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Track I

# Microcontroller based voice control robot specifically designed for surveillance

**Pahuja**

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The presented work has been carried out in such a way that voice instruction is used to control the robot. For required duty, an android application with a microcontroller is employed. Bluetooth technology facilitates the connection between the android app and the automobile. The robot is operated by the user orders on the application. The two DC servo motors attached to the microcontroller on the receiver side aid the robot's movement. The Bluetooth RF transmitter converts the command from the application into digital signal at the range of about 100 meters to the robot. The data is disappeared by the receiver and supplied to the microcontroller, which controls the DC motor to perform the required job. The goal of the voice controlled robotic vehicle is to complete a task by listening to the user's command. For the user to operate the robot smoothly, a prior preparation season is required. A code is used to give instructions to the controller in the same way. The Project voice controller robotic vehicle has numerous uses both now and in the future. In the future, improvement can be added to the work has a wide range of application, including military, home, security, rescue mission in medical support. Using the given resources, we were able to create a rudimentary model of a voice controlled robotic car. It is simple to use because it operate with basic voice commands. It has the potential to be utilized for surveillance. For security purposes, we can incorporate a web cam into the robot. The voice recognition software is highly sensitive to background noise and has a high accuracy for identifying voice command.





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Track I

# Modelling and Electric field Enigneering of Dc and RF Characteristics for Extended Field Plated AlGaN/GaN/ β-$Ga_2O_3$ HEMT

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**Abstract:**
In this work, High Electron Mobility Transistor is grown on various Substrates such as silicon (Si), silicon carbide (SiC), and sapphire substrate to exhibits a negative threshold voltage, whereas grown on β-gallium oxide (β-$Ga_2O_3$) to exhibit a positive threshold voltage. The optimization is done by using pi shaped gate and filed plate towards drain and triple tooth metal for the proposed structure. In this work Al0.8Ga0.2N /AlN /GaN /AlN /Al0.4Ga0.6N /GaN /AlN/ Al0.8Ga0.2N/ β-$Ga_2O_3$ HEMT is proposed to improve the breakdown voltage, Subthreshold swing. β-$Ga_2O_3$ is prominent material to reduces the leakage current in the structure. It is observed from the obtained results that the Breakdown voltage for Si is 15V, SiC is 20V, Sapphire is 114V, β-$Ga_2O_3$ is 125V and Unilateral power gain of 21.12dB, 19.56dB, 18.9dB, 9.5dB, at 851 GHz, 774 GHz, 738GHz, 318GHz when the proposed structure is grown on β-Ga2O3, SiC, Sapphire, Si substrates. In proposed HEMT there is compromise between frequency and break down voltage. If one factor improves the other reduces. But by using β-$Ga_2O_3$ as substrate the achievement of both the factors are possible. This is possible because of properly layering hetromaterials with matched lattice constant. β-$Ga_2O_3$is material which is trend in market and which resulted intensive research. In the proposed structure Ferroelectric material ie lead Zirconate titanate oxide ($PbZrTiO_3$) is used as gate to reduce the power consumption and to increase the storage capacity in unit area. Ferroelectric materials possess elevated dielectric constant, where s has the capability of storing more charge per unit area when compared to other materials. In small area these material they can store more data with low power consumption

**Keywords:** GAN, β-Ga2O3, PbZrTiO3 Maximum Frequency Oscillation, Cut off Frequency, and Silvaco TCAD.




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Track I

# Reconfigurable discrete tunable Antenna for Cognitive Radio Applications

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**Abstract—**
In present days, the reconfigurable antenna is a key element in wireless communication transceivers because it can operate in multiple bands, wherein the complete antenna space can be reused, leading to reduced overall size. This paper presents a reconfigurable T-shaped antenna tuned by control Radio Frequency (RF) switches. The antenna design, simulation, and measurement succeeded with an aperture area of 15*20 mm2 and obtained stable radiation patterns. This antenna is suitable to operate in (3 GHz to 6 GHz) for Cognitive Radio and Natural Sciences Applications such as military applications, mid-band 5G, X-band satellite communication, study of earth resources, forecasting of atmospheric conditions and Precision agricultural systems.

**Keywords—**Reconfigurable antenna, Cognitive Radio, Control RF switch




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Track I

# 3-Axis Robotic Arm: Substantial Capabilities in Industry 4.0 Applications

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**Abstract:**
New technologies are being used in industry, like service, and communications. Industry 4.0 is the next fourth industrial revolution that promotes organisational effectiveness. Automation is an exponentially growing field with various challenges. Robotic arms also known as articulated robotic arms, are widely used in the process of automation in industry 4.0. The main function of automation using robotic arms is to perform a given task repeatedly, which is greatly reducing the manual efforts and increasing the efficiency of the task performed. This paper consists of the development of a three-axis robotic arm for industry 4.0, which performs the instantly learned task repeatedly. This is designed using a servo system for more accuracy and an analog system to control the servo system using an Arduino UNO microcontroller. The designed 3-axis robotic arm performs various operations and basic services which may be difficult for human being to do so and shows accurate and fast performance in industry operations to enhance more productivity.

**Keywords:** 3-axis robotic arm, Automation, Industry 4.0, manufacturing industry, Robotics applications




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Track I

# DOMINO ADDER USING PSUEDO NMOS LOGIC

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**Abstract:** Domino adder is the most often used type of operation in implementing a fast computation of arithmetic's of register-transfer-level design in industry. Domino adder using dynamic logic and the Limited Switch Dynamic Logic (LSDL) circuit family. Adders are a crucial portion of all floating-point units, since they form the base element of all arithmetic functions. The adder presented here is built using a dynamic circuit style that improves performance significantly. This project establishes a relationship between the properties of arithmetic computations and several optimizing transformations using CSAs to derive consistently better qualities of results than those of manual implementations. In particular, we introduce two important concepts, power and delay. Experimental results from a set of typical arithmetic computations found in industry designs indicate that reducing the power consumption and delay.

**Keywords:** Domino Adder, Dynamic logic, Limited Switch Dynamic Logic, Power, Delay




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Track I

# Study of Physical Phenomenon of Seismo-Ionospheric Perturbations for Identification of Earthquake Precursors using GPSTEC – An Incisive Perspective

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**Abstract:** Earthquakes are one of the natural disasters and are inevitably having adverse effects on human life and his assets. Their detection and prediction mainly depend on understanding the underlying phenomenon, validity of the data acquired at the time of their occurrence through different techniques and development of mathematical models with sophisticated algorithms embedded for signal processing. Efforts are made in this direction to apply sophisticated algorithms such as non-parametric, parametric frequency estimation methods and complex wavelets to discriminate earthquake signatures in GPS TEC from other space weather disturbances.

**Keywords:** Earthquake, GPSTEC, Sophisticated algorithms




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Track I

# Role of Micro-RF Switches Role in Reconfigurable Antenna Design Analysis

**G V Ganesh**
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This work describes a novel bidirectional reconfigurable RF transducer, or antenna, where both frequency and pattern may be changed. The antenna consists of a rectangular T-shaped patch that is linked by two longitudinal slits. The pin diode will be connected to the slits in order to get the necessary frequency bands. The design was created using an HFSS tool and micro-machined using FR4 on a substrate measuring 70 mm by 70 mm. It is possible to detect frequency reconfiguration between 4.5, 5.8, 11.4, and 13.6 GHz, which are used for WLAN communications. The radiation patterns at the same bands will show a pattern reconfiguration of approximately 15°, 15°, and 30° angles. The Authors, exclusively licenced to Springer Nature Singapore Pte Ltd., as of 2023.




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Track I

# Role of Micro-RF Switches Role in Reconfigurable Antenna Design Analysis

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This work describes a novel bidirectional reconfigurable RF transducer, or antenna, where both frequency and pattern may be changed. The antenna consists of a rectangular T-shaped patch that is linked by two longitudinal slits. The pin diode will be connected to the slits in order to get the necessary frequency bands. The design was created using an HFSS tool and micro-machined using FR4 on a substrate measuring 70 mm by 70 mm. It is possible to detect frequency reconfiguration between 4.5, 5.8, 11.4, and 13.6 GHz, which are used for WLAN communications. The radiation patterns at the same bands will show a pattern reconfiguration of approximately 15°, 15°, and 30° angles. The Authors, exclusively licenced to Springer Nature Singapore Pte Ltd., as of 2023.




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Track I

# Design of ML and IoT-based Automatic Water Irrigation System for sustainable agriculture

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**Abstract:**
The development of an Automatic Water Irrigation System (AWIS) is becoming increasingly essential in agriculture, as it enables farmers to optimize water usage and increase crop yield. In this study, we propose a design for an AWIS that utilizes the Internet of Things (IoT) and Machine Learning (ML) technologies. The proposed system comprises various sensors that collect real-time data on the soil moisture content, temperature, humidity, and weather conditions, which are transmitted to a central database via a wireless network. The system uses ML algorithms to process this data and predict the optimal irrigation schedule for each crop based on the collected data and crop-specific needs.

To evaluate the system's performance, we conducted a series of experiments in a controlled environment, where we monitored the system's ability to adjust irrigation frequency and amount based on changing environmental conditions. Our results demonstrate that the proposed AWIS can significantly reduce water usage while maintaining crop yield compared to traditional irrigation methods. Furthermore, the system is scalable and can be customized to suit the specific needs of each farm. It can also be remotely accessed and controlled via a web interface, allowing farmers to monitor and manage their irrigation system from anywhere. In conclusion, the proposed AWIS design provides a cost-effective and sustainable solution for irrigation management, utilizing IoT and ML technologies. It has the potential to revolutionize agriculture and promote sustainable farming practices, leading to a more efficient use of resources and increased crop yield.




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Track I

# Graphene-based sulfonated polyethylene glycol hydrogel nanocomposites for flexible supercapacitors.

**Syed.Shameem**
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**Abstract:** This study explores the performance of a nanocomposite gel polymer electrolyte based on a graphene and sulfonated polyethylene glycol (PEG) hydrogel in quasi-solid-state flexible supercapacitors. Graphene oxide (GO) was reduced to create hydrothermally reduced graphene (HRG). The researchers created SPEG-HRG-y (y = content (wt.%) of HRG) nanocomposite gel polymer electrolytes by combining sulfonated PEG hydrogel (SPEG) with varying amounts of HRG. X-ray diffraction (XRD) showed the amorphous nature of SPEG-HRG-y. The electrochemical performance of SPEG-HRG-y was evaluated on a laboratory scale supercapacitor with HRG-coated CCHy current collectors using cyclic voltammetry (CV), galvanostatic charge-discharge (GCD), and electrochemical impedance spectroscopy (EIS) investigations (HRG - CCHy). SPEG-HRG-0.5 electrolyte with 0.5 wt.% HRG-CCHy showed a specific capacitance of 244 Farad per gram (Fg-1) at 1 Amp per gram (Ag-1) and a specific energy of 6.2 Watt hours per kilogram (Wh kg-1) at a specific power of 1 kilowatt per kilogram (kg-1). The capacitance remained at 91% of its initial value after 5000 GCD cycles. The addition of 0.5 wt.% HRG-CCHy to SPEG increased the electrolyte's amorphous character, reducing its impedance. HRG-coated CCHy demonstrated excellent capacitive behavior, making it suitable for use as a gel polymer electrolyte (GPE) in quasi-solid-state flexible supercapacitors.

**Keywords:** cyclic voltammetry; specific capacitance; specific energy; carbon cloth, flexible super capacitors; electrochemical impedance; gel polymer electrolyte; electro chemical double layer super capacitors.




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Track I

# A Multiband Tree-Shaped Fractal Antenna Design for Compact Wireless Communication Systems

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**Abstract:**
Fractal antennas have been shown to exhibit multiband characteristics due to their self-similarity and compact size. In this project, we propose the design of a tree-shaped fractal antenna that can operate across multiple frequency bands. The tree-shaped fractal antenna design involves iteratively branching and scaling down the antenna structure to achieve self-similarity. This allows the antenna to operate efficiently across a wide range of frequencies, while maintaining a compact size. The multiband characteristics of the antenna are achieved through the self-similarity and the complex geometry of the antenna structure.

Simulations and experimental results show that the proposed tree-shaped fractal antenna can operate across multiple frequency bands, including GPS, Wi-Fi, and Bluetooth frequencies. The antenna also exhibits good radiation efficiency and gain, making it suitable for a variety of wireless applications. The compact size and multiband characteristics of the proposed antenna make it an attractive option for wireless communication systems, particularly those with limited space available for antennas. The design can be easily adapted for use in different applications and can be optimized further to improve its performance in specific frequency bands. Overall, the tree-shaped fractal antenna with multiband characteristics offers a promising solution for achieving efficient and compact wireless communication systems.




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Track I

# Design of Trapezoidal Shape Patch Antenna for Wireless Communications

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A monopole rectangular shape patch antenna (RSPA) with trapezoidal shape complementary split ring resonator (CSRR) is designed for wireless communication application is presented in this paper. The trapezoidal shape CSRR is considered to obtain circular polarization and rectangular slit is considered to operate antenna for triple frequencies at 1.88, 4.17, and 6.73 GHz, respectively. The axial ratio of 1.25, 1.05, 1.28 dB is observed and a maximum gain of 6.29 dBi at 1.88 GHz frequency is produced. The RSPA model is designed for mobile and fixed satellite application.




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Track I

# Design and Realization of Ultra Low Noise Amplifier to Support Multi GNSS Constellations using GaN based BAW resonators and HEMT

**GOLLAPUDI SAI KRISHN**

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In this work, a novel wide band ultra-low noise amplifier (LNA) is proposed using AlGaN/GaN based high electron mobility transistors (HEMT) in conjunction with surface acoustic wave (SAW)/bulk acoustic wave (BAW) resonators to meet the required specifications for GNSS constellations (NavIC L5, Galileo (E1, E5), GPS (L1, L2, L5), and S-band). Specifically, an inductor-less LNA with filter topology will be investigated for the realization of compact, wideband, and low power design. The viability of both SAW and BAW resonators will be investigated for the monolithic integration with HEMTs.

Inductor-less multi-stage LNA with filter topology will be designed using HEMTs with AlGaN/GaN hetro-structure and the performance parameters of LNA (gain, Noise Figure, bandwidth, rejection, and power dissipation) will be investigated using Pathway Advanced Design System (ADS) and Silvaco Atlas software's. HEMT based multi-stage LNA are well known for high gain and high power handling capability, also offers robustness for launch vehicle environment and space applications.

Conventionally, wideband inductor-less LNAs are suffered with poor linearity over the frequency band and poor noise figure (NF). To overcome the drawback, we will be employing SAW/BAW resonators for creating resonance with other components at specific frequencies. Acoustic wave based resonators are renowned for their stability and low power consumption. Hence, the inclusion of SAW/BAW resonators can deliver LNAs with low power consumption, high stability and linearity across the complete frequency band. Interestingly, GaN exhibits piezoelectric properties which enables for the realization of SAW/BAW resonators on the same substrate monolithically. In addition, NF can be improved with the monolithic integration of HEMT and acoustic filter by eliminating the excess metallic and IC inter-connections. The uniqueness of this proposal is the design of LNA through monolithic integration of HEMT and BAW resonators using AlGaN/GaN structure on silicon substrate. The proposed work would be useful for identification of suitable wideband LNA for GNSS frequency bands [NavIC L5, Galileo (E1, E5), GPS (L1, L2, L5), and S-band].





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Track I

# A Low Power and High-Performance Carry Save Adder Using Domino Logic

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**Abstract:** Digital adders were thought of as binary numbers before they became common in personal computers, all of which are numbers of 3n bits or more. Because of the input, unlike a completely different digital adder, it produces two fixed-length numbers, one of which is a partial sum bit sequence and the other a carrier bit sequence. The full adder is the most important building block in digital signal processors and controllers, as it is used in arithmetic logic circuits (ALUs), in floating point units, and in the case of generator buffers. address or access memory. As the density of the IC chip increases, power consumption also increases. Therefore, low-power designs are the main requirement in the VLSI domain. Reducing the delay of digital circuits is an important topic in logic design for efficient adder implementation.

Adders are the basic building blocks of any Datapath processor or application. High-performance processing unit designs require fast, low-power adders. Designing an integrated circuit that is efficient in terms of area, power, and speed is a difficult task in modern VLSI design. This latency and performance study compares a modified storage adder with a traditional data store adder (CSA) and a domino logic-based CSA. The proposed design is verified by implementing a 3-bit redundant adder in standard Domino 90 nm CMOS technology.

**Keywords:** Domino logic, CMOS, 90nm, data path.




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Track I

# Extended S-MAC Protocol for enhancing energy in Wireless sensor networks

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**Abstract:**
Wireless Sensor Network applications employ many sensor nodes. All the sensor nodes are efficient sensing devices that run on limited capacity batteries. The majority of WSN applications, such as forest monitoring and environmental monitoring, are related to surveillance monitoring. Sensor nodes are arranged haphazardly, and each node communicates with any other node for an extended period without knowing the capacity of its battery. This leads to deficit the battery power and decreases the network lifetime. Due to energy consumption, the sensor nodes become inactive or dead during the procedure. By focusing on designing or inventing Extended S MAC(ES-MAC) protocols, the computing and electronics sectors are collaborating to lower the overall energy spent by sensors in sensor networks, i.e., to extend their lifetime. The performance of the proposed Extended S-MAC is evaluated by comparing its results with the other state-of-the-art MAC protocols. Comparing with the existing MAC, the proposed MAC obtained 17% more energy and proved it is better.

**Keywords:** Wireless Sensor Networks, MAC Protocol, S-MAC, ES-MAC, Energy Efficiency, Surveillance Applications.




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Track I

# Design of Empowered Digital irrigation System using IoT

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**Abstract**
Demands for resources and effective production management strategies against the rapidly diminishing resource base increase along with the global population. Conventional irrigation technologies, such as flood irrigation and sprinkler irrigation, frequently result in water scarcity and low crop yields. There is a need for irrigation systems that can help farmers to manage water resources efficiently. An irrigation system will use sensors, weather data, and other inputs to optimize the amount of water delivered to crops. This system would also allow farmers to monitor soil moisture levels, crop health, and other parameters. Based on the few articles they are various frameworks are used to monitor water levels and systems automatically with more duration. To overcome this problem a radical solution called an empowered digital irrigation system fuses low-power technology with high-speed data communication capabilities in less time. This system can autonomously modify watering schedules based on plant requirements and environmental circumstances by incorporating cutting-edge sensors, and weather monitoring systems. As a result, farmers and landscapers can maximize agricultural yields, reduce their impact on the environment, and reduce water waste. The way irrigates crops and landscapes could change because of the development of powered irrigation systems that would increase productivity, sustainability, and cost-effectiveness. Furthermore, the sensor data is transmitted to a Thing Speak channel, which generates graphs for further analysis. This paper aims to provide farmers with a better understanding of irrigation techniques and offer an effective approach to carrying out activities. By implementing this system, farmers can conserve water resources and optimize their irrigation practices to achieve better crop yields.

**Keywords:** Smart irrigation, Internet of Things, Low Power, Huge data transmission, Things peak.




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Track I

# ESSENCE OF WEARABLE DEVICES IN DIAGNOSING COVID19

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**ABSTRACT:** As IOT has rapid development by 2020, the role of wearable devices plays a crucial role in daily life. As the name implies wearable devices can be worn on our skin. There are different types of wearable devices which are available in the market like fit bits, smart watches, head mounted displays, smart jewellery, smart clothing, smart health. During COVID-19 pandemic period these devices are used extensively. The main objective of this research is to provide awareness of the role played by these devices in COVID-19 period. These devices are used in detecting symptoms of COVID-19 and help the patients in providing required medication. The information obtained from the patients is stored in the cloud using IOT. With this data the doctor can diagnose the patient's condition and provide the required treatment. The data obtained from patients like their pulse rate, oxygen levels, etc. is stored in the cloud.




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Track I

# Dual Polarized Microstrip Patch Antenna Array with Superstrate

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A smaller and high increase thunderous pit radio wire (RCA) is researched in this work. From the outset, a beam following model and the full-wave examination are introduced to explain the qualities of RCA in instances of limited parallel size and inhomogeneous superstrate. In result, an original smaller, high increase, and wideband RCA is proposed. The RCA comprises of a through opening feed fix and a variety of cross breed parasitic rings created on a superstrate. The by means of openings feed fix with a high radiation directivity fundamentally improves the RCA's acquire. On another hand, the aspect and data transmission of the RCA are worked on by the cross breed parasitic ring superstrate which is comprised by non-intermittent parasitic fix and rings. At long last, a model of the RCA is created and estimated.

**Keywords:** Compact, High gain, non-periodic microstrip superstrate




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Track I

# An Approximate Multiplier for Efficient Multiplication using Xilinx

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**Abstract:** In this paper, four double-quality 4:2 blowers are proposed. Double quality blowers imply it can exchange between two modes to be specific correct and rough working modes. Double Quality blowers have the capacity to give higher speeds and will bring down the precision. To plan this model ordinary dada multiplier is taken as a reference. Multiplier involves huge regions yet it performs rapid tasks. To decrease the framework's downsides, we have actualized double-quality 4:2 blowers utilizing dada multiplier. In this paper, we presented a dada multiplier with new inexact blowers. Using this estimated blower, we can diminish the region and power utilization likewise in the dada multiplier. Mainly for rapid duplications we utilize this convolution. By utilizing these estimated blowers, we can also lessen the circuit's intricacy. Compared to the ordinary dada multiplier and this advanced dada multiplier at least 20% of the defer will be decreased. However, the look-up tables and the number of gates are likewise diminished.

**Keywords**: 4:2 compressor, delay, speed, dada multiplier.




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Track I

# CNN based Animal Detection Low light environment using FPGA

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Field Programmable Gate Arrays (FPGAs) are widely used in digital signal processing applications due to their flexibility and programmability. In recent years, the development of FPGA-based animal detection systems has gained attention for its potential to improve wildlife monitoring and conservation efforts. This paper proposes an FPGA-based animal detection system designed to operate in low light conditions. The system consists of an image sensor, a low-light image enhancement algorithm, and a convolutional neural network (CNN) for object detection. The image enhancement algorithm enhances the low-light images to improve the performance of the CNN upto 90-95%. The CNN is trained using a large dataset of animal images and is optimized for detecting animals in low light using HAR Algorithm. Experimental results show that the proposed system achieves high accuracy in detecting animals in low light conditions. The FPGA-based system provides a low-power and low-cost solution for real-time animal detection in low light environments, which has potential applications in wildlife conservation and monitoring.
Keyword: CNN, FPGA, HAR, Low light




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Track I

# Synthesis and Characterization of 2D nanomaterials and their composites for Energy and Environmental applications

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**Abstract:**
A sophisticated and advanced class of atomically thick nanoparticles made up of one to several layers of atoms are known as two-dimensional nanomaterials (2D nanomaterials). Compared to other dimensional nanomaterials, two-dimensional (2D) nanomaterials have a higher surface area to volume ratio. In-depth research is being done on 2D nanomaterials for applications in membranes, energy production/storage, environmental concerns, tissue engineering, sensing, and catalysis.Among other nanomaterials, ultrathin materials excel because of their variety of special characteristics. Due to their high diameter-to-length ratio, 2D nanomaterials exhibit outstanding qualities that set them apart from their bulky counterpart.2D nanomaterials are crucial for energy and environmental applications such as H2 production, CO2 reduction, supercapacitors, electro- and photo-catalytic devices, solar cells, batteries, membrane separation, advanced oxidation process, and water remediation by utilising pertinent properties such as quantum-size effect, electron confinement, electrical/thermal conductivity, and optical transparency.Composites have the ability to enhance particular qualities for a focused deployment because of their multifunctional nature. Similar to 2D nanomaterials, composite materials have improved the way energy is produced and stored, and they are the reason the circular economy model makes sense. Therefore, for use in energy and environmental applications, researchers are more attracted to develop 2D nanomaterials and their composites.

**Key Words:** Nanocomposites, 2D nanomaterials, Mxene, Energy, Environmental




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Track I

# Barium titanate-Black phosphorus-graphene based SPR Sensor for Biomolecular Interaction

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**Abstract:** This paper bestows the numerical modeling of surface plasmon resonance (SPR) sensor using barium titanate-black phosphorus-graphene based structure for biomolecular interaction. Kretschmann configuration is followed to design the proposed structure by comprising copper as metal film, which are used to excite the surface plasmons on the prism's surface. Moreover, transfer matrix method is used to investigate the sensor's performance in terms sensitivity, quality factor and detection accuracy. The maximum sensitivity of 372 deg/RIU is furnished for the proposed sensor. Furthermore, the comparison study has been carried out, demonstrating that the proposed sensor provides better sensitivity compared to existing sensors that are proposed by other researchers. Finally, field distributions of the proposed sensor is depicted by using the opti-FDTD software.

**Keywords:** Angular interrogation, barium titanate, graphene, transfer matrix method, surface plasmon resonance.




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Track I

# PHOTOVOLTAIC BASED CASCACDED MULTILEVEL INVERTER FOR INDUSTRIAL APPLICATIONS

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**Y. Lalitha Kameswari**
Research Associate, Department of ECE, KLEF

**Abstract-**In the last ten years, the number of people using the power grid and the rise of high-power businesses have led to a big rise in the amount of energy they need. This has led to a significant rise in the amount of greenhouse gases released into the atmosphere by standard energy sources. Because of this, the amount of green energy sources in the power grid has grown a lot. Photovoltaic systems have become the most popular source of energy because they have so much potential. As a result, the installed PV capacity around the world has grown to more than 635 gigawatts (GW), which is enough to meet about 2% of the world's power needs. Power electronics are an important part of photovoltaic power creation, and the push for more efficient power electronic converters is growing. Researchers are now more interested in multilevel inverters (MLI) than two-level inverters because MLIs have less electromagnetic interference, are more efficient, and have higher DC link voltages. This paper explains the integration of PV system with the Multilevel Inverter and the performance analysis is analyzed in MATLAB/SIMULINK using 7-level Cascaded Multilevel Inverter.




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Track I

# NOVEL SURVEY IN OPTIMIZATION OF ANTENNA USING MACHINE LEARNING APPROACH

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**Abstract**
This paper represents the various types of algorithms in machine learning for the optimization of the different types of antennas i.e., monopole, microstrip, spiral etc., to acquire the better performance. Different optimization techniques (or) machine learning algorithms are used to improve the performance i.e., gain, bandwidth impedance matching with out any errors so that the theoretical values will match the practical values and acquire the better output. A various approaches and different machine learning algorithms are studied which are used to define various antenna parameters which is mainly depend upon the various radiation characteristics is clearly examined and explained. This shows us clearly how important machine learning in both optimization and design of antennas.

**Keywords:** Microstrip patch antenna, Machine Learning, Artificial Neural Networks, Gain




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Track I

# Enhancing the Energy Efficiency in Wireless Sensor Network Using Extended S-MAC (ES-MAC) Protocol

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**Abstract:** Wireless Sensor Network applications deploy sensor nodes in large numbers in such manner to provide better results. All the sensor nodes are efficient sensing devices operating by the limited capacity of batteries. Most of the WSN applications belong to surveillance monitoring, like forest monitoring and environmental monitoring. Sensor nodes are organized in an Ad hoc manner, and each node communicates individually with any other nodes for a long period without knowing its battery capacity. Due to the energy consumption, the sensor nodes suddenly become inactive or dead during the process. Thus, computing and electronics industries are joined together for reducing the overall energy spent by the sensors present in sensor network, i.e., to prolong their lifetime, they are focusing on configuring or designing MAC protocol to increase the energy efficiency. In earlier research different MAC protocols are implemented, but the efficiency varies based on the application and environment. Thus, it is important in designing a common MAC system to support a greater number of surveillance applications and also assists in improving the energy efficiency of the sensor in the network. To do that, this paper aimed to design and implement a novel Extended S-MAC routing protocol for enlightening energy efficiency. The Extended S-MAC is simulated in the Network Simulator tool, and the results are verified. The performance of the proposed Extended S-MAC is evaluated by comparing its results with the other state-of-the-art MAC protocols. Comparing with the existing MAC, the proposed MAC obtained 17% more energy and proved it is better.

**Keywords:** Wireless Sensor Networks, MAC Protocol, S-MAC, ES-MAC, Energy Efficiency, Surveillance Applications.




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Track I

# Application of Fuzzy Deep Neural Networks for Chest Radiograph-Based Covid 19 Diagnosis

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Finding the existence of the disease is difficult because of the rising number of COVID-19 patients worldwide and the scarcity of diagnostic tools. X-rays and other imaging modalities are often employed because they are accessible and affordable. Because there are so many online medical pictures from many medical modalities, including X-ray, computerised tomography (CT) scans, and magnetic resonance imaging (MRI), deep learning has shown to be an effective tool. Since the beginning of 2020, several medical research initiatives have been planned and started as a result of the extensive usage of deep learning methods in medical imaging. To distinguish between individuals with interstitial pneumonias unrelated to COVID-19 and those who have pneumonia connected to COVID-19, we have employed fuzzy logic and deep learning to analyse chest X-ray pictures. The proposed transfer learning technique is more effective than the present literature. Using the four-class classifiers of the ResNet 18 Architecture, covid, viral, and bacterial pneumonia may be distinguished from a healthy patient. The effectiveness of deep learning in medical image diagnosis is demonstrated by the suggested method's 97% classification accuracy, 96% precision, and 98% recall in the example of COVID-19 detection utilising chest X-ray pictures. Additionally, the outcomes show that the suggested approach, with a 97.1% ratio, has the highest level of sensitivity. The recommended technique, in comparison to the others, offers the greatest value with a 97.47% F1-score rate. With fuzzy features and Deep Learning approaches, classification accuracy increased, reaching up to 97.7% with ResNet 18, which is greater than the accuracy rates of the other techniques. By correctly classifying COVID-19 scans and other pneumonia cases, deep learning approaches have shown their potential for use in the near future.

**Keywords:** Deep learning, CT scans, MRI, Covid-19, ResNet 18




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Track I

# Logic Locking for Preventing Data Extraction

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**Abstract**
The proposed technique DisORC turns the oracle into a dishonest one whenever a potential attack is identified. DisORC works on the rule that it will perform its function even the input and output are not in the permissible limit.This key is used to secure the circuit, making it more challenging for attackers to reverse engineer and extract the original design. A sequence generator can be utilised to implement logic locking o display its correct functionality (i.e. produces correct outputs), valid key has to be provided to the locked design. Pseudo Random Number Generator (PRNG) is utilized to randomly generate the sequence of key values.In this paper, we present a locking technique in the routing phase using LFSR. Overworkensures that the timing and signal integrity of the circuit are maintained, and it minimize the potentiality of manufacturing issues such as lithography variations or etch effects.
.
**Keywords**- interconnect, reverse engineer, LFSR;




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Track I

# CNN features for 2D Video Based Multiple View Indian Sign Language Identification

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The biggest problem faced till now has been the exploding data dimensionality and no feature representation model for views from within a class label. The previous works tried to represent views from within a class by an anchor positive and anchor negative pairs. These pairs are learnt with an embedding loss function defined by triplet and cross entropy losses. The objective in this work is to discover and construct a global view feature through a weighted combination of multiple within class views. The primary step is to extract spatio temporal features on skeletal sign language video data with a 3D convolutional neural network. The second step is to project the higher dimensions of spatio-temporal features into a latent lower dimensional feature subspace which characterizes a sign in all views. The resulting global features representing all views from within a class are learned by a sign language classifier. The proposed model performed well on all kinds of 2D video data when compared to state of the art methods.




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Track I

# Effective Conductance Drop due to a Particle in a Solid State Nanopore

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**Abstract:** An understanding of the current drop in a solid state nanopore due to particle translocation or capture is important for the development of nanopore based sensing technologies. The current drop is predictable to a very good accuracy in high aspect ratio pores. But for lower aspect ratio pores, where there is interplay between access resistance and pore resistance, the existing theories for computation of access resistance cannot explain the results. This is primarily due to the absence of consideration of a particle in the access region. The attempt for modelling the influence of a charged particle on the access resistance has been empirical in nature. In this paper, we develop a unified model using uniform field theory and the coupled Poisson Nernst Planck-Navier Stokes(PNP-NS) equations to study the effect of varying particle position on the ionic distribution and hence the resistance sensitivity for a wide range of pore geometry and molar strength. Good quantitative agreement has been observed between the two approaches. As the perturbation of the electric field lines increases when the particle approaches the pore mouth, the effective conductance drop in the access region is the average over all possible positions of particle near the pore mouth. Taking into consideration this positional uncertainty during particle translocation, the effective resistance sensitivity is found to agree very well with the experimental results with low aspect ratio pore. Finally, we also examine the impact of varying aspect ratio on the ionic current traces of functionalized nanopores towards protein detection.

**Keywords:** Nanopores; Resistive Pulse Sensing;Modelling.




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Track I

# Pollutants and meteorological parameter analysis of weather conditions and their impact on Delhi's air quality

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**Abstract:** The first part of the research focused on the air pollution in Delhi in 2019 and 2020 caused by the concentration of air pollutants being over the permissible threshold. During the same time frame as this study, the impact of several meteorological factors on pollution was also examined. Second, a 14-day period in which air pollution concentration levels were assessed to be greater than norms were chosen as an episode. Pollutant and weather data were collected simultaneously at several air quality monitoring sites. Surface-level variations in meteorological factors were analysed using the statistical model. Together, data from an air quality monitoring station and a statistical model were run through a cross-correlation function (CCF) to look at how variations in weather conditions affected pollutant levels in the air. Some meteorological data were also gathered using satellite-based radar (SODAR). Analysis of the ventilation coefficient was then used to conclude whether or not the pollutant parameters were carried out. PM2.5 and PM10 were shown to be the most important factors in determining the city's overall pollution levels. Delhi experienced air pollution because the episode's low wind speeds and atmospheric boundary layer height values prevented the dispersion of pollutants.

**Keywords:** Air Pollution, SODAR, Delhi, Statistical Model.




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Track I

# Microcontroller based voice control robot specifically designed for surveillance

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**Abstract:** The presented work has been carried out in such a way that voice instruction is used to control the robot. The robot is operated by the user orders on the application. The two DC servo motors attached to the microcontroller on the receiver side aid the robot's movement. The Bluetooth RF transmitter converts the command from the application into digital signal at the range of about 100 meters to the robot. The data is disappeared by the receiver and supplied to the microcontroller, which controls the DC motor to perform the required job. The goal of the voice controlled robotic vehicle is to complete a task by listening to the user's command. For the user to operate the robot smoothly, a prior preparation season is required. A code is used to give instructions to the controller in the same way. The Project voice controller robotic vehicle has numerous uses both now and in the future. In the future, improvement can be added to the work has a wide range of application, including military, home, security, rescue mission in medical support. Using the given resources, we were able to create a rudimentary model of a voice controlled robotic car. It is simple to use because it operate with basic voice commands. It has the potential to be utilized for surveillance. For security purposes, we can incorporate a web cam into the robot. The voice recognition software is highly sensitive to background noise and has a high accuracy for identifying voice command.

**Keywords:** Microcontroller, servo motor, electronic surveillance




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Track I

# COMPACT UWB ANTENNA FOR IOT APPLICATIONS

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**Abstract:**
For the UWB (Ultra-wide Band) antenna we are using a semi- circular patch with F4-epoxy as substrate. The ground plane has a slot to better accommodate the results. This can be used in a single planar antenna for improving its characteristics such as bandwidth, gain improvement, isolation, and size reduction. In this we are using a proposed design which has the impedance bandwidth ranging from 3.4GHZ to 14GHZ for a reflection coefficient <-10db, a parametric analysis is conducted to investigate the bandwidth as well as gain characteristics. The proposed antenna has dimensions of 26 mm X 27 mm X 1.6 mm. The results of simulation and test are well agreeable to verify the feasibility of the proposed tag such tag, and it has low cost, narrow bandwidth and compact structure. It can be applied to low-cost logistics, production line management and another field.

**Keywords:** UWB, Internet of Things, Slots.




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Track I

# Spectrum Sensing using Bias Compensated Normalized Adaptive Algorithm for Medial Telemetry Applications

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**Abstract:** Spectrum sensing approach is used in cognitive radios to detect primary user signals in the frequency spectrum. Because of statistical covariance, the primary signal in received signals is covered up by noise. However, noise power is not constant and varies as a result of random noise and interference in the networks. This noise power may cause problems with noise uncertainty in energy detection performance. So, in this research, a bias compensated normalized least mean square (BNLMS) method is proposed, which includes noise power utilized for threshold adjustment, and then noise power is modified at each sensing point of the licensed spectrum. Noisy inputs are calculated and eliminated using the proposed method. Further stability is examined by calculating mean deviation and mean square deviation, after which convergence and steady-state error rate performance for varied step size with stabilization are observed. Then, probability detection and false alarm probability are calculated to reduce sensing errors to enhance energy detection performance by avoiding noise uncertainty problems. When compared to previous algorithms, we gain a greater probability of detection for diverse SNR levels, and this approach is applied in remote health care monitoring to prevent noisy interferences caused by wireless networks.

**Keywords:** cognitive radios, energy detection, noise uncertainty, primary user, threshold




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Track I

# A Flexible Piezoelectric Composite Films for Bio-mechanical Energy Harvesting and Self-powered Electronics

**Vivekananthan Venkateswaran**
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**Abstract**
Piezoelectric polymer-based composites have become an interesting topic of research owing to their chemical, physical and mechanical properties especially with energy harvesting and smart electronics. The piezoelectric materials blended in the polymer matrix increases the flexibility of the fabricated device extending the applicability towards wearable electronics. Herein, piezoelectric materials such as Barium titanate (BaTiO3) and barium strontium titanate (BaSrTiO3) synthesized through a cost-effective solid-state reaction technique were blended in the polymer polydimethylsiloxane (PDMS). The blended polymeric solution is spin coated on a substrate, cured it in oven to form a composite film. The composite film is the used as an active layer in the triboelectric nanogenerator. Compared with the plain PDMS film, the composite film enhances the electrical output to 2-to-3-fold increment due to the increased dielectric constant, surface modification, and piezoelectric dipole orientation upon actuations. With the usage of composite films, the device achieves a maximum electrical output power density of more than 0.5 W/m2 . Further, the nanogenerator device made of piezoelectric composite film is used for demonstrating various self-powered sensing applications such as self-powered intruder identification and sleep monitoring systems. The proposed research paves way towards batter free smart electronics and internet of things.

**Key words:** Piezoelectric, Nanogenerators, Self-powered systems, Composite films, Triboelectric




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Track I

# Antenna array optimization using butterfly algorithm

**Sahiti Vankayalapati**
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**Abstract:**
These instructions give you guidelines for preparing papers for the conference. Use this document as a template if you are using Microsoft Word. Otherwise, use this document as an instruction set. Paper titles should be written in uppercase and lowercase letters, not all uppercase. Avoid writing long formulas with subscripts in the title. The abstract must be written as one paragraph and should not contain displayed mathematical equations or tabular material. The abstract should include three or four different keywords or phrases, as this will help readers to find it.

**Keywords:** Enter key words or phrases in alphabetical order, separated by commas.

Note: 1. Title should not match with any conference, Scopus, Web of Science Title
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Track I

# Lattice Polyphase FIR Sample Rate Converter

**Abhishek Kumar**
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**Abstract:**
For the efficient implementation of polyphase sample rate converters, it is required to design polyphase and its transposed form in such a way that the noble identities can also be applied. It can be observed that the lattice structure of a single transfer function can be used to design the efficient polyphase interpolator converter. However, it cannot be converted to the efficient polyphase decimator structure because of lacking of its transposed structure. Accordingly, this correspondent proposes an efficient polyphase lattice decimator structure. Furthermore, performance analysis is performed and compared with existing literature in this correspondent.

**Keywords:** Sample rate converter, multirate systems, lattice structure.




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Track I

# Design of Microcontroller Based S-Curve Landing Position System for Elevator

**Abhishek Kumar**
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**Abstract:**
This work proposes the design of the motion pattern generator used for elevator vertical movements. A typical S-Curve like pattern generator is used on microcontroller-based system. Here, changes in jerk and acceleration setting can easily optimize patterns for various needs. We have also introduced microcontroller-based performance specification, uncertainties in the realistic case and constraints of designing an elevator motion controller. Additionally, proposed design is verified by an elevator motion controller based a mid-end microcontroller using new patterns. Simulation and experimental results have shown that the proposed pattern generator is robust to disturbance and can meet the specification.

**Keywords:** S-curve, microcontroller, control system.




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Track I

# Implementation of Deep Learning Algorithm for Detection of Diabetic retinopathy in FPGA

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**Abstract:**
Diabetic retinopathy, which usually develops as a result of diabetes mellitus, causes lesions on the retina that impair vision. If it is not detected in time, blindness could follow. Unfortunately, medication just serves to preserve vision; there is no known cure for it. The risk of vision loss can be significantly reduced with early detection and treatment of diabetic retinopathy. In contrary to computer-aided diagnosis techniques, ophthalmologists must manually diagnose diabetic retinopathy from retina fundus images, which takes time, effort, and money and is subject to human mistake. Recently, deep learning has become one of the most well-liked techniques for enhancing performance, notably in the classification and interpretation of medical pictures. In the analysis of medical pictures, convolutional neural networks are a more well-liked and effective deep learning technique. Doctors can spot the earliest indications of diabetic retinopathy using retinal ophthalmoscopy, and deep learning can aid in better diagnostic choices and staff workflow. Using the 80 by 20 rule, most deep learning techniques for diagnosing diabetic retinopathy divide retinal ophthalmoscopy images into training and validation data sets. This paper implement the deep learning method in FPGA and optimized it for Area, Power, and Delay.

**Keywords:** Deep learning, FPGA, Neural Network, Delay, Power.




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Track I

# Latitudinal Behaviour of Ionospheric Scintillations Along the Indian Longitudes

**Sampad Kumar Panda**
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**Abstract:**
Ionosphere is a dispersive medium through which all the radio signals pass while travelling from satellite to the ground receivers. Total electrons present in the ionosphere recombine and neutralize to form plasma bubbles due to variation in solar activity. Due to this the lower density F layer are lifted above that is clearly explained by the Rayleigh Taylor instability. The plasma bubbles are mostly occurring in the equatorial regions and hence known as the Equatorial plasma bubbles (EPB). In this paper we tried to investigate the scintillation behavior with increasing latitude to the higher low latitudes i.e., from Bangalore (13.021 E, 77.570 N), Hyderabad (17.417 E, 78.551 N), and Lucknow (26.912 E, 80.956 N). Amplitude scintillation index (S4) is used to measure the scintillation intensity. The rate of total electron content index (ROTI) is the variation in total electron content per minute and is also considered as the proxy for the scintillation index. ROTI variation during the maximum S4 during disturbed periods and some of the quite periods clearly shows that the L band scintillations are concurrent with the plasma bubble occurrences. These results provide a glimpse of the latitudinal behavior of the scintillation for the ionospheric community and space weather research.

**Keywords:** Ionosphere, scintillation, plasma bubble, ROTI, Space weather.




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Track I

# Importance of Body Node Coordinator (BNC) Positions on Intra-Body Sensor Network Performance

**Sunil Kumar**
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**Abstract:**
By putting the Body Node Coordinators (BNCs) in various Intra-WBSN places, our research in this study examines how well Intra-WBSN performs. Bio-sensor nodes gather physiological data, which is then sent to BNC via an intermediary node or forwarder. On the basis of cost-function, the forwarder node is chosen. The residual energy of the node and the route loss between the sensor node and BNC affect the cost-function. The body sensor node with the highest value of the cost function is chosen as the forwarder throughout the execution of each cycle. The network stability period, network lifetime, residual energy throughput, and path-loss are the performance metrics for the inquiry.

**Keywords:** Physical Node Coordinator (PNC); Cost-function; Path Loss; Wireless Body Sensor Network (WBSN); Intra Wireless Body Sensor Network (Intra-WBSN).




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Track I

# Efficient VLSI Implementation of VGG19 Machine Learning Algorithms for Bird Species Recognition

**Sameer Yadav**
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**Abstract:**
The automatic identification of bird species is the current focus of bioacoustics and machine learning. Sound spectrograms are utilized as a visual representation of sound waveforms for this purpose so that machine learning algorithms can analyze them. An interesting potential for identification purposes is the use of these methods to locate and recognize different bird species over wide geographic areas and for lengthy periods of time. One of the frameworks used for this project is VGG19, a convolution neural network that has been successfully used to a variety of image identification problems. It has been a popular choice for analyzing classification issues based on sound spectrogram data, such as successfully identifying various bird species. In order to use the system, audio data must be acquired, preprocessed, labelled, trained, verified, and then deployed for use in practical applications. This paper discuss the efficient implementation the VGG19 algorithm in hardware language i.e Verilog and optimized it for area, power, and delay in 40nm technology using Cadence environment.

**Keywords:** Neural Network, Machine learning, Verilog




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Track I

# On Convergence of Kalman Filters

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**Abstract:**
Kalman filters have been widely used in various applications of state estimation and parameter estimation such as robotics, industrial chemical process, tank systems, submarines, vehicle engines, etc. Since past few years, Kalman filters have been improved from using to linear systems to nonlinear systems, under the availability of perfect system models and models with uncertainties. Most of the improved versions of the Kalman filters are reported to have worked good enough in practical scenarios but not all the filters have theoretical convergence. It is a complex process to find theoretical convergence of every version of filters as the Kalman filters are still among the new methodologies. In this work, convergence of an adaptive Unscented Kalman filter is provided and its application for different system models is reported.

**Keywords:** Convergence of filters, Kalman filters, State estimation.




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Track I

# Hybrid design approach for efficient analog to digital interface using sigma delta modulators

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**Abstract**
A hybrid sigma delta modulator (HSDM) is a type of analog-to-digital converter (ADC) that combines the advantages of both sigma delta and pipeline ADCs. This hybrid approach allows for high-speed and high-resolution conversion, making it an attractive option for applications that require both speed and accuracy. The design of an HSDM involves the optimization of various parameters, including the number of stages, the choice of the quantizer, and the filter characteristics. The quantizer is responsible for converting the analog input signal into a digital signal, while the filter removes the noise introduced by the quantizer. The design process involves selecting the optimal quantizer and filter to achieve the desired resolution, speed, and power consumption. The filter can be designed using digital signal processing techniques, such as finite impulse response (FIR) or infinite impulse response (IIR) filters. The performance of an HSDM can be evaluated using various metrics, including signal-to-noise ratio (SNR), dynamic range (DR), and power consumption. These metrics are critical to determine the suitability of an HSDM for a particular application.

The design of an HSDM involves the optimization of various parameters, including the choice of quantizer and filter. The hybrid approach of an HSDM provides high-speed and high-resolution conversion, making it a suitable option for applications that require both speed and accuracy. The performance of an HSDM can be evaluated using various metrics, including SNR, DR, and power consumption. The design of an HSDM is a challenging task, but the potential benefits make it an attractive option for many applications.

**Keywords:** Sigma delta modulator, Optimization, SNR, DR




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Track I

# Deep Learning for Automatic Defect Detection in Frequency Modulated Thermal Wave Imaging

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**ABSTRACT**
When used in conjunction with helpful post-processing techniques, active infrared thermography has emerged as a practical non-destructive testing (NDT) method for the identification and characterisation of defects in industrial composites. However, the current revolution (NDT 4.0) focuses on automating defect detection through a variety of modules like artificial intelligence, deep learning, and the internet of things. Most research interest in deep learning is concentrated on a variety of supervised models with various learning strategies employing temporal or spatial information from thermal data as input characteristics. Defect zone thtese aermal profiles are exceedingly rare compared to their non-defect area counterparts when temporal information is taken into account, leading to an issue with class imbalance and a lack of training data. Present contribution is intended for defect detection using these approaches in frequency modulated thermal wave imaging of coatings and composite structures.

**Keywords:** Composite structures, Deep learning, Infrared thermography, Anomaly detection, supervised and unsupervised training.




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Track I

# Quadratic frequency modulated thermal wave imaging quantitative evaluation of subsurface anomalies using artificial neural networks

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**ABSTRACT:**
Quantitative subsurface analysis with increased reliability is fascinating the post processing research in infrared imaging for non destructive evaluation. Accompanied by a variety of post processing approaches, non stationary thermal wave imaging has been emerging as a reliable technique to cater to anomaly detection for a wide range of materials despite its lack of quantitative evaluation. This paper proposes a classification and regression based quantitative post processing modality to characterize subsurface anomalies using quadratic frequency modulated thermal wave imaging and validate it with the experimentation carried over a carbon fiber reinforced and glass fiber reinforced plastic specimens along with a suitable mathematical model based on thermal wave propagation principles. Subsurface details have been visualized in terms of their depths where their detection capability and reliability




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Track I

# Design and analysis of RF MEMS switch for wireless communications

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**ABSTRACT:**
Microelectromechanical systems are popularly known as MEMS and it is a system integrating several streams like electronics, electrical and mechanical on common substrate to develop a device. The MEMS devices combines the functionality of electronics, electrical and mechanical devices. Different elements are integrated in MEMS devices so that MEMS sensors can sense various parameters and controls the environment at the same time. The designed RF MEMS switch can work with low actuation voltage of 20V and it was obtained from electromechanical analysis of switch. The capacitance ratio of 160 was obtained from proposed MEMS switch. Electromagnetic and electromechanical analysis was performed on proposed switch.

**Index Terms** – RF switch, low pull-in voltage, capacitance ratio, return loss, insertion loss, response time.




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Track I

# Energy Efficient LEACH protocol for Routing in WSN

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Wireless Sensor Networks (WSNs) consist of small sensor nodes that have limited energy resources, making it a challenging task to develop routing schemes that are energy-efficient and can extend the network's lifespan. Clustering is commonly used in WSNs to improve energy efficiency, and one widely used clustering technique is the LEACH protocol. This paper presents a new energy-efficient LEACH protocol that incorporates network coding for WSNs. The LEACH protocol is used to form clusters, selecting cluster heads based on residual energy and drain rate metrics. Network coding is applied at the cluster head level to minimize the number of transmissions and improve network performance. Additionally, the next level of network coding is performed at a node by selecting a master node. Simulation results show that the proposed scheme outperforms the EE-LEACH and LEACH protocols in terms of network lifetime and packet delivery ratio.




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Track I

# IoT Based Smart security system Using Raspberry Pi

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Nowadays, it is mandatory for any industries to protect confidential data. So in any field there are restricted areas where everyone won't be allowed. Securing that restricted area is cost effective and it also needs human interaction in order to monitor it. From the last few years, IoT is rapidly growing in everywhere. Everyone is into IoT since it can be accessed from any locations. This paper mainly concentrates on reducing human interaction for continuous monitoring. It starts notifying the human face whenever the PIR sensor detects the movement of the human in the particular area and captures the image. Buzzer starts alarming, then parallelly with the delay in few seconds the Pi Camera starts capturing and that captured image will be sent to the respected email provided by the user. All this can be done through raspberry pi consists of the inbuilt wifi module, it connects to the internet to send image via Email to user's mail id.




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Track I

# An Efficient Approach for Design and Testing of FPGA Programming using NI ELVIS III

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**Abstract-**
Programming of Field Programmable Gate Arrays (FPGAs) have long been the domain of engineers with VHDL or Verilog expertise. FPGA's have caught the attention of algorithm developers and communication researchers, who want to use FPGAs to instantiate systems or implement DSP algorithms. These efforts however, are often stifled by the complexities of programming FPGAs. RTL programming in either VHDL or Verilog is generally not a high level of abstraction needed to represent the world of signal flow graphs and complex signal processing algorithms. This paper describes the FPGA Programs using Graphical Language rather than Verilog, VHDL with the help of NI ELVIS III and features of the NI LabVIEW FPGA environment.

**Key words:** FPGA Programming, VHDL, DSP, NI LabVIEW, NI ELVIS III




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Track I

# Role of Urbach Energy in Controlling Voltage Output of Solar Cell

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**Abstract**
The Urbach energy ($E_U$) has strong influence on voltage output and the efficiency, is observed upon close analysis of performance limiting factor in various thin film solar cells systems. The higher the extent of the band tail into the forbidden gap higher the Urbach energy. Simulation shows that the efficiency decreases with increasing $E_U$ energy irrespective of the material system. This result shows the applicability of the $E_U$ in selecting the new system for photovoltaic applications. The magnitude of the $E_U$ depends upon the extent of impurities and defects in material systems, limits the achievable $V_{OC}$ in the device and increases the $V_{OC}$ deficit. The capacitance of the p-n junction diode of thin film solar cell falls for high $E_U > kT$. The magnitude of $E_U$ larger than thermal energy kT ($E_U > kT$) have significant and observable deviation on the device's efficiency.

**Keywords:** Urbach energy, absorption, defects, $V_{OC}$ deficit




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