EDITORIAL

The PARISHODHANA, an In-House Journal of Science and Technology, launched from Geethanjali Institute of Science & Technology, Nellore, aims at providing a forum to the research community for presentation of original work, reviews and discussion of latest developments in various fields of engineering. Research culture should form an integral part of an Engineering College and a Technical Journal with papers and articles exclusively contributed by the faculty members of the College will go a long way in inculcating the apt research culture in the institution. This In house Journal of Science and Technology, the first issue of which is being launched, is an attempt in this direction. The current volume contains research papers as well as perceptive articles by the staff and students of the college. The papers span a wide range including basic sciences and management science, apart from the engineering disciplines.

This Journal is a culmination of our efforts in adding a scientific and technological flavor to the services that are offered from GIST. The scenario of globalization had provoked the theme of quality and standard blended with high level of competence amongst the industrial sectors. The present day technological advancements are more rapid and recommend an amalgamated Engineering curriculum warranting students to equip with creative thoughts and multi level skills.

This Journal shall motivate the young minds to put forward their technical ideas in a lucid way and develop the art of publishing one's own technical findings. This issue is exclusively devoted for publishing the research/project works carried out experimentally, analytically or both in different fields of Science, Engineering and Technology. I wish the editorial Board for their strenuous efforts in making this issue blossom with contents. Indeed such efforts are never possible for us without the stupendous support of our noble and service minded Management members.

I hope all our readers would be enlightened through this issue, which shall knock the doors of numerous enthusiastic readers every year. I request all the teachers and students keep writing to us and send their valuable technical articles for publication.

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An Integrated Approach for Microwave Home Security System

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ABSTRACT

In modern society, the crimes occur frequently more high-tech, intelligent trend in recent years. People have to be more attentive in home security. This paper discusses the development of a low-cost microwave home security system to detect the motion of people accurately in the required premises. An alert is produced to warn persons that the space has been violated. The transmitter section which contains microwave sensor continuously transmits Microwave rays which are received by the receiver section. Microwave sensors utilize electromagnetic fields and devices internally. The microwave sensor works on the principle of Doppler Effect which will detect the change in frequency. The transmitted signal illuminates the quantity of interest, and the receiver detects the existence, distance and position of a target, which has better application than PIR, IR and other object detecting sensors. The output of PLL will be the difference between the locked frequency and the received frequency. Soon after the microwave signal is interrupted, the microcontroller the program burnt into the EPROM and control the alarm and serially sends a message in SBUF to the GSM module. The operation of whole system is controlled by user's mobile phone to turn ON and OFF the microwave sensor using the DTMF decoder circuit. This paper is implemented using the after-market parts and build an integrated home security system..

Keywords: microwave signal; sensor; memory; mobile phone; home security.

1 Introduction

Several microcontroller based home security systems are available in the market. Although different real time systems designed mainly to protect homes against theft when the house owners either in home or away, the microcontroller based home security system differs from them in multiple ways. Because of its versatile nature of the combination of different security techniques such as Microwave sensors and GSM module, it becomes more popular trend of home security system in particular. The system can be easily programmed, executed, monitored and control by the user and also have more beneficial effects on society. Its social impact will be very important, because people far away from their home can feel secure. Thus, it leads the consumers to be more deterministic towards their works. The Microcontroller Based Home Security System is a low-cost security system, and it is really easy to make a home secure.

2 System Overview

The existing home security systems were very expensive and ineffective and seem to be working on the principles of burglar alarms and ordinary car alarms. Thus adequate changes in the designing of home security systems are required. In the earlier security systems, if trip happens it caused a loud siren to sound. In order to monitor these systems the attendees have to be within hearing distance which is not possible always. Intruders quickly learned how to defeat these systems making the home security system essentially useless. The old home security systems were triggered by the release of a button fitted into a door or window frame [1]. Once the alarm was triggered the intruder could easily silence the alarm by closing the entry way used to enter the properties. So the security system is not good enough to protect the resident from the intruder. However in the present system, the home security system is more efficient and gives a lot of convenience to the homeowners. This system is silently alert the homeowner about the activities in the home [2]. Combining the advancement of the technology used to create and develop home security systems together with the Internet, the home security system will silently send signals of the intrusion to a call center run by the home security company or nearby police station. It will also send a message to the homeowner cell phone to alert if there is possible break in.

2.1 Comparison with Automation Home Security

System and Digital Home Security System Every security system has strength and weaknesses that can be observe such as accuracy, speed of execution, safety, usability and much more. For both examples, the purpose of this work is same where to produce home security systems that provide a lot benefit to consumers. In general, the commonly used automated systems for home security are audio components, HVAC, intercoms, lighting, natural lighting, security, video, and other systems [2]. There are advantages and disadvantages of home automation security

systems. The most obvious and important advantage is that a home automation security system will help to prevent break-ins at the home. Automation Home Security System gives convenience to consumers to access many devices within home remotely, or from a central location. Another advantage of automation home security system is the energy efficiency and saving which will help to manage the energy consumption. In addition, the system is low cost, less space required, high security and high speed. Meanwhile, the Digital Home Security System also has strength which the speed of the execution is high. The usability of the system is very practical where it can be used not only in the home environment but also in a business environment too. Besides, it can be highly customized to suit each one's need and preference.

3 Component Selection

3.1 Microwave Sensor

In addition to the microcontroller incorporating the microwave sensors, the system becomes a sophisticated home security system. The RF "magic" is combined with Q3 and D1. We know that Q3 is a free running microwave oscillator and it operates approximately around 1.0 GHz. The lead lengths which contains inductance of the associated oscillator components for determining the length of the etched strip line are used. An Omni-directional pattern from the antenna helps the microwave RF energy to be radiated. This radiated energy will fill the surrounding area with radio waves. These waves will be reflected back toward the antenna.

Now, the role of the Doppler Effect comes in to the scenario. If within that area there is an object that is moving, the waves that are reflected will either be higher in frequency if the object is moving closer or lower if moving away. The Motion detector doesn't really care which direction; it is only looking for a frequency difference [3]. The radiated signal and the redetected signal are mixed at diode D1. The difference in the two frequencies provides the input to U1:C pin 10. This frequency (the difference) is in the range of 10 Hz to 40 Hz. U1:C is the amplifier that feeds the sensitivity potentiometer R8[4]. Transistors Q1 and Q2 function as a very precise voltage regulator providing the proper bias to the amplifiers.U1:D functions as a band pass filter and amplifier. Buffer amplifier U1:A provides the drive to output transistor Q8.

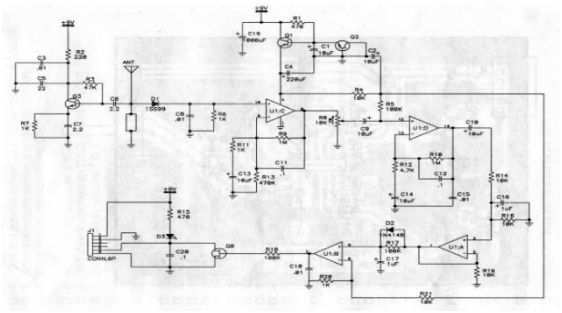


Fig. 1 2N3904 NPN transistor (Q1,Q2), 2SC2498 or 2570 NPN UHF transistor (Q3), BS170 FET transistor (Q8), LM-324 op-amp (U1)

3.2 PLL Circuit

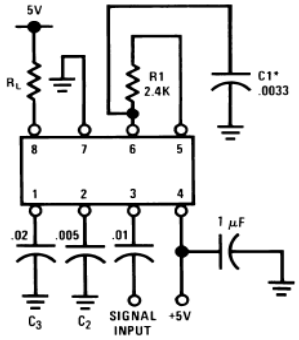


Fig. 2 PLL Circuit

The PLL circuit, which is shown in Fig.3 plays a major role in making the proposed system more effective in frequency synthesizing process. The microwave c systems where signal integrity is of first importance depends on PLL synthesizers. Thus, higher levels of frequency stability and accuracy with phase noise can be achieved optimum levels. Our aim of making the integrated microwave home security system can be designed. Further these PLL synthesizers can also be used in test and measurement, and microwave radios also.

The LM567 tone decoder is used in designing process to provide grounding of a saturated transistor switch during the process, if an input signal is present within the pass band. The circuit consists of an I and Q detector driven by a voltage controlled oscillator which determines the center frequency of the decoder. External components are used to independently set center frequency, bandwidth and output delay.

The standard equations for determining the center frequency of the tone decoder is equal to the free running frequency of the V_{CO} and bandwidth of the filter are expressed in equations (1) and (2) respectively.

$$fo = 1/(1.1\ R_1C_1) \qquad (1)$$

$$BW = 1070 \sqrt{\frac{Vi}{f_0 C_2}} \qquad (2)$$

in % of $f_0 f_0$

Where: Vi = Input voltage (volts rms), $Vi \leq 200mV$, C_2 = Capacitance at Pin 2 (μF)

3.3 GSM Module

The GSM module is used in the process to connect the system with the authorized person to detect the intruder's entry into the restricted area. GSM, a wireless modem works with a GSM wireless network for data transfer. We can use a PC card. External GSM modems are connected to PC through a serial cable or USB cable. Like the GSM phones, a GSM modem requires a SIM card from a wireless operator to enable it transfer data through the operator network. GSM modems are controlled by AT commands obviously.

With the help of these AT commands, the GSM modem can be used for read, write and delete operations effectively.. The Wavecom make of external GSM modem module was used in this system for SMS communication. It was interfaced to the microcontroller as shown in Fig.3.

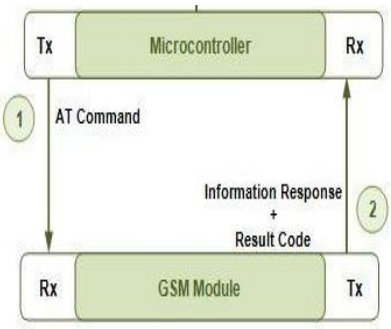


Fig. 3 GSM module

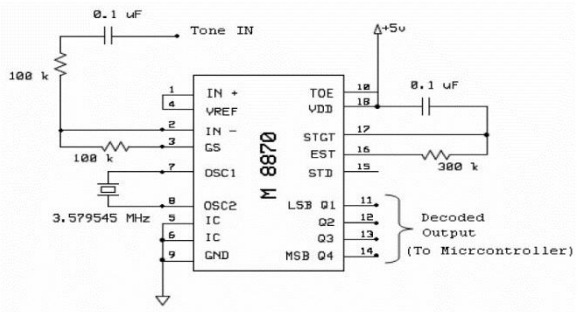
3.4 Microcontroller

For the purpose of designing a low cost, is a low-power, high-performance CMOS 8-bit microcomputer (The Atmel AT89C51) is considered. It is of 4K bytes of Flash programmable and erasable read only memory. It consists of 8- bit CPU with Flash on a monolithic chip. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional Nonvolatile memory programmer. We considered this AT89C51 microcontroller as it is a powerful microcomputer.

It provides a highly-flexible and cost-effective solution in our design. This microcontroller having additional features like compatibility with MCS-51™ Products, fully static operation with a range of 0 Hz to 24 MHz, 3-level Program Memory Lock and 128 x 8-bit Internal RAM. Due to these features, the real time characteristics are achieved for the design. The low power issues have been resolved with the salient features of the selected microcontroller like two 16-bit Timer/Counters and low-power Idle and Power-down Modes.

3.5 DTMF Decoder

The whole system is powered up and switched off by user's mobile phone. This uses the principle



of DTMF. The 8870 DTMF decoding chip identifies the tone given at its input and gives the decoded output in binary format at the output pins, using the process explained above.

Fig. 4 DTMF Decoder

The microcontroller is programmed to identify and energize the respective relay to activate the particular extension identified by the 8870 decoding chip. Detection of Dial tones are reflected on the bit TOE, while the output Q4, Q3, Q2, Q1 indicates the dial tone that is being detected on the telephony system.

4 Testing and verification

The results for our microwave wireless home security system were achieved two significant issues such as design and construction of two motion detectors. The basis for a Master/Slave network consists of a base station and a transceiver module.

Initially PLL is set to a constant center frequency of 90 kHz. When an object is detected by the sensor, the receiver receives the frequency shift which is given to the PLL circuit which in turn gives a high voltage of 3.5V. The output of PLL is given to microcontroller's port A. Upon receiving high voltage, microcontroller turns on Buzzer and sends message serially to the GSM module.

5 Conclusion

Finally, a low cost, auto-configurable and remotely controlled solution for security of homes has been introduced. The design approach

discussed in this paper is a novel technique and has achieved the target to control home security system. Another issue resolved is the remote SMS based system satisfying user needs and requirements. GSM technology capable solution has proved to be controlled remotely, provide home security and is cost-effective as compared to the existing systems.

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Optimal Design of Fused Chopper based Standalone Hybrid Wind Solar System

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Abstract

The target of this paper is to implement an economical chopper and electrical converter for the hybrid wind-solar system. Methods: a replacement topology of a mix of CUK and SEPIC convertor is used rather than a private DC/DC convertor. The motor load is provided by victimization the two diodes that connects each wind and solar energy singly or along depending on accessibility. With the improved management in DC/DC convertor and within the electrical converter that associated with the auxiliary circuit in accumulation by the closed-loop system PI controller a more robust control is achieved. Findings: The fused chopper replaced the separate solar and wind choppers and rather than typical electrical converter the novel pulse width modulated electrical converter used supplied with an correct pulse width modulation (PWM) control using 3 equal reference signals. The closed-loop system management is achieved with the digital PI controller and MPPT draws the maximum power from the solar that improves the response with the fast raise in load. The system is validated with MATLAB/Simulink and therefore the output voltage of fused chopper for various solar irradiance and wind speed are tabulated. The output voltage of electrical converter and therefore the motor characteristics are analyzed. Applications / Improvements: For standalone applications within the agriculture water pumping the requirement will satisfy with the hybrid wind solar system.

Keywords: Hybrid wind solar system, Fused chopper, Maximum power point tracking, CUK, Single Ended Primary Inductor (SEPIC).

1. Introduction

The hybrid solar-wind system finds its main application in agricultural, residential and remote areas where there is a lack or far from utility grids. When compared to individual renewable resource combination of two or more renewable resources has more merits. Whenever there is a lack of photovoltaic energy supplied to load, wind resource can be used to compensate the load. The output voltage supplied will be the sum of two voltages from separate energy resources as shown in figure1.The efficient utilization of the hybrid energy system depends on the selection of suitable converters. To improve reliability and make it a more economical, DC-DC converters are used between the hybrid energy system and inverter which drains the maximum energy from the wind and solar that feeds the DC link capacitor which acts as an input to the inverter as shown in figure 2. A number of hybrid wind, solar systems employ individual DC-DC buck and boost converter along with the maximum power point tracking (MPPT) control for separate renewable energy resources has been proposed [1,2,3,4,5].

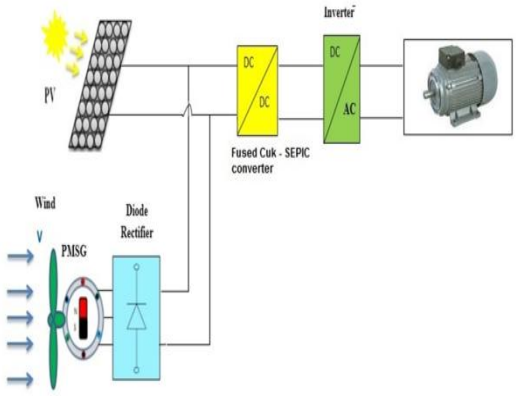

Figure1. Basic block diagram without controller

A number of alterations and control approaches have been developed to eliminate the complexity with the available familiar topologies such as diode clamped[6,7], capacitor clamped[8,9] and cascaded H-bridge inverter[10,11]. The proposed topology minimize the harmonics and improves the output sinusoidal waveform. The single phase inverter generates the PWM signal required for switches by replacing the single reference signal with three reference signals and exception of counteracting equal to the carrier signal[12,13] as shown in figure 3 and the output voltage of the inverter is connected to the single phase induction motor [14].

2. Hybrid converter

The output of the CUK converter is negative with the respect to the positive input and SEPIC converter output is positive to the output terminal. The combined CUK and SEPIC converter used in the hybrid wind, solar system extracts the maximum energy required to compensate the loa d variations with the help of proper utilization or sharing of the two diodes in the each converter by periodic ON and OFF[15].

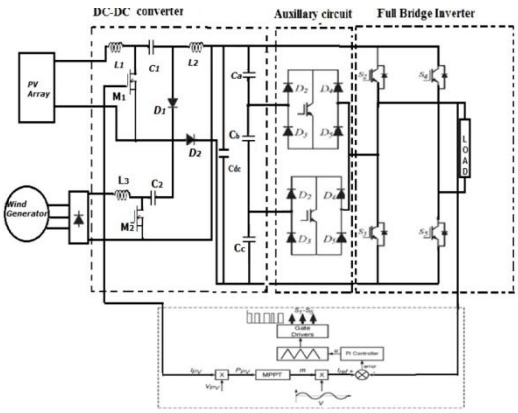

Figure 2. Proposed hybrid system

When the load has to be operated only with the available solar energy then diode D1 turns ON and when there is absence of solar, the other source wind has to be utilized and diode D2 turns ON is making the diode D1 OFF and the total DC input of the inverter will be the addition of output of two converters supplied by the solar and wind[16,17]. The CUK and SEPIC converter have significant importance in reducing high inrush of current and electromagnetic interference are proposed in [18,19,20].

3. Inverter

The proposed single-phase seven-level inverter topology generates the seven levels of voltages V_{pv}, $V_{pv/3}$, $2V_{pv/3}$, 0, - $V_{pv/3}$, $-2V_{pv/3}$, $-V_{pv}$ proposed in [21,22].

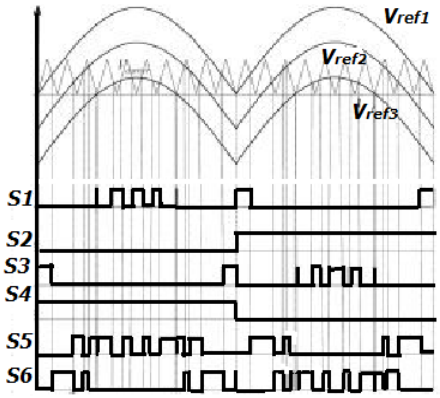

Figure 3.Switching pattern of the Inverter.

The pulses are generated with the comparison of three reference signals having the same frequency and amplitude namely V_{ref1}, V_{ref2}, and V_{ref3} with the single carrier signal (Vcarrier). If $_{Vref1}$ go beyond peak of Vcarrier, V_{ref2} and Vcarrier are compared until V_{ref2} reaches the peak value of the carrier. Then the comparison between V_{ref3} and Carrier was done until V_{ref3} attains zero. Now V_{ref2} and Vcarrier were compared till V_{ref2} attains zero[22,23,24]. The switching pattern for the seven- level inverter is shown in Figure.3.

4. MPPT and Control

The 'maximum power point' is the maximum voltage that solar module can generate. To extract the maximum power from the solar modules MPPT algorithm is implemented which is analog or digital technique that permits the solar cells to function irrespective of solar irradiance, ambient temperature or climatic conditions. MPPT controllers are included along with the solar power conditioning system to extract the maximum power from the solar module that can exploit the required DC voltage are prorposed in [25,26].The controlling of power withdrawn from the solar module according to the load demand is done by the PI controller looks up the tracking of instant error between the reference and actual value[27,28]. The error signal produces the reference signals V_{ref1}, V_{ref2} and V_{ref3} compared with the carrier signal to generate the PWM signals for the inverter [21-24,26.]

5. Simulation Results

The MATLAB/ Simulink model of hybrid system consists of two renewable energy sources which are wind and solar. These outputs connect to the fused CUK and SEPIC converter which feeds the inverter and its output voltage drives the single phase Induction motor shown in Figure 4.

The output voltage of the motor given as input to the PI controller that generates the gate pulses of the inverter and MPPT controller tracks the maximum power by controlling switch in a CUK converter as shown in Figure 5.

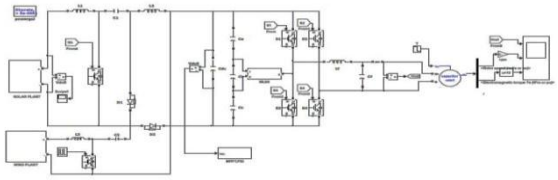

Figure 4. MATLAB/ Simulink model of hybrid system.

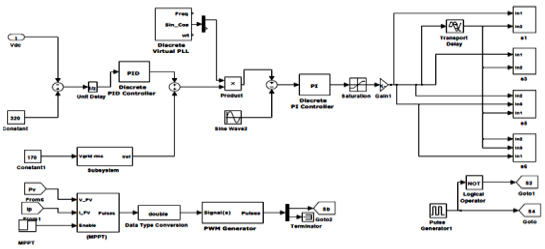

Figure 5. MPPT and PI control

The auxiliary circuit provided with the switches S5 and S6 is shown in Figure 6 and the wind generator model is shown in Figure 7

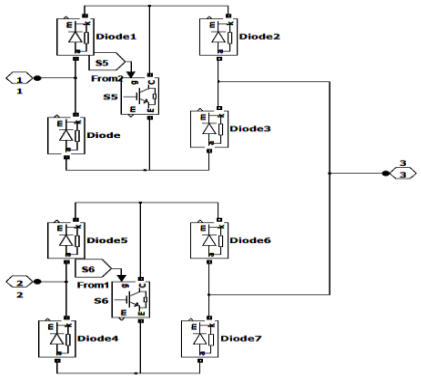

Figure 6. Auxiliary circuit

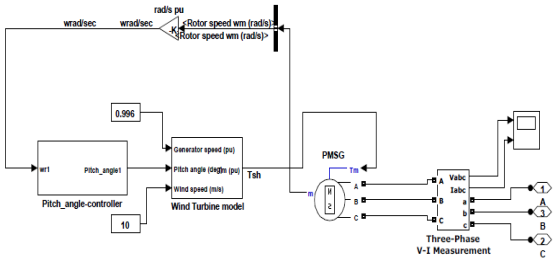

Figure 7. Wind generator

The propoed system's solar model with irradiance 75w/m^2 is shown in *Figure. 8*

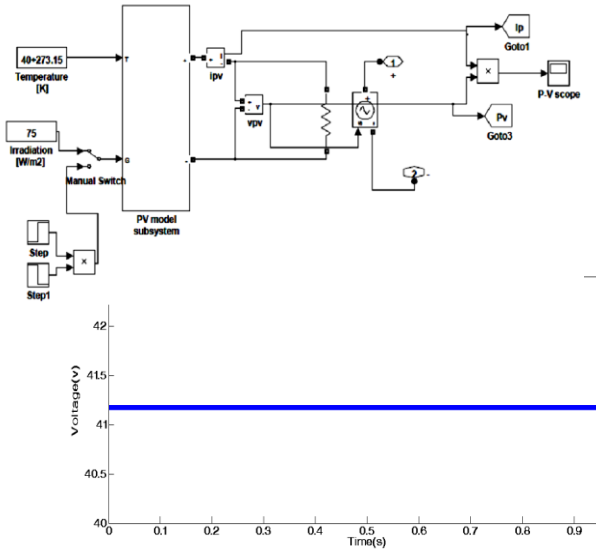

Figure 9. Solar output voltage

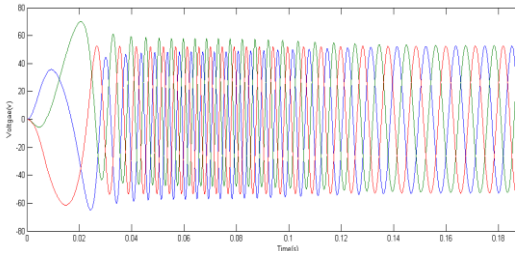

Figure 10. Wind system output voltage

The gate pulses to the switches S_1,S_2,S_3,S_4,S_5,S_6 of the inverter are shown in *Figure.11* and *Figure.12* respectively

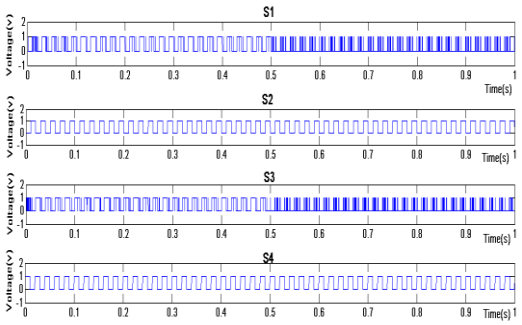

Figure 11. Gate Pulses of switches S1, S2, S3, S4.

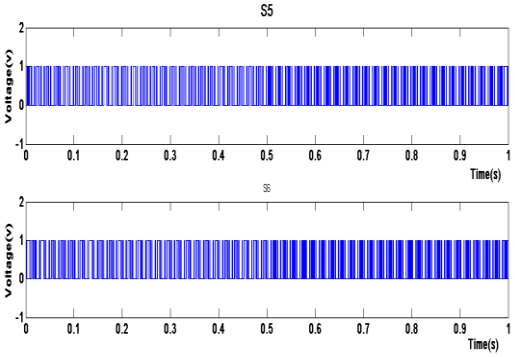

Figure 12. Gate Pulses of switches S5andS6

The inverter gives an output voltage of 300V. This input is fed to the single phase induction motor .The input voltage of the induction motor is shown in Figure 13.The motor gives a fast response to the rated speed of the motor . The speed and torque are shown in Figure.14 and Figure.15 respectively.

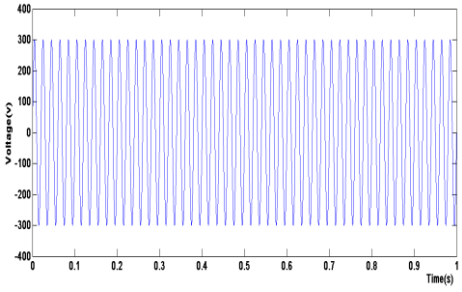

Figure 13.Output voltage from the inverter.

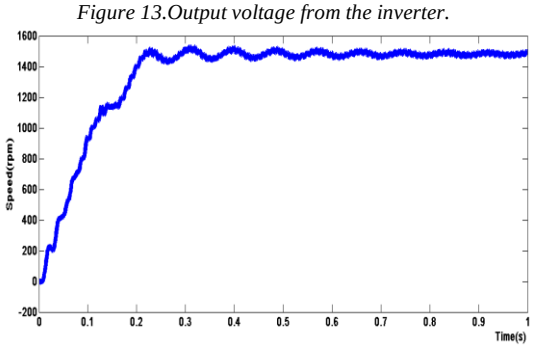

Figure 14. Speed of the motor.

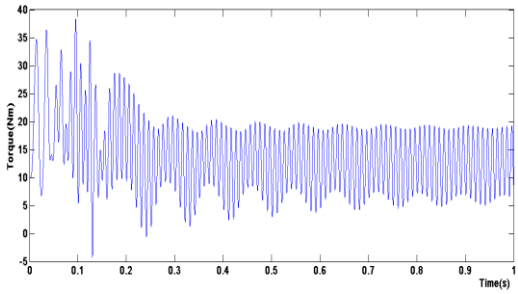

Figure 15. Torque of the motor achieved with closed loop Control

5.1 Design Parameters

The design parameters of fused CUK and SEPIC converter connected to Induction motor shown in Table 1. The output voltage of solar and wind from the hybrid wind solar system shown in Table 2.

Table 1. Design Parameters

Parameters	Symbols	Values
Inductance	L_1,L_2,L_3	2mH
Inductance	C_1,C_{dc}	1000µf
Capacitance	C_b	1000µf
Capacitance	C_a , C_c	3mf
Filter Inductance	L_f	15mH
Filter Capacitance	C_f	1005 µf
Switching Frequency	f_s	10 KHZ
Switches	S1, S2,S3, S4, S5,S6	IGBT
Diodes	D_1,D_2	0.001Ω
Rating of Induction motor	Single phase Asynchron ous Machine	0.5HP,300V,50HZ, Single phase capacitor start motor

Table 2. Output voltage from Hybrid System

Solar Plant		Wind Plant		Voltage across the DC link Capacitor(V_{dc})
Solar irradiance (w/m^2)	Output voltage (v)	Wind velocity(m/s)	Output voltage (v)	
75	41.43	10	40	80.72
100	58.30	12	50	98.30
110	69.2	15	60	120

6. Conclusion

This combined chopper based new topologies offer permanent power generation possible to meet the load demand by making available the two energy sources to supply the load either individually or simultaneously. The proposed combined converter improves the efficiency of the hybrid system by supporting wide ranges of solar and wind input, increases the conversion efficiency using Maximum Power Point Tracking, eliminates the need of additional input filters to filter out the high frequency harmonics, lower input current distortion and conduction losses.

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A Security Approach in System Development Life Cycle

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ABSTRACT

Many software organizations today are confronted with challenge of building secure software systems. Traditional software engineering principles place little emphasis on security. These principles tend to tread security as one of a long list of quality factors that are expected from all professionally developed software. As software systems of today have a wide reach, security has become a more important factor than ever in the history of software engineering can no longer be treated as Separate Island. There is an imperative necessity to incorporative security into software engineering. Incorporating security into software engineering necessitates modification of existing software engineering principles, as these have to be tailored to take into account the security aspect. All phases of software engineering are likely to be impacted. In this paper we tried a novel security mechanism in system development life cycle.

Keyword: Security, Design Phase, SDLC.

1. INTRODUCTION

In the software industry that requirements engineering is critical to the success of any major development project. Security requirements are identified during the system development lifecycle. However, the requirements tend to be general mechanisms such as password protection, spam and Phishing detection tools. Often the security requirements are developed independently of the rest of the requirements engineering activity, and hence are not integrated into the mainstream of the requirements activities. As a result, security requirements that are specific to the system and that provide for protection of essential services and assets are often neglected. The requirements elicitation and analysis that is needed to get a better set of security requirements seldom takes place.

Users may not have aware of the security risks, risks to the mission and vulnerabilities associated with their system. To define requirements, systems engineers may, in conjunction with users, perform a top-down and bottom- up analysis of possible security failures that could cause risk to the organization as well as define requirements to address vulnerabilities. Fault tree analysis for security is a top-down approach to identifying vulnerabilities. In a fault tree, the attacker's goal is placed at the top of the tree.

Then, the analyst documents possible alternatives for achieving that attacker goal. For each alternative, the analyst may recursively add precursor alternatives for achieving the sub goals that compose the main attacker goal. This process is repeated for each attacker goal. By examining the lowest level nodes of the resulting attack tree, the analyst can then identify all possible techniques for violating the system's security preventions for these techniques could then be specified as security requirements for the system.

Failure Modes and Effects Analysis is a bottom-up approach for analyzing possible security failures. The consequences of a simultaneous failure of all existing or planned security protection mechanisms are documented, and the impact of each failure on the system's mission and stakeholders is traced. Other techniques for developing system security requirements include threat modeling and misuse and abuse cases. Requirements may also be derived from system security policy models and system security targets that describe the system have required protection mechanisms.

The SQUARE process involves the interaction of a team of requirements engineers and the stakeholders of project. The requirements engineering team can be thought of as external consultants, though often the team is composed of one or more internal developers of the project. When SQUARE is applied, the user should expect to have identified, documented, and inspected relevant security requirements for the system or software that is being developed. SQUARE may be more suited to a system under development or one undergoing major modification than one that has already been fielded, although it has been used

both ways. Software life-cycle models describe phases of the software cycle and the order of execution of those phases. Many models are being adopted by software companies, but most of them have similar patterns. Typically each phase produces deliverables required by the next phase in the life cycle. Requirements are translated into design. Code is produced during the implementation phase and is driven by the design. Code is finally tested against requirements to ensure quality. In this paper we were implemented some security principles in Waterfall method.

2. PROPOSED METHOD

The Waterfall Model is the old method of structured system development. It's the base for all models although it has come under attack in recent years for being too rigid and unrealistic when it comes to quickly meeting customer's needs and development, the Waterfall Model is still widely used because of easy model for developers. It is attributed with providing the theoretical basis for other Process Models, because it most closely resembles a generic model for software development

The Procedure of Waterfall Model for software development:

- System Requirements:

System Requirement refers to the consideration of all aspects of the targeted business function or process, with the goals of determining how each of those aspects relates with one another, and which aspects will be incorporated into the system. What is the essential thing needed in developing system.

- System Analysis:

This step refers to the gathering of system requirements, with the goal of determining how these requirements will be accommodated in the system. Extensive communication between the customer and the developer is essential. Developer has to understand the exact requirement of user.

- System Design:

Once the requirements have been collected and analyzed, it is necessary to identify in detail how the system will be constructed to perform necessary tasks. More specifically, the System Design phase is focused on the data requirements, the software construction and the interface construction.

- Coding:

Allies name is programming, this step involves the creation of the system software. Requirements and systems specifications from the System Design step are translated into machine readable computer code.

- Testing

As the software is created and added to the developing system, testing is performed to ensure that it is working correctly and efficiently. This is the very big problem in system development in this paper we provide some security methods to enhance the water fall model.

Security in Design Phase:

In every phase we have to include the security enhancement. Even though it's very essential for every phase depth security features needed from the design phase onwards. In requirement gathering phase information fetching mostly happen between user and developer due to that need of security level will be less. Apart from the user collecting information should be trust worthy as well as valid information should be taken for the system development. In analysis phase, the information's what we obtain from the requirement phase that will give to the analysis phase. Collected information will be analysis used some valid documents materials, white papers, existing methods, etc.

Information grouped into the structure form from the unstructured form. In the analysis phase itself we have to estimate what kind of security requirements need for our system. Security elements and features should be included in every aspect of the system like user, data, module, design, testing, etc. Developers need to know secure software design principles and how they are employed in the design of resilient and trustworthy systems. Two essential concepts of design include abstraction and decomposition of the system using the architecture and constraints to achieve the security requirements obtained during the requirements phase. Most of the readers are probably familiar with these concepts.

Abstraction is a process for reducing the complexity of a system by removing unnecessary details and isolating the most important elements to make the design more manageable. Decomposition is the process of describing the generalizations that compose an abstraction. One method, top-down decomposition, involves breaking down a large system into smaller parts. For object-oriented designs, the progression would be application, module, class, and method. Other secure software design principles are detailed in a multitude of books, white papers, web portals, and articles. In this paper we are providing some techniques to improve the SDLC.

First thing is minimize the no of high consequence targets. Minimizes the number of actors in the system granted high levels of privilege, and the amount of time any actor holds onto its privileges. Ensures that no single entity should have all the privileges required to modify, delete, or destroy the system, components and resources. Separation of domains makes separation of roles and privileges easier to implement.

DON'T EXPOSE VULNERABLE OR HIGH-CONSEQUENCE COMPONENTS:

- Keep program data, executables, and configuration data separated. .Reduces the likely hood that an attacker who gains access to program data will easily locate and gain access to program executables or control/configuration data.
- Segregate trusted entities from un trusted entities**,** Reduces the exposure of the software's high- consequence functions from its high-risk functions, which can be susceptible to attacks.
- Assume environment data is not trustworthy, reduces the exposure of the software to potentially malicious execution environment components or attacker- intercepted and modified environment data.
- Use only safe interfaces to environment resources; this practice reduces the exposure of the data passed between the software and its environment.
- Minimize the number of entry and exit points; this practice reduces the attack surface.

DENY ATTACKERS THE MEANS TO COMPROMISE

- Simplify the design; this practice minimizes the number of attacker-exploitable vulnerabilities and weaknesses in the system.
- Hold all actors accountable, this practice ensures that all attacker actions are observed and recorded, contributing to the ability to recognize and isolate/block the source of attack patterns.
- Avoid timing, synchronization, and sequencing issues, this practice reduces the likelihood of race conditions, order dependencies, synchronization problems, and deadlocks.
- Make secure states easy to enter and vulnerable states difficult to enter, this practice reduces the likelihood that the software will be allowed to inadvertently enter a vulnerable state.
- Design for controllability, this practice makes it easier to detect attack paths, and disengage the software from its interactions with attackers.
- Design for secure failure, Reduces the likelihood that a failure in the software will leave it vulnerable to attack.

In large distributed systems, scale-up problems related to security are not linear because there may be a large change in complexity. A systems engineer may not have total control or awareness over all systems that make up a distributed system. This is particularly true when dealing with concurrency, fault tolerance, and recovery. Problems in these areas are magnified when dealing with large distributed systems. Controlling the concurrency of processes presents a security issue in the form of potential for denial of service by an attacker who intentionally exploits the system's concurrency problems to interfere with or lock up processes that run on behalf of other principals. Concurrency design issues may exist at any level of the system, from hardware to application. Some examples of and best practices for dealing with specific concurrency problems, includes following.

- **Processes Using Old Data:** Propagating security state changes is a way to address this problem.
- **Conflicting Resource Updates**: Locking to prevent inconsistent updates is a way to address this.

Order of Update in Transaction-Oriented Systems and Databases: Order of arrival and update needs to be considered in transaction- oriented system designs. System Deadlock, in which concurrent processes or systems are waiting for each other to act this, is a complex issue, especially in dealing with lock hierarchies across multiple systems. However, note that there are four necessary conditions, known as the Coffman conditions.
In above passage we provided some of security enhancement in design phase in future work we will consider the throughout the development life cycle.

Conclusion :

In this paper we started our initiation process of our research and we gave some suggestion to enhance the security mechanism to improve the system development life cycle. In our forthcoming papers we will give security principles throughout the lifecycle. It's our faith it will give better result than

the ordinary development life cycle models. Compare with SQUARE and CLASP methods this one is different in functionalities.

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Analysis of IA and PSO Algorithms for Siting and sizing of DG in Primary Distribution Networks

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Abstract- In Power Systems, Distributed Generation (DG) has been developing quickly because of their prospective solutions for power quality issues, similar to the deregulation in power system, to take care of the shortage of transmission capabilities and power demand. Inappropriate placement of DG sources in power system would not just prompt to increase power or energy losses but it also collapses voltage profile of the system. The ideal location of DG is needed for improving reliability and stability of a power system. This paper investigates the difficulty of distributed generator location to obtain an unnecessary loss reduction and enhancement of voltage profile in distribution networks. A stepped Improved Analytical (IA) technique and Particle Swarm Optimization (PSO) strategies proposed in this paper. Improved analytical (IA) method [1] is based on IA expressions to calculate the highest capacity of DG unit and a technique to perceive the pleasant place for DG allocation. The other task on this work a multi objective formula is proposed for premiere location and sizing of the DG is optimized the use of Particle Swarm Optimization (PSO). The proposed concepts validated the usage of an IEEE 33 bus network and the consequences display the suitability of the proposed strategies in decreasing the losses and enhancing the voltage profile of the network. A few thrilling outcomes are also mentioned on this paper.

Keywords – Analytical expression, loss reduction, improved analytical (IA), Distributed Generation (DG), optimal location and size and IEEE 33 Bus system

I. Introduction

Global temperature gradually increases with the continuous exhaustion of fossil energy, and the restriction of existing transmission network capability causes rapid development of Distributed Generators (DGs) [2]. Distributed generation (DG) is associated with the use of small generating unit mounted at planned point of electrical power device or places of load centre's [3].

Distributed generation is an electric powered power source linked immediately to the distribution system or on the purchaser location of the meter [4]. DG technology consists of diesel engines, wind generators, solar cells and fuel cells. Despite their small length, DG technologies are having a more potent effect in energy markets. In some markets, DGs are certainly changing the greater highly-priced grid electricity. DG can meet all or part of a patron's energy wishes. The principle motives for the increasingly full-size use of DG are it may be more economic than running a transmission lines to remote locations [5], it gives require power, with the effectiveness giving back up and supplemental power, it can give support control amid effectiveness system blackouts. DG units must be located in suitable areas with proper capacities to realize system advantage. It is observable that any loss reduction is important to distribution utilities, those are for the maximum part the substance successful to maintain losses at minimum. Losses diminishment is, in this manner, the most significant calculate to be regarded because the locating and function of DG [6], [7].

As an instance, multi target index for execution algorithm of distribution network for single DG size and location has been planned [6] in an radial feeder, contingent upon the innovation, DG units can deliver a section of the total active and moreover reactive power to loads in order that the feeder current diminishes from the supply to the place of DG systems.

Be that as it is able to, thinks about [8]–[10] have proven that if DG systems are disgracefully scattered and expected, the reverse power flows from the capacity DG can stimulate to better active and reactive power loss. A technique for DG placement utilizing "2/3 rule" that's typically related to capacitor description in distribution system with consistently distributed Here

a = (sign) tan ($\cos^{-1}(PF_{DG})$

sign = +1 Injecting reactive power by DG

$$X_i = \sum_{\substack{j=1 \\ j \neq i}}^{n} (\alpha_{ij} P_j - \beta_{ij} Q_j) \quad and \quad Y_i = \sum_{\substack{j=1 \\ j \neq i}}^{n} (\alpha_{ij} Q_j + \beta_{ij} P)$$

the ideal size of DG for every bus i, can be given by formerly mentioned conditions , for the loss to be least. Any size of DG apart from P_{DGi} positioned at bus i can activate to a higher loss.

Case 2 DG (i.e., 0 < PFDG < 1) is able up for infusing active power however eating reactive power (sign = −1). Like kinds 1 DG, the appropriate size of sort 2 DG at every bus i for the bottom loss is given by means of (2) and (3). Simple Distribution system with single DG [1] is shown in Figure 1.

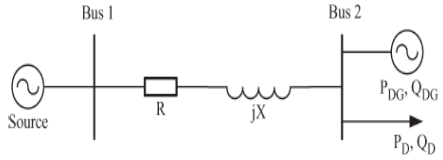

Figure 1. *Simple distribution system with single DG.*

Case 3 DG (i.e., PFDG = 1, a = 0) is in a position of infusing actual electricity best. The proper size of DG at every bus i for the least amount loss [1] am given by decreased (4)

$$P_{DGi} = P_{Di} - \frac{1}{\alpha_{ii}} \sum_{\substack{j=1 \\ j \neq i}}^{n} (\alpha_{ij} P_j - \beta_{ij} Q_j) \quad (4)$$

Case 4 DG (i.e., PFDG = 0, a = ∞) is in a position of sending reactive electricity handiest. The best length of DG at every bus i for the least quantity loss [1] am given through reduced (5)

$$Q_{DGi} = Q_{Di} - \frac{1}{\alpha_{ii}} \sum_{\substack{j=1 \\ j \neq i}}^{n} (\alpha_{ij} Q_j + \beta_{ij} P_j) \quad (5)$$

2.1 Particle Swarm Optimization

The major intention of this formulation is to make sure ideal placement and estimation of capacity of DG units while allowing for multiple intention of decrease in active power loss, reactive power loss and improving the voltage profile. These multiple intentions are collective through weights to generate a liner equation which is representative of all the intentions.

In this proposal the primary limits considered as

1) Power loss when DG introduced in network ≤ Power loss before DG introduced in network
2) Voltage limits are $V_{BUS\ MIN} \leq V_{BUS} \leq V_{BUS\ MAX}$

The multi objective function is given as

$$Max\ (F) = W1\{\max[0, \frac{1}{n}\sum_{i=1}^{n}(Voltage\ \%_{i\ with\ DG} - Voltage\ \%_{i\ without\ DG})]\} + W2\{\max[0, \frac{1}{n}\sum_{i=1}^{n}(P_{j\ with\ DG} - P_{j\ without\ DG})]\} + W3\{\max[0, \frac{1}{n}\sum_{i=1}^{n}(Q_{j\ with\ DG} - Q_{j\ without\ DG})]\} \quad (6)$$

In the above expression,

$Voltage\ \%_{i\ with\ DG}$: voltage percentage in i_{th} bus with DG unit

$Voltage\ \%_{i\ without\ DG}$: voltage percentage in i_{th} bus without DG unit

$P_{j\ with\ DG}$: Active Power Losses in j_{th} branch $P_{j\ with\ DG}$: Active Power Losses in j_{th} branch with DG unit

$P_{j\ without\ DG}$: Active Power Losses in j_{th} branch without DG unit

$Q_{j\ with\ DG}$: Reactive Power Losses in j_{th} branch with DG unit

$Q_{j\ without\ DG}$: Reactive Power Losses in j_{th} branch without DG unit

n : Number of Buses for given network

m: Number of Branches for given network

w_1, w_2 and w_3 are weights in this suggestion they are theoretical to be equal. Right here $w_1 + w_2 + w_3 = 1$

PSO is a populace of particles is in the beginning randomly produced. In PSO, answer for each optimization problem is measured as a bird in the identifying space and it is called "particle". Each particle having its own fitness value which is determined by multi objective functions (6) and it has also a velocity which verifies its objective and distance. All particles investigate in the solution space for their ideal positions and the positions of the ideal particles in the swarm. Initially PSO configures a set of arbitrary particles and then through repeated investigating finds the ideal solution. In each iteration the ideal position recognized with a particle is called p_{best} ; correspondingly the ideal position recognized with the entire swarm is called g_{best}. For each particle, the velocity and its position are restructured. every particle renews its position based upon its own ideal position, global ideal position along with particles and its earlier velocity vector according to the subsequent equations:

$$v_i^{k+1} = w \times v_i^k + c_1 \times r_1 (p_{best_i} - x_i^k) + c_2 \times r_2 \times (g_{best_i} - x_i^k) \quad (7)$$

$$x_i^{k+1} = x_i^k + \chi \times v_i^{k+1} \quad (8)$$

Where,

v_i^{k+1} : *i^{th} Particle Velocity at $(k+1)^{th}$ iteration*

w : *Inertia weight of a Particle*

v_i^k : *i^{th} Particle Velocity at k^{th} iteration*

c_1, c_2 : Positive constants having values between [0, 2.5]

r_1, r_2 : Randomly generated numbers between [0, 1]

p_{best_i} : *The best position of the i^{th} particle obtained based upon its own knowledge*

g_{best}: Global best position of the particle in the population

x_i^{k+1} : *i^{th} Particle position at $(k+1)^{th}$ iteration*

x_i^k : *i^{th} Particle position at k^{th} iteration*

χ : Constriction factor. It may assist insure convergence.

III. Test System Depiction, Re-enactment Results and Examination

The test system design of the network is having a solitary supply point with 33-buses, 3 laterals, 37 branches, 5 loops or tie switches which are saved frequently open and is shut just amid problem situation to keep up congruity of deliver or may be close to change circuit imperviousness to lower losses. The overall active and reactive power for test

system is 3715 kW, 2300 kvar with a total real power loss of 202.6 kW. The upper voltage limit is 1.05 p.u and lower voltage limit is 0.9 p.u. The single line diagram of test system is shown in Figure 2. Newtons-Raphson algorithm is used for power flow calculations. For simulation load model designed with a uniform power and primary bus voltage at 1.0 p.u.

Based totally at the proposed technique, an analytical software device has been developed in Matlab surroundings to run the power flow, calculate electricity losses, and become aware of the superior size and area of DG unit. The iteration settings for PSO contain 50 maximum numbers of iterations, with acceleration constant of 2 and 2.5 and highest and lowest inertia weights at 1 and 0.2 respectively. The highest and lowest velocity of particles is preset at 0.003 and -0.003 correspondingly. The simulations are carried out in a computer system having i5 processor cloaking a speed of 2.5 GHz with a RAM of 4GB.

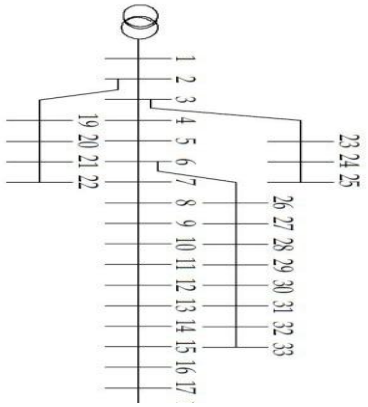

Figure 2. *Line diagram of IEEE 33 Bus distribution system*

TABLE I: DG Placement by Various Techniques For 33-Bus System

Case	Technique	installed DG Size	Location	P_{loss}	Loss Reduction	Time (s)
No DG		----	-----	202.677 kW	0.00	0.02
with DG	IA Method	2560.2300kW	6	110.1537 kW	47.9548	10.29
	PSO	1857.5kw	7	92.4365 kW	45.60913	6.75

The results of measuring capacity and location are illustrated in the TABLE I. It may be observed from the IA method identifies suitable area for placing DG of length 2560.23kw at bus number 6 and there is greater decrement in losses. It is able to be discovered from TABLE I, at the same time as placement of DG of capacity 2560.23kw reduces the actual energy loss of 110.1537 kW

TABLE II : Bus voltage magnitudes of 33-Bus system

BUS Number	Voltage (PU)	
	IA Method	PSO Method
1	1	1
2	0.999018	0.99814
3	0.995566	0.989975
4	0.995977	0.986885
5	0.996818	0.984066
6	0.99618	0.975559
7	0.992466	0.972171
8	0.987695	0.967462
9	0.981243	0.96137
10	0.975222	0.95572
11	0.97436	0.954884
12	0.97285	0.953427
13	0.966276	0.947488
14	0.963653	0.945286
15	0.961964	0.943914
16	0.960377	0.942585
17	0.957995	0.940616
18	0.957416	0.940027
19	0.998491	0.997612
20	0.99492	0.994038
21	0.994217	0.993335
22	0.993581	0.992698
23	0.992027	0.986415
24	0.985442	0.979792
25	0.982161	0.976492
26	0.995356	0.976033
27	0.994334	0.976834
28	0.98877	0.978
29	0.985011	0.97944
30	0.984178	0.981961
31	0.985087	0.989294
32	0.985761	0.99203
33	0.987175	0.995719

The position of DG additionally brings approximately development in voltage profile of the device. The bus voltage magnitudes of 33-bus device after placement of DG are illustrated in the TABLE II The plot of voltage profiles for various buses after the position of DG the usage of IA technique is printed within the Figure 3. The plot of voltage profiles for various buses after the placement of DG using PSO approach is outlined within the Figure 4

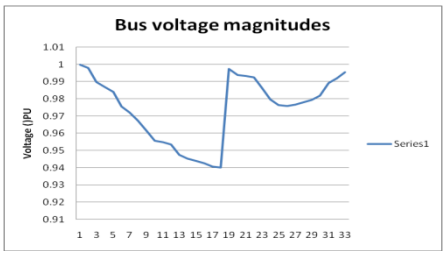

Figure 3. *Voltage Profile of 33 Bus System After Placement of DG using IA Metho*

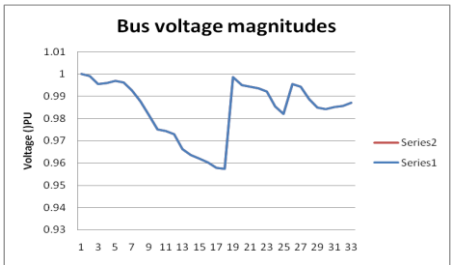

Figure 4. *Voltage Profile of 33 Bus System After Placement of DG using PSO Method*

TABLE III: LOCATION AND MINIMUM VOLTAGE MAGNITUDE FOR THE SYSTEM

CASE	**Bus at which Minimum Voltage Occurs**	**Voltage (PU)**
Base Case (without DG)	18	0.9052
with DG-IA Method	18	0.957416
with DG - PSO Method	18	0.940027

IV.CONCLUSION

This paper has provided IA and PSO methods for DG allocation for minimizing power loss and enhancement of voltage profile in distribution systems while enjoyable the principle objective of power injection. In IA method it is observed, it is that a approach to acquire an foremost or close to highest quality power aspect has been also provided for placing DG unit able to delivering active and reactive power. For DG capable of delivering in real and reactive energy, power factors to play a critical role in loss reduction. Another technique also proposed in this paper for ideal placement and capacity for generators was identified using PSO technique and the best of 50 trails runs have been presented. The importance of ideal placement was also suitably explained in this work. It was noted that incorrect location of DG will not bring in essential progress in the losses. It can also be noted from the conversation that the ideal placement of DG also improves the voltage profile of the network as a whole. It can be concluded that the proposed approaches, PSO is best optimization technique compared to the IA method because with small size of DG enhancement of voltage profile is more and reduction of loss percentage also more. Particle swarm optimization is projected for figuring out the final ability of DG and the vicinity is decided wherein loss is minimized and capability and area of DG anticipated for loss minimization.

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Survey on Fuzzy-Based Routing protocols in MAGNETS

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Abstract--- MANET is defined as a self configuring network which consists of wireless nodes that are interconnected. MANETs use wireless connections to connect various networks. There are numeral of issues and challenges in a mobile adhoc network. Routing is one of challenging issue in MANETs. The execution of mobile AdHoc network can be profoundly enhanced if the directing convention can be made versatile to the present system conditions. Thinks about demonstrate that the restriction of conventional routing protocols is the absence of capacity to react instantly to the adjustments in movement and portability conditions. Mobile nodes capable of switching immediately between proactive routing mode and reactive routing mode based on current status of the node can overcome the above constraint. A fuzzy based route mode selection come close to with information from multiple layers can inform direct switching capability to the mobile nodes. This choice system uses the data with respect to the quantity of connection breaks, the interface line length and the application sort (Delay tolerant or Delay touchy) of every hub. Hence a fuzzy based protocol could improve the performance of MANETs. This paper places of interest a relative study of conventional, modified and fuzzy based routing protocol and proposes the profit of using fuzzy logic in routing protocol.

I.INTRDUCTION

Mobile Adhoc Networks(MANET)

A MANET is a type of Adhoc network. MANETs are infra structure less networks that are self created and self controlled by a collection of mobile nodes that are interconnected and are able to dynamically form an autonomous multi-hop network. Because of self-forming environment and the ability to handle with quick topology changes MANETs are having a variety of applications.

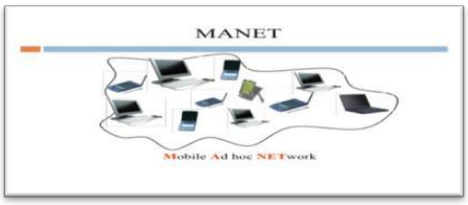

Figure 1: Mobile Adhoc Network

In MANET every node acts as a router, which helps in forwarding packets from source to destination.

MANET

II. ROUTING PROTOCOLS IN MANETS

Routing is process of finding an optimum route among available, in order to transfer packets from source to destination. Routing is considered as a two distinct process. Route discovery and Packet forwarding. Routing protocols are of two types, namely, Static routing and Dynamic Routing. In Static Routing, to transfer packets in the network, the administrators manually allot routes between source and destination. These routes are fixed over whole session. In Dynamic Routing, the router takes the responsibility of building and exchanging information regarding routing table according to changes in network topology. Dynamic Routing Protocols are further classified into three types. They are Reactive, Proactive, and Hybrid protocols.

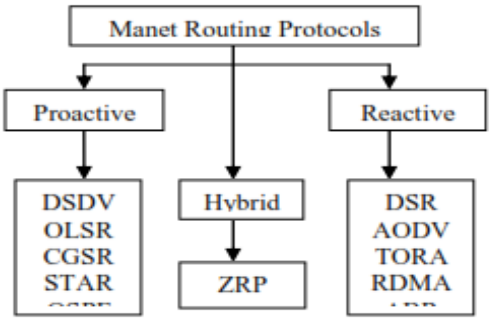

Figure 2: MANET routing protocols

DSDV [1] (Destination Sequenced Distance Vector Routing) is a routing table-driven protocol for adhoc network, the nodes keep up routing information all over the network, and it can be transmitted without delay when data packets are essential to sent, which makes it proper for high real-time necessities in the networking environment. However, there are various troubles of DSDV such as this protocol is mainly used for network that the size is not large, as well as the changes in the network topology is not very frequent. DSR [2] (Dynamic Source Routing) routing protocol is source-based routing and on-demand routing, the route will store records when it communicates with two nodes. Therefore, it reduces the cost of routing maintenance. In addition, it reduces the routing requesting information on channel possession by using the routing cache technology. on the other hand, the packet header length increases linearly and it

adds overhead with the increase of hops path, additionally, RREQ (routing request) packet uses the flooding to extend to the whole network, which will fallout in a bulky network load. AODV [3] (Adhoc On-demand Distance Vector) routing protocol is on-demand routing protocol based on DSDV and DSR routing protocols. On the other hand, AODV can keep away from routing loops by engrossing hop counting and destination serial number mechanism in DSDV routing protocol, on the other hand, AODV absorbs routing detection and route preservation mechanism in DSR routing protocol. Although AODV routing protocol is relatively grown-up, it still flaws such as large routing overhead and network latency.

III. FUZZY LOGICS IN MANETs

Fuzzy logic is applied in various areas such as quality of service-based routing, energy-aware routing, security, and Medium Access Control(MAC) protocols. Because of the basic features of ad hoc networks like uncertainty due to dynamic topology and mobility of nodes, limited resources and unstable links; a precise and accurate model is not possible to implement. In MANETs, fuzzy logic has been used to get better decision-making, condense resource consumption and increase performance. Fuzzy logic is also used to adaptively optimize protocol parameters more accurately and dynamically. The fuzzy routing protocols discover a maximal set of disjoint paths from source to destination, and then use a Fuzzy Logic Controller(FLC) to find out how to use those paths to hold the traffic. By implementing fuzzy logic techniques in MANET routing protocols then the network performance metrics such as network throughput increases, packet delivery ratio increases, routing overhead load decreases, and end-to-end delay decreases. Examples of fuzzy routing approaches are FLWMR[1] [4], which uses the number of hops in a path as its metric, and FLWLAMR[2] [5], which uses aggregate packet backlog along the path as its metric.

IV. QUALITY OF SERVICE

During transmission of packets from source to destination, the set of necessities that needs to be met by the network which is referred as a Quality of Service(QOS). QOS is considered as an important feature to make use of the network resources such asbandwidth, jitter, node energy level, queue length, delay, cost and reliability in an enhanced and well-organized manner. These QOS parameters can be given as inputs to fuzzy controller for determining the

V. FUZZY BASED ROUTING PROTOCOLS IN MANETS

Many algorithms have been proposed for routing in MANETs. Among them some are either reactive or proactive. The most vital issue of all the current calculations is that they don't fulfill all Quality of Service(QOS) parameters while finding the "best" way. It is critical to concentrate on all or most extreme QOS parameters at time of discovering "best" way in MANETs. Therefore, this section provides the outline of the existing Fuzzy Logic Based routing algorithms of MANETs. Starting with the case study survey of different published algorithms like

[A] FBEEMR[3] technique [6],
[B] EERP[4] for MANET using VSMT[5][7],
[C] FA[6] to enhance route stability of AODV routing protocol [8],
[D] HS-AODV routing protocol based on FCT[7][9],
[E] EESR[8] using QOSMA[9] in MANET [10],
[F] FLDB[10] for GPSR[11] mobile PB[12] routing protocol[11].

Using [A], with parameters as Hop Count(HC), Packet(P) and Energy(E), it concludes that Energy is inversely proportional to HC and P will be the best probability for optimal route. That means, in this protocol the FLC[11] takes HC, P, E as input parameters and RouteLifetime(RL) as output parameter. Each input and output variable are divided into seven linguistic values such as very low, low, less low, medium, less high, high and very high. Multiple fuzzy rules are inferred on these input parameters and for each and every route RL is calculated. Optimal path is selected whenever RL is very high. If HC is very low, P is very low and E is very high then RL is very high.Therefore, the relation between input and output parameter are as in eq (1), eq (2) and eq (3)

$$RL \propto 1/HC \qquad \text{E q (1)}$$
$$RL \propto 1/P \qquad \text{Eq (2)}$$
$$RL \propto E \qquad \text{E q (3)}$$

so the final relation is as

$$RL \propto E \propto 1/P \;\&\; 1/HC \qquad \text{E q (4)}$$

Using [B], with parameters as Energy(E) and Distance(D), it concludes that Energy is inversely proportional to Distance will be the best probability for optimal route. That means, in this protocol the FLC takes E and D as input parameters and Rating of Route(R) as output parameter. Each input and output variable are divided into three and nine linguistic values. Multiple fuzzy rules are inferred on these input parameters and R is calculated for each route. The route which is having higher energy and shorter distance is selected as optimal route. Therefore, the relation between input and output parameter are as in eq (5) and eq (6)

R ∞ E eq (5)
R ∞ 1/D eq (6) So the final

relation is as
R ∞ E ∞ 1/D eq (7)

Using [C], with parameters as Residue Energy(RE), Node Speed(NS), Hop Count(HC), it concludes that RE is inversely proportional to NS will be the best probability for optimal route. That means, in this protocol the FLC takes RE, NS, HC as input parameters and Trust Node(T) as output parameter. Each input and output variable are divided into three and five linguistic values. Multiple fuzzy rules are inferred on these input parameters and the node which is having high RE, low NS, short HC (or) high RE, low NS, medium HC (or) high RE, low NS, long HC is considered as trusted node (more qualified) to be part of a stable route. Therefore, the relation between input and output parameter are as in eq (8) and eq (9)

T ∞ 1/ NS Eq (8)
T ∞ RE Eq (9)

So the final relation is as

T ∞ RE ∞ 1/NS Eq (10)

Using [D], with parameters as Hop Count(HC), Sent Control Packet(P), it concludes that P is directly proportional to HC will be the best probability for optimal route. That means, in this protocol, FLC takes HC, P as input parameters and Active Route Timeout(ART) as output parameter. Each input and output variable are divided into three linguistic values. Multiple fuzzy rules are inferred on these input parameters and the route which is having ART as high is the considered as best route. ART will be high if HC and P is low. Therefore, the relation between input output parameter are as ineq (10) and eq(11) ART ∞ 1/ P eq (10)

ART ∞ 1/HC eq (11)

the final relation is as

ART ∞ 1/P & 1/HC q (12) Using [E], with parameters as Link Expiration Time(LET), Probabilistic Link Reliable Time(PLRT), Link Packet Error Rate(LPER),Residual Battery Power(RBP) and Link Received Signal Strength(LRSS), it concludes that LET, LRSS, RBP are inversely proportional to PLRT, LPER.That means, in this protocol, FLC takes LET, PLRT, LPER, RBP, LRSS as input parameters and Route Selection Probability(RSP) as output parameter. Each input and output variable are divided into three linguistic values. Multiple fuzzy rules are inferred on these input parameters and for each route RSP is calculated in terms of percentage. Therefore , the route which is having high percentage will be selected as optimal route,which is constant and energy capable. Therefore the relation between input and output parameter are as in eq (13), eq (14), eq (15),eq (16),eq(17) RSP ∞ LET eq (13)

RSP ∞ 1/ PLRT eq (14)
RSP ∞ 1/LPER eq (15)
RSP ∞ LRSS eq (16)
RSP ∞ RBP eq (17)
So the final relation is as
RSP∞LET&LRSS&RBP∞1/LPRT &1/LPER eq (18)

Using [F], with parameter as Node Moving Speed(NMS) , Number of Neighboring Nodes(NoNNs), it concludes that NoNNs is inversely proportional to NMS will be the best probability for optimal route. That means, in this protocol, FLC takes NMS, NoNNs as input parameters and Beacon Packet Interval Time(BPIT) as output parameter. Each input and output variable are divided into five linguistic values. Multiple fuzzy rules are inferred on these input parameters and this protocol selects the most excellent BPIT based on NMS mobility and NoNNs. Therefore the route which is having very short BPIT is considered as optimal route. The BPIT will be very short if NMS is high, NoNNs is very small (or) if NMS is very high, NoNNs is very small. Therefore the relation between input and output parameter are as in eq (19) and eq (20)
BPIT ∞ 1/ NMS eq (19)
BPIT ∞ NoNNseq (20)
So the final relation is as
BPIT ∞ NoNNs ∞ 1/NMS eq (21)

Table 1: Comparision of Fuzzy Logic based routing protocols

Routing Protocol	QOS parameters
FBEEMR[3] technique	Hop Count, Energy Level
EERP[4] for MANET using VSMT[5]	Energy Level, Maximum Distance between intermediate nodes
[6] FA to enhance route stability of AODV routing protocol	Hop count, Energy Level, speed, Trust Value,
HS-AODV routing protocol based on FCT[7]	Hop Count, bandwidth, delay
EESR[8] using QOSMA[9] in MANET	Link Expiration Time, speed, delay, energy level,
FLDB[10] for PSR[11] mobile PB[12]	Number of Intermediate nodes, speed

VI.CONCLUSION

This paper discusses how Fuzzy Logic theory can be used for implementing routing in AdHoc networks. It is important to consider maximum QOS parameters or all QOS parameters to select best possible path in adhoc networks. But as per best of my knowledge ,no existing protocols are considering all or maximum QOS parameters. Most of the authors are using 2 or 3 parameters as routing metrics. The future scope of this work can be enhanced to develop a new Fuzzy Logic based routing protocol for MANETs which will take all the important QOS parameters.

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A Novel Multirate Weighted FIR Filter Design using VLSI

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Abstract: A new class of FIR filtering algorithms and VLSI architectures based on the multirate approach were recently proposed. They reduce the computational complexity in FIR filtering, and also retain attractive implementation related properties such as regularity and multiply-and-accumulate (MAC) structure. In addition, the multirate feature can be applied to low-power/high-speed VLSI implementation. These properties make the multirate FIR filtering very attractive in many DSP and communication applications. In this paper, we propose a novel adaptive filter based on this new class of multirate FIR filtering structures. The proposed adaptive filter inherits the advantages of the multirate structures such as low computational complexity and low-power/high-speed applications. Moreover, the multirate feature helps to improve the convergence property of the adaptive filter.

Keywords: FIR filtering, multiply and accumulate (MAC), VLSI.

I. INTRODUCTION

A digital filter is a system that performs mathematical operations on a sampled or discrete time signal to reduce or enhance certain aspects of that signal. One type of digital filter is FIR filter. It is a stable filter. It gives linear phase response. Pipelining and parallel processing technique is used in FIR filter. Pipelining operation takes place in an interleaved manner. Pipelining done by inserting latches (delay element) in the system. It increases the overall speed of the architecture but the hardware structure and system latency will increases. Hardware structures increases due to inserting pipelining latches. For M level pipelining M-1 delay elements required. Latency is the difference between the availability of first output in the sequential system and the pipeline system. At every clock cycle it will operate multiple inputs and produced multiple outputs is called parallel processing. It required extra hardware. Both pipelining and parallel processing has disadvantages. For FIR filters, output is a linear convolution of weights and inputs. For an Nth-order FIR filter, the generation of each output sample takes N+1 multiply accumulate (MAC) operations.

Multiplication is strongest operation because it is repeated addition. It require large portion of chip area. Power consumption is more. Memory-based structures are more regular compared with the multiply accumulate structures; and have many other advantages, e.g., greater potential for high throughput and reduced-latency implementation and are expected to have less dynamic power consumption due to less switching activities for memory-read operations compared to the conventional multipliers. Memory based structures are well-suited for many digital signal processing (DSP) algorithms, which involve multiplication with a fixed set of coefficients. For this Distributed Arithmetic architecture used in FIR filter.

II. Study Methodology

Distributed arithmetic is an important technique to implement digital signal processing (DSP) functions in FPGAs. It provides an approach for multiplier-less implementation of DSP systems, since it is an algorithm that can perform multiplication with use of lookup table (LUT) that stores the pre-computed values and can be read out easily, which makes DA-based computation well suited for FPGA realization, because the LUT is the basic component of FPGA.

These blocks have to be efficiently mapped onto FPGA's logic resources. The major disadvantage of DA technique is that the size of DA- LUT increases exponentially with the length of input. Several efforts have been made to reduce the DA- LUT size for efficient realization of DA-based designs. The use offset-binary coding is proposed to reduce the DA-LUT size by a factor of 2. Recently, a new DA-LUT architecture for high-speed high-order has been introduced, where the major disadvantage of the FIR filters is vanished by using carry look ahead adder and the tri-state buffer. On the other side, some structures are introduced for efficient realization of FIR filter. Recently, novel one- and two-dimensional systolic structures are designed for computation of circular convolution using DA, where the structures involve significantly less area-delay complexity compared with the other existing DA-based structures for circular convolution. In the modified DA architecture is used to obtain an area time- power- efficient implementation of FIR filter in FPGA.

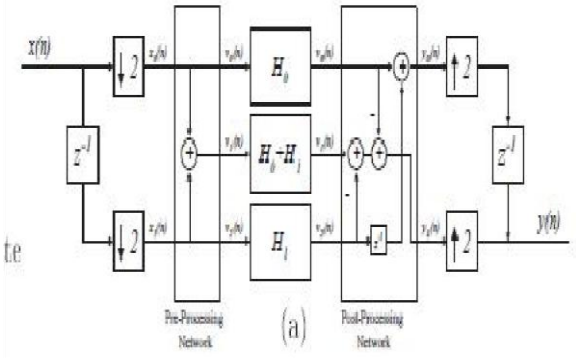
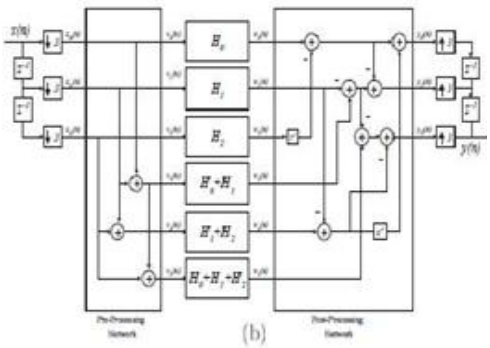


Figure 1: Multirate FIR filters with decimation factor (a) $M=2$, (b) $M=3$.



Due to the vast advantages of the multirate FIR filtering algorithm and architecture, we are motivated to

study **a** novel adaptive filtering scheme based on the multirate approach. Figure 2 shows our idea. Part (a) is the block diagram of a conventional LMS-type adaptive filter, where error signal ***e(n)*** is used to update the coefficients of the FIR filter so **as** to minimize the mean-squared error function, ***E[ez(n)].*** In our approach, we replace the transversal filter with the multirate FIR filter. As a result, the new adaptive filter inherits the advantages of the multirate FIR structures such **as** low computational complexity, regularity, and low-power/high-speed applications. Also, the multirate feature can help to improve the convergence properties of the adaptive filters. The detailed algorithm and architecture are discussed in the following section.

III. UPDATING ALGORITHM AND VLSI ARCHITECTURE

In this section, **we** derive the updating equations and architecture of the proposed multirate adaptive filter. Mathematically, an N-th order LMS adaptive FIR filter can be described by the following equations.

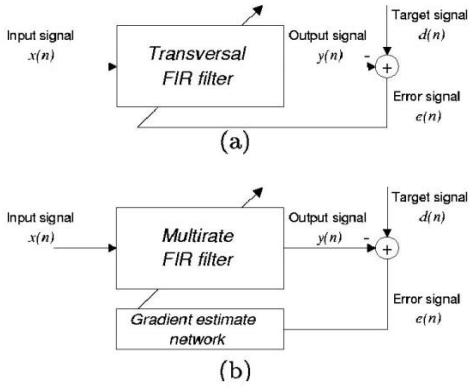


Figure 2: (a) Conventional adaptive filter. (b) The proposed adaptive filter based on the multirate FIR structure.

for ***k*** = **0,1,**. . . , N - 1, where *z(n)* is filter input signal, ***wk(n)*** is the ***kth*** filter coefficient, ***d(n)*** is the desired response, and ***p*** is the step size.Due to the characteristics of the proposed multirate adaptive filter, the updating equations in Eq. (1) need to be modified. First, **as** can be seen from Fig. 1, we can treat the central part of the multirate **FIR** filter that operates at the frequency of ***f/ M*** **as** a block- based FIR system. We may then employ the updating scheme in block ***LMS (BLMS)*** and rewrite Eq. (1) **a**

$$w_k(n+M) = w_k(n) + \mu \sum_{m=0}^{M-1} e(n+m)x(n-k-m). \quad (2)$$

Moreover, in the multirate FIR filtering scheme, the filter weights, wk for 0 *5* ***k*** *5* M - 1, are decimated and grouped into M sub-filters with tap length equals to ***N'*** **2** N/M (assume that N is multiple of M.) The *ith* sub-filter, *Wi*, is composed of ***wi,j(n),*** for 0 *5* ***j*** *5* N' -

1. They can be related to ***wk(n)*** **as**

and the subscripts *i* , *j* are used to denote the *jth* coefficient in the *ith* decimated sub-filter. Since Eq.

(2) is a block based update operated at an M-times lower sampling rate, it will be convenient to define a new time index I. Single increment of I corresponds to M increments of the original index ***n.*** Besides, we also define the decimated signals **as**

$$e_m(l) \triangleq e(Ml+m) = d(Ml+m) - y(Ml+m),$$
$$x_i(l) \triangleq x(Ml+i).$$

By applying above definitions and substituting ***n*** = MI into Eq. (2), we can derive the new weight updating equation for ***wi.j (n)*** **as**

$$\begin{aligned} & w_{i+Mj}(Ml+M) \\ &= w_{n+Mj}(Ml) + \mu \sum_{m=0}^{M-1} e(Ml+m)x(Ml-i-Mj+m) \\ &= w_{n+Mj}(Ml) + \mu \sum_{m=0}^{M-1} e_m(l)x_{m-i}(l-j). \end{aligned} \quad (3)$$

Furthermore, by using the fact of ***xm-i(l)***= ***xm- i + M (l***- 1) for m -1 **a** < 0, the new updating equation of the proposed multirate adaptive filter can be rewritten **as**

$$\begin{aligned} w_{i,j}(l+1) &= w_{i,j}(l) + \mu \left[\sum_{m=0}^{i-1} e_m(l)x_{m-i+M}(l-j-1) \right. \\ &\quad \left. + \sum_{m=i}^{M-1} e_m(l)x_{m-i}(l-j) \right] \\ &\triangleq w_{i,j}(l) + \mu \nabla_{i,j} \end{aligned} \quad (4)$$

For *and.* $0 \le j \le N'$ $\nabla_{i,j}$ is defined **as** the estimated gradient of *jth* weight of the *ith* sub-filter. A direct implementation of Eq. **(4)** is depicted in Fig. 3.It shows a regular realization of the proposed new updating algorithm with example of M = 3. By substituting Fig. 3 and Fig. **l (b)** into Fig. 2(b), we can have the overall structure (including pre-,post-processing networks, multirate filtering block, and the weight updating block) of the proposed adaptive filter in Fig **4.** As can be shown in Fig. 3 and Fig. **4,** both weight updating and multirate filtering block can be implemented in a very regular way, besides, we can also show that the updating equation in **(4)** can be applied for other choices of M and ***N.***

IV.COMPLEXITY ANALYSIS AND COMPARISON

Table 1 lists the required computational complexity of the filtering operation, error calculation, and weight updating among the standard LMS and multirate adaptive filters with M = **2** and M

= 3 ′ **.** Note that both the MPU and addition operations per unit sample (abbreviated **as** APU) are about the same in error calculation and weight updating **op**eration for all approaches. The computational complexity saving comes from the multirate filtering operations. The overall computational complexity of the multirate adaptive algorithm is less than the one of conventional LMS.

As M of M=3 increases, the saving is more significant. In addition, the proposed approach still retains the MAC operations, which is preferable in programmable DSP implementation

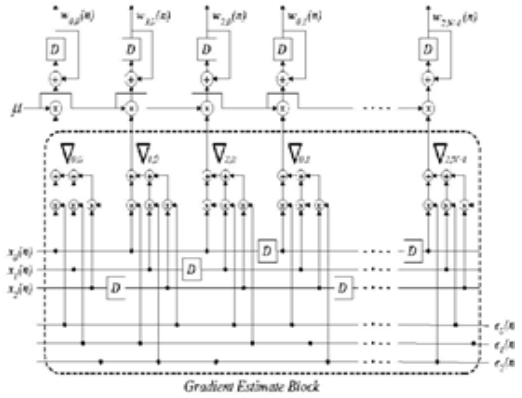


Figure 3 Direct Implementation of Weight updating block (WUB) M=3

Figure 4.The Overall VLSI structure of the multirate adaptive filter with decimation

$$w_k(n+1) = w_k(n) + \mu e(u-D)x(u-k-D). \quad (7)$$

Table 1: the comparison of computational complexity and power for standard LMS and multirate adaptive filters

	Standard LMS (*M*=1)		Multirate approach (*M*=2)		Multirate approach (*M*=3)	
	MPU	APU	MPU	APU	MPU	APU
Filtering	*N*	*N*-1	0.75 *N*	*N* +0.5	0.67 *N*	*N* +1.33
Error calculation	---	1	---	1	---	1
Weight updating	*N*	*N*	*N*	*N*	*N*	*N*
Total	2*N*	2*N*	1.75 *N*	2*N* +1.5	1.67 *N*	2*N* +2.33
Supply voltage (V'_{dd})	3*V*		2.04 *V*		1.70 *V*	
Power consumption (*P*)	$P_0=C_{eff}V_{dd}f_s$		0.41 P_0		0.27 P_0	

Moreover, by following the arguments in **[5], we** know that the multirate system is very suitable for low-power/ high-speed applications. It can be shown that the lowest possible supply voltage Vdd' for a device running at an M-times slower clock rate can be approximated by where **Vt** is the threshold voltage of the device. Assume the ***Vdd*** = ***3v*** and ***Vt*** = ***0.7V*** in original system (standard LMS).

$$\frac{V'_{dd}}{(V'_{dd}-V_t)^2} = M\frac{V_{dd}}{(V_{dd}-V_t)^2},$$

Provided that the capacitance due to the multipliers is dominant in the circuit and is roughly p can adaptive filter **as p**roportional to the number of multipliers, we estimate the power consumption

of multi rate adaptive filter as Where ***Po*** denotes the estimated power consumption of the standard **LMS** adaptive filter. The required supply voltage and power consumption for multirate approaches with ***Mn*=*2,3*** are listed in the last two rows of Table 1, where ***C e,ff*** is the effective capacitance of a single multiplier. It shows that the power consumption is greatly reduced compared with the standard LMS, and the saving is more significant **as** M increases

V. APPLICATION TO DELAYED LMS

In the VLSI implementation of Eq. **(l),** the long feedback path of the error signal imposes a critical limitation **on** its high-speed implementation. In applications which require high sampling rate or large number of filter taps, the direct implementation may not be applicable. To overcome the before mentioned speed constraint, the delayed *LMS (DLMS)* is usually adopted **[7].** It uses a delayed estimation error to update the filter weights, ***i.e.,*** the weight updating equation in **Eq.** (1) becomes

The extra D can help to relax speed constraint within the feedback path of **e(n).** Hence, the transversal filter can be implemented **as** a D-stage pipelined FIR filter so **as** to handle the high-sampling input signal. One major disadvantage of the DLMS algorithm is its **slow convergence rate [7].** That is, the optimum step size decreases **as** D increases, so does the convergence rate

In the proposed adaptive filter, the tap length is only ***N'*** = ***N/M.*** As a result, for fully-pipelined designs**,** the delay stage is reduced from N of the standard DLMS architecture to ***N',*** which leads to improvement in the convergence rate.

To verify our observations, we compare the ensemble averaged error between the conventional DLMS and the proposed multirate adaptive filter in the application of channel equalization **[lo,** Chap.91. Figure 5 and ***6*** show the learning curves for these two approaches in two different channels, where the Eigen value spread, ***x(R),*** of the received signal are
and **21.71,** respectively. Based on the results resented in Fig. **5** and Fig. **6,** we can make the following observations: The conventional DLMS behaves worst in terms of convergence rate and the steady state mean-squared error. The multi rate adaptive filters with ***M*** = **2** and M = **3** have smoother convergence curves (less

fluctuations.) The estimated gradient is averaged over M sample periods. Hence, the gradient estimation is more accurate. The multi rate approach performs better in both convergence

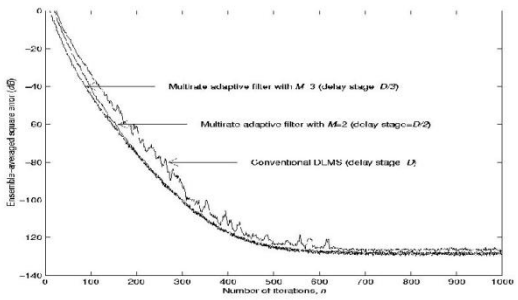


Figure 5: The learning curves of the conventional DLMS and multirate adaptive filters with $M = 2, 3$ (tap length $N = 18$ and eigenvalue-spread $\chi(R) = 21.71$.)

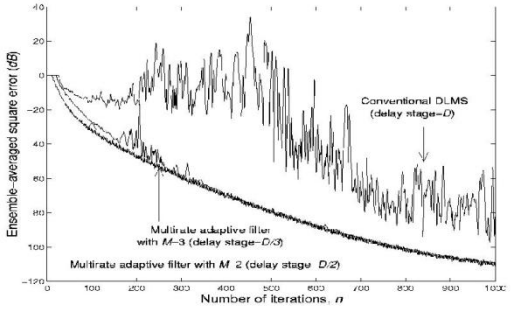


Figure 6: The learning curves of the conventional DLMS and multirate adaptive filters with $M = 2, 3$ (tap length $N = 18$ and eigenvalue-spread $\chi(R) = 21.71$.)

rate and steady state mean-squared error **as** M increases. It is due to the fact that the delay stage D is smaller than the conventional implementation. The phenomenon becomes clearer in more severe environment (larger Eigen value spread).

VI. CONCLUSION

In this paper, a new adaptive structure based on the multi rate filter is proposed. By virtue of the advantages of multi rate FIR filtering algorithm, the proposed scheme can reduce the required computational complexity and reserve the MAC structure. It also improves the convergence rate and steady state error in running delayed LMS.

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Teaching English: Analysis of Practices

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Abstract: *God gave the gift of language and speech only to human beings. Learning mother tongue is automatic as a child listens to it continuously. Similarly any other language of the surroundings is also learnt without effort. But learning English language in India is not easy as it is not spoken around like the mother tongue. Linguists say that reasonable ability in English language can be achieved with vocabulary of 2000 words in about 100-150 hours of study. But 90% of our engineering graduates are unemployable as they lack communication skills in English. This paradox makes it obvious that something is seriously wrong with our way of teaching-learning English.*

Indian children, since ages, followed the system of memorising texts without any understanding of it. As the child grew to a young man in course of time, the meaning and significance of what he learnt earlier was revealed to him. In the twentieth century Logic and Psychology helped linguists to think of some other ways of teaching-learning processes. The Behaviourist School of thought and the Cognitive School of thought vied with each other in propounding theories relating to teaching-learning of a language. Consequently new Grammars developed. Focus moved from Structures to Functional and then on to Communicative and now to Creative aspects of language. Age of learner and his mother tongue too are factors to reckon with in learning English language. Liberation from unsound pedagogy is a necessity.

In the light of these diametrically opposite approaches to language teaching-learning process a viable method of teaching English can be evolved if we keep an open mind.

I. Introduction

The arrangement of lower jaw in human beings is a unique gift of God because of which we are able to produce a variety of sounds which no other being on earth can. Our efforts to convey our feelings and ideas in a meaningful way through these sounds led to the development of words and language. Language is the foundation for the evolution of civilization.

In this paper my objective is to get familiar with old and modern ways of teaching English based on Philosophical and Psychological theories relating to functioning of human mind and learning of a language with special reference to English as a 2nd language and evolve a way that helps in attaining the goal, ability to use English.

II. Pedagogy and Present Situation

Research proved beyond doubt that a reasonable knowledge of English could be attained in *6 to 9 months* and that communication skills can be developed in *100 to 150 hours*. As per pedagogy a student who completes 9th class is expected to possess a vocabulary of 2000 words which is enough to display a reasonable ability in the four skills of language. By the time he completes his Intermediate course (+2) he should have acquired a vocabulary of 3000 words. He should be able to understand and use English for Specific Purposes (ESP) and face TOEFL.

But reality is that 75-90% of our Engineering graduates are without jobs as they lack Communication Skills. In spite of this general scenario some of the students speak good English even in their primary classes. Communists see a division in society as "Haves" and "Have-nots" in terms of wealth. Similarly we see today a division among our students as "Haves" and "Have-nots" in English. A few students who go to better schools and some whose parents take good care of their children's studies, learn good English and grab all the opportunities where as the "Have-nots" of English are deprived of every opportunity leaving them in despair. A majority of the Have-nots are from rural areas and Vernacular Medium. *When a construction worker is taken to another state, he learns the language of the region in 3-6 months without any teaching.* Are our students worse than him? These paradoxes prove that there is something fundamentally wrong with our teaching-learning process and that it needs a thorough investigation.

III. Earlier Practices

Before attempting to set things right let us ask a fundamental question --- What is language? It may be defined as *meaningful communication of feelings and ideas through words arranged in a particular order*. Language is like a building made of bricks called words and cement called grammar. Any attempt to teach English without teaching words is a vain attempt. We learn Tamil or Hindi from our neighbours by learning words (Pronunciation, meaning etc.) and trying to use them. So should be the way with English. *Not concentrating on learning of words is the fundamental mistake in the teaching-learning of English* because of which we have graduates who cannot even write a letter in English. *Giving summaries of lessons or paragraphs by oral explication, by dictating notes or through PPTs as some language teachers do, is teaching of content but not teaching of language.* Grammar is actually a bonus while learning mother tongue (L1), but for second language (L2) it has to be taught for ascertaining accuracy. That is why we say L1 is acquired but L2 has to be learnt.

Once, the objective of learning a language was to enjoy literature in that language. Later focus shifted to language with the concept 'Language through literature'. Then it has been teaching of Language Skills for communication. Abilasha, R and Dr M Ilankumaran highlight the changes in the later parts of 20th century thus:

In the later years of 1970s, audio lingual method fell into disregard. During 1980s and 1990s, there was a sweeping change over the existing trends then, and more emphasis was laid on authentic and meaningful contextualized discourse.[1]

The Content and Language Integrated Learning (CLIC) is an approach where the English teacher uses cross curricular content and so the students learn both the content and English**.** But when English teachers are asked to teach

lessons like "Cloud Computing" they will have to look at the clouds as they will not be able to teach neither English nor Computing with such lessons in the curriculum. A lesson prescribed has not only to be student friendly but also to be teacher friendly for teaching-learning to happen. With robots round the corner our objective in future is likely to be creative use of language.

Earlier English teacher used to read the textbook line by line in the classroom while students noticed the pronunciation of new words, different forms of a word (for example: appear, appeared, appearance, apparent, apparently), noted the shade of meaning from the context and identified the word groups in a sentence which improved their vocabulary and comprehension levels. When meanings of words are learnt a student develops interest to read more on his own. Exposure to language in any form makes him learn the word groups and word order or syntax automatically. Though Traditional Grammar was taught separately students used to see how those rules were applied while reading a text. Later teaching traditional Grammar was discontinued and a veiled approach of indirect teaching of grammatical items without using terms of Grammar was used. Repetitive practise of Structures and patterns was adopted.

IV. The Behaviourist School of Learning

The Behaviourist School which believes in Inductive Logic is based on Pavlov's experiments with dogs. This led to the belief that association of ideas and drilling results in habit formation. So they felt that repetition of language results in learning. B. F. Skinner, Leonard Bloomfield, Harold Palmer, A. S. Hornby, Charles Fries are some of the protagonists of this school. They focussed on Structures, accuracy, Speaking and RP. The sum and substance of this view is that drilling exercises are enough to learn a language. *Experimental verification shows that students displayed 90 to 95% accuracy through this method of teaching without ever understanding what they wrote by way of answers.* Students from **s**ome of the corporate +2 institutions who secure high marks in +2 examinations but get very low marks in EMCET are best examples to prove this point.

V. The Cognitive School of Learning

The Cognitive School which believes in Deductive Logic gives importance to understanding of what is read or heard and then produce sentences. Noam Chomsky and his militant followers are the exponents of this school. The gist of the Cognitive approach is -- *Language is rational. So apply your reason to learn language by understanding the material for reading.* A look at the CBSE question papers reveals that less than 30% of the questions relate to the prescribed texts and all other questions have to be answered with the general ability of a student. So a student today cannot depend on memorisation but try to understand concepts for his development.

Methods for L1 and L2 Teaching

Age of a learner and the language of his region are major factors in learning a language. We adopt the research findings regarding teaching English from England and USA where English is L1 (mother tongue) and apply them here where English is L2. Clearly the strategy to teach L1 is widely different from strategy for L2. For example activity based teaching and language games are useful for students *under 14* as they do not *understand* as much as adults. These are waste of time for older students who can *understand* concepts instantly and can spend time more on practicing the learnt aspect for consolidation. The point to note here is a 5 year old in England has so much of ability in English usage which a 17 year old in India does not have. Obviously the teaching methods applicable to a five year old Western are not suited to the 17 year old Indian. Ancient teachers while teaching Sanskrit, Greek or Latin made the students learn things by heart when they are children and when they grew into adolescents they thought and understood what they had learnt earlier. Memorizing and analyzing are the two ways of learning at different stages of life. Rashmi Pulizala and K Saritha righty said

...recent research in 2nd language acquisition suggests that certain traditional practices of Asia, memorization and form-focussed learning, which were believed to be ineffective, may have an important role to play in teaching and learning.[2]

VI. Adolescent Vs Child

Psycho-linguists discovered that children up to the age of ten possess an extraordinary and mysterious ability to learn any number of languages that come their way without any effort. After that age their ability starts decreasing till 14. The ease of learning vanishes totally after 14 and a student has to put in effort to learn a language. In adults knowledge of L1 helps in learning a second language (L2). Children learn chunks of data where as adults can learn only item by item. Understanding what is read, relating it to what is already known and tying to apply it are the factors which help students learn effectively. Word grammar (i.e. different forms of words, conjugation), Homonyms, Synonyms and Antonyms are good means of building vocabulary. Mimicry, substitutions are useful in teaching Phonology, Connectives, Vocabulary and Syntax. If we aim for RP we may end up with Indian English. If we aim at Indian English we may end up with *Tenglish* (Telugu like English) or *Hinglish* (Hindi like English) etc. We should concentrate more on Listening and Reading while teaching children and on Writing and Speaking while dealing with adolescents. Ability achieved in one skill helps in leaning other skills too as they are all inter-related.

VII. Testing: A tool to Learn

Testing is an important aid in teaching-learning process. It gives us feedback to decide the validity of the materials used and the methods employed. More than Entrance or Terminal Tests, Diagnostic Tests help us plan Remedial Teaching. *There should be a specific objective for each (bit of) question.* If copying is allowed in the examinations by 'kind' invigilators that is the end of education and consequently the nation.

VIII. Conclusion

Corporate colleges at +2 neglect English. But without English survival is a problem. So teachers at collegiate level have to put in more effort to bring the students back on track. English language cannot be learnt without word consciousness. Teachers have to sensitize students to become conscious of spelling, contextual meaning,

pronunciation, form of a word and the way it is used. With exposure to English an awareness of word groups in a sentence and word order in a sentence (Syntax) can be acquired almost without conscious effort. Language spoken in the region can be treated as L1 though mother tongue is different. When we force small children to speak English without L1 environment it results only in Butler English which has to be unlearnt later to learn the right language**.** *Learning a language is directly proportional to the amount of exposure to it.*

Methods of teaching English must be different for under 14 students and adolescent learners. Adults learn by observation and understanding concepts, a cognitive rational approach, Concepts of Grammar too can be given directly for understanding and practise. English is to be learnt for communication, critical thinking and creativity. Gaming activities for adolescents may be liked by the playful but will be considered silly or waste of time by serious learners as in the fast world of today concept has to be given directly adopting deductive approach.

Having said all this let me finally say that the most effective tool in teaching is the personality of the teacher which motivates learners.

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A Comparative Study On Concrete Containing E- Plastic Waste And Fly Ash Concrete With Conventional Concrete

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Abstract:
Utilization of waste materials is a partial solution to environment and ecological problems. Use of these materials not only helps in getting them utilized in cement, concrete and other construction materials, it helps in reducing the cost of cement and concrete manufacturing, but also has numerous indirect benefits such as reduction in landfill cost, saving in energy, and protecting the environment from possible pollution effects. Electronic waste, abbreviated as e –plastic waste, consist of discarded old computers, TV's, refrigerators, radios- basically any electrical or electronic appliance that has reached its end of life.

The waste material or by product from thermal plants such as fly ash as a partial replacement of cement in concrete helps in reduces the possibilities of environmental pollution. The inclusion of Fly ash affects all aspects of concrete. As a part of the composite concrete mass, it can be used both as a fine aggregate as well as a cementitious component. It influences the rheological properties of fresh concrete as well as the finished product. It improves the strength, finish and durability of the hardened mass. It reduces segregation, bleeding and lowers the heat of hydration apart from the energy and cost saving aspects.

This investigation covers the comparative study of e-plastic waste material as coarse aggregate replacement for 5%, 10%, 15%, and 20%, fly ash as cement replacement for 5%, 10%, 15%, 20% is done for M20 grade of concrete. The compressive strength, split tensile strength and flexural strength for different percentage of e-waste material and fly ash is compared with conventional concrete and corresponding results are graphically represented, and the optimum dosage of partial replacement is also suggested.

Keywords: e-plastic waste, fly ash, compressive Strength, split tensile strength, flexural strength, different percentage of replacement, optimum dosage, M20 grade of concrete.

Concrete is a composite construction material, composed of cement (commonly Portland cement) and other cementitious materials such as fly ash and slag cement, aggregate (generally a coarse aggregate made of gravel or crushed rocks such as granite, plus a fine aggregate such as sand), water and chemical admixtures.

Concrete solidifies and hardens after mixing with water and placement due to a chemical process known as hydration. The water reacts with the cement, which bonds the other components together, eventually creating a robust stone-like material. Concrete is used to make pavements, pipes, architectural structures, foundations, motorways/roads, bridges/overpasses, parking structures, brick/block walls and even boats.

The cement industry is one of two primary producers of carbon dioxide (CO_2), creating up to 5% of worldwide man-made emissions of this gas, of which 50% is from the chemical process and 40% from burning fuel. The CO_2 emission from the concrete production is directly proportional to the cement content used in the concrete mix; 900 kg of CO_2 are emitted for the production of every ton of cement.

It is widely known that water/cement ratio primarily governs the strength of concrete and lower water/cement ratio gives higher strength. Another important requirement is that the concrete should have adequate workability at the time of casting so that it can be properly compacted with minimum air voids.

FLY ASH: The inclusion of Fly ash affects all aspects of concrete. As a part of the composite concrete mass, it can be used both as a fine aggregate as well as a cementitious component. It influences the rheological properties of fresh concrete as well as the finished product. It improves the strength and durability of the hardened mass. It reduces segregation, bleeding and lowers the heat of hydration apart from the energy and cost saving aspects.

If the cement or fine aggregate is replaced, to improve the workability Super plasticizers are required. Super plasticizers are materials which when added in small volume to concrete or mortar can produce considerable improvements in their strength characteristics. It is also known that all the water added while mixing concrete is not completely utilized for hydration.

FLY ASH

Even with low water / cement ratio about half of the total water may still remain uncombined after long curingperiod, leading to porosity in the hardened concrete, resulting in poor performance. Therefore, it is necessary to keep the total water content to a limited level, resulting in lower workability, requiring better methods of compaction. This can be achieved by using suitable admixtures.

There are inorganic materials that have pozzolanic or latent hydraulic properties. These very fine-grained materials are added to the concrete mix to improve the properties of concrete (mineral admixtures), or as a replacement for Portland cement. These are called as mineral admixtures. Admixtures are additions to the mix used to achieve or improve workability and other properties of concrete.

Fly ash use improves concrete performance, making it stronger, more durable, and more resistant to chemical attack. Its use also creates significant benefits for our environment. Fly ash is a by-product of coal- fired electric generating plants; it is used to partially replace Portland cement (by up to 60% by mass). The properties of fly ash depend on the type of coal burnt. In general, siliceous fly ash is pozzolanic, while calcareous fly ash has latent hydraulic properties. Fly ash is generally captured by electrostatic precipitators or other particle filtration equipment before the flue gases reach the chimneys of coal-fired power plants, and together with bottom ash removed from the bottom of the furnace is in this case jointly known as coal ash.

Depending upon the source and makeup of the coal being burned, the components of fly ash vary considerably, but all fly ash includes substantial amounts of silicon dioxide (SiO_2) (both amorphous and crystalline) and calcium oxide (CaO), both being endemic ingredients in many coal-bearing rock strata. Since the particles solidify rapidly while suspended in the exhaust gases, fly ash particles are generally spherical in shape and range in size from 0.5 µm to 300 µm. Two classes of fly ash are defined by ASTM C618: Class F fly ash and Class C fly ash. The difference between these classes is the amount of calcium, silica, alumina, and iron content in the ash. The chemical properties of the fly ash are largely influenced by the chemical content of the coal burned.

The burning of harder, older anthracite and bituminous coal typically produces Class F fly ash. This fly ash is pozzolanic in nature, and contains less than 20% lime (CaO). Other minor constituents include oxides of calcium, magnesium, titanium, sulphur, sodium and potassium. Possessing pozzolanic properties, the glassy silica and alumina of Class F fly ash requires a cementing agent, such as Portland cement, quicklime, or hydrated lime, with the presence of water in order to react and produce cementitious compounds. Fly ash produced from the burning of younger lignite or sub bituminous coal, in addition to having pozzolanic properties, also has some self-cementing properties. In the presence of water, Class C fly ash will harden and gain strength over time. Class C fly ash generally contains more than 20% lime (CaO). Unlike Class F, self-cementing Class C fly ash does not require an activator. Alkali and sulphate contents are generally higher in Class C fly ashes

E-PLASTIC WASTE: During the past few decades, the phenomenon of premature deterioration of concrete structure is being witnessed .This has become a matter of concern in many countries bringing of the issue of durability of concrete in the fore front .Also the codes of practice in many countries including Indian Code IS 456-2000, have undergone changes Incorporating revised provisions pertaining to durability of concrete. In this context an attempt has been made to high light the method of combining certain waste e-products along with the conventional constituents of concrete which meets the requirements of special and uniformity that cannot always be achieved using the traditional

methods of manufacturing of concrete.

The propose work aims at enhancing. The characteristics such as placement and compaction without segregation. It is aimed in the attempts made in this project to ensure long-term mechanical properties, early-age strength, toughness volume stability or service life in severe environments. E- waste describes loosely discarded, surplus, obsolete, broken, electrical or electronic devices. Rapid technology change ,low initial cost have resulted in a fast growing surplus of electronic waste around the globe .Several tones of E waste need to be disposed per year. Traditional landfill or stockpile method is not an environmental friendly solution and the disposal process is also very difficult to meet EPA regulations. How to reuse the non disposable E waste becomes an important research topic. However, technically, electronic waste is only a subset of WEEE (Waste Electrical and Electronic Equipment). According to the OECD any appliance using an electronic power supply that has reached its end of life would come under WEEE. E plastic waste is one of the fastest growing waste streams in the world. In developed countries, previously, it was about 1% of total solid waste generation and currently it grows to 2% by 2010.

E-PLASTIC WASTE

In developing countries, it ranges 0.01% to 1% of the total municipal solid waste generation. The waste inventory based on this obsolescence rate and installed base in India for the year 2005 has been estimated to be 146180.00 tones. This is expected to exceed 8, 00,000 tones by 2016. In India, e-waste is mostly generated in large cities like Delhi, Mumbai and Bangalore. In these cities a complex e-waste handling infrastructure has developed mainly based on a long tradition of waste recycling. Sixty-five cities in India generate more than 60% of the total e waste generated in India. Maharashtra ranks first followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab in the list of e waste generating states in India. There are two small WEEE/E-waste dismantling facilities are functioning in Chennai and Bangalore. There is no large scale organized e-waste recycling facility in India and the entire recycling exists in unorganized sector.

IMPORTANCE OF THE PRESENT STUDY

E waste describes loosely discarded, surplus, obsolete, broken, electrical or electronic devices. Rapid technology change ,low initial cost have resulted in a fast growing surplus of electronic waste around the globe .Several tones of E waste need to be disposed per year. Traditional landfill or stockpile method is not an environmental friendly solution and the disposal process is also very difficult to meet EPA regulations. How to reuse the non disposable E waste becomes an important research topic. However, technically, electronic waste is only a subset of WEEE (Waste Electrical and Electronic Equipment). According to the OECD any appliance using an electronic power supply that has reached its end of life would come under WEEE. E plastic waste is one of the fastest growing waste streams in the world. In developed countries, previously, it was about 1% of total solid waste generation and currently it grows to 2% by 2010. In developing countries, it ranges 0.01% to 1% of the total municipal solid waste generation. The e waste inventory based on this obsolescence rate and installed base in India for the year 2005 has been estimated to be 146180.00 tones. This is expected to exceed 8, 00,000 tones by 2016. In India, e-waste is mostly generated in large cities like Delhi, Mumbai and Bangalore. In these cities a complex e-waste handling infrastructure has developed mainly based on a long tradition of waste recycling. Sixty-five cities in India generate more than 60% of the total e waste generated in India. Ten states generate 70% of the total e waste generated in India. Maharashtra ranks first followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab in the list.

CONCRETE MIX DES

IGN (GRADE M20):

1. Characteristic compressive strength required in the field at 28 days. 20Mpa
2. Maximum size of aggregate 20mm
3. Degree of workability 0.90
4. Degree of quality control Good
5. Type of exposure Mild
6. Water cement ratio 0.50

B. Test data for materials:

1. Specific gravity of cement 3.15
2. Specific gravity of coarse aggregates 2.80
3. Specific gravity of fine aggregates 2.60
4. Water absorption:
   Coarse aggregate 0.50%
   Fine aggregate 1.0%
5. Free (surface) moisture:
   Coarse aggregate 0.25%
   Fine aggregate 2%
6. Fly ash: As per I.S.: 3812, specific gravity 2.25

Therefore, required sand content as percentage of total aggregate by absolute volume = 35-3.5

= 31.5%

Required water content = 186+5.58 =191.61kg/m^3

Determination of cemen t content:

Water-cement ratio =

0.50 Water =191.6 lit

Cement =191.6/0.50 =383 kg/m^3

This cement content is adequate for ‘mild’ exposure condition.

TABLE: 1 Determination of coarse and fine aggregate contents:

Maximum size of Aggregate (mm)	Entrapped air, as % of volume of Concrete
10	3

20	2
40	1

From the above table, for the specified maximum size of aggregate of 20mm, the amount of entrapped air in the wet concrete is 2 percent. Taking this into account and applying equations:

V = [W + C/Se+ 1/p × fa/Sfc] (1/1000)

0.98=[191.6+383/3.15+1/0.315 x fa/2.60] x 1/100

0

fa =546Kg/m^3,

Ca = (l-p)/p × fa×Sca/Sfa

Ca=(1-0.315)/0.315x546x2.8/2.6

=1278.66Kg/m Ca=1188Kg/m^3

Water = 191.6Kg

Cement = 383Kg

Fine aggregate = 546Kg

Coarse aggregate = 1278.66Kg

TABLE: 2 the mix proportion then becomes:

Water	Cement	Fine aggregate	Coarse aggregate
191.6Kg	383Kg	546Kg	1188Kg
0.5	1	1.425	3.34

TABLE: 3 Comparison of plain concrete and fly ash concrete (kg/m^3)

Materials	Plain Concrete	Fly ash concrete (5%	Fly ash concrete (10	Fly ash concrete (15	Fly ash concrete (20
Water (free)	191.6	182.02	182.02	182.02	182.02
OP Cement	383	363.85	344.7	325.55	306.4
Fine Aggregate	546	546	546	546	546
Coarse Aggregate	1278.66	1278.66	1278.66	1278.66	1278.66
	2399.26	2370.53	2351.38	2332.23	2313.08

TABLE: 4 Comparison of plain concrete and e-plastic waste concrete (kg/m^3)

Materials	Plain Concrete	E-plastic waste concrete (5%)	E-plastic waste concrete (10%)	E-plastic waste concrete (15%)	E-plastic waste concrete (20%)
Water (free)	191.6	191.6	191.6	191.6	191.6
OP Cement	383	383	383	383	383
Fine Aggregate	546	546	546	546	546
Coarse Aggregate	1278.66	1214.727	1150.794	1086.861	1022.928
	2399.26	2335.325	2271.394	2207.461	2143.528

EXPERIMENTAL WORK:

It was proposed to investigate the behavior of E-plastic as partial replacement of coarse aggregate in concrete and fly ash replaced cement in concrete it is compared with the conventional concrete mix.

TESTS ON CEMENT

The Ordinary Portland (OPC) cement of 43 grade conforming to IS: 8112 1989 was used for the present experimental study. The important properties of this cement have been tested using Vicat apparatus, Le chatelier flask

TABLE: 5 Consistency of cement

Sl. No	Weight of water in (gms) W_1	Weight of cement in (gms) W_2	(W_2/W_1) x 10	Depth of Penetration (mm)
1	75	300	40	6
2	78	300	38.4	5
3	81	300	37.03	6
4	84	300	35.7	6
5	87	300	34.48	5
6	90	300	33.3	6

TABLE: 6 Properties of Cement

S.NO	Characteristics	Values obtained	Standard values
1	Normal consistency	34mm	33 to 35 mm
2	Initial setting time	35 min	Not be less than 30mins

3	Final setting time	420 min	Not be greater than 600min
4	Fineness Test	2%	Not more than 10%
5	Specific gravity	3.15	3.12 to 3.19

TABLE: 7 Characteristics of Sand

S.NO	CHARACTERISTICS	VALUE
1	Specific gravity	2.6
2	Water absorption	1.85%
3	Fineness modulus	2.485

TABLE: 8 Characteristics of coarse

S.NO	CHARACTERISTICS	VALUE
1	Specific gravity	2.8
2	Water absorption	0.50%
3	Abrasion test	13.7

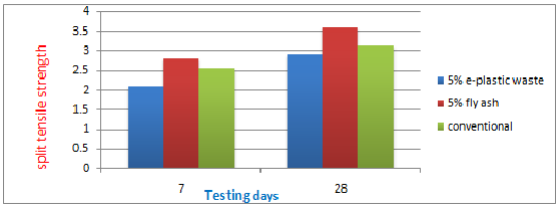
TABLE: 9 Physical properties of E-plastic waste

Properties	E-waste particle	Coarse aggregate
Specific gravity	1.01	2.65
Absorption (%)	<0.2	0.5
Color	Black & Dark	Dark
Shape	Angular	Angular
Crushing Value	<2%	24.20%
Impact value	<2%	22.73%

Workability test on concrete:

Result obtains from compaction factor show that the workability of concrete

Compaction factor value = 82



COMPRESSIVE STRENGTH TEST:

These results are obtained by testing the total 9 specimens for 7 days, 14 days and 28 days and by considering the average of the test results and that are tabulated in table

TABLE: 10 Compressive strength of fly ash and e-plastic for (5%, 10%, 15% and 20%) replacement in concrete with conventional concrete:

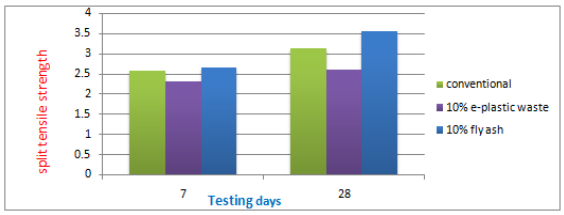
		% of replacement	Average Compressive strength in N/mm^2		
			7 days	14 days	28 days
Grade of Mix M20	For fly ash concrete	5%	14.87	19.19	25.47
		10%	15.89	20.14	26.01
		15%	13.2	18.87	24.59
		20%	13.18	17.5	21.57
	For E-plastic concrete	5%	13.2	14.75	19.66
		10%	10.58	14.45	17.14
		15%	7.91	11.78	11.87
		20%	4.47	7.9	9.62
	Conventional concrete		12.89	14.27	21.2

strength values of different proportions of replacement of fly ash and E-plastic wastes in concrete are tabulated and represented graphically. TABLE: 11 Comparisons of spilt tensile strength for fly ash and e-plastic waste with conventional concrete

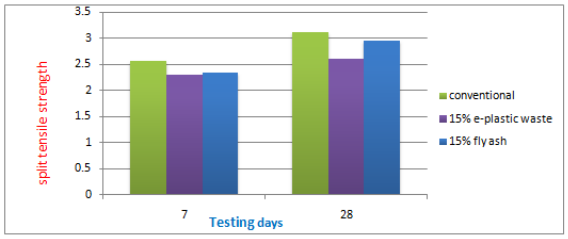
		% of replacement	Split tensile strength in N/mm2	
			7 days	28 days
Grade of Mix M20	For fly ash concrete	5%	2.8	3.6
		10%	2.65	3.55
		15%	2.35	2.95
		20%	2.2	2.8
	For E-plastic concrete	5%	2.08	2.9
		10%	2.3	2.6
		15%	1.6	2
		20%	1.25	1.85
	Conventional concrete	…….	2.57	3.12

GRAPH: 5 Comparisons of spilt tensile strength for 5% replacement of fly ash and e-plastic waste with

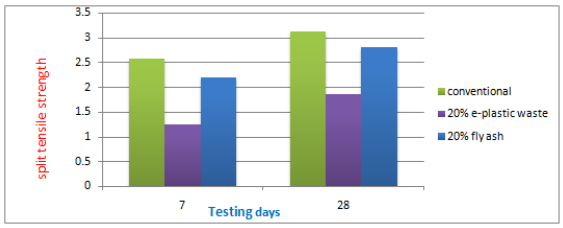
conventional concrete



GRAPH: 6 Comparisons of spilt tensile strength for 10% replacement of fly ash and e-plastic waste with conventional concrete

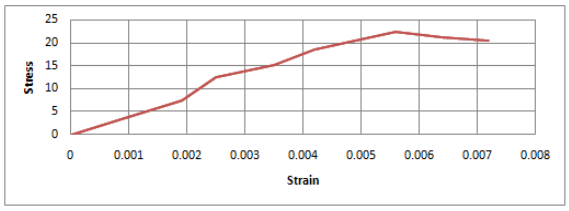


GRAPH: 7 Comparisons of spilt tensile strength for 15% replacement of fly ash and e-plastic waste with conventional concrete

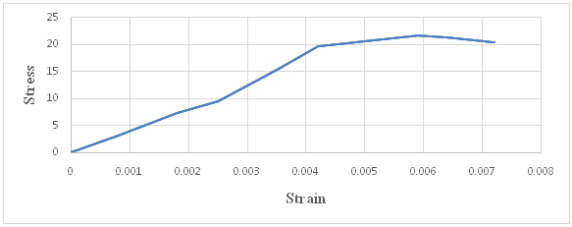


GRAPH: 8 Comparisons of spilt tensile strength for 20% replacement of fly ash and e-plastic waste with conventional concrete

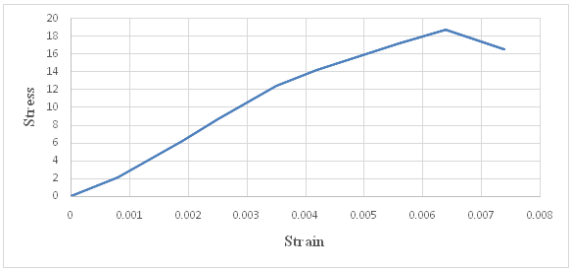
IN BEHAVIOURS



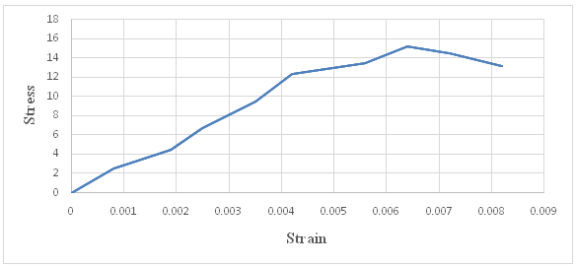
GRAPH: 9 Stress-strain curve of conventional cement concrete



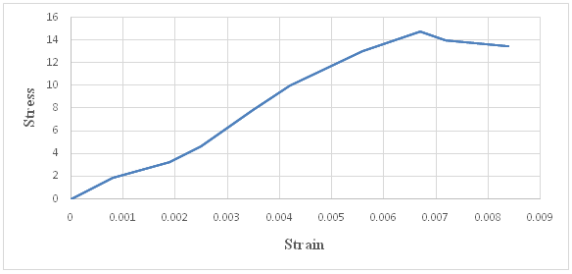
GRAPH: 10 Stress-strain curve of 5% of e-plastic waste cement concrete



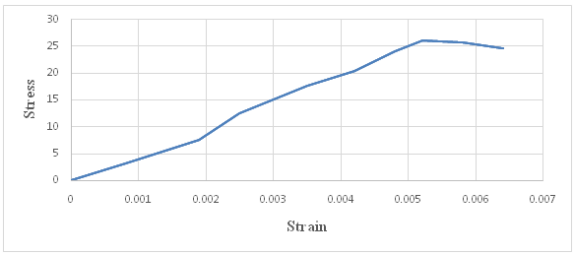
GRAPH: 11 Stress-strain curve of 10% of e-plastic waste cement concrete



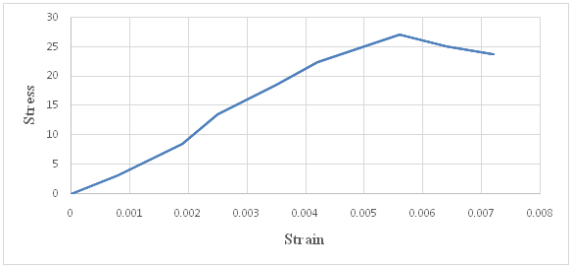
GRAPH: 12 Stress-strain curve of 15% of e-plastic waste cement concrete



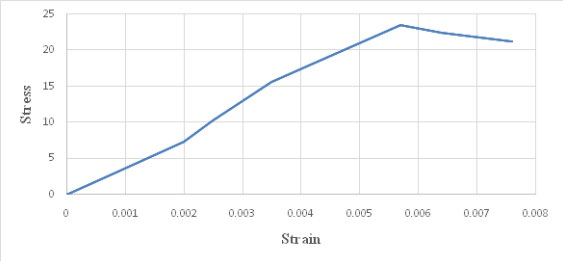
GRAPH: 13 Stress-strain curve of 20% of e-plastic waste cement concrete



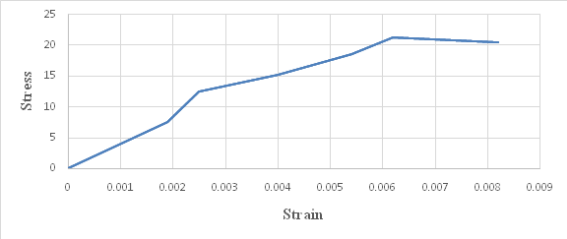
GRAPH: 14 Stress-strain curve of 5% of fly ash cement concrete



GRAPH: 15 Stress-strain curves of 10% of fly ash cement concrete



GRAPH: 16 Stress-strain curve of 15% of fly ash cement concrete



GRAPH: 17 Stress-strain curve of 20% of fly ash cement concrete

CONCLUSIONS FOR E-PLASTIC WASTE

An analysis was made on the strength characteristics by conducting the test on e- waste concrete with e plastic aggregate the results revealed that up to 5% replacement e-waste concrete is giving improvement compression, tensile and flexural strength. Graphs show the compressive, tensile and flexural strength of e plastic concrete with mixing ratio of e-plastic waste with coarse aggregate. However an increase in the content of e plastic aggregates gradually enhanced 7 days, 14 days and 28 days compressive, tensile, stress – strain, young's modulus and toughness up to 10% replacement in the case of conventional concrete.

This study intended to find the effective ways to reutilize the hard plastic waste particles as concrete aggregate. Analysis of the strength characteristics of concrete containing recycled waste plastic gave the following results.

1. It is identified that e-waste can be disposed by using them as construction materials.
2. The compressive strength and tensile strength of concrete containing e plastic aggregate is retained More or less in comparison with controlled concrete specimens. However strength noticeably decreased when the e plastic content was more than 10%.
3. It has been concluded that 10% of E-waste aggregate can be incorporated as coarse aggregate Replacement in concrete without any long term detrimental effects and with acceptable strength Development mechanism.
4. The young's modulus of e-waste concrete will be increases up to 5% only after increasing e-plastic waste the young's modulus will be falling down.
5. The toughness value will be increases up to 10%.

FOR FLY ASH CONCRETE

An analysis was made on the strength characteristics by conducting the test on fly ash concrete with fly ash replaced by the cement. The results revealed that up to 10% replacement fly ash concrete is giving improvement compression, tensile, stress- strain and toughness. Graphs show the compressive, tensile, stress-strain of fly ash concrete with mixing ratio of fly ash. However an increase in the content of fly ash gradually enhanced 7 days, 14 days and 28 days compressive, tensile, stress-strain and toughness up to 15% replacement in the case of conventional concrete.

1. Low volumes of fly ash improve the compressive strength of concrete.
2. Fly ash replacement with 10% produced highest compressive strength.
3. The young's modulus value will increases up to 10%, after exceeds 10% of fly ash in concrete it will be falling down.
4. The toughness value will be increases in up to 15% of fly ash concrete.
5. Young's modulus has shown improvement with the decrease of fly ash content.

COMPARISONS OF E-PLASTIC WASTE AND FLY ASH CONCRETE

From this project I conclude that the mechanical properties of the concrete, such as compression, tensile, stress-strain and toughness has been found to be fly ash concrete will give 5% more strength compare to e-plastic waste concrete for all percentage of replacement

SCOPE OF FUTURE WORK

- Use of increase in percentage of e-plastic waste as coarse aggregates aggregate replacement up to 5% in concrete mix results in good strength gain comparative to conventional mix
- Silica fumes and metakaoline may include in fly ash concrete to enhance the strength behavior of concrete.
- Durability test may also conduct.
- Add fibers like glass, steel, polyethylene fiber which may increase the crack resistance.
- We can opt M20 grade of concrete for better test result.

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Is 5G a new Update for 4G or A New Technology?

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Over a century after Jagadish Chandra Bose invented radio communication but saw Italian inventor Guglielmo Marconi walk away with the credit, he is set to get his due. The millimetre wavelength frequency that Bose used in his experiment in 1895 is the foundation of 5G that scientists and technologists across the world are now trying to re-invent [1].

Every network since from 1G to 4G which has initiated wirelessly grew upon focusing to provide various services related to the user priority. While the recent changes of obtaining the 4G LTE technology and the user ratio for the Internet has grew enormously very large. Many applications after the introduction of Unlicensed Band Spectrum of Wirelessly accessible networks issued has increased a lot giving a chance to produce a lot many applications related to the usage of low power and lower range Wide area networks like Lora Wan, Wi-Fi, IEEE 802.11a/b/g/n, etc.

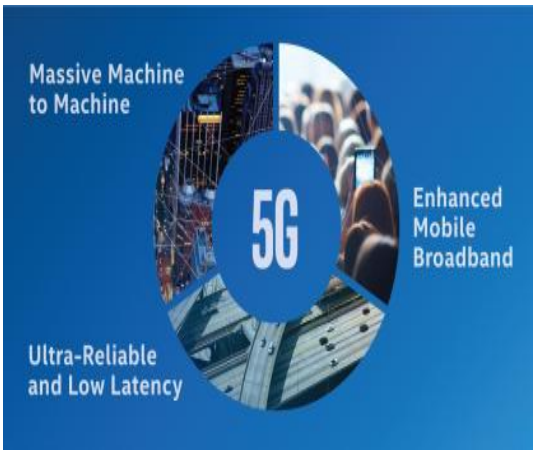
When coming to the technical details regarding the 4G LTE networks, it is setting up the peak requirements of about 100Mbit/sec to 1Gbit/Sec according to the ITU-T specifications. Since the first-release versions of Mobile WiMAX and LTE support much less than 1 Gbit/s peak bit rate, they are not fully IMT-Advanced compliant, but are often branded 4G by service providers. According to operators, a generation of the network refers to the deployment of a new non-backward-compatible technology.
On December 6, 2010, ITU-R recognized that these two technologies, as well as other beyond-3G technologies that do not fulfil the IMT-Advanced requirements, could nevertheless be considered "4G", provided they represent forerunners to IMT-Advanced compliant versions and "a substantial level of improvement in performance and capabilities with respect to the initial third generation systems now deployed". [2]
But we when viewing the opinion of maker's, they were very eagerly waiting for the public release of spectrum bandwidths of 5G networks.

So, what actually 5G is?

5G is referred to as the 5th Generation Mobile Wireless Communication network, which provides a greater efficiency in calls than ever before with a very high data rates ranging at millimetre bandwidths, starting at a frequency of 28GHz. (fig1- Source: Google Images)
Since it is using Millimeter waves, it has an efficient and very high bandwidth. But the most considerable part is that it consumes very low power. Although, there is still no traces of 5G in practice, but prototypes are being using by most of the developing companies and geek's. We up to now only have a single evaluation board provided by Qualcomm Corporation [3][4]. A lot more than that follows is the recent technology emerging and the usage of Internet based Applications and appliances namely IoT & IoE, Lora Wan, etc. are making a long usage of the data streams and their requirements were increasing day by day through the Internet.

Of course, technologies related to Big Data and Cloud are managing them currently but continentally it too requires a larger data streams to transfer the data rapidly through the internet. The present emerged 4G LTE networks however are able to handle them nicely but are still not consistent to handle at some times. But the 5G networks uses *Beam Division Multiple Access(BDMA)* type Access technology that has a potential to overcome this issue using its *Quasi-Orthogonal Filter Banks.*

These Access types raised a possibility of creating



Massive MIMO (Multiple Input, Multiple Output) Technologies(fig2) that can make the accessing of active nodes of users to be participated in the communication flow without any sarcastic issues to be followed by. The other most integrated issue is that 5G comes out with IoT which will become a part of it. This makes the user feel free and comfortable to use his appliances and other Things to be worked and accessed out throughout the world without any delay. It is due to the low latency issues that makes it to become low interference by the other network signals from

vivid providers. According to Nokia analytics, it is providing a range of 3 milliseconds of latency response whereas the 4G LTE fluctuates between 8-10 milliseconds of response. This makes it easy to be integrated in the upcoming intelligent devices so the transmission and reception of the log data and command sets becomes easier to be communicated.

The IEEE organisation came up to standardize this technology so that scientists and researchers from all over the grounds of the globe can be able to access them and utilize them accordingly (fig 3& 4 – Source: https://5g.ieee.org/)

Fig:4- IEEE Miscellaneous Standards

The data rate which is the highlighted feature of the 5G networks i.e. 1Gbit/Sec is also seems to support all the Augmented and Mixed Reality based applications to go live on internet on the day tomorrow. The Multimedia streaming for the user will become a bit higher and everything of videos would be running at 4K very easily. As well MIT is making its own Tech analysis and researches based upon the 5G telecom techniques and improving the digital frame algorithms for transferring them in patterned ways. According to some analysts by 2020 this time in India also we can be able to get the services of 5G starting as a Partnership project 5G PPP (PPP: Public Private Partnership) (fig5- Source: https://www.quora.com/) and follows.

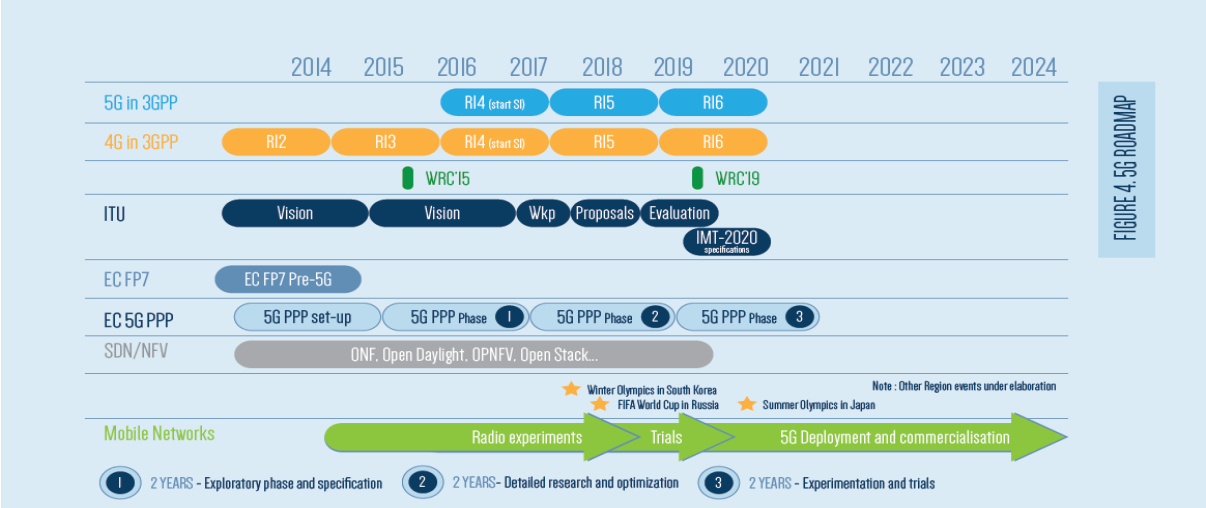


Fig:3- IEEE Computer Society Standards

This also makes its way in medical sector and of very stringent areas also, since the response of the transreciever will be very accurate and are in high speed and are of Full Duplex so that it will be taken over any types of issue.

Some militaries already use full duplex technology that relies on bulky equipment. To achieve full duplex in personal devices, researchers must design a circuit that can cancel incoming and outgoing signals so they don't collide while an antenna is transmitting and receiving data at the same time. This is especially hard because of the tendency of radio waves to travel both forward and backward on the same frequency—a principle known as reciprocity. But recently, experts have assembled silicon transistors that act like high-speed switches to halt the backward roll of these waves, enabling them to transmit and receive signals on the same frequency at once. One drawback to full duplex is that it also creates more signal interference, through a pesky echo. When a transmitter emits a signal, that signal is much closer to the device's antenna and therefore more powerful than any signal it receives. Expecting an antenna to both speak and listen at the same time is possible only with special echo-canceling technology. With these and other 5G technologies, engineers hope to build the wireless network that future smartphone users, VR gamers, and autonomous cars will rely on every day. Already, researchers and companies have set high expectations for 5G by promising ultra-low latency and record-breaking data speeds for consumers. If they can solve the remaining challenges, and

figure out how to make all these systems work together, ultrafast 5G service could reach consumers in the next five years. [5]

As par Industrial IoT(IIoT) is increasing that requires a highly confidential and totally secured connectivity and a very reliable source so that they can work on it easily. They all trust that 5G will Sure can make extract all its essence related to it.

Thus, I will Conclude my article, that there is a lot to be going to have happen by the 5G networks, while some were on the par developing with Deep securities and with more extra futurates in the name 6G & 7G in some parts of European and Japanese Countries, but the 5G is creating a lot of hype regarding its own and also the developers are also striving accordingly to fix

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IOVFDT for Concept-Drift Problem in Big Data

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Abstract:

The problem of How to efficiently uncover the knowledge hidden within massive and big data remains an open problem. It is one of the challenges is the issue of 'concept drift' in streaming data flows. Concept drift is a wellknown problem in data analytics, in which the statistical properties of the attributes and their target classes shift over time, making the trained model less accurate. Many methods have been proposed for data mining in batch mode.

Stream mining represents a new generation of data mining techniques, in which the model is updated in one pass whenever new data arrive. This one-pass mechanism is inherently adaptive and hence potentially more robust than its predecessors in handling concept drift in data streams. In this paper, we evaluate the performance of a family of decision-tree-based data stream mining algorithms. The advantage of incremental decision tree learning is the set of rules that can be extracted from the induced model.

The extracted rules, in the form of predicate logics, can be used subsequently in many decision-support applications. However, the induced decision tree must be both accurate and compact, even in the presence of concept drift. We compare the performance of three typical incremental decision tree algorithms (VFDT [2], ADWIN [3], iOVFDT [4]) in dealing with concept-drift data. Both synthetic and real-world drift data are used in the experiment. iOVFDT is found to produce superior results.

Keywords:-
Data Stream Mining; Concept Drift; Incremental Decision Tree; Classification.

I. INTRODUCTION

Big data has become a hot research topic, and how to mine valuable information from such huge volumes of data remains an open problem. Many research institutes worldwide have dedicated themselves to solving this problem. The solutions differ from traditional data mining methods, where the mining process must be efficient and incremental.

Processing big data presents a challenge to existing computation platforms and hardware. However, according to Moore's Law, CPU hardware may no longer present a bottleneck in mining big data due to the rapid development of integrated circuit industry. A well-designed algorithm is crucial in solving problems associated with big data.

A data stream model is usually defined as a model in which data move continuously at high-speed. Most big data can be considered as data streams, in which new data are generated continuously. Data streams contain very large volumes of data, which cannot be stored in either internal or external memory. A one-pass algorithm therefore forms the basis of data stream mining, which briefly stores a sufficient statistical matrix when new data passes, but does not require the full dataset to be scanned repeatedly.

A data stream also depicts an infinite big data scenario in which the underlying data distribution of newly arriving data may differ from older data in the real world: the so-called concept-drift problem. For example, clickstreams of users' navigation patterns on an ecommerce website may reflect their purchase preferences as analyzed by the system. However, as people's preferences for products change over time, the old model is no longer applicable, resulting in concept drift.

Decision trees are one of the most important data classification techniques. These techniques are widely used because of their ability to interpret knowledge in different domains and present it as a tree-like graph. Decision trees can be distinguished into two categories according to their components: single-tree algorithms and multi-tree algorithms. A single-tree algorithm is lightweight and easy to implement and thus favored for data stream environments, although in some cases, a multi-tree algorithm may achieve slightly higher accuracy.

DATA STREAMS MINING PROBLEMS

To store continuous data stream is a great challenge for storage devices. To generate pattern or knowledge from stream data, algorithms with different techniques are needed. We don‟t have enough amount of space to store stream data and problem occurs between accuracy of data pattern and storage. So we can classify into five categories as shown in table I. [10].

Table I. Classification of Challenges via Category

S.No	Issues	Challenges	Solution approach for these issues
1	Memory management	Data arrival rate and variant data arrival rate over time are irregular and fluctuated	Summarization techniques
2	Data Preprocessing	Quality of mining result and automation of preprocessing	Light-weight pre-processing technique
3	Data structure	Limited memory size and large volume of data stream	Incremental maintaining of data structure, novel indexing, storage and querying techniques
4	Resource	Limited resource like storage and computation capabilities	AOG
5	Visualization of results	Problem in data analysis and quick decision making by user	Still is a research issue(one of the proposed approach is: intelligent monitoring)

In this paper, we investigate the performance of single-tree learning for concept-drift data streams. Three representative tree inductions are used in this evaluation: VFDT [2], a classic algorithm that pioneered the use of Hoeffding bound to build an incremental decision tree; ADWIN [3], a start-of-the-art tree model that uses an adaptive-window technique to handle concept drift; and iOVFDT [4,9], a model previously developed by the present authors that balances accuracy, tree size and learning speed.

The results show that iOVFDT has good performance for both synthetic and real-world concept-drift data streams. The advantage of the adaptive tie threshold makes iOVFDT suitable for real-world applications.

The paper is organized as follows: Section 1 introduces the research topic; Section 2 reviews some related work; Section 3 presents the preconditions for the evaluation, including the platform, data sources and measurements; Section 4 analyzes the evaluation results and discusses the comparison; and Section 5 concludes the paper.

II. INCREMENTALLY OPTIMIZED DECISION TREE (IOVFDT)

For noisy big data, a new decision tree induction proposes to use a multi-objective function to balance prediction accuracy, tree size and learning speed. New methods of functional tree leaf improve accuracy. Besides, intuitive graph visualizes tree structure dynamically for massive data analysis.

A. Introduction

How to extract meaningful information from big data has been a popular open problem. Decision tree, which has a high degree of knowledge interpretation, has been favored in many real world applications. However noisy values commonly exist in high-speed data streams, e.g. real-time online data feeds that are prone to interference. When processing big data, it is hard to implement pre-processing and sampling in full batches. To solve this trade-off, we propose a new decision tree so called incrementally optimized very fast decision tree (iOVFDT). Inheriting the use of Hoeffding bound in VFDT algorithm for node-splitting check, it contains four optional strategies of functional tree leaf, which improve the classifying accuracy. In addition, a multi-objective incremental optimization mechanism investigates a balance amongst accuracy, mode size and learning speed. iOVFDT is extension that can be integrated with the latest version of MOA. Besides, iOVFDT has a high extendibility that is able to combine with most VFDT-extended algorithms.

B. Implementation Platform

Massive Online Analysis (MOA) is a framework for datastream mining. It includes a

collection of machine learning algorithms (classification, regression, and clustering) and tools for evaluation. Related to the WEKA project, MOA is also written in Java, while scaling to more demanding problems. In assification part, MOA has simulated decision tree algorithms that can be evaluated by built-in measurements. The well defined experimental platform implements in two modes: graphic interface and command line. iOVFDT aims to train a decision tree with minimum error from big data, even if the data contain imperfect quality like noise and bias data. The incremental decision tree algorithm that inherits the use of Hoeffding bound in VFDT. Besides, four types of functional tree leaf are proposed in iOVFDT package, improving classifying accuracy. Suppose *nijk* is the sufficient statistic that reflects the number of attribute *Xi* with a value *xij* belonging to class *yk*. *i ,j ,k* are the index of attribute *X*, value of attribute *Xi* and class *y* respectively.

***Majority Class* functional leaf:**

$$\arg\max k = \{n_{ij1} \quad \cdots \quad n_{ijk} \quad \cdots \quad n_{ijK}\}$$

***Naïve Bayes* functional leaf:**

$$p_{ijk} = \frac{\mathrm{P}(x_{ij}|y_k)\cdot\mathrm{P}(y_k)}{\mathrm{P}(x_{ij})}, \quad \arg\max k = \{p_{ij1} \quad \cdots \quad p_{ijk} \quad \cdots \quad p_{ijK}\}$$

Weighted Naïve Bayes functional leaf:

$$p_{ijk} = \omega_{ijk}\frac{\mathrm{P}(x_{ij}|y_k)\cdot\mathrm{P}(y_k)}{\mathrm{P}(x_{ij})} \quad where \quad \omega_{ijk} = \frac{n_{ijk}}{\sum_{k=1}^{K} n_{ijk}}$$

$$\arg\max k = \{p_{ij1} \quad \cdots \quad p_{ijk} \quad \cdots \quad p_{ijK}\}$$

***Error-adaptive* functional leaf:**

$$\arg\min \mathrm{F} = \{Err(\mathrm{F}^{MC}, y_k), \quad Err(\mathrm{F}^{NB}, y_k), \quad Err(\mathrm{F}^{WNB}, y_k)\}$$

FMC, *FNB* and *FWNB* require memory proportional to *O (N·I·J·K)*, where *N* is the number of nodes in tree model, *I* the number of attributes; *J* is the maximum number of values per attribute; *K* is the number of classes. *FNB* and *FWNB* are converted from that of *FMC*. So we don't require extra memory for *FEA* respectively. When required, it can be converted from *FM*.

C Extension of MOA (Massive Online Analysis):

Extension of MOA platform, iOVFDT package supports both GUI and command-line mode. What's more, this package adds new functions of ROC statistics and tree visualization to improve the experimental tasks.

iOVFDT applies a multi-objective optimization model to control the node-splitting. After normalizing those three dimensions, the area of this triangle model is defined as $\Phi(TRt)$, where *TRt* is the decision tree structure at timestamp *t*. The range of $\Phi(TRt)$ is within a min-max model that ensures the variances of statistics mean and true mean isn't too big to maintain, where $\mathrm{Min}.\Phi(TRt) < \Phi(TRt^*) < \mathrm{Max}.\Phi(TRt)$. If $\Phi(TRt)$ goes beyond this constraint, the existing model is not suitable to embrace new data that the algorithm should be updated. Therefore, the nodesplitting condition is adaptively optimized that: $\Delta H(Xi) > HB$ or $\Phi(TRt) > Max.\Phi(TRt)$ or $\Phi(TRt) < Min.\Phi(TRt)$.

iOVFDT Package Built-in MOA

After downloading iOVFDT package (*iovfdt.jar*) and required MOA packages (*moa.jar* and *sizeofag.jar*), GUI can be run by typing the command in console:

java -cp iovfdt.jar:moa.jar -javaagent:sizeofag.jar moa.gui.GUI

Three new components are included in *iovfdt.jar*:

- Family of iOVFDT algorithm (four types of optional functional tree leaf)
- Model Evaluation Method (with ROC statistics and tree structure buffer output)
- Decision Tree Visualization (by *prefuse.jar* open source visualization tool)

Example 1a: evaluate model by GUI mode

1. Configure the task as EvaluateModel_ROC;
2. Select iOVFDT as the learning method;
3. Select the training data *nursery_train.arff* and testing data *nursery_test.arff*.
4. Select the location to save tree model buffer to *IOVFDT_SampleTree.txt*;
5. Output the result to *IOVFDT_MOA_2012.txt*;
6. Press button "RUN".

The related output results are shown in Fig 1 and Fig 2.

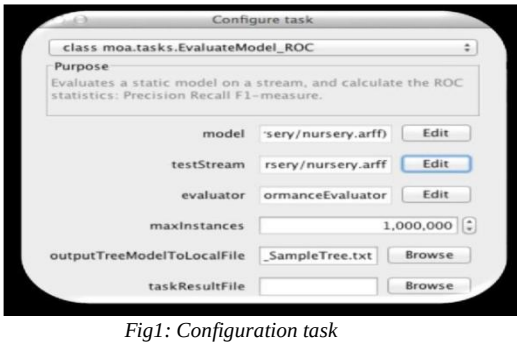


Fig1: Configuration task

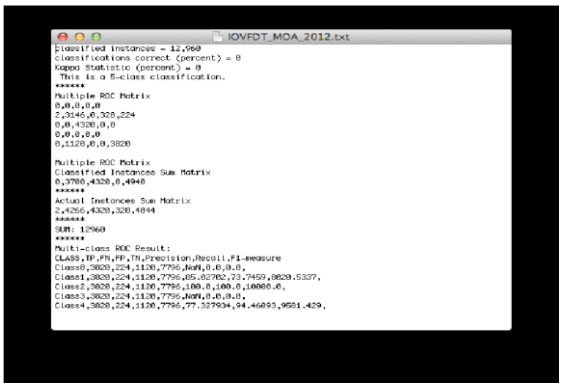


Fig 2: Classifying process

Example 1b: evaluate model by command-line mode

- java –cp iovfdt.jar:moa.jar – javaagent:sizeofag.jar moa.DoTask
- "EvaluateModel_ROC
- -m (LearnModel -l iOVFDT -s
- (ArffFileStream -f
- /Users/data/uci_nursery/nursery_train.arff))-s (ArffFileStream -f
- /Users/data/uci_nursery/nursery_test.arff) -T
- /Users/IOVFDT_SampleTree.txt" >
- "/Users/IOVFDT_MOA_2012.txt".

The related output results are shown in Fig 3, Fig 4 and Fig 5

.

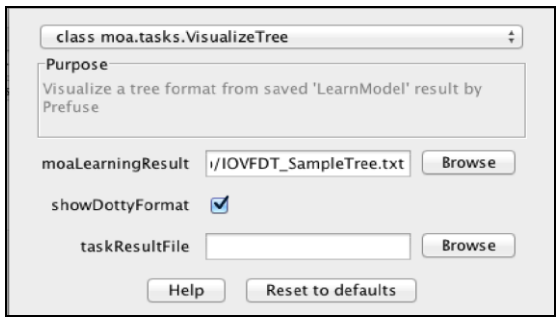


Fig 3: Visualization of Decision Tree

Example 2: visualize decision tree

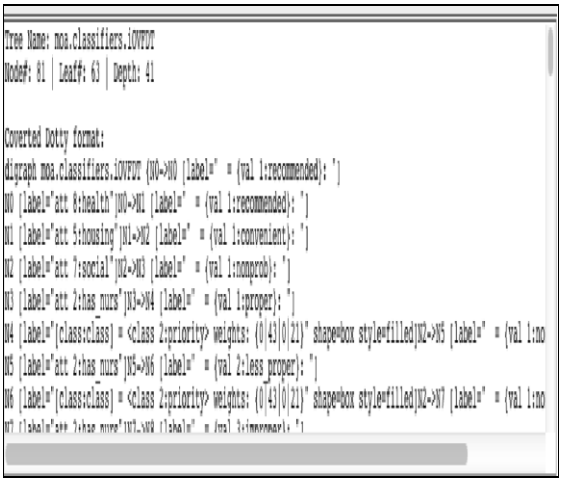
1. Configure the task as VisualizeTree;
2. Select the saved tree buffer *IOVFDT_SampleTree.txt*;
3. *Optionally: show dotty format converting;
4. Press button "RUN".

WITH OTHER ALGORITHMS

In this evaluation, we focus on the one-pass learning performance of various incremental decision trees, in which the algorithm learns and updates the tree

Integration With Other VFDT-extended Algorithms

In source code part, we write comments for each place of modification based on *HoeffdingTree.java*. Generally, seven-part modifications are proposed in *iOVFDT.java*. In each of them, it includes some new class, variables and functions designed for iOVFDT algorithm. When you want to integrate it to other extension of decision tree that uses Hoeffding bound as node-splitting criteria, just add these seven modifications to appropriate places in source codes. It is very easy.



4 :Converted Dotty format

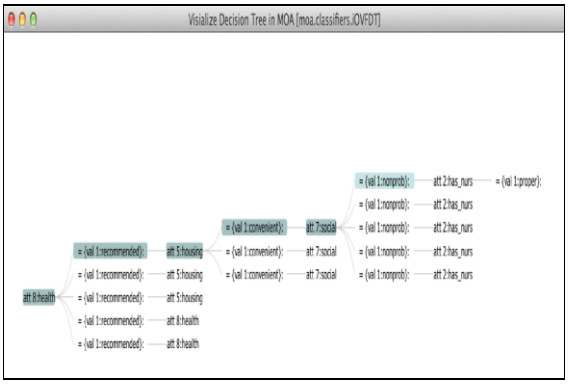


Fig 5: Exploring Decision Tree

III. EVALUATION COMPARISON

model as each new sample arrives. This learning approach is suitable for large volumes of data, or even infinite data. We use both synthetic and real-world data in this evolution. We can configure the level of concept drift in the synthetic data, while we have known concept

drift in the real-world data. The concept drift is visualized by a feature selection method that shows the ranked relationship of each attribute in a class.

A. Datasets and Platform

In the real world, big data may comprise millions of instances that arrive at high speed. To simulate a big data environment, MOA [1] provides a platform in which data arrives continuously. The running environment is a Windows 7 PC with an Intel 2.8 GHz CPU and 8 G RAM. We simulate the *Waveform* data using the MOA Data Generator. The data comprise the records collected from distributed sensors containing 9 numeric attributes, and three types of waveforms as the targeted class. The number of instances is 200,000. We configure the drifting percentage as 0% (no attribute drifts), 25% (5 of 9 attributes drift), and 50% (10 of 9 attributes drift).

window technique with a user pre-defined tie-breaking threshold to deal with concept drift instead of a fixed window size.

ADWIN provides an adaptive-window solution for the concept-drift problem. As ADWIN performs as well as or only slightly worse than the best window for each rate of change in CVFDT [3], CVFDT was not compared in this test.

iOVFDT uses an adaptive tie-breaking threshold and an optimized node-splitting condition. It supervises the model error using a min-max model that reflects the concept drift when a leaf splits into an internal node.

Functional Tree Leaf (FTL) [6] is an improvement for these algorithms, and it is claimed that the error-adaptive FTL obtains better performance than the majority class and naïve Bayes algorithms [1,4]. Hence, we only test the tree inductions with erroradaptive FTL in this paper.

VFDT and ADWIN require a tie-breaking threshold setup, where $K \in (0,1)$. The configurations for VFDT, ADWIN and iOVFDT are δ = 10-6 and *nmin* =200

C. Meansurement

To evaluate the performance of the algorithms we use some common measurements for decision tree learning, as listed in Table II.

TABLE II.MEASUREMENTS

Measure	Specification
Accuracy	The accuracy of classification. #Correctly Classified /#Total InstancesX100%
Kappa	A measure of classifier performance in unbalanced class streams [7].
#Node	The number of internal nodes.
#Leaf	The number of leaves. A rule is a branch from the root to a leaf in the expression of a set of if-then-else rules. #Leaf indicates how many rules are included in a tree mode.
Depth.	The number of nodes that exist in the longest path from the root to a leaf.
MemKB	The memory(KB) used for tree building.
Time	Model training time in seconds. It also reflects the learning speed of an algorithm.

The real-world data are from UCI machine learning. *Cover Type* data were released in 1999, comprising forest land inventory data for natural ecosystem management. Forty-two categorical attributes and 12 continuous attributes are used in the two predictive models to predict seven different cover lands. This is an open dataset for analyzing the concept-drift problem.

B. Evaluated Algorithms

Three typical incremental decision-tree algorithms are tested: VFDT[2], ADWIN[3], and iOVFDT[4].

VFDT pioneered the use of HB for node splitting, but has no criteria for handling concept drift. Its improved version, CVFDT [5], uses a fixed sliding-

IV. RESULTS AND DISCUSSION

A. Synthetic Waveform Concept-drift Data Streams

First, we examine the negative effect of concept drift on decision tree learning. VFDT, with the default value of K, is applied to the waveform data with different percentages of concept drift. Figure 6 shows the test results implemented every 10,000 samples. The figure clearly shows the effect of the concept-drift problem on the accuracy of classification. In Figure 2, we zoom-in on the tests from the 10^4 to the 10^2

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A. Synthetic Waveform Concept-drift Data Streams

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the tests from the 10^4 to the 10^2 samples and drift down to the samples between the10,000th and the 20,000th data records. The accuracy clearly fluctuates when concept drift exists in the data streams. Zooming in reveals some details, such as a crossover between the 25% drift and 50% drift in Figure 7. However, the overall trend shows that concept drift gradually reduces the accuracy.

Figure 6. Negative Effect of Concept Drift on Accuracy

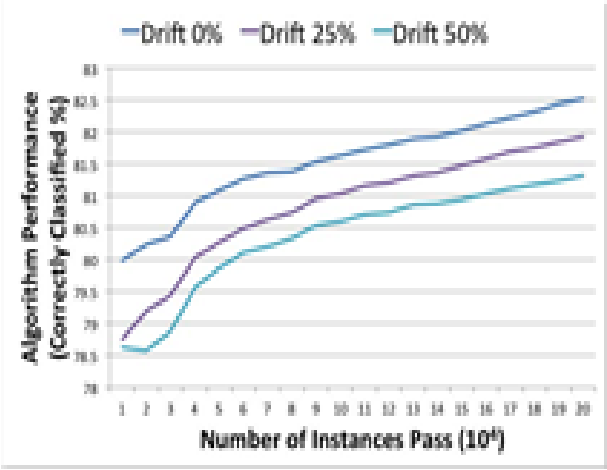

Figure 7. Zoom-in on the Negative Effect of Concept Drift on Accuracy.

Second, we illustrate the performance in terms of accuracy and changing tree size as new data arrive. The results are visualized in Figure 5. Due to the page limitation, the figures are attached at the end of the paper. We use K = 0.05 (a small value and the default setup of MOA), K = 0.50 (the mean value), and K = 0.95 (a large value) in this test. We can see that in general, iOVFDT obtains better classification accuracy than ADWIN and VFDT. The tree size is stable in iOVFDT but varies with different K in ADWIN and VFDT. When K is configured as a small value, the tree sizes of ADWIN and VFDT are smaller than that of iOVFDT, but in the other cases, iOVFDT produces a more compact tree size.

Third, we assess the accuracy, tree structure and memory cost when different K values are applied in VFDT and ADWIN. However, we do not know which value of K is the best until all possible values have been tried. This is not practical in real-time applications. In this test, we use K = 0.05, 0.10, 0.15,…, 0.95. In addition to accuracy, the Kappa statistic [7] and the structural features of the decision tree model, such as the number of nodes, number of leaves and tree depth, are important for evaluating the models. Each path from the root to a leaf represents a rule in the decision tree model, thus the number of leaves reflects the number of patterns in the tree model. In addition, the amount of memory consumed reflects the computation cost of a tree-learning algorithm in the MOA platform. For VFDT and ADWIN, we show the average result for different K values in Table III. iOVFDT generally outperforms VFDT and ADWIN in this test. We use the iOVFDT result as the benchmark, and Table IV shows the improvement compared to VFDT and ADWIN. In this table, we find that iOVFDT improves accuracy by 1-2%, and improves the tree size by more than 15% and 35% compared to VFDT and ADWIN. In addition, iOVFDT consumes less memory and thus reduces the computational cost.

Drift%	Method	Acc%	Kap%	#Node	#Leaf	Depth	MemKB
0	iOVFDT	82.61	73.92	1029	515	23	6,115
	VFDT	81.78	72.67	1229	615	18	7,358
	ADWIN	81.05	71.58	1651	825	22	11,550
25	iOVFDT	81.24	71.87	1057	529	19	5,857
	VFDT	80.73	71.10	1248	625	17	6,918
	ADWIN	80.03	70.04	1647	824	21	10,469
50	iOVFDT	81.33	71.99	1049	525	18	5,886
	VFDT	80.77	71.16	1252	626	16	7,007
	ADWIN	80.07	70.10	1650	825	21	10,807

TABLE III. COMPARISON OF AVERAGE PERFORMANCE OF WAVEFORM

TABLE IV. IOVFDT IMPROVEMENT SUMMARY

Drift%	Method	Acc%	Kap%	#Node	#Leaf	Depth	MemKB
0	VFDT	1%	2%	-16%	-16%	26%	-17%
	ADWIN	2%	3%	-38%	-38%	5%	-47%
25	VFDT	1%	1%	-15%	-15%	12%	-15%
	ADWIN	2%	3%	-36%	-36%	-10%	-44%
50	VFDT	1%	1%	-16%	-16%	10%	-16%
	ADWIN	2%	3%	-36%	-36%	-16%	-46%

V. CONCLUSION

Advances in technology have resulted in the development of new methodologies specifically designed for handling big data problems. Although improvements in computer hardware are fundamental to such developments, a flexible way of solving the hardware bottleneck lies in the improvement of software algorithms. Stream mining is intended to tackle high-speed and changing data on the fly. The one-pass process makes it possible to handle massive and big data, and even infinite data.

A decision tree is an important classification model, which turns the output of mining results into useful intelligence in the form of a tree-like graph. In the past decade, incremental decision trees have become popular for solving big data problems. There are two major types: single-tree algorithms and multi-tree algorithms.

In our previous work, we developed iOVFDT [4, 9], a new incremental tree induction with an optimized node-splitting mechanism for adaptive learning. In this paper, we investigate the phenomenon of concept drift using three representative single-tree induction algorithms. The evaluation results show that iOVFDT obtains good accuracy with a compact model size and less use of memory.

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Investigation on Wireless Charging

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Abstract- Wireless charging is a innovation of transmitting power through an air gap to loads f with the end goal of energy recharging.The current advance in wireless charging procedures and improvement of business items have given a promising option approach to address the energy bottleneck of traditionally convenient battery-controlled gadgets. However the fuse of wireless charging into the existing wireless communication system additionally carry a progression of testing issues with in regards to execution, scheduling and power administration.In this article we introduce far reaching diagram of wireless charging procedures, the improvements in specialized measures and some system applications. Actually the system applications of these generally have a place with medical implantation and versatile chargers for any electrical and electronic loads.Furthermore, we examine open difficulties in executing wireless charging innovations.

Index Terms- Wireless charging, Wireless Power Transfer, Magnetic coupling, Resonance coupling, Radiative/RF radiation, Acoustic Power transfer, Ultrasonic Resonance.

I. INTRODUCTION

Wireless charging is also called as wireless power transfer, is a technology that enables the source to transmit the electromagnetic energy to a electrical load through the air gap without interconnecting cords. This innovation is drawing in an extensive variety of utilizations from a low power tooth brush to high power vehicle in view of its comfort and better client encounter.Presently a-days, this innovation is quickly developing from speculations towards the standard component of a business item particularly if there should be an occurrence of keen contraptions. Many driving organizations like Samsung, Apple, Huwaei, started to discharge new era mobiles which are having in-fabricated wireless charging ability.Presently a-days is quickly developing from speculations towards the standard component of a business item particularly if there should be an occurrence of keen contraptions. Many driving organizations like Samsung, Apple, Huwaei, started to discharge new era telephones which are having in-fabricated remote charging ability.IMS look into

[3] imagined that wireless charging items will be 4.5 billion market by 2016 and it crossed the farthest point they evaluated. Pike inquire about [4] evaluated that the cordless controlled items will be tripled by 2020 getting to be 20 billion market.

Comparing to the traditional charging techniques the wireless charging has the following benefits:

- Firstly, it enhances the user-friendliness as the hassle from connecting cables is expelled
- Secondly, diverse brands and distinctive models can charged by the same charger.
- Thirdly, it enhances the flexibility, especially for the devices for which replacing their batteries or connecting cords .
- Fourthly, it produces better durability (i.e., water proof and dust proof) for contact free devices.
- Fifthly, the wireless charging can give the asked for control by the charging gadgets on request mold and in this manner more adaptable and effective.

Nevertheless, normally wireless charging incurs higher implementation cost contrasted with wired charging. First, a wireless charger should be introduced as a substitution of conventional charging cord. Second, a mobile requires implantation of a remote power reciever. In addition, as wireless chargers regularly create more heat than that of wired chargers, extra cost on making material might be brought about.

The development of wireless charging is mainly going in two directions they are:

1. Radiative wireless charging (RF or radio frequency based wireless charging).
2. Non-radiative wireless charging (coupling based wireless charging).
3. Acoustic wireless charging (ultrasonic resonance based wireless charging)

Radiative wireless charging receives EM waves, precisely RF waves or microwaves for the power exchange through the medium as radiation(given in Section4.2). The energy exchanged relies on upon the electric field of the EM wave which is radiative. Because of the safety issues raised by RF exposure [5] these charging for the most part works in low power area. On the other hand, *non radiative wireless charging* in view of the coupling of the magnetic field of the two coils inside a separation of curls measurement for energy transmission(given in Section4.1). As the magnetic field of the EM wave lessens rapidly than the electric field of the EM wave so in this innovation the power exchange distance is especially restricted. Due non radiative nature, this innovation has been generally utilized as a part of day by day charging exercises.

Aside from the above advances there is a new charging innovation that which was developed as of late. It is '**Acoustic Power Exchange**'. In this really ultrasonics are utilized for the exchange of energy. The guideline required in his innovation was ultrasonic resonance. This innovation has a decent degree going into the market as it can be a proficient and eco-friendly(given in Section4.3).

In this article we expect to give an extensive view on developing wireless charging accusing frameworks along of their principal technologiesand application in correspondence systems. This view covers different real wireless charging advances like inductive coupling, magnetic resonance coupling, RF/microwave radiation, Acoustic(ultrasonic resonance) . The article arrange is as per the following, Right off the bat we will clarify how the wireless charging appeared i.e., history of it and the essential required in cordless power exchange wonder. Besides, the sorts of wireless charging innovations that appeared till now and there separate block diagrams,system flows, functionality, applications, advantages,disadvantages.

II. HISTORY

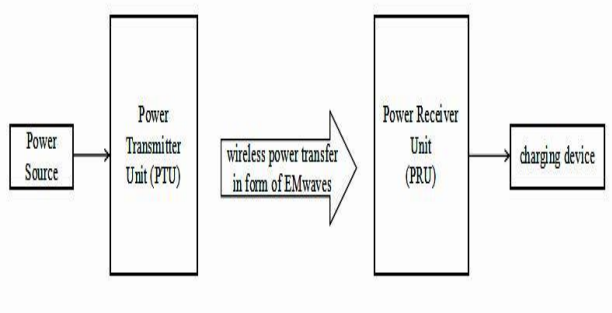
Electromagnetism is the pioneer point of remote power exchange where EM waves convey the energy. The investigation of electromagnetism was begun from1819 when H.C. Oersterd found the electric current createsmagnetic field around it. Later on Ampere's Law, Biot-Savart's Law and Faraday Law had inferred to give some fundamental property of the magnetic field. Tailing them, in 1864 J.C. Maxwell acquainted a few conditions with describe how the electric and magnetic fields are produced and altered each other. Later in 1873 production of Maxwell book ***'A Treatise on Electricity and Magnetism'*** which actually unified the electricity and magnetism[15]. From that point forward the electricity and magnetism are said to be controlled by a same force.

Later on Nicolas Tesla,who is the founder of alternating current electricity, was the first to lead probe wireless power exchange by utilizing microwaves. He concentrated on long-distance wireless power transfer and understood the exchange of microwave signals over a separation around 48 kilometers in1896. Another significant breakthrough was accomplished in 1899 to transmit 10^8 volts of high -frequency electric power over a separation of 25 miles to light 200 bulbs and run an electric motor[16,17]. However, the innovation that Tesla applied must be racked on the grounds that transmitting such high voltages in electric arcs would make appalling impact to people and electrical hardware in the vicinity.Around the same period, Tesla additionally made an extraordinary commitment to advance the attractive field progress by presenting the well known "Tesla coil", illustratedin 1901, Tesla developed the Wardenclyffe Tower, appeared into exchange electrical energy without cords/wires through the Ionosphere. In any case, because of innovation confinement (i.e., low system efficiency because of large scale electric field), the thought has not been generally additionally created and popularized. Beside Tesla, W.C.Brown, who is the practical engineer invented a component called Rectenna. This component is utilized to exchange the microwave power into electricity[20]. Advance improvements are taken in the rectenna configuration to get high power. This is the historical backdrop of wireless charging innovation.

III. BASIC PRINCIPLE OF WIRELESS CHARGING

Wireless power transfer is process which is almost similar to the basic communication system process. Power is needed to be transferred from transmitter to the reciever by using different technologies or schemes(i.e., coupling method, RF method) which is as similar to that of the message signal transfer from the transmitter to the reciever in the basic communication system where we use different types of modulation schemes which are used to transfer the message signal effectively. In a simple way to say the wireless charging technologies are the analogous of modulation schemes in the communication systems

ig.1. Block diagram of basic wireless charging



e figure1 is the basic block diagram of the basic wireless charging technology. The primary square speaks to the power source which is for the most part known for all which gives the electrical power. The following square is the Power Transmitting Unit (PTU) which is the comprises of energy amplifier,matching circuits, A-D converters, correspondence module and resonator (primary) or transmitter. In this square the electrical energy changed over in type of EM waves where the EM waves convey the electrical energy to the following piece through the air gap. This PTU square has a similar functionality of the modulator in the communication system.

Alongside PTU ,we have Power Receiving Unit (PRU) which comprises of resonator(secondary) or recipient, rectifiers, DC -DC converters, communication module.

Design of Prestressed Concrete Bridge Cross Over a Canal at Gandhi Janasangam

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Abstract-

The present project is about the design Prestressed concrete two lane Road Bridge instead of single lane bridge over Kanigiri main canal at Gandhi Jana Sangam, which is in a condition of collapsing state. The bridge is damaged at several places and cracks appeared. The bridge was constructed in 1886 (i.e., 130 years ago). This bridge is the bomby highway bridge it is connected to different places such as Sangam, Atmakur, Udaygiri, Pamuru, Proddutur, Badvel, Bellary, Kurnool, Guntakal, Mantralayam, Hubli. First we went to the site and observed the bridge. We observed the bridge thoroughly and found cracks at several places. We did surveying to know the specifications of the bridge. We took photograhs of the damaged portion of the bridge. Then we decided to design a two lane pre-stressed concrete bridge in order to meet the traffic requirement as it is a single lane bridge with heavy traffic movement.

The concept of pre-stressed concrete appeared in the year 1888. In this present engineering technology durable and sustainable bridges play an important role for the socioeconomic development of the nation. Owners and designers have long recognized the low initial cost, low maintenance needs and long life expectancy of pre-stressed concrete bridges. This is reflected in the increasing market share of pre-stressed concrete, which has grown from zero in 1950 to more than 55 percent today. This growth continues very rapidly, not only for bridges in the short span range, but also for long spans in excess of length which, here therefore, has been nearly the exclusive domain of structural steel. Many bridge designers are surprised to learn that precast, prestressed concrete bridges are usually lower in first cost than all other types of bridges coupled with savings in maintenance, precast bridges offer maximum economy. The precast pre-stressed bridge system offered two principal advantages: it is economical and it provides minimum downtime for construction. Pre-stressing is the application of an initial load on the structure so as to enable the structure to counteract the stresses arising during its service period.

I. INTRODUCTION

A bridge is a structure built to span physical obstacles without closing the way underneath such as a body of water, valley, or road, for the purpose of providing passage over the obstacle. There are many different designs that each serve a particular purpose and apply to different situations. Designs of bridges vary depending on the function of the bridge, the nature of the terrain where the bridge is constructed and anchored, the material used to make it, and the funds available to build it.

Components of a Bridge:

The main components of a bridge are: a) Super structure

b) Bearings, bed blocks

c) Substructure

Components which lie above the level of bearings are grouped as SUPERSTRUCTURE, these parts which lie below the level of bearings are classified as SUBSTRUCTURE.

Super structure: Comprises of decking consisting of bridge floor (a slab or a plate or a Grid), girders or trusses, cables, etc., supporting the floor, cables connected to pylons and the deck as in cable-stayed bridges, handrails, guard stones etc.

Bearings : The bearings transmit the load received from the decking on to the substructure and are provided for distribution of the load evenly over the substructure material, which may not have sufficient bearing strength to bear the super structure load directly. Bearings also facilitate the horizontal and angular deformation as per the analysis.

Sub structure: Piers, Abutments, wing walls, return walls and foundations for the same. The foundations may be of the open type, pile foundations and well or caisson foundations.

River training works like revetment of slopes at abutments, appprons at bed level. Approaches to the bridge to connect it properly to the lead embankments or roads on either side.

BRIDGE INVESTIATION

came to know that the bridge over Kanigiri main canal at Gandhi Jana Sangam, is in a condition of collapsing state. The bridge was constructed in 1886 (i.e., 130 years ago). The bridge is damaged at several places and cracks appeared.

This bridge is the part of bomby highway and it is way for different places such as Sangam, Atmakur, Udaygiri, Pamuru, Proddutur, Badvel, Bellary, Kurnool, Guntakal, Mantralayam, Hubli.

OBSERVATION OF THE BRIDGE:

First we went to the site and observed the bridge. We observed the bridge thoroughly and found

cracks at several places and conducting non distractive test like rebound hammer test. In this time e observe bridge is near collapse condition and it cannot do any repair of this bridge.

Specifications of at present Bridge:

Length of the bridge = 60 m

Width of Bridge = 6 m

Single Lane Bridge No.of Spans = 5

Figure 1.

Figure2.

Figure 3.

Figure 4.

II. FACTORS INFLUENCING SELECTION

The following are among the more important factors that should be considered when selecting the type of Road Bridge to be constructed at a particular site:

- Road geometry
- Bridge length
- Span length and configuration
- Method of construction
- Economics
- Durability/maintenance
- Aesthetics
- Possible future widening
- Type of crossing
- Site and foundation conditions
- Clearances (high/wide load route)

It should be recognised, however, that the above list is not exhaustive and the items are interrelated and selection of a bridge type should involve consideration of all relevant factors.

PRE STRESSED CONCRETE BRIDGE

Bridge is life line of road network, both in urban and rural areas. With rapid technology growth the conventional bridge has been replaced by innovative cost effective structural system. One of these solutions present a structural PSC system that is T-Beam. PSC T-beam, have gained wide acceptance in freeway and bridge systems due to their structural efficiency, better stability, serviceability, economy of construction and pleasing aesthetics.

PSC beam design is more complicated as structure is more complex as well as needed sophisticated from work. In the place of PSC T-beam if we talk about RCC T- beam geometry is simple and does not have sophisticated in construction. Bridge design is an important as well as complex approach of structural engineer. As in case of bridge design, span length and live load are always important factor. These factors affect the conceptualization stage of design. The effect of live load for various span are varied.

In shorter spans track load govern whereas on larger span wheel load govern. Selection of structural system for span is always a scope for research. Structure systems adopted are influence by factor like economy and complexity in construction. The 24 m span as selected for this study, these two factor are important aspects. In 24 m span, codal provision allows as to choose a structural system i.e. PSC T- beam. This study investigates the structural systems for span 24 m and detail design has been carried out with IRC loadings and IS code books. The choice of economical and constructible structural system is depending on the result.

BRIDGE LOADING STANDARDS

Evolution of Bridge Loading Standards:

The first loading standard (IRC: 6) in India was published by the Indian Roads Congress in 1958 and subsequently reprinted in 1962 and 1963. The Section-II of the code dealing with loads and stresses was revised in the second revision published in 1964. The metric version was introduced in the third revision of 1966. The IRC: 6

Code has been revised to include the combination of loads, forces and permissible stresses in the Fourth revision published in 2000s

PRE-STRESSED CONCRETE BRIDGES

Pre-stressed concrete is ideally suited for the construction of medium- and long-span bridges. Ever since the development of pre-stressed concrete by Freyssinet in the early 1930s, the material has found extensive application in the construction of long-span bridges, gradually emplacing steel which needs costly maintenance due to the inherent disadvantages of corrosion under aggressive atmospheric conditions. Solid slabs are used for the span range of 10 to 20 m. while T-beam slab decks are suitable for spans in the range of 20 to 40 m. Single or multi cell box girders ac preferred for larger spoils of the order of 30 to 70 m. Pre-stressed concrete is ideally suited for long -span continuous bridges in which precast box girders of variable depth are used for spans exceeding 50 m. Pre-stressed concrete has been widely used throughout the world for simply-supported, continuous, balanced cantilever, suspension, hammer-head and bridle- chord type bridges in the span range of 20 to 500 m.

III. DESIGN OF BRIDGE COMPONENTS:

(A) Design of Post tensioned Pre-stressed Concrete continuous beam and slab bridge deck for a highway crossing:

Two continuous spans of 30 m each.

Width of road =2 lane (7.5 m).

Kerb on each side = 1 m.

For pre stressed concrete girders adopt M-60 grade concrete with cube strength transfers as 40 N/mm2.

For cast in-situ deck slab adopt M-20 grade concrete.

High tensile standards of 15.2 mm diameter conforming to IS:6006-1983 and FE-415 HYSD bars are used.

Live load = IRC class A-A tracked vehicles

(A) CROSS SECTION OF DECK:

4 main girders are provided at 2.5 m intervals

Thickness of deck slab = 250 mm

Wearing coat = 70 mm

Kerb 1000 mm wide by 300 mm deep are provided at each end.The overall depth of main girders is assumed at 50 m per meter of span

Overall depth of girder = 50×430 = 1500 mm

Thickness of top and bottom flange is 800 mm

Thickness of web is = 200 mm

The main girders are pre cast and the slab connecting the girder is cast in-situ

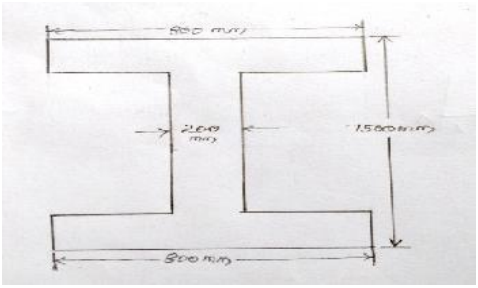

Figure 5.

Design of interior slab panel:

The slab panel 2.5 m by 5 m is supported on all four sides **Loads:**

Dead load of slab = 1×1×0.25×24 = 6.00 KN/m²

Dead load of wearing coat = 0.08×22 = 1.76 KN/mm²

Total dead load = 7.76 KN/m² **Bending Moment:**

Live load is IRC class A-A tracked vehicle alone wheel is placed at the center of panelAs the slab is continuous design B.M = 0.8 Mb and ML.

Design the including impact and continuity factor is given by

Mb (short span) = (1.25×0.8×35.35) = 35.35 KNm
ML (long span) = (1.25×0.8×12.14) = 12.14 KNm

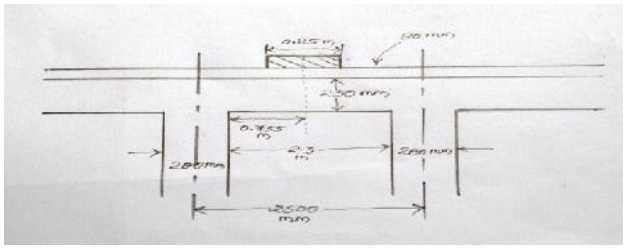

Figure 6.

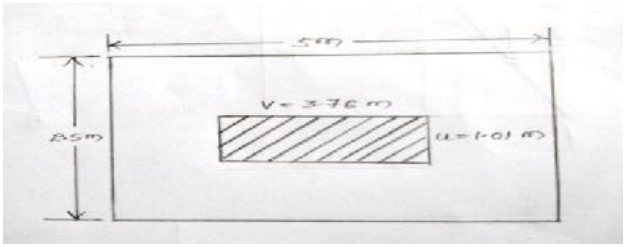

Figure 7.

Shear Force:

Dispersion in the direction of span = [0.85+2(0.08+0.25)] = 1.51 m

For maximum shear load is kept such that the whole dispersion is in span . the load is kept at (1.51/2) = 0.755 m from the edge of the beam

Shear force / meter width = 71.150[2.3-0.755]/2.30 = 47.794 KN

Shear force with impact = 1.25×47.794 = 59.7 KN

Dead Load and Bending Moments and Shear Forces:

Design B.M including continuous factor MB = 0.8×4.70 = 3.76 KN m

ML = 0.8×1.65 = 1.32 KNm Dead load shear force = 0.5×7.76×2.3 = 8.944 KN

Total Design Moment and Shear Force:

Total MB = (35.35+3.76) = 39.1 KNM

ML = (12.14+1.32) = 13.46 KNM Total shear force Vx = 67.674 KN

Effective Depth:

$D = \sqrt{M/QB}$

$= \sqrt{39.11 \times 10_5 \times 10/0.762 \times 1000}$

= 226 mm≈ 230 mm

Adopt effective depth d = 230mm

Check for shear:

Nominal shear = Jv = V/bd=0.242 N/mm2

Jc = 0.25 N/mm² for a slab of overall depth 250mm read the value of constant k= 1.1 from table 3.10

The permissible shear stress in concrete slab = kJc = 0.275 As $\zeta v < \zeta c$ Hence shear is safe.

Area Of Steel :

AST = [M/Σst×jd]

= 938 mm²

Use 12mm diameter bars

Spacing s = 1000ast/Ast

= [1000×Π/4×12²]/938

= 120.57mm≈ 120mm c/c

Provide 12 mm bars at 120 mm centers

Effective depth along long span using 12 mm diameter bars

Use 10mm diameter bars at 150mm centers

(B) DESIGN OF GIRDER

Cross section of deck:

Four main girders are provided at 2.5 m intervals

Thickness of deck slab is 250 mm

Wearing coat = 80 mm

Kerb 1000 mm wide by 300 mm deep is provided at each end.

Spacing of girders =5 m

The overall depth of main girders is assumed at 50 mm per meter of span.

Overall depth = 50×30 =1500 mm

Thickness of top and bottom flanges = 350 mm

Width of flange = 600 mm

Thickness of web = 200 mm

Section properties of main girders:

Cross sectional area A = 0.58 m²

Second moment of area I= 1.516×1011 mm4 =0.1509 m4 yb = yt = (1500/20) = (1.5/2) = 0.75 m

Section modulus = ZB = Zt = (I/fb (or) yt) = 0.201×109 mm³ The main girders are precast and the deck slab is cast insitu.

Loads acting on main girder:

The total dead load (g) = 20 + 14.5 + 5 = 39.5 ≈ 40 KN/m

Dead Load Moment and Shear Force:

Dead load moment at mid support section MgB = 4500 KNm

Dead load moment at mid span section MgD = 2556 KNm Dead load shear is maximum near support section and is computed as

Vg = 0.62×g×L

= 744 KN

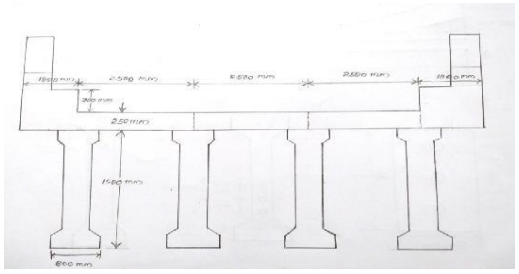

Figure 8. Bridge elevation

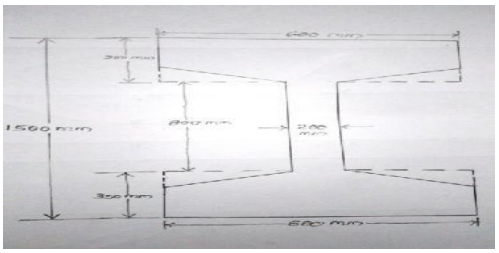

Figure 9. Girder cross section

Live load bending moment in girder:

Referring to the influence line for bending moment at mid span section D.

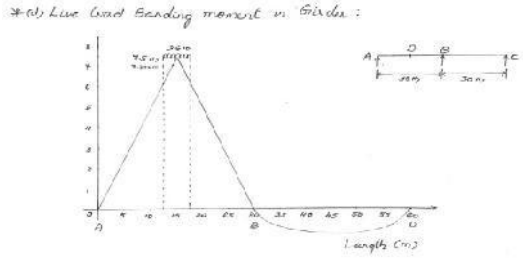

Figure 10.

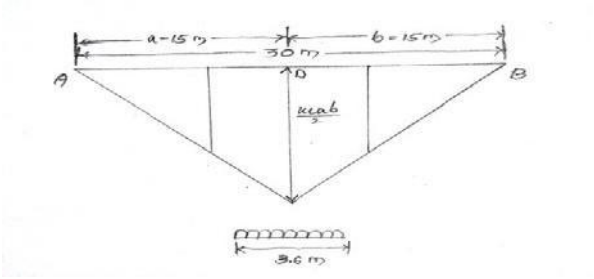

Figure 11.

The maximum live load moment at mid span is computed as MD = (7.5+7.392)/2 ×700

= 5212.2 KNm

Similarly from figure using the influence line for bending moment at mid support. The live load bending moment at support B is computed as

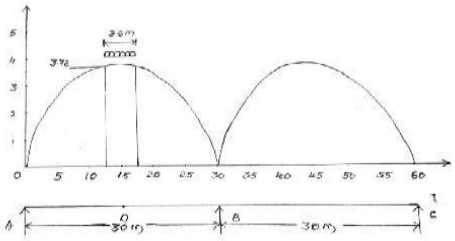

Figure 12.

MB = 3.72 × 700 = 2604 KNm

The live load bending moment including the reaction factor and impact factor for the exterior girder are

MqD = 0.382×1.1×5212.2 = 2190.166 KNm

MqB = 2604×1.1×0.38= 1094.20 KNm

Live load shear forces in girder:

The maximum live load shear develops in the interior girders when the IRC class AA loads placed near girder.

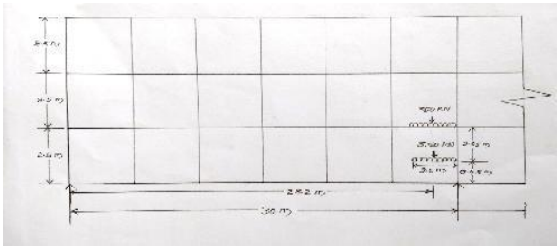

Figure 13.

	SHEAR FORCES(Inner girder)			
	Dead load shear force (V_g)	Live load shear force (V_q)	Total shear force (V_g+V_q)	Required($1.5V_g+2.5V_q$)
Near mid support section	744 KN	427.042 KN	1171.042 KN	1116+1067.605 =2183.605 KN
	BENDING MOMENTS (OUTER GIRDER)			
	Dead load bending	Live load bending moment (M_q)	Total working load bending moment(M_g+M_q)	Required bending moment ($1.5M_g+2.5M_q$)
Mid span section (D)	2556	2190.166KNm	4746.166 KNm	3834+5475.415 9309.415 KNm
Mid support section (B)	4500	1094.20 KNm	5594.2 KNm	6750+2735.5 9485.5 KNm

Table 1.

Check for minimum section modulus:

$M_d = (M_g+M_q)$ = 4500 + 1094.20 =5594.2KNm

$f_{br} = (\eta f_{ct} - f_{tw})$ = 16N/mm²

$f_{int} = \left(\frac{ftw}{\eta}\right) + \left(\frac{Md}{\eta Zd}\right)$ == 34.789 N/mm²

$Z_b \geq \left(\frac{Mq+(1-\eta)Mg}{fbr}\right)$

$Z_b \geq 0.124\times10^9$ mm³ < 0.201×10^9 mm³

Prestressing force:

Hence the provided section is adequate. For the two continuous spans AB and BC a concordant cable profile is selected such that the secondary moments are zero Assume cover is 250 mm

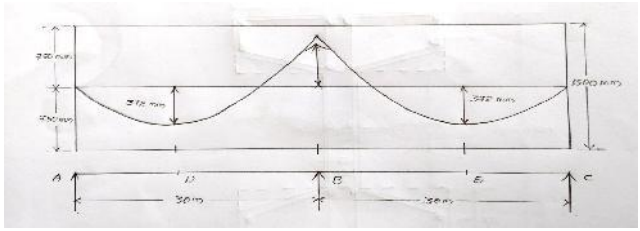

Figure 14.

Prestressing force is obtained from the relation:

$$P = \frac{A \times fint \times ZB}{Zb + Ae}$$

= 8258.655 KN

Using Freyssinet system anchorage type 19k -15 (19 standards on of 15.2mm diameter) in 95mm cable duct. Force in each cable = 19×0.8×260.7 = 39.62 KN

Provide 3 cablescarrying an intial prestressing force

P = (3×3962) = 11886 KN

Area of each strand of 15.2 mm diameter= 140 mm²

Area of 19 strands in each cable = 19×140

= 2660 mm²

Total area in 3 cables Ap= 3×2660 = 7980 mm²

The cables are arranged in a parabolic concordant profile so that their centroid has an eccentricity of 500mm towards top fiber at mid support B are an eccentricity of 372 mm towards the bottom at mid span section D.

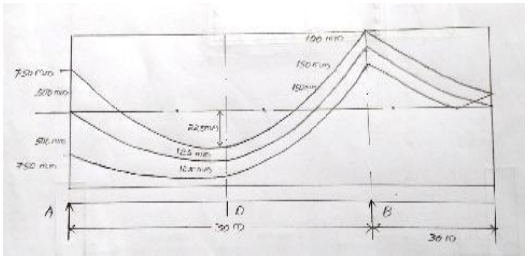

Figure 15.

Center Of Span Section:

(P/A) = (11886×10^3)/ (0.58×10^6) = 20.49mm²

(Pe/Z)= (11886×10^3×372)/0.201×10^9 = 21.99mm²

(Mg/Z)= 2556×10^6/0.210×10^9 = 12.716mm²

(Mq/Z) = 2190.166×10^6/0.201×10^9 = 10.896mm²

At the stage of transfer

At top σ_t = (P/A - Pe/Z □ Mg/Z) = 11.216mm² At bottom σ_b = (P/A + Pe/Z – M_g/Z) = 29.764N/mm²

At the service load state σ_t = (η(P/A) η(Pe/Z)□(Mg/Z)□(Mq/Z)) = 22.412 mm² σb = (η(P/A) □(Pe/Z) –(Mg/Z) – (Mq/Z)) =

10.328N/mm²

Mid Support Section:

P/A = 20.49 N/mm² Pe/Z = 21.99 N/mm² Mg/Z = (4500×10^6)/0.201×10^9 = 22.38 N/mm² Mg/Z = (1094.20×10^6)/0.201×10^9 = 5.443 N/mm²

At the stage of transfer σt = (20.49 + 21.99 – 22.38) = 20.1 N/mm² σb = (20.49 – 21.99 + 22.38) = 20.88 N/mm²

At the service load stage

σt =(0.8(20.49+21.99) – 22.38 – 5.443)= 6.161N/ mm²

σb = (0.8(20.49 – 21..99) + 22.38 + 5.443) = 26.623 N/mm²

The stresses are within permissible limits.

The ultimate strength is nearly equal to the mid span.

A_{us} = (M_{bal}/0.87f_y(d-0.5D_f)) = 5336.46 mm²

Provide 9 bars of 25mm dia (A_s = 5750 mm²)

Check for ultimate shear strength:

Design shear force = V_u = 2183.605 KN

According to IRC: 18 – 1985 the ultimate shear resistance of the support section un cracked in flexure is given by

V_{cw} = 742.824KN < 2183KN

Unbalance shear = 2183 – 742.824 = 1440.176KN

Using 16mm diameter 2 legged stirrups at a spacing of 80mm centers near supports gradually increased to 200mm towards the centre of span.

Design of end blocks:

Solid end blocks of 600mm by 1500mm are provided for a length of 2m from each of the two end faces.

Brusting tension F_{bst} = 0.17×3962 = 673.54KN Use Fe-415 HYSD bars

A_{st}= $\frac{673.54\times10^3}{0.87\times415}$ = 1865.50mm²

Provide 16mm diameter bars at 150mm centers in the horizontal plane distributed in the region from 0.2y_o to 2y_o.

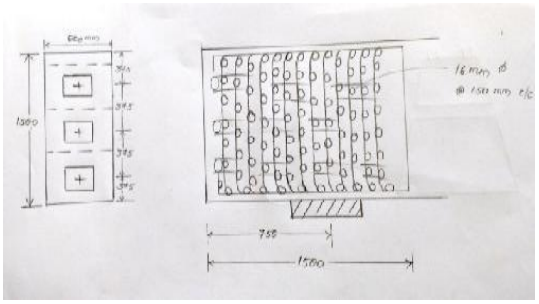

Figure 16.

Maximum and minimum stresses are in table:

Table 3.

(C) DESIGN OF PIER:

Dead load from each pier = 40KN

Reaction due to live load on one span = 700 KN

Breaking forces = 140KN

Wind pressure on the pier = 2.4KNm²

Materials of pier 1:3:6 cement concrete

Density of concert = 25KN/m²

S:NO	TYPE OF LOAD	STRESSES	
1.	Dead load and self weight	203.13	203.13
2.	Buoyancy	_	-76.49
3.	Eccentric live	55.56	55.56
4.	load Breaking force	109.8	109.8
5.	Wind pressure	8.30	8.30

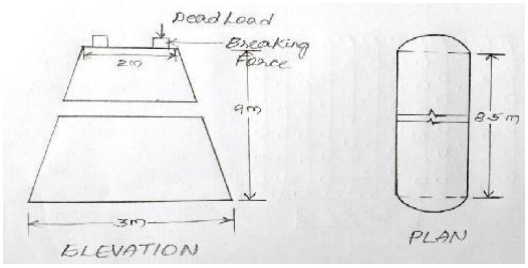

Figure 17.

Maximum stress 376.79

00.39

Minimum stress 258.69 182.29

(D) DESIGN OF ABUTMENT:

Dead and live load of the abutment = 700+40 = 740KN

Soil bearing capacity of soil = 150KN/m²

Vertical load due to earth = 15KN

Coefficient of friction between masonry of soil = 0.5

Density of masonry = 25KN/m²

Horizontal load = 20KN

Total vertical forces (W)= W1+W2+W3+W4 = 1317.5KN

Consider the moment of all the forces at A

M = (740×1)+(450×1)+(112.5×2.33)+(15×2.67) – (20×2) = 1452.18KN

Maximum and minimum stresses = $\frac{W}{b}(1 \pm \frac{6e}{b})$

= $\frac{1317.5}{3}(1 \pm \frac{6\times0.4}{3})$

σ_A = 790.5KN/m² σ_B= 87.83KN/m²

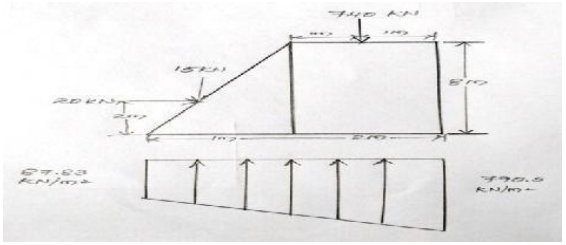

Figure 18.

Factor of safety = $\frac{\mu w}{\sum H}$ = $\frac{658.75}{20}$ = 32.94 > 2

Hence the abutment has sufficient factor of safety against sliding.

(E) ELASTOMETRIC PAD BEARING:

Maximum dead load reaction for bearing = 40KN

Maximum live load reaction for bearing = 70KN

Longitudinal frictional force for bearing = 45KN (Assume)

Effective span of the girder = 30m

Estimated rotation at bearing of the girder due to dead and live load = 0.002 radians

Total estimated shear stress due to creep, shrinkage and temperature = 6×10^{-4}

Concrete for beam and bed block = M_{20} grade

Allowable contact pressure (σ_c) =0.25×20×$\sqrt{2}$ = 7.07N/mm²

Effective bearing area = $\frac{\text{Maximum working load}}{\text{Allowable contact pressure}}$

= $\frac{Nmax}{\sigma c}$ = $\frac{740\times10^3}{7.07}$ = $10.46\times10^4 < 15\times10^4$

Hence it is safe.

Hence it is safe.

Bearing stress) = $\frac{Load}{Area}$ (α_m = 4.67N/mm²

Refer Table = $\frac{700\times10^3}{15\times10^4}$ 15.2 and IRC 83 clause 916.2

Elastomer layer (h_i) = 10mm

Thickness of outer layer (h_e) =5mm

Thickness of steel laminates (h_s) =3mm

Side covering (C) = 6mm

Adopt 3 laminates with 2 internal layer

Therefore, Total thickness of elastometric pad (h_o) = ($2\times h_e + 2\times h_i + 3\times h_s$)

= (2×5 + 2×10 + 3×3) = 39mm

Total shear stress = 0.915+0.53+0.765 = 2.21 < 5N/mm² Shear stress is within permissible limit.

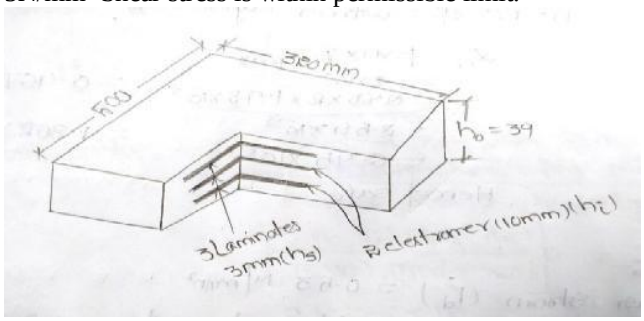

Figure 19.

IV. CONCLUSION

The following conclusions are drawn upon:

Bending moments and Shear force for PSC T-beam girder are lesser than RCC T-beam Girder Bridge. Which allow designer to have lesser heavier section for PSC T-Beam Girder than RCC T-Girder for 60 m span

Construction of this bridge is reducing the traffic problems at peak hours.

Moment of resistance of steel for both has been evaluated and conclusions drawn that PSC T-Beam Girder has more capacity for 60 m and more than 60 m of span.

Shear force resistance of PSC T-Beam Girder is more compared to RCC T- Girder for 60 m span.

As we go Total Super structure of a Bridge Project the Quantity of steel and the Cost of concrete for PSC TBeam Girder is less than RCC T-Beam Girder as quantity required by T-beam Girder.

Deflection for PSC T-beam Girder is less than RCC TBeam Girder Bridge.

Durability for PSC T-beam Girder is more than RCC TBeam Girder Bridge.

V. CODES & STANDARDS

The design of various components of the structure, in general are based on provisions of IRC/IS Codes.Wherever IRC code is silent, reference is made to other Indian/International codes and standards. The list of IRC Codes (latest revisions) given below will serve as a guide for the design of structures.

1) IRC: 5-1998 Standard Specifications and Code of Practice for Road Bridges, Section I – General Features of Design.

2) IRC: 6-2000 Standard Specifications and Code of Practice for Road Bridges, Section-II – Loads and Stresses.

3) 5.

4) IRC: 21-2000 Standard Specifications and Code of Practice for Road Bridges, Section-III – Cement Concrete.

5) IRC: 18-2000 Design Criteria for Pre-stressed Concrete Road Bridges (Post Tensioned Concrete) (Third Revision).

6) IRC: 22-1986 Standard Specifications and Code of Practice for Road Bridges, Section-VI – Composite Construction..

7) IS: 6006-1983 Indian Standard Specification For Uncoated Stress Relieved Strand For Pre-Stressed Concrete.

REFERENCES

[1] Bridge Engineering by V.V.Sastry

[2] Prestressed Concrete by N Krishna Raju

[3] Bridge engineering by N Krishna Raju

[4] Miyamoto proposed in 1997 to study the effect of prestressing using external tendons to strengthen the Misaka Bridge in Hyogo Prefecture, JapanDezi (2002) proposed a model for analyzing the nonlinear behaviour of steel-oncrete composite beams prestressed by external slipping cables, taking into account the deformability of the interface shear connection.

[5] Analysis of prestressed composite beams using both elastic assumptions and approximate ultimate strength methods was also discussed in papers by Szilard and Hoadley(1963).

[6] Stras (1964) tested three simply-supported, prestressed composite beams, all of them prestressed along their full length with 10mm diameter high-strength tendons at an eccentricity of 22mm from the tension flange

[7] Ng Chee Khoon (1997) tested a series of 18 beams ranging from 1.5m to 9m using L/dpso ratio between 15 and 30 for their second order effect.