\square_{yx}}{E_y} \qquad (2)$$

For the case of the plane-stress state in orthotropic plate, hence $\sigma z = \tau zy = \tau zx = 0$ the inverse form of the Hooke's law, Eq. (1) is used, where the components of the reduced stiffness matrix [Q] of a lamina are given by term:

$$Q_{11} = \frac{E_X}{1-\square_{XY}\square_{YX}}, Q_{22} = \frac{E_Y}{1-\square_{XY}\square_{XY}}, Q_{12} = Q_{21} =$$

$$\frac{XY}{1-\square_{XY}\square_{XY}} = \frac{\square_{YX} Y}{1-\square_{XY}\square_{XY}}, \tilde{Q}_{66} = G_{XY} \qquad (3)$$

For stress-strain analysis of a laminated composite plate, it is necessary to obtain the inverse form of the lamina stress-strain relationship of Eq. (1) in the lamina off-axis coordinate system (x, y), Fig. 1.a, which in short matrix form is:

$\{\sigma\}xy = Q \{\varepsilon\}xy$ (4)

where the off-axis lamina stiffness matrix Q in the laminate (x, y)-coordinate system and the second order transformation matrix T , where are m = cosα, n = sinα, are given as:

$$Q = T^{-1} Q T , T = \begin{matrix} m^2 & n^2 & 2mn \\ n^2 & m^2 & -2mn \\ -mn & mn & m^2 - n^2 \end{matrix} \quad (5)$$

The stress strain relations in principal material coordinate for lamina of an orthotropic material under plane stresses are,

$$\begin{matrix} \sigma_x \\ y \\ \tau_{xy} \end{matrix} = \begin{matrix} Q_1 & Q_2 & Q_{16} \\ Q_{12} & Q_{22} & Q_{26} \\ Q_{16} & Q_{26} & Q_{66} \end{matrix} \begin{matrix} \varepsilon_x \\ y \\ \gamma_{xy} \end{matrix} \qquad (6)$$

where ,

$Q_1 = Q_{11}\cos^4\alpha + 2 Q_{12} + 2 Q_{66} \sin^2\alpha\cos^2\alpha + Q_{22}\sin^4\alpha$

$Q_2 = Q_{11} + Q_{22} - 4Q_{66} \sin^2\alpha\cos^2\alpha + Q_{12}(\sin^4\alpha + \cos^4\alpha)$

$Q_{22} = Q_{11} \sin^4\alpha + 2 Q_{12} + 2Q_{66} \sin^2\alpha\cos^2\alpha + Q_{22}\cos^4\alpha$

$Q_{16} = Q_{11} - Q_{12} - 2Q_{66} \sin\alpha\cos^3\alpha + Q_{12} - Q_{22} + 2Q_{66} \sin^3\alpha\cos\alpha$

$Q_{26} = Q_{11} - Q_{12} - 2Q_{66} \sin^3\alpha\cos\alpha + Q_{12} - Q_{22} + 2Q_{66} \sin\alpha\cos^3\alpha$

$Q_{66} = Q_{11} + Q_{22} - Q_{12} - 2Q_{66} \sin^2\alpha\cos^2\alpha + Q_{66} (\sin^4\alpha + \cos^4\alpha)$ (7)

However, we address into the principal material system. To do this, we have to employ the transformation relation for stress and strain, specifically as in below equation.

$$\begin{matrix} \sigma_1 \\ \sigma_2 \\ \tau_{12} \end{matrix} = T \begin{matrix} \sigma_x \\ \sigma_y \\ \tau_{xy} \end{matrix} \quad and \quad \begin{matrix} \varepsilon_1 \\ \varepsilon_2 \\ \gamma_{12} \end{matrix} = T \begin{matrix} \varepsilon_x \\ \varepsilon_y \\ \gamma_{xy} \end{matrix} \quad (8)$$

And as we have to analyses deformation of the laminate that stresses are uniform throughout the laminate, the strains are uniform throughout the laminate. By definition,

$\varepsilon_x = \frac{\delta\Delta_x}{\Delta_x}$ along x direction of laminate; $\varepsilon_y = \frac{o\Delta_y}{\Delta_y}$ along y direction of laminate, .

and $\varepsilon_z = \frac{\delta\Delta_z}{\Delta_z}$ along thickness of laminate ------------------- (9)

where $\delta\Delta_x, \delta\Delta_y, \delta\Delta_z$ denote as the change in the length of laminate in x, y, & z directions respectively and $\Delta_x, \Delta_y, \Delta_z$ are the original length of laminate in x, y, & z directions respectively.

The deformation of laminate are given by the equations, namely

$\delta\Delta x = \Delta x \varepsilon x$, $\delta\Delta y = \Delta y \, \varepsilon y$ and $\delta\Delta z = \Delta z \, \varepsilon z$ (10)

So the deformed dimension are taken as

$\Delta x + \delta\Delta x = ?$

$\Delta y + \delta\Delta y = ?$ and

$\Delta z + \delta\Delta z = ?$ (11)

Assumption in Classical lamination theory.

i.   Each lamina is orthotropic.
ii.   Each lamina is homogeneous
iii. A line straight and perpendicular to middle surface remains straight and perpendicular to middle surface during deformation.
iv.   The laminate is thin and is loaded only in its plane(plane stress) ($\sigma z = \tau x z = \tau y z = 0$)
v.   Displacements are continuous and small throughout the laminate
vi.   Each lamina is elastic
vii. No slip occurs between lamina interfaces.

Volume Fractions:
Consider a composite material that consists of fibers and matrix material. The volume of the composite material is equal to the sum of the volume of the fibers and the volume of the matrix.

Therefore,

$vC = vf + vm$

Where

vc - volume of composite material vf - volume of fiber
vm - volume of matrix

The maximum stress failure criterion, as it applies to the plane-stress case, can be stated as:

The maximum shear stress in the 1-2 plane equals the maximum shear stress in a specimen of a same material loaded in shear in the 1-2 plane when it fails.

Note the either-or nature of the criterion. Failure can occur for more than one reason. In addition, first two portions of the criterion each involves tension and compression. Symbolically, the maximum stress criterion states that a fibre-reinforced material will not fail if at every point

$\sigma 1C < \sigma 1 < \sigma 1T$
$\sigma 2C < \sigma 2 < \sigma 2T$
$\tau 12 < \tau 12S$ (12)

While satisfaction of inequalities of equation (12) guarantees, according to the criterion, no failure, it is the equalities associated with equation (12) that are important for determining failure loads. These equalities are

$\sigma 1 = \sigma 1C \; \sigma 1 = \sigma 1T \; \sigma 2 = \sigma 2C \; \sigma 2 = \sigma 2T$
$\tau 12 = -\tau 12S$
$\tau 12 = \tau 12S$ (13)

Equation (13) defines the boundaries of the no failure region in principal material coordinate system stress space $\sigma 1 - \sigma 2 - \tau 12$. In this space each of the above equations defines a plane, and the totality of the planes defines a rectangular volume. Because of the difference in the tensile and compression failure loads, geometric center of the volume does not coincide with the origin of the stress space.

B.   Standards For Specimen Test
ASTM D-3039 for Tensile Test (250mmx25mmx4mm) [Reference no. (2)]
ASTM   D-3410   for   Compressive   Test (140mmx12.7mmx3mm) [Reference no. (4)]

C.   Volume Fraction of Composite
Let, the fiber volume fraction vf and the matrix volume fraction vm be defined as

V = vf and V = vm
f   vc   m   vc

 such that the sum of volume fractions is

Vf + Vm = 1

Oriented at 60°, volume fraction 60% of glass fibre, 40% of epoxy which is subjected to axial load of 12kN [Reference no. (1)] in X-direction. (Fibre direction).

D.   Simulation Procedure
In model generation, here we have different options; we selected structure and h-method. The next step, in preprocessor, element type we select SHELL and linearlayer99, SHELL99 may be used for layered applications of a structural shell model. SHELL99 allows up to 250 layers. If more than 250 layers are required, a user-input constitutive matrix is available and again in preprocessor, real constants, we give

material number, no. of layers, orientations of fibre and thickness of layers.

Selecting material number, orientations and thickness of laminate in real constant. Then selecting material properties, materials models, elastic and orthotropic here we enter elasticity, poison ratios and shear stress values. In modeling of laminate, create > areas select rectangle then by 2 corners, we give width 250 and height 25.
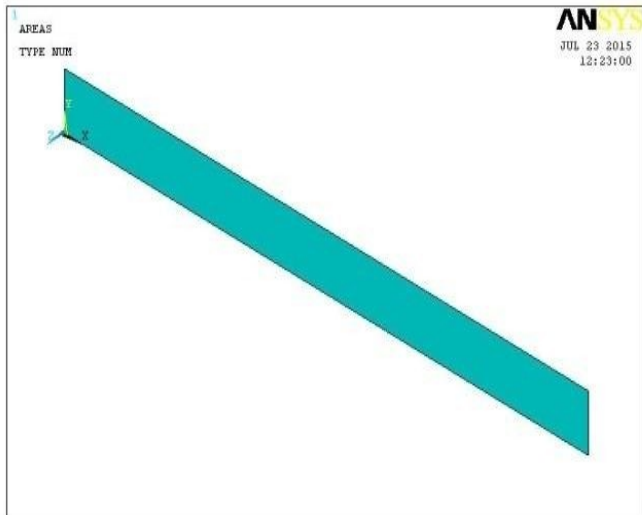
Figure 1: Isometric view of Laminate at 450 fibre orientation

Meshing a laminate, here first we have to give edge length in size controls through manual size, areas, all areas and edge length and again in preprocessor, mesh, areas, mapped ,3 or 4 sided and selecting the laminate, to mesh fibre laminate. After meshing we can easily fixed the laminate and define loads as according to the work. All the tedious work of formulating and assembling of matrices are done by the computer. First in displacements, on nodes, we fixed the laminate in all degree of freedom then we define the load in tensile and compression by giving load value, to know the behavior of composite laminate.
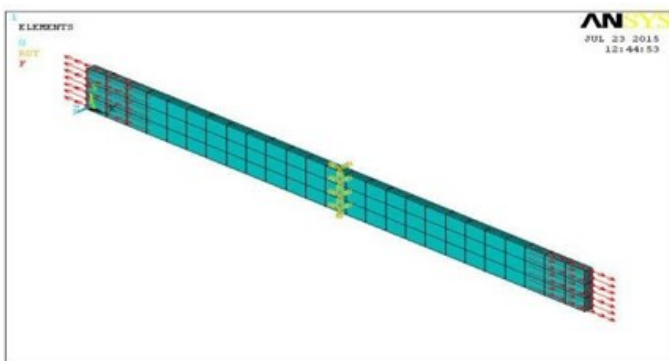
Figure 2: Isometric view of GFRP laminate under uniaxial tensile load

In post processor program using inter-active color graphics. Here we find the von Mises of fibre laminate at 450 orientation.
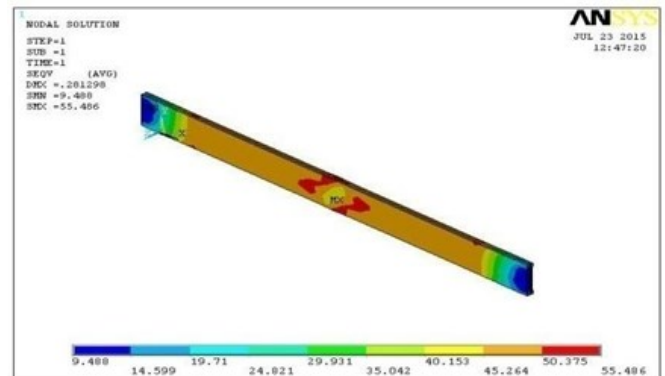
Figure3: Isometric view of von Mises stress of laminate at 450 fibre orientations under Tensile load

4. RESULTS AND DISCUSSIONS

A. Mat lab Results

Matlab program was written to find out the stresses, strains and deformation of composite laminates. To eliminate the errors occurred in calculation.
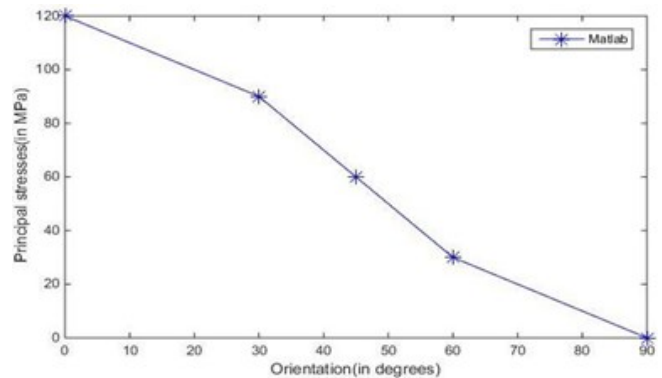
Figure 4: Plot for plane stress condition under tensile loading in matlab – Orientation Vs Principal stresses
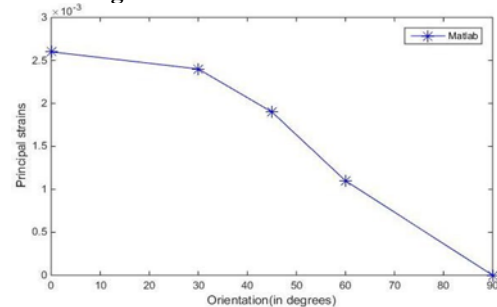
Figure5: Plot for plane stress condition under tensile loading in Matlab – Orientation Vs Principal strains
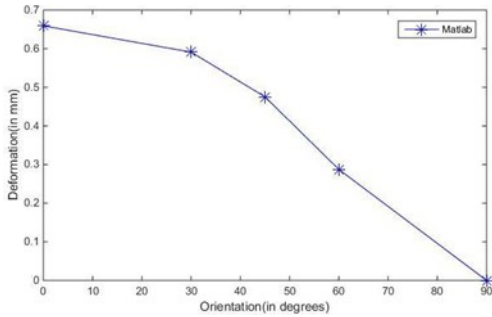
Figure 6: Plot for plane stress condition under tensile loading analytically – Orientation Vs Deformations
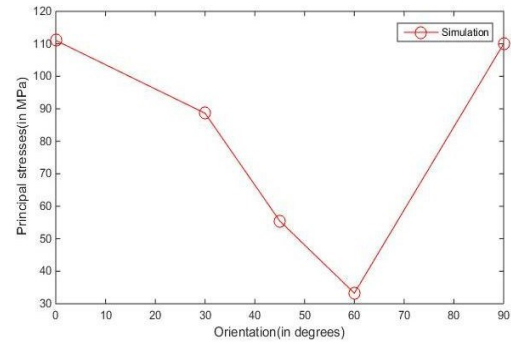
Figure 10: Plot for plane stress condition under tensile loading in Ansys – Orientation Vs Principal stresses
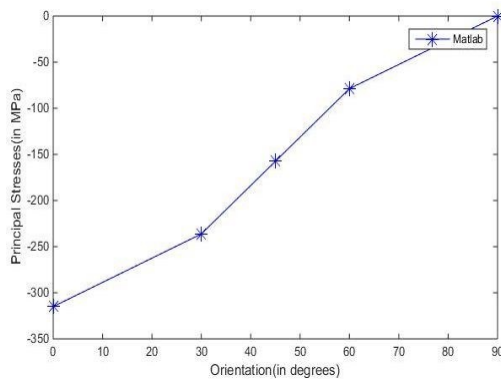
Figure 7: Plot for plane stress condition under compressive loading in matlab – Orientation Vs Principal stresses
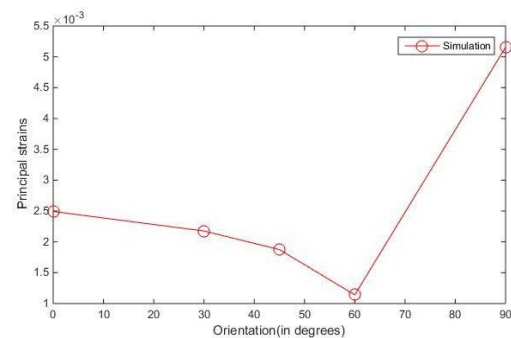
Figure 11: Plot for plane stress condition under tensile loading in Ansys – Orientation Vs Principal strains
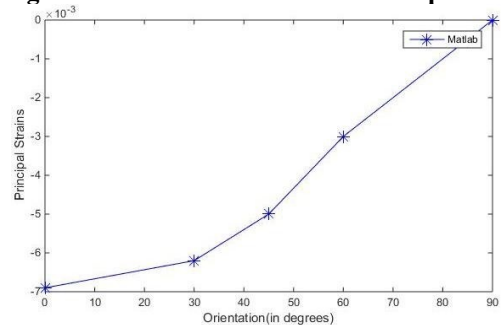
Figure 8: Plot for plane stress condition under compressive loading in matlab – Orientation Vs Principal strains
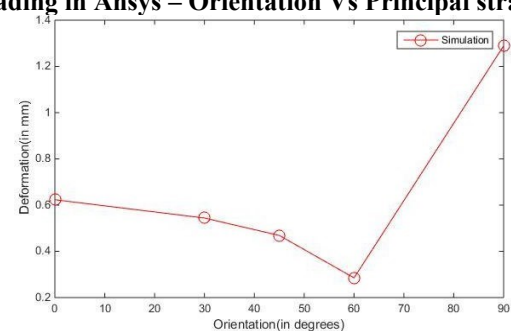
Figure 12: Plot for plane stress condition under tensile loading in Ansys – Orientation Vs Deformations
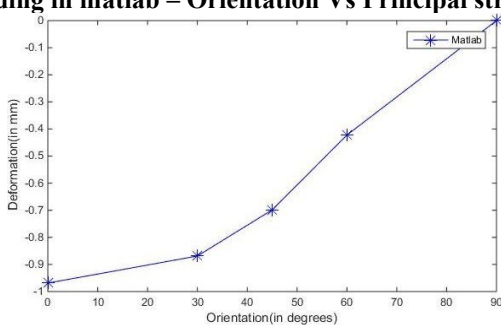
Figure 9: Plot for plane stress condition under compressive loading in matlab – Orientation Vs Deformations

B.   Ansys Results

Ansys software 11.0 is all purpose tool used to simulate, a real problems of composite materials through linear (static and dynamic model) is used to validate the results obtained.
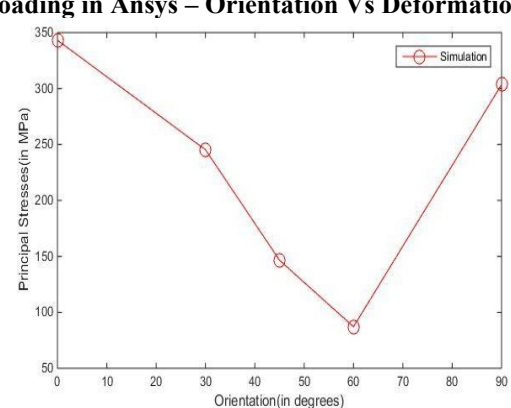
Figure 13: Plot for plane stress condition under compressive loading in Ansys – Orientation Vs Principal stresses
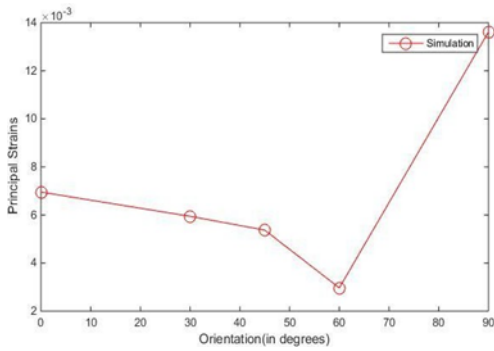
Figure 14: Plot for plane stress condition under compressive loading in Ansys – Orientation Vs Principal strains
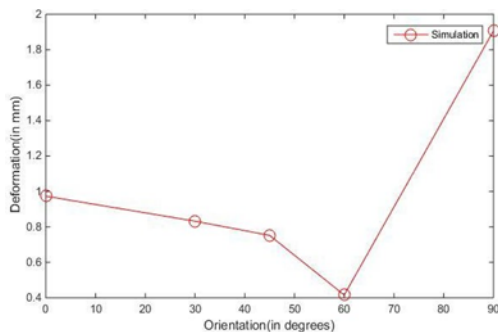
Figure 15: Plot for plane stress condition under compressive loading in Ansys – Orientation Vs Deformations
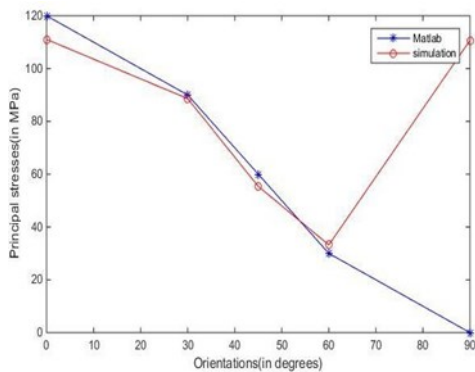
Figure 16: Plot for tensile load under plane stress condition comparing principal stress values of matlab and simulation
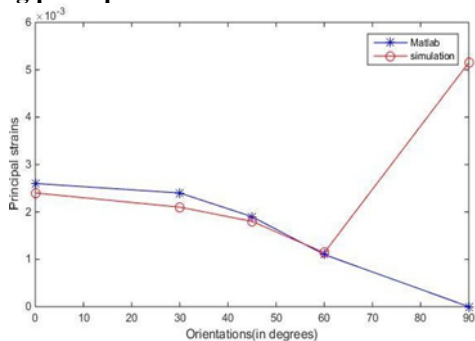
Figure 17: Plot for tensile load under plane stress condition comparing principal strains values of matlab and simulation
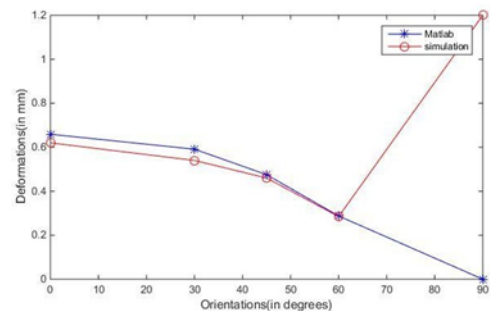
Figure 18: Plot for tensile load under plane stress condition comparing deformation values of matlab and simulation
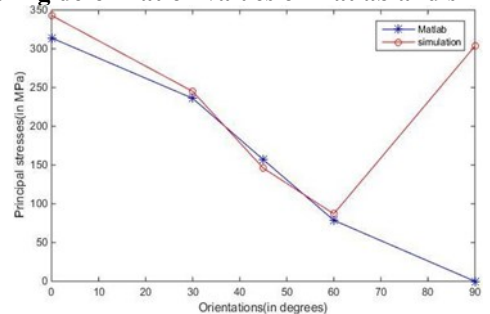
Figure 19: Plot for compressive load under plane stress condition comparing principal stress values of matlab and simulation
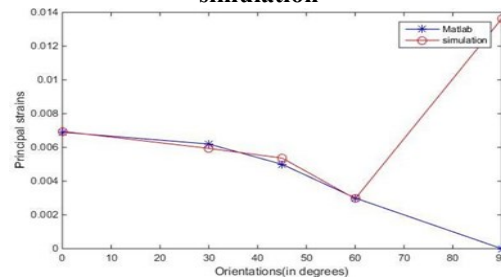
Figure 20: Plot for compressive load under plane stress condition comparing principal strains values of matlab and simulation
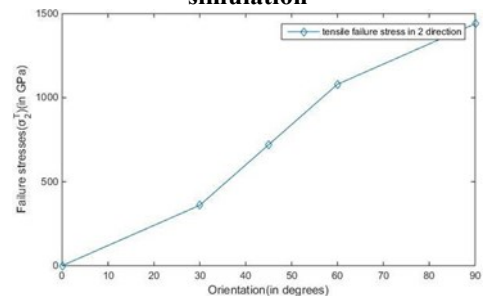
Figure21: Plot for plane stress condition under tensile loading – Failure stresses σ2T Vs Orientations
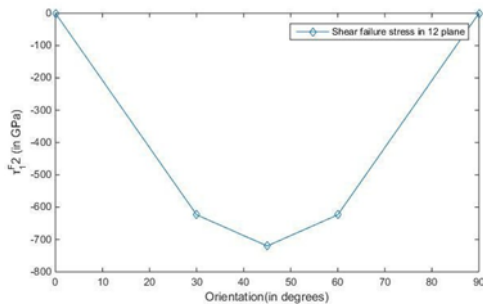
Figure 22: Plot for plane stress condition under tensile loading – Failure stresses τ12F Vs Orientations
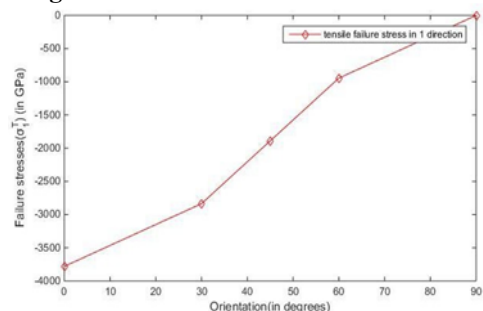
Figure 23: Plot for plane stress condition under compressive loading – Failure stresses σ1T Vs Orientations
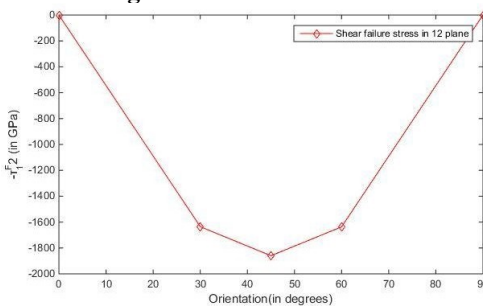
Figure 24: Plot for plane stress condition under compressive loading – Failure stresses −τ12F Vs Orientations
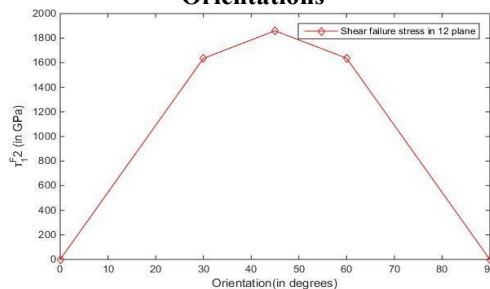
Figure 25: Plot for plane stress condition under compressive loading – Failure stresses τ12F Vs Orientations

5. CONCLUSION

The classical laminate theory is very important tool for predicting the behavior of composite materials. The following were the conclusions observed:

1. he fiber angle ±600 holds good in terms of deformations when compare to other fiber angles under tensile and compressive loading.

2. In terms of principal stress 00 fiber angles holds good than other fiber angles under tensile and compressive loading.

3. In fiber angle ±600 the principal strain obtained was minimum when compared to other fiber angles under tensile and compressive loading.

Finally it is concluded that the fibre angle at 00, 600 are optimum angles when working with GFRP materials. Therefore it is concluded that effect of fiber orientation in composite material plays a vital role for obtaining good results. The results obtained from these work are useful in the design of structural applications.

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10. Mechanics of Composite Materials with MATLAB by George Z. Voyiadjis Peter I. Kattan

DIFFERENT MODELS FOR ZNO NANOTUBE BASED PHOTO-ELECTRODES FOR DYE-SENSITIZED SOLAR CELLS: A REVIEW

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Abstract— ZnO photo-electrodes modified by two-steps coating-etching process with chemical wet etchants for dye-sensitized solar cell were investigated. The ZnO films were coated on a fluorine-doped tin oxide glass substrate and etched by mixed acid solution of HC_l: HNO_3: distilled water, washed, and thermally treated for the first step. The second step, films coating process was repeated and etched by base solution of diluted NH_4OH in distilled water. Surface morphologies of unmodified and modified ZnO films look similar DSSCs with modified photoelectrodes showed efficiency enhancement with maximum power conversion efficiency of 2.29%. Surface-grown ZnO nanotubes have to be synthesized by a chemical solution method, hydrothermal method and by surfactant- assisted in-situ chemical etching on a glass plate coated with ZnO seed layer via thermally decomposing zinc acetate at proposed temperature 280°C. The morphological and structural analyses have to be investigated by optical polarizing microscope, Atomic Force Microscopy (AFM), Field-emission scanning electron microscopy (FE-SEM) and X-ray diffraction (XRD) spectral analysis. It is proposed to investigate that the ZnO nanotubes will be synthesized via surfactant-assisted in-situ chemical etching strategy to produce mesoflower-like structures with hexagonal structure everywhere and has to be confirmed through FE-SEM analysis. The ZnO nanotube based photo-anodes produced by the proposed investigations are to be highly expected to contribute towards the improvement in the efficiency of nanocrystalline Dye-Sensitized Solar Cells (DSSCs). This will be more beneficial in future usage of ZnO NTs in different fields and applications. Particularly, this approach opens the ways in research and development for high volume manufacturing of low-cost, flexible optoelectronics devices on disposable paper substrates and can be used in the future miniaturization trends.

Keywords—ZnO, nanotubes, Photoelectrodes, DSSC.

1. INTRODUCTION

Conventional dye-sensitized solar cell (DSSC) composed of three main parts included photoelectrode, counterelectrode and electrolyte. Wide band gap semiconductor is generally coated on transparent conducting oxide films (TCO) to form as the photoelectrode. TiO2 and ZnO are mostly reported in DSSC due to stability and simple for synthesis One-dimensional nanostructures of ZnO are very important semiconductor building blocks with unique and novel physical and chemical properties.Various morphologies of ZnO nanostructures, such as nanowire arrays, nanorods, nanobelts and nanotubes, have been synthesized using physical, chemical and electrochemical methods. As for energy harvesting, ZnO nanowire (NW) array based piezoelectric nanogenerators have been demonstrated to convert mechanical energy into electricity by utilizing the coupled semiconducting and piezoelectric properties of ZnO. Dye-sensitized solar cells (DSSC) have been studied extensively as a potential alternative to conventional inorganic solid solar cells. Considerable efforts have been devoted to the development of more efficient photoanode materials including ordered meso-structured materials. Highly ordered semiconductor oxide nanotube arrays are particularly attractive, which enhances power conversion efficiency due to its enhanced surface area for the attachment of dye molecules on the photoactive oxide material. ZnO is a promising, but less explored wide band gap semiconductor oxide used for DSSC fabrication. The photoelectrode is focused as an important part because it looks like electron generator of the device. Surface modification techniques can be used to improve the photoelectrode such as plasma treatment, sparking process and etching process [6-8]. It's much higher carrier mobility is more favorable for the collection of photo induced electrons. Taking into account of these factors the present problem is framed to have a detailed study of the effect of morphological and structural parameters on the fabrication of photoelectrodes for DSSC applications. The proposed

investigation provides simple and efficient methods for the construction of nanostructured photoelectrodes for solar cell applications and also provides a strategy for constructing self-powered nano devices.

In this work, ZnO photoelectrodes modified by two-steps coating-etching process with chemical etchants for DSSCs and their photoconversion properties will be investigated. The two-steps coating-etching process will be included namely; two-steps coating process and two-steps etching process. DSSCs with modified photoelectode showed efficiency enhancement by increasing of *FF(Fill Factor)* and can be attributed to formation of pores structure in ZnO films during etching process. Results showed that the nanotubes have equivalent performance as the nanowires for energy conversion at least in the magnitude of the output voltage.

2. LITERATURE

André Felipe Vale da Fonseca. et. al. describes in his paper that electrodeposition of Europium-doped Zinc Oxide (ZnO) nanorods as well its application as photoanodes in dye sensitized solar cells (DSSCs). The incorporation of the Europium in the ZnO structure was evidenced by X-ray diffraction (XRD) and X-ray photoelectron spectroscopy (XPS). The DSSCs based on Eu-doped nanorods photoanodes exhibits a higher conversion efficiency value (η) (0.50%) compared to the undoped photoanodes (0.34%). Mott-Schottky analysis was performed and this increase is assigned to the better electronic injection efficiency from the dye to the conduction band of Eu-doped ZnO nanorods, The improvement on the DSSC performance was around 45%, showing the great potential from the practical point of view. To complement the experimental data, computational simulations were employed based on DFT framework, in order to carry out a detailed analysis of the electronic structures of these materials, as well as to provide an elucidation of its underlying physical mechanism at an atomic level [9].

Guodong Xia. et. al. in his work found that nucleate boiling heat transfer of a water-based multi-walled carbon nanotubes (MWCNTs) nanofluid in a confined space first, the effects of four different surfactants on the stability of the nanofluids were investigated and the suitable surfactant gum acacia (GA) was selected for the boiling experiments. Then, the boiling experiments of the nanofluids with various volume fractions (0.005% - 0.2%) of the MWCNTs were conducted at a sub-atmospheric pressure of $1\times10\text{-}3$ Pa and the test heat fluxes are from 100 to 740 kW/m2. Furthermore, GA with four different mass fractions was respectively dissolved in the nanofluids to investigate the effect of the

GA concentration on the boiling heat transfer. The effects of the heat flux, the concentrations of the MWCNTs and surfactants, the bubble behaviors and the surface conditions after the boiling processes have been analyzed. The results showed that the MWCNTs nanofluid can enhance boiling heat transfer as compared to the base fluid. This is mainly caused by the nanoparticles deposition on the boiling surface result in increasing the surface roughness and reducing surface contact angle. It is also found from his study that addition of GA can inhibit the deposition of the nanoparticles but may reduce the boiling heat transfer coefficient of the nanofluids. According to his experimental results, the maximum heat transfer coefficient enhancement 26 ratio can reach 40.53%. It is also noticed that the heat transfer enhancement ratio decreases with increasing the heat flux at lower heat fluxes from 100 to 340 kW/m^2 while it increases with increasing the heat flux at higher fluxes from 340 to 740 kW/m^2. At the lower heat fluxes, the deposition layer increases the frequency of bubble formation and thus the boiling heat transfer is strengthened. While at the high heat fluxes, the increasing heat flux may strengthen the capability of the nanoparticles deposition and the disturbance of the nanoparticles and increase the enhancement ratio of heat transfer coefficient [10].

Oleg Lupan. et. al. investigated in his study the influence of carbon nanotube (CNT) hybridization on ultraviolet (UV) and gas sensing properties of individual and networked ZnO nanowires (NWs). In case of CNT decorated ZnO nanonetworks, the influence of relative humidity (RH) and applied bias voltage on the UV sensing properties was thoroughly studied. By rising the CNT content to about 2.0 wt% (with respect to the entire ZnO network) the UV sensing response is considerably increased from 150 to 7300 (about 50 times). With respect to gas sensing, the ZnO-CNT networks demonstrate an excellent selectivity as well as a high gas response to NH$_3$ vapor. A response of 430 to 50 ppm at room temperature was obtained, with an estimated detection limit of about 0.4 ppm. Based on those results, several devices consisting of individual ZnO NWs covered with CNTs were fabricated using a FIB/SEM system. The highest sensing performance was obtained for the finest NW with diameter (D) of 100 nm, with a response of about 4 to 10 ppm NH$_3$ vapor at room temperature [11].

Marwa F. Elkady. et .al. stated in his work that was great impact of a material's surface area on adsorption processes, hollow nanotube magnetic zinc oxide with a favorable surface area of 78.39 m2/g was fabricated with the assistance of microwave technology in the presence of poly vinyl alcohol (PVA) as a stabilizing agent

followed by sonic precipitation of magnetite nano-particles. Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) micrographs identified the nanotubes' morphology in the synthesized material with an average aspect ratio of 3. X-ray diffraction (XRD) analysis justified combination of magnetite material with the hexagonal wurtzite structure of ZnO in the prepared material. The immobilization of magnetite nanoparticles on to ZnO was confirmed using vibrating sample magnetometry (VSM). The sorption affinity of the synthesized magnetic ZnO nanotube for phenolic compounds from aqueous solutions was examined as a function of various processing factors. The degree of acidity of the phenolic solution has great influence on the phenol sorption process on to magnetic ZnO. The calculated value of ΔH^0 designated the endothermic nature of the phenol uptake process on to the magnetic ZnO nanotubes. Mathematical modeling indicated a combination of physical and chemical adsorption mechanisms of phenolic compounds on to the fabricated magnetic ZnO nanotubes. The kinetic process correlated better with the second-order rate model compared to the first-order rate model. In his result indicates that the predominance of the chemical adsorption process of phenol on to magnetic ZnO nanotubes [12].

Avinash Rokade. et. al. in his paper Solution-based controlled morphological 1D ZnO nanorods (NRs) and nanotubes (NTs) were synthesized by a very simple and versatile electrodeposition method. The X-ray diffraction, UV-Vis spectroscopy, and scanning electron microscopy were used to characterize phase, composition quality and optical properties of synthesized ZnO NRs and NTs. The growth mechanism, morphological evolutions, structural intactness of ZnO NRs, NTs, and their subsequent use as photoanode for efficient photoelectrochemical splitting of water were discussed in detail. ZnO NTs exhibited markedly enhanced photocurrent density of 0.67 mA/cm^2 at 0.5 V vs SCE over NRs and also benefited from more negative flat band potential for hydrogen evolution [13].

Jinxia Ma. et. al. describes that the new production method of zinc oxide (ZnO)-starch nanocomposite were found. Starch was dissolved in zinc chloride ($ZnCl_2$) solution (65 wt%) at 80 °C. Then, ZnO-starch nanocomposite was achieved when the pH of the solution was adjusted to 8.4 by NaOH solution (15 wt%). ZnO nanoparticles were also obtained when the generated ZnO-starch nanocomposite was calcined at 575 °C. The properties of ZnO-starch nanocomposite and ZnO nanoparticle were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), and transmission electron microscopy (TEM). In his

results he found that the sizes of ZnO-starch composite and ZnO particle were 40–60 nm. UV blocking effect was observed from both ZnO-starch nanocomposite and ZnO nanoparticle. The ZnO-starch nanocomposite was used to directly coat the surface of plain paper with a laboratory paper coater. The surface strength and smoothness of paper were improved by the coating of ZnO-starch nanocomposite. The antibacterial property was also known from the coated paper [14].

Z Sobri. et. al. in his paper the metal oxide nanoparticles such as zinc oxide are increasingly being recognized for potential use in research and health-related application. They are incorporated in the modern health care products functioning as antimicrobial properties. These inorganic compounds could be applied for antimicrobial paper. The growth distribution of zinc oxide nanoparticles prepared via in-situ approaches on unbleached and bleached pulps. In order to produce these pulps, hydrothermal method is used. The micrograph obtained from the scanning of Field Emission Scanning Electron Microscope exhibited that zinc oxide nanoparticles appeared in the range of 64.1 nm to 87.5 nm supported by the analysis of Field Emission Scanning Electron Microscopy with Energy Dispersive X-Ray analysis, as high as 27% zinc and 39% oxygen. The expected, zinc oxide nanoparticles decreased the mechanical properties of paper due to the interference of fiber bonding [15].

Vividha Dhapte. et. al. describes that the Zinc oxide (ZnO)–polycarbonate (PC) nanocomposite films were preared by blade coating method by using pre-synthesized spherical ZnO nanoparticles of 15–20nm size and pre-dissolved polycarbonate. The blend was homogenized by sonication and the films were dried in an oven at moderate temperature. The various types of films with different % loading of ZnO nanoparticles in PC were prepared and their effect on antibacterial properties were found. He observed that the increasing wt-% loading of ZnO nanoparticles in PC leads to enhanced antibacterial properties against Staphylococcus aureus (S. aureus) and Escherichia coli (E. coli). The newly prepared ZnO nanoparticles were thoroughly characterized by XRD, SEM, UV-visible and photoluminescence spectroscopy before their use in preparing nanocomposite films. Contact angle measurement of the films were studied to ascertain their hydrophobic behavior. Such nanocomposite films have potential in various packaging applications because of their effective antibacterial and UV-blocking properties and hydrophobic nature [16].

D. H. Galvan. et. al. in his work the experimental and theoretical studies were performed on Single Wall Carbon Nanotubes (SWCN)decorated with ZnO nanoparticles located on the surface of the SWCN.

Measurements of High Resolution Transmission Electron Microscopy (HRTEM) and Photoluminescence were performed, and theoretical calculations were carried out under the Extended Hückel Tight Binding Approximation. HRTEM results dispense information about the existence of SWCN with ZnO nanoparticles on top. An considerably enhancement in the Photoluminescence (PL) behavior of the hybrid system were found as compared to pristine SWCN. Evaluated energy bands of the pristine SWCN provide an energy gap of 0.06 eV. Whereas the ZnO cluster is located onto the SWCN the new system behaves as a metal. The analysis of total and Partial Density of States (PDOS) provides information about each atom orbital contribution to the total DOS. It is found that carbon contributes with p-orbitals while Zn contributes with p-orbitals and a very small contribution of d-orbitals. The overlap of all these contributions produces hybridized orbitals, which may likely to be responsible for the enhancement of Photoluminescence on the new hybrid system [17].

3. CONCLUSIONS

In Eu-doped ZnO nanorods was successfully synthesized and applied as photoanodes in dye sensitized solar cells. The doping of the ZnO nanorods with Euwas evidenced by XRD which evidencing a small shift on 2q values of (100) diffraction peak for the Eu-doped nanorods, and also by XPS analysis, in which the content of Europium was around of 10.51% with relative content of ~29.1% of Eu2þ and ~70.9% of Eu3þ. Our theoretical findings reveal the effect of Eu-doping on the electronic structure of ZnO and are in very good agreement with our experimental results. The improvement is assigned to the better electronic injection efficiency from the dye to the CB of ZnO nanorods, i.e., due to the shift in the CB after the europium incorporation in the ZnO crystalline lattice. The conversion efficiency values (h) for the Eu-doped based DSSCs were 0.50%, which was around 45% higher in comparison with the undoped nanorods, (0.34%) showing the great potential from the practical point of view to increase the use of ZnO in solar cells.

In conclusion, we have studied the DMSO solvent washing treatment effect on the PEDOT:PSS film properties, perovskite film quality, and corresponding perovskite device performance. The results exhibited that the DMSO solvent washing treatment could significantly enhance the film conductivity, charge carrier transfer efficiency, and the quality of perovskite. Hence, devices with the treated PEDOT:PSS layer exhibited improved J_{sc} and PCE.

Hollow structured magnetic zinc oxide nanotubes were successfully synthesized using the microwave method in the presence of PVA as a stabilizing agent followed by sonic precipitation of magnetite nano-particles. The prepared material was examined using X-ray diffraction, scanning electron microscopy, transmission electron microscopy and vibrating sample magnetometer techniques to confirm its purity, nano-size and magnetic properties, respectively. Improvement in both the phenol solution temperature and material dosage has a positive impact on the percentage of phenol decontamination.

This mathematical equilibrium modeling suggested that phenol decontamination using magnetite ZnO nanotubes includes both chemical and physical adsorption processes. Finally three kinetics models comprising pseudo-first-order reaction rate, pseudo-second-order reaction rate and Elovich models were used to examine the phenol adsorption process. It was evident that the adsorption of phenol on to the magnetic zinc oxide nanotubes was described well by the pseudo-second-order reaction rate model, which allows a prediction that the studied sorption system is controlled by a chemisorption process

In this experimental successfully fabricated 1D nanostructures (NRs and NTs) of ZnO on a FTO substrate through a facile electro deposition method. The influence of two different morphologies of ZnO on PEC measurements for hydrogen production was studied and discussed in detail. ZnO NTs exhibit remarkably enhanced PEC response with enhanced photocurrent density, excellent stability, and much superior characteristics then NRs. These characteristics can be attributed to increased surface area. Our work provides a very simple, economical, and scalable method for designing ZnO NRs and NTs with high PEC response. There are still lots of challenges that need to be probed for both ZnO NRs and NTs. Since the surface morphology,

surface area to volume ratio and optoelectronic properties

can affect the performance of realized device. Therefore, continuous research efforts and new developments would open new prospects for different types of applications based on ZnO NRs and NTs such as chemical and biological sensors, novel optoelectronic, and photonic devices.

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MULTIPURPOSE AGRICULTURE ROBOT

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Abstract;The paper aims on the design, development and the fabrication of the robot which can dig the soil, put the seeds, leveler to close the mud and sprayer to spray water, these whole systems of the robot works with the battery and the solar power. More than 40% of the population in the world chooses agriculture as the primary occupation, in recent years the development of the autonomous vehicles in the agriculture has experienced increased interest. The vehicle is controlled by Relay switch through IR sensor input. The language input allows a user to interact with the robot which is familiar to most of the people. The advantages of these robots are hands-free and fast data input operations. In the field of agricultural autonomous vehicle, a concept is been developed to investigate if multiple small autonomous machine could be more efficient than traditional large tractors and human forces. Keeping the above ideology in mind, a unit with the following feature is designed. Our project focuses on remote controlling and slight automating the tractor with sensors so as to get daily farming tasks done with ease. Here we try to automate some farming tasks such as remote controlled tractor and water spraying
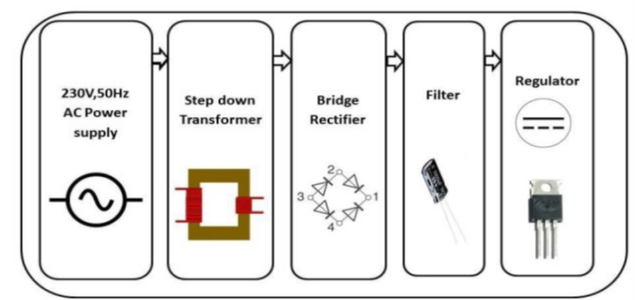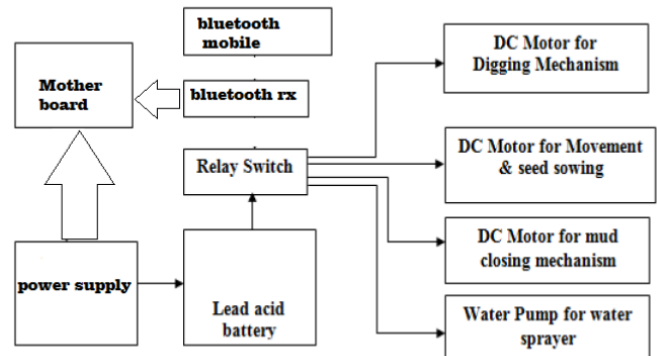
Keywords: Agricultural Robot, Solar Powered, Relay

1. INTRODUCTION

The project aims in designing a Robot that can be operated using Android mobile phone. The controlling of the Robot is done wirelessly through Android smart phone using the Bluetooth feature present in it. Here in the project the Android smart phone is used as a remote control for operating the Robot. The robot in the project can be made to move in all the four directions using the Android phone. The direction of the robot is indicated using LED indicators of the Robot system. In achieving the task the controller is loaded with a program written using Embedded 'C' language.

1.1 Block Diagram

Bluetooth device is interfaced to the control unit on the robot for sensing the signals transmitted by the android application. This data is conveyed to the control unit which moves the robot as desired. An AVR microcontroller is used in this project as control device. Remote operation is achieved by any smart-phone/Tablet

etc., with Android OS, upon a GUI (Graphical User Interface) based touch screen operation.
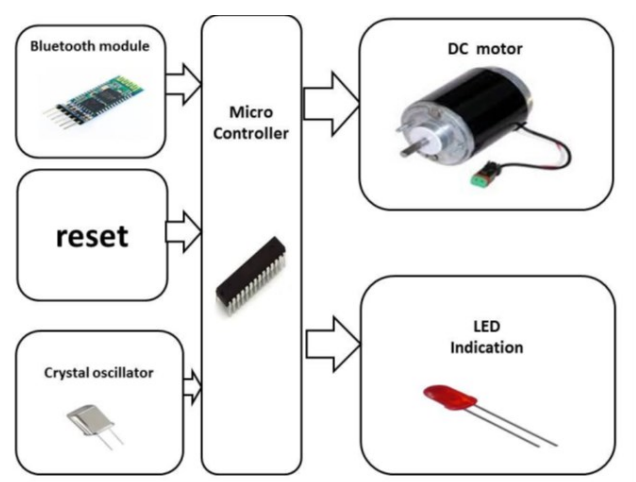
Transmitting end uses an android application device remote through which commands are transmitted. At the receiver end, these commands are used for controlling the robot in all directions such as forward, backward and left or right and captures the video and transmits to TV through RF signal At the receiving end the movement is achieved by two motors that are interfaced to the microcontroller. Serial communication data sent from the android application is received by a Bluetooth receiver interfaced to the microcontroller. The program on the microcontroller refers to the serial data to generate respective output based on the input data to operate the motors through a motor driver IC. The motors are interfaced to the control unit through motor driver IC.

2.OVERVIEW OF EMBEDDED SYSTEM ARCHITECTURE

Every embedded system consists of custom-built hardware built around a Central Processing Unit (CPU). This hardware also contains memory chips onto which the software is loaded. The software residing on the memory chip is also called the 'firmware'. The embedded system architecture can be represented as a layered architecture as shown in Fig.
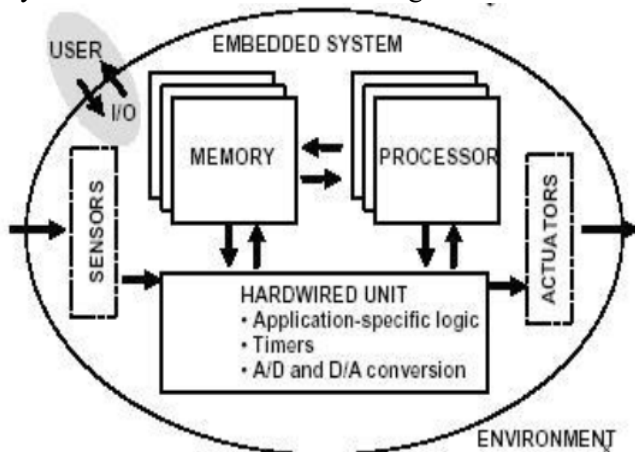
Fig 2 Parts of an Embedded System

Embedded Systems plays a vital role in our day today life. They are used for household appliances like microwave oven to the satellite applications. They provide good man to machine interface. Automation is the further step in the world of Embedded Systems, which includes the elimination of the human being in the mundane applications. They are cost effective, accurate and can work in any conditions and round the clock.

3. HARDWARE DESIGN

The hardware consists of Atmega16 Microcontroller Overview, LED, and battery; Step down Transformer Regulated DC Power supply, DC motor, Regulator power supply, crystal oscillator, H-bridge, TTL, android, wireless communication, serial communication, touch screen

4.IMPLEMENTATION

Since olden times man has been cultivating and depending heavily on the plants and crops to arrange for the staple food. To do this he had to toil and severe with labor. As the technology advances people wish for more and more comfort, reliability and fast operations. India is a farmer's country and major part of the revenue is generated out of the agriculture industry. Keeping the above ideology in mind we propose to design a unit with the following features:
1. Ploughing
2. Seed sowing
3. Seed sprinkling
4. Harvesting
5. Pesticide Sprinkler.

4.1 Applications

Robots have many fields of application in agriculture. Some examples and prototypes of robots include the Merlin Robot Milker, Rosphere, Harvest Automation, Orange Harvester, lettuce bot,]and weeder, Milk Bot and Horticulture.

4.2 Advantages and Disadvantages

Advantages
• It is one of the latest and sophisticated systems.
• It controls whole system automatically.
• It is reliable and requires less maintenance.
• It is Affordable.
• The system working is simple and easy to use
Disadvantages
• Need DC power supply all time and quickly discharged.
• Need of skilled workers to drive and for maintenance.

5. RESULT

The picture below is the prototype of multipurpose agricultural robot.
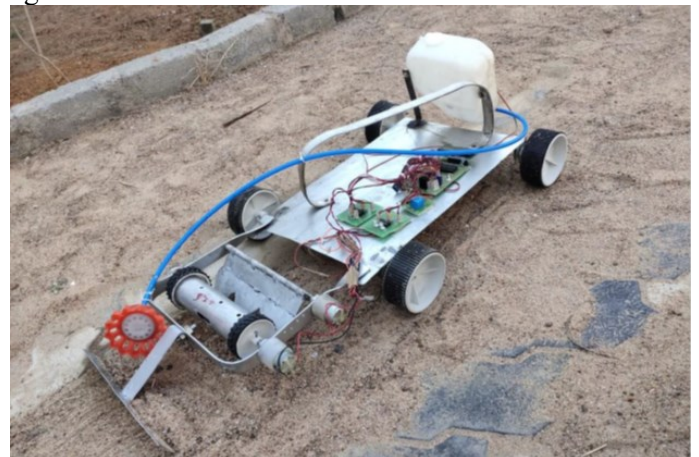
This project entitled " AGRICULTURAL ROBOT "has been using discrete electronics component around advance microcontroller 8051 the system is operated by DC motors and corresponding output are obtained means performing agri. operations. The above parameters are sensed and automated by the ultimate application of arduino microcontroller. It gives very precise and accurate results. In this project we made an effort to overcome some problems in agriculture. The rapid growth in the industries is influencing the labors who are situating in the villages to migrate to the cities. This creating the labor problem for the agriculture. The wages for the labor is also more.

6.FUTURE SCOPE AND CONCLUSION

In agriculture, the opportunities for robot-enhanced productivity are immense – and the robots are appearing on farms in various guises and in increasing numbers. The other problems associated with autonomous farm equipment can probably be overcome with technology. This equipment may be in our future, but there are important reasons for thinking that it may not be just replacing the human driver with a computer. It may mean a rethinking of how crop production is done.

In this project, we achieved control both wireless communication between the mobile Robot Android GUI Application. The main task of this project make a surveillance robot which can be control by emerging android technology It gives versatile operation of robot controller which need not modify the hardware. The Present project aims at designing an intelligent robotic vehicle which can be controlled wirelessly through RF communication.

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A HI-5 POWER GENERATION FROM SOLAR, HYDEL, WIND, MAIN AND FOOT STEP FORWIRELESS POWER TRANSMISSION

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Abstract: Generating electrical power from different parameters these voltages are need to boost to give charging capacity for battery. Now we are converting this power as wireless power transmission by using CU coils. Wireless Electricity transmission is based on strong coupling between electromagnetic resonant objects to transfer energy wirelessly between them. This differs from other methods like simple induction, microwaves, or air ionization. The system consists of transmitters and receivers that contain magnetic loop antennas critically tuned to the same frequency. Due to operating in the electromagnetic near field, the receiving devices must be no more than about a quarter wavelengths from the transmitter. Unlike the far field wireless power transmission systems based on traveling electro-magnetic waves, Wireless Electricity employs near field inductive coupling through magnetic fields similar to those found in transformers except that the primary coil and secondary winding are physically separated, and tuned to resonate to increase their magnetic coupling.

1. PROBLEM DEFINITION

The main idea of this project producing power from different types of parameter sources which can available in India like Solar, Hydel, Wind, Main & foot step powers can boost from boosting voltage circuits and charges storage energy, from battery we are converting voltage in to wireless current. Generating electrical power from different parameters these voltages are need to boost to give charging capacity for battery Now we are converting this power as wireless power transmission by using CU coils Wireless Electricity transmission is based on strong coupling between electromagnetic resonant objects to transfer energy wirelessly between them. This differs from other methods like simple induction, microwaves, or air ionization.

2. BLOCK DIAGRAM

Transmitter and Receiver sections are designed as below

This project producing power from different types of parameter sources which can available in India like Solar, Hydel, Wind, Main & foot step powers can boost from boosting voltage circuits and charges storage energy, from battery we are converting voltage in to wireless current.

The basic aim of this project is to transmit electric power wirelessly. Wireless Power Transfer (WPT) or wireless energy transmission is the transmission of electrical power from a power source to a consuming device without using solid wires or conductors. Wireless transmission is useful to power electrical devices in cases where interconnecting wires are inconvenient, hazardous, or are not possible.

4. ADVANTAGES AND DISADVANTAGES
Advantages
➤ Wind Energy is an inexhaustible source of energy and is virtually a limitless resource.
➤ Energy is generated without polluting environment.
➤ This source of energy has tremendous potential to generate energy on large scale.
➤ Like solar energy and hydropower, wind power taps a natural physical resource.
➤ Windmill generators don't emit any emissions that can lead to acid rain or greenhouse effect.
➤ Wind Energy can be used directly as mechanical energy.
Disadvantages
➤ The wind doesn't blow well at all locations on Earth.
➤ Wind maps are needed to identify the optimal locations.
➤ The initial cost of a wind turbine can be substantial, though government subsidies, tax breaks and long-term costs may alleviate much of this.

3. HARDWARE IMPLEMENTATION
The components are Solar energy, wind energy, Battery, Regulated DC power supply, Transformer, Piezo electric sensor, Actuators, Piezo electric motors, Dynamo, Inverter ,CFL.

Transmission of electricity from remote wind farms can be a major hurdle for utilities since many time turbines are not located around urban centers.

5. APPLICATIONS
1. Power plants
2. Homes
3. Commercial use
4. Ventilation system
5. Power pump
6. Swimming pools
7. Solar Cars
8. Remote applications
9. Solar Lighting

6. CONCLUSION
Wireless power transfer is quickly becoming a viable reality. This technology offers an extremely efficient alternative to previous attempts at providing wireless power. Future improvements in wireless technology offer world changing implications. Wireless power transmission would have many interesting applications. Some of the applications involve simply powering devices or vehicles from a remote power source. However, the energy grid could be affected as well. If long distance, high efficiency wireless power transmission is possible, we could reduce our reliance on transmission lines to transfer energy over long distances. Moreover, wireless power transfer could allow an alternative source of clean energy by transmitting solar power from space back down to places where it is

needed on earth. Further research into wireless transmission will show whether some of these plans are feasible.

7. RESULT AND DISCUSSION

The main idea of this project is to produce power from different types of parameter sources which can available in India like Solar, Hydel, Wind, Main & foot step powers can boost from boosting voltage circuits and charges storage energy, from battery we are converting voltage in to wireless current.

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DESIGN AND FABRICATION OF WIND-SOLAR HYBRID POWER GENERATION

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Abstract The idea is appealing: A two in one system for green power generation; a photovoltaic sub-system for the times when the wind isn't blowing or is blowing at a slow speed, and a wind powered sub-system for nighttime and periods without sunlight. Hybrid systems can minimize the intermittency problem of renewable systems. A typical hybrid solar-wind power system comprises photovoltaic modules, a small wind electric turbine, electronic controllers, a battery bank of 8v connected in series the end outputs are a fan, LED lights, and a mobile charger
Keywords: Photovoltaic, Hybrid system, Intermittency

1. INTRODUCTION

Electricity is most needed for our day to day life. There are two ways of electricity generation either by conventional energy resources or by non-conventional energy resources. Electrical energy demand increases in word so to fulfill demand we have to generate electrical energy. Now a day's electrical energy is generated by the conventional energy resources like coal, diesel, and nuclear etc. The main drawback of these sources is that it produces waste like ash in coal power plant, nuclear waste in nuclear power plant and taking care of this wastage is very costly. And it also damages he nature. The nuclear waste is very harmful to human being also. As the most conventional source of energies are solar and wind, we are combining the solar and wind power to generate electricity hence making it a hybrid power generation system.

1.1 Energy Resources

The world's energy resources can be divided into fossil fuel, nuclear fuel and renewable resources. Renewable energy resources and significant opportunities for energy efficiency exist over wide geographical areas, in contrast to other energy sources, which are concentrated in a limited number of countries. Rapid deployment of renewable energy and energy efficiency, and technological diversification of energy sources, would result in significant energy security and economic benefits. Solar energy and wind energy are chosen here for hybrid power generation

2.HARDWARE IMPLEMENTATION

The components include solar panel, PMDC motor, Rechargeable lead acid battery, LED, 7806 and LM 31Voltage regulator IC, IN 4007 Diode, Resistor, variable resistor 5kΩ

2.1 Block diagram

The aim of this work is design and implementation of a solar-wind hybrid energy system. This work is expected to help to understand the basics of solar-wind hybrid power generation. A small part of the daily electricity consumption with an efficient utilization of solar and wind power.

Here we made a hybrid system where the solar power is stored in a battery and the combination of battery output and wind power output fed to the load. Because of the availability of wind is throughout the day & night whereas solar power is only available in daylight and for a limited time, here we are not storing the wind power
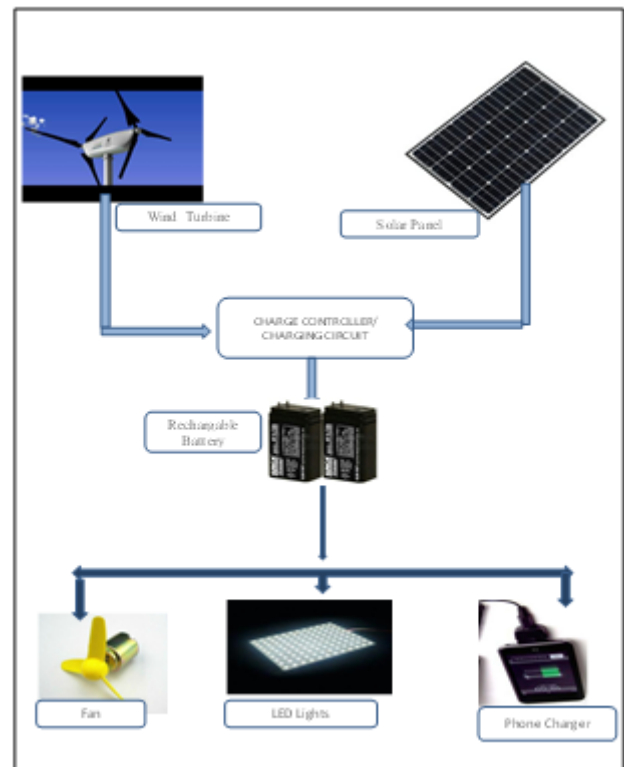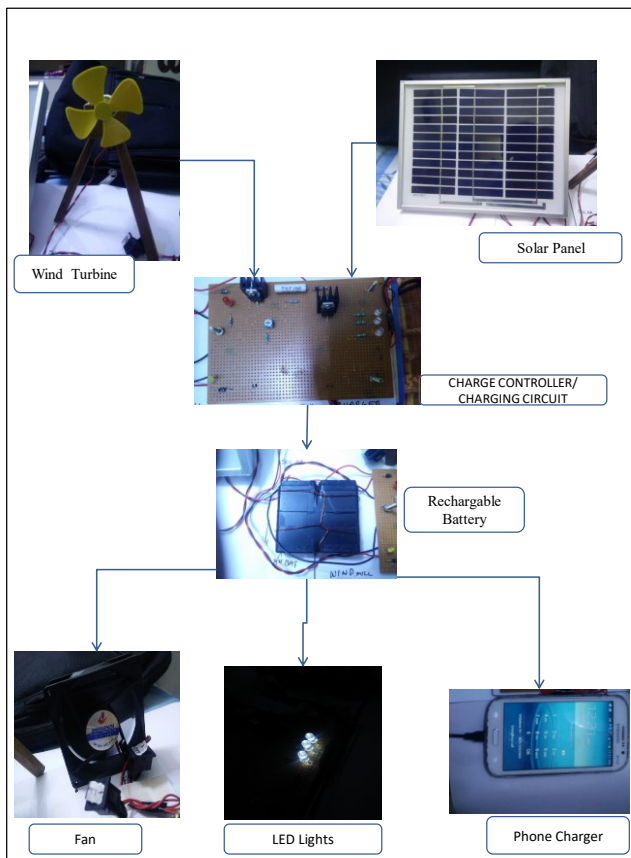
Fig2 Whole Process of Wind-Solar Energy HYBRID Power Generation System

2.3 Testing And Result
Testing of the circuit
1. The input to the circuit can be fed from a standard 12V 1 amp adapter.
2. To set up the circuit initially do not connect any battery.
3. Feed 12V input; adjust the 5k preset pot to get 9v across the battery charging terminals.
4. LM-317 regulates 9V from the 12V output.
5. IC 7806 regulates only 6V fixed, from the 8V battery and gives it to the mobiles charging circuit.
6. Diode IN-4007 is used, so that the charge does not go reverse.
7. Resistors are connected.
8. Circuit is now ready to function.
9. Switch OFF power. Connect a discharged battery and switch ON power, the circuit will do the rest it will cut off as soon as the battery voltage reaches 8V.

Result
The project "Design & Fabrication of Wind-Solar Hybrid Power Generation Model" was designed such

that to deliver power to switch on the loads like Lights, Fans, mobile chargers, etc especially for rural areas but we can use this model in urban area's too. The PMDC Motor uses electromagnetic principles to convert mechanical rotation into direct current (DC) using wind energy. The system generates electrical power as non-conventional method by wind energy power using wind turbine setup. We also use solar energy to charge the battery.

3.ADVANTAGES AND DISADVANTAGES:
Advantages:
1. This system helps in wind energy generation.
2. Storing of Solar energy
3. Efficient and low cost design.
4. Low power consumption.
5. Easy to operate.
Disadvantages:
1. This system requires periodic monitoring and maintenance.
2. This system fails to work if the load is heavy.
3. Status of operated devices is not known.
4. Property Requirement
5. High Costs

4.APPLICATIONS
1. In industries, streets, etc which can be practically implemented in real time.
2. Agricultural applications, water pump control, fencing control, street light control of Houses etc.,
3. The solar wind hybrid systems are used where the load is relatively small.
4. In commercial and industrial sectors, the systems are used (for example) in rural offices or small tourist hotels where power shortage is chronic.
5. It can be used in schools especially in rural and urban fringe areas.
6. It can be used for military (charging of communication units) as well as in railways (track signaling).
7. It can be used in high end residential apartments and villas for specific needs.

5. CONCLUSION
Hybrid power generation system is good and effective solution for power generation than conventional energy resources. It has greater efficiency. It can provide to remote places where government is unable to reach. So that the power can be utilize where it generated so that it will reduce the transmission losses and cost. Cost reduction can be done by increasing the production of the equipment. People should motivate to use the non conventional energy resources. It is highly safe for the environment as it doesn't produce any emission and harmful waste product like conventional energy resources. It is cost effective solution for generation. It

only need initial investment. It has also long life span. Overall it good, reliable and affordable solution for electricity generation

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DESIGN & IMPLEMENTATION ON GAS LEAK DETECTION & LOCATION SYSTEM BASED ON WIRELESS SENSOR NETWORK

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Abstract: - A new gas leak detection and location system was developed; it compromises sensitive sensors and ZIGBEE, WSN which is smart, low-cost, low-power and Low - maintenance. In two modes, this system can monitor the gas leakage sensitively, get the data from a scene of the accident and locate the leakage point. Based on WSN, the system is easy to be deployed and overcomes the shortcomings on current systems. It is used to improve the rescue quality and shorten the time for rescue. Therefore it can compensate for the weaknesses of current systems. The information in the system is stored via a .Net application enabling the user to access the data whenever required. With the help of this data, proper precautions can be taken to minimize the pollution levels in the air to make human life sustainable. This paper is Develops a gas leak detection and location system for the production safety in Petrochemical Industry. The system is based on Wireless Sensor Networks (WSN). It can collect the data of monitoring sites wirelessly and sent to the computer to update values in the location software. It can give a real-time detective of the potential risk area, collect the data of a leak accident and locate the leakage point. However the former systems can not react in time, even cannot obtain data from an accident and locate accurately. The paper has three parts, first, gives the overall system design, and then provides the approaches on both hardware and software to achieve it. The data received from the sensor device is simultaneously stored in a system for a future reference in the levels of contamination.

Keywords: wireless sensor, gas detection, ZIGBEE, .Net

1.INTRODUCTION

This paper is microcontroller based project. A Gas sensor is used to detect dangerous gas leaks in the kitchen, industries or near the gas heater. Whenever there is a gas leakage in the surrounding areas of this node this will be detected by the sensor. The main aim of the project is to develop a gas leak detection and location system for the production safety in Petrochemical Industry when they exceeds threshold, intimation is given to the nearby control section including readings of parameter and location of the gas leakage . Security management of several home and office appliances is a subject of growing interest and in recent years we have seen many systems providing such security. These days apart from security from robbery there must be security from flammable gases Present in the surrounding to protect houses, offices, vehicles, industries etc. From various harmful gases. There is a need to have security from this gases. Mobile phone is also playing role in its parallel world with telephones. When there is Gas leakage the telephone and mobile phone both will play great role in the detector to contact and warn the authorized person about flammable gas leakage. Both Mobile Phone and Telephone are required to perform the project.

2.EXISTING SYSTEM

The existing system only detects the fire and gas leakage in certain important areas only. In existing system, the fire and gas leaks are measured and the communication is through wires to the control station. In case of faults like discontinuity in cables, lead to loosing of vital information related to plant safety. Increase in the complexity of process industry leads to increase in the number of instruments to detect fire and leakage. This increases the number of cables that run from industrial sensors to the control station which leads to messy wiring. This also increases the size of the duct. Troubleshooting the reduced insulation or any wire open is difficult because it is a messy wiring and identifying the individual cable is very difficult along the duct. This also increases the cable cost.

To overcome these difficulties we implemented a portable device. This device can be fixed in their helmet or jacket. To measure various parameters this device consists of sensors. They are Gas sensor, Temperature sensor, Heart beat sensor, Pressure sensor. These sensors in the portables device sense various parameters (gas, temperature, pressure) continuously. And if the value

exceeds the reference value, immediately it activates the relay driver and produces an alarming sound. So it will be useful for the person to know about hazardous situation. Heart beat sensor, senses the workers heart beat continuously. If the person loses his/her consciousness then this information is sensed by the sensor and it will be passed to the control room. All the communications are done by wireless Zigbee protocols, so that the information will be transmitted without any obstructions. The main advantage of Zigbee is that it is a multimode communication, so that the data is transmitted node by node. A GPS is used in our system to track the location of the person during hazardous conditions, so that he can be rescued immediately.

3.PROPOSED SYSTEM

In this system, we are going to monitor and transmit the industrial parameters such as gas leakage and fire. These parameters are monitored using gas sensor and fire detectors. The analog outputs are converted into digital form using analog to digital converter and then given to microcontroller. These data are sent to the control room through a Zigbee wireless via UART also displayed in the LCD display for workers. Corresponding to the sensor outputs the relay is activated using microcontroller to operate the precaution devices. With this a buzzer alert is al so given. In the receiver side a PC is used to view all the parameter conditions. The relays can be activated from the remote area too via Zigbee wireless communication. In addition to this, this system integrates person locating with gas concentration checking system effectively, and realizes functions of person attendance, distance measurement positioning, gas concentration detecting and data communication.

This system is an open system, and it permits developing different applications thereon. It provides a lot of spatial gas concentration knowledge with the timestamp for follow-up gas prediction research. The field device can be a fixed device or a portable device. The portable device is carried by the worker whenever he enters the plant area. It is mainly detects the gas leakage if any, wherever the worker goes, it also sends the information about the location of the person and the heartbeat of the person. The fixed device is fixed in the plant area. It also detects gas leak age and transmits information to the control room.

Transmitter:
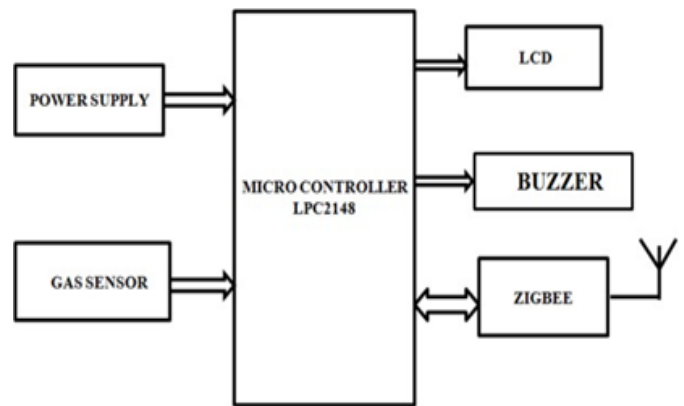
Receiver section:
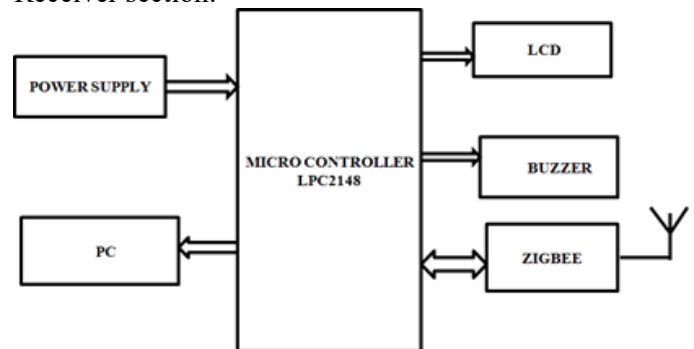
TheLPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 KB to 512 KB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 KB up to 40 KB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32- bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based

on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue. The key idea behind Thumb is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:
•   The standard 32-bit ARM set.
•   A 16-bit Thumb set.
The Thumb set's 16-bit instruction length allows it to approach twice the density of standard ARM code while retaining most of the ARM's performance advantage over a traditional 16-bit processor using 16-bit registers. This is possible because Thumb code operates on the same 32-bit register set as ARM code.
Thumb code is able to provide up to 65 % of the code size of ARM, and 160 % of the performance of an equivalent ARM processor connected to a 16-bit memory system. The particular flash implementation in the LPC2141/42/44/46/48 allows for full speed execution also in ARM mode. It is recommended to program performance critical and short code sections (such as interrupt service routines and DSP algorithms) in ARM mode. The impact on the overall code size will be minimal but the speed can be increased by 30% over Thumb mode.
ZIGBEE is an IEEE 802.15.4 standard for data communications with business and consumer devices. It is designed around low-power consumption allowing batteries to essentially last forever. The Zigbee standard provides network, security and application support services operating on top of the IEEE 802.15.4 Medium Access Control (MAC) and Physical Layer (PHY) wireless standard. It employs a suite of technologies to enable scalable, self-organizing, self-healing networks that can manage various data traffic patterns. Zigbee is a low-cost, low-power, wireless mesh networking standard. The low cost allows the technology to be widely deployed in wireless control and monitoring applications, the low power- usage allows longer life with smaller batteries and the mesh networking provides high reliability and larger range. Zigbee has been developed to meet the growing demand for capable wireless networking between numerous low power devices. In industry, Zigbee is being used for next generation automated manufacturing, with small transmitters in every device on the floor, allowing for communication between devices to a central computer. This new level of communication permits finely tuned remote monitoring and manipulation.
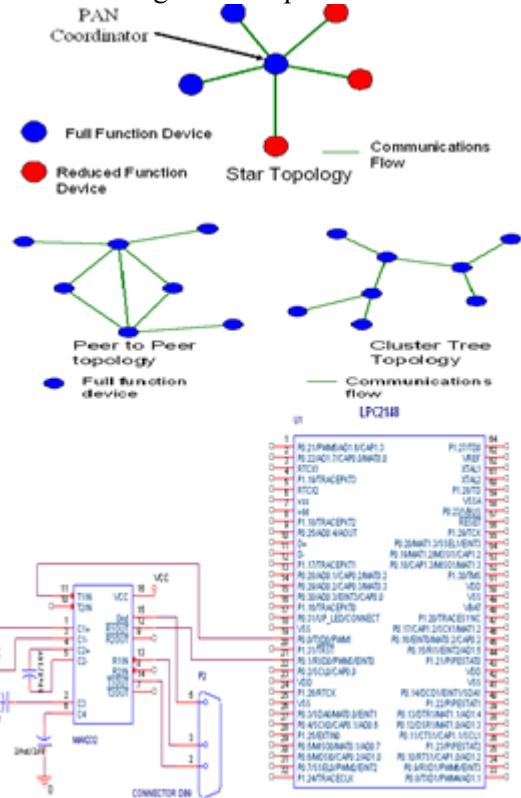
Dynamic deployment is use in a leakage accident. Throw some terminal nodes through ejection of a robot or at some height, and then all the information of the distribution of temperature and gas thickness can be collected. The location of the leakage point can be known from the analysis of the information. In the past, rescuers can not approach the accident spot in a long time because of the toxic gas, high temperature or heavy fog. It is hard to rescue and deal with the problems in time. However, the system provides reference for an effective rescue plan and can help to shorten salvage time. To make sure the transmission steady and reliable, the topology of the system is mesh. When terminal nodes can not transmit data via some routers as a result of routing faults, they will judge the other routes and choose a new one. Dynamic deployment, nodes are placed dynamically in the risky area to get the information related to temperature and gas leakage and exact location can be identified.
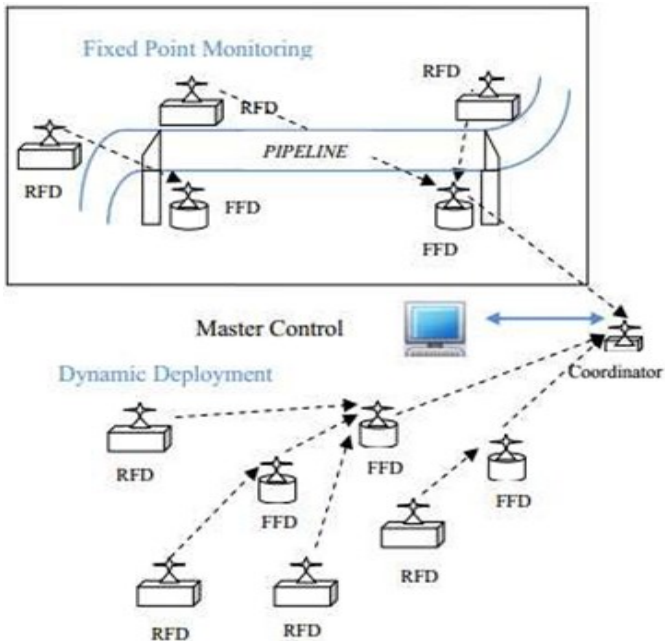
FIG: represent the sensor node structure consists of two sections - dynamic deployment and fixed point monitoring.

4.CONCLUSION

A new gas leak detection and location system was developed. It compromises sensitive sensors and ZIGBEE, WSN which is smart, low-cost, low-power and low- maintenance. In two modes, this system can monitor the gas leakage sensitively, get the data from a scene of the accident and locate the leakage point. Based on WSN, the system is easy to be deployed and overcomes the shortcomings on current systems. It is used to improve the rescue quality and shorten the time for rescue. Therefore it can compensate for the weaknesses of current systems.

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DESIGN & IMPLEMENTATION OF MEMORY ARCHITECTURES IN QUANTUM DOT CELLULAR AUTOMATA TECHNOLOGY

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Abstract: The QCA technology is used for designing and implementation of digital circuits efficiently due to its features like smaller feature size, high speed, low power dissipation and high switching frequency. These characteristics prompt memory cell architecture and implementation in QCA as an appealing choice for manufacturing storage devices. CMOS technology is experiencing power dissipation, short channel effects and quantum effects problems with its relation to chip size, which makes it too hard for integrating more transistors, reaching its scaling limits. Quantum Dot Cellular Automata (QCA) is one of emerging nanotechnologies in recent times to overcome this flaw. This paper discusses architectures of several line and loop based memory cells to compare in terms of density, low power, complexity and switching frequency and to deduce an architecture method which is significant for designing memory cells

Keywords: Quantum Dot Cellular Automata, memory cell, architecture, density, complexity, low power

1.INTRODUCTION

In CMOS computing components are becoming smaller in size based on the Moore's law. This has caused CMOS based computing devices to experience several limitations (Misra et al., 2014). Some of important CMOS limitations are high power consumption, interconnection effects, short channel effects, fabrication difficulties and its high cost as a result of CMOS devices, high performance capability and device density which is making difficulties for CMOS technology advancement (Bhoi et al., 2021).

A new alternative paradigm for conventional CMOS technology in nanotechnology called QCA technology has emerged which overcomes flaws which are experienced with CMOS technology (Misra et al., 2015). The QCA technology used quantum cells, which makes it reversible in nature and has a relatively small feature size, low power dissipation and low delay compared to conventional CMOS (Bhoi et al., 2017).

The QCA technology features are very suitable for implantation of memory cells, while designing QCA memory cell architecture, important issue to consider is switching frequency and feedback paths so that so that arrangement of clocking zones are accurate in order for correct operation by means of pipelining (Frost et al., 2002).

Memory architecture, designing in QCA technology cannot be done similar to that of CMOS technology due to QCA's unique characteristics like the placement of the cells, clocking need to be considered so that memory is always in movement.

In this paper, our objective is to discuss and study memory architectures, which are broadly based on the prior line based and loop based memory cell designs, then discuss both line and loop based memory designs for their characteristics like density, low power, design complexity and latency. Lastly, we conclude why loop based architecture design approach of memory cells is suitable.

The paper organization is as follows. Section II briefly discusses fundamentals of QCA technology such as QCA cells, clocking schemes of QCA, and basic QCA gates and memory in motion. Section III discusses existing line and loop based memory cell architectures.

2.FUNDAMENTAL OF QCA TECHNOLOGY

2.1.QCA Cell

A QCA cell consists of four quantum dots placed at each of four corners of a square shaped cell as shown in Figure 1. Two electrons can move diagonally in between any two quantum dots due to coulombs interaction. Based on the position of electrons, polarization of the QCA cell is determined. There are only two possible states of a QCA cell based on polarizations -1 and +1. The QCA cell is in state low or logic '0', if electrons are diagonally arranged on the left side of a QCA cell, then the polarization of the cell is considered to be -1. The

QCA cell is in state high or logic '1', if electrons are diagonally arranged on the right side of a QCA cell then polarization is cell is considered to be +1.

A QCA inverter has QCA wire which is broken in such way they are parallel to each other as in Figure 3b. The last cell is of opposite polarization of that of first cell due to coulomb attraction force.
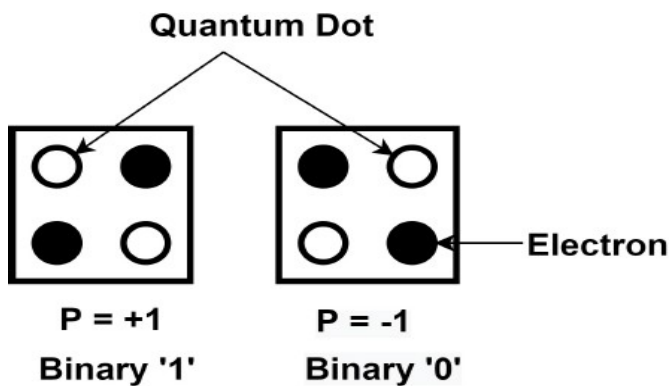
Figure 1. QCA Cell and its Polarization

2.2.Clocking Scheme in QCA

Clocking of cells in QCA technology is vital during the implementation of any circuit in order to synchronize and switching states or phases of cells for the data to flow correctly. There are four clocks shown in Figure 2, which can be applied during implementation where each clock is in phase difference of 90 degrees.
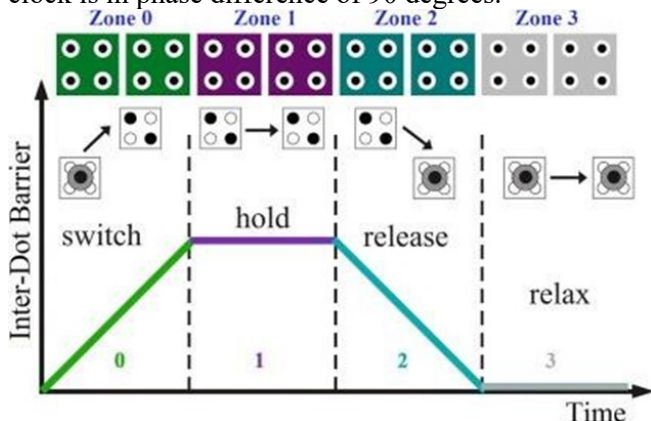
Figure 2. Clocking Schemes in QCA

2.3.Basic QCA Gates

The basic QCA gates are inverter and majority gates, which are vital components during designing. The majority gate consists of five QCA cells shown in Figure 3a, where middle cell is a driver cell. It has three input cells and one output cell. The output of majority gate is majority states of its input value. By changing any one of input majority gates to polarization -1, an AND gate is realized. Similarly, if any one of input of majority gate is fixed as polarization +1, an OR gate is realized.

(a) (b)

Figure 3. Basic QCA gates (a) Majority gate, (b) Inverter

3.QCA MEMORY CELL ARCHITECTURE REVIEW

For QCA technology memory implementation, the memory should always be in motion. The memory cells are connected as a loop, the memory should move continuously through these cells. The loop is divided into all four clock zones to hold information shown in Figure 4b. Memory architecture can employ serial or parallel process (Frost et al., 2002)

In QCA technology, memory cell design to keep memory in motion has broadly two architectural approaches, namely line based and loop based shown in Figure 4 presented in (Heikalabad et al., 2016). Below we review how data movement is maintained, clocking employed and operation of several memory cells based on line (Figure 4a) and loop based architectural approach (Figure 4b).
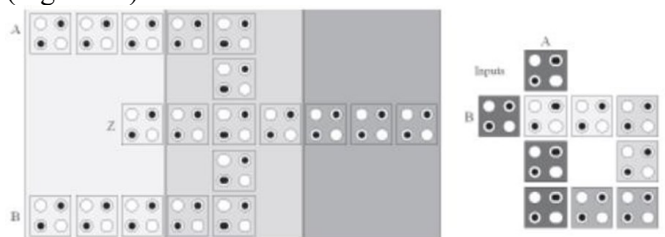
Figure.4. QCA Memory cells (a) Line based, (b) Loop based

3.1.Line Based Approach of Memory Cells

Types of approach for designing of memory cells are reviewed below. Line based approach needs to have a QCA wire with a clocking technique so that data needs to propagate back and forth.

In (Vankamamidi et al., 2005a), used parallel memory architecture and topology is based on two lines. So, it has advantages over (Vankamamidi et al., 2005b), as there is no delay for a bit to read or write since only one bit is stored in each memory cell. This helps in reduction

of delay and clock cycles compared to serial memory architecture. A basic bidirectional line is used for storing of memory data, data is moved along this line back and forth. Read or write of data is done in four process steps, hence it employed three clock cycles for implementation of memory cells. To make a memory in motion on the line, two more clock cycles are used to relax and hold for adiabatic switching.

A two phase clock cycle is used by this memory cell in (Taskin et al., 2006), which is used for synchronization. A bi-directional line is used for rotation of stored data and uses a parallel memory architecture. Only one clock generator is used for generating two clock cycles. An advanced two phase parallel architecture is presented in (Taskin et al., 2008). This architecture has a majority gate at core of memory cells. Depending on memory operation, it can act as a majority gate or as a memory line.

In (Song et al., 2020) is a serial process, so many bits are stored in each memory cell. So, the delay depends on the number of bits present in memory cell when it needs to perform read or write operation. It requires dual level clocking across three memory tiles (which were presented) for input, loop and output. Thus, each memory tile has three clock cycles. Memory cells and memory line share same clocking zones irrespective of its word size.

3.2.Loop Based Approach of Memory Cells
In (Berzon et al., 1999) presented a memory cell implementation done using a SQUARES formalism for the address circuit logic realization components. A majority gate acts as SRAM is used as for realizing write logic to the loop. A shift closed loop is implemented based on SQUARES which employs four clocking zones. The loop output is pipelined to shift register. To load register, read signal is required and specified bit is written on output bit line. The shift, loop holds the data for all counter cycles. A series of the XNOR gates are used in array for implementing comparator circuitry. As all bits stored use the same read or write circuit, delay is same as that of bits stored. Additionally, density is more, using lots of clock cycles.

In (Vankamamidi et al., 2005b), a RAM memory cell using QCA technology is presented. The individual single layer RAM cell has read or write circuitry. By using a memory loop, data is stored. When read or write line are polarized to 1, input enters the loop and continuously circulates. If read or write line is polarized to 0, data in a loop are given to output. To achieve read or write circuitry AND, OR and inverter gates is used, making design simple. A total of 158 cells is utilized for memory cell layout. To design a more bit RAM. The

memory can hold more than two bits if we employ parallel process architecture.

In (Dehkordi et al., 2011) presents two memory cells modified using the inherent capabilities of QCA. The programming of majority gate and clocking techniques are employed for circuitry design. Firstly discussed memory cell is based on S- R latch design which forms a memory loop for holding data. Memory cell utilizes 100 cells with seven clocking zones and over all delay of 4 clock cycles to implement RAM cell circuitry. In second memory cell is based on D latch. D latch is a memory loop which holds data which is used in RAM cell designing. The RAM cell uses a total of 63 cells, but utilizes 12 clock zones, making the overall delay of RAM cell to 4 clock cycles. In (Hashemi et al., 2012) presents a novel memory cell with set/ reset capability. The D flip flop is level and edge triggered is introduced which is used as a storage memory loop for RAM cell circuitry. Set/reset is used to activate the memory cell. A 2:1 multiplexer which is presented, is also used for realizing memory circuitry. Total 109 cells are used to realize D flip flop based memory cell with a delay of 1.75 clock cycles.

In (Angizi et al., 2015), D latch is realized using a majority gate, which is presented. This Majority gate acting as D latch is used in realizing RAM cell. This design is simple and has improved in the area, but is has low speed computation.

In (Fam et al., 2019), a D latch using the advanced clocking mechanism is presented which used as a memory loop in realizing RAM cell of a single layer. It has simple design for read or write circuitry with total utilization of 55 cells and delay of 2.5 clock cycles.

In (Heikalabad et al., 2016) presents a five input minority gate, which is used in the comparison circuitry in CAM cell. A S-R latch memory loop is also employed for storing memory in read or write circuitry of CAM cell. This design uses 100 cells for design of CAM cell and delay of 2 clock cycles making it more speed operation. The (Khosroshahy et al., 2017) introduced a majority gate of five inputs which is used as a component in the comparison circuitry of the single layer CAM cell. This cell uses read or write circuitry same as that of (Fam et al., 2019), but is more area efficient.

In (Taskin et al., 2008), a low power XOR gate is presented which is used in the comparison circuitry in the CAM cell of a single layer. Additionally, read or write circuitry is reduced and has advanced clocking mechanism compared to prior works which has significantly less area and power.

In (Heydari et al., 2019) a set or rest RAM cell is presented. A majority gate of low power is presented which is used to set or reset RAM cell output. It has a

considerable low area and delay with efficient switching energy. In (Heydari et al., 2019) and (Mubarakali et al., 2019) are RAM cell crossover structures, where (Mubarakali et al., 2019) uses an S-R latch based memory loop and (Sadoghifar et al., 2018) used novel D latch based memory loop. Both these memory cells have reduced wastage area, reduced cell count.

In (Song et al., 2020) presents an asynchronous RAM cell with set and reset capability. The set and reset of RAM cell are done by 2 to 1 multiplexer which is also presented. The proposed RAM cell is of multilayer structure with improved area and delay with efficient scalability.

4.DISCUSSIONS

The line and loop based memory cell's architecture are discussed and compared in terms of density, low power, complexity and latency.

4.1.Latency

The clock zones for line based memory cell structures require additional clocking in order to facilitate flow of data through a QCA wire, and storing of data needs additional clocking zones making implementation of such memory cell complex. Whereas loop based memory cell structures use a feedback path loop though, where data is circulated and stored easily though there is difficulty in employing efficient clocking mechanisms. The loop based memory cell implementation is more preferred as it doesn't require additional clock zones. The delay of parallel memory cell architecture is less compared to serial memory cell architecture as in parallel only one bit is stored in memory loop, so during read or write operation there is no additional delay wherein in serial access, more bits stored in each memory cell which use shared read or write circuitry, making delay equal to that of word size in memory loop.

4.2.Density

The implementation of memory cell through feedback path has significantly reduced the number of cells as read or write circuitry plus a memory loop is included within same where data is continuously circulated. Additionally, novel components and techniques are introduced for read or write circuitry implementation using a feedback path like latches, multiplexers, decoders etc. Which further reduces wastage areas and size comparable to a line based memory cells where it requires additional clock generators decoders and read or write circuits individually. So, the size of memory loop implementation in loop based architecture is significantly less compared to that of line based design.

4.3.Low Power

The decreased number of clock zones and density in loop based architecture significantly yields low power dissipations. Low power components in recent times are used to implement a memory cell in feedback fashion which further decrease high power considerations. The line, based memory cells, though easy to design have additional cells, wastage areas, additional clocking doesn't yield an overall power efficiency.

4.4.Design, Complexity

The line, based memory cells are very simple to design and implement even if it has disadvantages in speed, power and size. There is little scope for advancement of line based memory cell techniques (Sodoghifar et al., 2018).

The loop based memory cell circuitry designing and implementation needs considerations in clocking and layout mechanisms as memory loop is significantly smaller in size thus raising difficulty and need for using efficient clock zones within that memory loop. The architectural layout is further needed to be researched and apply novel advanced design techniques to reduce wastage areas, gates and clocking. Research is thus needed to find efficient novel architectural design techniques and advanced novel clocking in order to implement efficient memory cells.

The loop based memory cells have an overall efficiency compared to line based memory cells, even if there is complexity in design of loop based memory cells. No advancement in research for line based memory cell designing techniques further make loop based memory cells more preferable.

5.CONCLUSION

There is a steady advancement in research of loop based memory cells where researchers are finding new techniques for designing and clocking in order to achieve efficient and better performed memory cells in terms of smaller density, low power and fast speed. The line, based memory cells wherein has little to no scope for further advancement and improvement of memory cells in order to yield a better performed memory cell.

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DESIGNING OF WIRELESS COMMUNICATION NETWORK FOR INTELLIGENT VEHICLE MONITORING SYSTEM

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Abstract: - To meet the requirements of an intelligent vehicle monitoring system, this architecture integrates Global Position System (GPS), Global System for Mobile communications (GSM) and a Microcontroller in the whole. This device is used to prevent texting and calling of mobile phones while driving vehicles. If the driver is using the phone while the vehicle is in motion, it triggers a signal which notifies the cops with the vehicle's number plate and the location with the help of GPS system. It receives the mobile signal and detects the presence of mobile. In this paper the use of mobile phones while driving is one of the most dangerous and widely seen causes of fatal road accidents. The objective of the paper is to develop a device to find people who use mobile phones while driving and evade from stringent laws enforced by the government easily. This novel and ingenious technique facilitates the government to take adequate action against those who are violating these laws. This signal eventually triggers the microcontroller with a glowing LED. Due to the voltage fluctuation, the message is sent to the cops using GSM communication.

Keywords: Wireless/Mobile Communication; Mobile bug; Speed sensors; Vehicle Monitoring; GSM Modem; GPS based vehicle tracking system; Call Notification.

1.INTRODUCTION

An Accident is a disaster which is specific, identifiable, unexpected, unusual and unintended external event which occurs in a particular
time and place, without apparent or deliberate cause but with marked effects. It implies generally negative probabilistic outcome which may have been avoided or prevented had circumstances leading up to the accident been recognized, and acted upon, prior to its occurrence. The first one hour is the golden hour and that can make all the difference.
The aim is to reach out quickly to the law breakers, upping the chances of their survival from an accident. Serious injuries can result in disability, fatalities and life-

long psychological, emotional and economic damage to loved ones. The working of our project is divided into following sections: GSM Communication is GSM Modem receives trigger pulse from Mobile Bug Module. It transmits messages to police control room for call detecting. It is controlled by microcontroller by interfacing with RS-232.

Speed Sensors keeps track of the speed of the vehicle and activates the GSM Modem when the speed of the vehicle goes beyond 40km/hr. The GSM Modem is programmed such that it transmits message only when the speed limit exceeds 40km/hr.

If the person, who drives the car, receives a call or a message while driving, then LED glows and their unique ID will be sent to cops using the GSM Modem and at the cops control center they will be having a GSM receiver, the output of which is given to another LED.

GPS Tracking is Module calculates the geographical position of the vehicle. This helps in detecting the location/position, velocity of our system. The module output data like global positioning system fixed data, geographic position-latitude are passed to GSM Modem.

In this modern, fast moving and insecure world, it is become a basic necessity to be aware of one's safety. Maximum risks occur in situations where in an employee travels for money transactions. Also the Company to which he belongs should be aware if there is some problem. What if the person traveling can be tracked and also secured in the case of an emergency?! Here's a system that functions as a tracking and a security system. It's the intelligent vehicle control for critical remote location application. This system can deal with both pace and security. The Vehicle Monitoring and Security System is a GPS based vehicle tracking system that is used for security applications as well. The project uses two main underlying concepts. These are GPS (Global Positioning System) and GSM (Global System for Mobile Communication). The main application of this system in this context is tracking the vehicle to which the GPS is connected, giving the information about its position whenever required. This is done with the help of

the GPS satellite and the GPS module attached to the vehicle which needs to be tracked.

Thus we have at the Base station; the complete data about the vehicle. For real time monitoring an automatic monitoring system can be established with GSM, in this vehicle automatically identify and upload critical data about the vehicle and operating conditions. The monitoring device can send modified control parameters and guidelines to the vehicle driver. These parameters are temperature, alcohol detection, gas leakage detection, stirring grip checking, etc.

2.PROPOSED SYSTEM

The project is targeted on motor cars monitoring by black boxes and its possibilities to improve road – traffic safety. During years, there were more attempts of some alternatives of the black box but it was not widespread used.

Proposed design is cost-effective, reliable and has the function of accurate tracking. When large object or vehicles were spread out over ground, the owner corporations often found it difficult to keep track of what was happening. Also the need of tracking in consumer's vehicle use to prevent any kind of theft because police can use tracking reports to locate stolen vehicle. GSM and GPS based tracking system will provide effective, real time vehicle location, and reporting. A GPS- GSM based tracking system will inform where your vehicle is and where it has been, how long it has been. The system uses geographic position and time information from the Global Positioning Satellites.
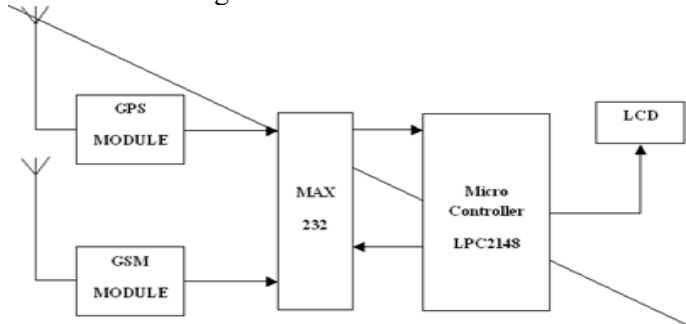
Fig.1. Block Diagram of Intelligent vehicle monitoring system

The LPC2141/42/44/46/48 support emulation and debugging via a JTAG serial port. A trace port allows tracing program execution. Debugging and trace functions are multiplexed only with GPIOs on Port 1. This means that all communication, timer and interface peripherals residing on Port 0 are available during the development and debugging phase as they are when the application is run in the embedded system itself.

Embedded ICE

Standard ARM Embedded ICE logic provides on- chip debug support. The debugging of the target system requires a host computer running the debugger software and an Embedded ICE protocol convertor. Embedded ICE protocol convertor converts the remote debug protocol commands to the JTAG data needed to access the ARM core. The ARM core has a Debug Communication Channel (DCC) function built-in.

The DCC allows a program running on the target to communicate with the host debugger or another separate host without stopping the program flow or even entering the debug state. The DCC is accessed as a co-processor 14 by the program running on the ARM7TDMI-S core. The DCC allows the JTAG port to be used for sending and receiving data without affecting the normal program flow. The DCC data and control registers are mapped in to addresses in the Embedded ICE logic. This clock must be slower than 1 to 6 of the CPU clock (CCLK) for the JTAG interface to operate.

Embedded trace

Since the LPC2141/42/44/46/48 have significant amounts of on-chip memory, it is not possible to determine how the processor core is operating simply by observing the external pins. The Embedded Trace Macro cell (ETM) provides real-time trace capability for deeply embedded processor cores. It outputs information about processor execution to the trace port. The ETM is connected directly to the ARM core and not to the main AMBA system bus. It compresses the trace information and exports it through a narrow trace port. An external trace port analyzer must capture the trace information under software debugger control.

Instruction trace is significantly compressed by only broadcasting branch addresses as well as a set of status signals that indicate the pipeline status on a cycle by cycle basis. Trace information generation can be controlled by selecting the trigger resource.

Real Monitor

Real Monitor is a configurable software module, developed by ARM Inc., which enables real-time debug. It is a lightweight debug monitor that runs in the background while users debug their foreground application. It communicates with the host using the DCC, which is present in the Embedded ICE logic.

Interfacing max232 with LPC2148: It provides 2-channel RS232C port and requires external 10uF capacitors. Carefully check the polarity of capacitor when soldering the board.

3. RESULTS

Keil compiler is software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller

for further processing. Keil compiler also supports C language code.
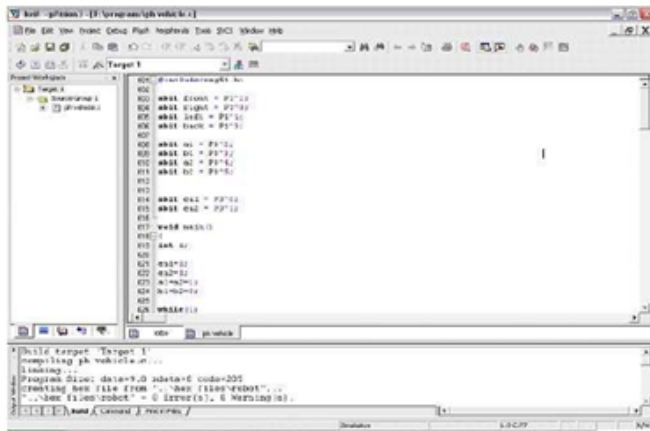
Compilation of source code
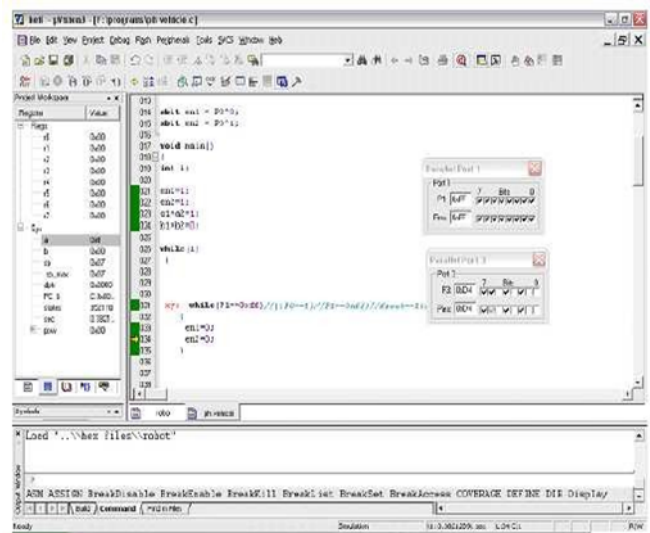
Run the Compiled Program

4. CONCLUSION

Tracking system is becoming increasingly important in large cities and it is more secured than other systems. It is completely integrated so that once it is implemented in all vehicles, then it is possible to track anytime from anywhere. It has real-time capability, emerges in order to strengthen the relations among people, vehicle and road by putting modern information technologies together and able to forms a real- time accurate, effective comprehensive transportation system.

This system has many advantages such as large capability, wide areas range, low operation costs, effective, Strong expandability and Easy to use in vehicle traffic administration. Upgrading this setup is very easy which makes it open to future a requirement which also makes it more efficient.

We can use the EEPROM to store the previous Navigating positions up to 256 location and we can navigate up to N number of locations by increasing its memory. We can reduce the size of the kit by using

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MOVING OBJECT TRACKING SYTEM FOR WIRELESS SENSOR NETWORKS

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Abstract— An important issue of wireless sensor networks is object tracking, which typically involves two basic operations: update and query. This issue has been intensively studied in other areas, such as cellular networks. However, the in- network processing characteristic of sensor networks has posed new challenges to this issue. In this paper, we develop several tree structures for in-network object tracking which take the physical topology of the sensor network into consideration. The optimization process has two stages. The rapid progress of wireless communication and embedded microsensing MEMS technologies has made wireless sensor networks possible. In light of storage in sensors, a sensor network can be considered as a distributed database, in which one can conduct in-network data processing. The first stage tries to reduce the location update cost based on a deviation-avoidance principle and a highest- weight-first principle. The second stage further adjusts the tree obtained in the first stage to reduce the query cost. The way we model this problem allows us to analytically formulate the cost of object tracking given the update and query rates of objects. Extensive simulations are conducted, which show a significant improvement over existing solutions.

Index Terms—Object tracking, in-network processing, sensor network, data aggregation, mobile computing.

1 INTRODUCTION

HE rapid progress of wireless communication and embedded microsensing MEMS technologies has made wireless sensor networks possible. Such environments may have many inexpensive wireless nodes, each capable of collecting, processing, and storing environmental informa- tion, and communicating with neighboring nodes. In the past, sensors are connected by wire lines. Today, this environment is combined with the novel ad hoc networking technology to facilitate intersensor communication [11], [12]. The flexibility of installing and configuring a sensor network is thus greatly improved. Recently, a lot of research activities have been dedicated to sensor networks [4], [5], [6], [7], [8], [9], [13], [14].

Object tracking is an important application of wireless sensor networks (e.g., military intrusion detection and habitat monitoring). Existing research efforts on object tracking can be categorized in two ways. In the first category, the problem of accurately estimating the location of an object is addressed [1], [10]. In the second category, in- network data processing and data aggregation for object tracking are discussed [8], [15]. The main theme of this paper is to propose a data aggregation model for object tracking. Object tracking typically involves two basic operations: update and query. In general, updates of an object's location are initiated when the object moves from one sensor to another. A query is invoked each time when there is a need to find the location of an interested object.

Location updates and queries may be done in various ways. A naive way for delivering a query is to flood the whole network. The sensor whose sensing range contains the queried object will reply to the query. Clearly, this approach is inefficient because a considerable amount of energy will be consumed when the network scale is large or when the query rate is high. Alternatively, if all location information is stored at a specific sensor (e.g., the sink), no flooding is needed. But, whenever a movement is detected, update messages have to be sent. One drawback is that when objects move frequently, abundant update messages will be generated. The cost is not justified when the query rate is low. Clearly, these are trade-offs.

In [8], a Drain-And-Balance (DAB) tree structure is proposed to address this issue. As far as we know, this is the first in-network object tracking approach in sensor networks where query messages are not required to be flooded and update messages are not always transmitted to the sink. However, [8] has two drawbacks. First, a DAB tree is a logical tree not reflecting the physical structure of the sensor network; hence, an edge may consist of multiple communication hops and a high communication cost may be incurred. Second, the construction of the DAB tree does not take the query cost into consideration. Therefore, the result may not be efficient in some cases.

To relieve the aforementioned problems, we propose a new tree structure for in-network object tracking in a sensor network. The location update part of our solution can be viewed as an extension of [8]. In particular, we take the physical topology of the sensor network into consideration. We take a two-stage approach. The first stage aims at reducing the update cost, while the second stage aims at further reducing the query cost. For the first stage, several principles, namely, deviation-avoidance and highest- weight-first ones, are pointed out to construct an object
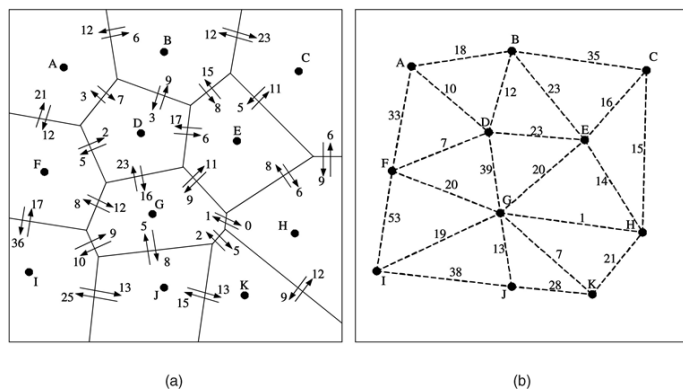
Fig. 1. (a) The Voronoi graph of a sensor network. The arrival and departure rates between sensors are the numbers associated with arrows. (b) The graph G corresponding to the sensor network in (a). The number labeled on each edge represents its weight.

tracking tree to reduce the communication cost of location update. Two solutions are proposed: Deviation-Avoidance Tree (DAT) and Zone-based Deviation-Avoidance Tree (Z-DAT). The latter approach tries to divide the sensing area into square-like zones, and recursively combine these zones into a tree. Our simulation results indicate that the Z-DAT approach is very suitable for regularly deployed sensor networks. For the second stage, we develop a Query Cost Reduction (QCR) algorithm to adjust the object tracking tree obtained in the first stage to further reduce the total cost. The way we model this problem allows us to analytically formulate the update and query costs of the solution based on several parameters of the given problem, such as rates that objects cross the boundaries between sensors and rates that sensors are queried. We have also conducted extensive simulations to evaluate the proposed solutions. The results do validate our observations.

Several other tracking-related problems have also been studied, but they can be considered independent issues from our work. The authors in [14] explored a localized prediction approach for power efficient object tracking

by putting unnecessary sensors in sleep mode. Techniques for co- operative tracking by multiple sensors have been addressed in [1], [3], [10], [15]. In [3], a dynamic clustering architecture that exploits signal strength observed by sensors is proposed to identify the set of sensors to track an object. In [15], a convoy tree is proposed for object tracking using data aggregation to reduce energy consumption.

The rest of this paper is organized as follows: Preliminaries are given in Section 2. DAT, Z-DAT, and QCR algorithms are presented in Section 3. Performance studies are conducted in Section 4. This paper concludes with Section 5.

2 PRELIMINARIES

We consider a wireless sensor network deployed in a field for the purpose of object tracking. Sensors' locations are already known at a special node, called sink, which serves as the gateway of the sensor network to the outside world. We adopt a simple nearest-sensor model, which only requires the sensor that receives the strongest signal from the object to report to the sink (this can be achieved by [3]). Therefore, the sensing field can be partitioned into a Voronoi graph [2], as depicted in Fig. 1a, such that every point in a polygon is closer to its corresponding sensor in that polygon than to any other. In practice, a sensor under our model may represent the clusterhead of a cluster of reduced-function sensors. In this work, however, we are only interested in the reporting behavior of these clusterheads.

Our goal is to propose a data aggregation model for object tracking. We assume that whenever an object arrives at or departs from the sensing range (polygon) of a sensor, a detection event will be reported (note that this update message are not always forwarded to the sink, as will be elaborated later). Two sensors are called neighbors if their sensing ranges share a common boundary on the Voronoi graph; otherwise, they are nonneighbors. Multiple objects may be tracked concurrently in the network, and we assume that from mobility statistics, it is possible to collect the event rate between each pair of neighboring sensors to represent the frequency of objects travelling from one sensor to another. For example, in Fig. 1a, the arrival and departure rates between sensors are shown on the edges of the Vonoroi graph. In addition, the communication range of sensors is assumed to be large enough so that neighboring sensors (in terms of their sensing ranges) can communicate with each other directly. Thus, the network topology can be regarded as an undirected weighted graph G ¼ ðVG; EGÞ with VG representing sensors and EG representing links between neighboring sensors. The weight of each link ða; bÞ2 EG, denoted by wGða; bÞ, is the sum of event rates from a to b and b

to a. This is because both arrival and departure events will be reported in our scheme. In fact, G is a Delaunay triangulation of the network [2]. Fig. 1b shows the corresponding Delaunay triangulation of the sensor network in Fig. 1a.
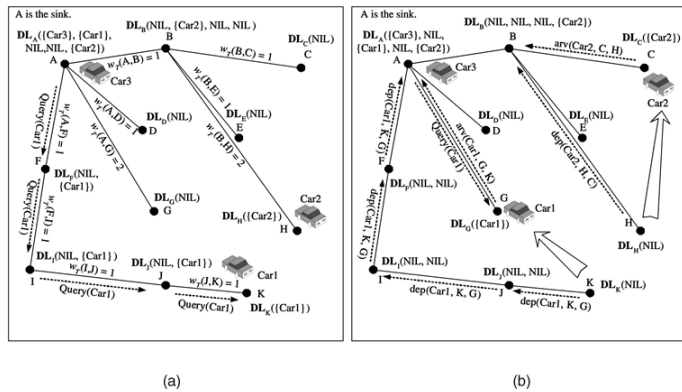
Fig. 2. (a) An object tracking tree T , where the dotted lines are the forwarding path of a query for Car1. (b) The events generated as Car1 moves from sensor K to G and Car2 moves from H to C.

In light of the storage in sensors, the sensor network is able to be viewed as a distributed database. We will exploit the possibility of conducting in-network data aggregation for object tracking in a sensor network. Similar to the approach in [8], a logical weighted tree T will be constructed from G. For example, Fig. 2a shows an object tracking tree T constructed from the network G in Fig. 1b. Movement events of objects are reported based on the following rules. Each node a in T will maintain a detected list DL_a ¼ ð$L0$; $L1$; ... ; LkÞ such that $L0$ is the set of objects currently inside the coverage of sensor a itself, and Li;i ¼ 1; ••• ; k, is the set of objects currently inside the coverage of any sensor who is in the subtree rooted at the ith child of sensor a, where k is the number of children of

a. When an object o moves from the sensing range of a to that of b (ða; bÞ2 EG), a departure event depðo; a; bÞ and an arrival event arvðo; b; aÞ will be reported by a and b, respectively, alone the tree T . On receiving such an event, a sensor x takes the following actions:

● If the event is depðo; a; bÞ, x will remove o from the proper Li in DLx such that sensor a belongs to the ith subtree of x in T . If x ¼ a, o will be removed from $L0$ in DLx. Then x checks whether sensor b belongs to the subtree rooted at x in T or not. If not, the event depðo; a; bÞ is forwarded to the parent node of x in T .

● If the event is arvðo; b; aÞ, x will add o to the proper Li in DLx such that sensor b belongs to the ith subtree of x in T . If x ¼ b, o will be

added to $L0$ in DLx. Then x checks whether sensor a belongs to the subtree rooted at x in T or not. If not, the event arvðo; b; aÞ is forwarded to the parent node of x in T .

The above data aggregation model guarantees that, disregarding transmission delays, the data structure DLi always maintains the objects under the coverage of any descendant of sensor i in T . Therefore, searching the location of an object can be done efficiently in T ; a query is only required to be forwarded to a proper subtree and no flooding is needed. For example, Fig. 2a shows the forwarding path of a query for Car1 in T . Fig. 2b shows the reporting events as Car1 and Car2 move and the forwarding path of a query for the new location of Car1.

Our goal in this paper is to construct an object tracking tree T ¼ ðVT ; ET Þ that incurs the lowest communication cost given a sensor network G ¼ ðVG; EGÞ and the corresponding event rates and query rates, where VT ¼ VG and ET consists of jVT j— 1 edges with the sink as the root. Intuitively, T is a logical tree constructed from G, in which each edge ðu; vÞ2 T is one of the shortest paths connecting sensors u and v in

G. Therefore, the weight of each edge ðu; vÞ in T , denoted by wT ðu; vÞ, is modeled by the minimum hop count between u and v in G. The cost function can be formulated as CðT Þ¼ UðT Þþ QðT Þ, where UðT Þ denotes the update cost and QðT Þ is the query cost. Table 1 summaries the notations used in this paper.

3 TREE CONSTRUCTION ALGORITHMS

This section presents our algorithms for constructing efficient object tracking trees. In Section 3.1, we develop algorithm DAT targeted at reducing the update cost. Then, in Section 3.2, based on the concept of divide-and-conquer, we devise algorithm Z-DAT to further reduce the update cost. In Section 3.3, algorithm QCR is developed to adjust the tree obtained by algorithm DAT/Z-DAT to further reduce the total cost.

3.1 Algorithm DAT (Deviation-Avoidance Tree)

Object tracking typically involves two basic operations: update and query. Based on the aggregation model in Section 2, updates will be initiated when an object o moves

from sensor a to sensor b. It can be seen that both the departure event depðo; a; bÞ and the arrival event arvðo; b; aÞ will be forwarded to the root of the minimum subtree containing both a and b. Therefore, the update cost UðT Þ of a tree T can be formulated by counting the average number of messages transmitted in the network per unit time:

TABLE 1 Summary of Notations

$dist_G(u,v)$	The minimum hop count between u and v in G.
$dist_T(u,v)$	The sum of w_Ts of edges on the path connecting u and v in T.
$w_G(u,v)$	The event rate between u and v.
$w_T(u,v)$	The weight of edge (u,v) in T. $(= dist_G(u,v))$.
$lca(u,v)$	The lowest common ancestor of u and v.
$p(v)$	The parent of v in T.
$Subtree(v)$	Members of the subtree rooted at v.
$root(v)$	The root of the temporary subtree containing v during the construction of T.
$q(v)$	The query rate of v.
$neighbors(v)$	Neighbors of v.
$children(v)$	Children of v.

.

$$U(T) = \sum_{(u,v)\in E_G} w_G(u,v) \times (dist_T(u, lca(u,v)) + dist_T(v, lca(u,v))); \qquad (1)$$

where lca(u; v) denotes the root of the minimum subtree in T that includes both u and v (from now on, we will call lca(u; v) the lowest common ancestor of u and v), and distT (x; y) is the sum of weights of the edges on the path connecting x and y in T . For example, in Fig. 2a, distT (F; K)¼ wT (F; I)þ wT (I; J)þ wT (J; K)¼ 3. In order to identify which factors affecting the value of U(T), we show that U(T) also can be formulated in a different way as follows:

Theorem 1. Given any logical tree T of the sensor network G, we have

$$U(T) = \sum_{(p(v),v)\in E_T} w_T(p(v); v) \times \sum_{\substack{(x,y)\in E_G \\ x\in Subtree(v) \\ y\notin Subtree(v)}} w_G(x; y); \qquad (2)$$

- Equation (2) contains the factor wT (u; v). Its minimal value is 1 when u 6¼ v. Consequently, it is desirable that each sensor's parent is one of its neighbors. Only the tree in Fig. 3d satisfies this criterion. By selecting neighboring sensors as parents, the average value of distT (u; lca(u; v))þ distT (v; lca(u; v)) in (1) can be minimized. For example, the average values of distT (u; lca(u; v))þ distT (v; lca(u; v)) are 3.591, 2.864, and 2.227 for the trees in Fig. 3a, Fig. 3c, and Fig. 3d, respectively.

- In (1), the weight wG(u; v) will be multiplied by distT (u; lca(u; v))þ distT (v; lca(u; v)). For two edges (u; v) and (u0; v0)∈ EG such that wG(u; v) > wG(u0; v0), it is desirable that

$$dist_T(u, lca(u; v)) + dist_T(v, lca(u; v))$$

$$< dist_T(u^0; lca(u^0; v^0)) + dist_T(v^0; lca(u^0; v^0)):$$

Combining this observation with the second obser-

where Subtree(v) is the subtree of T rooted at node v and p(v)
is the parent of v.

Proof. This can be proved by observing which events will be reported along an edge in T . Given (p(v); v)∈

ET , for any (x; y)∈ EG, where x ∈ Subtree(v) and y ∈= Subtree(v), since the lowest common ancestor of x and y must not in Subtree(v), any event generated on (x; y) will be transmitted from v to p(v). Otherwise, no message will be transmitted from v to p(v). This leads to the theorem. tu

From (1) and (2), we make three observations about U(T):

- Equation (1) contains the factor distT (u; lca(u; v)). Its minimal value is distG(u; lca(u; v)), which denotes the minimum hop count between sensor u and sensor lca(u; v) in G. Therefore, we would expect that distT (u; sink)¼ distG(u; sink) for each u ∈ VG; otherwise, we say that u deviates from its shortest path to the sink. If distT (u; sink)¼ distG(u; sink) for each u ∈ VG, we say that tree T is a deviation-avoidance tree. Fig. 3 shows four possible object tracking trees for the graph G in Fig. 1b. The one in Fig. 3b is not a deviation-avoidance tree since vation, an edge (u; v) with a higher wG(u; v) should be included into T as early as possible and p(v) should be set to u if distG(u; sink) < distG(v; sink), and vice versa. We call this the highest-weight-first principle.

Based on above observations, we develop our algorithm DAT. Initially, DAT treats each node as a singleton subtree. Then we will gradually include more links to connect these subtrees together. In the end, all subtrees will be connected into one tree T . The detailed algorithm is shown in Algorithm 1, where notation root(x) represents the root of the temporary subtree that contains x. To begin with, EG is sorted into a list L in a decreasing order of links' weights. Based on the third observation, algorithm DAT will examine edges in L one by one for possibly being included into tree T . For each edge (u; v) in L being examined by algorithm DAT, (u; v) will be included into T only if u and v are currently located in different subtrees. Also, (u; v) will be included into T only if at least one of u and v is currently the root of its temporary subtree and the other is on a shortest path in G from the former node to the sink (these conditions are reflected by the if statements in lines 5 and 7). An edge in G passing these checks will then be included into T . Note that without these conditions, deviations may

(a)

(b)

(c)

(d)
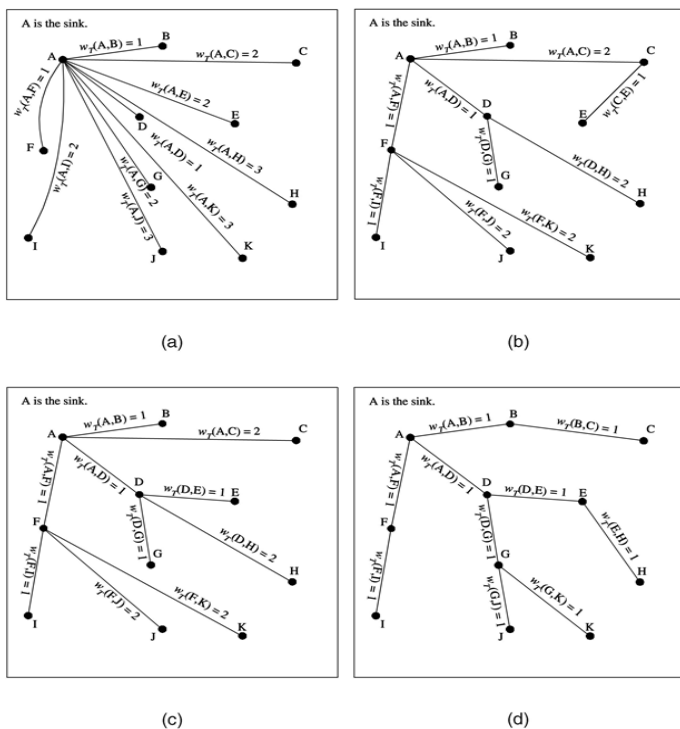
Fig. 3. Four possible location tracking trees for the graph in Fig. 1(b).

(a)

(b)
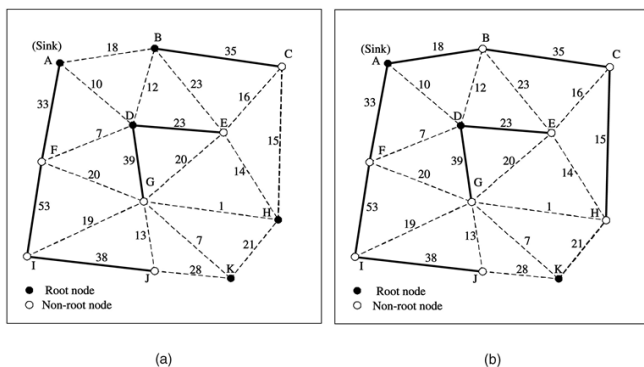
Fig. 4. Snapshots of an execution of DAT. Solid lines are those edges that have been included into T .

occur. It can be seen that T is always a subgraph of G and wT ðu; vÞ¼ 1 for all ðu; vÞ2 ET . For example, Fig. 4a is a snapshot of an execution of DAT. When ðF; GÞ is examined by DAT, it will not be included into T because neither F nor G is the root of its temporary subtree. Another snapshot is shown in Fig. 4b. When ðB; DÞ is examined, it will not be included into T . Although D is the root of its temporary subtree, B is not on the shortest path from D to A, i.e., distGðD; AÞ 6¼ distGðB; AÞþ 1. ðA; DÞ will be then examined after ðB; DÞ. ðA; DÞ can be included into T , because D is the root of its temporary subtree and A is on the shortest path from D to A.
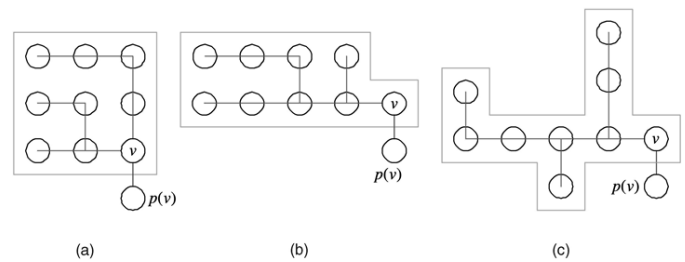
Fig. 5. Possible structures of subtrees with nine sensors.

4 CONCLUSIONS

In this paper, we have developed several efficient ways to construct a logical object tracking tree in a sensor network. We have shown how to organize sensor nodes as a logical tree so as to facilitate in-network data processing and to reduce the total communication cost incurred by object tracking. For the location update part, our work can be viewed as the extension of the work in [8], and we enhance the work by exploiting the physical structure of the sensor network and the concept of deviation avoidance. In addition, we also consider the query operation and formulate the query cost of an object tracking tree given the query rates of sensors. In particular, our approach tries to strike a balance between the update cost and query cost. Performance analyses are presented with respect to factors such as moving rates and query rates. Simulation results show that by exploiting the deviation-avoidance trees, algorithms DAT and Z-DAT are able to reduce the update cost. By adjusting the deviation-avoidance trees, algorithm QCR is able to significantly reduce the total cost when the aggregate query rates is high, thus leading to efficient object tracking solutions.

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DESIGN & IMPLEMENTATION OF WIRELESS SENSOR NETWORKS

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Abstract— Sensing any change in the physical environment and delivering this real time information about the system to the remote station for analysis has created many applications. With the research and development in the science and technology new wired and wireless technologies for sensing have been developed with time. This paper presents an information these technologies used for wired and wireless sensor networks. For wireless sensor network some features of zigbee, enOcean, wavenis, Z-wave, wifi and Bluetooth are discussed in this paper. Brief discussion of different applications of the sensor networks is also presented.

Keywords—applications; technologies; wired sensor network; wireless sensor network.

1 INTRODUCTION

Sensor network is a group of nodes which gathers data according to their specialty. The node contains the power source, microprocessor, external memory, sensors, analog to digital converter and transceivers. Microprocessors in the nodes perform the necessary operation on data prior to send it to the remote station. Microprocessor has limited internal memory. So the external memory is also provided in the node to store the sensing data. Sensors are the physical devices which collects the environmental data as the analog signal. Then this data is converted into the digital with the help of analog to digital converter present in the node. Transceiver is the device in the node which receives the control signal from the sender and sends the operator data from the sensors to the remote station.

Power source provide the energy (electricity) to the node for its operation. This power source as a battery for the wireless sensor nodes or through cable connection for the wired sensor or the power can be generated with the some energy harvesting modes like solar cell etc. Sensor networks further can be divided into two types:

1. Wired sensor network

In the wired sensor networks power source is wired. The power is continuously supplied to the node. Moreover the data from /to transceiver is send/received using wired
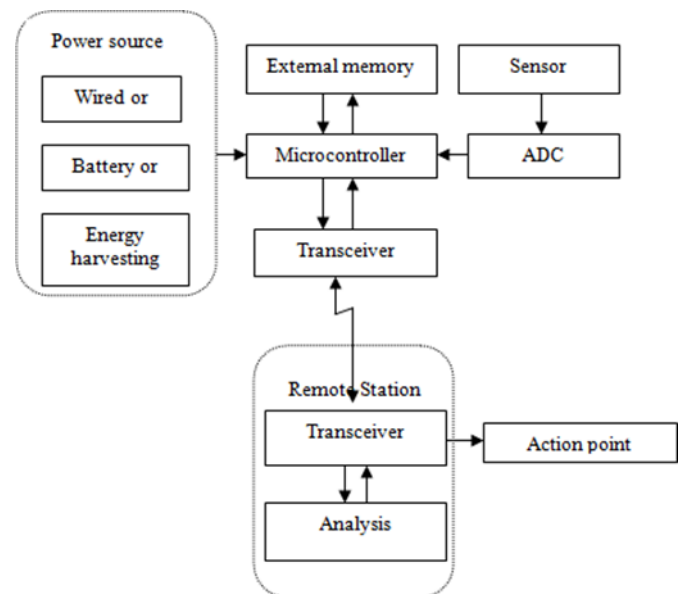
Fig. 1 Block Diagram of wireless Sensor Node

communication channel. These sensor networks are highly reliable and their applications are limited. Moreover they have mesh network of the wires connecting to the network which makes them complex to handle and increase their cost.

2. Wireless sensor networks

In wireless sensor network the nodes are not connected with any wire. Transceivers wirelessly send /receive the data and control signals to the control center or from the control center. In wireless sensor networks communication channel is the frequency spectrum. Moreover the power source in these nodes is the battery. As these nodes are implemented in very far areas, batteries are changed after a long time. Therefore energy consumption issue is the main research topic for wireless sensor networks. Now the data gathered at the field location is transferred to the remote station through the transceiver by the wireless channel. There data is processed for the analysis and required actions are being taken. As shown in Fig.1 energy can be provided by

three ways (battery, wire or energy harvesting module) to the sensor node. Data gathered by the sender node is sent to the remote station through wireless channel. After processing data at the remote station action is taken according to the requirement.

In the wireless sensor networks, the parameters which evaluate the performance of the network are packet delay, reliability, fault tolerance, energy consumption etc. Preference of these parameters changes from application to application.

2. TECHNOLOGIES

There are other different technologies which are used in the wireless sensor networks .these are –zigbee ,z-wave ,wavenis ,wifi,EnOcean,Bluetooth,Insteon,x10 etc.

A.Zigbee

This technology is built on the IEEE 802.15.4 media standard and this works from layer 3 to the application layer of the ISO-OSI model [1]. Its working frequencies are 868 MHz, 915 MHz, and 2.4 GHz and low bit rate transmission 20kbps, 40kbps and 250kbps respectively. Moreover it is low cost wireless network technology. It has short delay and provides faster response. It need 15ms to wake up from sleeping mode and only 30ms to access the network. For insurance of reliable data transfer it uses dynamic routing protocol. Generally mesh network topology is used for the interconnection of the nodes, as in this there are at least two pathways to connect each node. In mesh each node is self routed and able to connect to other nodes if needed. A large number of nodes can use zigbee at the same time. 65000 nodes can be supported at most in a zigbee network. It has low power consumption. Two AA batteries can be used for 6 month to 2 years duration in low power standby mode [2]. Its low power consumption is due to the PSK modulation techniques, increased sleeping time of the node and use of EEMAC algorithm on the MAC layer [3]. Zigbee operates up to a range 10 to 100 meter. There are three ways in which security is provided by the zigbee technology. It uses AES encryption for the high-level secure transfer of the data. It also has option of no security setting and using access control list. So these features of the zigbee technology provide a great scope for its use.

B. EnOcean

It is a wireless network technology which has been very successful in Europe. Its main focus is on the energy efficiency .To achieve this it does not use the normal communication reliability procedures like message acknowledgement and CSMA. EnOcean resolve this issue using very short messages which reduce the message collision probability and hence save energy avoiding the repetition of message several times. It is not a feature rich, able to handle adhoc networks and not

very complex as it is equipped with the energy harvesting modules .Energy can be harvested from environmental resources like solar energy, temperature difference or vibration/motion. EnOcean uses direct media access control (MAC) scheme [4].

C.Wavenis

It was made for ultra low power energy consumption and long range transmission of small amount of data. It has automated 2-way communication. It supports Asynchronous or synchronous operation depending on network size and application [5]. It has feature of easy network device setup. Every device using wavenis technology support repeater function upto 4 hops. Wavenis operates in license free ISM bands .It has following regulatory standards.

1. 868 MHz (EU EN 300-220) with strict duty cycle regulation.
2. 915 MHz (US FCC 15 247, 15-249) with mandatory signal spreading.
3. 433 MHz with no duty cycle restriction.

Wavenis applications communicate at 19.2 Kbps [1].

D. X10

This protocol is used in smart homes and it is used for wired sensor networks. It uses electrical power lines to transmit message signals, incurs low cost and easy to install .It also has less data transfer rate-20 bps. Moreover X10 is inclined towards noise [6].

E. Insteon

It is the modification of the legacy X10 and is backward compatible to X10. Insteon uses both radio frequency signals and the home's existing electrical wiring as the communication channel. It provides error detection and automatic error correction of the data packet. In the mesh network of the Insteon every device acts as a repeater-receives and sends the every message to all other devices on the network and they do not contain any routing tables. This technology operates with frequency 131 kHz on power lines and for wireless transmission radio frequencies used in US and Europe is 915MHz and 868MHz respectively but Radiofrequency used in Australia and New Zealand is 921MHz. It can support 16,777,216 maximum devices per network. Its new feature is wireless communication [7].

F. Z-wave

It is a wireless communication standard designed for remotely controlled applications in residential and light commercial environments. Its speed is 40 kbps (915MHz) and reach is up to 30 meter in air and reduced indoor. It is widely adopted and uses 128-bit AES encryption for the security purpose and avoids interference with Wifi, Bluetooth and other systems that operate on crowded 2.4 GHz. It was developed by Denis

Startup called Zen-Sys that was acquired by sigma designs in 2008 [1].

G. wifi

It is a popular wireless technology based on IEEE 802.11 standards and used in home networks. Speed can reach from 11Mbps-300Mbps.Its adoption rate is extremely high

.Wifi can be less secure than the wired connections. For security purpose it uses Wifi protected access 2(WPA2) 802.11i [1]. Wifi has high power consumption as the data rates and range is high. Wireless access point using 802.11g and 802.11b has a range of 35 m in doors and 100m outdoors.

H. Bluetooth

It is short range, wireless technology and is basically wire substitute. This technology is based on IEEE 802.15.1. It is very efficient and processing bandwidth is 1000-3000Kbps. It operates in the range 2400-2483.5 MHz and makes network of maximum 7 nodes and network called piconet [2].

Brief comparison of typical wireless network technologies is given in table I.

Table 1. Comparison of typical wireless network technologies

	Technologies			
	Zigbee	**z-wave**	**bluetooth**	**wavenis**
Data rate	20,40,250kbps	40kbps	1000-3000kbps	19.2kbps
Range (in meter)	10-100m	30m,in open air	50m	Significant range
Application Area	Monitoring and control	Remote control application	Wire substitute	Remote control and data monitoring
Standard	IEEE 802.15.4	Proprietary wireless communication standard	IEEE 802.15.1	Certified ETS300 - 220, FCC15-247, 15-249
Security	128 bit AES encryption	128 bit AES encryption	SAFER+ Block cipher	3DES, AES 128, RSA

3. APPLICATIONS

According to the specification of the sensors, area of applications of sensor networks is very versatile. Most of the population, at the present time is in the developing countries and main income source in these countries is agriculture. With the development of the technology in the past decades green house management agriculture introduced to increase the farm production efficiency and profitability by reducing unintended effects on green house environment. The necessary parameters like temperature, humidity and irrigation in the green house can be known by the wireless technology zigbee at low cost. zigbee module is used to continuously monitor the parameter data of the green house and send to the remote station where it is get operated on the LabView GUI Software and control signal send back to the green house to maintain the parameter value level [8].

Similar and extended functionality of the operations has been described in [9]. In this, the data gathered is put on the web portal and along with it the user feedbacks of the products, future market trends and the knowledge seminar from the experts, data stored in the database for the future use has been included.

A wireless sensor network has been proposed with the sensor which senses the pH value of the water of the river [10]. In this monitoring areas are divided into sub areas like area near water pump house(A), near factory industry(B), near agricultural land(C) and near residential area(D). In each area with the cluster of sensor nodes a head node is located. Sensor nodes are deployed at the different depths of the river to measure the water quality at other levels also. A Head node from the respective clusters takes the data from other nodes and sends it to the remote station for the processing. The system in this uses zigbee communication to meet the low power consumption requirements of the development scenario. And in [11] the parameter under investigation include temperature, phosphate, dissolved oxygen, conductivity, pH, turbidity, and water level in the smartCoast R&D project, co-founded by the Irish Marine Institute and EDA.

In an application of WSN the avalanche conditions can be identified in the respective areas before the actual loss by this natural calamity [12]. In this system the sensor is made up of the two or more elementary radiators. The radiators belonging to the sensor are immersed in the snow one after another. As the snow melts the water level in the snow increases which increase the conductivity of the medium. And after performing the required calculations the threshold value for the danger alerts can be calculated.

WSN are also used to know the oilfields on the sea floor or the seismic movement monitoring [13]. Effective energy efficient node replacement and routing algorithms has been discussed. The nodes are autonomous and use wireless acoustic transmission for data transmission.

A system to monitor the temperature in cold chain logistics in transportation has been made [14]. It prevents the perishing of the food. The system used integration of the wireless microcontroller JENNIC 5418 based on IEEE 802.15.4 standard with a thermocouple sensing

converter MAX31855. They used the wireless access points integrated with the GPS and the 3G communication system.

In the medical fields, WSN provides the diagnostic minority systems those do not involve puncturing the skin or entering a body cavity. In the current research it is desired to integrate more biosensors, electronics and wireless technologies into low power sensing devices that can be worn or directly planted into the patients. Other wireless applications in the hospitals are to localize the assets and streamlining hospital staff by integrating personal digital assistant (PDA) or smart phone of doctors to the larger hospital network. Smart surgical tools provide wireless sensing and tracking for computer assisted surgery and seamless use inter operatively [15].

4. CONCLUSION

There are number of technologies of wired and wireless sensor networks. These technologies are using the different protocols and provide the different values for the performance parameters. Zigbee technology provides considerable data rate along with the low power consumption. EnOcean uses special messages instead of CSMA protocol to reduce the energy consumption. X10 and Insteon technologies can work on the electrical power lines which make them suitable for home automation. Wifi is high power consuming and high data rate delivering technology. Its high power consumption makes it inapplicable for wireless sensor node. Bluetooth is also a high power consumption technology which provides high data rate for shorter ranges. The main constraint of wireless sensor networks is to operate on the lowest possible level of the energy. This is because that the wireless nodes are deployed in the field which are rarely visited or attended and more over their battery replacement is costly.

Wireless sensor networks are used in the versatile applications. These are being used in agriculture, home automations, environmental condition monitoring, defense areas, and medical field.

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HYBRID ORDER STATISTICS FILTER FOR SAR IMAGE SPECKLE NOISE

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ABSTRACT:SYNTHETIC APERTURE RADAR (SAR) images are affected by multiplicative speckle noise, which affects the information content in a SAR image and makes it difficult for image recognition, interpretation and image classification.

In this paper we have proposed an algorithm for suppression of speckle noise using hybrid order statistics filter which is a combination of mean and median filter hence it is also known as HMM filter (Hybrid Mean Median Filter). The performance of the proposed filter is tested against some standard filters for suppression of speckle noise in SAR images and was compared in terms of performance metrics such as MSE and PSNR, and it was found that this filter gives better performance.

Keywords: Speckle Noise, Hybrid, SAR Images, Suppression.

1. INTRODUCTION:

Synthetic aperture radar (SAR) is a remote sensing instrument for obtaining a better understanding of environment.SAR images are useful for remote sensing applications as they are independent of time or day or weather conditions. SAR system uses micro- Waves and records both the amplitude and phase of the back-scattered radiation.

The wave reflected from the target consists of contributions from many independent scattering points. The interference of these coherent waves results in the granular pattern of noise known as 'speckle'. To reduce the fluctuations, various independent intensity values of the same pixel are averaged, which is called incoherent averaging. Increasing the power of the signal will increase the speckle noise in a SAR image.

For this reason speckle noise is also known as multiplicative noise. Incoherent averaging reduces speckle noise, but at the expense of resolution. Many speckle noise reduction techniques have been developed for removing speckle noise and retaining the edge details. However, in most of the speckle reduction techniques studied by the researchers there is no comprehensive method that takes all the constraints into consideration.

This paper is organized as follows:
Section 2: Gives mathematical model of speckle noise. Section 3: Presents a review of the adaptive speckle filters. Section 4: Introduces the proposed filtering technique. Section 5: Presents quality evaluation metrics for evaluating the quality of the speckle reduction algorithm. Section 6: Gives the experimental results on SAR Images. Section 7: Conclusion. Section 8: References

2. MATHEMATICAL MODEL OF SPECKLE NOISE

A digital image is generated from a SAR echo is represented by spatial variations of pixel intensities. The speckle noise model is approximated as multiplicative and given by

$$D_{m,n} = S_{m,n}.U_{m,n}+V_{m,n} \qquad (1)$$

Where $D_{m,n}$ is the noisy pixel, $S_{m,n}$ is the noise free pixel, $U_{m,n}$ and $V_{m,n}$ represents the multiplicative and additive noise respectively and m,n are indices of the spatial locations. Since the effect of additive noise is considerably small when compared to that of multiplicative noise, Eq.(1) is written as

$$D_{m,n} \approx S_{m.n}.U_{m,n} \qquad (2)$$

Applying Logarithmic compression to the noisy signal, The logarithmic compression transforms of Eq(2) to additive noise is $\log(D_{m,n}) = \log(S_{m,n})+ \log(U_{m,n})$ (3a)

$$G(m,n) = R(m,n) + N(m,n) \qquad (3b)$$

The term $\log(D_{m,n})$, which is the SAR image after logarithmic compression is denoted as G(m,n), and the terms $\log(S_{m,n})$ and $\log(U_{m,n})$,which are the noise free pixel and noisy components are denoted as R(m,n) and N(m,n) respectively after logarithmic compression. This model shows the speckle noise as a multiplicative modulation of the scene reflectivity. Hence the speckle effects are more pronounced in a high intensity area than in a low intensity area.

3. REVIEW OF EXISTING SPECKLE FILTERS
a) MEDIAN FILTER:
Median filter is a non linear filter whose response is based on ranking the pixels encompassed by the filter and then replacing the value of the center pixel with the middle value. [6], [7] Median filter is used for the SAR images to remove noise and get better image quality, it is useful to filter the same image two or three times. The main disadvantage of the Median filter is the extra computation time.

b) WEINER FILTER:
The input to the Wiener filter is assumed to be a signal, $s(t)$, corrupted by additive noise, $n(t)$. The output, $\hat{s}(t)$, is calculated by means of a filter, $g(t)$, using the following convolution.

$$\hat{s}(t) = g(t) * [s(t) + n(t)]$$

Where
- $s(t)$ is the original signal (not exactly known; to be estimated)
- $n(t)$ is the noise
- $\hat{s}(t)$ is the estimated signal (the intention is to equal $s(t+\alpha)$)
- $g(t)$ is the Wiener filter's impulse response

c) FIR HYBRID MEDIAN FILTER (FHM):
The best of the filters in the FHM filters, from the point of view of preserving edge position, is the two-level _bi-directional linear-median hybrid filter. It employs the mask A to I in the 5x5 region
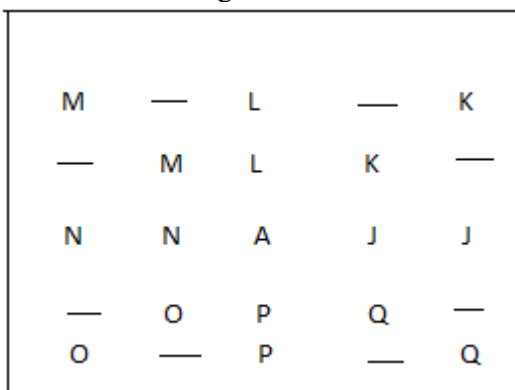
5X5 MASK

4. PROPOSED FILTERING ALGORITHM
Hybrid Mean-Median (HMM) filter is a combination of FIR median hybrid filter and M3 filter. This filter replaces the central pixel by the maximum value of FIR hybrid median and mean for each mask of 7x7 and 5x5.

R (m, n) = Max (FIR Hybrid Median (m, n), Mean (m, n)) where
FIR Hybrid median (m, n) = med (A, med (A, J, L, N, P), med (A, K, M, O, Q))
The linear mask of this filter with the structures A, J to Q in the 7x7 and 5x5 regions is
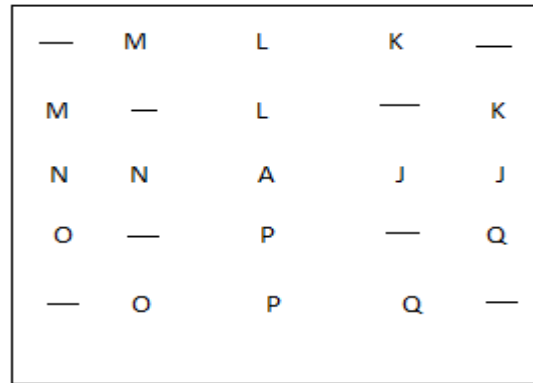
5X5 MASK
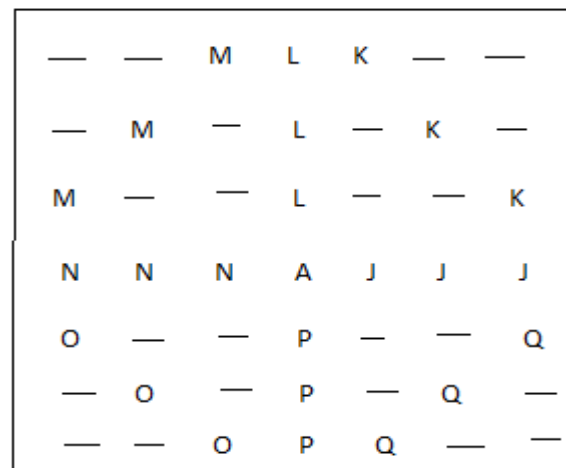
7X7 MASK

ALGORITHM:
1. Find the median **MD** of the pixels marked as **J, L, N, P** and the central pixel **A** in the 5x5 or 7x7 windows.
2. Find the median **MB** of the pixels marked as **K, M, O, Q** and the central pixel **A** in the 5x5 or 7x7 windows.
3. Compute **M.** where
    M = median (MD, MB, A)
    M is called FIR hybrid median filter.
4. Find the mean of all the pixels in the chosen window.
5. Final Filter Value is given as
    R (m, n) = Max (M (m, n); Mean (m, n))

5. EVALUATION METRICS
The proposed algorithm has been implemented using MATLAB. The fidelity criteria of image enhancement are difficult to measure as there is no common algorithm for the enhancement of the image. Statistical measurements are used to measure enhancement of the image. The performance of each filter is evaluated quantitatively for SAR image with speckle noise using the quality metrics like Mean Square Error (MSE), Peak Signal-to–Noise Ratio (PSNR),

MEAN SQUARE ERROR (MSE):
The MSE for two P×Q monochrome images (G and R) where one of the images is considered a noisy approximation of the other is defined as:

$$MSE = 1/PQ \sum_{m=0}^{P-1} \sum_{n=0}^{Q-1} [\,G(m, n) - R(m, n)\,]^2$$

PEAK SIGNAL TO NOISE RATIO (PSNR):

PSNR is also a measure of the quality of a despeckled image which is defined as

$$PSNR = 10 \log_{10} \frac{(MAXi)^2}{MSE}$$

Where MAXi is the maximum intensity of the unfiltered images. A higher PSNR suggests that the reconstructed image is of higher quality.

6. EXPERIMENTAL RESULTS

wiener filter output

input image

fhm filter output

median filter output

hmm filter output
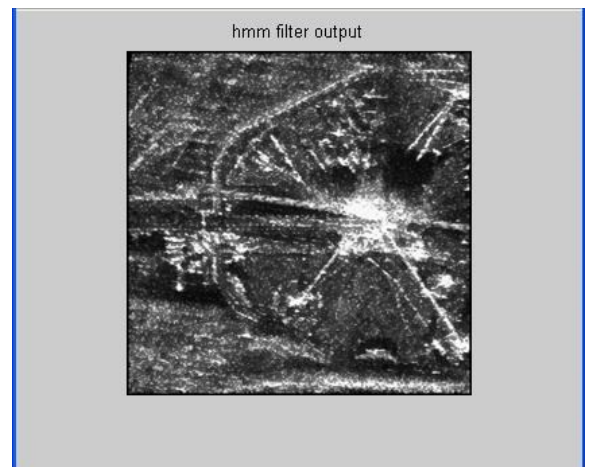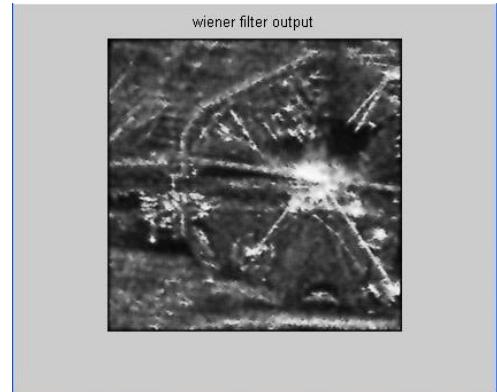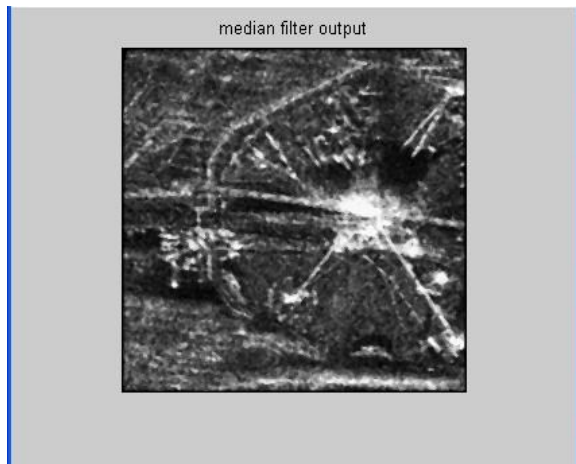
METRIC EVALUATION

TYPE OF FILTER	MSE	PSNR
MEDIAN FILTER	0.019	22.30
WEINER FILTER	0.005	24.63
FHM FILTER	0.003	28.56
HMM FILTER	0.001	31.36
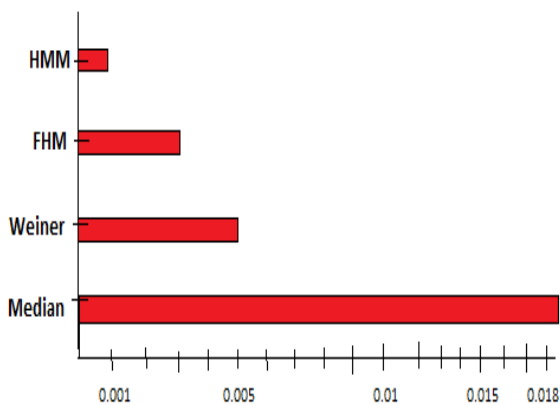
Filter Performance in terms of MSE
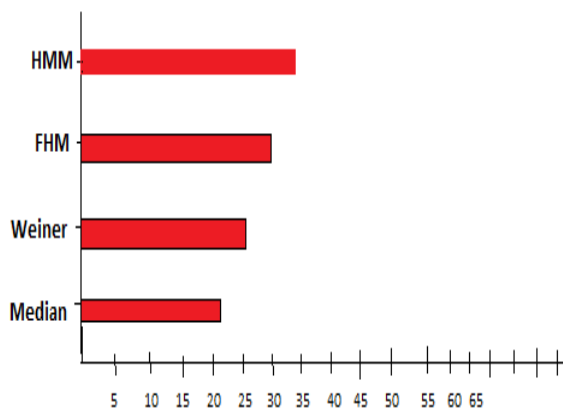
Filter Performance in terms of PSNR

7. CONCLUSION

The primary goal of speckle noise reduction is to remove speckle without losing fine detail, Simulation results suggest that HMM filter gives better results in terms of PSNR and MSE while preserving edges for terrain classification, target detection and other applications. HMM filter gives fourfold improvements in edge shift over other filters hence it can also be called as detail preserving filter. It also has corner preserving properties and it is resistant to edge shift.

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DESIGN & IMPLEMENTATION OF CONNECTIONLESS NETWORK SERVICE PROTOCOLS FOR MOBILE AD HOC NETWORKS

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Abstract: The stipulation of connectionless network service (CLNS) is much more demanding in mobile ad hoc networks. A lot of researches have been done so as to provide CLNS by designing various MANET protocols. However, efficient performance evaluations and relative analysis of these protocols in a common pragmatic environment have been performed only in a limited manner. A Mobile Ad Hoc Network (MANET) is a network that changes locations and configure itself on the fly. It means MANETs are used where the infrastructure is not available such as military or police exercises, disaster relief operations and urgent business meetings. In this survey the relative features, functions and reliability of each CLNS protocols are studied and discussed.

Keywords: CLNS, MANETS, Reliability

1. INTRODUCTION:

Recent advancements such as Bluetooth introduceda new type of wireless systems known as mobile ad hoc networks. Mobile ad hoc networks or "short live" networks operate in the absence of fixed infrastructure. They offer quick and easy network deployment in situations where it is not possible otherwise. Ad hoc is a Latin word, which means "for this or for this only" Mobile ad hoc network is an autonomous system of mobile nodes connected by wireless links; each node operates as an end system and a router for all other nodes in the network.

Ad Hoc networks can provide communication forcivilian applications, such as message exchanges among business meeting, medical and security personnel involved in rescue missions. These applications rely only on connectionless services because of no infrastructure available. Connectionless network service provides network layer services to the transport layer. When support is provided for CLNS, routing uses routing protocols to exchange routing information. CLNS does not perform connection setup or termination because paths are determined independently for each packet that is transmitted through a network. In addition, CLNS provides best effort delivery, which means that no guarantee exists that data will not be lost, corrupted, disordered, or duplicated.

CLNS relies on transport layer protocols toperform error detection and correction.

Following this, we recap the operation, key features & functions and major protocols in selecting a connectionless network service. We focus on journal articles and peer-reviewed conferences, thereby hopefully extracting the mostuseful and important rift of the candidate solutions.

(I) Issues need to be considered while providing CLNS:

Connectionless network service refers to communication between two network end points inwhich messages can be sent from one end point to another without prior arrangement.

CLNS are:

- Stateless having no previously definedprotocol
- Easily accessible.

But the CLNS is not ensured that the recipient is available to receive the data. The Data has to be resent several times. It's hard to filter malicious packets using firewalls. No acknowledgement willbe given during the data transfer. The main advantage of using CLNS is that it is mainly used in "real time" applications where data sending is more important.

CLNS is a type of network service at the layer 3 of the OSI model. This service does not have the reliability of the connection-oriented method, but it is useful for periodic burst transfers. Neither system must maintain state information for the systems that they send transmission to or receive transmission from. LANs operate as connectionless systems. A computer attached to a network can start transmitting frames as soon as it has access to the network. It does not need to set up a connectionwith the destination system ahead of time.

However, a transport-level protocol such as TCP may set up a connection-oriented session when necessary. Contrast this with Connectionless service, which does

not require establishing a session and a virtual circuit[1]. This can be found in the network layer or transport layer, depending on the protocol. You can think of a connectionless protocol as being akin to mailing a post card. You send it and hope that the receiver gets it.

Features of a connectionless service :

□ Packets do not need to arrive in a specific order

□ Reassembly of any packet broken into fragments during transmission must be in proper order

□ No time is used in creating a session

□ No Acknowledgement is required.

The largest connectionless network in use today is the Internet.

4. Protocols providing CLNSProtocol classification

Standard connectionless protocols over
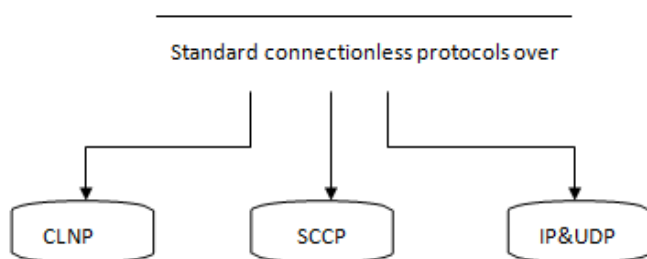
(a) Connectionless network protocol (CLNP):
CLNP, is a Public Data Network protocol that provides the connectionless mode network service.

Aim of CLNP:
CLNP performs two services: breaking data into packets and addressing packets across networks. It is known as a "datagram" service, which refers to the process of splitting up data into chunks for transmission and adding a header to it. The addressing responsibilities of the protocol follow the Network Service Access Point (NSAP) protocol[6].

Functions of CLNP:
CLNP is the equivalent to the Internet Protocol definition of the TCP/IP (Transmission Control Protocol/Internet Protocol) stack. "Connectionless" systems simply send out data to an address without checking whether the data actually arrived. Connectionless Network Protocol (CLNP)[10] is an ISO network layer datagram protocol. CLNP provides the Connectionless-mode Network Service. CLNP is intended for use in the Sub network Independent Convergence Protocol (SNICP) role, which operates to construct the OSI Network Service over a defined set of underlying services, performing functions necessary to support the uniform appearance of the OSI Connectionless-mode Network Service over a homogeneous or heterogeneous set of interconnected subnetworks[7].
CLNP uses Network service access point (NSAP) addresses and titles to identify network devices. The

Source Address and Destination Address parameters are OSI Network Service Access Point Addresses (NSAP address). A network-entity title is an identifier for a network-entity in an end-system or intermediate-system. Network-entity titles are allocated from the same name space as NSAP addresses, and the determination of whether an address is an NSAP address or a network-entity title depends on the context in which the address is interpreted. CLNP (Connectionless Network Protocol) provides the same maximum datagram size as IP, and for those circumstances where datagrams may need to traverse a network whose maximum packet size is smaller than the size of the datagram, CLNP (Connectionless Network Protocol) provides mechanisms for fragmentation (data unit identification, fragment/total length and offset). Like IP, a checksum computed on the CLNP header provides a verification that the information used in processing the CLNP datagram has been transmitted correctly, and a lifetime control mechanism ("Time to Live") imposes a limit on the amount of time a datagram is allowed to remain in the Internet system.

CLNP has the following PDU(protocol data unit) structure:

Header part	Address part	Segmentation part	Option part	data

Header part

NLP ID - Network Layer Protocol Identifier. The value of this field is set to binary 1000

8	16	24	24	35	40	56	72bit
N LP ID	Length ID	Version	Life time	Flags	Type	Seg. Length	Checksum

0001 to identify this Network Layer protocol as ISO 8473, Protocol for Providing the Connectionless- mode Network Service and the value of this field is set to binary 0000 0000 to identify the Inactive Network Layer protocol subset.

● Length ID - Length Indicator is the length in octets of the header

● Version - Version/Protocol Id Extension identifies the standard Version of ISO 8473

● Lifetime - PDU Lifetime representing the remaining lifetime of the PDU, in units of 500 milliseconds.

● Flags - three flags: segmentation permitted, more segments, error report

● Type - The Type code field identifies the type of the

protocol data unit, which could be data PDU or Error Report PDU

• Seg. Length - The Segment Length field specifies the entire length, in octets, of the Derived PDU, including both header and data (if present).

• Checksum - The checksum is computed on the entire PDU header.

Address Part

It contains information of destination and source addresses, which are defined in OSI 8348/AD2 with variable length.

Segmentation Part

If the Segmentation Permitted Flag in the Fixed Part of the PDU Header[2] (Octet 4, Bit 8) is set to one, the segmentation part of the header, illustrated in Figure 6, must be present: If the Segmentation Permitted flag is set to zero, the non-segmenting protocol subset is in use.

Option Part

The options part is used to convey optional parameters

Data Part

The Data part of the PDU is structured as an ordered multiple of octets

(b) Signaling connection control part (Sccp):
Signaling Connection Control Part (SCCP), is a Signaling System 7 protocol that provides the connectionless mode network service as described in ITU-T Recommendation X.213. Signaling Connection Control Part (SCCP), a routing protocol in SS7 protocol suite in layer 4, provides end-to-end routing for TCAP messages to their proper database and relies on the services of MTP for basic routing and error detection. SCCP provides connectionless and connection-oriented network services above MTP Level 3.

SCCP allows routing using a Point Code and Subsystem number or a Global Title. A Point Code is used to address a particular node on the network, whereas a Subsystem number addresses a specific application available on that node. SCCP employs a process called Global Title Translation to determine Point Codes from Global Titles so as to instruct MTP on where to route messages.

SCCP[10] messages contains 3 parameters which describe the type of addressing used, and how the message should be routed:

SCCP message parameters:
(i)   Address Indicator
(ii)   Global title indicator
(iii)   Routing indicator

(iv)   Address Indicator Coding

SCCP Protocol classes:
SCCP provides 5 classes of protocol to its applications:
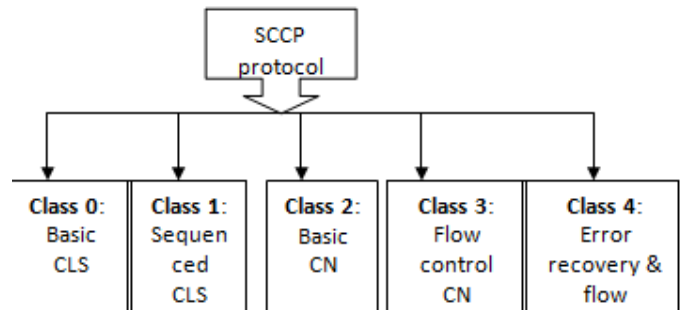
*CLS – Connectionless
*CN – Connection Oriented
Class 0: Basic connectionless
The SCCP Class 0 protocol class is the most basic of the SCCP protocol classes. Network Service Data Units passed by higher layers to the SCCP in the originating node are delivered by the SCCP to higher layers in the destination node. They are transferred independently of each other. Therefore, they may be delivered to the SCCP user out-of- sequence. Thus, this protocol class corresponds to a pure connectionless network service. As a connectionless protocol, no network connection is established between the sender and the receiver.

Class 1: Sequenced connectionless
SCCP Class 1 builds on the capabilities of Class 0, with the addition of a sequence control parameter in the NSDU which allows the SCCP User to instruct the SCCP that a given stream of messages should be delivered in sequence. Therefore, Protocol Class 1 corresponds to an enhanced ^{o} connectionless protocol with assurances of in- ^{f} sequence delivery.

Class 2: Basic connection-oriented
SCCP Class 2 provides the facilities of Class 1, but also allows for an entity to establish a two-way dialog with another entity using SCCP.

Class 3: Flow control connection oriented
Class 3 service builds upon Class 2, but also allows for expedited (urgent) messages to be sent and received, and for errors in sequencing (segment re-assembly) to be detected and for SCCP to restart a connection.

Class 4: Error recovery and flow control connection oriented
Class 4 service is never used in real time. Signaling Connection Control Part provides reliable delivery of packets between end stations in a telephone network. SCCP makes it possible to address a message to a specific type of device, such as a conventional telephone

set, cell phone set, VoIP end station, fax machine, or computer. SCCP maintains the correct sequencing of packets, even during times of high network traffic or partial network failure. SCCP is used as the transport layer for services such as 800/888/877 (free-phone) numbers, phone cards (calling cards) and roaming in cellular networks.

Protocol Structure

SCCP messages are contained within the Signaling Information Field (SIF) of an MSU. There are two formats for the SCCP messages: one is defined by ANSI[3] and the other is defined by ITU-T.[10]

SCCP Header Structure

Routing table
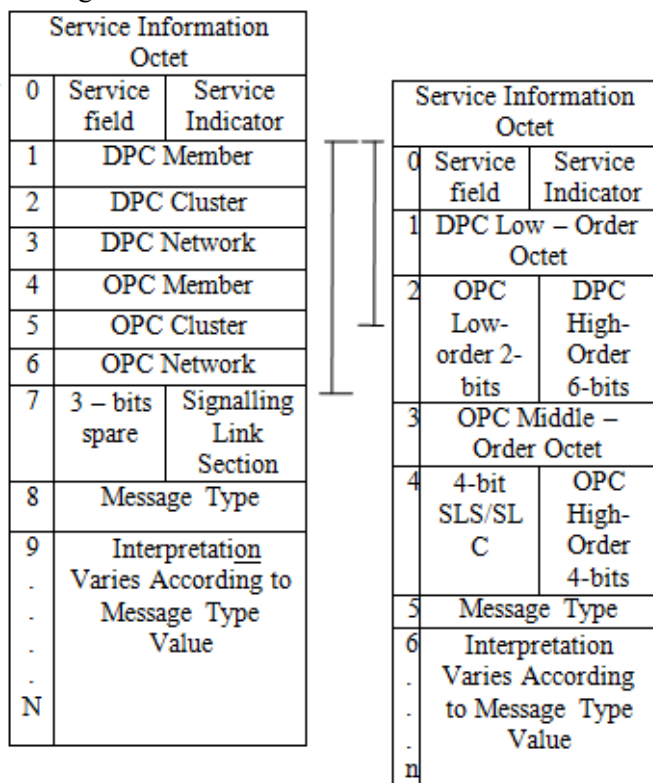
The signaling information field(SIF) contains the routing label followed by the SCCP message header with the following structure:

Routing label
Message type
Mandatory fixed part
Mandatory variable part
Optional part

□ **Routing label** - A standard routing label.
□ **Message type code** - A one octet code which is mandatory for all messages. The message type code uniquely defines the function and format of each SCCP message.
□ **Mandatory fixed part** - The parts that are mandatory and of fixed length for a particular message type will be contained in the mandatory fixed part.

□ **Mandatory variable part** - Mandatory parameters of variable length will be included in the mandatory variable part. The name of each parameter and the order in which the pointers are sent is implicit in the message type.

□ **Optional part** - The optional part consists of parameters that may or may not occur in any particular message type. Both fixed length and variable length parameters maybe included. Optional parameters may be transmitted in any order. Each optional parameter will include the parameter name (one octet) and the length indicator (one octet) followed by the parameter contents.

(C) IP & UDP:

Internet Protocol and User Datagram Protocol essentially provide the connectionless mode network service as described earlier[8].

The Internet Protocol (IP) is the principal communications protocol used for relaying datagrams (packets) across an internetwork using the Internet Protocol Suite. Responsible for routing packets across network boundaries, it is the primary protocol that establishes the Internet.

Historically, IP was the connectionless datagram service in the original Transmission Control Program introduced by Vint Cerf and Bob Kahn in 1974, the other being the connection-oriented Transmission Control Protocol (TCP)[4]. The Internet Protocol Suite is therefore often referred to as TCP/IP.

The first major version of IP, now referred to as Internet Protocol Version 4 (IPv4) is the dominant protocol of the Internet, although the successor, Internet Protocol Version 6 (IPv6) is in active, growing deployment worldwide.

Services provided by IP

The Internet Protocol defines an addressing methods and structures for datagram encapsulation. Addresses identify hosts and provide a logical location service. Each packet is tagged with a header that contains the meta-data for the purpose of delivery. This process of tagging is also called encapsulation. IP is a connectionless protocol and does not need circuit setup prior to transmission.

IP Reliability

As a consequence of this design, the Internet Protocol only provides best effort delivery and its service can also be characterized as unreliable. In network architectural language it is a connection-less protocol[11]. The lack of reliability allows any of the following fault events to occur:

- Data corruption
- Lost data packets
- Duplicate arrival
- Out-of-order packet delivery; meaning, if

packet 'A' is sent before packet 'B', packet 'B' may arrive before packet 'A'. Since routing is dynamic and there is no memory in the network about the path of prior packets, it is possible that the first packet sent takes a longer path to its destination.

In addition to issues of reliability[9], this dynamic nature and the diversity of the Internet and its components provide no guarantee that any particular path is actually capable of, or suitable for, performing the data transmission requested, even if the path is available and reliable.

UDP

The User Datagram Protocol (UDP) is the TCP/IP connectionless transport protocol. Connectionless transport protocols are used for multimedia applications. Networking protocols are grouped by function into a protocol stack[5]. There are several transport layer protocols available.

Features & Functions of UDP

After a connection has been established, data integrity can be managed by sequencing data packets for the same session. Without establishing a connection, these data management functions are not possible. UDP merely sends out packets at one end and receives them at the other. Whether those packets are out of sequence or have damaged or lost data is not controlled.

The purpose of UDP is to offer a lightweight alternative to TCP. Where applications perform their own data integrity checks, or have alternative connection-establishing procedures, UDP is used. UDP became popular with multimedia applications like video streaming and Internet telephony, which have separate procedures for data integrity and session management.

4. FUTURE CHALLENGES

MANETs are probably to expand their applications in the future communication environments. The support of CLNS will thus be an important and desirable component of MANETs. Several important research issues and open questions need to be addressed to facilitate CLNS support in MANETs. Use of location, mobility, power consumption and route availability are some of the issues that are currently being examined and need further

exploration. Other challenges and open issues include robustness and security, and support for multiple levels of services in CLNS routing schemes.

5. CONCLUSION

In this paper, we focused on the basic concepts in CLNS routing in MANETs and the various issues that are needed to be faced during the provision of CLNS. The through overview on various CLNS routing protocols have been made. We have summarized the classifications, features and functions of these protocols. There are still many issues and challenges which have not been considered. This will be subjected to further investigations.

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FORECASTING BITCOIN PRICES USING DEEP NEURAL NETWORKS

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ABSTRACT Project based learning is the methodology in which projects drive knowledge and is used in dedicated subjects without negotiating the coverage of the required technical material. This paper discusses the scheme and delivery of project based learning in computer science engineering as major project which adopts undergraduate creativities and emphasizes on real-world, open-ended projects. These projects foster a wide range of abilities, not only those related to content knowledge or technical skills, but also practical skills. The goal for this innovative undergrad project is to show how a trained machine model can predict the price of a cryptocurrency if we give the right amount of data and computational power. It displays a graph with the predicted values. The most popular technology is the kind of technological solution that could help mankind predict future events. With vast amount of data being generated and recorded on a daily basis, we have finally come close to an era where predictions can be accurate and be generated based on concrete factual data. Furthermore, with the rise of the crypto digital era more heads have turned towards the digital market for investments. This gives us the opportunity to create a model capable of predicting crypto currencies primarily Bitcoin. This can be accomplished by using a series of machine learning techniques and methodologies.

1. INTRODUCTION

Bitcoin is a payment system of digital cryptocurrency which is entirely decentralized. Transactions based on this network are fully cryptographed. During recent years, cryptocurrencies have had a boom in its prices, Bitcoin has been increasingly considered an investment asset by many traders. Due to its high volatile nature of bitcoin, it has become increasingly hard to predict the price of it and make good financial decisions. Implementing Machine learning in Bitcoin predictions have been focused by many investors and researchers by applying various techniques modelling with various structured data and feature dimensions. To predict the value of Bitcoin with different frequencies, machine learning techniques are used to classify Bitcoin by daily price and high-frequency price. The birth of long short-term memory (LSTM) and the artificial recurrent neural network (RNN) architecture proposed by Sepp Hochreiter and Jürgen Schmidhuber in the year 1997 has sparked a new wave of optimism in predicting the future better . The design of LSTM is the analysis of time-series data points and their sequential relationships, gave hope that we can train the model to estimate the next move before we even see it. Even though our predictions could be close to reality, our goal is to push the error of our prediction to zero .

The money that we used to understand:

As far as the written record has existed, money and banking have gone hand in hand. As discussed by Yuval Noah Harari, in the sweeping history of human race sapiens: it is easy to remember who owes what obligation to whom in kinship, but the economy of obligations is impossible to scale, above all once you add strangers. Currencies around the world are pure manifestations of sovereignty conjured by governments (Steil, 2007). Digital currencies are just the recent innovation and their widespread is a thing of the future. Bitcoins as we know it is the first-ever implemented decentralized database system used not just to store data but also used as cryptocurrencies. The peer-to-peer electronic cash system is not a walk in the park to digest. The technological improvements have outpaced the need of financial networks and outgrown the need for banks in the process. Nakamoto proposed a digital currency that would live on the network of other computers, meaning that the community would provide the processing power of their computer to keep it alive. The key to the entire system was termed as blockchain.

So, what is Bitcoin? To truly comprehend this, you need to know that Bitcoin is a network that runs on a computer program. It is nothing but zeros and ones stored on a computer, relying on a software operating at the very core of it all. It is electronic money; it is not money stored electronically. For instance, google wallet that stores credit card, debit card and the loyalty card is a digital wallet that stores money traditionally, but bitcoin has a different approach (pagliery, 2014)

2. PROBLEM STATEMENT:

One of the major problems with Bitcoin is the price prediction in Bitcoin because of its high volatility. Our objective is to design and train the financial data set using LSTM and RNN with feature selections to predict the Bitcoin price and achieve a minimal root mean squared error

a) Financial Assessment:

In 2016, the author Dahlberg, explored the financial aspects and capabilities in hedging using generalized Auto Regression condition called Heteroskedasticity (GARCH), to state the fact that Bitcoin reacted quickly to sentiment. There was also found the status in the market between commodity and currency as it contains both the properties. The portfolio management and the risk analysis are a method of GARCH which is useful in exploring the relationship between commodities like Gold, copper, etc. It is also useful in estimating the volatility of financial market returns . The Bitcoin value prediction using blockchain network-based features was attempted many times to predict its value, but the study has been able to show the price fluctuations in Bitcoin price with the classification accuracy of 55%. Furthermore, it is agreed by the researchers that the highest accuracy of blockchain price could be found in the neural networks.

b) Price Prediction:

The value of Bitcoin keeps changing every day just like the stocks. There are a large number of algorithms in place to predict the value of stock market data. However, the parameters are quite different for cryptocurrencies. Therefore, it is necessary to have a good prediction method in place that is reliable for investors to make quick investing decisions. Thus, we feel necessary to leverage Machine learning technology to predict the price of bitcoins .

c) Machine Learning:

Data mining is described and perceived as the extraction of prior significant information from data. Machine Learning gives a specified reason for Data mining .
The Machine Learning can be part of two classifications, the demonstrating of datasets with labelled examples which are named as supervised learning. The feature called target can either be discrete or continual, be that as it may, this impacts the model. In the off chance, the variable target is detached, the request model is used. In case if the target variable is persistent, the regression model is used .

The unsupervised in Machine learning includes the displaying of datasets with no known qualities or results. This technique's motivation is to frame bunches or gatherings by utilizing comparable information. The goal of this method is to anticipate the cost of bitcoin. The supervised algorithms incorporate wavelets discrete change and wavelets, different sorts of artificial neural organizations incorporate MLP, RNN and LSTM.

3. METHODOLOGY:

i. Multilayer Perceptron:

The multilayer perceptron's are otherwise known as the simple feed-forward neural networks. The MLPs form the bedrock for the models in Neural Network. In neural network methodology, the inputs are the example fed to the model and the outputs are the predictions. Each layer is the modular subfractions. The input and output layer and the layer between these two layers are called the hidden layer are part of the model. Each layer output is a unit which can be viewed as comparable to a neuron in the mind. The functions of the model are defined in weights as these parameters are adjusted when training the model. The fundamental restriction of MLP connection to RNN is that they are influenced by the gradient slope issue. This issue is that as layers and time steps of the network identify with one another through augmentation, subsidiaries are vulnerable to disappearing gradients .

ii. Recurrent Neural Network:

Elman built up the recurrent neural network (RNN), the RNN was organized like MLP, with the special case that signs can stream forward and back in an iterative manner. The context layer is added to smoothen another layer. Despite passing contribution between the layers, the context layer is dealt with yield layer to be dealt with into the accompanying layer with the accompanying data. After each timestep, this state is overwritten. . This outcome is a strong network. The length of the network memory is the complete length of the worldly window, it is a suitable method for the prediction task . In some experimentation, RNN has indicated abilities to take care of long-haul conditions, practically speaking they regularly have trouble learning because of long-term dependencies and gradient drop challenges between them .

iii. LSTM:

Like RNN, Bayesian optimization was picked for choosing boundaries for this model where feasible. This is a heuristic hunt strategy which works by expecting the function was examined from a Gaussian process and keeps a back conveyance for this function as the consequences of various hyperparameter choices are distinguished. One would then be able to enhance the normal improvement over the best outcome to pick hyperparameters for the following experiment . The presentation of both the RNN and LSTM network are assessed on approved data with huge overfitting measures set up. Dropout is executed in the two layers. Likewise, an early plug is modified into the model to

forestall overfitting. This stops the model if its validation loss does not improve for 5 epochs.

iv.   Feature Engineering:

The major player in the data set is the establishment of a trained dataset in the model. We provide bulk observations of data in the past or data experience as a learning input. Perceptively, we expect to receive better results the more we deliver. We would distinguish the labels and features; we can understand the value that we want to predict by using the labels. The value of Bitcoin price in an hour, two, etc. (labels) or the price of bitcoin in just an hour (Label).

In the training sample, the labels are just used for training. The range of feature is shown in the model with their associated labels. For example, the price of Bitcoin an hour ago and two hours ago as in our objective, we want the model to learn the relationship between the precedent values and the expected Bitcoin price .

e)   Data Exploration:

To start training the model using LSTM and RNN we need the dataset. An example dataset with financial pricing data is used for this method. The first step is to make sure that we have all the packages ready to load the data into the IDE and clean the data for any empty rows and null values.

```
import numpy as np
import pandas as pd
from matplotlib import pyplot as plt
import seaborn as sns
data = pd. read_csv("data/bitcoin.csv")
data = data.sort_values('Date')
data. head ()
```

the data(head) function gives the top five rows from the head. For our purpose, the close () column is called as it contains the information of the price of Bitcoins at the end of the day for the particular date. Using the MatPlotlib we then plot the value of the price of Bitcoin which is shown below.

```
price = data[['Close']]
plt.figure(figsize = (15,9))
plt.plot(price)
plt.xticks(range(0,                data.shape[0],50),
data['Date'].loc[::50],rotation=45)
plt.title("Bitcoin Price",fontsize=18, fontweight='bold')
plt.xlabel('Date',fontsize=18)
plt.ylabel('Close Price (USD)',fontsize=18)
plt.show()
```

Since the values of Bitcoin are shown in the graphical view, the dataset is then checked if it contains any null values.

```
price.info()
```

f)   Data Preparation:

i.   Normalization:

In this step we make sure that the data taken is normalize in values. The goal of this method is to change the numeric column in the dataset to a common scale, without misrepresenting the difference in range of values. For this purpose, we will use MinMaxScaler from the sklearn library,

```
from sklearn.preprocessing import MinMaxScaler
min_max_scaler  =  MinMaxScaler()  norm_data  =
min_max_scaler.fit_transform(price.values)
print(f'Real:        {price.values[0]},        Normalized:
{norm_data[0]}')
print(f'Real:        {price.values[500]},       Normalized:
{norm_data[500]}')
print(f'Real:        {price.values[1200]},      Normalized:
{norm_data[1200]}')
```

g)   Data Split:

During this method, two problems are tackled in this step, the first being that the data is to be split into training and test data. The value obtained from the training method is used to teach our model while the test data we will use as the baseline for comparison in our prediction. To make sure that the predictions make sense, we cannot test on the same data that we train as we would run into the risk of over fitting the network values. In addition to this, we would also have to prepare the data for the LSTM network. This specific type of network would require us to send the data in chunks, isolating the history data which we use in the training and our target which tells us how far in the future that our model needs to learn to predict.

The Univariate data function would then be responsible for this part of the network,

```
def univariate_data(dataset,
start_index, end_index, history_size, target_size):
  data = []
  labels = []
  start_index = start_index + history_size
  if end_index is None:
    end_index = len(dataset) - target_size
  for i in range(start_index, end_index):
    indices = range(i-history_size, i)
    # Reshape data from (history_size,) to (history_size, 1)
    data.append(np.reshape(dataset[indices], (history_size, 1)))
    labels.append(dataset[i+target_size])
    return np.array(data), np.array(labels)
```

The split will have in this next step:

```
past_history = 5
future_target = 0
TRAIN_SPLIT = int(len(norm_data) * 0.8)
x_train, y_train = univariate_data(norm_data,
                        0,
                        TRAIN_SPLIT,
```

```
                    past_history,
                    future_target)
x_test, y_test = univariate_data (norm_data,
                    TRAIN_SPLIT,
                    None,
                    past_history,
                    future_target )
```

h)   Building the model:

In this step, the model is architecture is built, which will take several tries and experience to find the right layers and hyperparameter for each one of them. The necessary library for the model is imported,

```
from keras.models import Sequential
from keras.optimizers import Adam
from keras.layers import Dense, LSTM, LeakyReLU, Dropout
num_units = 64
learning_rate = 0.0001
activation_function = 'sigmoid'
adam = Adam(lr=learning_rate)
loss_function = 'mse'
batch_size = 5
num_epochs = 50
# Initialize the RNN
model = Sequential()
model.add(LSTM(units          =          num_units,
activation=activation_function, input_shape=(None, 1)))
model.add(LeakyReLU(alpha=0.5))
model.add(Dropout(0.1))
model.add(Dense(units = 1))
# Compiling the RNN
model.compile(optimizer=adam, loss=loss_function)
```

Then the model is called upon using this function,

```
model.summary()
```

i)   Training the model:

Since we now have our data ready, we can now start training the data using Keras,

```
history = model.fit(
    x_train,
    y_train,
    validation_split=0.1,
    batch_size=batch_size,
    epochs=num_epochs,
    shuffle=False
)
```

It is also very important in finding the right parameter. It is also very important that the parameter shuffle is set to false, and the analysis completely depends on the order of the information. Since we have used very less amount of data, training the data was quite easy without a GPU. On more advanced models and more granulated information, these models can take hours or days to train.

```
loss = history.history['loss']
```

```
val_loss = history.history['val_loss']
epochs = range(len(loss))
plt.figure()
plt.plot(epochs, loss, 'b', label='Training loss')
plt.plot(epochs, val_loss, 'r', label='Validation loss')
plt.title("Training and Validation Loss")
plt.legend()
plt.show()
```

The chart below shows the comparison between both functions:

j)   Prediction:

Since our model is completely trained, we can now start making predictions and evaluating them to see how our model is doing.

```
original                                =
pd.DataFrame(min_max_scaler.inverse_transform(y_test
))
predictions                             =
pd.DataFrame(min_max_scaler.inverse_transform(mode
l.predict(x_test)))
ax    =    sns.lineplot(x=original.index,    y=original[0],
label="Test Data", color='royalblue')
ax = sns.lineplot(x=predictions.index, y=predictions[0],
label="Prediction", color='tomato')
ax.set_title('Bitcoin price', size = 14, fontweight='bold')
ax.set_xlabel("Days", size = 14)
ax.set_ylabel("Cost (USD)", size = 14)
ax.set_xticklabels('', size=10)
```

4. CONCLUSION

Predicting the future will always be on the top of the list of uses for machine learning algorithms. Here in this project we have attempted to predict the prices of Bitcoins using two deep learning methodologies. This work focuses on the development of project based learning in the field of computer science engineering, by taking into account the problem definition, progression, student assessment and use of hands on activities based on use of deep learning algorithm to develop application which can predict bitcoin prices

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FORECASTING STOCK MARKET MOVEMENT DIRECTION USING SENTIMENT ANALYSIS AND SUPPORT VECTOR MACHINE

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Abstract: Investor sentiment plays an important role on the stock market. User-generated textual content on the Internet provides a precious source to reflect investor psychology and predicts stock prices as a complement to stock market data. This paper integrates sentiment analysis into a machine learning method based on support vector machine. Furthermore, we take the day-of-week effect into consideration and construct more reliable and realistic sentiment indexes. Empirical results illustrate that the accuracy of forecasting the movement direction of the SSE 50 Index can be as high as 89.93% with a rise of 18.6% after introducing sentiment variables. And, meanwhile, our model helps investors make wiser decisions. These findings also imply that sentiment probably contains precious information about the asset fundamental values and can be regarded as one of the leading indicators of the stock market.

1. INTRODUCTION

GENERAL

Forecasting stock market trends has been treated as one of the most challenging but important tasks. Stock market is a nonlinear and dynamic system, and investor sentiment constitutes a key factor of the financial market. With the proliferation of news, blogs, forums, and social networking websites, textual content on the Internet provides a precious source to reflect investor sentiment and predicts stock prices as a complement to traditional stock market time series data.

OBJECTIVE

The objective this project is to get an efficient and persuasive sentiment index of the forecasting of stock market how it will vary according to the day-of-week, and closing data of stock market. The returns had the tendency to decline on Mondays. Then, the effect is proved to exist in global stock markets. The reasons probably include that a much larger amount of information is produced on weekends than weekdays.

Existing System:

- Artificial neural networks (ANNs) are biologically inspired computer programs designed to simulate the way in which the human brain processes information.
- ANNs gather their knowledge by detecting the patterns and relationships in data and learn (or are trained) through experience, not from programming.
- An ANN is formed from hundreds of single units, artificial neurons or processing elements (PE), connected with coefficients (weights), which constitute the neural structure and are organised in layers.

Disadvantages:

- Black box nature

Computational burden

2. LITERATURE SURVEY:

Title: The day-of-the-Week effects of stock markets in different countries

Author:

Year:

Description:

This paper applies the method of rolling sample test and the GARCH model to investigate the day-of-the-week anomalies in stock returns of main indices in 28 markets from 25 countries over the world. We propose the calendar effect performance ratio to measure the significance of day-of-the-week anomalies in this paper. Our study demonstrates that the Monday anomalies are prominent in SZC1, DOW, MERVAL, WIG20, FTSEMIB and STI index; the Tuesday anomalies are prominent in SPX, SPXT; the Wednesday anomalies are prominent in MEXBOL, JCI, DAX, SMI, AS51, NKY and NZSE50FG; the Thursday anomalies are prominent in SMEC, PX and PCOMP; the Friday anomalies are prominent in IBOV, IPSA, RTSI$, XU100, SENSEX, FBMKLCI, IBEX, and HSI index. We also investigate calendar effects for 6 stock market indices measured in US dollars and still find the calendar effect phenomena for these selected indices when they are in US dollars. The findings in this paper will be valuable to both the academia and practitioners.

Title: Stock market sentiment lexicon acquisition using microblogging data and statistical measures

Author:

Year:
Description:
Lexicon acquisition is a key issue for sentiment analysis. This paper presents a novel and fast approach for creating stock market lexicons. The approach is based on statistical measures applied over a vast set of labeled messages from Stock Twits, which is a specialized stock market microblog. We compare three adaptations of statistical

measures, such as Point wise Mutual Information (PMI), two new complementary statistics and the use of sentiment scores for affirmative and negated contexts. Using Stock Twits, we show that the new lexicons are competitive for measuring investor sentiment when compared with six popular lexicons. We also applied a lexicon to easily produce Twitter investor sentiment indicators and analyzed their correlation with survey sentiment indexes. The new microblogging indicators have a moderate correlation with popular Investors Intelligence (II) and American Association of Individual Investors (AAII) indicators. Thus, the new microblogging approach can be used alternatively to traditional survey indicators with advantages (e.g., cheaper creation, higher frequencies).
Title: Recognizing emotions in text using ensemble of classifiers
Author:
Year:
Description:
Emotions constitute a key factor in human nature and behavior. The most common way for people to express their opinions, thoughts and communicate with each other is via written text. In this paper, we present a sentiment analysis system for automatic recognition of emotions in text, using an ensemble of classifiers. The designed ensemble classifier schema is based on the notion of combining knowledge-based and statistical machine learning classification methods aiming to benefit from their merits and minimize their drawbacks. The ensemble schema is based on three classifiers; two are statistical (a Naïve Bayes and a Maximum Entropy learner) and the third one is a knowledge-based tool performing deep analysis of the natural language sentences. The knowledge-based tool analyzes the sentences text structure and dependencies and implements a keyword-based approach, where the emotional state of a sentence is derived from the emotional affinity of the sentence's emotional parts. The ensemble classifier schema has been extensively evaluated on various forms of text such as, news headlines, articles and social media posts. The experimental results indicate quite satisfactory performance regarding the ability to recognize emotion

presence in text and also to identify the polarity of the emotions.
Title: Analyzing Social Roles Based on a Hierarchical Model and Data Mining forCollective Decision-Making Support
Author:

Year:

Description:

With the popularity of social networking services (SNSs) and the increase of users, individuals' social roles in a social network have become more and more important in terms of the recommendation of personalized services and the collective decision- making process. Usually, in an SNS system, active users may not represent the major opinions among the whole users, and most of the users' opinions may be multifarious. In this paper, we focus on analyzing and identifying users' dynamical social roles to facilitate the collective decision-making process. After introducing the social choice theory and an improved collective decision-making model, we present a three-layer model to analyze users' social roles in a hierarchical way and develop an integrated mechanism to utilize the identification of social roles to support the collective decision making. Based on a developed NetLogo-based tool, a case study for the course-offering etermination with an application scenario is demonstrated to show the process of usingusers' social roles to support the collective decision making. The comparison experiment conducted between our method and the Delphi method shows the usefulness of our proposed method to help users achieve the decision consensus in a more efficientway.
Title: A Survey of Opinion Mining and Sentiment Analysis
Author:
Year:
Description:
Sentiment analysis or opinion mining is the computational study of people's opinions, appraisals, attitudes, and emotions toward entities, individuals, issues, events, topics and their attributes. The task is technically challenging and practically very useful. For example, businesses always want to find public or consumer opinions about their products and services. Potential customers also want to know the opinions of existing users before they use a service or purchase a product.
With the explosive growth of social media (i.e., reviews, forum discussions, blogs and social networks) on the Web, individuals and organizations are increasingly

using public opinions in these media for their decision making. However, finding and monitoring opinion sites on the Web and distilling the information contained in them remains a formidable task because of the proliferation of diverse sites. Each site typically contains a huge volume of opinionated text that is not always easily deciphered in long forum postings and blogs. The average human reader will have difficulty identifying relevant sites and accurately summarizing the information and opinions contained in them. Moreover, it is also known that human analysis of text information is subject to considerable biases, e.g., people often pay greater attention to opinions that are consistent with their own preferences. People also have difficulty, owing to their mental and physical limitations, producing consistent results when the amount of information to be processed is large. Automated opinion mining and summarization systems are thus needed, as subjective biases and mental limitations can be overcome with an objective sentiment analysis system.

Proposed System

- A Support Vector Machine (SVM) is a discriminative classifier formally defined by a separating hyperplane.
- In other words, given labeled training data (supervised learning), the algorithm outputs an optimal hyperplane which categorizes new examples.
- In two dimentional space this hyperplane is a line dividing a plane in two parts where in each class lay in either side.

ADVANTAGES

- Unstructured and semi structured data
- Very good when we have no idea on the data.

3. MODULES :

1. Web crawler
2. Preprocessing
3. Daily sentiment
4. Modified sentiment
5. Prediction

1. Web crawler

We aim to build a web crawler to automatically download the targeted textual documents from the Internet and store them to a database for further processing. The web crawler begins with the seeds in the form of a list of URLs. The scheduler manages the queue of URLs, deciding the priority and eliminating duplicate parts. Next, the downloader is responsible for acquiring the web pages from the Internet and providing them to the spider, which is used to parse the pages and extract the targeted contents.

2. Preprocessing

Data Preprocessing refers to the steps applied to make data more suitable for data mining. The steps used for Data Preprocessing usually fall into two categories:

- Selecting data objects and attributes for the analysis.
- Creating/changing the attributes.

3. Daily sentiment

A sentence-based sentiment analysis approach is used to process the textual data during a specific period. We regard a sentence as a unit to interpret the meaning of the whole document instead of a single word because a sentence can express a relatively complete meaning and help address the ambiguity problem. As a result, a document is divided into sentences first. Next, we segment the sentences into separate words, then project the words onto the sentiment space, count the number of positive and negative words.

4. Modified sentiment

The day-of-week effect is one of the most well-known financial anomalies, which means that the average return on a Monday is much lower than that on the other days of the week. The reason includes that large amount of news is reported on the weekend or on Friday just after the market is closed. With such considerable and valuable information to deal with, investors are very likely to change their mind and take actions on Mondays.

5. Prediction

Prediction refers to the output of an algorithm after it has been trained on a historical dataset and applied to new data when you're trying to forecast the likelihood of a particular outcome. The algorithm will generate probable values for an unknown variable for each record in the new data, allowing the model builder to identify what that value will most likely be. Here we are predicting the forecasting of stock market information by using SVM algorithm.

4. CONCLUSION

We aim to exploit investor sentiment to forecast stock market movement direction by emphasizing the role of investors. Investor psychology drives the stock market and it matters for our research. Accordingly, user-generated content on the Internet provides a precious source to reflect investor psychology. Sentiment analysis is used to convert unstructured textual documents into daily sentiment indexes. Furthermore, the financial anomaly day-of-week effect that means the average return on Mondays is much lower than that on the other days of the week probably influences the precision of the sentiment indexes, so we adjust the indexes by introducing an exponential function on past sentiment changes on weekends and then generalize to holidays. Correspondingly, Sina Finance and Eastmoney, two

typical financial websites, were selected as experimental platforms to obtain a corpus of financial review data. Then, the machine learning model SVM is employed to predict a very important index in China, the SSE 50 Index, by implementing fivefold cross validation and a realistic rolling window approach.

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HOME AUTOMATION SYSTEM BASED ON IOT

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Abstract With advancement of Automation technology, life is getting simpler and easier in all aspects. In today's world Automatic systems are being preferred over manual system. With the rapid increase in the number of users of internet over the past decade has made Internet a part and parcel of life, and IoT is the latest and emerging internet technology. Internet of things is a growing network of everyday object-from industrial machine to consumer goods that can share information and complete tasks while you are busy with other activities. Home Automation system (HAS) using IoT (Internet Of Things) is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The home automation system differs from other system by allowing the user to operate the system from anywhere around the world through internet connection. Keywords: Bluetooth Wireless Technology, Smartphones, Home Automation System, Arduino Uno, Android, Bluetooth Module

1. INTRODUCTION

Since Myanmar's telecoms revolution began in 2014, the number of internet users has risen from 2 million to more than 39 million, while the number of SIM cards in circulation has risen by almost 400 percent, according to government figures. Myanmar now has at least 33 million active mobile subscriptions in a country with an official population of 53 million. Today, most mobile phones using in Myanmar are 'smart phone', which offers more advanced capabilities in connectivity issues than regular cell phones. Smart phone usage rate is reported at 80% in Myanmar. Smart phone usually support one or more short range wireless technologies such as Bluetooth and infrared, making it possible to transfer data via these wireless connections. Smart phone can provide computer mobility, ubiquitous data access, and pervasive intelligence for almost every aspect of business processes and people's daily lives [1]. One of the smart phone applications that have been developed is smart homes technology [2]. The fundamental of building an automation system for an office or home is increasing day-by-day with numerous benefits. Industrialist and researchers are working to build efficient and affordability automatic systems to monitor and control different machines like lights, fans, garage door motors, smoke detection and other requirements [3]. The use of Bluetooth technology in a smart phone today is not just for the transfer of data and files only. In recent years, Bluetooth technology is used one of the applications of home automation System. Bluetooth technology operate over unlicensed, its available at 2.4GHz frequency, it also can link digital devices within a range of 10m to 100m at the speed of up to 3Mbps but it depending on the Bluetooth device class [4]. By using home automation System, we can control household appliances. So, many manual actions are replaced by reducing human efforts and time saving. The design of Home Automation System which remains the existing electrical switches which status is synchronized in all the control system with low voltage activating method and that provides more safety for danger of electric shock and provide security to decrepit peoples. In this paper, Bluetooth based home automation system using android smart phones and Arduino UNO microcontroller board is used. Such a system will enable users to have control over home lighting, water pump and garage motors and smoke detection in their home with Bluetooth. The main requirement for user is an Android smart phone, which is present in almost every person hand nowadays, and a control circuit. The control circuit consists of an Arduino Uno microcontroller, which processes the user controls switching of devices and detect the alarm. The microcontroller and the smart phone are connected with Bluetooth wireless technology because Bluetooth technology is low cost to use and secure wireless network. This application also focuses on smoke detection with secure application against unauthorized user. Remote operation is achieved by any smart phone/Tablet etc., with Android OS, upon a GUI (Graphical User Interface) based touch screen operation.

2. LITERATURE REVIEW

In these recent years, smart home automation system has become very common of technology and especially with fast development in internet WebPages. Various smart home systems with improved technologies have been implemented. Most of the technologies are based on controlling home automation systems in android

application which gives user interface for monitoring and controlling their home electronic appliances from local network or internet.

2.1. Arduino Board

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on LED, publishing something online. We use the Arduino programming language and the Arduino Software (IDE) by sending a set of instructions to the microcontroller on the board to control the Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers such as students, hobbyists, artists, programmers, and professionals has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike. Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software is also open-source, and it is growing through the contributions of users worldwide [5].

2.2. Arduino UNO

The Arduino UNO is the best board to get started with electronics and coding. The UNO is the most used and documented board of the whole Arduino family. Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino
 platform [6].
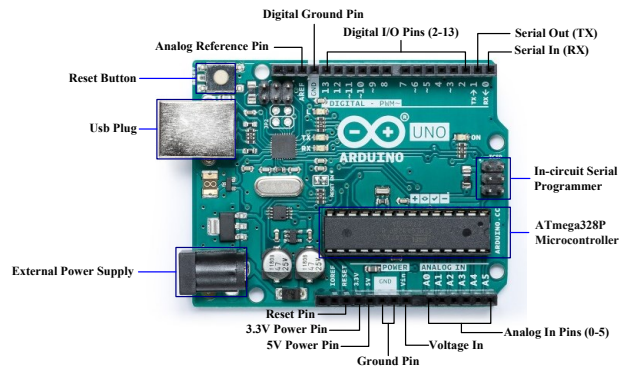
Figure 1. Arduino UNO REV3 board

2.3. Arduino Software

Arduino IDE (Integrated Development Environment) is open-source software and that enables better and assisted code editing, compiling and debugging. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. So, this Arduino IDE basically has inbuilt functions and commands that though work on Java platform, are customized to run on the Arduino board. Thus Arduino IDE serves for code editing, its compilation, debugging and then burning the code into the Arduino board.

2.4. Bluetooth Module (HC-06)

HC-06 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC. HC-06 Bluetooth module provides switching mode between master and slave mode which means it able to use neither receiving nor transmitting data. The Bluetooth module HC-06 is a MASTER/SLAVE module. By default the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT COMMANDS. The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections. Master module can initiate a connection to other devices. The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to your embedded project.
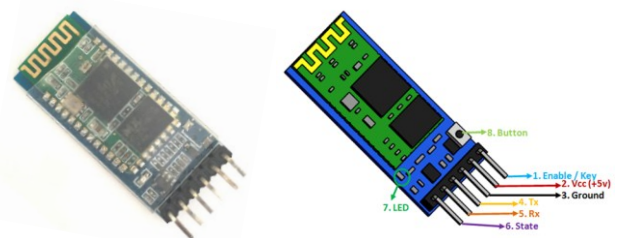
Figure 3. HC-06 bluetooth module

2.5. MIT App Inventor 2

MIT App Inventor is to develop applications for Android phones using a web browser and either a connected phone or emulator. The App Inventor servers store inventor designs and create fully functional apps without writing any code of your projects. The App Inventor development environment is supported for Mac OS X, GNU/Linux, and Windows operating systems, and several popular android phone models. Applications created with App Inventor can be installed on any Android phone.
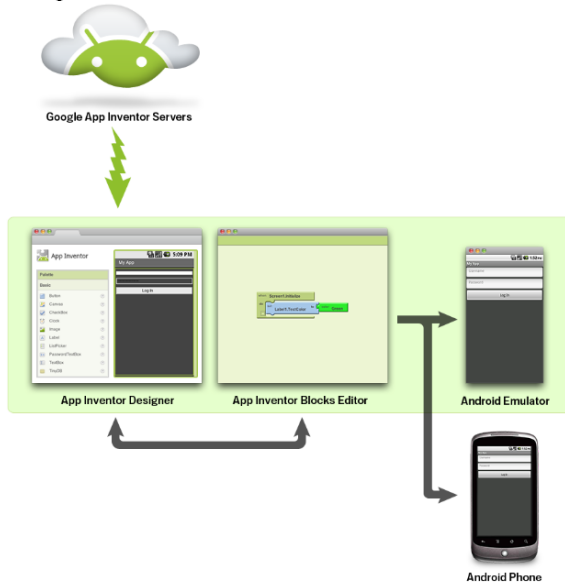
Figure 4. Function of MIT app inventor 2

3. IMPLEMENTATION OF THE PROJECT

For this project of Smart Home Automation System, open source android platform is used. Android application from any mobile devices connects to the Bluetooth module HC-06 and controls the home appliance devices such as rooms lighting, water pump motor and garage motor. For the safety purpose of this project, Bluetooth connection of application and Bluetooth device need password when paring for authorized using. After that confirm message for Bluetooth connection is successful and then list on available devices in android application can control as remote devices. This project also monitor CO2 content in the house by MQ-2 gas sensor and make alarm sound by speaker when the certain amount of smoke detected in the house. Block Diagram of the implemented project shown in Fig. 5. Our proposed project consists of the following three sections.

(a)   Input from Bluetooth module via android application and gas sensor
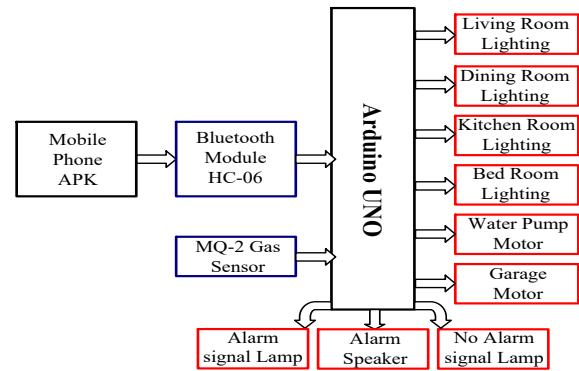
Figure 5. Block diagram of the implemented project
(b) Arduino UNO microcontroller processing
(c) Output of process indication and alarm

First development of our project, all the component modules are made simulation by Proteus Design Suit version 8.0 simulator and check for the working output condition. Hardware components simulation of this project consists of Arduino UNO, Bluetooth module, motors, output of gas sensor and rooms lighting by android app control are shown in Fig. 6.
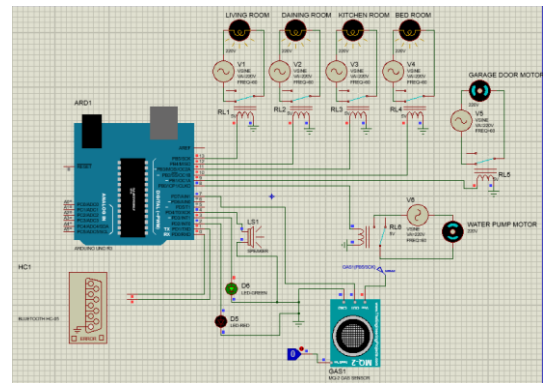
Figure 6. Simulation output of bluetooth based home automation system

The connection and placement of hardware components has been elaborated with the help of circuit diagram of the system interconnection.

The required DC power supply that to run the system can get from 9V battery or computer USB port and feeds the microcontroller and Bluetooth module. The Bluetooth module receives the signal sent from an android smart-phone, where the application software made by MIT app inventor is installed. The microcontroller, thereby, sends instruction, when executed codes in C language of Arduino IDE. Rooms lighting and motors can be controlled by using android based application software. The hardware of this project consists of Arduino module, Bluetooth module and gas sensor module. The Bluetooth module is connected with the Arduino UNO board for the right connection with RX, TX, ground and power pins. Through the Bluetooth module for monitoring and controlling the particular rooms lighting and motors

reaches the board and process accordingly and output of the Arduino goes to the particular hardware components with control them. In this method, Bluetooth wireless connection is used, the user must be present within in range (< 15 meters) to control the system. When user sends signal or data to the Arduino board then the corresponding pin of Arduino goes to high state and switches the home applicant hardware to open or close. The circuit diagram of this project including output home appliances are shown in Figure 7.

Figure 8 and 9 are shown flow chart for system operation of Arduino UNO and created app preview respectively. The hardware consists of an Arduino UNO along with input output ports (analog, digital, power), Bluetooth module, USB port, 9 and 5 volt DC input port, Relay Control Unit for home appliances and Alarm Unit for MQ-2 gas sensor etc.
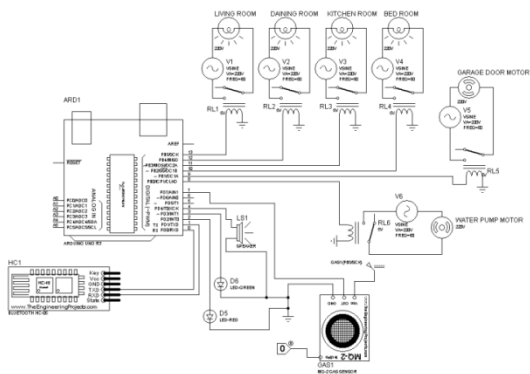
Figure 7. Circuit diagram of bluetooth based home automation system
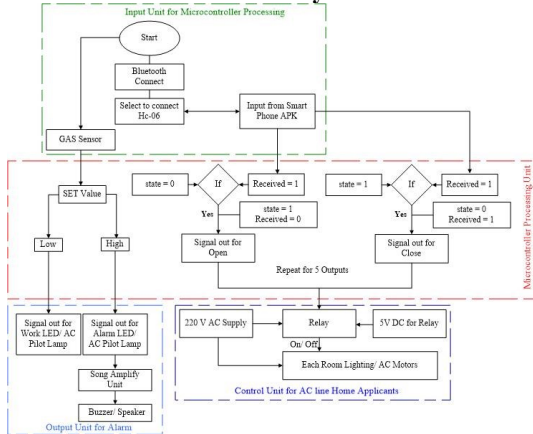
Figure 8. Flow chart of the system operation
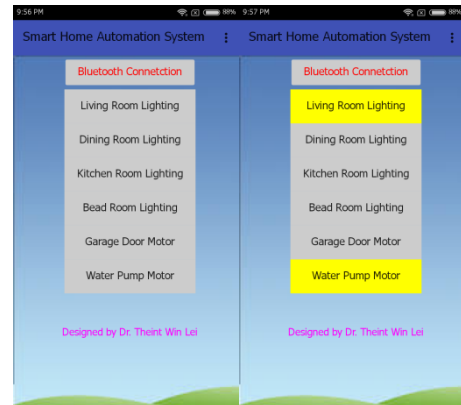
Figure 9. Created app for home automation system

In this present project, Bluetooth module that has been set to slave mode is used to communicate the controller with the smart phone application. Application is created by App Inventor 2. App Inventor 2 is a visual, blocks language for building Android Apps. There are two main types of components in an app Inventor 2, visible and non-visible. Visible components of application are can see when the app is launched that includes buttons, text boxes, and labels. These are often referred to as the graphical user interface (GUI). Non-visible components are not seeing, so they are not part of the user interface. Instead, they provide access to the built-in functionality of the device. The non-visible components are the technology within the device they are little worker bees and they do jobs for control of the application. App Inventor 2 can easily create GUI interface for user friendly and block editor can make the relevant function of each button from application easily without writing coding.

The application installed in Smart phone and control the Arduino UNO digital output pin no. 13, 12, 11, 10, 9 and 8 for rooms lighting and motors on-off by using relay switch. 5 V DC Relay units are connected to pins 13, 12, 11, 10, 9 and 8 for switch control action of 220V AC home applicants has been achieved. MQ-2 gas sensor connect to the pin no. 7 to give analog input signal of CO_2 content in the room and pin no. 2,3 and 4 make output of the gas sensor. 2 LEDs or Pilot Lamps are connected to pins 2 and 3 for output signal of gas sensor for normal and alarm conditions. Pin no. 4 is connected with speaker via song amplifier unit to get the alarm sound of smoke detection in the room. The designed system of Home Automation has been tested and run successfully shown in Figure 10. Hardware for Relay Units to drive 220V AC lighting units, motors and other song amplifier unit for alarm system is not included and need to extend.
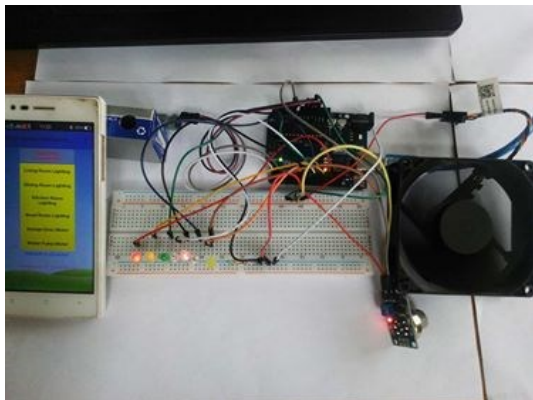
Figure 10. Test run system architecture with controlled output results

4. CONCLUSION

This project is indeed a low-cost and efficient project for home application. This project is also a cost-effective project with a simple and easy to use interface for decrepit and physically disables peoples. By using this method, home appliances can be controlled to avoid the dangerous of electric shock and convenience for users. It can make secures home by alerting people when smoke detected or gas is leaked in the home. With few additions and modifications, this project can be make commercial scale products for Home Automation System. In future we can add temperature sensors so that it can monitor some surrounding temperature parameters around the house and we can improve the communication using Internet web base technology. This project can also promote with wireless camera, in order to incorporate other security features of Smart Home Automation System. In terms of upgrading security in the home, doors and windows are also mounted by setting alarm in case of any kind of thief or sabotage.

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IMPLEMENTATION OF FRONT-END WEB TECHNOLOGY USING BOOTSTRAP FRAMEWORK FOR PORTRAYALOFINSTITUTIONONWEB

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Abstract A website is a collection of Webpages, images, videos and other digital assets that is hosted on one or several Web servers, usually accessible via the Internet, Mobile phone or a LAN. The pages of websites can usually be accessed from a common root URL called the homepage, and usually reside on the same physical server. The URLs of the pages organize them into a hierarchy, although the hyperlinks between them control how the reader perceives the overall structure and how the traffic flows between the different parts of the sites.

Web technology refers to the means by which computers communicate with eachother using markup languages and multimedia packages. It gives us a way to interact with hosted information, likewebsites. Webtechnologies include the following:

1. Mark-up languages, such as HTML, CSS, XML, CGI, and HTTP (Front-end or Client-side technologies)
2. Programming languages and technologies that help create applications for the web. Some of these are Perl, C#, Java, Visual Basic, and .NET (Back-end or Server-side technologies)
3.Webserver and server technologies that enable request handling on a network, where different user shave to share the same resources and communicate with each other
4. Databases, which are extremely important for data and information storage on a computer network.

ThiswebsitehasbeendevelopedforShadanCollegeofengineeringandtechnology in an effort to make it as attractive and dynamic as possible. Compared to the existing site the proposed site in this project is more fluent and dynamic. It has more information for the visitors to access. Efforts has been put to make the site very smoot hand responsive. The college website in this project has been developed with the help of HTML, CSS mark-up languages and JavaScript as scripting language for the frond-end. Bootstrap framework was also used to build the website to make it more efficient and good looking.

Keywords: Home, Examination, Facilities, Department, Contact, Events, Responsive Web Design Strategy.

1.INTRODUCTION
1.1   General

A websiteis a collection of Web pages, images, videos and other digital assets that ishosted on one or several Web server, usually accessible via the Internet, Mobile phone ora LAN. The pages of websites can usually be accessed from a common root URL calledthe homepage, and usually reside on the same physical server. The URLs of the pagesorganize them into a hierarchy, although the hyperlinks between them control how thereader perceives the overall structure and how the traffic flows between the different partsofthesites.

Websites are typically dedicated to a particular topic or purpose, such as news, education, commerce, entertainment, or social networking. Hyperlinking between web pages guidesthe navigation of the site, which often starts with a home page. Users can access websitesona range ofdevices, including desktops,laptops,t ablets,andsmartphones.

1.2   Objective

The objective of this project is to make a website that portrays an independent institution. This website has been developed for Shadan College of engineering and technology inanefforttomakeitasattractiveanddynamicaspossible.Comparedtotheexistingsitetheproposed site in this project is more fluent and dynamic. It has more information for the visitors to access. Efforts has been put to make the site very smooth and responsive. The college website in this project has been developed with the help of HTML, CSS mark-up languages and JavaScript as scripting language for the frond-end. Bootstrap framework was also used to build the website to make it more efficient and goodlooking.

1.3   ExistingSystem

Theexistingsystemisverysimpleandjustthenextstageoftraditionalmannerofportrayalof institutions features and facilities. The existing college website is static which makes itless interactive.The system only has basic features with none to minimal animation andwithoutproperstyling.Thissystemhadbasichtmlwithve

rylessattractionanddecoration.Theywerenotveryuserfriendlyandveryconfusingforanaverage user

1.3.1 ReviewofLiterature

1.3.1.1 LiteratureSurvey

TITLE :HTMLandCSS:Design andBuildWebsites

AUTHOR :Jon Duckett

YEAR :2011

DESCRIPTION

To create a fixed width layout, the width of the main boxes on a page will usually be specified in pixels (and sometimes their height, too). Here you can see several <div>elements, each of which uses an id or class attribute to indicate its purpose on the page. Ina book like this, the result of both the fixed and liquid layouts look similar. To get a realfeel for them, you need to view them in your browser and see how they react when youadjustthesizeof thebrowser window. Thefixedwidthlayoutwillstaythesamewidthnomatter what size the browser window is, whereas the liquid layout will stretch (or shrink)tofillthescreen.

The liquid layout uses percentages to specify the width of each box so that the design willstretch to fit the size of the screen. There is a rule on the <body> element to set the widthof the page to 90% so that there is a small gap between the left and right-hand sides of thebrowser window and the main content. If you imagine the browser window to be verywide or very narrow, you can see how lines of text could become very long or very short.This is where the min-width and max-width properties help create boundaries withinwhich the layout can stretch (although Internet Explorer 7 was the first version of IE tosupporttheseproperties).

TITLE :HTML&CSS:TheCompleteReference

AUTHOR :ThomasA.Powell

YEAR :2010

DESCRIPTION

Given the looseness HTML5 supports and its de-emphasis of the XML approach tomarkup,youmightassumethatHTML5isaretreatfromdoingthingsintherightwayandan acceptance of "tag soup" as legitimate markup. The harsh reality is that, indeed, validmarkup is more the exception than the rule online. Numerous surveys have shown that inthe grand scheme of things, few Web sites validate. For example, in a study of the AlexaGlobal Top 500 in January 2008, only 6.57 percent of the sites surveyed validated. Whensamplesizesareincreased and webegintolookatsitesthat arenotasprofessional,thingsactuallygetworse.Interestingly,Googlehasevenlargerstudies,andwhiletheydon'tfocusspecifically on validation, what they indicate on tag usage indicates clearly that no matterthe sample size, clean markup is more the exception than the rule. Yet despite the markup madness, the Web continues to work. In fact, some might say the permissive nature ofbrowsersthatparse junkHTMLactuallyhelpstheWebgrowbecause itlowersthe barrierto entry for new Web page authors. Certainly a shaky foundation to build upon, but thestarkrealityisthatwemustdealwithmalformedmarkup. Tothisend,HTML5makesonevery major contribution: it defines what to do in the presence of markup syntax problems.The permissive nature of browsers is required for browsers to fix markup mistakes.HTML5directlyacknowledgesthissituationandaimstodefinehowbrowsersshouldparseboth well-formed and malformed markup. HTML5's aim to bring order to the chaos ofsloppy markup is but one of the grand aims of the specification. It also aims to replacetraditionalHTML,XHTML,andDOM specifications,andtodosoin abackward-compatible fashion. In its attempt to do this, the specification is sprawling, addressing notjustwhatelementsexistbuthowtheyareusedandscripted. HTML5embracesthefactthatthe Web not only is composed of documents but also supports applications, thus markupmustacknowledge andfacilitatethe buildingofsuchapplications.

1.4 ProposedSystem

Theproposedsystemcontainsthefeaturesandfacilitiesthatlackinthepreviousmentionedexisting system. This system has latest CSS that gives a great look and feel to html of thewebsite. It also uses great scripts to give beautiful animations to the website. This websiteis made more attractive and effective with the help of bootstrap. Using bootstrap lot offeatures such as carousel, rows and columns etc., are added to the website. The end resultof this website is absolutely mesmerizing which is made possible with the help of all thelatestwebtechnology.

2.PAPER DESCRIPTION

2.1 General

This paper has been developed for Shadan College of engineering and technology in an effort to make the website as attractive and dynamic as possible.Compared to the existing site the proposed site in this project is more fluent and dynamic. It has more informationforthevisitorstoaccess.Effortshasbeenputtomakethesiteverysmoothandresponsive.ThecollegewebsiteinthisprojecthasbeendevelopedwiththehelpofHTML,CSSmark-up languages and JavaScript as scripting language for the frond-end.Bootstrap framework was also used to build the website to make it more efficient and good looking.

2.2 Methodologies

2.2.1 ModuleNames

Thisprojecthavingthefollowingmodules:

1) Home
2) About
3) Admissions
4) Departments
5) Examinations
6) Facilities
7) Events
8) Contact

2.2.2 ModuleExplanation

➢ **Home**

This is the first module of the project. This module is also the initial or home module ofthewebsite.Thismodulecontainsthenameandlogoofcollegeinheaderandalsothecodefor entrance exams of the college. It has a navigation bar that provides links to all otherpages of the website. This module is a representative module of all other modules. Itcontains a carousel that displays the features of the college. It has the footer at the bottomthat provides social media links of the college. And also provides all the important andusefullinks forthevisitorsofthewebsite.

➢ **About**

This module is one of the important modules of the website. This module provides all theinformationrelatedtocollege.It hasdifferent othersub-pagesthat containsthedata ofthecollege. It has pages such as vision and mission: gives the vision of the college, history ofthe college, information about the governing body, magazine and other media and alsogivesinformationabouttheMOUsandAluminirelatedto the college.

➢ **Admissions**

Thismoduleprovidestheinformationabouttheadmissionintothecollege.ItprovidesbothUGandPGadmissioninformation.Itgiveinfoabouttheadmissionprocedure,thecriteriaforadmissionandalsothefeestructurerelatedtobothUGandPGadmission.

➢ **Departments**

Themodulecontainstheinformationaboutallthedepartmentsthatthecollegecontains.Itshows all the Btech and Mtech and MBA departments and there information. It providestheinformationaboutthefacultyworkingineachofthedepartment.Italsogivesthecoursedescriptions and clubs related to the departments. It also provides a list of all theroll ofhonorsofalltheyearsfromtheestablishmentofthecollegeforeveryspecificdepartment.

➢ **Examinations**

This module contains information related to the examination that are held in the institute.Itprovidesacademiccalendar,notification,regulationsand timetablesoftheexaminationaspertheuniversitynotice.Itals

oupdatesabouttheresultsoftheexaminationandthefeesnotice.

➢ **Facilities**

Thismodulecontainsalltheinformationaboutthefacilitiesprovidedbythecollege.Ithasdifferent sub modules with different information related to the college. It shows facilitiessuch as Library, laboratories, transport and sport facilities, cafeteria, auditorium and otherfacilities.

➢ **Events**

This module provides access to information of all the events that had occurred in thecollege. It provides information about the sports events, seminars, workshops, drills anddrivesthattookplaceinthecollege.

➢ **Contact**

This module of the website contains content related to contact of the college. It providesallthecontactssuchasemailsandphonenumbersandalsoprovidesthemapsandlocationofthecollegeforthevisitors tofollow.

2.2.3 ModuleDiagrams

➢ **Home**

➢ **About**
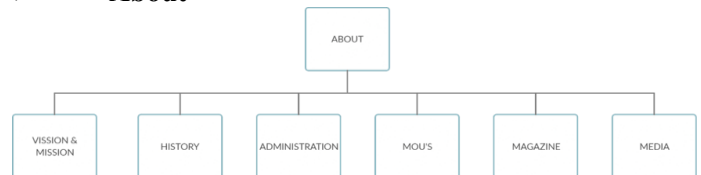
➢ **Admissions**
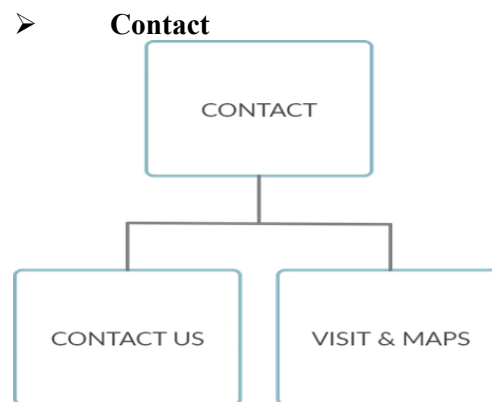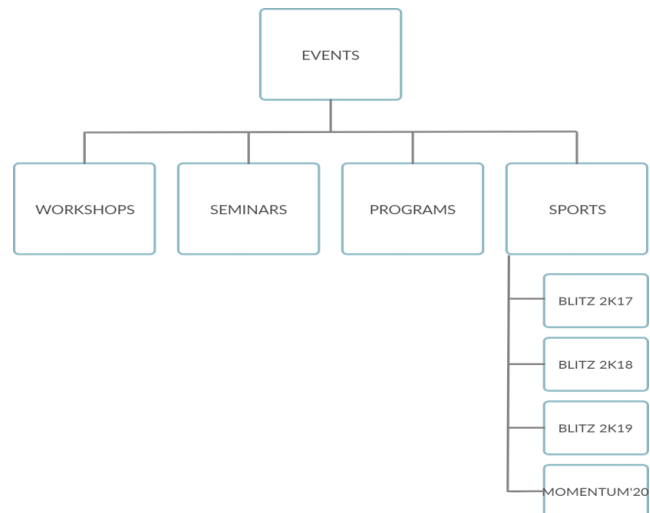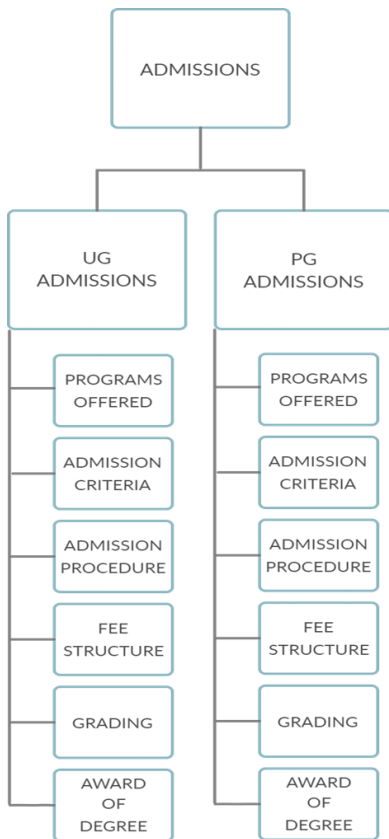
> **Departments**

> **Facilities**

> **Events**

> **Contact**
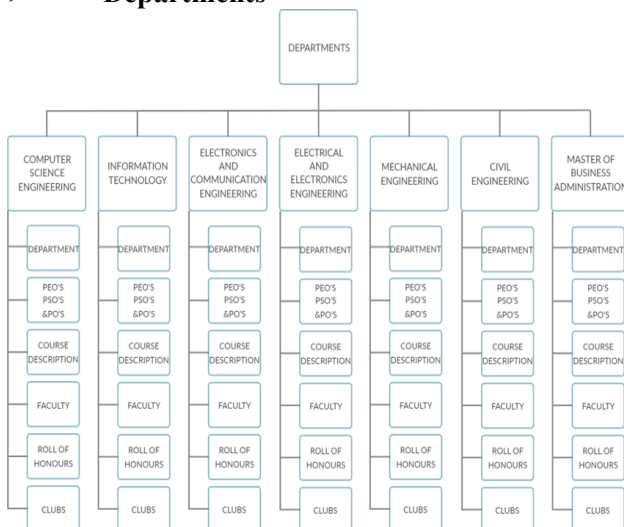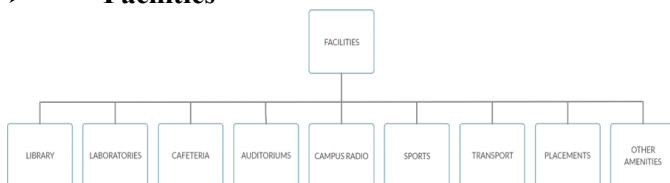
2.2.4 GivenInput–ExpectedOutput

> **Home**

Input   :Clickonhomepage link
Output:Accesstoall theotherpagesand featuresofthe website

> **About**

Input   :Clickonaboutpagelinks
Output:Accessto allinformationrelatedtothe college

> **Admissions**

Input   : Click on admissions page links
Output:Accessto admissionsofthecollege

> **Departments**

Input   :Clickondepartmentspagelinks
Output:Accesstoalldepartmentsofthecollege

> **Examinations**

Input   :Clickonexaminationspage links
Output:Accessto allexaminationinformation ofthe college

> **Facilities**

Input   :Click onfacilitiespage links
Output:Accesstoallinformationoffacilitiesofthe college

> **Events**

Input   :Clickoneventspage links
Output:Accesstoall theeventsinformationofthe college

➤ **Contact**
Input : Clickoncontactpage link
Output :Accesstoallcontactinformationofthecollege
2.4. TechniquesUsedorAlgorithmsUsed
➤ **ResponsiveWebDesignStrategy**
Thankstotheincrediblerise inthenumberofmobiledevices,responsivewebdesigningisnotanymoreaUX-onlydiscipline.Allmarketersneedtounderstandandconsiderresponsive web designing as a component of their strategic planning. It may not benecessary for you as a content marketer to know all the tricks of the designing anddevelopmentofaresponsiveweb.

However,youneedtoknowwhatexactlyRWDis.Also,youneedtoknowyourexactcontentmarketingresponsibilities. Thewebworldissaidtohaveundergonesometechnological changesand responsivewebdesignisattheforefrontasfarascontentmarketersareconcerned.Responsivewebdesignimplies you can write content and publish it once. The layout actually changes accordingtothecapabilities andsize ofthedevice. There has been an astronomical rise in web surfing through mobile devices. You areconfronted with a multitude of diverse screen sizes across tablets, smartphones, phablets,desktops, TVs, consoles and even wearable devices like smart watches. As the screen sizeis constantly changing, you need to optimize your website for all these mobile devices.Your website should be designed in such a manner that it should be able to adapt towhateverscreensize.

3. REQUIREMENTSENGINEERING
3.1 General
Requirementsengineering (RE) istheprocessofdefining,documenting,andmaintainingrequirementsintheengineeringdesignprocess.Itisacommonrole insystemsengineering and software engineering. In this chapter we mention and list down all thehardware and software requirements of the project and we also specify all the functionalandnon-functionalrequirements ofthe project.

3.2 HardwareRequirements
Thehardwarerequirementsmayserveasthebasisforacontractfortheimplementationofthe system and should therefore be a complete and consistent specification of the wholesystem. They are used by software engineers as the starting point for the system design. Itshouldshowwhatthesystemdoandnothow itshouldbe implemented.

HARDWARE
System : Computer orLaptop
Processor : 2.60GHz
Hard Disk : 500GB
RAM : 8GB
SystemType : 64-bit

Network : NetworkInterfaceCard
3.3 SoftwareRequirements
The software requirements document is the specification of the system. It should includeboth a definition and a specification of requirements. It is a set of what the system shoulddo rather than how it should do it. The software requirements provide a basis for creatingthe software requirements specification.It is useful in estimating cost, planning teamactivities,performingtasks andtrackingthe teams andtracking theteam's progressthroughoutthedevelopmentactivity.

SOFTWARE
Operating System : Windows10
Software :MicrosoftVisualStudio Code
Framework :BOOTSTRAP4Programming
Languages :HTML, CSS, JAVASCRIPT
Browser : Google Chrome

3.4.FunctionalRequirements
A functional requirement defines a function of a software-system or its component. Afunctionisdescribedasasetofinputs,the behavior,andoutputs.

3.4.1.HomePage
3.4.1.1.DescriptionandCriticality
The website should contain a home page or index page as the initial page. When a visitoruses the URL toopen the website he must be first sent to the home page of the website.Thehomepageofthewebsiteshouldcontainthecollegenameandlogoanditshouldhaveanavigationbarforthevisitorstonavigatethrough thewebsite.The homepageshouldbea representative of all the other pages in the website and it must highlight most importantfeaturesofthecollege.This featureishighlycritical.

ReqNo/-	Description	Criticality	Risks	Dependencies
1	Home Page	High	-----------	-----------

3.4.2.AboutPage
3.4.2.1.DescriptionandCriticality
This feature is very important as it gives details about the college. It should highlight thevision and mission ofthecollege.Itshould providedataaboutthegoverningbodiesofthecollege. It should provide college history and Alumni data. It should show case themagazine and media pages of the college. This page is crucial as it highlights the college.Thecriticallyis medium.
3.4.2.2.FunctionalRequirements

Thevisitorsmustbeabletoidentifythecollegevisionandthepeoplewhoruntheinstitute.

Req No/-	Description	Criticality	Risks	Dependencies
1	AboutPage	Medium	----------	----------

3.4.3.AdmissionDetailsandForms
3.4.3.1.DescriptionandCriticality
ThewebsiteshouldprovidealltheadmissiondetailstoalltheUndergraduateandpostgraduatecoursespresentinthecollege. CoursessuchasBTECH,MTECH,MBAthatare present in the college must be mentioned and process and procedures of applying tothese courses should be provided. The criteria of admission and fee structure along withdegree awarding and grading rules shall be mentioned. The website should also facilitatethe visitors with the admission forms related to the admissions into UG and PG courses ofthe college.

3.4.3.2.FunctionalRequirements
The visitors must be able to find the available courses in the college and the admissionprocedure. They should also be able to download the admission forms or shall be able toapplyforadmissions throughonlineforms.

Req No/-	Description	Criticality	Risks	Dependencies
1	Admissiondetails	High	----------	----------
2	Admissionforms	High	----------	----------

3.4.4.ContactDetails
3.4.4.1.DescriptionandCriticality
The website should contain a contact page which carries the contact details of the college.When a visitor visits a website and looks browses the website they may get queries andwant to clarify it. So the contact details like email, phone numbers and locations areimportantforthemtobeabletocontactthecollegeadministration.

3.4.4.2.FunctionalRequirements
The visitor must be provided with details of the college so that they can contact in case ofanyqueries.

Req No/-	Description	Criticality	Risks	Dependencies
1	Contactdetails	Medium	----------	----------
2	Maps	Medium	----------	----------

3.4.5..ExaminationDetails

3.4.5.1.DescriptionandCriticality
The examination details should be provided on the website of the college so that studentsor visitorsshould be able to get information about the exams being conducted in theinstitution.Theexamstimetabledetailsrelatedtotheaffiliateduniversitymustbeprovided. The website should mention the rules and regulations related to the exams. Thewebsite shouldalsoprovide theresults ofthestudentsaftertheexams.

3.4.5.2.FunctionalRequirements
The examination details must be updated every time the exams are conducted. The resultsmustbeupdatedontime.

ReqNo/-	Description	Criticality	Risks	Dependencies
1	Examinationdetails	Medium	----------	----------
2	TimeTable	Medium	----------	----------
3	Results	Medium	----------	----------

3.4.6.BusinessRules
3.4.6.1.DescriptionandCriticality
The business rules include terms of use and policies of the website. The college shouldhavesomebusinessrulesthat needtobefollowedmandatorily sothattheprivacyofusersis maintained and terms of use are given. The visitors should be provided with these rulesso theycaneasily read andunderstandthe policiesandrequirementsofusing thewebsite.

3.4.6.2.FunctionalRequirements
The business rules of the website are very important as they help to understand the waypeople use thewebsite andthe collegeuse ofvisitorinformation.

ReqNo/-	Description	Criticality	Risks	Dependencies
1	Termsandconditions	Medium	----------	----------
2	PrivacyPolicy	Medium	----------	----------

3.4.7.CertificationRequirements
3.4.7.1.DescriptionandCriticality
Certification should be provided to the website so that the website is marked as secured.Certificates such as SSL certificate are important for making https so that data transfer issafe.

3.4.7.2. FunctionalRequirements
Thecertificationisimportantasit'snecessaryto securetheuserdataonthewebsite.

3.4.8.LegalandRegulatoryRequirements
3.4.8.1.DescriptionandCriticality

The website should be following the legal laws which are common all over the globe andparticularly related to the local region. It should also be complying with the laws of theinstitute itself. The legal laws are mandatory to follow as it may result in violation of anyglobalorspecificregionrelatedrules.

3.4.8.2.FunctionalRequirements

The website should be binding with the institution rules and the legal laws of the countryandspecificregions where thewebsiteis intendedtorunmostly.

4. APPLICATIONS

Having a website means customers are always able to find you–anytime, any where.Evenoutside of business hours, your website continues to find and secure new customers. It offers the user convenience as they can access the information they need in the comfort oftheirownhome. Atitssimplest, awebsiteprovidesaquickandeasywayofcommunicatinginformation. You can list your opening hours, contact information, show images of yourlocation and use contact forms to facilitate enquiries. As your site is accessible to anyone all over theworld, theabilitytobreakthroughgeographicalbarriershasneverbeeneasier.Anyone, from any country, will be able to find your institution. Website can provide ameansofonlineQ&Aforthevisitorstocleartheirqueries.Thewebsiteallowsthevisitorstoapplyforthecollege byusingtheadmissionformsfromtheirhomeitself.

4.1.Scopeforfuture Enhancement

From IoT to chat bots, artificial intelligence is here to stay. The technology is already being developed for web design and development, with AI algorithms capable of building websites. Machine learning can take it a step further by taking advantage of user analysis to predict user intent and to create a tailored experience. The Internet of Things, also known as IoT, will allow for the internet to become more than a simple network of computers. In the future, the internet will become a network of devices centered in the automation and enhancement of both processes and infrastructures. Together, both AI and IoT will allow for service-focused strategies: IoT will provide businesses with expert data for intelligent trade-offs, while AI will make use of

Req No/-	Description	Criticality	Risks	Dependencies
1	SSLcertificate	High	----------	----------

intelligence to make the right choices. Motion UI helps web -developers to create rapid prototypes of animated elements. These can be seamlessly integrated into websites to create transitions, CSSanimations,andSaasmixings.

5.CONCLUSION

In this paper, we implement the best possible practices for making the college websiteeasy and efficient to use by the visitors. The college website has been designed basicallyforthestudentsandtheinstitution. Bygoingonthewebsitethevisitorscanfindallthedatarelatedtothecollegeatoneplaceandgetridofthequeriestheyhave.Thepreviouswebsitewas very simple with basic html codes and the in the early days of websites. But the presented website is has a good look and feel. It also has all new web technology relatedupdates. It has lot of cool animations and attractive images and videos to show case the college. The website also include cool components provided by bootstrap. Collegewebsiteisagoodapproachtoeasilysearchbyjustsittingathome.Andgetaccesstotheadmissionsinformation and facilities of the college.It also provides with all departmentandexaminationrelated detailsandalsoprovidescontactsforthe visitors.

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LIGHTWEIGHT AND DOS RESISTANT MULTIUSER AUTHENTICATION IN WIRELESS SENSOR NETWORKS FOR SMART GRID ENVIRONMENTS

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ABSTRACT :- Using a smart grid, which increases efficiency and makes it easier to monitor critical equipment in a power grid. Online real-time applications equipped with a wireless sensor network (WSN) sense and collect data in order to provide information on power generation, transmission, distribution, and customer. Applications, the administrator, and (mobile) consumers can access the WSN directly. The communications between them must be protected from adversaries to avoid false data injection, which could cause damage either to the applications, the equipment, or the sensor nodes. Another threat comes from the characteristics of the sensor nodes, which makes them vulnerable to denial of services (DoS) attacks, i.e., flooding with false messages. In this paper, a multiuser dynamic cipher puzzle (M-DCP) equipped with TinySet is proposed. This new method provides guaranteed confidentiality in the multiuser WSN authentication and lightweight DoS resistance. The M-DCP using RC5 encryption combined with the elliptic curve digital signature algorithm (ECDSA) and partial recovery can increase brute force complexity to about 1.861×10 137 iterations. Furthermore, the regularization of TinySet is done to simplify the administrator's task in defining the initialization parameters. The experiment showed that the regularized TinySet required less storage space with a 64-bit index than with a 32-bit index or with Counting Bloom Filter. In addition, the average query and verification time of the proposed scheme increased only by under a second or 36% compared to Counting Bloom Filter-based authentication. This is still appropriate for implementation in the WSNs

1. INTRODUCTION

1.1 GENERAL Using a smart grid, which increases efficiency and makes it easier to monitor critical equipment in a power grid. Online real-time applications equipped with a wireless sensor network (WSN) sense and collect data in order to provide information on power generation, transmission, distribution, and customer.

Applications, the administrator, and (mobile) consumers can access the WSN directly. The communications between them must be protected from adversaries to avoid false data injection, which could cause damage either to the applications, the equipment, or the sensor nodes. Another threat comes from the characteristics of the sensor nodes, which makes them vulnerable to denial of services (DoS) attacks, i.e., flooding with false messages. In this paper, a multi user dynamic cipher puzzle (M-DCP) equipped with Tiny Set is proposed. This new method provides guaranteed confidentiality in the multiuser WSN authentication and lightweight DoS resistance. The M-DCP using RC5 encryption combined with the elliptic curve digital signature algorithm (ECDSA) and partial recovery can increase brute force complexity to about 1.861×10137 iterations. Furthermore, the regularization of Tiny Set is done to simplify the administrator's task in defining the initialization parameters. The experiment showed that the regularized Tiny Set required less storage space with a 64-bit index than with a 32-bit index or with Counting Bloom Filter. In addition, the average query and verification time of the proposed scheme increased only by under a second or 36% compared to Counting Bloom Filter-based authentication. This is still appropriate for implementation in the WSNs.

1.2 OBJECTIVE M-DCP is complemented with Tiny Set that organizes user addition, removal, and query with efficient and compact storage. Although Tiny Set increases the user addition time at the administrator node (which acts as the user manager), the storage overhead decreases by a minimum of 77% and theverificationatthesensornodesincreasestounder0.5second compared to CBF.

2. EXISTING SYSTEM

➢ Cooperative Fuzzy Artificial Immune System (Co-Fais)

➢ The security of WSNs has been approached in various different ways.

➢ Existing system is prone to DoS.

➢ This type of attack either takes over the user's computation resources or network connectivity. 1.3.1 **EXISTINGSYSTEM DISADVANTAGES**

➢ Prone to DoS attacks

➢ Less security with lot of flaw

1.2 PROPOSED SYSTEM

➢ Multiuser Dynamic Cipher Puzzle (M-DCP)

➢ We propose a multiuser dynamic cipher puzzle (M-DCP) equipped with TinySet is proposed.

➢ This new method provides guaranteed confidentiality in the multiuser WSN authentication and lightweight DoS resistance.

➢ Furthermore, the regularization of TinySet is done to simplify the administrator's task in defining the initialization parameters.

1.4.1 PROPOSED SYSTEM ADVANTAGES

➢ More efficient and accurate

➢ Provides guaranteed confidentiality in multi user environment

3. DIRECTED DIFFUSION: AN INSIGHT

Directed Diffusion [1] is a data-centric, interest-based routing protocol. An interest is a request for a specific type of data. For ex: In a sensor network to monitor various properties of water in a lake, the interest could be a request for data on toxins to be sent every 10 seconds for the next 50 seconds from a particular area of the sensor network. This interest message would be sent as a packet. The node that sends out interests is referred to as the sink node. The sink node resends these interest packets periodically. A base station node normally does the interest dissemination. This node broadcasts its interests to all its neighbors in the network. This process is referred to as interest-dissemination. The interests consists of the following parameters:

• Type of data required by the sink node

• Area of sensor network from which the data is required (X, Y co-ordinates)

• How often the data needs to be sent to the sink node? This is referred to as data refreshing rate.

• Expiration time

Based on these parameters for the interest dissemination, a gradient is set-up in the reverse direction for data flow. This gradient is set-up in response to the interest dissemination instantiated by the sink node. This process of interest dissemination and the corresponding gradient establishment continues until we reach the nodes generating the events. These are referred to as source nodes. The data is routed through paths, which have a higher gradient value. Those nodes, which send out data more frequently to the sink node, would be positively reinforced. This would mean that the paths to these

nodes would obtain higher gradient values, by increasing the data refresh rate. The sink node must refresh and reinforce the interest once it begins to receive data from the source node. Also each node stores a copy of the interest it receives in an interest cache, before it forwards the interest. This is done to avoid routing loops and repeated flooding. Thus the directed diffusion is based on data centric routing where the sink node broadcasts the interest.

4. ATTACKS ON DIRECTED DIFFUSION [2]

The possible attacks on directed diffusion protocol can be classified under:

1.   Denial of Service attacks

2.   Modification and spoofing of routing information

3.   Dropping or selective forwarding of data

In the following sections these attacks along with the possible countermeasures against these attacks is discussed.

1.   Denial Of Service attacks

The simplest form of the denial of service attack would require an attacker to deploy a malicious node with a powerful transmitter and a large battery power. This would enable the attacker to jam the communications in the entire sensor network with his powerful transmitter. A normal malicious node would only be able to jam the communication link in its immediate vicinity.

A second form of denial of service attack would involve spoofing negative reinforcements. A malicious node could spoof negative reinforcements to certain nodes. If the latter nodes communicate with the base station or a sink node via the malicious node, they would be denied service to the base station because of the spoofed negative reinforcements that they received from the malicious node. The figure below depicts this:
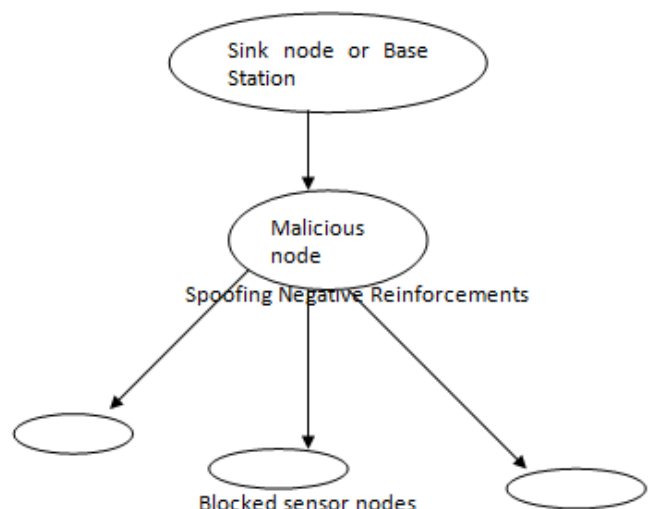
Fig1: Simple DOS attack

2. Modification and spoofing of routing information

In Directed Diffusion the routing is done on the basis of interest dissemination and the corresponding gradient establishment. If a malicious node receives interests from the base station, it could replay the interest with itself listed as the base station. This would enable the malicious node to receive a copy of the events, which are sent to the base station.

A malicious node can influence the other nodes to route data through it by spoofing positive and negative reinforcements and false data events. For example consider that a malicious node receives interests from the base station or a sink node. It adopts the following procedure

- Rebroadcasts the interests to its upstream nodes. Upstream is the direction from sink node to source node.
- Sends strong positive reinforcements to the upstream nodes. This would enable the malicious node to receive a steady flow of events from the its upstream nodes
- Send spoofed events at a high data rate to the sink node or base station
- This would make the base station to positively reinforce the malicious node as against the alternate routes, as the node is generating a steady stream of events.
- Thus the malicious node has successfully been able to include itself in the path of the base station and observes all packets sent to the base station

The figure below depicts this:
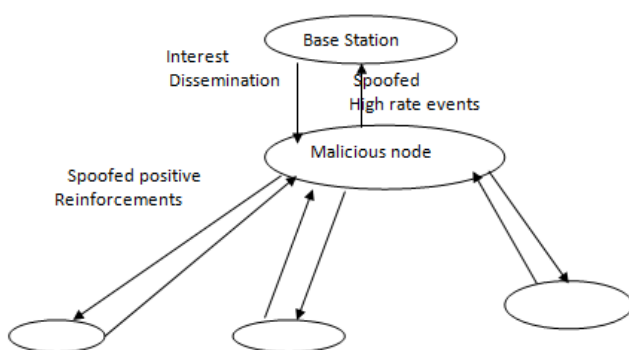
Nodes generating and sending event data as they have a high gradient path to malicious node

Fig2: Spoofing Positive Reinforcements
(Also enables easy selective forwarding)

3. Dropping or selective forwarding of data

Most sensor networks are multi hop networks. These networks rely on all the nodes to correctly forward the messages. In this scenario a malicious node could drop or selectively forward only certain messages. If a malicious node drops all messages, it would be as good as the node not being present in the network. The sensor network is designed to adapt to this. But a more severe form of this attack would be if a malicious node selectively forwards only certain messages. With the spoofed positive and negative reinforcements discussed in the previous section, we saw how a malicious node can successfully include itself in the path of data flow. This now makes selective forwarding trivial. The malicious node can now forward only certain messages and suppress the rest. Thus once a malicious node includes itself in the path of data flow, the selective forwarding can be easily achieved.

4. COUNTERMEASURES

The following are some of the problems with the directed diffusion protocol, which make the protocol more vulnerable:

1. The interest packet in the Directed diffusion protocol does not have any information regarding the sink node that generated the interest. There could be some provision to specify the identity of the sink node in the interest packet. This along with the encryption of the data would make spoofing interests difficult.
2. The data packets received from the source nodes contain no information regarding the identity of the source node. This information coupled with encryption of data would to some extent prevent malicious nodes from spoofing high data rates to the base station.

One of the useful steps that can be taken to prevent some of the attacks is to use encryption at the link layer. The nodes could share a key with the base station and thus data flow could be authenticated. It is vital that efficient symmetric key cryptographic schemes be employed. Public key cryptography would be too expensive and infeasible to use in sensor networks with the limited memory and computational capabilities of the nodes. The link layer encryption would prevent most external attacks against sensor networks. Internal attacks from compromised nodes are harder to defend against. One novel scheme of preventing some of the attacks would be for the base station to limit the number of neighbors a node can have. This would restrict the compromised node to communicating with its immediate neighbors. It would be very hard to defend against a denial of service attack if the malicious node has a strong transmitter. It is vital to design the security infrastructure into the routing protocol rather than trying to retrofit. With the challenges of

5.CONCLUSION

The use of WSNs in SG applications raises new challenges. User organization, security and WSN

characteristics are critical aspects for SG implementation. Therefore, M-DCP for message authentication in WSNs was developed. This scheme meets SG requirements. M-DCP is complemented with Tiny Set that organizes user addition, removal, and query with efficient and compact storage. Although Tiny Set increases the user addition time at the administrator node (which acts as the user manager), the storage overhead decreases by a minimum of 77% and theverificationatthesensornodesincreasestounder0.5second compared to CBF. This membership scheme was optimized by using regularization with the aim of simplifying the administrator's task of defining the initialization parameters for Tiny Set. A regularized Tiny Set using a 64-bit index is recommended because in most cases it requires less storage spacethana32- User Puzzle generator Admin Upload file Search file Decrypt file Download Tag generation Tag verification Tiny set membership Verify puzzle All details 26 bitindex.Moreover,the difference in the user addition time between a 64-bit index and a 32-bit index is under 1 second. M-DCP adapts the Tiny Set membership scheme to DCP. MAC processing in the original DCP is eliminated and replaced by two types of the cryptographic hash function. Furthermore, the length of the tag is fixed so the adversaries' complexity increases. The processing time on the sender side is increased because of puzzle generation by a reasonable amount. The verification time for authentication using DCP is only about 382mslonger than with BAS using CBF, i.e. only about36%longer.Thisacceptableoverheadincrease,bothon the sender and the receiver side, is offset by the guarantees of authenticity, confidentiality, and protection against DoS attacks. Therefore, the adversaries' possibility combination using brute force increases to about 1.861×10^{137} iterations.

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PROCESS AND APPLICATION OF DATA MINING IN THE UNIVERSITY LIBRARY

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ABSTRACT In view of characteristics of users data in the university library and based on big data technology, in this paper we propose a data mining process and discuss some applications of data mining in the university library. Besides, we inveterate the problems in the application of big data mining in the university library and provide some suggestions to solve these problems.

1. INTRODUCTION:

Data are any figure, facts or text that can be processed by a computer. Now a day's many organizations deal and manage large amount of data and databases in various formats. Data mining techniques are used to operate on large volumes of data to discover hidden patterns and relationships helpful in decision making. Data mining software helps users to analyze data from different dimensions, categorize it and a summarized relationship is identified during the mining process. Various data mining techniques are used in different fields of life such as medicine, statistical analysis, engineering, education, banking, marketing, sales etc.

1.1. Associations in data mining: Association rule learning is a popular and well researched method for discovering interesting relations between variables in large databases. For eg {onion and Potatoes}=> {bread and cheese found in the sales data of a super market would indicate that if a customer buys onions and potatoes together he or she is likely to also buy bread and cheese. Such information can be used as the basis for the decisions about marketing activities such as example promotional pricing on product placements. In addition to the above example from market basket analysis association rules are employed. Today in many application areas including web usage mining, intrusion detection and biometrics it is used.

2. DATA MINING PROCESS:

Data mining process should be standard. It should be reliable and repeatable by people having a very little knowledge of data mining skills. It involves the following processes.

➢ Job knowledge: The objective of the job, background information, data mining objective risks involved, assessment of the situation and success criteria

➢ Data Understanding: Collect data, describe, explore data, and check the quality of the data.

➢ Data preparation: data selection, data description, consolidation, cleaning, formatting and derive data qualities.

➢ Data modeling process: Modeling techniques are identified based on the data mining objectives, parameter setting, testing designs and model assessment.

➢ Evaluation process: results evaluation, apply and review the process and decide upon action to be taken or decisions based on the model.

➢ Deployment process: Planning for monitoring and maintenance, produce final reports, reviews experiences and present documentation etc.

Chart of Data Mining Process

3. DATA MINING COULD BE USEFUL TO ANSWER QUESTIONS LIKE

➢ Forecasting things that are likely happen in future

➢ Classifying things into groups based on patterns

➢ Associating similar events that are likely to occur together

➢ Associating people into groups based on their attributes

➢ Listing the sequence what events are likely to lead to whom

Data mining can be applied in business & industry applications to identify and discover the expected behavior of the customer. It can rate the behavior of the customer in the areas like credit card analysis, insurance claim fraud analysis, telecommunication call record analysis, consumer goods promotion analysis etc. A super market becomes information broker and basketball teams prefer data mining to track game strategy. Web mining finds the affinity of visitor to web pages analyzing web logs, identifies popular pages, analyze links that are hard to find, etc.

It was also applied in Terrorism Information Awareness project in May 2003 conducted by the Defense Advance

Research project Agency (DARPA) after the terrorist attack on September 11, 2001. It was designed to develop technologies to deduct the terrorist groups' attacks against the US government. These technologies enabled more comprehensive and thorough mining of transactional data such as immigration records, passport and visa applications, car rentals, driving license renewals, airline ticket purchases, criminal records etc. Data mining is useful in criminal investigation and home land security. It helps in suspecting criminals as well as studying their behavior by examining trends in location, crime type and their habits.

Data mining techniques are applied to scientific enquiry and research analysis. Data mining assist researchers by speeding up their data analyzing process, thereby allowing them more time to work on other projects. .Many scientific enquiries, information retrieval, patent analysis, remote sensing etc prefer the use of data mining for novel discovery.

U.S government uses data mining to track fraud to increase security. Many banks in U.S apply data mining techniques for customer attrition prediction.

Data mining in assessing the profitable, non –profitable and high risk customers.
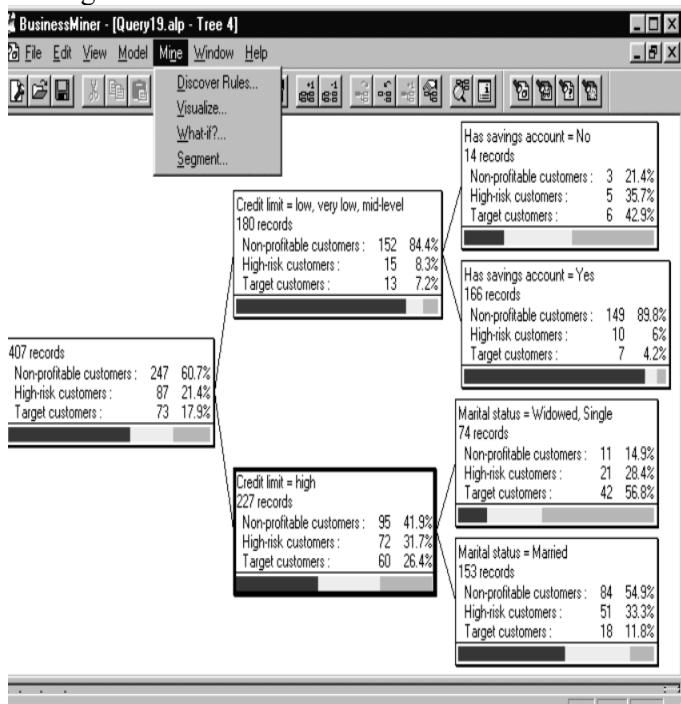
4.   DATA   MINING   IN   LIBRARIES (BIBLIOMINING):

For the past few years library professionals are also making use data mining in Library and information services called "Bibliomining" as was coined by Nicholson and Stanton in 2003. Bibliomining is derived from bibliometrics and user based data mining which brings together through data warehousing applications in various library services. Bringing together these two data sources into one data warehouse allows the researchers and librarians to fully understand the information space they have created. A properly designed data warehouse enables evaluation of a service which helps in understanding the library use across the services offered. Hence the librarian's need for decision making and the scholar's need for research should drive the fields captured in data warehouse. So it helps to understand patterns of behavior among library users and patterns of information resource use throughout the institution. For example data mining that would be useful in digital library evaluation is web- usage mining. Here data mining uses the transaction log records from the web server to discover the patterns with the help of efficient techniques followed by an interpretation and validation of discovered information relating to track the usage pattern of digital library services. It is the combination of data mining, bibliometrics, statistics and reporting tools used to extract patterns of behavior- based artifacts from library systems. Integrating bibliomining into current research and evaluation efforts will allow the librarians and researchers a detailed idea of the resources contained in their library and how the resources are being accessed by the users. Thus each bibliomining analysis benefits in three different levels:

➢   benefits for individuals through improved library services

➢   benefits library managers through improved decision making information

➢   benefits the institution is that the library serves through reporting of relevant patterns of user behavior.

Thus by providing information on the performance and utility of the library as a unit bibliomining can provide justification for continued financial and institutional support for library operations. Bibliomining can be used along with techniques of evaluation such as cost benefit analysis, surveys etc. Data mining technology is highly useful for information retrieval, semantic analysis, navigation of unstructured texts, digital library evaluation, web –usage mining and to make proactive and knowledge driven decision across library services. In this way it helps librarians to extract meaningful information and researchers in linking information to knowledge discovery.

5 .DATA MINING IN LIBRARY MANAGEMENT SYSTEM:

Mining in educational environment is called educational data mining, concerned with developing new methods to discover knowledge from educational databases like library, sports, health and management etc. in order to a analyze students trends and behavior towards particular subjects when in close with examinations.

5.1 .Integrated Library system – Vendors:

Innovative interfaces Inc. announced Decision Center in January 2012 which by it was implemented in libraries as an early adopter program. This product mines operational data from millennium or sierra to help libraries identify candidates for weeding, selection or transfer, manage budget allocations or handle other operational activities.

Ex Libris Ltd provides a variety of tools in Alma analytics based on the use data and operational data generated within Alma to inform operational decisions based on Purchase trends, comparative analysis and even predicative analysis.

Serials Solutions has identified collection analysis as a key priority announcing Intota assessment as the initial offering within its new library services platform. Intota assessment not only will make use of the library's own collection and usage data but it will also extract resources within the ProQuest arsenal (such as serials Solutions knowledge base of e-resources data, Books in Print and Ulrich's) to support library decisions in operations and collection development.

OCLC for example has offered WorldCat collection analysis service for many years providing libraries with data about their collections such as subject strengths, unique items and other characteristics determined through WorldCat holdings.

5.2. Data Mining Applications in library operations:

Libraries can use transactions log at the circulation to know the borrowing nature of the user and for circulation borrowing statistics to know highly demanded books and to take decision to buy new books. Number of returns, over dues, issues, renewals, reserves, recalls etc. patron wise over a period of time to know the behavior of the patron and his habits. Some of the examples cited under are from university of Hyderabad.

Data mining can be applied to track the enormous downloads of the online data bases through the I.P address and track the misuser. There are cases for continuous systematic downloads of online data bases violating the license agreement resulting in suspension of access . Data mining was used to track the person from the I.P address and through the systematic downloads from that particular address of the machine.

The Usage statistics of electronic databases helps the library managers to take decision on renewal of the databases and know the usage trend of the users. The chart below shows the usage report at University of Hyderabad. The usage pattern reveals the preferences of the user through the counter report. Science direct, ACS and JSTOR are highly used databases with SIAM review as least. The databases ranking in order of priority can be known and decision regarding their renewal can be

taken. Such usage data can be combined with surveys to know subject highly used to take better decisions.

Further through bibliographic databases like SCOPUS and Web of Science data mining can be applied to track the citations and research output of the faculty. The screen shot mentioned shows the research output of authors which keeps increasing year after year. Two faculties from chemistry department whose research output is higher than other departments are depicted in the figure as examples. Professor Desiraraju from chemistry department citations are high and his h-index is 42 from the year 1999 to 2013 followed by professor Basavaiah of chemistry department whose h-index is 29. Similarly each author of every department research report can be run by applying data mining techniques.

University of Hyderabad   Usage report Period Jan- Dec2012
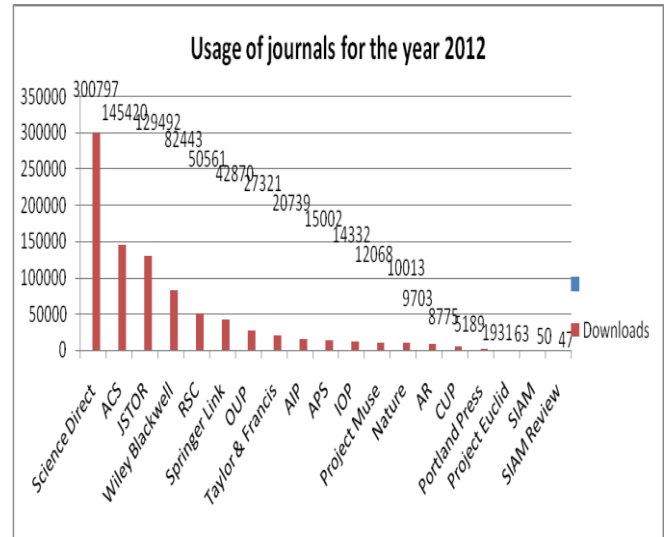
Citation Report of highly cited authors from university of Hyderabad

6. CONCLUSION

In the university library, traditional data interprets overall resource allocation and users' demand from macro perspectives. However, big data can perform micro-analysis on users to understand individual needs and adjust the proportion of allocation between different resources, which can provide technical support for discipline development and individualization of services. Compared with traditional data application technology, big data mining technology is in the developing stage. There is no clear method, path and evaluation criteria and guidelines on the utilization of the big data in the university library. Besides, big data mining for collection resources and reader information requires more staffs with in-depth professional skills of data mining. Moreover, the work of big data mining in the university library requires practitioners to abandon the mindset of step by step. Alternatively, they should have a good

sense of innovation and data mining inspiration, and are able to find the connection between different information. Therefore, in order to give full play to the application effect of data mining technology in the university library, staffs in the library engaged in data mining need to actively exert their subjective initiative and have a strong sense of responsibility and dedication, such that constantly adjust, develop and maintain the data mining models. In this way, university library can provide better decision-making support for the discipline development in the university, more reliable data support for system management and overall resource optimization, and more timely and personalized services for various users.

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RUMOR PROLIFERATION AND DETECTION IN SOCIAL MEDIA: A REVIEW

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Abstract—With the pervasiveness of online media data as a source of information, verifying the validity of this informa- tion is becoming even more important yet quite challenging. Rumors spread a large quantity of misinformation on microblogs. In this study we address two common issues within the context of microblog social media. First, we detect rumors as a type of misinformation propagation, and next, we go beyond detection to perform the task of rumor classification (RDC). We explore the problem using a standard data set. We devise novel features and study their impact on the task. We experiment with various levels of preprocessing as a precursor to the classification as well as grouping of features. We achieve an F-Measure of over
0.82 in the RDC task in a mixed rumors data set and 84% in a single rumor data set using a two step classification approach.
Keywords–Rumor Detection and Classification; Super- vised Machine Learning; Feature-based model.

1. INTRODUCTION

Social media is currently a place where massive data is generated continuously. Nowadays, novel break- ing news appear first on microblogs, before making it through to traditional media outlets. Hence, microblog- ging websites are rich sources of information which have been successfully leveraged for the analysis of sociopragmatic phenomena, such as belief, opinion, and sentiment in online communication. Twitter [27] is one of the most popular microblogging platforms. It serves as one of the foremost goto media for research in natu- ral language processing (NLP), where practitioners rely on deriving various sets of features leveraging content, network structure, and memes of users within these networks. However, the unprecedented existence of such massive data acts as a double edged sword, one can easily get unreliable information from such sources, and it is a challenge to control the spread of false information either maliciously or even inadvertently. The information seeker is inundated with an influx of data. Most importantly, it is hard to distinguish reliable information from false information, especially if the data appears to be formatted

and well structured [9] [24]. The problem is exacerbated by the fact that many information seekers believe that anything online in digital form is true and that the information is accurate and trustworthy; although, it is well known that a lot of the information on the web could be false or untrue. This is especially crucial in cases of emergencies. For example, by simply hitting the Re-tweet button on Twitter, within a fraction of a second, a piece of information becomes viral almost instantly. There are widely varying definitions of the term "rumor". We adopt the following definition of rumor: a rumor could be both true or false. A rumor is a claim whose truthfulness is in doubt and has no clear source, even if its ideological or partisan origins and intents are clear [2].

In verifying the accuracy of claims or events online, there are four major aspects that could be checked: Provenance, the original piece of content; Source, who uploaded the content; Date-and-location, when and where the content was created [22]. Analyzing each of these items individually plays a key role in verifying the trustworthiness of the data.

In this paper, we address the problem of detecting rumors in Twitter data. We start with the motivation behind this research, and then the history of different studies about rumors is overviewed in Section 2. Next, in Section 3, the overall pipeline is exposed, in which we adopt a supervised machine learning framework with several feature sets, and finally in Section 4, we compare our results to the current state of the art performance on the task. We show that our approach yields comparable and even superior results to the work to date.

2. RELATED WORK

Psychologists studied the phenomenon of rumors from various angles. First studies were carried out in 1902 by German psychologist and philosopher, William Stern, and later in 1947 by his student Gordon Allport, who studied how stories get affected in their lifecy- cle [10]. In 1994, Robert Knapp published "A Psychology of Rumors", which comprised of a collection of more than

a thousand rumors propagated during World War II.In his work, the rumor is what was transmitted by word of mouth and bore information about a person, an event, or a condition, which fulfilled the emotional desires of the public [11]. In 1948, Allport and Postman [12] studied the behavior of rumors and how one rumor reflects leveling, sharpening, and assimilation behavior in its propagation. Related studies in political communi- cation conducted by Harsin [2] presented the idea of the "Rumor Bomb". For Harsin, a "Rumor Bomb" spreads the notion of the rumor into a political communication concept. In other research, Kumar and Geethakumari [5] explore the use of theories in cognitive psychology to estimate the spread of disinformation, misinformation, and propaganda across social networks. There are several studies about the behavior of misinformation and how they are distinguished in a microblog network. For example, Budak took a step further [4] investigating how to overcome the spread of misinformation by applying an optimized limitation campaign to counteract the effect of misinformation.

From an NLP perspective, researchers have studied numerous aspects of credibility of online information. For example, Ghaoui [3] detects rumors within specialized domains, such as trustworthiness, credibility assessment and information verification in online communication. Modeling and monitoring the social network as a connected graph is another approach. Seo [6] identifies rumors and their corresponding sources by observing which of the monitoring nodes receive the given information and which do not. Another relevant work, Castillo [23], applied the time-sensitive supervised approach by relying on the tweet content to address the credibility of a tweet in different situations. The most relevant related work to ours is that reported in [1], which addresses rumor detection in Twitter using content-based as well as microblog-specific meme features. However, differences in data set size and number of classes (ru- mor types) render their results not comparable to ours. Moreover, Qazvinian et al. [1] suggest label-dependent features in creating their User-based (USR) and URL features, which is only possible by having the input data labeled for being a rumor or not. In other words, labeled data is used for creating the language model (LM) with USR and URL features, and the trained LM is then used for extracting the value of each feature. In our study, we propose a totally label-independent method for feature generation that relies on the tweet content, and boosts our model in a realtime environment.

Rumor	Rumor Reference	# of tweets
Obama	Is Barack Obama muslim?	4975
Michele	Michelle Obama fired many staff members?	299
Cellphone	Cell phone numbers going public?	215
Palin	Sarah Palin getting divorced?	4423
AirFrance	Air France mid-air crash photos?	505

3. APPROACH

We addressed the problem of rumor detection and classification (RDC) within the context of microblog social media. We focused our research on Twitter data due to the availability of annotated data in this genre, in addition to the above mentioned interesting character-istics of microblogging, and their specific relevance to rumor proliferation.

A. Data

Qazvinian et al. [1] published an annotated Twitter data set for five different 'established' rumors as listed in Table I. The general annotation guidelines are presented in Table II.

Table II. Rumor detection annotation guidelines

0	If the tweet is not about the rumor
11	If the tweet endorses the rumor
12	If the tweet denies the rumor
13	If the tweet questions the rumor
14	If the tweet is neutral
2	If the annotator is undetermined

The following examples illustrate each of the annotation labels from the Obama rumor collection.

0: 2010-09-24 15:12:32 , nina1236 , Obama: Muslims 2019 Right To Build A Manhattan Mosque: While celebrating Ramadan with Muslims at the White House, Presi. http://bit.ly/c0J2aI

11: 2010-09-28 18:36:47 , Phanti , RT @IPlantSeeds: Obama Admits He Is A Muslim http://post.ly/10Sf7 - I thought he did that before he was elected.

12: 2010-10-01 05:00:28 , secksaddict , barack obama was raised a christian he attended a church with jeremiah wright yet people still beleive hes a muslim

13: 2010-10-09 06:54:18 , affiliateforce1 , Obama, Muslim Or Christian? (Part 3) http://goo.gl/fb/GJtsJ

14: 2010-09-28 22:22:40 , OTOOLEFAN , @JoeNBC The more Obama says he's a Christian, the more right wingers will say he's a Muslim."

2: 2010-10-05 17:37:04 , zolqarnain , Peaceful Islam-Muslims Burn CHURCH in Serbia: http://wp.me/p121oH-1ir OBAMA SILENT #politics #AACONS #acon #alvedaking #women #news #tcot

Table III shows statistics for the annotated tweets corresponding to each of the five rumors. The original data set as obtained from [1] did not contain the actual tweets for both Obama and Cellphone rumors, but they only contained the tweet IDs. Hence, we used the Twitter API for downloading the specific tweets using the tweet ID. Accordingly, the size of our data set is different from that of [1] amounting to 9000 tweet in total for our experimentation.

TABLE III. List Of Annotated Tweets Per Label Per Rumor

Rumor	0	11	12	13	14	2	Total
Obama	945	689	410	160	224	1232	3666
Michelle	83	191	24	1	0	0	299
Palin	86	1709	1895	639	94	0	4423
Cellphone	92	65	3	3	3	0	166
Air France	306	71	114	14	0	0	505
Mix	1512	2725	2452	817	321	1232	9059

B.   Experimental Conditions

We approached RDC in a supervised manner and investigated the effectiveness of multi step classification with various sets of features and preprocessing tasks versus a single step detection and classification approach. In the single-step classification for RDC, we performed detection and classification simultaneously as a 6-way classification task among the six classes in the labeled data, as shown in Table II, by retrieving the tweets as Not Rumor(0), Endorses Rumor(11), Denies Rumor(12), Questions Rumor(13), Neutral(14), and Undetermined tweets(2). In the two-step classification set up, an initial 3-way classification task is performed among the fol- lowing groups of fine grained labels (0, Not Rumor), (2, Undetermined tweet), and the compound (11-14, Rumor) labels. This is followed by a 4-way classification step for the singleton labels, (11, Endorsing the Rumor), (12 Denys the Rumor), (13, Questions the Rumor), and (14, Neutral about the Rumor). In the second step, we took out class 0 and 2 tweets from the training data set and only classified the tweets from the test data set, which had been classified as rumor in the first step. The underlying motivation of our effort in designing the single-step and two-step classification is to investigate the performance of each technique in order to solve two problems. First, classifying tweets as 'Rumor' and 'Not Rumor', which can assist users to distinguish the type of tweets. Second, classifying the rumor type that the tweet endorses, denies, questions or is neutral. Although in both problems we investigated the rumor, these two problems are different. Our two-step model pipeline is dynamic in a way that the output of the the first step

(Rumor Detection) is the input data set for the next step (Rumor Type Classification). We also designed a new set of pragmatic features along with updating the set of features in Twitter and network-specific category, which could boost the overall performance in our pipeline.

C.   Machine Learning Frameworks

For our experiment we applied J48, a discriminative classifier that utilizes decision trees and supports various types of attributes. WEKA platform [25] is used for training and testing the proposed models in our pipeline.

TABLE IV. Final list of used features. '*' Marked features are the appended set of features

	ID	Value
	* Time	Binary
Twitter and	* Hashtag	Binary
Network	Hashtag Content	String
Specific	URL	Binary
	Re-tweet	Binary
	*Reply	Binary
	User ID	Binary
	Content Unigram	String
Content	Content Bigram	String
	Pos Unigram	String
	Pos Bigram	String
	*NER	String
Pragmatic	*Event	String
	*Sentiment	String
	*Emoticon	Binary

D.   Feature Sets

We experimented with content, network, and social meme features. We extended the number of features by including the pragmatic attributes. We employed all the features proposed in [1] in addition to developing more pragmatic attributes as well as additional network features. For network and meme features, we explicitly modeled source and timestamped information and for pragmatic features we proposed NER, Event, Sentiment, and Emoticon. Table IV lists all the features for the RDC task and marked the new features with "*".

1)   Content Features: This set of features is developed using tweet content. We applied various preprocessing granularity levels to measure the impact of preprocessing on the RDC task.

a)   Unigram-Bigram Bag of Words (BOW): Similar to the content lexical features proposed in [1], we used a bag of words feature set comprising word unigrams and bigrams. We employed the WEKA's String To Word Vector along with N-gram tokenizer for creating this feature set with the TF-IDF weighting factor as the matrix cell content corresponding to each feature. We also generated the lemma form of the words in the tweets using WordNet [19] lemmatization capability. Accord-ingly, we created four feature sets: unigram tokenized

word form, unigram lemma form, bigram tokenized word form, and bigram lemma form.

b) Part of Speech (POS): POS tagging for social media is challenging since the text genre is informal and quite noisy. We relied on the CMU Twitter POS tagger [7]. The feature values are set to a binary 0 or 1, corresponding to unseen or observed.

2) Pragmatic Features: In an extension to the features proposed by [1], we further explored the explicit modeling of pragmatic features to detect favorable and unfavorable opinions toward specific subjects (such as people, organizations). Applying this set of features offers enormous opportunities for detecting the type of rumors [21].

a) Sentiment: There are a wide variety of features for sentiment classification on Twitter data sets that have been studied in various publications. We believe that polarity of a tweet could be an informative factor to extract user's opinion about each rumor. For tagging the sentiment polarity of a tweet we applied the Stanford Sentiment system [18]. We preprocessed the data by removing punctuations, URL, "RT", and lowercased the content. Each tweet is tagged with one of the following sentiment labels; Very Positive, Positive, Neutral, Negative, or Very Negative.

b) Emoticon: Another pragmatic cue is Emoticon. Studies on modeling and analyzing microblogs, which explicitly use emoticon as a feature, show its impact on classification [17]. We used the list of popular emotions described in Wikipedia [26]. We manually designated and labeled the list of entries as either expressing Positive (2), Negative (1), or Neutral (0) emotions.

c) Named-Entity Recognition (NER): We employed Twitter NLP tools [20] to explicitly extract information about named-entities, such as Location, Person, Organization, etc. In this paper we show how modeling NER has an explicitly positive impact on performance.

d) Event: Extracting the entity Obama and the event phrase praises in connection with Muslims is much more informative than simply extracting Obama. We utilized the same Twitter NLP tools [20] for tagging event labels.

3) Network and Twitter Specific Features: Relying on Twitter specific memes, we expanded features listed in [1] by adding time and network behavior features, such as Reply.

a) Time: It is quite remarkable that social networks spread news so fast. In a similar task to [13] we analyzed the process of rumor expansion on Twitter in our data set. Both the structure of social networks and the process that distributes the news lead to a piece of news becoming viral instantaneously. We labeled and ranked all the days based on the number of tweets posted

in a day. We modeled the tweet creation-time attribute. We also observed that more than 90% of rumors are posted during the five most busiest days in the collected data set. Figure 1 shows the results of tabulating time frequency of the rumors in the Palin rumor data set and how the number of rumors changed within a six month period. Accordingly, we designated two labels for the time feature: Busy Day or Regular Day, depending on what type of day tweets were (re)tweeted.
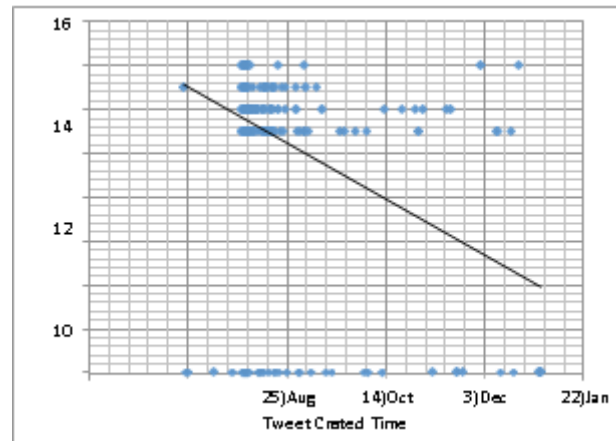
Figure 1. tweet Distribution for the Palin Rumor collection within a 6 month period

b) Reply, Re-tweet, User ID: Replying and retweeting in microblogs are revealing factors in judging user's trustworthiness when it comes to relaying information [14]. For example, User A is more likely to post a rumor than User B if User A has a history of retweeting or replying to User C who also has a rumor spreading history. Investigating the credibility of users is an expensive and almost impossible task, but it is doable when we only want to investigate a specific story. For example, knowing the limited number of users who have

TABLE V. Number Of Features And Labels Used In Single Step And Two Step Classifications

Method	1st Step		2nd Step
	Labels		Labels
(SRDC) 6-way classification	(0)(11)(12)(13)(14)(2)		
(TRDC) 3-way (1st step) — 4-way (2nd step) classification	(0)(2)(11-14)		(11)(12)(13)(14)

a history of posting rumors could be a hint to detect the large number of users that follow, retweet or reply to those tweets.

c) Hashtag: Hashtags serve as brief explanations of the tweet content [16]. We extracted hashtags in the labeled data set. Tweets with no hashtags are assigned a value 0 to their hashtag feature dimension, and tweets containing hashtag(s), received a 1 in the hashtag dimension. Additionally, we added all the observed hashtags as feature dimensions, thereby effectively identifying the tweets that share the same hashtag. For compound hashtags, we used a simple heuristic. If the hashtag contained

an uppercase character in the middle of the hashtag word, then we split it before the uppercase letter. For instance, #SarahDivorce is separated into two hashtags and converted to Sarah and Divorce. We then modeled both compound and separated hashtags as hashtag feature dimensions.

d)   URL: Twitter users share URLs in their tweets to refer to external sources as an authentic proof (a source of grounding) to what they share. All URLs posted in tweets are shortened into 22 characters using the Twitter t.co service. Analyzing the URL is an expensive task and requires a huge source of information to verify the content of the shared URL. We excluded all URLs but we modeled their presence as a binary feature.

4. EXPERIMENTAL DESIGN

All the experiments are designed, performed, and evaluated based on various experimental settings and conditions, all elaborated in this section.

A.   Data

We experimented with three data sets: the two largest rumor sets, Obama and Palin, and a mixed data set (MIX) which comprises all the data from the five rumors. We splited each of the three data sets into 80% train, 10% development, and 10% test.

B.   Experimentation Platform

All experimentations were carried out using the WEKA-3-6 platform [25].

C.   Baselines

We adopted two baselines: Majority and limiting the features to the set of features proposed in [1], which are Content, Hashtag-Content, URL, Re-tweet, and User ID. As the name indicates, the Majority baseline assigns the majority label from the training data set to all the test data.

D.   Experimental Conditions and Evaluation Metrics

We had two main experimental conditions: single- step RDC (SRDC) and a two-step RDC (TRDC). We employed the set of 15 features listed in Table IV. Information about SRDC and TRDC is illustrated in Table V. In the development phase multiple settings and configurations were performed on the development data set for tuning, then the models that achieved the highest performance were used on the test set. Evaluating the performance of the proposed technique in rumor detection should rely upon both the number of relevant rumors that are selected (recall) and the number of selected rumors that are relevant (precision). Hence, we calculated F-measure, a harmonic mean of precision and recall due to its bias as an evaluation metric. TableVI shows the F-measure value for the different settings on the test set.

5. RESULTS AND ANALYSIS

In this section the impacts of different experimental conditions are investigated.

A.   SRDC and TRDC

By studying the results in Table VI, it can be observed that TRDC significantly outperforms SRDC, since TRDC achieves an F measure of 82.9% compared to 74% in SRDC for the MIX data set, and 85.4% for the Obama data set compared to a 71.7% in SRDC. By comparing the F-Measure with the Majority baseline and the features proposed in [1](VAR11) as the second baseline, we could explicitly see how applying the proposed methodology and set of features enhances the overall performance in certain rumors, and also leads to acceptable performance in the MIX data set.

Table VI. F-measure results of srdc and trdc methods employing 15 features and var11 features

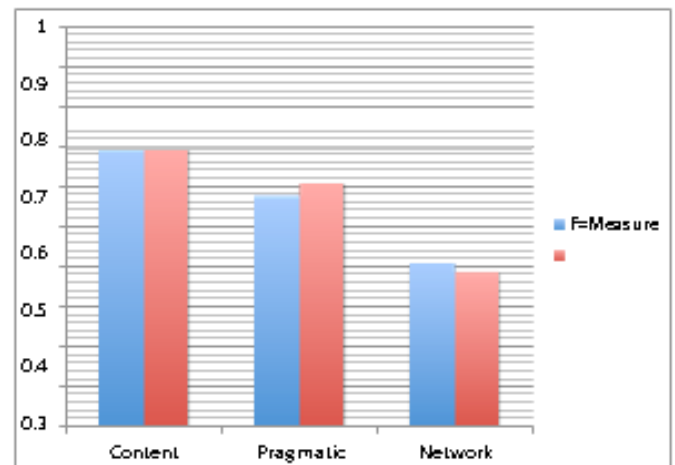| data set	Method	Our 15 Feat.	VAR11 Feat.
	Majority	0.30	
	SRDC	**0.743**	**0.748**
MIX	TRDC	**0.83**	**0.83**
	Majority	0.33	
	SRDC	**0.717**	0.705
1-3 Obama	TRDC	**0.854**	0.844
	Majority	0.46	
	SRDC	**0.754**	0.748
Palin	TRDC	**0.79**	0.70

Figure 2. The Average F-measure and precision of SRDC and TRDC classifications employing each group of features: Content, Pragmatic, Network
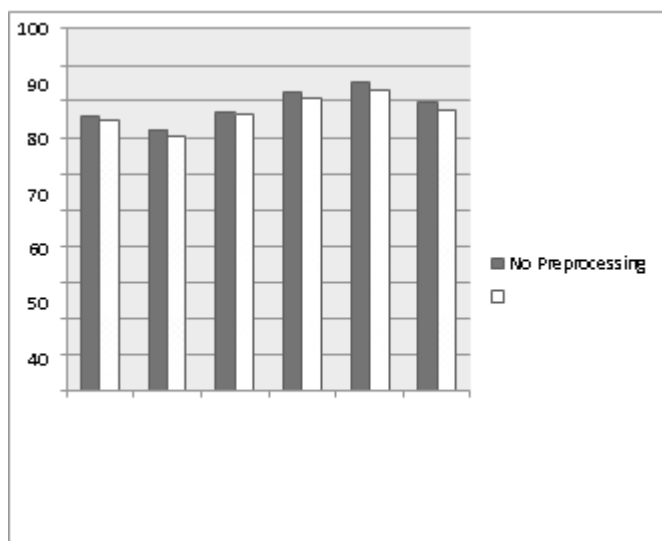
B.   Impact of Feature Set

Figure 3. The overall accuracy in different experiments with and without preprocessing

6. CONCLUSIONS AND FUTURE WORK

In this paper, we study the impact of a single-step (SRDC) 6 way classification versus a two-step classification (TRDC). Our contributions in this paper are two-fold: (1) We boosted the pipeline by decoupling the rumor detection from the classification task. We proposed an automated TRDC pipeline that employs the results from the rumor detection step and performs the classification task upon data and leads to promising results in comparison to SRDC. (2) We employed a new set of meta linguistic and pragmatic features, which

In this experiment, we assessed the performance of different groups of features individually. Figure 2 shows the average F-measure and precision of SRDC and TRDC by employing the Content, Pragmatic and Network sets of features. As shown in Figure 2, employing the Content set of features yields the overall best precision. In contrast to the other features, the network feature set had the minimum impact on our classification.

C.   Impact of Preprocessing

As mentioned above, we applied various levels of preprocessing to the content of tweets such as stemming, lemmatization, punctuation removal, lowercasing, and stop words removal. We measured the impact of applying such preprocessing versus no preprocessing. Figure 3 il- lustrates that accuracy doesn't benefit from preprocessing and results in the loss of valuable information. leads and performs the experiments with and without preprocessing on the textual content. We achieved the F-Measure of more than 0.82 and 0.85 on a mixed and the Obama rumor data sets, respectively. Our proposed features achieved better performance compared to the state of the art features proposed in [1]. Our study however suggests that our pipeline does not benefit from

preprocessing which might be attributed to the weakness of the tools used for processing twitter content at this stage. We are planning to expand the proposed methodology to streaming tweets. Having a limited amount of labeled data, we are investigating means of augmenting the training data with noisy data in a semisupervised framework.

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COMPARATIVE ANALYSIS OF NON-PERFORMING ASSETS OF PUBLIC AND PRIVATE SECTOR BANKS

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ABSTRACT: Indian banking system was not sound at the time of independence. In 1949, 2 major actions were taken with a view of structural reforms in the banking sector. Banking regulation Act, which provided extensive power to RBI over the commercial banks and another was the nationalization of RBI. Banking regulation act provided excessive power the RBI. In a free enterprise economy, commercial banks operate like any other business entity and gain private profit so at the time of independence it was viewed that the freedom of commercial bank was not in the harmony of the socialistic pattern of society, so they were nationalized in 1969 to establish the control over these banks. The last decade has seen many positive developments in the Indian banking sector. The policy makers, which comprise the Reserve Bank of India (RBI), Ministry of Finance and related government and financial sector regulatory entities, have made several notable efforts to improve regulation in the sector. The sector now compares favourable with International Journal of Business Administration and Management. ISSN 2278-3660 Volume 7, Number 1 (2017), © Research India Publications http://www.ripublication.com 103 banking sectors in the region on met rics like growth, profitability and non-performing assets (NPAs).A few banks have established an outstanding track record of innovation, growth and value creation. This study will attempt to assess the impact of private banks on the traditional public sector banks and a comparative analysis of their working efficiency.

KEYWORDS: Comparative analysis , public & private sector banks.

1. INTRODUCTION

Advances and Loans Allowed by company banks really are invaluable for people intensely, companies, businesses, and modern concerns. The expansion and development of business exercises have been changed to a gigantic amount through fiscal financing. Loans and improvements bolstered by banks help with fulfilling here today and longterm money associated prerequisites of organizations. Conceding loans and advances for financial development might possibly be the prime duty of banks. Loaning by the bank's department is generally pumped on the lands which it will get the impact of resources being traded from the frame to gainful intentions, together with these comparative lines that the market grows.

Nonetheless how Toward devoting conveys a danger termed credit chance in addition, which stems from the downturn of debtor Non-performing. Resource alludes to loans that are in danger of default. After the debtor has failed to make intrigue or primary payments for a couple of weeks, in the authentic point the bank loan amount is considered being a Non-performing Asset. Non-performing Assets (NPAs) are catchy and opportunity for the money associated with foundations considering the fact they anticipate premium payments for the cost.

Banks need to dictate Non-performing resources promote directly to the corresponding three categories in light of this period where the advantage has stayed propounded along with the realizability of this levy

1). Substandard Assets (A substandard resource is just one that includes stayed NPA to get a period not specifically or corresponding to annually),

2. Dicey Assets (With impact from March 3 1, 2005, an asset has to be assigned fetched much, as it's stayed NPA for more than per year),

3. Mis-fortune Assets would be such advantages that are believed about uncollectible.

Now's a study paper A benefit is assigned non-performing resource (NPA) in the event the debtor won't pay obligation is crucial and excitement for a little while of 180 days. Depending on March 2004 But, the default status is going to be led in a debtor in case obligation isn't paid for ninety days.

Record Of this issue:

Extensively, Non-Performing Asset (NPA) is distinguished because of propelling, where installation of settlement or premium of a portion of crucial (when there has to be an incident of duration loans payable from the industry venture banks) or possibly remains outstanding for a specific period. In India, that really is of NPAs has shifted after an ideal moment. As signaled by the Narasimhan Committee Report (1991), those benefits (advances, invoices down declared, overdrafts,

currency credit and therefore forth.,) that superior remains because of awhile of 180 days ought to be considered NPAs.

Thus, This age has been diminished, also by March 1995 onwards gains that the premium has since remained outstanding for a couple of weeks and has been considered NPAs.Non performing Assets (NPA) is rolling out as over an elongated stretch because of a troubling threat into the Indian banking industry banking changes from the national government of India and Reserve Bank of India (RBI) as much as both Narasimha Committee Reports have been already murdered by the wicked impacts of this slumping threat. Despite different therapeutic advances controlled to take care to end this problem, solid consequences are evading The seriousness of th challenge is nevertheless deeply endured by everyone the branches of banks.

1. To Examine the Influence of NPA about the efficacy of chosen banks people

2. To gauge the efficiency in handling NPA involving your chosen

3. To create recommendations Better NPA direction in banks that are chosen.

4. To Master part of RBI on NPA

Non-performing resource proposes non-executing and makes bank and broker non-executing since it kills or yields reusing of advantages, denies pay from the great situation by strategy for separates or premium preferred position by method for course of action. Constantly end, NPA address the surveyed "credit chance". Right now attempted has been intended to research the condition of NPAs straightforwardly division banks (PSBs), in the midst of the current past.

Indian financial industry experiences really conflicted with different difficulties and danger like the upkeep of NPAs. Non-performing resources stayed a matter of worry for the banks in India dependably, be that as it may it's been center on the grounds that the financial zone changes were started in 1992. Beginning now and in to the not so distant the entirety of the bank trying endeavors to help the NPA Level in addition to they have winning right now a gigantic degree. Around the whole of walk 2007, net NPAs in collaboration with net advances for winning tad of open division banks were inside the level of 2 percent. Look Adults, Debt Recovery Tribunals (DRTs) and plan of corporate Debt Restructing have given noteworthy push to banks to contain their NPAs. In the present past, furnished with Reconstruction and securitization of Financial Assets and Enforcement of Security Interest Act, the financial business has just settled the ability to lessen its NPAs with full life. Aside from Establishment of 'Favored

viewpoint Reconstruction Companies' has helped the banks to invalidate their NPAs

2. NON-PERFORMING ASSETS OF PUBLIC AND PRIVATE SECTOR BANKS

The standard of Indian banks" resources will most likely disintegrate over another 2 yrs. This will be driven by the log jam all through the market, and by the maturing of advances produced in present day times. The NPAs are accepted as a critical parameter to guage the exhibition and money related soundness of banks. The measure of NPAs is among the drivers of budgetary security and development of the financial division. The Financial organizations and establishments are these days confronting an issue of dealing with the Non-Performing Assets (NPAs) as these benefits are demonstrating to become significant difficulty for the development of the economy. NPAs in basic words could be thought as the borrower won't pay head and enthusiasm for an interim of 180 days. However, it truly is mulled over given that default status will be aimed at a borrower if levy aren't paid for 3 months. On the off chance that any development or credit office allowed by the loan specialist to a borrower becomes non-performing, at that point the bank should treat the entirety of the advances/credit offices conceded contrasted with that borrower as non-performing with no any respect to the undeniable reality that there may in any case exists certain advances/credit offices having performing status.

3. PERCENTAGE OF NET NPA:

Net NPAs is the proportion of gross NPAs less

(1) interest charged to borrowal and not recovered and not saw as pay and kept in interest pressure

(2) proportion of courses of action held in respect of NPAs and

(3) proportion of guarantee got and not appropriated.

The Reserve Bank of India describes Net NPA as Net NPA = Gross NPA – (Balance in Interest Suspense account + DICGC/ECGC claims got and held pending adjustment + Part portion got and kept in expectation account + Total courses of action held).

Net NPAs are found out by diminishing all out change of courses of action extraordinary at a period end from net NPAs. Higher extent reflects rising dreadful nature of advances.

NPA extent = Net non-performing assets/Loans given

The Reserve Bank of India Banks has urged the banks to process their Gross Advances, Net

Advances, Gross NPAs and Net NPAs as per the going with formula.

% of Net NPA:

Year	2016	2015	2014	2013	2012	Mean	SD
SBI	3.81	2.12	2.57	2.1	1.82		0.788435
PNB	9	4.06	2.85	2.35	1.52	3.22	2.669859
KOTAK	3	2	1	1	1	0.934	0.844941
HDFC	0.21	0.1	0.75	0.25	0.03		0.283231
	-0.15382						

Profit for resources (ROA):

Profits for resource proportion is the overall gain (benefits) created by the bank on its all out resources (counting fixed resources). The higher the extent of normal income resources, the better would be the subsequent profits for all out resources. Essentially, ROE (returns on value) demonstrates returns earned by the bank on its all out total assets. ROA = Net profits / Avg. total assets

Return on Assets %:

Year	2016	2015	2014	2013	2012	Mean	SD
SBI	0.44	0.76	0.65	0.91	0.88		0.191233
PNB	-0.59	0.53	0.64	1	1.19	0.641	0.620714
KOTAK	1.34	1.72	1.64	1.55	1.36	1.599	0.153767
HDFC	1.73	1.73	1.72	1.68	1.52		0.08961
	-0.29251						

The organization of banks may offer getting ready to the experts in the art of crediting to the different classes and they may continue empowering updating their understanding and capacities in recovering the advances and advances.

Bank organization may have explicit FICO appraisal associations to complete the obtaining furthest reaches of the potential borrowers beforehand offering credit to the poor people.

Steps ought to be taken to recover the advance in time by grasping all around arranged recovery segment.

There is an off-base inclination in the cerebrums of the farmers that cultivating credit may be conceded one day or other. In this manner, the horticulturalist who can repay the agrarian credit may not way to deal with repay the advances in time. Thusly the farmers in our country requires an extensive proportion of prompting and the bank officials busy with this development should give basic urging and managing.

Effect of NPA:

NPA influence the execution and advantage of banks. The most striking impact of NPA is change in financier's emotions which may square credit augmentation to beneficial explanation. Banks may incline towards more risk free theories to keep up a key good ways from and decline threat, which isn't useful for the advancement of economy. If the degree of NPAs isn't controlled advantageous they will:

* Reduce the triumphant furthest reaches of preferences and seriously impact the ROI.
* The cost of capital will go up.
* The assets and commitment screw up will expand.
* Higher provisioning essential on mounting NPAs horribly impact capital abundancy extent and banks benefit.
* The money related regard builds (EVA) by banks gets angry considering the way that EVA is identical to the net working advantage short expense of capital.
* NPAs causes to lessen the estimation of offer to a great extent even underneath their book a motivator in the capital market.
* NPAs impact the danger standing up to limit of banks.

As NPA has a crucial impact in productivity and execution estimation of a bank so a bank should constantly have a power over it according to the disclosures, the Gross NPA of SBI is higher so it requires diminishing the gross NPA by capable recovery organization.

Effect of NPAS on Banking activities :

The effectiveness of a bank isn't reflected uniquely by how large is its accounting report yet in addition by the level of profit for its advantages. The NPAs as a rule don't produce premium salary for banks. At the equivalent time, banks must give arrangements to NPAs from their present benefits. The NPAs have malicious impact on the arrival on resources in the following ways:

1. The premium salary of banks will fall in reality it is to be accounted uniquely on receipt premise.
2. Banks benefit is influenced because of the giving of dubious obligations and unfavorably subsequent to discounting it as obligation.

3. Profit for speculations (ROI) is decreased.

4. The regulatory focus sufficiency proportion is upset as NPAs enter its estimation.

5. The cost of capital will up go.

6. Obligation and Asset bungle will enlarge.

7. It limits reusing of the assets.

4. RESULT & DISCUSSION NPA:

The issue of Non-Performing Assets (NPAs) is a huge issue and risk to the private division banks and open fragment banks, since it wrecks the sound budgetary spots of them. The customers and general society would not keep trust on the banks any more if the banks have higher pace of NPAs. Thusly, the issue of NPAs must be dealt with in such a manner, to the point that would not crush the cash related positions and impact the image of the banks.

The RBI and the Government of India have figured out how to decrease the volume of NPAs of the private territory banks and open fragment banks . The recuperating estimates taken by Government of India, Reserve Bank of India and the Bank organization starting late, diminished NPAs essentially as proposed by Sri M. Narasimham. To upgrade the capability and advantage, the NPA must be diminished further.

A couple of Strategies to be trailed by Banks for diminishing NPA can be given as underneath:

• Notices.

• Guarantor consequent meet-ups.

• Telephone.

• Newspaper presentation for credits of more than five lakhs.

• Property seizes.

• Recovery Certificate.

• Court case.

• Debt Recovery Tribunal ought to realize to recover the NPAs

• Banks should be very wary in considering settlement exchange off proposals

• Banks should try to introduce a course of action of internal survey of support of credits before installment for far reaching midpoints.

The organization of nonperforming assets is a staggering task for each Bank in the Banking industry. The imperative explanation and requirement for organization of NPA is relied upon to their multi dimensional impact on the exercises, execution and position of bank. Eventual outcomes of focus through light fair and square of nonperforming assets of private part banks and open zone banks . It is found that degree of NPAs both gross and net is on an ordinary in upward example in SBI anyway sliding example for KOTAK Bank for one year then upward example in second year. The non performing asset is an essential issue and impediment

looked by banking industry. Willful defaults, inappropriate planning of advance proposals, poor checking and so forth are the purposes behind speaks to finding a good pace. NPAs impact the circumstance and likewise execution in a couple of courses, for instance, interest pay, advantages, and game plans against NPA"s and whatnot. Subsequently steps should be taken to fix this issue at soonest and in a powerful manner.

The total aggregate of Gross Non-Performing Assets (NPAs) for open and private section banks is around Rs. 6 lakh crore. The NPA figures close by signify commitment for every one of the 49 open and private part banks were shared by the Ministry of Finance considering a Parliament question on Friday.

The proportion of best twenty Non Performing Assets (NPA) records of Public Sector Banks stays at Rs. 1.54 lakh crores.

The advances given by banks are called assets, which produce wage by methods for premiums and partitions. If the part isn't paid until the due date, it is known as an awful credit. If it loosens up recent days, it is named NPA. The extent of NPAs to indicate impels given by a bank is a for the most part used marker reflecting the quality of the financial system.

In preeminent terms, State Bank of India has the most significant estimation of Gross NPA around Rs. 93,000 crores. Punjab National Bank (Rs. 55,000 crores) and Bank of India (Rs. 44,000 crores) come straightaway.

Specific measures have been taken for sections where the pace of NPA is high, the lawmaking body said in view of the parliament question. To improve the assurance or recovery of bank advances, IBC (Insolvency and Bankruptcy Code) has been requested and SARFAESI (Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest) Act and RDDBFI (Recovery of Debts as a result of Banks and Financial Institutions) have been updated, the response said. Further, six new Debt Recovery Tribunals (DRTs) have been developed for improving recovery.

5. CONCLUSION:

Gross NPA of Public division banks is higher than the private section banks which shows its organization viability. Net NPA of PNB is higher than the SBI which reveals its extraordinary position.

Return on assets of PVT banks is lower than Public anyway it is declining. In the event that there ought to emerge an event of PNB it isn't as much as SBI anyway growing

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DYNAMICS OF CURRENCY FLUCTUATION

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ABSTRACT:
While keeping up access to money, global companies are likewise concentrating on their FX exposures — as debasement hazard compromises inflows, the expense of subsidizing remote trade outpourings increments, and the worth and credit danger of FX possessions held in increasingly helpless nations and banks comes into question.

Recognizing FX risks
Before figuring out what move treasury should make to oversee FX chance, the initial step is to understand the degree of hazard and where it emerges:
Build up remote money prerequisites. Income gauging is fundamental to decide the measure of money an organization needs to hold, both at bunch level and in each outside cash. While determining is a customary action for treasurers, it is especially significant at present — given the dangers of cash depreciation, nearby bank counterparty chance, snap capital and money controls, and so forth. While every business is extraordinary, the choice ought to be driven by momentary income determining, hazard resilience, and organizing significant installments.
Stress test income estimates. In the present condition, the potential for determining blunder — both in recognizing and measuring hazard — is higher than regular given the flightiness of interest and interruption in gracefully chains. Stress testing to survey the effect of potential spikes or troughs is a significant method to distinguish liquidity squeeze focuses and potential FX dangers.
Look past the business to distinguish dangers. FX hazard the board on occasion of pressure takes on an unexpected measurement in comparison to during progressively considerate conditions.
While treasurers commonly take a gander at FX hazard as far as income and accounting report introduction, FX chance ramifications expand a lot further. Numerous MNCs sell comprehensively in their gathering useful money, for example USD. Where these organizations offer to clients that work in nearby money, yet pay USD, the client takes on the related FX hazard. Be that as it may, this FX chance turns into the MNC's credit hazard in their records receivable. In like manner, many flexibly chains are USD-named. At the point when a MNC's non-US providers purchase materials and assembling parts in USD, they take on FX chance; be that as it may, this hazard at that point turns into the MNC's provider chance.
KEYWORDS: Currency, Fluctuation

Supporting FX dangers :
Most corporates support in the FX forward business sectors, however as market liquidity has evaporated, and unpredictability expands, treasurers may need to survey their methodology:
See credit limits. The spike in instability is making some huge negative swings in the imprint to showcase valuations of firms' current subsidiary supports. This more prominent negative valuation of these supports diminishes the limit of FX suppliers to execute new fences, and credit lines become completely used. Treasurers ought to evaluate the degree to which supporting credit lines have been affected by the ascent in unpredictability to ensure they can execute new fences when required. Where credit lines are used, treasury may need to utilize less credit concentrated supporting options, for example, FX alternatives. Maintain a strategic distance from under-supporting. Unusualness in estimates makes supporting progressively troublesome. The normal inclination on occasion of vulnerability is to support less, yet this could prompt higher FX hazard. One methodology is to fence dependent on midpoints, and gradually increment support proportions as perceivability increments.

2. PRIMARY DATA:
I have assembled data by associating with traders who are trading money auxiliaries.

3. SECONDARY DATA:
With an authoritative objective of data evaluation I have taken four sets traded NSE. To get more information about this' I accumulated data from objectives, articles and journals related to money partner advertise. for academic clarification behind data I indicated NISM money subordinate module practice manual.
Test SIZE:
USD/INR
GBP/INR
EUR/INR

Test DURATION:
one year is taken for assessment
Information ANALYSIS TOOLS
9 DAYS EMA/13 EMA

4. LITERATURE REVIEW:

It is most clear single marker of worldwide hazard hunger is the US dollar list. Sharp tumble from 103 levels during the pinnacle of COVID-19 related feelings of trepidation in end-March 2020 to 96.5 levels currently is flagging monstrous hazard on exchange with cash spilling out of place of refuge US government bonds into chance resources like values, including EM values.

This is supported by trillions of dollars of liquidity support gave by worldwide national banks and monetary improvement by different governments.

A file of EM monetary forms has reinforced from its record lows supporting this scramble to purchase EM hazard resources. This depends on desires for a V-molded worldwide financial restoration subsequent to reviving of economies and smoothing of bend in China, Korea, Australia, Japan, Europe and now USA.

In the event that dollar shortcoming proceeds and it breaks the present level where it appears to have slowed down its down move, we could see further upside in EMs including India. Additionally, areas which are recipients of "opening up of economy" exchange will outflank stanzas guarded. Shopper optional, worldwide cyclicals, financials, diversion, travel, cordiality will beat stanzas social insurance, customer staples, IT and so on. On the off chance that the US dollar shortcoming inverts, at that point expect the inverse.

CONVENTION:

1. An acknowledgment that harm to total interest is so extreme because of mental effect on customer conduct that profit bounce back may not be as quick as the market is hopefully estimating in,

2. The size of phenomenal showings everywhere throughout the West will undoubtedly go about as "seeding occasions" with a slack of about a fortnight for the quick reappearance of a second flood of distress prompting sharp spike in positive cases and account concentrating back on the wellbeing alarm and pandemic.

Then again any updates on development of a preventive fix for example antibody or a corrective one for example any successful enemy of viral prescription to treat the sickness will keep on fanning the blazes of hazard on conduct.

Exchanging volumes have fundamentally decreased, squeezing incomes, and gracefully binds are easing back — the same number of enterprises are confronting request unpredictability. We are seeing an earnest trip to quality, with fundamentally expanded dollar store levels,

while interest for USD credit lines, in US dollars, is essentially expanding. FX markets are seeing instability and decreased liquidity making debasement chance, for non-practical monetary standards, a genuine test.

As of late, Citi money the board specialists met up on a digital recording to examine how treasury groups are wrestling with this flightiness in the business sectors and activities to consider — and here are a portion of the primary takeaways.

5. ADVANCING CIRCUMSTANCES:

Perceivability and authority over money around the world has never been increasingly significant. Treasurers are cautiously estimating income throughout the following 3-6 months, to guarantee that the business can endure — should inflows lessen or even stop. Organizations are appropriately protecting and supporting all of liquidity they can. Treasurers are drawing down on outer offices and checking on their intercompany financing forms, in addition to unifying and holding money at a gathering level beyond what many would consider possible. Few are taking a gander at radical new methodologies — yet are drawing in natural, demonstrated strategies, for example, target or zero adjusting components, both locally and cross-outskirt. Thusly, they are in a superior situation to assemble liquidity — while utilizing computerization when assets and remote working is hampering tasks.

In Asia Pacific, where associations have had longer to manage COVID-19 ramifications, treasurers have been bridling information from shared assistance communities, installment and assortment industrial facilities to work out further working capital investigation forms, for example,

Performing nitty gritty portfolio examination to open money with sellers and merchants to finance incomes and diminish momentary resources; Investigating credit default trade spreads of these sellers and wholesalers to moderate credit default dangers.

6. RESULT & DISCUSSION:

Evaluating cash hazard day by day, especially while invoicing in various monetary standards.

Financial specialists of the six injury up plans of Franklin Templeton common store should trust that a little longer will cast their votes to choose which substance would execute the wrapping up process. On June 3, the Gujarat High Court gave a stay request on the up and coming democratic procedure that Templeton had started for picking either its own trustees or Deloitte for the wrapping up procedure of the six obligation plans. The reserve house had wrapped up these six plans on April 23. The stay request was looked for by an Ahmedabad-based solicitor, Areez Khambatta, the

second-age proprietor of Rasna Ltd; the producers of the Rasna soda pop concentrate and one of India's most notorious brands. Certainly, Areez and his family are the applicants and not Rasna Ltd.

The candidates have looked to put aside the April 23 choice of ending up of the plans and challenged that Franklin Templeton abused the Securities and Exchange Board of India's (SEBI's) common reserve guidelines and didn't look for unitholders' endorsement before choosing to twist up. The senior Khambatta's family additionally needs SEBI to establish a free position to assume control over these six plans and return the cash to their unitholders. Last Friday, Franklin Templeton documented a request in the Gujarat High Court to empty the remain. According to the stay request, the High Court will hear the issue again on June 12, however it could come up sooner than that. In any case, if the issue gets heard on June 12 or later, the forthcoming vote, that was to have occurred between June 9-11 followed by an internet meeting between its trustees and financial specialists on June 12, will get delayed.

This strategy is unfathomably successful in securing against negative developments, in which a misfortune would some way or another happen had the forward agreement not been set up. Nonetheless, this limits the impacts of positive developments, as well.

On the off chance that conversion standard changes bring about a benefit, the first pre-set rate will in any case be gotten, and no additional cash earned.

Before endeavoring to support FOREX hazard, it's basic to do however much research as could reasonably be expected first. Realizing your picked advertise is vital to limiting danger adequately.

As there are a lot of accessible techniques, rehearsing is additionally similarly significant. Getting comfortable with your picked methodology is probably going to give more prominent consolation, aptitude, and results over the long haul.

For more data about supporting danger in worldwide business, connect with MKS&H today to talk with an expert business advisor.

MACD CALCULATION FOR GBP/INR

Date	Open	High	Low	Close	12ema	26ema	MACD	Signal line
Oct 21, 2018	94.164	94.249	91.983	92.441	-1.734	-1.734	-1.734	-1.734
Oct 28, 2018	92.403	94.032	91.738	92.238	-1.734	-1.734	-1.734	-1.734

Nov 04, 2018	92.637	94.193	92.19	92.319	-1.734	-1.734	-1.734	-1.734
Nov 11, 2018	92.2	93.021	89.771	90.681	-1.734	-1.734	-1.734	-1.734

7. CONCLUSION:

The expression "supporting" alludes to a variety of techniques used to lessen chance when leading universal business. The training looks to limit the outcomes of negative market developments, permitting organizations to build up progressively dependable assessments of income. In any case, supporting is an idea that can frequently appear to be befuddling. It is anything but a method of expanding the measure of cash made. It is a system set up absolutely to assist decline with gambling and diminish potential misfortunes thus.

Here's the means by which supporting can help limit remote trade (FOREX) hazard, particularly with respect to business abroad.

Supporting is a generally wide term, alluding to various strategies. In this way, there are no particular components set up for each supporting activity.

Be that as it may, there are explicit techniques utilized more generally than others to accomplish the best outcomes.

This technique centers around acquiring money. Speculators obtain remote cash dependent on the evaluated sum they're hoping to get later on.

This obtained sum is changed over into their nearby money and kept, accordingly, supporting any danger of swapping scale vacillations. The money got is utilized to reimburse the obligation, whether or not neighborhood premium is sufficient to cover the enthusiasm of the advance. Accordingly, obligation activities can be a costly alternative relying upon neighborhood conditions. Apparently the most widely recognized supporting technique, forward trade contracts are understandings in which financial specialists affirm a present conversion scale for a pre-set future date. This methodology implies their advantages are shielded from developments, as the rate is pre-decided.

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ONLINE TRADING AT ANGEL BROKING

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KEYWORDS: ONLINE TRADING ANGEL BROKING.

1. INTRODUCTION:

In order to construct the transparency, efficiency available, interesting depth, NSE offers an entirely automated display screen largely grounded trading system known as National Exchange pertaining to Automated Trading (NEAT) even called Online Trading. This particular method works very well for trading in the management hub industry sector by just the trading associates of its in the consolidated states to manage together with huge effortless and efficiency.

This NEAT or possibly online trading plan has lent considerable level on the marketplace by allowing many users at seacoast to coast to exchange therefore and simultaneously narrowed the spreads greatly. An excellent unique consolidated purchase guide for every share displays, on a real time foundation, industry orders coming out of all over the national nation. Could make NSE a real national industry. It's elevated info effectiveness by simply enabling quicker usage of cost fine info in marketplace charges. High velocity of delivery of trades has enhanced functional effectiveness. It is able to easy for industry individuals to start to watch the entire sector, that created business much more sharp, resulting in elevated trader self-confidence. Since evaluation trail is completely ideal & disputes might be solved by logging the industry delivery process in its entire, most investors regardless of the financial standing of theirs or maybe actual physical place are assured for reasonable treatment.

Technology has converted the ground selection from the inventory marketplaces, they can't demand a trading flooring and also they'll could exchange coming out of the one region, program investors inside the national state. Before display primarily based trading was presents Local Stock Exchanges were definitely participating in a sizable part in the management centre marketplace as there have been neighborhood traders. Today all the switches have become set designed for internet trading according to the stipulations of SEBI.

2. EVOLUTION OF ONLINE TRADING:

On-line trading is getting extremely popular within the last year or perhaps two because of the ability of ease and use. Number of companies have eliminated online to fulfill up their customer's needs, enabling these to operate if they need and how they might like to. Trading may be the investing of products and services yet, in current context this identifies investing of economic services which includes securities, through NET.

3. TRADING:

Trading within dematerialized investments is quite like trading in actual physical securities. The main distinction might be the point that in sufficient time of settlement, rather than shipping in the actual physical type, it's usually completed through profiles transfer.

Trading in the stock market may be accomplished only through documented run member's of the stock market whether or perhaps not the securities will keep bodily kind of Demat type. DP's function is helping the settlement in demat type merely. Trading within dematerialized investments is currently sold at NSE(National share exchange), BSE(Bombay share exchange), DSE(Delhi share exchange), MSE(Madras share exchange), and ISE(Inter connectivity stock exchange). These types of switches have areas extraordinary for trading in an area along with dematerialized investments wherein industry could be attained perhaps in actual physical or maybe just demat type depending on the number of the supplying.

4. NATIONAL SECURITIES DEPOSITORIES LIMITED: (NSDL)

By November 1996 NSDL commenced its functions. Holding and managing of securities in the electronic form gets rid of issues that normally linked with physical certificates, like traumatisme loss in transportation, issue of negative delivery etc., This facilitates settlement periods Further. Number of users of NSDL depository product is raising steadily. It is actually the endeavor-to keep all modern-day and potential uses of NSDL depository system.

The investors of National Securities Depository Limited (NSDL) are Industrial Creation Bank of India (IDBI) Unit Trust of India (UTI), HDFC Bank, Krauts Bank Deena Traditional bank, Global Trust Traditional bank, Standard Chartered Traditional bank, Citibank NA and Hong Kong as well as Shanghai Banking Firm Limited

(HSBC). Every one of the shareholders of NSDL depository facilities.

TRADING NETWORK:
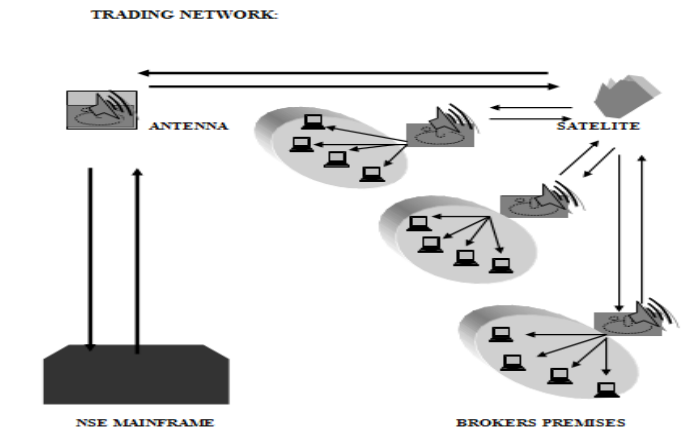
CENTRAL DEPOSITORY SERVICE LIMITED (CDSL):
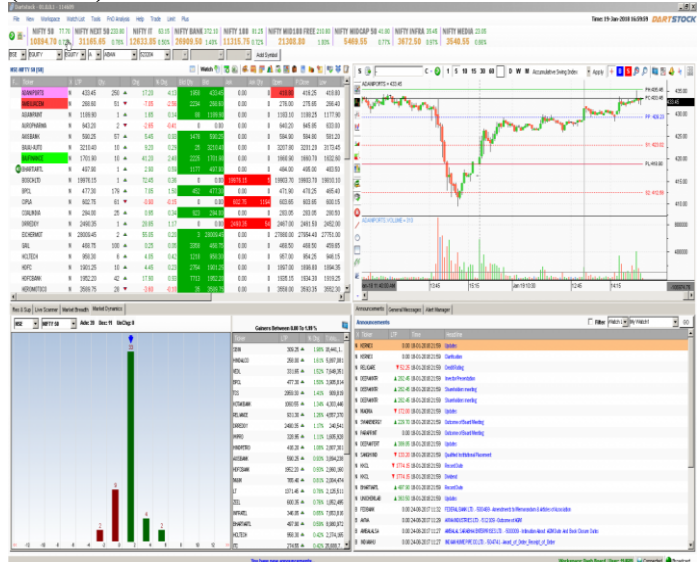
5. RESULT & DISCUSSION:

A depository facilitates holding of securities in the electronic form and allows securities ventures being processed by simply book entry by simply a Depository participant (DP), Who while a realtor with the depository, offers depository services to shareholders. According to SEBI guidelines, finance corporations, bank custodians, traders etc., meet the standards to carry out something as DPs. The investor having knows as Useful owner (BO). Need to open a DMAT account through virtually any DP for dematerialization of his coalition and transferring investments.

The balances in the investors consideration is recorded and maintained with CDSL can be bought through the DP. The DP is important supply the entrepreneur, at regular times, an argument of consideration, shows the facts of the securities possessing and transactions. The depository system features eliminated paper records, which are keen to be imitation, forged counterfeit

leading to bad shipping. CDSL, provides a great efficient and fast transfer of investments

Trading Strategy:
Overseas bullion finished with profits on Monday monitoring the weak point of the U.S. Dollar, nonetheless, rebound in the U.S. Equity markets capped profits. Marketplaces likewise awaited the U.S. presidential debates this week as investors refrained themselves from shooting big jobs.

Household yellow as well as bronze recovered on Monday, monitoring tight overseas rates. Household bullion might exchange lifeless on Tuesday monitoring the overseas rates.

On the Charts, MCX Gold October shrink has bounced back again of 49380 quantities and provided a good above 50000 amounts indicating several benefit thrust as much as 50200-50500 quantities. Assistance can hold during 49750 49500 amounts.

MCX Silver December might always exchange upside above 57000 quantities where rates have shut with over two % profits above 60000 amounts indicating several benefit thrust as much as 60900 63000 quantities. Assistance is during 59800 58700 amounts.

In season 1994, National STOCK EXCHANGE (NSE) had turn into, that brought an excellent ultimate ending on the wide open cut cry method of trading securities which was in direction 150year, and also launched Display Based. For the inventory market(s) 100s and a large selection of trading occur each day. Potential customers are on the big geographical are as an outcome of the difficulties concluding a swap by just paying dollars to investments as well as seller to customer rapidly in delivery of trades on individuals time frame in difficult. Consequently the listing switches enable trading to come about pertaining to a specified time, to produce as being a "Trading Cycle". An outstanding settlement volumes establishes every trading circuit. When trading time period above is, working day customer broker compensates cash or merchant broker supplies investments for any CC/CH more than a predefined. This process is thought while as pay in, investments get to the customers as well as the CC/CH provides income to proprietor agent. This particular sort of strategy is mentioned as as fee. It of payout as well as pay in is usually called settlement.

Week Initially the trading cycle was of only one particular, which was decreased to a minimum of one specific week. The undertakings moved into throughout this period of time phase, of a week or maybe 7 times as well as evenings, had been used to regularly be settled possibly by just transaction accessible or maybe purchase distribution of share certificates sent out on

informed many days and evenings a single fortnight or maybe seven times next expiry with the trading. The settlement agendas are made proven to the associates with the exchange in advance.The weekly pay out time period was substituted by day negotiations, popularly known as heading settlements, by that pretty much every morning is unique trading morning. Via December 2001 With impact, T+5, heading settlement cycle was created for each equities were' T' could be the' Trading Day' and even payout and pay in for the settlement was carried out on 5th functioning morning after transact morning. For instance, mon if T was, monday the pay in as well as payout were definitely performed on right after, as Sunday

6. CONCLUSION:

The NEAT (national exchange for computerized trading) or online trading system has lent considerable interesting depth on the market by enabling whole lot of members from coast to seacoast to trade together and so narrowed the spreads significantly. A great individual consolidated order book for each and every stock displays, over a genuine time basis, control orders from coast to seacoast. This makes the NSE real countrywide market. It has improved information efficiency by allowing faster incorporation of price sensitive information into value. High acceleration of execution of trades has exploded functional efficiency. You'll be able for market participations to begin to view the full market, which made the marketplace more transparent, resulting in increase investor self-confidence. Since audit path is totally perfect and disputes could be settled by signing the trade performance process in the entirety, all traders regardless of their financial standing or geographical location are assured for reasonable treatment.

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PERFORMANCE OF HEDGE FUNDS

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KEYWORDS: Performance of hedge funds.

ABSTRACT
Any aim perusal of this foundation of financial evolution of this grown and of those growing economies of this world renders you using inevitable belief that economic strategy generally and fiscal system particularly have played have been playing with a critical part in initiating and accelerating the development of the market (Jayanna S 1990).The financial system as an integral aspect of the financial system, oils the wheels of financial system very efficiently and economically. The main function of any fiscal strategy is to ease the allocation and installation of economic resources both spatially and temporally generally speaking (Merton Robert, 1995) and also to ease the transfer of capital out of excess impending units to shortage pending units specifically; that subsequently affects the economies, investment decisions, technological creation and long term growth prices.

1. INTRODUCTION:

In the present financial problem financing expenses are dropping and vacillations in the offered sector have positioned speculators in disarray. One thinks that its difficult to use choice on the venture. This is essential, on account of ventures are unsafe in nature and monetary experts have to consider various parts before placing methods into speculation highways. These components include hazard, go back, the unpredictability of liquidity as well as offers. The process goal of contrasting curiosity in frequent shop and value shares programs is breaking down the demonstration of shared assets with the benchmark of theirs and also contrasting them and values by making use of alpha, beta, return, and hazard as being a boundary. Genuine info had been taken for ascertaining hazard, beta, alpha and return.

The investigation is going to manage fresh speculators that have to put resources into typical supports plans in value giving info about precisely how to quantify the hazard as well as the return of particular shared market conspire. The investigation prescribes innovative monetary experts to choose shared assets instead of values as an outcome of the higher industry as well as hazard precariousness. The shared store is an endeavour that capacities as a financial centre individual among fiscal business as well as experts community. They begin asset planning, assignment of improvement as well as the property of financial markets in the economic system. The essential objective of the typical property is gathering the assets from the massive amount of speculators that for probably the most part delay to get into legally in the capital industry due to various limitations, for instance, absence of capability, adept info, adequate assets, accessibility of good time for study and research, so forth along these lines the present evaluation is an unassuming exertion to examine the demonstration of shared assets like a financial delegate in the common public. The examination has centred on three important perspectives. Within the very first place, delivery assessment of shared reserve according to financing perspective, dissecting the several hazards as well as a return while placing methods to financial store. Next, the business presentation assessment of the shared subsidize based on the speculators perspective that has contributed the cash of theirs to popular assets. The discernment of theirs, fulfilment, targets, inclination, conduct, demeaour, so forth with regard to popular assets are considered. 3rd angle is in touch with the presentation of shared property in placing to the management standards of theirs whether the typical assets are proceeding based on requirements or perhaps not.

2. GLOBAL SCENARIO:

The cash associated segment is in a process of fast change. Improvements are proceeding all around as a part of the common fundamental changes designed for enhancing the earnings as well as usefulness of the economic system in the greatly powerful world. The task of an incorporated money connected foundation is invigorating and do monetary development. The US twenty eight billion Indian monetary place has developed at around fifteen % and has

shown dependability throughout the prior rather some time, in any case, when various markets in the Asian place were confronting an urgent situation. This particular soundness has become throughout the power that the In-nation framework as well as the account organizations have worked through these years. The financial division has stayed up together with the growing requirements of different and corporate borrowers. Banks, capital market participants as well as

safety net providers have developed a broad scope of administrations and things to suit desires.
INDIAN SCENARIO

Financial SERVICE IN INDIA
In many recently available few years, India has risen as the just about the most rapidly developing economies on the earth. India is purchased with national such as Brazil, Russian federation, and China (BRIC Nations) that are putting off on the key drives of the world economic system in the following almost no years. Since the moment, India earlier paved the way for outside venture (FDI &FII) there continues to be a completed turnaround. Presently the traditional Hindu speed of improvement is something of past and timing eight % to nine % GDP advancement fee.

Whether or not we taking the example of on going world-wide downturn India has learned how you can function definitely better compared to various nations. Immediately from banking framework to financial regularities, the nation has blossomed with out execution as well as discipline. The blasting Indian economy brought about far reaching look as well as growth of new businesses; probably the most up marvel is in money type connected industry of India. Cash associated assistance in India has shot a monster jump from the points during the staying in the banks line for a couple of hours for opening an asset account or even trying to obtain several fixed outlets (FD) accomplished. The monetary administrations have expanded complicated and today individuals have the determination to choose essentially the most appropriately possesses all the required qualities.

3. INDIAN STOCK MARKET:
The India stock and place showcase is essentially isolated into two sections, to be certain the capital market as well as the currency advertise. The monetary exchange is a tremendous slice of the capital industry in the nation whereby one may finish the exchange of capital. It's typically completed through the techniques for direct financing using speculation and security. The speculation sector could also be sub partitioned into the optional and essential store.

P. T. Barnum, the nineteenth century artist as well as legislator, previously declared money is an amazing ace however an extraordinary hireling. He was simply rehashing what male had acknowledged a quite long period before him. Clearly, the wealthy had just started evaluating techniques making riches job for them. The existing cash connected administrations business, with the many things of its & administrations, is the result of this deep rooted consider.

The monetary administrations sector oversees cash for organizations as well as people. It provides such associations as business as well as venture banks, insurance agencies, speculative stock investments, Visa businesses, customer cash firms, bookkeeping offices, plus financier firms. The business' administrations are largely defined with banking as well as safety administrations, resource the professionals, remote trade, ventures, and bookkeeping.

Financial administrations structure the backbone of fiscal advancement and growth. They motivate the setting up of all the shapes and the improvement and sizes organizations of organizations. Business as well as enterprise made with the aid of the administrations empower people to gain as well as spare.

Cash associated administrations show the powerless classes from destitution and of having greater existences. To the wealthy, budgetary administrations provides chances to pull in money develop

Time	Monthly	ltp	profit	Yearly result	average	list
1 Week	06-Jul-20	10024.70	0.25%	-	1.48%	57/66
1 Month	12-Jun-20	10474.40	4.74%	-	5.99%	67/67
4 Month	14-Apr-20	11251.70	12.52%	-	16.44%	65/67
6 Month	14-Jan-20	8944.40	-10.56%	-	-11.28%	28/67
YTD	01-Jan-20	9042.60	-9.57%	-	-10.06%	44/67
1 Year	12-Jul-19	9914.40	-0.86%	-0.86%	-5.95%	17/65
2 Year	14-Jul-18	10028.50	0.29%	0.14%	-4.24%	14/62
4 Year	14-Jul-17	11874.40	18.74%	5.90%	-0.71%	2/54
5 Year	14-Jul-15	14285.40	42.85%	7.40%	5.12%	4/49
10 Year	14-Jul-10	48469.50	284.69%	14.42%	8.92%	1/29
Since Inception	29-Dec-09	44564.60	445.65%	15.24%	6.26%	10/64

RETURNS (NAV as on 10th July, 2020)

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Returns Calculator

SIP RETURNS (NAV as on 10th July, 2020)

Period Invested for	₹1000 SIP Started on	Investments	Latest Value	Absolute Returns	Annualised Returns
1 Year	12-Jul-19	12000	11827.6	-1.44 %	-2.68 %
2 Year	14-Jul-18	24000	24244.59	1.02 %	0.99 %
4 Year	14-Jul-17	46000	47441.55	4.98 %	2.56 %
5 Year	14-Jul-15	60000	71481.56	19.14 %	6.96 %
10 Year	14-Jul-10	120000	246850.92	105.71 %	14.84 %

COMPARE PERFORMANCE

Category	1 D	1 M	4 M	6 M	YTD	1 Y	2 Y	4 Y	5 Y
This Fund	-0.70 %	4.01 %	11.74 %	-11.18 %	-10.17 %	-1.54 %	-0.21 %	5.64 %	7.24 %
Nifty 50	0.42 %	8.42 %	20.11 %	-12.48 %	-11.22 %	-6.46 %	-0.98 %	2.98 %	5.01 %
Benchmark: S&P BSE 200 TRI	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
Category Average	0.02 %	7.05 %	17.44 %	-11.82 %	-10.05 %	-6.48 %	-4.89 %	-1.04 %	4.90 %
Category Rank	64/65	67/67	65/67	28/67	44/67	17/65	14/62	2/54	4/49
Best in Category	1.72 %	10.76 %	26.09 %	0.00 %	1.66 %	9.49 %	10.54 %	8.48 %	11.19 %
Worst in Category	-0.89 %	4.01 %	10.56 %	-24.49 %	-22.68 %	-20.94 %	-19.14 %	-14.94 %	-2.07 %
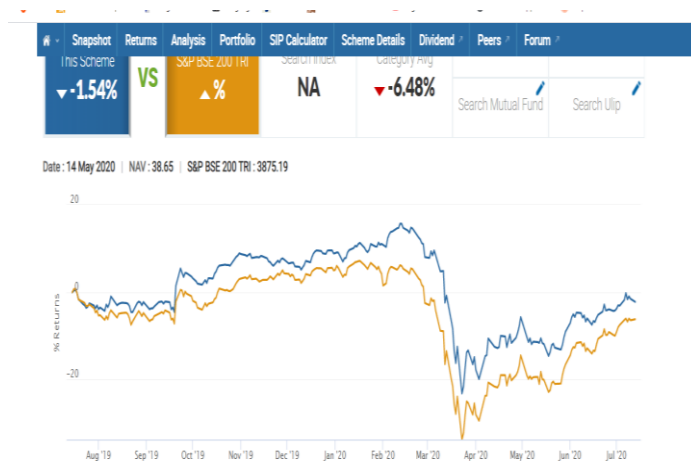
4. DISCUSSION:

Top 10 Sectors in October 2018	
Sector (Industry Allocation)	Portfolio (%)
Banking & Financial Services	19.64
Pharmaceuticals	16.42
Automotive	12.49
Tobacco	6.73
Utilities	6.43
Engineering & Capital Goods	5.09
Telecommunication	4.98
Information Technology	3.66
Oil & Gas	3.62
Cement & Construction	3.3
Miscellaneous	2.67
Source: www.moneycontrol.com	

The as of late presented expat standard Bill in Kuwait's National Legislative has triggered several conversation in India, particularly after a few of press accounts proposed that if the Bill was made law, it is going to get about 800,000 Indians to give up the little West Asian nation. The Bill is performing the rounds for a great deal of years at this particular time and keeping in the mind of yours that it's not sure what will function as the destiny of its, it is essential to realize

India-Kuwait ties have frequently got an important monetary and also exchange measurement. As of late it is also enhanced to incorporate culture, science, and innovation, common flight, and youth undertakings.

India has reliably been of most of the top exchanging accomplices of Kuwait. Kuwait is a great provider of unrefined crude oil to India. Throughout 2017 eighteen, Kuwait was the ninth biggest oil provider to India, which fulfillsaproximatelly 4.63 % of India's vitality should have. Reciprocal exchange with Kuwait during 2016 seventeen was $5.9 billion, and in 2017 eighteen it went up to $8.53 billion. Inside FY19 it produced by 2.7 % advancement to $8.76 billion: while Indian fares were $1.33 billion, imports have been $7.43 billion

5. CONCLUSIONS:

Typical assets are among the most profoundly building items in money connected administrations showcase. Shared property are affordable for a broad range of financial experts from hazard unfriendly to chance conveyor. Shared property have many choices of go back, hazard totally free go back, regular return, promote associated return, etc assets that are everyday are that's right for all time of speculators, pay individual, specialists, so forth. Monetary specialists need to not be master in worth advertise; shared assets are able to fulfill the need of theirs. Reserve supervisors are master about there and put assistance in a lot broadened portfolio, outstanding yield with typically risk-free is conceivable resort standard shop.

In this particular age and day, speculators are indicating a lot more trust in shared reserve compared to various other cash connected item. There's simply no demand of a monetary advisor, on the off chance that you've info that is excellent on shared assets and the kind of theirs to contribute. Widespread retailer is likely to showcase hazard, in spite of it's usually safeguarded than securities exchange. This's demonstrated in execution assessment location of this report. The economic experts are able to use Standard Deviation, Sharpe's and also Treynor's examination before selecting their portfolio.

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