WDEE 18

12th November ~ 14th November; 2018

NATIONAL CONFERENCE

ON

Web Designing and Electrical Engineering

Conference Proceeding

NIT, Bhubaneswar

Nalanda Institute of Technology, Bhubaneswar

Organized by

Department of Electrical Engineering And Computer Science And Engineering

Nalanda Institute of Technology

Bhubaneswar - 752050

Web Designing and Electrical Engineering

20th Nov. – 23rd Nov. 2018

CONFERENCE PROCEEDING

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ABOUT THE CONFERENCE

Science and technology has continuously evolved through decades. WDEE 2018 was organized in Nov - 2018 and was successful in capturing the development of web designing and electrical engineering. Department of Electrical Engineering And Computer Science And Engineering, NIT, Bhubaneswar is organizing WDEE 2018 to showcase recent advances in materials processing and applications. In keeping up with the research interest of the materials community, WDEE 2018 will provide an update on scientific and technical aspects covering broad areas of interests in engineering construction materials, processing and applications.

ABOUT THE DEPARTMENT

The Department of Electrical Engineering And Computer Science And Engineering has been in existence since 2007 with the inception of the college with an initial intake capacity of 60 each and is producing high quality technical manpower needed by industry, R&D organizations, and academic institutions. The Department has full fledged faculty members who are specialized in the fields of design, thermal, production and CAD/CAM. Laboratories are fully equipped to enhance the knowledge of the student, periodic industry trips and visits to various project sites are arranged. Special lectures and seminars are held on a frequent basis to assist them tailor in their particular areas of interest and trying hard to transform students of even mild talent to professionals in the web designing and electrical engineering. Already more than 900nos of alumni have been produced so far, placed in different Government, private, Public & other sectors and some of them have pursued higher studies. However, with the progress of time, many more frontier areas of mechanical engineering have been taken up for active research.

ABOUT THE INSTITUTE

Established in the year 2007, Nalanda Institute of Technology (NIT) is one of the premier engineering colleges in the self-financing category of Engineering education in eastern India. It is situated at temple city Bhubaneswar, Odisha and is a constituent member of Nalanda Educational Trust. This reputed engineering college is accredited by NAAC, UGC and is affiliated to BPUT, Odisha. NIT aims to create disciplined and trained young citizens in the field of engineering and technology for holistic and national growth.

The college is committed towards enabling secure employment for its students at the end of their four year engineering degree course. (The NAAC accreditation in the year 2018 vouches for the college's determination and dedication for a sustainable learning environment). The academic fraternity of NITT is a unique blend of faculty with industry and academic experience. This group of facilitators work with a purpose of importing quality education in the field of technical education to the aspiring students. Affordable fee structure along with approachable location in the smart city of Bhubaneswar, makes it a preferred destination for aspiring students and parents.

The Institute works with a mission to expand human knowledge beneficial to society through inclusive education, integrated with application and research. It strives to investigate on the challenging basic problems faced by Science and Technology in an Inter disciplinary atmosphere and urges to educate its students to reach their destination, making them come up qualitatively and creatively and to contribute fruitfully. This is not only its objective but also the ultimate path to move on with truth and brilliance towards success.

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VICE CHAIRMAN MESSAGE

On behalf of the Organizing Committee, it is my great pleasure to welcome you to National Conference on Web Designing and Electrical Engineering (WDEE - 2018). In our endeavour to raise the standards of discourse, we continue to remain aware in order to meet with the changing needs of our stakeholders. The idea to host the WDEE - 2018 is to bring together Researchers, Scientists, Engineers, Scholars and Students in the areas of Electrical Engineering And Computer Science Engineering. The WDEE - 2018 Conference will foster discussions and hopes to inspire participants from a wide array of themes to initiate Research and Development and collaborations within and across disciplines for the advancement of Technology. The conference aims to bring together innovative academic experts, researchers and Faculty in Electrical Engineering And Computer Science Engineering to provide a platform to acquaint and share new ideas. The various thematic sessions will showcase important technological advances and highlight their significance and challenges in a world of fast changes. I welcome all of you to attend the plenary sessions and invite youto interact with the conference participants. The Conference Committees will make any possible effort to make sure that your participation will be technically rewarding and a pleasurable experience.

I am looking forward to meeting you in during WDEE - 2018 and to sharing a most pleasant, interesting and fruitful conference.

With regards,

Prof. Malaya Kumar Padhi
Vice. Chairman
Nalanda Institute of Technology, Chandaka
Bhubaneswar, Odisha

PRINCIPAL'S MESSAGE

It gives me great pleasure to welcome you to the National Conference on " Web Designing and Electrical Engineering " (WDEE - 2018), which will take place from November 12–14, 2018.

This conference's goal is to spread knowledge among other educated people in addition to discussing current, hot topics in a certain field. Dramatic advancements have been made in engineering and technology over the years. I am hoping that WDEE - 2018 will turn out to be the most beneficial national conference devoted to showcasing the newest developments in engineering and technology.

We have asked eminent specialists to participate in the Technical Programs in order to give an exceptional technical level for the conference presentations. Technical seminars and keynote plenary sessions will be held.
I hope WDEE - 2018 will make you aware of state-of-the art systems and provide a platform to discuss various emerging technologies in Electrical Engineering And Computer Science Engineering.

With regards,

Prof. (Dr.) N. Sutar
Principal Nalanda Institute of Technology, Chandaka
Bhubaneswar, Odisha

CONVENER'S MESSAGE

National Conference on " Web Designing and Electrical Engineering" (WDEE 2018) is a prestigious event jointly organized by Electrical Engineering And Computer Science Engineering Department with a motivation to share a progress in recent technologies. The objective of WDEE 2018 is to present the latest research and results of scientists (preferred under graduate and post graduate students, research scholars, post-doc scientists, academicians and working professionals) related to the subjects of Electrical Engineering And Computer Science Engineering. The conference will provide with paper presentations and research paper presentation by prominent speakers who will focus on related state-of-the-art technologies in the areas of the conference.

I wish all the success to the conference WDEE 2018.

With regards,

Prof. Sakti Charan Panda
Professor and HOD of Mechanical Engineering Nalanda Institute of Technology, Chandaka Bhubaneswar, India

Contents

Assessment of conductor thermal models for gridstudies

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Abstract:-

Static network models based on constant resistances with predetermined values are used by existing EMS programmes. Convection and radiation heat must be used to dissipate ohmic losses in order for overhead conductors to maintain their steady-state thermal balance, which causes conductor resistances to depend on both the environment and transmitted current. It is possible to distinguish between the effects of external conditions and conductor current by analysing each term in the equation relating to the thermal balance of overhead conductors. Three rough thermal models are developed as a result, and they are compared with the Spanish transmission system. There are test examples that demonstrate how the chosen model's impact on transmission losses may be sufficient, especially when the transmission system connects regions with various loading levels and weather conditions.

Introduction:-

Currents flowing through overhead conductors give rise to Joule losses that raise their temperature. Besides the amount of ohmic losses dissipated, several environmental factors (mainly ambient temperature and wind speed) and conductor parameters (diameter and emissivity) determine the equilibrium temperature reached by the conductor. It is well-known that the resistance of a metallic wire grows almost linearly with its temperature. Therefore, strictly speaking, transmission lines are not linear time-invariant components as their resistance is a function of both time and current. As a matter of fact, differences between summer and winterline resistances over 15% have been reported.

While the dynamic thermal behaviour of individual conductors has been historically the focus of much attention, mainly in ampacity-related studies,its implications for systemwide studies have been largely neglected. This may be partly due to the fact that something apparently as simple as gathering the correct line para- meters for a large transmission system frequently constitutes a cumbersome task, especially if second-order effects are to be considered. Consequently it is customary to adopt a static model when performing routine network studies(load flow, state estimation, etc.) in which constant conductor temperatures are assumed throughout, irrespec- tive of the ambient temperature and transmitted power. Typically databases and input files provide line resistancesat 201C.

This paper focuses on the influence of environmental factors and daily load evolution on conductor resistances and, as a consequence, on the results provided by EMS.

Nanotechnology Knowledge and Attitude among Undergraduate Students

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Abstract:-

In order to deal with a matter at the nanoscale, a variety of technologies, techniques, and procedures are referred to as nanotechnology. The development of materials' mechanical and physical properties has led to the introduction of numerous new diagnostic modalities and nano-delivery systems in the field of dentistry. The study's objective was to assess how Iraqi undergraduate dental students perceived nanotechnology. Method: This study used online surveys delivered to 417 dental students over the course of five stages. The questionnaires asked general questions before being divided into four axes. The generation of a single variable in the second, and third axes was analyzedby five point of Likert scale. **Result:** 58% of students had an idea about nanotechnology, while 42% of students did not had an idea about nanotechnology. the largest percentage of students have difficulties in accessing information about nanotechnology. The largest percentage of the student want to introduce the nanotechnology in the curriculum, also largest percentage of the student wish to search information about the nanotechnology and support the use ofnanotechnology in clinic.

Key word: *nanotechnology, dentistry field, dentalstudent, curriculum, awareness.*

Introduction:-

Nanotechnology is “a term that involve a spectrum of technologies, techniques and processes that can deal with a matter at the nanoscale – fall in between 1 nanometer to 100 nanometers in size”. Many new diagnostic modalities and nano-delivery systems that have been introduced by improvement of the materials mechanical and physical properties’ in the field of dentistry and medicine .

The nanoscale is using to measure atoms which are consider the building blocks in biological tissue. An interaction on a molecular level can be produced by introducing nano-sized particles and this will result in increasing the total effectiveness and affinity when compared to interacting of biological molecules with micro or macro sized particles [3]. In the nanoparticle,there are more atoms on the surface than deep within itscore, this due to the high surface to core ratio which is a unique physical characteristic for nanoparticles. And this physical characteristic is useful because the atoms on the surface have unbound when compare with atoms on the core, and have a potential for making new and strong bonds, and this why the nanoparticles are more reactive when compare with micro and macro particles which have moreatoms with its core than that on the surface.

Study of the ESP32 SoC's Xtensa LX6 CPU for use in neural network applications

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ABSTRACT:-

Machine Learning (ML) has grown to be crucial for many computing applications in recent years. The widespread use of artificial intelligence-powered embedded IoT devices will be made possible by the pervasiveness of ultra-low-power embedded devices like the ESP32 or ESP32 Cam with tiny Machine Learning (tinyML) applications. The Espressif ESP32 microcontroller has developed enough power over the past few years to be used for tiny machine learning (tinyML) activities. The ease of use of platforms like Arduino IDE, MicroPython and TensorFlow Lite (TF) with tinyML application make it an indispensable topic of research for mobile robotics, modern computer science and electrical engineering. The goal of this paper is to analyze the speed of the Xtensa dual core 32-bit LX6 microprocessor by running a neural network application. The different number of inputs (9, 36, 144 and 576) inputted through the different number of neurons in neural networks with one and two hidden layers. Xtensa LX6 microprocessor has been analyzed because it comes inside with Espressif ESP32 and ESP32 Cam which are very easy to use, plug and play IoT device. In this paper speed of the Xtensa LX6 microprocessor in feed-forward mode has been analyzed.

Keywords- *TinyML, Xtensa LX6 microprocessor, Machine Learning, Neural Network, Embedded IoT Device, Espressif ESP32 and ESP32 Cam.*

The rapid development of machine learning and the shrinking of electronics have opened up new areas for study. The idea of environmentally friendly energy, which emphasises the use of electric-driven gear, has recently been discussed. Recently, researchers have considered using small or tiny machine learning applications on System on Chip (SoC) microcontrollers with less computing capability because machine learning has previously experienced considerable success with multiple core processors.

However, the extensive deployment of the machine learning algorithms will bring a clear rise in the artificial intelligence where a huge amount of processing power will be used due to process small algorithm with high-end multicoreprocessor. Other animals and humans have a brain and a central nervous system to avail the process of information with neural networks. In the different fields, neural network has been successfully implemented, from detecting criminal and medical diagnosis through image classification, to autonomous driving.

As part of a long-established custom, practice, or belief, the training of neural network is commonly centralized, and for the computational intensity and big memory requirementsit is mostly done on cloud servers. An instance of a particular situation the dataset of deep neural networks it could be morethan several dozen terabytes for learning.

In centralized approach some researcher found disadvantages like data privacy issues, between devices and cloud it increased latency and network traffic for that forbid in some determination. It also decreases thereliability, when exchanging of information is important between cloud and device or sensors. And some researcher presents that sometimes the center can be SoC, smartphone and micro data center between source and data.

GPS Satellite Frequency Adjustments Amendments

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Abstract:-

In order to provide precise positioning, the Global Positioning System (GPS) uses satellites in medium earth orbit (MEO). According to relativity theory, exact placement between the Earth and satellites calls for the use of clock frequency corrections. In addition to GPS frequency adjustments for prograde and retrograde satellite motion, this study also includes an original formula for gravitational red shift andan inertial correction formula.

Using camera, IMU, and ultrasonic sensors for indoor 3D reconstruction

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Abstract:-

The recent advances in sensing and display technologies have been transform- ing our living environments drastically. In this paper, a new technique is in- troduced to accurately reconstruct indoor environments in three- dimensions using a mobile platform. The system incorporates 4 ultrasonic sensors scan- ner system, an HD web camera as well as an inertial measurement unit (IMU). The whole platform is mountable on mobile facilities, such as a wheelchair.The proposed mapping approach took advantage of the precision of the 3D point clouds produced by the ultrasonic sensors system despite their scarcity to help build a more definite 3D scene. Using a robust iterative algorithm, itcombined the structure from motion generated 3D point clouds with the ul- trasonic sensors and IMU generated 3D point clouds to derive a much more precise point cloud using the depth measurements from the ultrasonic sen- sors. Because of their ability to recognize features of objects in the targeted scene, the ultrasonic generated point clouds performed feature extraction on the consecutive point cloud to ensure a perfect alignment. The range meas- ured by ultrasonic sensors contributed to the depth correction of the gener- ated 3D images (the 3D scenes). Experiments revealed that the system gener- ated not only dense but precise 3D maps of the environments. The results showed that the designed 3D modeling platform is able to help in assistive living environment for self-navigation, obstacle alert, and other driving as- sisting tasks.

Keywords: *3D Point Cloud, Position Estimation, Iterative Closest Point (ICP), Ultrasonic Sensors Distance Measurement, 3DIndoor Reconstruction*

Introduction:-

The fusion of multiples ultrasonic sensors and a camera to produce a better 3D reconstruction of an indoor environment is a challenging task even though it helps to extend the possibilities in robotics. The main idea is to build up a plat-form combining the advantages of low-cost compensatory sensors towards ac- ceptable indoor environment 3D reconstruction, with a satisfactory quality for mobile platforms (such as a wheelchair) navigation anddriving assistance.

This paper implements the data fusion at two levels. Firstly, to fuse the data from the ultrasonic sensor array to compute the distance to any objects (or ob- stacle) in the scene with accuracy after removing measurement noise and drift,and secondly, to fuse the ultrasonic depth measurements and the 3D point clouds generated from multiple 2D calibrated images from the mounted web camera using existing methods.

Using Self-Organization Criticality, Electrical Tree Simulation

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ABSTRACT:-

The development of electrical treeing has been the subject of extensive study up to this point. The most popular approach for the simulation-based research of electrical treeing is to use the DBM stochastic model to simulate the development of electrical treeing patterns. Earlier simulation studies demonstrated that this stochastic model can accurately reproduce the electrical treeing patterns that actually exist in a point-to-plane electrode system. The tree channels can only spread using this model on equipotential lines proportionate to the local electrical field. In order to get good agreement with experimental data, it is important to create a novel stochastic model to simulate the electrical patterns

Keywords: *Fractal; Electrical Tree simulation; Self-Organization Criticality*

INTRODUCTION:-

For solid insulating materials, electrical treeing is a typical pre-breakdown phenomen- on when materials are subjected to severe electrical stress. Electrical tree develops in a way that resembles a tree's branching structure. The branch-like structures are actually conductor channels created by partial discharge operations. Electrical treeing is one of the primary causes of the long-term deterioration of insulating materials, according to field and manufacturing experience. To increase the dependability and safety of the power system, it is crucial to research the electrical treeing phenomena in insulating materials.

One of the major causes for polymer insulation degra- dation in a long time is electrical tree growth, the phenomenon of electrical tree growth contains discharge channels presented tubular random branching growth and partial discharge, which causes damage resulting in new formations of plasma channel, vice versa discharge structures determine the trajectory and the parameters of partial discharge, so electrical tree and partial discharge are the self consistent process of insulation degradation.

Dynamic process of electrical tree growth and character- istics of partial discharge depend on the applied voltage'samplitude, frequency, electrode shape, physical properties of the medium, temperature and so on.

Energy Efficient Direction-Based Topology Control Algorithm for WSN

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Abstract:-

A wireless sensor network is made up of thousands or even hundreds of small nodes, each of which might have a fixed or moving position. These nodes are distributed normally or at random to report occurrences in a certain area to the base station through sink nodes. Energy conservation in wireless sensor networks is required due to the limited onboard energy of sensor nodes. A new algorithm called Energy-Efficient- Direction-Based-Topology- Control-Algorithm is suggested for this purpose (EEDBTC).In proposed algo-rithm, direction is the main concern whenever an event occurs the node will send data in the direction of base station so that less energy is consumed. Theresults of the same were compared with customary dense wireless sensor network, color based WSNs and it was observed that this algorithm is muchbetter than previous topology control algorithms used.

Keywords: *Sensor Nodes, Topology Control, Energy Conservation, Energy Efficiency*

Simple Memory-Incorporating Touch-Sensitive Switch Using Nonlinear Electrical Resonator

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ABSTRACT:-

We present a novel switching mechanism that depends on the instability of a straightforward nonlinear electrical resonator with a varactor diode serving as its capacitive component. Fast switching is possible, and there is no additional circuitry required because the switching operation is self-contained. This nonlinear switch can be engaged external to the circuit by magnetic, inductive, or capacitive coupling, making it intrinsically touch-sensitive. In contrast to flip-flops, whose states are switched by applying a TTL pulse. Alternately, frequency-shift-keying (FSK) modulation, which promises quick manipulation of the memory state, can also be used to carry out the switching action. By building a touch-sensitive LED lattice, we show how these concepts might be used in practise.

Keywords: *Nonlinear Switch; Electrical Resonator; Bistability; Touch Sensitivity*

Introduction:-

The flip-flop is unquestionably the most common memory component in digital electronics that can be flipped between two states. For instance, the common SR flip-flop is made up of two crossed NOR (or NAND) gates. When no signal is applied, the flip-state flop's remains in the previous configuration. A brief voltage signal (a TTL pulse) is applied to the appropriate input to flip the flip-flop to the other state. Here we propose a nonlinear electrical resonator thatin some ways acts like a flip-flop. As we show, theswitching between its two states is accomplished via ei- ther a driver-frequency protocol (FSK modulation), or bybringing a magnet or inductor into the vicinity of the resonator; it can also be switched by capacitive coupling. Once set, the system remembers its state until another switching action is performed. However, unlike a flip- flop,the element can be induced to switch from the out- side of the circuit. Alternatively, a frequency modulation scheme can be employed for fast switching. Finally, we show the application of this idea by constructing a con- trollable LED array. Since the switching action can occur in response to touch (via changing the capacitance) or proximity to a magnet or inductor, this resonator acts like touch-sensi- tive switch and is perhaps reminiscent of a “touch lamp”. When the metal housing of such a lamp is touched, its effective capacitance is increased. There are then a number of ways to convert capacitance to a digital output. Even the simplest scheme incorporates a number of inte- grated circuit components: a fixed-amplitude AC voltage driver charges and discharges the housing, and the charging current is increased upon touch; further cir- cuitry senses this enhanced current and switches a flip- flop. Our nonlinear resonator, in contrast, does not re- quire any further solid-state electronics to act like a switch; no comparators or flip-flops are needed. Recently, enormous progress has been made in thefield of capacitive coupling and sensing, and this has led to the development of touch-sensitive LCD screens. Hereagain, controllers and micro-processors are incorporated to compute the location of the touch on the screen. The power of an array of nonlinear resonators proposed here (see discussion of the prototype) is that no such mi- croprocessing is necessary—the switching action is in- trinsic, relying primarily on the bistability of the non- linear resonator. Alternatively, fast switching can be accomplished by driving the system at a constant frequency, and then for a brief time interval (given by the FSK modulation pulse width) toggling to another nearby frequency. We show that the pulse width can be as small as two oscillation periods. In the resonator used here, the shortest switching pulse was 7 μs, but this time can be considerably re- duced in principle by lowering the inductance value or employing varactor diodes of lower effectivecapacitance. There is little doubt that switching speeds could reachinto the gigahertz range by scaling component properties and boosting the resonance frequency.

An Electrical Noise Model Based on Fluctuation-Dissipation

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Abstract:-

This essay demonstrates that it makes no sense to model electrical noise as emanating from noisy resistances because that would go against their very nature as systems that produce electrical noise. We provide a novel electrical noise model that incorporates the work of Johnson and Nyquist and also agrees with Callen and Welton's quantum mechanical description of noisy systems, where electrical energy fluctuates and dissipates over time. By the two currents the Admittance function links in frequency domain with their common voltage, this new model shows the connection Cause-Effect that exists between Fluctuation and Dissipation of energy in time domain. In spite of its radical departure from today's belief on electrical noise in resistors, this Complex model for electrical noise is obtained from Nyquist result by basic concepts of Circuit Theory and Thermo-dynamics that also apply to capacitors and inductors.

Keywords: *Admittance-Based, Noise Model, Fluctuation, Susceptance, Dissipation, Resistance*

Introduction:-

Despite the close relationship that some writers have observed between shot and Johnson noises ,[2]current understandingof electrical noise in circuits treats them as separate physical phenomena, each with their own physical model.Considering electric current as carried by discrete electrons inde-pendently of one another, as Johnson did in vacuum de- vices to study their shot noise, this connection isn'ttoo surprising. What is a surprise, however, is that to-day's works in this field tend to consider noise currentsas carried by packets of electrons that, to our knowledge, hardly are found in ordinary matter. We mean proposals like contending that electrical charge piling-up in a lonely resistance *R* generates shot noise, thus transgress- ing a Quantum-Mechanical result of the need for a Complex Admittance function to describe a noisy system. This transgression and that of Special Relativity that a null *C* shunting the *R* of a resistor endures, led us to review the Partial Interpretation (PI) in use today of Johnson-Nyquist results that leads to a wrong modelling of electrical noise sometimes. Section 3 shows how to pass from this PI to an Advanced Model (AM) for elec- trical noise that agreeing with the laws of Physics, also allows a right modelling of this noise where the aforesaidPI fails. This passage is done in frequency domain by the familiar noise densities $SI \square f \square$ in A Hz and $SV \square f \square$ in V^2 Hz . Section 4, however, considers the generation of electrical noise by Fluctuations and Dissipations of elec- trical energy in time domain, taking place in the Admit- tance of two-terminal devices like resistors and capaci- tors, no matter its physical structure. Some relevant con- clusions are drawn at the end.

Electrical Transport Properties of La-$BaTiO_3$

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ABSTRACT:-

High temperatures (300 K to 800 K) were used to examine the electrical characteristics of donor-doped La-BaTiO3 system samples that had been quenched. When the temperature rose, so did the resistivity and carrier concentration. The sample's mobility exhibits an exponential temperature dependence, and its value is in good agreement with theoretical estimates. The activation energy (0.036 eV) was computed from the conductivity data and showed that the conduction mechanism in this system is thermally initiated.

***Keywords*:** Hall Mobility, Electrical Resistivity, Microstructure and Donor Doped-BaTiO3

INTRODUCTION:-

Because of its exceptional dielectric properties, including minimal dielectric loss and low temperature coefficients of dielectric constants, the BaTiO3 system has received a lot of interest. Most notably, because of its distinct ferroelectric transitions, it has potential technological applications. The electric transportation characteristics of BaTiO3 were extensively studied by numerous researchers in order to comprehend the underlying physics. BaTiO3's total electrical conductivity has been widely studied in relation to temperature and oxygen partial pressure. pressure, and the working model of its defect structure is available. The chemical diffusivity is reported as a measure of (oxygen) nonstoichiometry re-equili- bration kinetics for "undoped" and 1.8 m/o A1-doped BaTiO3, respectively. Subsequently, thermoelectricity of mixed ionic electronic conductor $BaTiO_3 + \delta$ is thermo- dynamically analyzed and measured across the mixed n/p regime of both undoped and 1.8 m/o A1-doped BaTiO3 at elevated temperatures. Later on, the electronic carrier mobilities of BaTiO3 are reported [13. The mobilities of electrons and holes over the temperature range 800˚C - 1100˚C were determined by measuring electrical conductivity and chemical diffusivity on undoped and 1.8 m/o Al-doped BaTiO3, respectively, in their mixedn/p regimes. Later on, the factors that affect the shift of Curie temperature and the calculated evolution of overall polarization and dielectric constant of a BaTiO3 crystal were examined [14]. Many of these reports focused on the carrier's mobility, studied at low temperatures. However, the Hall mobility has received far less attention partially due to the difficulty of Hall experiment itself, aswell as the low signal of Hall voltage emitted by the Ba- TiO3 ceramic. Recently there is considerable in- terest in the formation and characterization of the mag- nitude of the Hall mobility of the electrons in reduced BaTiO3 single crystal and polycrystalline by Kolodiazhnyi .The value of electron density is different from the expected value.

A Novel Half-Bridge Power Supply for High Speed Drilling Electrical Discharge Machining

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ABSTRACT:-

High Speed Drilling Electrical Discharge Machining (HSDEDM) eroding metal using controlled electric sparks. The HSDEDM technology has been widely employed over time for high speed drilling and producing big aspect ratio holes for difficult-to-machine materials. Several topologies are possible for the HSDEDM power supply that provide high power applications. This work presents a revolutionary Pulsed-Width-Modulated (PWM) half-bridge HSDEDM power supply with Zero-Current-Switching (ZCS) for the discharge gap and Zero-Voltage-Switching (ZVS) for switches. Excellent features of this power supply include a low component count and built-in short circuit safety. This topology has an energy conservation feature and removes the need for output bulk capacitors and resistances. Energy used in the erosion process will be controlled by the switched IGBTs in the half-bridge network and be transferred to the gap between the tool and work-piece. The relative tool wear and machining speed of our proposed topology have been compared with that of a normal power supply with current limiting resistances.

***Keywords*:** *High Speed Drilling Electrical Discharge Machining, Half-Bridge Power Supply, Zero Current Switching, Zero Voltage Switching*

INTRODUCTION:-

Spark erosion machining, sometimes referred to as electrical discharge machining (EDM), is gaining popularity. By repeatedly electrically discharging an electrode against the workpiece while keeping them spaced apart by a discharge gap, EDM removes material from high hardness conducting materials. Electrical discharge erosion happens when dielectric fluid is driven into the discharge gap. When a voltage large enough is applied, the dielec- tric fluid breaks down, the gap is ionized and electrons areemitted from the tool (cathode). When more electrons gather in the gap, the resistance drops, which causes elec- tric spark to jump between the work-piece surface and the tool. The whole sequence of operation occurs within a fewmicroseconds and is accompanied by a shock wave in the dielectric. The impact of the wave on the electrode causes high transient pressure. The current density in the dis- charge channel is of the order 10,000 A/cm2. The tem- perature of the central point of the channel is of the order of tens of thousands of °C. The forces of the electric and magnetic fields caused by the spark produce a tensile force and tear-off particles of molten and softened metal from this spot on the work-piece [1,2].Within the scope of EDM, High Speed Drilling Electrical Discharge Machining (HSDEDM) is an importanttechnology. The basic components of a HSDEDM systemare as follows and the schematic is shown in Figure 1.Like other EDM methods, the HSDEDM process is especially suitable for machining high strength and hard metal materials. Generally, a rotating thin copper or brasstube electrode is used as the drilling tool. High speed and pressure dielectric (water) is pumped through this hollow

electrode and injected into the discharge gap to flush out eroded debris from working area to ensure the process remains stable. The dielectric fluid also acts as a coolant. Rotation of the electrode helps reduce deviation and un- even wear, which maybe otherwise be caused by the highpressure dielectric, on the face end of the electrode. The servo system acts to adjust the discharge gap and feed throughout the process. The most outstanding feature of HSDEDM is high speed of manufacture which can be up to 60mm/min. This is hundreds of times the speed of the normal EDM and is exceeding the level of the traditional drilling. The processed apertures range from 0.3mm to 3mm and the aspect ratio can be up to 100.

New “Intellectual Networks” (Smart Grid) for Detecting Electrical Equipment Faults, Defects and Weaknesses

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Abstract:

The systems for tracking the characteristics of electrical equipment are the "intellectual networks' (Smart Grid) most crucial components. It was suggested to deploy information-measuring systems (IMS), which were described in this study, along with quick digital protection against short-circuit regimes in transformer windings. The outcomes of using frequency response analysis (FRA) to verify the condition of transformer windings, an application's experience with LVI testing, and infrared equipment control findings are presented in this study. The LVI method and short-circuit inductive reactance tests are sensitive for finding problems such axial and radial winding deformations, twisting of low-voltage or regulating windings, loss of winding pressing, and others.

Keywords: *Intellectual Networks; Smart Grid; Monitoring System; Electrical Equipment; Information-Measuring System; Frequency Response Analysis; Transformer Winding Fault Diagnostic; Low Voltage Impulse Method; Short-Circuit Inductive Reactance Measurement*

Introduction:

The Federal Grid Corporation of United Energy System, a TJoint Stock Company, runs the United National Electricity Network of Russia. The length of the electrical power transmission lines is 121.7 thousand kilometres, and the number of substations is 805 with a voltage range of 220 to 750 kV. For the first time, the company's five-year investment programme, which calls for the construction of 73 new substations, was confirmed in 2010.

“Modernization must bear the innovation nature, which assumes passage to the existing energy technolo- gies of XXI century”—says Mr. Sergey Shmatko, Min- ister of power electrical engineering of Russia. The real- ized by Federal Grid Company passage to “clever power engineering” (Smart Grid) will make it possible not only substantial to change today’s energy landscape, but also will give pulse to the development of electrotechnical industry, the mastery of new technologies and electrical equipment by plants and by scientific design institutes, it will fill by the practical sense of the development of Russian scientists.

Optimal Power Flow in Electrical Microgrids

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Abstract:

The state of the art for solving optimal power flows (OPF) and its use in electrical microgrids is presented in the first section of this research. In order to optimise the voltage profiles and hence lower active power losses, a mathematical algorithm based on the gradient approach is then suggested for use with OPF in a low power microgrid. In order to show the effectiveness of the strategy, the proposed algorithm is finally put into practise in a low power microgrid.

Keywords: *Optimal Power Flow, Microgrid, Gradient Method, Profile Voltages, Reduction of Losses*

Introduction:

An optimal power flow (OPF) consists of solving equations which characterize an electrical power system (ac- tive and reactive power of each node) adjusting the control variables values (voltages or powers) in order to op- timize a specific system parameter, represented by one target function [1]. A system usually includes state va- riables (unknown quantities) and independent variables (unknown data). Control variables can be any of the in- dependent variables in the system, and are selected depending on the purpose of the analysis.

The target function of a power system for the OPF study is determined depending on the parameter which is going to be optimized or improved; some typical parameters are as follows :

- Minimizing the generation cost
- Minimizing transmission losses of active power
- Minimizing transmission losses of reactive power
- Minimizing the interruption costs by flows
- Minimizing the reprogramming number of controls
- Minimizing pollutant emissions of thermal generators

In order to improve the features of power systems and reduce line losses, in recent years, the electrical micro- grids have appeared. Electrical microgrids are small electrical systems that may have autonomous management

of power generation and energy distribution, which can function in a dependent or independent way from the electrical grid and also with the potential implementation of renewable energy sources.

To enhance features and achieve an optimal performance in electrical microgrids, authors as have im- plemented OPF in various mathematical algorithms.

This paper presents a state of art regarding the mathematical methods which have been implemented in the analysis of OPF and its application in electrical microgrids. Subsequently, a mathematical algorithm based on the gradient method is proposed for the solution of OPF in low power microgrids, in order to improve the pro- files voltages and consequently reduce the active power losses. Finally, the application results of the gradient method in a low power microgrid with photovoltaic generation are presented.

Analysis of a Simple Probe for *In-Situ* Resistivity Measurements

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Abstract

We present a probe factor for a simple measurement device, which can be used to determine *in-situ* electrical resistivity in soils or other penetrable bo- dies. The probe is primarily sensitive to the material immediately surrounding it and therefore is ideal for determining localized conductivities. The geome- try of the probe can be scaled to effectively adjust the region of interest. The calibration, or "probe factor" is a function of the geometry, as well as the electrode configuration. Results are presented assuming a Wenner array configu-ration, however they can easily be extended to other geometries, such as the Schlumberger or dipole-dipole array.

Keywords

Electrical Resistivity Measurements, Soil Moisture, Electrical Conductivity,Geophysical Measurement

Introduction

Measurements of a materials electrical resistivity can provide useful information for, indirectly determining soil moisture [1], assisting in the design of cathodic protection systems to prevent corrosion in buried metal structures [2], deter- mining electrical substation grounding characteristics [3], measuring subsurface hydrological properties [4], and the extent of sub-seafloor sediment [5] [6] in oceanographic studies, to name but a few. Electrical Resistivity Tomography (ERT) also provides a useful geophysical tool in imaging resistivity variations in the subsurface [7].

This paper describes a simple probe to be used for *in-situ* resistivity measurements. We derive a probe factor based on the geometry of our device, whichis given by an exact analytic solution of the boundary value problem. Our motivation for developing this probe was the need for an *in-situ* device to measure soil moisture over time within a free-draining lysimeter. Since the probe mea- sures electrical resistivity directly, it is also necessary to relate this value to soilmoisture through experimental measurements [1].Analysis of this probe is similar to those used in bore-hole boundary value problems, specifically those employing an integral equation approach (see for example, Zhang [8]; Tsang [9]; Gianzero [10]). The current application is inte- rested in material properties near
the probe, and hence a more accurate representation of the probe current source(s) is required. The associated bo- undary value problem for the probe is solved in Appendix A, using an integral equation approach and assuming a homogeneous media where the conducting rings are placed over an insulated rod. The derivation in Appendix B includes the effect of a planar ground surface.

Cluster Analysis of Electrical Behavior

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Abstract:-

In this study, we apply data mining clustering analysis to the electricity system. In order to make the clustering result obvious, we adopt principal component analysis and the K-means clustering technique. Simula- tion and analysis using Matlab are used, and this helps to confirm the reasonableness of the clusters. The paper's conclusion can serve as a crucial foundation for the power system's peak, steady operation, and security.

Keywords: K-*Means Clustering Analysis, Principle Component Analysis, The Power System*

Introduction:-

Data mining and clustering analysis are becoming increasingly crucial in the age of big data since there is so much data affecting our work and life every second. On the other hand, because our national economy is growing so quickly, there is an increasing demand for power. And because the majority of our present energy comes from thermal sources, power dispatch and peak demand are becoming more and more crucial for maintaining the stability of the power system. A crucial connection in the power decision is the clustering analysis to customer power load. This essay will concentrate on the use of big data in the electricity system. Clustering algorithms can be classified using a variety of different criteria. Commonly used algorithms in clus- tering analysis include K-means clustering algorithm, agglomerative hierarchical clustering algorithm, SOM of neural network clustering algorithm, the FCM of fuzzy clustering algorithm, and so on [1]. By comparison, we discover that the K-MEANS program and the FCM program have good comprehensive performance, however the FCM program are too complex for us to use. The power system data is produced every second, so the K- MEAN program are outstanding for its highly efficiency. We select K-means clustering algorithm to analyze the customer power load. Thus may balance power load according to different classification. And this can provide different service to different kinds of customers. The characteristic of this article is: every detail is analyzedfrom rom the generation of customer power load to data clustering.

A Centrality for Electricity Networks Based on Energy

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ABSTRACT:-

To assess centrality in electrical networks, we provide an energy-based methodology. Here, the effective resistance between two vertices serves as a measure of the energy present between them. If there is only one generation and one load,the centrality of an edge according to our method is the energy difference between the network before and after the edge is deleted. We have an interesting discovery that our proposed centrality is strongly related to the local current-flow betweenness on the IEEE 14-bus system in that the significance of edges under the two metrics are extremely similar.

Keywords: *Centrality; Energy; Effective Resistance; Current-flow Betweenness*

Introduction:-

The electrical network is one of the most critical andcomplex infrastructure networks in modern society.There are some important issues which are keys to theperformance of the network. Reliable electric powersupply, for example, is crucial for many devices and itsdisturbances may disrupt the devices or even paralyze thenetwork. This brings the concern about reliability andresilience to disturbances and failures of various types of infrastructure systems, and a corresponding demand formethods of analyzing the vulnerabilities of the electricalnetwork [1]. Moreover, the blackouts of the North American and Italian electric power grids in 2003 ex- posed the weaknesses of the electrical network. Theweakness and vulnerable analysis about the electricalnetwork have been widely studied in the past years [1-4]. With recent advances in network and graph theory, many researchers have applied centrality measures tocomplex networks in order to study network properties. Various centrality measures have been defined. Theydraw links between the structure of networks and thevulnerability to certain types of failures, and are used toidentify the most vulnerable elements of a network. Tra- ditionally, there are four centrality measures within net- work analysis, i.e., degree centrality, betweenness,closeness, and eigenvector centrality. The degree metricutilizes the local information. Closeness and betweennessutilize the shortest path information. And the eigenvector metric rely on the Laplacian matrix of the group. All of them consider only the topological properties but not theactual physical flow through the power system. Moreo- ver, the betweenness and closeness centrality postulate that the information or flow transfer along the shortest path, but this is not true for the current in the electrical network. A series of centrality measures considering the physical flow are proposed. [5] proposed a so-called random-walk betweenness, counting how often a node is traversed by a random walk between two other nodes. This centrality is known to be useful for finding vertices of high centrality that do not lie on the shortest path. Actually, the random-walk betweenness is closely related to the current-flow betweenness proposed in [6]. The paper derives the metric straightforward from the electrical current and proves that the current-flow closeness is in fact identical with the information centrality. Some papers proposed their measures which are actually of no difference with the current-flow betweenness though they didn't point that directly. For example, [8] proposed an electrical centrality measure based on the impedance matrix which is similar to the current-flow centrality. Besides, they pointed out the differences of the topology of power grids from that of Erdos-Renyi random graphs, the "small-world" networks or "scale-free" networks but the power networks appear to have a scale-free network structure under their proposed measure. However, as the indication, the proposed electrical centrality meas- ure in [8] was defined incorrectly. But a simple analysis shows that the revised measure was the right current- flow betweenness.

Electrical Load Forecasting Using Fuzzy System

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Abstract

To cope with the demand and supply of electrical load of an interconnected power system of a country, we need to forecast its demand in advance. In thispaper, we use a fuzzy system to forecast electrical load on short-term basis. Here, we consider temperature, humidity, seasons of a year and time seg- ments of a day as the parameters, which govern the demand of electrical load. For each of the parameter, we use several membership functions (MFs) and then apply the Mamdani rule on MFs and the output is determined by using the centroid method. Finally, the surface plot reveals the real scenario of the load demand. The difference between actual load and the output of the fuzzysystem is found as +1.65% to −13.76%. The concept of the paper can be ap- plied in interconnected power system of Bangladesh to reduce power loss, especially when generation is higher than the demand.

Keywords: *Defuzzification, Fuzzy Inference, Centroid Method, Surface Plot, APE*

Introduction:

Electrical load forecasting is classified as short and long-term, where the long-term deals with adjustment of demand-supply for 10 - 50 years, whereas short-term makes the adjustment for a few months to 5 years. This paper con- siders short-term electrical load forecasting taking daily load of Bangladesh. This section provides some previous works relevant to short-term load forecasting. A study of the short-term electrical forecasting using fuzzy logic is done in [1] tominimize the difference between actual electrical load and the forecast load. Theauthors have used data from PSTCL 220 kV substation V.O.P Pakhowal, Lud-hiana, Punjab, India. Eight triangular membership functions (MFs) are used forinput time, four triangular MFs for temperature and eight triangular MFs for output forecasted load; where input and output are linked using “if then” condi- tions. Finally, a comparison is made between actual load and fuzzy forecastedload graphically, where few points merge closely and few points deviate widely.

In [2], short-term load forecasting is done based on fuzzy logic, to find elec- trical load loss in the generation end. The authors prepare fuzzy rules based on historical data. A work is found about long term forecasting of power system in [3], where the authors use Artificial Neural Network (ANN) and Adaptive Neu- ro-Fuzzy Interference System (ANFIS). Six parameters are used as input, which are temperature, humidity, wind speed, rainfall, data of previous load and data of actual load. A table is presented to compare the error between ANN and ANFIS, where the average error is 6.7% and 0.096% respectively.

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Future of Electricity Tran smission and Distribution: Smart Grid

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Abstract:

The need for change in the electrical system of the modern era has been felt for a century, and it is thought to be the most significant change that we need. However, before making a new change, it is important to remember the things from the past so that there are better chances of making a great and beneficial change. The goal of this research is to determine what modifications should be made to a traditional system in order to make it automated and self-sufficient and increase the system's reliability in terms of electrical power. This essay evaluates the current one-way power system, identifies areas for improvement, and attempts to give a broad overview of the necessary system improvements. The paper has focused more on the smart grid system andhas explained the importance of smart grid system in terms of efficiency, au-tomation and decision making capability in case of faults occurred on primi-tive grids with the help of comparative studies. The paper also highlighted theresults in form of comparison with conventional grids and threw some light on the vision, control and the application of the smart grid system that will provide a two way system to the electrical network of the country and will make the distribution and consumption of energy more efficient also which isgoing to increase the reliability and accuracy in the system.

Keywords: *Smart Grid, Automatic Grid System, Vision of Smart Grid, CommunicationTechnologies*

Introduction;

With the increase in the demand of less human power and decreased labor the technology is advancing towards the automation system to make things much easier, simpler and accurate [1]. Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. With the passing days the automation is taking over the industries and the desideratum of human sensory is decreasing. Since the world is getting smarter with advancement in the technology and automation is the foremost and most required technology as well as automation plays an increa- singly important role in the world economy and in daily experience.

Since the technology is upgrading with the time the ease with which we are able to access our appliance and products whether it be home appliances or bigindustrial machineries is increasing. Automated system provides increased flex-ibility and security as compared to that of manual system [2]. In the same way the foremost and the basic need of human life is power that is being supplied with the help of grids. Before moving towards any other advancement in the technology with the electrical world we must need to think about the advance- ment in the electrical power distribution and the thing that we need to think the first and foremost is about termed as Smart Grid.

Analog to Digital (ADC) and Digital to Analog (DAC) Converters

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Introduction:-

Analog signals are frequently used to describe electric voltage and current signals. Before being fed into computers, analogue signals must be transformed to digital signals. Signals from analogue sources are transformed into digital signals using analogue to digital converters (ADCs). Conversely, before being input into an electrical or electronic equipment, a digital computer output sometimes needs to be converted to an analogue signal. DACs (Digital to Analog Converters) are employed in this process.. In this paper we will examine important characteristics associated with ADC/ DAC converters. In addition,we will explain how to specify a converter to meet the requirements of a specific system.

We will also list and describe the various ADC/DAC converter types. We'll show and examine binary-weighted and R- 2R ladder type DAC circuits. ADC circuits of the Parallel Comparator or Flash, Dual Slope, and Successive Approximation types will be shown and discussed. We will go into great detail about the benefits and drawbacks of each type of ADC or DAC converter.

Digital to Analog Converter (DAC) Characteristic:-

We must take into account three DAC characteristics when choosing a Digital to Analog Converter (DAC) chip for a certain application. The lowest voltage or current change that the DAC output signal can have is defined by the resolution or step size. A typical example is an 8- bit DAC with a step size or resolution of (5V / 2 8) = 19.5 mV and a maximum output voltage of 5 volts. The resolution may occasionally be expressed as a percentage. The percent resolution for the 8-bit DAC is (1 / 2 8) x 100 = 0.39%. The amount of time needed for the DAC output to reach 99.5% of its new value is known as the settling time. A commercial DAC typically settles after 300 nanoseconds. The accuracy of a DAC is used to express the proportion of its actual output to its anticipated output.

Typically, precision is equal to 50% of step size. The precision for the 5 V, 8-bit DAC is 0.975 mV. This suggests that the DAC manufacturer guarantees the maximum output to be between 5.00975V and 4.99025V.

Design an FPGA for an 8051 microcontroller

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ABSTRACT:-

This article explains the design and implementation of a variation of the 8051 microcontroller, one of the most widely used microcontrollers in industry, utilising Quartus II software and the VHDL language on an Altera DE-2 FPGA board with an Altera Cyclone-II FPGA.. The purpose of this workis to demonstrate the design of a simpler 8051 microcontroller that combines the fundamental parts, theset of development-time instructions, and the same dynamic reconfiguration during runtime. The microcontroller proposes using more than one fixed set of instructions, with only one active at a time, and provides the option to combine fresh sets of instructions so that the microcontroller can use them in real-time as if they were a part of the fixed set of instructions.. In this work comparative simulations are presented in relation to the time of execution and performance of traditional systems in relation to the microcontroller developed. In future work we will add more peripheral devices and instruction set.

Keywords: *8051 microcontroller, VHDL, FPGA, Quartus II, Altera DE-2 board*

INTRODUCTION:-

The design of embedded systems and communications, which are mostly based on microcontrollers, have grown significantly in recent years. Microcontrollers, which facilitate data collecting, processing, and control devices in industries and in intricate projects involving electronics and computers, have all the features of a complete computer system on a single chip. However, as these devices have become more complicated, it has become necessary to develop newer, more affordable devices with higher performance, adaptability to shifting client needs, operational flexibility, and cost. The development of high performance digital systems that are capable of reconfiguring the hardware to optimise the features needed by systems and control paradigms of the application has been made possible by technological advancements in programmabledevices like the Field Programmable Gate Array (FPGA).

Design of low-power CMOS VLSI circuits using multi-objective optimization in geneticalgorithms

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Abstract:-

An automated design CAD tool for digital CMOS VLSI circuits is presented in this research. A multi-objective optimization strategy based on genetic algorithms (GA) is suggested in order to fit the circuit performance into required specifications, and the transistor sizes are computed using the analytical equations defining the behaviour of the circuit. The optimization algorithm is created in MATLAB, and HSPICE simulations based on 0.18-m CMOS technology parameters are used to confirm the resulting circuit's performance. Using the suggested design tool, various digital integrated circuits were successfully designed and verified. Additionally, it is demonstrated in this research that there is excellent agreement between the design results produced by the suggested algorithm in MATLAB and the results of the circuit simulation produced by HSPICE.

Keywords: *VLSI; Genetic algorithm; Full-Adder; CMOS; Low-Power; Optimization*

Introduction:-

The most efficient design of VLSI circuits, including high-performance Full-Adders, is getting harder and more time- consuming as a result of the rising demand for digital integrated circuits. Power dissipation, propagation delay, power- delay product (PDP), and layout area are among the performance metrics used to describe the performance of high- performance digital integrated circuits like full adders. These metrics are regarded as the primary goals that must be optimised simultaneously.

The design factors, such as load capacitance CL, bias voltages and currents, and transistor size (W, L), often define the performance metrics of a digital integrated circuit [2]. However, the values of the design parameters have a significant impact on how well a digital integrated circuit performs. Determining the values of design parameters in order to optimise one objective measure while satisfying limitations on the other performance measures is the challenge in creating an optimised digital integrated circuit.

Since, some performance parameters of digital integrated circuits are most likely conflicting with each other, optimized digital IC circuit design suffers from long design time, high complexity, high cost and requires highly skilled designers. Furthermore, finding an optimal solution for design of digital integrated circuits is very challenging and time consuming. Therefore, developing reliable tools for automated design of widely used digital integrated circuits such as full-adder circuits is very important .

Static Flip-Flop Design for Low-Power Digital Sequential Circuits

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Abstract:-

In this article, we correlated several single edge caused master and slave flip-flops. The low-power flip-flops are now the most important components for building static or subsequent circuits. By comparing their performance, delay, rise time, fall time, and power dissipation, we arrive at a conclusion. We are comparing and calculating the number of transistors in each flip-flop because Power is dependent on the number of transistors in the circuits. Linear Feed Back Shift Registers (LFSR), which operate at 5MHZ frequencies and 45nm technology, are used to analyse static and sequential circuits.Keywords— Flip-Flop, Edge Triggering, low power, Average power, Rise time, Fall Time and Frequency.

INTRODUCTION:-

Fundamental recycled particles are heavily impacted by flip-flops and latches in all different types of digital circuits. The digital designs of today's technology make extensive use of pipelining techniques as well as many flip-flops and simple modules like shift register files. A significant amount of effective clock power has been recycled to pick up the subsequent components. Latch and flip-flop clock power can be decreased, which will lower chip power overall. Flip-flops occur in new, diverse structures, such as D-, T-, and JK-flip-flops; of these, the D-flip-flop is the better-known model.

A regular Single Edge Triggered flip-flop data each of two powerful falling edge either powerful rising edge ofthe clock period. Powerful single edge triggered latches continue regularly configured as flip-flop outline, i.e., the sequential structures seeing two flip-flops in cascade.

Development of Acoustic Optical Fiber Sensor for Arc Discharge in Power Transformer

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Abstract:-

The primary factor in power transformer failures and mishaps is insulation issues. Arc discharge is a significant sign and symptom of deteriorated transformer insulation. Therefore, it is crucial to implement the online monitoring of arc discharge faults as soon as possible and effectively, as well as to keep an eye on transformer status in real-time and perform fault analysis based on it. Previous studies have shown that in addition to producing ultrasonic signals, arc discharges also produce a significant number of auditory signals. Therefore, monitoring the acoustic signal of an arc discharge offers a novel concept for transformer live monitoring. The construction of an arc discharge acoustic sensor based on a fibre grating in a transformer aims to close this research gap. An integrated transformer-built acoustic sensor with a wide measurement range and excellent anti-interference performance that can detect both audible sound and low-frequency ultrasound has successfully been developed in response to the issue that the cross sensitivity of stress and temperature affects the sensor's measurement accuracy. 1 kHz to 60 kHz is the theoretical measuring range. The built-in test platform for detecting the arc discharge's acoustic signal inside the transformer is used to assess the optical fibre acoustic sensor's capacity for detecting acoustic signals by contrasting it with an audible and an ultrasonic sensor. The findings indicate that the two primary acoustic signal bands are 2 kHz–10 kHz and 50 kHz–60 kHz.

Keywords: *Transformer, Arc Discharge, Optical Fiber Acoustic Sensor*

1. Introduction

One of the key components of the electrical system, the power transformer is crucial to the secure operation of the power grid. An important indicator of the transformer's insulation safety is the arc discharge inside the transformer.. The arc discharge is mainly caused by interturn winding and interlayer windinheg faults [1]. According to the statistics of CIGRE Transformer Working Group in 2013 [2], when the arc discharge fault occurs inside the transformer,the further development of the fault cannot be stopped due to the insufficient detection sensitivity of the power system relay protection and the untimely action response, which led to the cracking of more than half of the transformer oil tanks and eventually led to an explosion accident, posing an extremely serious threat to the safe and stable operation ofthe power grid. The arc discharge detection method of power transformer is mainly characterized by acoustic, photoelectric and other phenomena induced by its discharge. Based on this, there are many methods for its monitoring, including optical measurement, gas chromatography, infrared thermal imaging, ultrasonic method, pulse current method and so on [3-8]. Theacoustic method is one of the most commonly used methods, and the arc discharge monitoring technology based on audible sound is a relatively new monitoring and diagnosis method at present. At this stage, in view of the fact that the audible sensor of arc discharge does not generate electromagnetic signals during the acquisition and transmission of the acoustic signal of arc discharge, and has no electrical connection with the equipment, so it does not interfere with the equipment itself.

PROTOCOLS FOR WIRELESS SENSOR NETWORKS THAT ARE ENERGY EFFICIENT:

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ABSTRACT:-

Target detection and tracking, environmental monitoring, industrial process monitoring, and tactical systems have all seen extensive use of wireless sensor networks. Energy-efficient operations are crucial for the nodes in wireless sensor networks since they operate with insufficient power sources. Energy conservation is critical at all of the layers of the TCP/IP protocol suite, but it is particularly important at the MAC layer. We employ the MAC protocol to operate in wirelessly connected sensor networks because it increases sleep duration, decreases idly listening and overhearing, and eliminates concealed terminal problems or packet collisions. The accessible energy-efficient MAC protocols for sensor networks are discussed in this article's first section along with their energy-saving technique. In the second section, we go over the design of similar protocols before contrasting them based on their benefits and drawbacks.

Keywords: *Wireless sensor Network, Mac protocol, Energy.*

INTRODUCTION:-

Now a days intrusion detection, defense, climate control, medical systems ,environment monitoring, robotic exploration, smart spaces, disaster management, target tracking, wildlife habitat monitoring, scientific application, are uses the Wireless Sensor Network. The Wireless sensor networks are made up of one or more battery-operated sensor devices with embedded processor, small memory and low power radio. Coverage and communication range for sensor nodes compared to other mobile devices is limited due to low power capacities of sensor nodes. Sensor networks are composed of large number of nodes to cover the target area. Nodes in wireless sensor network communicate with each other to give a common task [1].

How to efficiently utilize the limited amount of energy has been the primary concern in designing MAC protocols for WSNs [2]. As there was a challenge for WSN designers is to develop a system that will run for years, they used not only robust hardware and software, but also lasting energy sources.

Review of Modern Field Effect Transistor Technologies forScaling

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ABSTRACT:-

The field-effect transistor technology that the modern electronics industry uses the most is mostly reviewed in this study. The field effect transistor structure is continuously updated thanks to the short channel effect. As a result, the short channel effect's foundation and effects are first described. The creation of fin structure and gate-all-around field effect transistors, as well as their current status and corresponding technical challenges, are the main topics of this study. Reviewing these two key technologies essentially clarifies the technology's development process and technical challenges. The introduction of these technologies' applications in the enterprise occurs concurrently. The projected technology development trend is presented last.

INTRODUCTION:-

These days, integrated circuits can be found in anything from personal computers to portable electronics. People now have higher expectations for the excellent performance and mobility of these electronic devices due to the growth of the economy and advancements in electronic technology. The revenue for consumer electronics items is anticipated to be US$365,538 Million in 2020, and the market size will reach US$450,387 Million in 2024, according to the most recent reliable statistics and projections [1]. Due to the use of very large-scale integration, these gadgets have shrunk ever-increasingly (VLSI). The fundamental components of VLSI are metal oxide semiconductor field-effect transistors (MOSFETs). Extremely large-scale integration (ELSI) becomes feasible as FET technology continues to shrink down..

Planar MOSFETs are processed smaller and smaller as a result of the manufacturing technology's ongoing advancements, which reduces the channel length. As a result, the short channel effect (SCE) develops into an issue that cannot be avoided. The materials and structures between the gate and the channel were changed in an effort to address this pressing issue, and a three-dimensional (3D) FET structure was presented as an alternative to the more common two-dimensional (2D) FET [2] [3]. Many chipmakers have been adopting FinFET technology, and Intel used it in their Core I series of processors. However, the practical development of mature technology is problematic. The manufacturing process is complicated by the FinFET's distinctive structure and the ever smaller distance between each gate. Consequently, gate-all-around (GAA) technology, a new advancement in FinFET technology,.

This article first introduces SCE which is the main reason for the development of FET from 2D to 3D, and then respectively reviews the development history of FETs with Fin and GAA structure. Some challenges and difficulties for future development of these technologies are also presented.

Robust & Energy Efficient Universal Gates for HighPerformance Computer Networks at 22nm Process Technology

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ABSTRACT:-

Digital systems are said to be constructed using basic logic gates. These gates are the NOR, NAND, AND, OR, EXOR & EXNOR gates. This paper presents a robust three transistors (3T) based NAND and NOR gates with precise output logic levels, yet maintaining equivalent performance than the existing logic structures. This new set of 3T logic gates are based on CMOS inverter and Pass Transistor Logic (PTL). The new universal logic gates are characterized by better speed and lower power dissipation which can be straightforwardly fabricated as memory ICs for high performance computer networks. The simulation tests were performed using standard BPTM 22nm process technology using SYNOPSYS HSPICE. The 3T NAND gate is evaluated using C17 benchmark circuit and 3T NOR is gate evaluated using a D-Latch. According to HSPICE simulation in 22 nm CMOS BPTM process technology under given conditions and at room temperature, the proposed 3T gatesshows an improvement of 88% less power consumption on an average over conventional CMOS logic gates. The devices designedwith 3T gates will make longer battery life by ensuring extremely low power consumption.

Keywords—*Low power, CMOS, pass-transistor, flash memory, logic gates.*

INTRODUCTION:-

growing demand for portable devices is driving chipdesigners to rely on scaling down of device sizes with increased computation performance and longer battery life.

The increasing chip density and complexity has led to more power dissipation.

This directly affects the battery operated portable devices and requires expensive cooling and packaging technologies. In amodern day high performance microprocessor, around 45%of the total power is consumed by the data path and memory units [1]. NAND and NOR logic gates plays an important role in building up of most of the data path units and memory. Therefore, a careful design and analysis is required for NAND and NOR gates to obtain optimum performance [2].

Logic gates carry out basic logical functions and are the primary building blocks of digital integrated circuits. They are formed bythe amalgamation of transistors to realize digital Geetha Priya M. is with the Electronics and Communication Engineering Department, Amrita Vishwa Vidhyapeetham, Ettimadai, Coimbatore, Tamilnadu, India (corresponding author to e-mail: geetha.sri82@gmail.com).

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Srinivasan S. is with Network Communications Department, Thomson Reuters, Bangalore, Karnataka, India (e-mail: srinivasan.siva@ thomsonreuters.com).operations. Every digital manufactured product, like computers, calculators, mobile, even digital watches, are made up of logic gates. For example, an adder circuit can be formedby the combination of many gate like by using NOR/NAND gates only or by using AND, OR gates and so on. The adder which is of great significance in computer networks and also for many more applications is fundamentally constructed from the logic gates.

With a focus to realize high speed and ultra low power data networks, circuits should be built with low power dissipating gates. To support the ever-changing needs of current and emerging applications, the authors have developed the most appropriate universal gates with reduced transistor count. Simulation results of proposed 3T based logic gates (NAND and NOR) utilizing standard 22nm CMOS BPTM technology illustrate a significant improvement with respect to number of transistors, propagation delay and power dissipation. The proposed new design of 3T based logic gates is based on modified CMOS inverter and pass-transistor logic (PTL). This research paper is organized as follows: In Section II, review of pass transistor and CMOS inverter logic, proposed logic gates in section III, which is followed by the simulation results using HSPICE and conclusion in Sections IV and V, respectively.

Scheduling in Real Time for MapReduce Clusters

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Abstract: MapReduce has been widely used asa Big Data processing platform. As it gets popular, its scheduling becomes increasingly important. In particular, since many MapReduce applications require real-time data processing, scheduling real- time applications in MapReduce environments has become a significant problem. In this paper, we create a novel real-time scheduler for MapReduce, which overcomes the deficiencies of an existing scheduler. It avoids accepting jobs that will leadto deadline misses and improves the cluster utilization. We implement our scheduler in Hadoop system and experimental results show that our scheduler provides deadline guarantees for accepted jobs and achieves good cluster utilization.

INTRODUCTION

MapReduce is a framework used by Google for processing huge amounts of data in a distributed environment [1] and Hadoop [2] is Apache's open source implementation of the MapReduce framework. Due to the simplicity of the programming model, MapReduce is widely used for many applications [9]. Event logs from Facebook'swebsite are imported into a Hadoop cluster every hour, where they are used for a variety of applications, including analyzing usage patterns to improve site design, detecting spam, data mining and ad optimization [3]. The New York Times rents a Hadoop cluster from Amazon EC2 [9] to conduct large scale image conversions [9]. Hadoop is also used to store and process tweets, log files, and many other types of data generated across Twitter [9]. As MapReduce clusters get popular, their performance modeling [24][25][26] and scheduling become increasingly important. Yahoo! developed the capacity scheduler to share a Hadoop cluster among multiple groups and users [10]. Facebook's fair scheduler enabled fair sharing in MapReduce [3]. In particular, since many MapReduce applications [9], including some of the aforementioned ones (e.g., online data analytics for spam detection and ad optimization), require real-time data processing, scheduling real-time applications in MapReduce environments has become a significant problem [11][12][13][18][19] [20][23].

Polo et al. [11] developed a soft real-time scheduler that allows performance-driven management of MapReduce jobs. Dong et al.
[13] extended the work by Polo et al., where a two-level MapReduce scheduler was developed to schedule mixed soft real-time and non-real- time jobs according to their respective performance demands. Although taking MapReduce jobs' QoS into consideration, most existing approaches [11] [13][18][19][20] do not provide deadline guarantees for the jobs. Ferguson et al. developed Jockey [23] to provide guaranteed job latency in data parallel clusters. Their approach, however, can only be applied to control recurring jobs. Kc and Anyanwu [12] developed a Deadline Constraint scheduler, aiming to provide time guarantees for MapReduce jobs. However, the Deadline Constraint scheduler has several deficiencies, which may lead to not only resource underutilization but also deadline violations (please refer to Section III for detailed analysis).

This paper develops a novel Real-Time MapReduce (RTMR) scheduler to not only provide deadline guarantees for MapReduce applications but also ensure good utilization of MapReduce clusters. The remainder of this paper is organized as follows. Section 2presents the background. In Section 3, we briefly describe the Deadline Constraint scheduler [12] and its deficiencies. Section 4 presents our new scheduling algorithm in detail. Evaluations of these two schedulers are provided in Section 5. Section 6 concludes the paper.

Sensing Across the Continent: Using Cellular Sensor Networks to Track Migratory Birds

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ABSTRACT

In this work, CraneTracker, a cutting-edge sensor technology for tracking migratory birds, is introduced. The station is intended to track Whooping Cranes, an endangered bird that travels 4,000 kilometres between southern Texas and north- central Canada every year as part of its migration. For reliable, continentalscale information delivery during migration, CraneTracker has a wide range of sensors, a multi-modal radio, and power control circuitry. The application of cellular technology in inexpensive sensor platforms enhanced by a low-power transceiver for adhoc networking is driven by the demand for widespread connectivity. A novel class of cellular sensor networks (CSNs) for time-sensitive and mobile sensing applications is produced by this platform. Via field trials with wild Sandhill Cranes, Siberian Cranes, and wild Turkeys, the CraneTracker is assessed. Experimental evaluations demonstrate the potential of energy-harvesting CSNs for wildlife monitoring in large geographical areas, and reveal important insights into the movements and behaviors of migratory animals. In addition to benefiting ecological research, the developed platform is expected to extend theapplication domain of sensor networks and enable future research applications.

INTRODUCTION

The Whooping Crane (*Grus americana*) is one of the most endangered bird species native to North America. As of spring 2011, there are only 575 birds in existence, with no more than 279 individuals in the Aransas-Wood Buffalo Population (AWBP). The AWBP is the only wild migratory population and the source of the nearly 300 birds that are incaptivity or have been released in efforts to re-establish the species in Wisconsin, Florida and Louisiana [9]. These birds conduct an annual migration of 4, 000 km (2,500 miles) between southern Texas and north-central Canada, during which they travel as much as 950 km/day (600 miles/day).Tracking and monitoring the cranes during migration reveals potential causes of mortality, and the impact of changing habitat on bird behaviors. This knowledge is of prime im- portance to conservation efforts.

Migratory bird tracking has many system, hardware, and software design challenges. The tracking devices must be lightweight and compact so that bird behaviors are not im- pacted. The extremely high mobility during migration cre- ates severe challenges in maintaining communication links with the birds. Moreover, it is very difficult to recapturea bird once the device is attached. Hence, a tracker must operate reliably under unpredictable environmental condi-tions during the deployment. The weight and mission du- ration requirements also impose significant challenges to en- ergy management. Furthermore, due to the lack of existingquantitative measurements on crane behavior, detailed field measurements are needed to establish a baseline for compar-ison in later experiments. Finally, the endangered status of Whooping Cranes necessitates extensive evaluations of thesystem on other "proxy" animals prior to deployment on the target species.

Wireless sensor networks (WSNs) have been playing an in- creasing role in wildlife monitoring [11, 14, 17, 19, 20]. Their light weight, low cost, and communication capabilities are a desirable combination for scientists seeking to analyze ani- mal behavior. However, existing solutions have focused on tracking animals in much smaller geographic areas than the cranes' habitat. The data is not considered time-sensitive, and there is no restriction on the upper bound of the communication delay. In contrast, ecologists studying cranes require the data within 24 hours so that field observations can be made, and causes of death determined. Furthermore, the cranes' migratory paths are unpredictable, which makes it impractical to rely on short range, predeployed infrastructure. Currently, satellite based trackers are used to providea high degree of connectivity without relying on fixed ter- restrial infrastructure, but have communication delays thatexceed 48 hours [31]. These solutions are impractical for many types of wildlife studies which require latencies of lessthan one day. Finally, existing studies have been characterized by either limited durations and/or frequent maintenance. These limitations prevent existing solutions frombeing re-used for monitoring birds during migratory periods. In this paper, we present a multimodal platform, CraneTracker, for monitoring Whooping Cranes and our experiences from field experiments on wild turkeys and cranes. An overview of the system architecture is shown in Fig. 1, wherethe migration path of the cranes is highlighted over NorthAmerica. This figure shows the need for communications connectivity at an extremely large scale. This motivates theuse of cellular technology in low- cost sensor applications, where the existing coverage of cellular networks is exploited. In addition, with a second low-power radio, smallscale deployments of ad-hoc networks can still be used to improvecommunication coverage in key areas, e.g., well-known nesting, breeding, and wintering grounds, and in cases where the cologists need to acquire information from the field. Developing software for this new sensing paradigm is complicated by the fault tolerance needed in these systems [6]. The system must cope with defective behavior caused by faulty or physically damaged components. To this end, ex- tensive validation and testing is conducted to eliminatetential faults before the system is deployed. Moreover, the platform must be capable of handling periods of low energy reserves, where the system capabilities are restricted. This is addressed through an energy- aware software and hard- ware architecture. Finally, a complete monitoring system isdeveloped that incorporates storage and visualization components.

Sensing and Communication on the Field for Precision Agriculture Using the Internet of Underground Things

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Abstract:-

The adoption of information technology solutions in crop fields within precision agriculture methodologies has recently been prompted by predicted increases in global population and the need for food. This need led to the development of the Internet of beneath Things (IOUT), which consists of sensors and communication devices partially or entirely buried beneath for real-time soil sensing and monitoring. With the help of this new paradigm, the intricate social network of growers, agronomists, agricultural experts, and advisors can easily be integrated with underground sensors, machinery, and irrigation systems. Modern communication architectures are reviewed, and the underlying sensing and communication technologies for IOUT are described in this paper. Additionally described are recent developments in wireless underground communication theory and applications. There are significant issues with IOUT design and execution.

INTRODUCTION:-

By 2050, there will be a 32 percent rise in global population, doubling the demand for food. But currently, food production accounts for up to 70% of all water withdrawals. To increase crop for drop, new tools are required. The main source of data on the financial health, production methods, and resource usage of American farm businesses as well as the financial stability of American farm households is the USDA Agricultural Resource Management Survey (ARMS). According to ARMS statistics, precision agriculture is now practiced widely across the country. In Fig. 1, adoption rates of major precision agriculture approaches (bars) along with the total precision agriculture adoption rate (line) are shown for corn for each year of USDA ARMS publication (USDA ARMS 2015 version was under development at the time of this writing). It can be observed that adoption rate of precision agriculture for corn increased from 17.29 percent in 1997 to 72.47 percent in 2010 with similar trends observedfor other crops such as soybean and peanuts. Aside from presenting a growing trend in the usage of precision agriculture in corn production, it is evident that as new technologies emerge, they are widely adopted by farmers.

Among the various precision agriculture techniques, crop yield monitoring is the most widely adopted technique (61.4

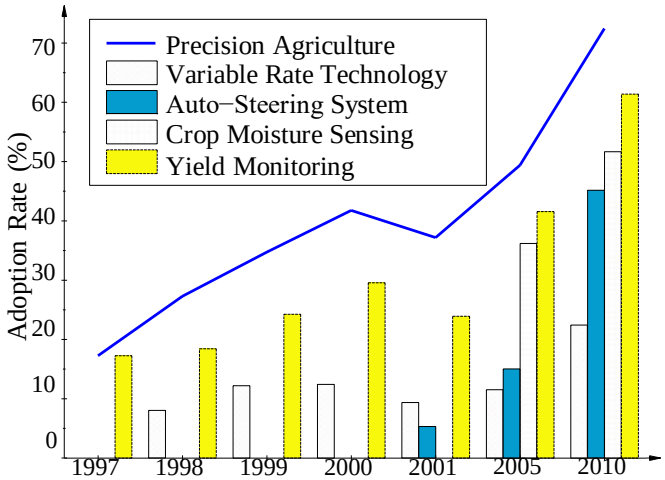

Fig. 1: Precision agriculture technology adoption in corn production (USDAARMS Data).

percent). In addition, guidance and auto-steering system adop- tion jumped from 5.34 percent in 2001 to 45.16 percent in nineyears. Use of equipment and crop location information en- ables precise control with auto-steering systems which reduce production and maintenance costs and reduces repetitive field work for farmers. Despite the drastic increase in adoption rates of other techniques, variable rate technology (VRT) adoption has been relatively steady, where adoption rate increased from percent in 1998 to only 11.54 percent in 2005. Adaptive application of resources like fertilizers, pesticide, and water promises significant gains in crop production but requires accurate and timely information from the field. It can be observed that only after the adoption of recent crop moisture sensing technology, VRT adoption doubled to 22.44 percent in2010. During the same period, crop moisture sensing adoptionincreased from 36.21 percent in 2005 to 51.68 percent in 2010.

It is clear that the success and adoption of variable rate technology depends on advancing soil monitoring approaches. Despite being the most recent precision agriculture technology, crop moisture sensing has become one of the most adopted

SENTENCE RECOGNITION FOR SILENT SPEECH INTERFACES FROM ARTICULATORY MOVEMENTS

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ABSTRACT:-

An articulation-based silent voice interface for command-and-control systems has shown promise in recent research. A text-to-speech synthesiser can be powered by an interface that transforms articulation into words. Using continuous tongue and lip motions, we have suggested a revolutionary near-time approach in this study to recognise complete utterances. Our mission is to help aphonic or severely motor speech-impaired individuals make functional speech with their tongue and lips. Using a functional sentence data set gathered from ten speakers, our method was tested (3012 utterances). Each sentence prediction had an average accuracy of 94.89% and an average delay of 3.11 seconds. The outcomes demonstrate the viability of our method and its capacity to develop a real-time articulation-based quiet based silent speech interface for clinical applications.

Index Terms— Sentence recognition, silent speech interface, support vector machine, laryngectomy

INTRODUCTION:-

Oral communication plays an important role in social life. Persons with speech impairments (caused, e.g., by laryngectomy, which is partial or complete surgical removal of larynx) struggle with their daily communication [1]. Each year, about 15,000 new cases of laryngeal and hyperlaryngeal cancer are diagnosed in the United States [2] and there are an estimated 16,500 tracheo-oesophageal surgeries every year in the UK [3]. However, currently, there are only limited treatment options for those individuals, which either produces an un-natural voice (i.e., by electrolarynx) or is limited by slow manual input (i.e., as in typing-based Augmentative and Alternative Communication devices, AAC) [1]. New assistive technologies are needed to provide a more efficient and natural mode of oral communication for these individuals.

Silent speech interfaces (SSIs), although still experimental [4], may provide an efficient communication modality. Articulation-based SSIs convert silently produced articulatory movement or vocal tract data into orthographic transcriptions that can be used to drive a text-to-speech synthesizer (TTS) or to trigger the playback of pre-recorded sounds. An advantage of using pre-recorded sounds is that the individual's own voice can be recorded and replayed post laryngectomy [2, 3, 4].

Two major challenges of developing SSIs are the lack of portable and fast data acquisition devices (hardware) and of sufficient algorithms (software) to convert non-acoustic data to speech text. Electromagnetic articulography (EMA) is a promising development towards better hardware [4]. Fagan et al. have shown the potential of their EMA-based silent speech interface for command-and-control applications by successfully classifying a set of words from movements of sensors affixed to the tongue and lips [3, 5]. Our study is focused on the development of a fast and accurate algorithm that converts articulation to text.

Articulatory data can improve the accuracy of automatic word recognition for the voiced speech of both healthy [6, 7] and neurologically impaired individuals [8]. This typically involves the use of *articulatory features* (AFs) which include lip rounding, tongue tip position, and manner of production, for example. Phoneme-level AF-based approaches often obtain word recognition accuracies less than 50% [6] because articulation can vary significantly within those categorical features depending on the surrounding sounds and the speaking context [9]. These challenges motivate a higher-level unit of recognition.

Sentence-level recognition has rarely been investigated due in part to the difficulty in training appropriate models. Our long-term goal is to recognize a set of functional sentences (i.e., those used by AAC users in practice) that drive EMA-based silent speech interfaces for clinical applications. This paper presents a novel sentence-level and near-time recognition algorithm. The algorithm was tested using a functional sentence dataset, which is part of our ongoing data collection. The algorithm is characterized by the following features: (1) recognition is sentence-level, rather than phoneme-level; (2) it is based on continuous articulatory movements, rather than on discrete AFs; (3) it uses a dynamic thresholding technique based on probability change patterns; and (4) it is extensible, which means a variety of classifiers can be built-in easily. The algorithm will provide the recognition component of our future articulation-based SSI.

Karnaugh Maps Simplified by Grouping Non-Power-of-Two Components

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Abstract:-
The ones in the map are joined into rectangles whose length and breadth must be powers of two, according to what we learn about the Karnaugh map in the switching theory course. The logic function that is characterised as a sum of products is the outcome. This study demonstrates that we may also create groups in which the rectangles' length and breadth are equal to three. In terms of logic gates, this produces a logic function that is simpler than the sum of products, resulting in circuits that are more hardware-efficient. Later in the paper, this concept is expanded to include other elemental groups. Lastly, a fresh viewpoint on the Karnaugh map that combines the suggested strategy with the traditional one is offered

Keywords Boolean algebra · Digital circuits · Groups of non-power-of-two elements · Karnaugh map · Logic function · Simplification

Introduction:-

Several Boolean algebraic techniques exist that condense logical operations. The Quine-McCluskey approach [7, 8] and the Karnaugh map [5, 6, 11] are the two most widely used. Several fresh suggestions for enhancing these algorithms have been made over time.. This includes new maps to handle larger number of variables, models to explain how the number of variables in the Karnaugh map is reduced, computer tools to apply the Karnaugh map efficiently, recursive algorithms to solve Boolean relations, and upgrades of the Karnaugh map such as using of XOR patterns or projected sum of products. In this paper, a new upgrade of the Karnaugh map is presented, which is based on making groups of non-power-of-two elements.

When we study the Karnaugh map, we learn that the ones in the map must be combined in groups of $a\ b\times$elements, where a and b are powers of two. Other shapes and rectangles of other sizes are not allowed. A simple example is when there are three ones in a row of the Karnaugh map. In this case, two groups of two elements are created. One with the first element and the middle one, and the other group with the middle element and the last one. The alternative where three elements are grouped together, is not allowed.

Sketch-Based Collaboration for UAV Pilots and Mission Experts: Sky Writer

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ABSTRACT:-

The collaborative communication tool Sky Writer enhances the typical display of a UAV pilot and enables other stakeholders to inform the pilot of their requirements and intents. Most of the time, UAV pilots engaged in time-sensitive missions, such as responding to urban disasters, must devote their cognitive resources to flight duties, which can make working with other stakeholders unsafe or difficult. Sky Writer meets stakeholder needs while putting the UAV pilot's cognitive load at the absolute minimum. An interface containing contextual flight data and a live video stream of the flight is provided to stakeholders by the application. Users can draw directly on the video stream or utilise a spotlight indicator that is mirrored on all system screens, including the pilot's display, to draw on the video stream. Any contemporary web browser can be used to access the application, which functions on both touch and conventional devices. Concept testing with two pilots at Disaster City revealed that while the drawing features were most helpful while the UAV was stationary, the spotlight feature was most helpful when it was moving. The system will soon be put to the test by trained responders to see how well it performs in a simulated response and to provide information for the ongoing design process.Categories and Subject Descriptors
I.2.9 [**Robotics**]: Operator Interfaces

Keywords
Unmanned aerial vehicles; sketch interface

INTRODUCTION:-

Figure 1. The AirRobot 100-B with its controller.

An important challenge facing UAS teams (composed of a pilot, mission specialist, and safety officer [1]) is conveying information from the various stakeholders to the pilot in a non-disruptive, but informative manner. Figure 1 shows a traditional UAV system, composed of the UAV and the pilot's hand controller. Prior work has enabled stakeholders to have a visual common ground with the pilot by giving them their own dedicated display that mirrors what the pilot sees [2]. Sky Writer extends upon that by enabling the stakeholder to visually convey information to the pilot via sketches and spotlight annotations on the video stream. Additionally, this work adds flight context information, like live mapping, to the stakeholder's display, providing them with more data to inform their directions to the pilot. Finally, Sky Writer is executed in a modern web browser, allowing mirrored displays to be easily deployed to additional stakeholders, who can then see the mission in real time and provide annotation input of their own.

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Small Unmanned Aerial Vehicles: Comfortable Approach Distance Ms.BANASHREE DASH

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ABSTRACTION:-

The comfort level of a small unmanned aerial vehicle (sUAV) approaching a human at either above head height or below head height was not significantly different, according to the first known human-subject investigation presented in this work. For crowd control, entertainment, or flying personal assistants, it is crucial to know how much, if any, pain is caused by a sUAV flying close to a person. Prior studies have concentrated on how people relate to one another or to autonomous ground vehicles, and the experimental techniques frequently depend on the human subject voluntarily expressing their anxiety. In order to test the premise that human-robot interaction will resemble human-human interaction, the experimental design used in human proxemics investigations was duplicated while psychophysiological sensing was added. This hypothesis was not supported by the within-subjects experiment with 16 participants. Instead, in human studies, sUAVs that were higher than the average height of a "tall" person (2.13 m) did not significantly vary from those at "short" heights in terms of heart rate variability or the distance at which the participant stopped the robot (1.52 m). Two potential confounds could be to blame for the lack of effect: (1) replicating previous human proxemics trials did not capture how a sUAV would probably move or interact, and (2) informing the subjects that the robot could not harm them. Regardless of any confounding, the outcome

INTRODUCTION:-

As small Unmanned Aerial Vehicles (sUAVs) becomemore commonly used around the general public, it is im- portant that the Human-Robot Interaction (HRI) and public safety communities understand how people will react a sUAV for applications such as crowd control, entertainment, orflying personal assistants.

This paper presents from the first known study of com- fortable approach distance and height for general human- robot interaction with a sUAV. The specific research question addressed in this study is: *How closely will an uninformed participant allow a sUAV to approach before feeling uncom-fortable or anxious, and does this distance change based on the height of the vehicle?* Since Hayduk [6] defines personal space as "the area individual humans actively maintain around themselves into which others cannot intrude without arousing discomfort," these distances at which participants

begin to feel uncomfortable will be referred to as *per- sonal space* or *comfortable approach distance*. This study measured the difference in personal space by measuring at what distance people, who were standing still, would aska sUAV to stop based on two different height conditions, corresponding to a short person (1.52 m) and or a tall person or low ceiling (2.13 m). The expectation was that sUAVs flying at the "tall" height would result in larger personal spaces, just as shorter people prefer to stay at a further distance from taller people. An experiment replicating prior psychological studies was conducted with 16 participants in a within-subjects design, and used the traditional stop distance method but added psychophysiological data, notably heart rate variability, as a convergent measurement in comfortable approach distancing.

Small Unmanned Aerial Vehicles: Comfortable Approach Distance Ms.BANASHREE DASH

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ABSTRACTION:-

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INTRODUCTION:-

As small Unmanned Aerial Vehicles (sUAVs) becomemore commonly used around the general public, it is im- portant that the Human-Robot Interaction (HRI) and public safety communities understand how people will react a sUAV for applications such as crowd control, entertainment, orflying personal assistants.

This paper presents from the first known study of com- fortable approach distance and height for general human- robot interaction with a sUAV. The specific research question addressed in this study is: *How closely will an uninformed participant allow a sUAV to approach before feeling uncom-fortable or anxious, and does this distance change based on the height of the vehicle?* Since Hayduk [6] defines personal space as "the area individual humans actively maintain around themselves into which others cannot intrude without arousing discomfort," these distances at which participants

begin to feel uncomfortable will be referred to as *per- sonal space* or *comfortable approach distance*. This study measured the difference in personal space by measuring at what distance people, who were standing still, would aska sUAV to stop based on two different height conditions, corresponding to a short person (1.52 m) and or a tall person or low ceiling (2.13 m). The expectation was that sUAVs flying at the "tall" height would result in larger personal spaces, just as shorter people prefer to stay at a further distance from taller people. An experiment replicating prior psychological studies was conducted with 16 participants in a within-subjects design, and used the traditional stop distance method but added psychophysiological data, notably heart rate variability, as a convergent measurement in comfortable approach distancing.

Smart Home Technology IoT Implementation

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ABSTARCT:-

Smart homes are rapidly rising to prominence as the most interesting application of the new Internet of Things (IoT) technology. By utilising centralised and shared operations, smart houses take advantage of the high degree of accessibility present in current mobile devices (such as cellphones, multimedia systems, and laptops) to provide residential users cutting-edge, integrated, and immersive infrastructure. It is crucial to offer home customers an adequate level of security against cyberattacks as these sorts of networks become more prevalent. Smart homes, however, provide protection problems since many appliances in a situation of a resource-constrained smart house do not require the introduction of the standard protection measures. In this study, the context, applications, and integration of the Internet of Things into domestic automation are discussed. The advantages of smart houses for simplicity of use, comfort, and helping the vulnerable save money on their daily needs will all be covered in this article. Smart homes will also have significant advantages for electricity and water efficiency. The premise of the paper analyses new technologies and solely determines how near to deployment they actually are.

Keywords: Home Automation, Innovative Technologies, Internet of Things, Security.

INTRODUCTION:-

As technology evolves into more complex and connected systems, it is no surprise to find that it becomes an integral part of everyday life. Only 20 yrs. ago it was a luxury to own a computer at home. Today, not only virtually every household owns a strong machine, but every individual also owns a mobile or tablet unit that remains by their side at all times. The pervasiveness of technology may also be alarming, simply because of how often human behaviour and interaction have changed. But the trick is to treat technology as an opportunity[1].

With the help of the technology required to link household products to a network getting smaller and cheaper for nearly every day that passes, one doesn't have to think that far into the future to envision a smart home thatis linked and ready to ease the lives of the occupants. A number of the infrastructure currently still operates. All that's left is to work on making the average user efficient, easy to understand and cheap enough. This paperwould clarify the idea behind the Internet of Things (IoT), how it can be used for home automation, why Smart Home systems are relevant and what innovations are already accessible in this area. The idea behind the Internet of Things has been available for about 25 years now but was not publicly implemented until 1998 in the form of a resolution. It's impossible to believe that there was enough infrastructure for the Internet of Things back in 1998 to be a feasible project, however by thinking into the future experts had the correct idea [2].

When the Internet first came into existence there was a machine system. Growing machine was signed in and enabled data to be transmitted back and forth. When the Internet user population began to grow and sites of the social media burst into prominence, it has become an age of the People's Internet. Countless websites and applications (the main ones are Instagram, Facebook, and Twitter) are accessible and utilized to remain linkedby a significant majority of the population. So now that both computers and people are linked over the internet,the next logical move is to continue linking items. At first it may feel that introducing inanimate artefacts to the linked network has no particular useful function. Despite technology evolving exponentially as it has been, though, the Internet of Things has the “capacity to provide the world despite intelligent infrastructure when more data is accessible”. What can be achieved with the Internet of Things has boundless possibilities.There are various divisions of possibilities emerging from the Internet of Things as can be seen in Fig 1. Someof these thoughts still apply to one another. Building Automation for example has a bright blue dotted line thatlinks it to electricity and water resources. It is that while they are two different projects with their own set of innovations in store for the future, they will collaborate together to build households and industries with smartdevices and sensors built to track the usage of energy and water with the hope of recycling [4]. Embedded sensors are connected to everyday items to enforce this relation with real objects across the internet in order togather data on them. These sensors may track light, heat, sound, and several other variables and can be used tomonitor and regulate the local climate. Any of these items is linked to the Internet, which is how all the data gathered is obtained to be processed, and how such artefacts may be exploited towards the end [5].

Software Defined Network Initiative of the IEEE
A suggestion

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ABSTRACT:-

In order to promote professional and scholarly interchange of ideas, research, and development relevant to software defined networks (SDNs), this article proposes the creation of an IEEE initiative on SDNs. The proposal is the result of a lot of work by a group that includes the writers. After a thorough gap analysis, gaps and significant opportunities were found. Eventually, a precise set of elements were suggested for publishing, conferences, standards, education, certification, and publicity, along with time and budgetary considerations.

INTRODUCTION:-

Software Defined Networking (SDN) has become one of the most active research areas in networking and communications today. There is a flurry of activities in the industry and academia and yet, there is no major professional organization leading the way in a substantial and comprehensive way. This prompted IEEE Communications Society and IEEE Future Directions Committee to set up a task force to propose an IEEE initiative to make the IEEE as "the place to go" for any SDN related activities such as publications, conferences, and standardization.

The authors of this paper formed a task force to prepare a proposal, which is the subject of this paper. The team members shared the load, each taking on a specific area of the proposal. The team met on a weekly basis to discuss the findings and future directions. The methodology used by team was straightforward: perform a gap analysis by reviewing current activities, different interpretations of SDN, and related technologies such as cloud computing, and identify overlaps. Then, identify the gaps, open areas, and key opportunities in general. Finally, identify opportunities for IEEE in the areas of publications, conferences, standards, education, certification, etc.

It was quickly determined that there are different views on SDN and the well-known interpretation [1,2,3] is rather limited! Despite the existing activities, we emphasize that the field is just emerging and will grow quickly. The related technologies such as Cloud Computing, Cognitive Radio Networking, are not threat to SDN. On the contrary, SDN can be a strong enabler for other emerging technologies due to its significant flexibility and overarching scope.

An important finding of the team is that there is a need to broaden the vision of SDN to cover all components end-to-end, and to include all types of technologies (wireless, optical, etc.) involved. This broader vision is especially important for IEEE to fill the gap and provide a larger scope for its products in publications and conferences.

The primary objective of the proposal is to establish an IEEE-wide initiative with a comprehensive program based on a broad vision of SDN. The proposal emphasizes a prioritized launch of products and services to utilize resources efficiently. Accordingly, the mission of the proposal includes keeping up, leading, and co-branding as much as possible with other IEEE and non-IEEE activities. The highlighted individual areas are as follows:

- An IEEE Magazine on SDN and a Journal on SDN
- A major conference and regional and topical conferences
- A Standards Committee on SDN to drive standardization
- Tutorials, e-courses, training courses, and webinars
- Certification programs for people, devices, and testbeds
- Web Portal for links to IEEE SDN programs, repository, communications

The rest of the paper provides a detailed vision of the future of SDN. Section II provides a summary of the analyses and opportunities identified by the team. In Section III, the individual components of the proposal are presented. The management issues related to the initiative are discussed in Section IV. Finally we conclude the paper in Section V.

STAR DELTA STARTER USING A THREE-PHASE INTRODUCTION MOTOR

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ABSTRACT:-

This piece of machinery or appliance lowers the initial torque and current. Three contactors, an overload relay or circuit breaker, and a timer for setting the time in the Star position are typically included in the Automatic Star Delta Starter design (starting position). The Star Delta Starter's primary function is to enable the usage of the starter, which requires that a motor be in the delta linked position during a typical run..

When the motor is at idle, it just is like the short-circuited transformer at secondary side because all the rotor bars are connected together to form a closed path. This will draw a large current flow through the rotor bars. So, when the motor is started, stator draws high current which is 8-10 times that of the rated current. Therefore, before starting the motor, itis necessary to reduce the voltage applied to the motor.

While there are distinct phases of current in a star connection, the line voltage is three times greater than the phase voltage. Hence, if a motor is started in a star connection, the voltage is dropped, which causes a reduction in current. While running a motor in a delta connection, full voltage is applied because the voltage is the same as the phase voltage. For a three-phase motor with a 440 volt AC main supply and a 50 Hz frequency, the Star/Delta Starter is typically made of three contactors, a pneumatic timer, and a thermal overload relay or circuit breaker.

Keywords: Induction Motor, Three phase, Star delta starter, etc.

INTRODUCTION:-

Function of Starters:- The device which is used to limit the starting current and reduce the starting torque is called Starter. It reduces the starting current to a safe value.

Need of Starters:- The flux coupling with the rotor conductors and its relative speed affect E's magnitude. The applied voltage affects how strong the rotor flow is. When the stator winding is subjected to the recommended voltage, the rotor is stationary, and as a result, the slip is one. As a result, if the stator winding receives its maximum rated voltage, a large amount of induced emf will be generated in the rotor conductors since their relative speed to the stator's rotating flux is very high, or equal to the stator flux's synchronous speed. Moreover, the conductors on the rotor are short circuited, which results in low impedance.

Hence the current drawn by the stator winding or motor is very large, approximately 5 to 7 times the full load current.

The ill effects of high starting current are as follows:-

The copper losses occurring in the stator and rotor windings due high starting current are extremely large, which would produce a lot of heat inside the machine and may damage the insulation of the windings. Moreover, there will be a dip in supply voltage.

The starting current drawn by the motor can be reduced to a permissible value by:

A Applying reduced voltage to the stator winding
A Inserting resistance in the stator circuit
A Inserting resistance in the rotor circuit

In case of slip ring induction motors, it is possible to add external resistance in rotor phases as wound rotor has 3 phase star connected winding to limit the starting high current. However, in case of squirrel cage induction motors it is not possible to add any kind external resistance as it consists of copper bars, which is short circuited by end rings on both sides. So, in case of squirrel cage induction motors, initial high current is controlled by applying reduced voltage to stator winding during starting period and the full normal voltage is applied when rotor has picked up speed to about 70 to 80% of its normal speed.

Different types of Starting methods:-

There mainly two types of starters available:-

DC Starters:-

1. Two-point Starter
2. Three-point Starter
3. Four-point Starter

AC Starters:-

1) D.O.L Starter (Direct Online)
2) Automatic/Manual Primary Resistance Starter
3) Automatic/Manual Autotransformer Starte
4) Automatic/Manual Star Delta Starter

Static Experimental Experiments to Determine the Operating Properties of a Synchronous Generator

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ABSTRACT:-

This paper deals with the determination of the operation characteristics of a Synchronous Generator (SG) using static experimental tests (current and voltage decay tests). Using these tests the magnetization characteristic, the machine parameters (synchronous magnetization inductances and differential magnetization inductances), the no-load characteristic and the external characteristic were determined. The synchronous generator, a device that is now employed in the majority of power plants, can be evaluated for performance using its magnetization characteristic, parameters, and operational characteristics. Static experimental methods have a number of advantages over traditional moving-rotor experiments and numerical methods of field calculation that necessitate knowledge of geometrical dimensions and material qualities. rapid results, low power consumption, and no impact on the drive system where the machine is incorporated, with simple implementation for any type of SG. The mathematical model of SG uses dedicated Matlab-Simulink programs and the results obtained by static methods are compared with those obtained by classical methods. Also to better approach the phenomenon of magnetic saturation and a more accurate estimate of the parameters, the magnetization characteristic, synchronous magnetization inductances and differentialmagnetization inductances are determined versus the total magnetizing current.

Index Terms—electric machines, generators, parameter estimation, performance evaluation, circuit testing**.**

INTRODUCTION:-

The synchronous machine is widely utilised in a variety of industrial applications, including electrical power plants, electric drive systems, automation systems, robotics, and automobiles. This electrical machine has been the subject of numerous theoretical and experimental study. The synchronous machine's operational characteristics provide crucial details regarding the machine's performance under various working conditions. The methods for evaluating the operation characteristics of synchronous machine are numerous [1-4]. Obviously the most used of them are based on experimental tests with moving rotor and these ones can be considered classical [3, 4]. In case of large power machines the classical tests are however difficult to be put inpractice and they involve important electric energy consumption. In such cases mathematical estimations or other experimental methods easy to implement are preferred.The usage of specialised machine models, which typically comprise the voltage equations of various machine circuits and can be expressed by unique equivalent electric diagrams, is required for mathematical estimations. The machine's electrical parameters, which can be calculated using electromagnetic field theory or other experimental techniques, are included in the mathematical models. The usage of numerical approaches, which exhibit good adaptability and accuracy, has grown during the past few decades for electromagnetic field analysis of electrical equipment [17–21]. Unfortunately, these techniques require accurate understanding of the materials' electric and magnetic properties as well as the machine's geometrical dimensions, information that is frequently unavailable.

Among the mathematical models used for the analysis of electrical machines we can mention variable parameters models, concentrated parameters models, models in phase coordinates or in orthogonal coordinates.

In case of synchronous machine, due to its constructive particularities and due to the ease of computations the *d-q* mathematic model with concentrated parameters has been the most used so far.

As mentioned before, to determine the operation characteristics of synchronous machine we can use other experimental methods that can be easily implemented without important energy consumption. In this category we can mention the static experimental methods (static rotor) which offer some real advantages: easy implementation, reduced consumption of energy, no impact on the electric drive of the machine [22-28].

Student creativity, motivation, and self-control and their effects on learning and performance in college computer science courses

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ABSTRACT:-

It is widely acknowledged that more post-secondary students must choose to study in and graduate from STEM-related disciplines. It has been determined that students' motivation and strategic self-regulation play key roles in their success in STEM studies. Yet, it is not well known how students' involvement, self-regulation, knowledge acquisition, and usage of strategies affect various learning outcomes. In this study, we looked at the relationships between motivation, strategic self-control, and creative competency and course success as well as long-term learning of computational thinking knowledge and skills in basic computer science courses. Use of self-regulated strategies and knowledge building were positively and negatively associated with student grades and long-term retention. More study effort was linked to better grades, and longer study sessions were linked to greater knowledge retention. Higher learning- and task-approach goal orientations, endogenous instrumentality, and positive affect were associated with higher grades and knowledge retention, as well as with strategic self-regulation and engagement, while lower learning-, task-, and performance-avoid goal orientations, exogenous instrumentality, and negative affect were associated with lower motivation. But not grades or memory retention, implicit IQ perceptions were linked to strategic self-regulation. Artistic competency was linked to better levels of strategic self-regulation and knowledge retention, but not grades. STEM education implications are highlighted.

INTRODUCTION:-

The need for more post-secondary students to major and graduate in STEM fields is widely recognized as in the National Academies report "Rising above the gathering storm: Energizing and employing America for a brighter economic future" [1]. Substantial funding is provided for enhancing instruction in STEM fields [2]. A relatively low percentage of students major in STEM fields, and despite attracting students with generally better academic preparation and aptitude, students in STEM fields experience higher attrition than those in other post-secondary majors [2].

Students' strategic self-regulation has been identified as playing a critical role in their success in STEM learning [3,4],

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Study of Capacitor Switching Transients and a Method for Determining Capacitor Size and Location

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ABSTRACT:-

In this study, transients caused by the switching of shunt capacitors in power networks are analysed. These transients will spread throughout the network along the transmission components, and as a result, they will be sensed in places far from the capacitors, like load terminals. This can have adverse consequences on the quality of the supply at those load buses. The distributed-parameter analysis will provide analytical equations for the anticipated transient voltages at the load terminals in terms of both the size and placement of the switched capacitor based on a typical radial system. This paper's second section provides straightforward closed-form formulas for determining the precise size and position of the shunt capacitor in terms of observable characteristics of the voltage signal at the load terminals.

Index Terms*:-* Capacitor switching, electromagnetic transient analysis, parameter estimation, power quality, simulation.

INTRODUCTION:-

Properly implemented, the two main advantages of con-necting shunt capacitors at selected buses within the power networks are: the improvement of the network's voltage profile,i.e., reducing the spatial as well as the temporal voltage varia-tion within the network, and decreasing the network's losses [1].In general, these capacitors are not connected all of the time,since the network loads are changing with time according tocertain load curves [2]. As a result, they might be turned on and off multiple times over a regular day. Transient voltage stresses that are caused by these switching activities could threaten the supply quality at a number of load sites [3]–[5]. The percentage of personal computers, televisions, and other sensitive solid-state electronic loads in distribution networks is rising, which is giving this issue additional prominence. To evaluate these transient stresses and their effects on the sensitive loads and components, established susceptibility curves that are accessible in the literature can be used. To that purpose, thorough knowledge of the anticipated amplitudes and waveforms of these transients is needed.

There are several commercial and educational software pack- ages (such as EMTP) that can be successfully used to get this information for practical and complicated networks. The largenumber of components and transient signals (i.e., voltages andcurrents) does not allow the practicing engineer, in most cases, to clearly realize the mutual interdependence among these quantities nor to recognize eventually existing general trends and practically interesting patterns or special cases. This paper will deal, therefore, with a reduced model comprising a typical bal- anced radial feeder with a sinusoidal voltage source applied at its sending end and a load connected at its receiving end. It is assumed that a shunt capacitor is switched across the power line or feeder at a location somewhere between the source andload. Several models for the analysis under the assumption of different degrees of approximation are given in [3], resulting in the system eigenvalues as functions of the capacitor loca- tion. The reference also gives an asymptotic expression based on three different models. The first model is the most compre-hensive and takes all feeder parameters into account, includingcopper losses, and both the load impedance as well as the source internal inductance. The second model neglects the feeder resis- tance and the source inductance, while the third model neglectsboth the feeder resistance and the source inductance and fur- ther assumes a purely resistive load. A serious limitation and possible source of error in the analysis in [3] is the use of a concentrated parameter feeder equivalent circuit assumed as a short line (i.e., neglecting the feeder shunt capacitance alto- gether) for all three models. This is particularly important in cases involving relatively long feeders and high-frequency sig-nals [6]. Regarding the suggested identification technique, the reference gives a procedure to determine the capacitor locationalong the feeder in terms of the measurable frequency of the high-frequency transient voltage observed at the load terminals.So far, however, no relations are available to identify the size of the switched shunt capacitor, which is also of importance fordetermining the appropriate online or postswitching protectivemeasures.

Study of Hadoop Cluster Failure Recovery Energy

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***Abstract*— Today, an essential criteria for assessing a computing system is energy efficiency. Unfortunately, because of numerous limitations, preserving energy is a difficult task. For instance, three clones of each data block are randomly distributed in Hadoop, one of the most widely used distributed processing frameworks, in order to enhance performance and fault tolerance. Nevertheless, a method like this restricts the maximum number of devices that may be powered off without compromising the availability of the data. In order to get around this restriction, earlier research developed a brand-new system called a covering subset that keeps a set of active nodes to guarantee the rapid availability of data even while all other nodes are off. If no failure occurs, this covering subset-based technique operates without a hitch. A node in the covering subset could fail, though.**

In this research, we investigate Hadoop clusters' energy-efficient failure recovery. We look into erasure coding and replication as potential redundancy mechanisms, rather than only employing replication as a Hadoop system does by default. For both systems, we create failure recovery algorithms and quantitatively assess their energy effectiveness.

I. INTRODUCTION

Enormous data centers are built to support various types of data processing services like email services and searching engine services. Data centers are becoming crucial in modern life. According to data center research organization Uptime Institute's survey in May 2011, 36 percent of the large companies surveyed were expecting to exhaust IT capacity within 18 months. That means, they must enlarge their existing data centers or build more data centers. To maintain a data center, a large amount of energy need to be consumed for both computing and cooling [2]. It is reported that in 2010 2% of electricity is used by data centers in US and 1.3% around the world [5]. As data centers continue to grow in size and number, some researchers estimated that by 2012 the cost of electricity for data centers could exceed the cost of the original capital investment [10]. As a result, how to achieve energy efficiency is a major issue for data centers [1].

One typical and effective way for saving computing energy is to shut down idle machines. According to [3] and [6], there are a large number of idle machines in data centers consuming up to 60% of the total energy. In order to inactivate as many machines as possible to save energy, researchers attempt to dynamically match the number of activate nodes with the current workload [3]. However, it is nontrivial to apply this approach to MapReduce framework which is a popular and powerful programming model for data-intensive cluster computing. First, MapReduce framework stores the data across many nodes in order to provide an affordable storage for multi-petabyte datasets with a good performance and reliability. [4] indicates that data availability requirement prohibits a MapReduce system from shutting down idle nodes even if significant periods of inactivity are observed. During such periods, energy consumed by those idle machines is wasted. Moreover, MapReduce provides mechanisms to ensure fault tolerance and load balance, which also exert a negative effect on the energy efficiency. By default, a well-known open source MapReduce framework implementation, Hadoop, employs three replications for each data block and the copies are distributed randomly in the cluster. This mechanism actually limits the number of nodes that can be turned off without affecting the data availability.

In order to address this limitation, Leverich et al. introduce a new mechanism which groups machines of a MapReduce cluster into two subsets, i.e., covering and non-covering subsets [4]. At least one replica of all data blocks must be stored in the covering subset nodes. This way, it ensures the immediate availability of the data, even when all nodes in non-covering subset are turned off. With this mechanism, non-covering subset nodes can be turned on or off according to the workload volume without affecting the data availability. It is shown that the covering subset approach can save between 9% and 50% of energy consumption in Hadoop clusters [4]. This approach overcomes the aforementioned limitation and is likely to be widely adopted.

Complementary to Leverich et al.'s work [4], this paper investigates failure recovery in Hadoop clusters and analyzes the energy consumed in the process. A node of a cluster can become unaccessible when it experiences hardware/software errors. Large clusters of commodity machines often have high failure rates, where the Mean Time Between Failure (MTBF) could be as short as 40 minutes [9]. Since a Hadoop cluster is usually constructed with commodity machines, a node failure happens frequently and cannot be neglected. In Hadoop, as well as most other well-known MapReduce implementations, replication is the default redundancy mechanism used to achieve fault tolerance. Although

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Study of the Nuclear Non-Proliferation Treaty Based on Game Theory

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ABSTRACT :-

Despite the fact that practically everyone wants to avoid the spread of nuclear weapons, the negotiated accords don't seem to be able to stop the constant increase in the number of governments that possess nuclear weapons. We suggest a computer model for comprehending the intricate problems involved in nuclear arms discussions, the reasons different states decide to participate in a nuclear weapons programme, and the strategies for defusing crisis circumstances.

INTRODUCTION:-

Numerous international treaties are made with the best of intentions. However, every treaty needs to be examined onits actual affects rather than on its intentions. The *Treaty on the Non-Proliferation of Nuclear Weapons,* commonly referredto as the *Non-Proliferation Treaty (NPT)* aimed to make the world more secure from nuclear weapons. The treaty divided all countries based on their nuclear status as of January 1, 1967, into nuclear weapon states (NWSs), which included China, France, the Soviet Union, the United Kingdom, and the United States, and non-nuclear weapon states (NNWSs), which included all the other states. All the NWSs signed the treaty as well as all the NNWSs except India, Israel and Pakistan. North Korea is the only country that withdrew from the treaty. Hence the NPT enjoyed a great popularity and is often considered a great success.

The essence of the NPT is a bargain between the NWSs and the NNWSs. The NWSs committed themselves to nuclear disarmament and to help the NNWSs to develop civilian use of nuclear technology. In return, the NNWSs committed themselves to foresake ever developing nuclear weapons. Unfortu- nately, this bargain did not work out as planned. After forty years, the NWSs increased the total number of their nuclear weapons, while many NNWSs engaged in clandestine nuclear weapon development programs. The world does not look safer than it was forty years ago. Nevertheless, NPT defenders claimthat the NPT slowed down nuclear proliferation. In other words, without the NPT, nuclear proliferation would have been even worse than it is actually today. In this paper we examine this hypothetical claim using game theory. We start our analysis with some definitions.

Uranium enrichment is the process of dividing any ura- nium compound into two parts, one part with a higher and another part with a lower concentration of U 235 atoms. Uranium ore has a very low percent of U 235 atoms. Most nuclear reactors can work on *low enriched uranium (LEU)*, where the proportion of U 235 is less than 20 percent. Nuclear bombs require *highly enriched uranium (HEU)*, where the proportion of U 235 is greater than 80 percent. The uranium enrichment technology is the same for LEU and for HEU. To obtain HEU, the uranium enrichment process simply needs to be repeated several times until the desired level is reached.

Plutonium reposessing is the process of separating the plutonium, a byproduct of uranium fission, from the rest of the spent fuel in an uranium atomic reactor. The plutonium can be used either as fuel for plutonium atomic reactors or as material for plutonium atomic bombs.

Dual-use technology is any technology that can be used for both civilian or military purposes. For example, uranium enrichment and plutonium reposessing are both dual-use tech- nologies.

Surface-embedded graphs reachability with space-efficient techniques

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***Abstract*— This paper describes a log-space reduction that reduces an n-vertex directed acyclic network with m(n) sources embedded on a genus g(n) surface to a graph with O(m(n) + g(n)) vertices while maintaining reachability between a given pair of vertices. The reachability proble m over a wide class of directed acyclic graphs can be solved using new deterministic algorithms with improved space constraints and improved simultaneous time-space limitations by applying current techniques to this reduced graph.**

***Keywords*-reachability; surface-embedded graphs; acyclic di-graph; log-space algorithm;**

I. INTRODUCTION

Graph reachability problems are central to space-bounded computations. Different versions of this problem characterize several important space complexity classes. The problem of deciding whether there is a path from a given vertex u to a vertex v in a directed acyclic graph is the canonical complete problem for non-deterministic log-space (NL). The recent breakthrough result of Reingold implies that the undirected reachability problem characterizes the complexity of deterministic log-space (L) [1]. It is also known that certain restricted promise versions of the directed reachability problem characterize randomized log-space computations (RL) [2]. Clearly, progress in space complexity studies is directly related to progress in understanding graph reachability problems. We refer the readers to a (two decades old, but excellent) survey by Avi Wigderson [3] and a recent update by Eric Allender [4] to further understand the significance of reachability problems in complexity theory.

In this paper we focus on designing *deterministic* algorithms for reachability with improved space complexity. For the general directed graph reachability problem the best known result remains the 40-year old $O(\log^2 n)$ space bound due to Savitch [5] (where n is the number of vertices in the graph). Designing a deterministic algorithm for the problem over *directed acyclic graphs that are embedded on topological surfaces*. We present the best (to date) space complexity upper bounds for the reachability problem over this class of directed graphs.

Prior Results: Jakoby, Lis´kiewicz, and Reischuk [7] and Jakoby and Tantau [8] show that various reachability and optimization questions for *series-parallel* graphs admit deterministic log-space algorithms. Series-parallel graphs are a very restricted subclass of planar DAGs. In particular, such graphs have a single source and a single sink. Allender, Barrington, Chakraborty, Datta, and Roy [9] extended the result of Jakoby *et al.* to show that the reachability problem for Single-source Multiple-sink Planar DAGs (SMPDs) can be decided in logarithmic space. Building on the work of Allender *et al.* [9], in [10], the present authors show that reachability for planar DAGs with $O(\log n)$ sources can be decided in logarithmic space. Theorem 1 below is implicit in [10].

Theorem 1 ([10])**.** *Let* $\mathcal{G}(n, m)$ *denote the class of planar DAGs with at most* $m = m(n)$ *sources, where* n *is the number of vertices. The reachability problem over* $\mathcal{G}(n, m)$ *can be solved by a log-space nondeterministic machine using a one-way certificate of* $O(m)$ *bits. In particular, reachability over* $\mathcal{G}(n, m)$ *can be decided deterministically in* $\min\{O(\log n + m), O(\log n \cdot \log m)\}$ *space.*

The $O(\log n + m)$ space bound is obtained by a brute-force search over all certificates of length $O(m)$. Setting $m = O(\log n)$ we get a deterministic log-space algorithm for reachability over planar graphs with $O(\log n)$ source nodes. The $O(\log n \cdot \log m)$ bound is obtained by first

Testing a Wireless Underground Sensor Network to Link Soil to the Cloud

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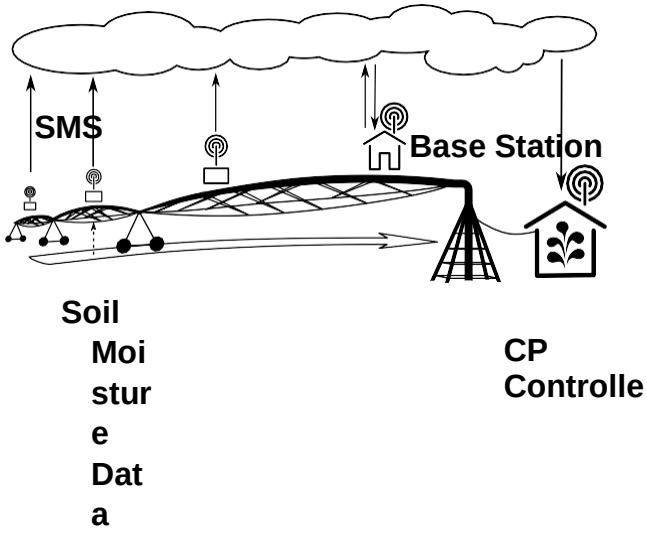
ABSTRACT:-

This demonstration features an online testbed for an underground sensor network as well as a revolutionary subterranean communication system. The Cyber-physical Networking (CPN) Laboratory at the University of Nebraska–Lincoln developed the underground communication system, which incorporates an underground antenna designed to lessen the negative impacts of soil on underground communication. The CPN subterranean sensor network testbed, which is situated in Clay Center, Nebraska, is connected online. A mobile data network and a network of underground communication systems with soil moisture sensors make up the underground sensor network



Excessive, wasted water has prompted the creation of the *Top 10 Water Challenges of Nebraska* [9]. Approximately 70% of the world's water usage is related to agriculture [8], thus, more efficient irrigation solutions promise a large benefit for farmers, consumers and the environment. The demand for reducing water consumption encourages development of precision agriculture (PA) techniques, which focus on the ex- istence of in-field variability of natural components, including chemical leaching, runoff, drainage, water content, nutrients, and soil components [3], [4]. One of the examples of PA is the Variable Rate Irrigation (VRI) system from Valmont Industries [10], which controls the irrigation rate at different zones in a field. This system allows for the flow of each sprinkler head to be adjusted, which gives a virtual dartboard of control, where each cell can get as much or little water as needed. Thus timing and amount of irrigation can be controlled across a field.

Precision irrigation hardware techniques are already devel- oped, but determination of the exact amount of water neededin a zone of field is the main challenge. Currently, fields are analyzed only once, and irrigation systems are programmed according to these results [1]. However, due to the fact thatthe environment is highly variable and unpredictable [5], a real-time system to monitor the soil and control the irrigation system has the potential to yield even greater water savings.

Current research in this area suggests promising results. In [11], the effect of using a wireless sensor network to aid

Testing for Regression in Human Performance

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ABSTRACT:-

New interface features, including keyboard shortcuts and toolbars, are added as software systems develop. Although it is common practise to regression test new features for functional correctness, systematic regression testing for usability has received less attention due to the time and effort required for human studies. Regression testing efforts are limited by the human labour required to describe the user interface and activities in cognitive modelling tools like CogTool, which offer some assistance by computing estimates of user performance. In our most recent work, we created CogTool-Helper to lessen the time and effort needed to create human performance models of existing systems. By offering task-specific test case generation and outlining our concept for human performance regression testing (HPRT), which generates a significant number of test cases and assesses a variety of human performance forecasts for the same task, we build on this previous work. We investigate the viability of HPRT on four LibreOffice jobs, identify a number of regressions, and then talk about how a project team may make use of this knowledge. We also demonstrate how using an inference approach can improve sampling efficiency. At most 10% of the performance estimations are lost for samples that consume 50% of the runtime.

INTRODUCTION:-

Regression testing (testing after modifications to detect faults that have been introduced by changes, e.g., [1], [2]), has become best practice in the development of commercial software. A large body of research, automated processes, and tools have been created to solve problems related to regression testing for functional correctness. Regression testing of quality attributes, like system response time, has also received attention (e.g., [3], [4]), and there is research into incorporating human expertise to increase test efficiency [5]. But regression testing of one important quality, usability, has remained largely untreated in the software engineering (SE) literature. Regression testing of usability is an important consideration in software development because as systems grow in functionality, they often also grow in complexity, withmore features added to user interfaces, which can hurt end- user efficiency and discoverability (i.e., the ability for a new user to discover how to accomplish a task through exploring the interface). For instance, adding toolbars to an interface should, in theory, increase user efficiency (a factor of usability) because only one mouse action is necessary to use an always- visible toolbar as opposed to two or more mouse actions to pull down a menu and select a command. However, the positioning of the toolbar may move other user interface (UI) elements further away from where skilled users need them for common tasks, necessitating longer mouse movements and, in fact, decrease efficiency. In addition, many toolbars with smallicons may add screen clutter and may decrease a new user's ability to discover how to accomplish a task over a simplerUI design.

The Importance of the Internet of Things

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ABSTRACT:-

We are always breaking new innovation standards in the modern era of advanced innovation. IOT is one of the topics that is talked the most in the industry. Our way of life is being impacted by the Web of Things, which is rapidly generating innovation. IOT provides a framework for continuous items and additionally aids in keeping track of these objects. IOT devices are closely connected so they may exchange resources and information with other machines. IOT uses many types of sensors that are inserted into various devices and convey information. These sensors use IOT standard stage to exchange information.. These steps collect information from many sources, follow up with additional research on the information, extract the fundamental data, and finally communicate the findings. This analysis essay discusses the importance of IOT, its characteristics, basic requirements, and applications. This paper's main goal is to provide an overview of the development and application of the Internet of Things (IOT), as well as of its models, benefits, and drawbacks.KEYWORDS: Architecture, Internet of things, Radio frequency identification, Sensors, Smart devices, Webservices.

INTRODUCTION:-

Web of Things (IOT) is the popular expression in all scholastic and industry quarters of sciences and innovation. All in all sense, it speaks to the limit of organization gadgets to intelligently detect and methodically gather information from different sources the world over and afterward share this information across internet. Then the shared information is additionally prepared and used for other helpful purposes. The IoT is a range of brilliant machines speaking with other keen machines, objects, conditions and foundations. In the present current advanced world each individual is associated with all other individuals utilizing various associating and specialized gadgets, wherein the most famous method of correspondence is Internet. Subsequently the web interfaces individuals around the globe and consequently IoT turns into the core interest for inferring the underlining practices, data, and drifts just as designs through the utilization of web[1]. The essential thought of IoT has won from around twenty years. It has pulled in numerous academicians, specialists just as industrialists in light of its enormous sway in improving the everyday life and society. At the point when things like keen family apparatuses are associated with an organization they get ad libbed to offer ideal assistance all in all. Some ordinary things which is conceivable with IoT is a brilliant home with programmed windows that can be opened and shut and react when the gas burner is turned on by naturally opening. The forced air system can be changed from the vehicle and lights could be constrained by utilizing web[2]. This sort of a climate is particularly more helpful for people with incapacity and in addition a definitive plan of gadgets as a framework rather than singular units. The hypothetical premise of organization of savvy gadgets was first applied in 1982 to a coke candy machine at Carneige Mellon University as the first advanced apparatus detailing its supply of jugs and the temperature state of the beverages. In the wake of perusing different sources, it was discovered that the book "The Computera of the 21st Century" composed by Mark Weiser in 1991 just as Academic quarters like Unicom and Percom planned a contemporary vision of IoT. Reza Raji, a specialist in 1994, depicted the idea of IEEE Spectrum as "moving little parcels of information to a huge arrangement of hubs to coordinate and robotize everything from home apparatuses to whole plants." From 1993 to 1997, a few organizations like Microsoft at Work (MaW) and Novell's proposed arrangements dependent on a comparative stage. Throat was a little project elevated by Microsoft to unite normal business apparatus, similar to fax machines and printers, utilizing a typical correspondences convention allowing control and status data to be pooled with PCs running Microsoft Windows. The thought acquired prominence when Bill Joy visualized D2D (Device to Device) correspondence at the World Economic Forum at Davos, Switzerland in 1999[3].

The Interplanetary Internet Implemented on a Terrestrial testbed

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ABSTRACT:-

Future space exploration will require the development of a space network that will enable efficient data transport between spacecraft and with the terrestrial Internet. Everyone would have direct access to telemetric data from far-off planets and satellites if this technology is practical. The idea of an Interplanetary Internet (IPN) is still in its infancy, and before extensive deployment can take place to make IPN practicable, a significant amount of shared standards and research is required.

The nature of delay in space communication is fundamentally different from that of delay environments on Earth. Moreover, space deployments and testing in space conditions take a lot of money and time. We offer an IPN design and put it into practise using the physical nodes on the terrestrial ORBIT testbed and the Interplanetary Overlay Network (ION) software module. In order to confirm that the network implementation is accurate, two space network scenarios are created and experimentally assessed. Additionally, we concentrate on the investigation of bundle transmission latency and independently assess the impact of bundle size and quantity. The experimental review sheds light on the causes of bundle transmission delays, such as congestion, custody rejection, and bundle lifetime expiration.

INTRODUCTION:-

Space communication and networking research has addeda new engineering and scientific era to the history of space exploration. The early phase of space communication used radio signal shot towards spacecraft antennas whenever they came into view. Telecommunications software lacked universality and differed from one mission to another. This, in turn, led individual flight projects to acquire and operate their own specialized space communication networks. To overcome these problems we need to develop a space network that can be interconnected, standardized and evolved over the future decades and such motivations led to novel networking architectures and technologies that could support spacecommunication networks - such as the Interplanetary Internet (IPN).

The IPN is a store-and-forward network of Internets in supportof a deep space exploration that is often disconnected, hasa wireless backbone with error-prone links and delaysranging to tens of minutes, even hours, even when there is a connection. Moreover, there are a number of physical phenomena in outer space such as solar storms and magnetic interferences which interrupt normal communication between spacecrafts. Moreover, the spacecrafts which are farther away from Earth have back dated technology than the ones launched recently. The existing terrestrial Internet and theTCP/IP suite will not be able to handle the constraintsposed by such extreme conditions. We propose and study afuture deep space network architecture which will survivesuch extreme conditions. The remote networks of the solar system such as the Earth based Internet and other planetarynetworks support various protocols and they hook up to theIPN backbone by choosing among mobile satellite gatewaysthat would seamlessly convert between these protocols [1]. Delay Tolerant Networking (DTN) is viewed as an overlaynetwork on top of such regional planetary networks. Itincorporates a new protocol layer called as the bundle layeron top of heterogeneous region specific lower layers. TheNASA Jet Propulsion Laboratory (JPL), has developed theInterplanetary Overlay Network (ION) to implement DTNin Interplanetary environments. It is open source, modular, easy to modify and we can also plug in our own routing protocol. It implements the Bundle Protocol as in [2] alongwith the CCSDS File Delivery Protocol (CFDP) [3] and theLicklider Transport Protocol (LTP) found in IRTF RFCs 5325[4], 5326, and 5327. Three experiments on space DTN wererecently conducted, namely - the UK-Disaster MonitoringConstellation (UK-DMC) Experiment (2008), the DeepImpact Network Experiment (DINET) (2008) and Experimenton-board the International Space Station (ISS) (2010) andall these experiments were done in space. Considering thecritical issues and cost for space deployments and testing,we propose designs of IPN deployments on the Open AccessResearch Testbed for Next-Generation Wireless Networks(ORBIT testbed) at Rutgers University so as to examinethe network and its operations more easily. Delay TolerantNetworking is the basis for the GSTAR routing approach [5]proposed for a future Internet in the MobilityFirst project [6].

The Relationship Between Environmental Awareness and Wireless Underground Sensor Networks

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ABSTRACT:-

Wireless underground sensor networks (WUSNs) utilise buried sensors that communicate with one another through the earth. The channel quality of WUSNs is significantly impacted by environmental conditions like soil moisture. The connection of the network and the communication range of the nodes subsequently evolve over time. The issues with underground communication are resolved by the deployment of above-ground nodes, which maintain connectivity. The connectivity of WUSNs under various environmental conditions is modelled in this work using the cluster size distribution under sub-critical conditions and a special aboveground communication coverage model for underground clusters. The resulting connectivity model is used to analyse the two communication techniques, transmit power control and environment-aware routing, which maintain connectivity while consuming less energy. It has been shown that networks can remain connected at all soil moisture levels by regulating transmit power at the expense of energy utilisation. Relays that are employed in accordance with the soil's moisture content may help to lower this energy consumption. A combination of the two approaches is also considered in order to assess the trade-off between connection and energy use.

INTRODUCTION:-

The potential applications of Wireless underground sensor networks (WUSNs) include intelligent irrigation, environment monitoring, infrastructure monitoring, localization, and border patrol [2], [7]. However, WUSNs face unique challenges since the sensor motes are buried in soil. Therefore, novel solutions are needed to address the connectivity and energy consumptionissues brought by the unique communication medium.

In WUSNs, the quality of the communication channels varies over time due to the variations in soil moisture [15]. Therefore, for a given field with deployed sensor nodes, the network may not remain connected over time. It may be argued that the network can be designed and deployed according to the worst case to guarantee the connectivity. However, in practice, thisis not a suitable solution because (1) the worst case may not be known *a priori* and (2) the deployment cost may be very high due to the large number of nodes required to keep the network connected in the worse case conditions. In fact, most applications, e.g., soil moisture monitoring in agriculture, can tolerate that only part of the network is connected. However, thenodes that are temporally not connected to the network should stop sending data in order to save energy. Therefore, the issue of balancing the number of nodes in the network and energy consumption of the network, considering the dynamics of the environmental parameters, is of importance for WUSNs.

In this paper, two communication schemes: *transmit power control* (TPC) and *environment-aware routing* (EAR) are analyzed. TPC adjusts the transmit power of the underground nodes while EAR turns off the underground nodes that are not directly connected to an aboveground node when the soil moisture is beyond a threshold. The two schemes make local communication decisions based on the locally detected soil moisture level. Only local information is utilized such that no overhead message exchange among nodes is needed. Therefore, energy is saved for the underground nodes. To understand the impact of the two schemes on the network connectivity and the energy consumption, we analyze the connectivity of WUSNs with underground nodes and aboveground nodes in the dynamics of soil moisture.

To this end, the network connectivity is modeled in three steps. First, the distribution of the number of given size clusters is modeled. Second, the aboveground communication coverage, which indicates the probability that a cluster is connected to aboveground nodes, is estimated. Finally, the network connectivity is modeled. This model captures the impact of the variations of the environmental parameters, especially soil moisture, on the network connectivity.

The rest of the paper is organized as follows: the related workis discussed in Section II. Background in underground communication is provided in Section III. In Section IV, the problemis formally stated and in Section V the network connectivity is modeled, including a cluster size distribution model and an aboveground communication coverage model. In addition, these models are verified through extensive simulations in Section VI and the employment of the models to analyze the communication schemes is described in Section VII. Finally, the paper is concluded in Section VIII.

Tuberculosis transmission model stability analysis using the Routh-Hurwitz criterion and bifurcation technique

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ABSTRACT:-

Mycobacterium tuberculosis is the causative agent of the infectious illness tuberculosis. In this article, we go over how to examine the stability of a disease without the tuberculosis transmission model using the Routh-Hurwitz stability criterion. The number of roots of the characteristic polynomial (eigenvalues) with positive real portions can be calculated using this method to be equal to the number of changes in the first column of the Routh array's sign. If all of the eigenvalues are negative, then the model is stable. While the bifurcation method is used to analyze the stability of the endemic equilibrium point of the tuberculosis transmission, the endemic equilibrium point is locally asymptotically stable if reproduction number greater than one and additional parameters requirement that bifurcation met. Finally, numerical simulations are demonstrated to verify the used method.

INTRODUCTION:-

Mycobacterium tuberculosis is the pathogen that causes tuberculosis (TB). Transmission of the disease occurred when victims of pulmonary tuberculosis coughed, sneezed, or sang when the air they breathed included TB bacteria. Because of cases of multidrug-resistant tuberculosis, TB treatment becomes challenging. The course of treatment is lengthier, and more expensive medications are required. Yet, maintenance is not fully free in many developing nations. Some people might not be able to fully cover the cost of their medical care. In order to save money, some patients who hadn't fully recovered opted to forgo treatment and treat themselves at home.Construction, analysis and the use of math model is regarded as one of the most important math. Model mathematics used in many fields and field of study different. Some journal model has been studying math down into the real world especially world health, which is studying about TB, Studying about HIV/AIDS, studying about syphilis, [8] studying about influenza and studying about Ebola. The spreading of a TB disease in this divided into five subpopulations, namely susceptible class (S), *latent* class (E), infectious treated at home class (I_1), contagious treated at hospital class (I_2), dan recovery class (R).

UML ANALYSIS USING STATE DIAGRAMS

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ABSTRACT:-

In this article, a novel method for examining UML designs using state and sequence diagrams is presented. A super-state diagram is created from many state diagrams and includes the cross-product of the chosen states as well as a transition matrix of potential transitions. To find unreachable states and impossibly difficult transitions, one uses the closure of the transition matrix. The consistency between the state diagrams and the sequence diagrams is also assessed using the closure. Sequences that are missing or impossible can be found. To compute the closure of the transition matrix and compare the results with sequence diagrams, a prototype tool has been created..

INTRODUCTION:-

Finding errors in software designs before they are implemented is very important. Most researchers in software engineering have found that the earlier an error is found, the easier it is to correct. If we can improve the analysis capabilities for software designs, we may have a significant impact on removing faults earlier in the software development process.

UML diagrams [7], such as class diagrams, use case and sequence diagrams, and state diagrams, are used to specify the usual software design. Despite the fact that class diagrams and use case/sequence diagrams are the most frequently used diagrams in software design, the state diagram offers a great notation for describing how methods influence objects and how they behave.

Sequence diagrams are interclass (interobject or interagent) and they detail how objects in the model interact via method calls. A sequence diagram can be viewed as a partial collaborative view of a set of objects. Transitions in a sequence diagram occur as the result of method calls between objects. Methods of different objects are often paired together as the result of one object's method calling the method of another object.

A state diagram is intraclass (intraobject or intraagent) and it describes the states one object in the model can be in and the transitions which cause that object to change state. A state diagram provides the component view of anobject. To understand how the states of one object interact with the states of another object, a different approach has to be used.

The UML specification does not impose any requirements for consistency between the data shown in the state and sequence diagrams. While this does give UML more freedom in how it can be applied, it may also result in varying perspectives of the system being modelled. Recently, the software engineering community has concentrated its study on the issue of connecting state diagrams with sequence diagrams [ex. 1]. But typically, the work only required one state diagram and one or more sequence diagrams.

Our approach to consistency analysis combines the state information of multiple state diagrams into a composite super-state diagram. This super-state diagram details all of the possible composite states the objects can be in as well as the transition pairs which lead from one composite state to another. In this way the super-state diagram provides the complete collaborative view of a set of objects in the model. A given sequence diagram then should be a valid subsequence of the set of sequences that are possible in a super- state diagram.

Using the Xilinx System Generator to Create a Bayer Filter with Smooth Hue Transition Interpolation

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***Abstract*—** In this work, a Bayer filter with a smooth hue transition is designed using the System Generator for DSP. We discuss two distinct designs and conduct experimental comparisons between them, one based on a MATLAB implementation and the other on a Bayer filter modification utilising bilinear interpolation.

I. Introduction

Digital cameras perform a sequence of complicated processing steps while recording color images. A color image usually contains three different color components in each pixel: red (R), green (G) and blue (B). Digital cameras use three separate sensors to capture these three components [1]. In order to reduce the cost, digital cameras capture images using a sensor overlaid with a color filter array (CFA). CFAs allow only one color component for each pixel, which means we need to generate the full color images from the output of the image sensor [2].

Bayer color filter arrays (Bayer CFAs) are currently one of the most common CFAs in digital cameras and can be used together with many different interpolation methods [3, 4]. The *System Generator for DSP*, commonly referred to as just *System Generator* [5, 6], is a MATLAB/Simulink-based simulation tool from Xilinx Inc. [7]. The System Generator is a hardware design package that allows programming on the FPGA and modeling a system using Simulink. The System Generator contains many modules, such as FIR filter, FFT, FIFO, RAM and ROM.

II. The Bayer Color Filter Array

Bayer CFAs greatly reduce the complexity and the cost of digital cameras. Each Bayer CFA contains twice as many green elements than red or blue ones, reflecting the fact that the cone cells in the human retina are most sensitive to green light. The full color image contains of three components (R, G and B) in each pixel, but a Bayer image, which is the output of a Bayer CFA, contains only one component in each pixel. However, from a Bayer image a full color image is generated by *demosaicing* [8], that is, an interpolation that estimates the values of the missing components [9]. For *demosaicing*, Xilinx uses *bilinear* interpolation, which performs the following three steps:

1. Estimate the missing green values in the red and blue pixels by using their four green neighbors. For example, using the Bayer image in Fig 1., the bilinear interpolation finds:

$$G8 = (G3 + G7 + G9 + G13)/4$$
$$G14 = (G9 + G19 + G13 + G15)/4 \quad (1)$$

2. Estimate the missing red or blue values in the green pixels:

$$B7 = (B6 + B8)/2$$
$$R7 = (R2 + R12)/2 \quad (2)$$

3. Estimate the missing red value of the blue pixel and the missing blue values of the red pixels:

$$R8 = (R2 + R4 + R12 + R14)/4$$
$$B12 = (B6 + B8 + B16 + B18)/4 \quad (3)$$

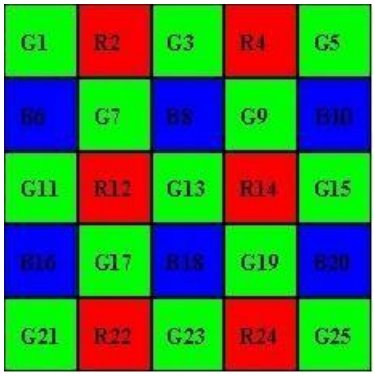

Fig. 1 A Bayer color filter array

Instead of the *bilinear* interpolation, this paper uses *smooth hue transition* interpolation [10]. Before estimating the missing red and blue values, we first estimate the missing green values of the red or blue pixels, the same way as in step (1) of the bilinear interpolation. Let the blue hue be B/G and the red hue R/G. These are used the estimate the missing blu

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Using VHDL, design and simulation of the 8255 programmable peripheral interface

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Abstract:-

A general-purpose I/O interface is implemented by the 8255A programmable peripheral interface PPI to link peripheral devices to a microcomputer system bus. The functional configuration of the core is created using VHDL code, and the input signal (Test bench) for PPI 8255 is also created using VHDL code. For one 8-bit peripheral port, Ports A, the simulated result is confirmed. There are three programming modes for peripheral ports: Simple Input/Output Programmable I/O Lines, Mode 0. For PPI 8255, verified simulation and synthesised results are also included.. All designed is done by using Xilinx ISE10.1i.

Keywords: VHDL Code, MOS, MCS85, PPII .

INTRODUCTION:-

The PPI 8255 The 8255 Programmable Peripheral Interface chip, which was created as a peripheral for the Intel 8085 microprocessor, is a part of a sizable family of peripheral devices called the MCS-85 Family.. Later, this chip was also utilised with the Intel 8086 and its offspring. Later, numerous other manufacturers began producing (cloning) it. It is produced in versions with PLCC 44 pins and DIP 40 pins.. This chip is used to give the CPU access to programmable parallel I/O, and is similar to other such chips like the Motorola 6520 PIA (Peripheral Interface Adapter) the MOS Technology 6522 (Versatile Interface Adapter) and the MOS Technology CIA (Complex Interface Adapter) all developed for the 6502 family. Other such chips are the 2655 Programmable Peripheral Interface from the Signe tics 2650 family of microprocessors, the 6820 PIO (Periphera PIO(Peripheral Input/output) from the Motorola 6800 family, the Western Design Center WDC 65C21, an enhanced 6520, and many others. The 8255 is widely used not only in many microcomputer/ microcontroller systems especially Z-80 based, home computers such as SV-328 and all MSX, but also in the system board of the best known original IBM- PC, PC/XT, PC/jr, etc. and clones. However, most often the functionality the 8255 offered is now not implemented with the 8255 chip itself anymore, but is embedded in a larger VLSI chip as a sub function. The 8255 chip itself is still made, and is sometimes used together with a micro controller to expand its I/O capabilities.

Using Wireless Underground Sensor Networks to Capture Mobile Data

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ABSTRACT:-

With the help of Wireless Underground Sensor Networks (WUSNs), it is possible to monitor a field continuously without interfering with above-ground activities like football games or plough operations. It is difficult to ensure that a significant subterranean network is connected while remaining economical in terms of deployment and maintenance because of the increased route loss in soil. This work develops a WUSN architecture that is feasible and consists of mobile nodes that collect data from underground nodes that are stable. In order to do this, field experiments are used to examine the effects of packet size and error control strategies on network performance. An improved understanding of the wireless channel and the dependability between subterranean and aboveground nodes allows for the development and evaluation of a family of mobile WUSN protocols with regard to packet delivery success, delay tolerance, and network longevity.

INTRODUCTION:-

Wireless sensor networks (WSNs) seek to monitor an en- vironment and report events in a cheap, reliable manner [1]. Motes are small, low-cost computers equipped with micropro- cessors, low power radios and sensing devices. Hundreds (orthousands) of devices are used to monitor an environment andrelay data through a network. Wireless underground sensor networks (WUSNs) extend sensing and transmission into thesoil. WUSNs monitor soil properties while lying under the surface where they are safe and out of the way of above- ground activities [2]. This paper investigates a scalable WUSN architecutre, which achieves a long network lifetime by using mobile nodes to harvest data collected by underground nodes. The scalability and network lifetime of a WUSN are lim- ited by energy and communication range. Being underground (UG), motes cannot replenish energy, nor is it cost-feasible to frequently dig up motes to replace batteries [3]. Due to the short communication range in the UG channel, two UG motes must be within one to five meters of each other tocommunicate [2]. This yields a high density of UG motes,
which is also not cost-feasible [4].

As shown in Fig. 1, mobile sinks, however, can be usedto connect a sparsely deployed network of stationary sensor nodes [4], [5]. Thus, an UG node is connected to the network if a mobile sink collects its data in a certain time frame. The limit of this time frame, also known as the delay tolerance of the network, determines how many mobile nodes are needed.Mobile sinks are ideal for delay tolerant applications of WUSNs, such as agricultural field monitoring and sports field maintenance. As agriculture makes up 1.2% of the United States' economy and 6% of the world's economy [6], im- provements in crop efficiency have a large impact on the world. Continuous monitoring of soil properties (moisture, pH balance) give farmers detailed recommendations on howto irrigate and fertilize. Today, existing precision agriculture tools rely on soil data collected in a non-continuous way, oftenonce a year [7]. Field monitoring is the target application of the mobile, data harvesting WUSNs modeled and evaluated herein.

Terrestrial WSNs may also be used to monitor field con- ditions [8], but require permanent aboveground (AG) devices. WUSNs have no permanent AG fixtures to get in the wayof AG activities, such as crop harvesting. Therefore, with WUSNs, the field can be used while soil data is continuously collected.

WUSNs, however, must transmit data through the soil. There are three different UG channels to consider [9]:

- Underground-to-Underground Channel (UG2UG)
- Aboveground-to-Underground Channel (AG2UG)
- Underground-to-Aboveground Channel (UG2AG)

Utilizing Convolutional Neural Networks, data mining ancient script image data

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ABSTRACT

Huge image libraries of ancient texts have been created as a consequence of the recent increase in ancient scripts. The study of the development of these ancient scripts is made possible by data mining of the gathered images. It is particularly controversial to determine where the Indus Valley language came from. We evaluate which Phoenician alphabet letters and Brahmi symbols are most similar to the Indus Valley script symbols using convolu- tional neural networks. Surprisingly, our research reveals that overall, the Phoenician alphabet is much more similar to the Indus Valley script symbols than the Brahmi script.

KEYWORDS

Indus Valley Script, Brahmi Script, Phoenician Alphabet, Convolu- tional Neural Networks

INTRODUCTION

The Indus Valley Civilization flourished in northwest South Asia between 3200 and 1300 BCE, including parts of modern-day India, Pakistan, and Afghanistan [34]. The origin theories for the Indus Valley Civilization and its writing system vary from diffusionist explanations to earlier indigenous roots [34]. The Indus Valley script, which has over 400 distinct symbols and thousands of inscriptions, mostly on seals, is an unintelligible language. Unfortunately, the writings are too brief to be deciphered using conventional methods. The most common Indus Valley script characters are displayed in Figure 2.Decipherment efforts are usually aided by bilingual inscriptions, which have not been found yet. Another clue to a script could come from finding a similar but already known script with which the unknown symbols could be matched. That matching can give the already known scripts occur later in time than the unknown script. In this paper, we use neural networks and two known scripts to find tentative phonetic assignments to the Indus Valley script symbols. These two scripts are the following:

unknown script symbols a tentative phonetic value.

Phoenician alphabet: The first known script that we try is the Phoenician alphabet, which is frequently studied because it spread to a large part of Eurasia. The Phoenician alphabet is an abjad writing system, written from right to left, which consists of 22 letters representing consonants.

Brahmi syllabary: The second known script is the Brahmi script, which is the second oldest South Asian script. The origin of the Brahmi script is controversial. The Brahmi script is said to stem from the Phoenician alphabet [33]. The lack of intermediate archae- ological artifacts between the end of the Indus Valley Civilization in 1300 BCE and the earliest Brahmi script in the late 4th to mid 3rd centuries BCE [32] makes the latter unlikely to be a descendant of the former. Unless all writing was done on perishable materials the intervening period.

The Brahmi script is a syllabary but for the same consonant C the Ca, Ce, Ci, Co, and Cu. forms are only minor variations of each other. In this paper, we focus on the syllabic symbols of Ca series, which are shown in Figure 3.

In this paper, we answer the following data mining questions:

(1) Which script, Phoenician or Brahmi, is more likely to be a descendant of the Indus Valleyscript?
(2) What tentative phonetic assignments can be given to the Indus Valley script symbols?

Section 2 describes the dataset of the ancient scripts and texts which we used as a data source in our research. Section 3 describes the neural networks that we used for the computerized comparison of the visual characteristics of pairs of symbols from two different scripts. Section 4 presents the experimental results. Section 5 dis- cusses related work. Finally, Section 6 gives some conclusions and directions for further research.

Utilizing Game Theory to Examine the Effectiveness of Self-Organizing Software Teams

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ABSTRACT:-

Software development has shifted over the past 20 years away from centralized, plan-based management and toward agile methods like Scrum. Self-organizing software development teams are one of the fundamental principles that underpin all agile methodologies. Academic study supports the notion that these teams can boost team morale and developer productivity. Recent works on agile, however, fail to take into account developers' strategic behavior, especially when assigning tasks, which is one of a self-organizing team's key functions. This article makes the case that self-organizing software teams can easily be modeled using game theory, giving us an understanding of how agile developers might behave when acting strategically. We support our argument by presenting a general model for self-assignment of development tasks based on and extending concepts drawn from established game theory research. We further introduce the software engineering community to two metrics drawn from game theory—the price-of-stability and price-of-anarchy—which can be used to gauge the efficiencies of self-organizing teams compared to centralized management. We demonstrate how thesemetrics can be used in a case study evaluating the hypothesis that smaller teams self-organize more efficiently than larger teams, with conditional support for that hypothesis. Our game-theoretic framework provides new perspective for the software engineering community, opening many avenues for future research.

INTRODUCTION:-

The publication of the *Agile Manifesto* [1] in 2001 instigated a long-lived change in the way software development teams are managed, pushing the industry toward agile methodologies such as Scrum or lean [2]. A reported 95% of respondents in the 2020 *State of Agile* report—software professionals from across the world in industries ranging from technology to retail—reported that agile development methodologies are used in their workplace. Most (75%) use them for sprint planning and agile project management, primarily Scrum [3]. One key principle of the *Agile Manifesto* is "[t]he best architectures, requirements, and designs emerge from self-organizing teams" [1]. As organizations embrace agile software development, they eschew centralized, plan-driven project management in favor of multi-functional, autonomous teams that can quickly adapt to changing requirements without top-down planning [4]. Self-organization is a topic of much research, with a variety of studies seeking to understand roles in *self-organizing teams (SOTs)* (e.g., see [5]–[9]) and task assignment in agile project management (e.g., see [10]–[12]). These studies provide insight into the practices and benefits of SOTs, but do little to explore *strategic* self-organization, where developers consider the choices of all other developers while seeking their best personal outcome. If team members are left to choose their own tasks strategically, they may sacrifice some social good for their own utility, decreasing the *efficiency* of the team compared to a team with an ideal centralized plan. We believe there is a need for further study of strategic behavior to answer the following research questions within the software engineering domain: (A) How can we (theoretically) model and understand strategic behavior in SOTs? (B) How can we evaluate and measure the efficiency of developers' strategic behavior? (C) How do developers self-organize in real-world settings, and is it consistent with the model's predictions?

This paper advocates for the use of non-cooperative game-theoretic models and concepts to address the above questions. We argue that aspects of developer behavior in SOTs can be modeled using game theory. Game-theoretic models are used in software engineering research (see, e.g., [13], [14]) but currently only apply to other aspects of the software development lifecycle (e.g., bug fixes, testing).

To address our research questions, we outline a preliminary game-theoretic model of self-assignment of development tasks in a SOT, and provide a detailed example of how our model can be used to evaluate the efficiency of self-organization compared to ideal plan-based project management (A). We introduce the software engineering community to two measures of efficiency used in game theory research but not yet applied in the software engineering domain—the *price-of-stability (PoS)* and the *price-of-anarchy (PoA)* [15], [16]—and describe their use with a concrete realization of our model (B). We leave our third question for future human subject studies to determine specific parameters for the model (C).

We use *PoS/PoA* to evaluate the efficiency of a simulated SOT in a concrete realization of our model, based on Tullock contests [17]–[20]. Our simulation provides evidence that smaller teams may self-organize more efficiently than larger teams when considering team morale, but may be less efficient when considering team productivity. We describe our findings and provide examples of future research that could grow from our model and conclude by summarizing related work.

Voltage summing current conveyor (VSCC) For oscillator and summing amplifier applications

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ABSTRACT:-

A voltage summing current conveyor (VSCC) has been introduced in this paper as an active building component for the controlled oscillator and summing amplifier applications. Due to its simple structure and low power consumption at 0.5 V, the VSCC only needed a modest supply voltage. There are three passive parts in the controlled oscillator. The VSCC-based oscillator offers low voltage operation, very good frequency stability, the use of grounded capacitors that are suited for IC implementation, and the use of fewer passive components. Additionally, a grounded passive resistor and one VSCC were used to realise the summing amplifier. The amplifier offers benefits including great precision and extremely high input impedance. To verify the proposed circuit's performance, it is simulated using SPICE.

Keywords: Current conveyor, oscillator, voltage summing circuit, low-voltage, floating gate MOS

INTRODUCTION:-

Differential difference current conveyor (DDCC) has been mentioned recently . This circuit was upgraded to a differential difference complementary current conveyor (DDCCC). A DDCCC could be used to realise the differential voltage current conveyor (DVCC), which was proposed. (grounding ter- minal Y3 of a DDCCC results in a DVCC). Many applications of DVCC and DDCC have previously been proposed. Although there are many circuit topologies that use voltage summing, it hasn't been demonstrated in any active block utilising only a current conveyor. Additionally, utilising DDCC, the voltage summing current conveyor may be accomplished. Kuntman has already provided a contemporary conveyor that does mathematical operations. The characteristics of the FGMOS differential pair have increased the circuit's linearity range..However, such a complex circuitry structure has not beenrequired for voltage summing function and also, the circuit has no tunability.The sinusoidal waveform is an important function in electronics systems. The sinusoidal oscillators are com- monly utilized in signal processing circuits, communi-cation, control and measurement systems, etc.

Therefore, several sinusoidal oscillators using operational amplifier (Op-Amp) have been introduced in the litera- ture. On the other hand, the op-Amp allows the limited gain-bandwidth product. Thus situated, both the condition of the oscillation (CO) and the oscillation frequency of the oscillators designed using op-Ampare negatively affected. For this reason, these oscilla- tors are not suitable for operating at higher frequencies. Lately, current-mode circuits have been attracted attention due to having advantages such as wide band-width, simple circuit structure, wider dynamic range and low power dissipation. In this context, thereare many controllable oscillators with two or more ac- tive elements or employing only one active element such as current conveyor (CC), transconductance am- plifier (OTA), current differencing transconductance amplifier (CDTA) and differential voltage current con-veyor transconductance amplifier (DVCCTA) in the liter- ature. It can be seen that the above mentioned performance parameters of the current-mode circuits, especially total power dissipation, have been gone the worse when the more active elements have been usedin the designing circuit. Although one active element has been used in design, the circuit structure using as an active element can be included a lot of components. Thus, both using less components and designing at low-voltage have been aimed recently. In earlier studies, the summing amplifiers and the difference amplifiers, which typically use Op-Amp and the current conveyor, were reported. To implement the functions that are current variable by the bias currents of the conveyors, the circuit described in 2003 employs just three CCCIIs.

Wireless Underground Sensor Networks' Hidden Terminal Problem: An Empirical Study

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ABSTRACT:-

Widespread use of Wireless Underground Sensor Networks (WUSNs) is possible for environmental monitoring in applications for agriculture, security, and ecology. In most applications, aboveground motes are used to collect data instead of subsurface sensor motes. Yet, when numerous subsurface motes transfer data to the aboveground mote, hidden terminal problem emerges because of the various communication ranges of the channels. In this study, studies are carried out to empirically identify this issue in WUSNs. Additionally, an RTS/CTS system is created to solve this issue, and it is demonstrated that this increases communication success from 32% to 76%. More study is encouraged because, despite improvements in collisions, RTS/CTS systems alone cannot ensure successful multi-access operation due to the wide variation in channel quality in WUSNs.

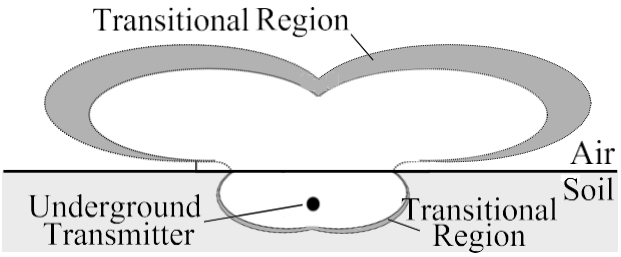

Fig. 1: The different communication ranges in underground-to-above ground communications

INTRODUCTION:-

Wireless Underground Sensor Networks (WUSNs) are a natural extension of Wireless Sensor Networks (WSNs) to the underground environment, where underground nodes are deployed to monitor the properties of the environment, such as soil moisture, salinity in agriculture applications, vibrations in border patrol applications and chemical levels in ecological applications [1]. In WSUN applications, besides underground nodes, aboveground nodes are deployed to gather information from the underground nodes. For these applications, three communication links exist: the underground to underground (UG2UG) link, the underground to aboveground (UG2AG) link, and the aboveground to underground (AG2UG) link [7], [8]. Due to the conductivity of the soil, in addition to the spreading loss, electromagnetic waves also suffer from additional attenuation in soil. Thus, among the three links, the communication ranges vary dramatically. This is illustrated in Fig. 1, where the different communication distances and the transitional regions of the underground-to-aboveground communications are shown. In our experiments, the communication ranges of the UG2AG and AG2UG links are found to be 7 to 10 times longer than the communication range of the UG2UG link.

Due to the disparity of the links, in WUSNs, underground nodes face the inevitable hidden terminal problem. When multiple underground nodes try to send packets to an aboveground node simultaneously, they cannot sense the existence of each other through carrier sensing. Hence packets collide at the aboveground node. Even worse, in WUSN applications, aboveground nodes are sparsely deployed. Therefore, one aboveground node will gather information from tens to hundreds of underground nodes, which increases the probability of collision at the aboveground node.

In existing contention-based WSN MAC protocols, the RTS/CTS mechanism is employed to eliminate the hidden terminal problem [5]. Before a sender sends a data packet, it sends out a Request To Send (RTS) packet. Its neighbors that receive this packet refrain from sending data. The specified receiver, receiving the RTS packet, sends a Clear To Send (CTS) packet to the sender. This CTS packet stops its neighbors from sending data. In WUSN applications, by adopting this mechanism, the CTS sent by the aboveground nodes will notify the other underground nodes that the channel is busy. Thus, the collision at the aboveground node will be alleviated.

However, besides possible collisions, communications in WUSNs also suffer from high packet loss rate. This is mainly due to the high variance in channel quality in the air portion of the underground-to-aboveground channel [7]. In our experiments, it is shown that the packet loss rate can be as high as 30%. Thus, in the MAC layer, the RTS or CTS packets may be lost. This causes the nodes to retransmit RTS packets and further increases the probability of collision.