

Department of Electronics and Communication Engineering

Technical Magazine

Issue 2 [March, 2023]

1. Message from the Head of Department

The department of Electronics and Communication Engineering (ECE) was established in 2009 with an intake of 60 students and is affiliated with Anna University. The department offers a post graduate programme (M.E. VLSI Design) with an intake of 9 students. The department has also been recognized as a research center for carrying out Ph.D. programmes at Anna University. Our department offers tremendous opportunity to mould the young professionals to enhance their skills and knowledge as per current developments. The department affords professional training to the students in the emerging areas. The department of ECE has a team of dedicated and motivated faculty members to impart quality education. Excellent infrastructure is provided by the management to meet the requirements of the current trend. Our department has been recognized as a research center by Anna University, Chennai, from 2017 onwards. We, as a team, must prepare and guide the students to ace the forthcoming challenges of real life. The students are motivated to take part in extra curricular and co-curricular activities at the national and international levels to fetch accolades for the institution. The department strives hard to reach greater heights to address issues in society with the wonderful support offered by the management.



Dr.K.Sumathi,HOD/ECE

2. Vision and Mission of the department

Vision

To become a most sought after centre of learning in Electronics and Communication Engineering to produce engineers possessing domain knowledge with research focus to meet socio-economic needs.

Mission

- DM 1 : To adopt a systematic and technology-enabled teaching-learning process with the ability to contribute to research.
- DM 2 : To develop electronics and communication engineers with managerial skills and life-long learning practices for sustainable economic growth that is beneficial to society.
- DM 3 : To establish a center of excellence in VLSI technologies and embedded systems and provide a creative environment with industry-linked initiatives for encouraging innovation.

3. Program Educational Objectives – PEOs

PEO 1 : The graduates will have successful careers in industries or pursue higher studies and research or emerge as entrepreneurs.

PEO 2 : The graduates will be able to apply fundamental and advanced knowledge, skills and techniques in devising innovative products for the benefits of society.

PEO 3 : The graduates will be able to critically analyze existing literature in an area of specialization and research oriented methodologies to solve the problems identified.

4. Program Specific Outcomes – PSOs

PSO 1: Professional skills: Students shall have skills and knowledge to work on analog and digital systems, adhoc and sensor networks, VLSI, embedded and communication systems

PSO 2: Competency: Students shall qualify at the State, National and International level competitive examination for employment, higher studies and research.

5. Program Outcomes –Pos

- PO 1 : Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO 2 : Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO 3 : Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
- PO 4 : Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO 5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO 6 : The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO 7 : Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO 8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO 9 : Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- PO 10 : Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO 11 : Project management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO 12 : Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

6. Message From Editorial Team

Dear Students,

We hearty welcome you to the newly launched ECE Department's first issue of the Magazine for the academic year 2022-2023.

The objective of the magazine is to mainly focus on Achievement of the students from the ECE department in the Co-curricular and Extra-Curricular Activities.

We are also thankful to our Management and Principal for their support and encouragement. Finally we are gratified to our reviewers for their frank opinions and constructive suggestions, namely our colleagues and students.

- **Chief Editor:** [Dr.K.Sumathi,HoD/ECE]
Faculty Advisors: [Mrs.A.Ambika,AP/ECE,
Ms.S.Shanmugapriya,AP/ECE,Mrs.Priyamanohari]
- **Student Editor:** [A.RamjanBegam,II ME VLSI Design]
- **Design Team:** [Mrs.A.Ambika,AP/ECE]

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LOW POWER DETECTOR TRACKER ENABLED CYCLIC-LDPC ENCODER USING FPGA

Design of low power VLSI circuits are increasing recent days. For confidential data transfer, Storage in System on chips(SOC), robust encoders are used. In the existing system, parallel computing architectures for frequency-statistical sorting and code-size computational sorting. This architecture results in a process of building a tree and assigning symbols that can be completed by scanning the data only once. This solves the problem of the low efficiency of the traditional algorithm, which needs to scan the data twice. Consequently, in addition to the advantages of the high compression ratio inherited from the Canonical Huffman, the proposed architecture has overridden advantages for a high parallelism processing capacity. The experimental results showed that the proposed architecture decreased the encoding time by 26.30% compared to the available Huffman encoder using the standard algorithm when encoding 256 8-bit symbols. In the proposed system, low power parity check algorithm is implemented. The cyclic Low density Parity check(LDPC) encoder is implemented with the help of Majority logic decomposition. The detector tracking algorithm is implemented with time scaled tracking process using majority logic XOR gates and Comparator circuit. The resultant will provide fast encoding process as well as decoder circuit.

- A.RAMJAN BEGAM

II ME VLSI Design

DESIGN AND ANALYSIS OF CNTFET FULLADDER USING XOR LOGIC

A novel approach to designing a full adder gate using a neural network model trained with back propagation. The full adder gate is a fundamental component in digital circuits, critical for arithmetic operations. Traditional designs rely on logic gates and

complex wiring, often requiring substantial physical resources. In this work, we propose a neural network-based solution that leverages the power of machine learning techniques to create a more efficient and adaptable full adder gate. The neural network architecture is designed to learn the intricate relationships between input signals and the corresponding sum and carry outputs. The training process employs back propagation to optimize the network's weights, enabling it to accurately emulate the behavior of a conventional full adder gate. Experimental results demonstrate that the neural full adder gate achieves comparable performance while potentially offering advantages in terms of scalability and adaptability. This work contributes to the convergence of digital circuit design and machine learning, paving the way for more innovative and efficient approaches to traditional computing components.

- A.GANGADEVI

II ME VLSI Design

REDUCE POWER CONSUMPTION IN NAND FLASH MEMORY
USING ADIABATIC LOGIC CIRCUIT

NAND flash memory is widely used in mainstream electronic products due to its high performance, low power consumption, non-volatility and high storage capacity. With the gradual reduction in feature size and more bits stored in each cell, NAND flash memory cells become more vulnerable to various channel noises, including data retention, cell-to-cell interference (CCI), program/erase (P/E) cycles and read disturb. The above noises significantly degrade the data-storage reliability. As a result, the data storage lifetime is dependent on retention time and P/E cycles. Retention and CCI are recognized as the main sources of noise, which lead to significant performance deterioration of flash memory systems. To analyses the current flash memory model have proposed a switching-voltage detector and compensation

circuits for an ultra-low-voltage CMOS inverter. The switching voltage of an inverter is an important design parameters for a digital circuit, and is determined by the difference in threshold voltages between MOSFETs. However, switching voltage varies significantly with fabrication process conditions and temperature. To address this problem, have developed a threshold voltage difference detector circuit. Have also proposed a possible compensation technique for the inverter. Monte Carlo simulations demonstrated that the threshold voltage detector circuit can monitor the threshold voltage difference between PMOSFET and nMOSFET, and that inverter can achieve 50% reduction in switching-voltage variation with CMOS inverter is utilized and implemented with HVTD compared to a conventional CMOS inverter. Here we used the adiabatic logic circuits. Adiabatic logic technique is becoming an answer to the problem of power dissipation. The adiabatic switching technique reduces the power dissipation during switching events.so implemented the adiabatic logic to reduce the power consumption in design.

- K PREETHI

II ME VLSI Design

ENHANCEMENT OF THREE STAGE COMPARATOR WITH HIGH SPEED AND LESS KICKBACK

A comprehensive performance analysis of traditional three-stage comparators with kickstart (TCKS) and the innovative Enhanced Comparator Fuzzy Neuron (ECFN) comparators is done focusing on noise, delay, and power consumption under varying input voltage conditions. ECFN, enriched with neuro-fuzzy optimization, exhibits remarkable adaptability and efficiency in handling different voltage scenarios, making it a compelling choice for a wide range of applications. In the assessment of noise performance, ECFN's

neuro-fuzzy optimization emerges as a game-changer. Its dynamic parameter adjustments reduce noise consistently across a diverse set of input voltage levels, addressing critical challenges in applications requiring precise signal processing amidst noisy environments. Furthermore, ECFN excels in minimizing delay, a crucial aspect in real-time systems. Its adaptive neuro-fuzzy optimization ensures minimal delay during its operation, offering improved efficiency and performance in high-speed data processing and time-sensitive control applications. Lastly, this study highlights ECFN's impressive power efficiency. Through its neuro-fuzzy optimization, ECFN substantially reduces power consumption, especially in scenarios where energy efficiency is paramount, such as in battery-operated devices and energy-conscious systems. The incorporation of neuro-fuzzy optimization in the ECFN comparator delivers significant advantages in noise reduction, delay minimization, and power efficiency, positioning it as a compelling choice for applications demanding precision, speed, and energy efficiency across varying input voltage conditions. This contributes to a deeper understanding of advanced comparator technologies and their potential to enhance performance in today's diverse and demanding electronic systems.

- M.MUTHU MURUGAN
II ME VLSI Design

ADVANCED FOOTSTEP POWER GENERATION SYSTEM USING **RFID**

The country's population is growing every day, and this has an impact on how much power is needed in several ways. So, converting this energy back into useful form is the primary solution for future demands. In this idea to produce electricity from footfall, piezo sensors are used to create power that is then stored in a

battery to charge the battery. The battery's stored energy is used to charge mobile phones using RFID cards. a cutting-edge footstep power generator that harnesses the energy of walking using piezo sensors. Piezo sensors are positioned underneath the platform to produce electricity when people walk on them. The mechanical vibrations and magnetic forces produced by footfalls when walking or running are captured by the VMTs, which are integrated into footwear or other wearable technology. Then, these energies are transformed into electricity. The VMTs also make use of RFID technology to wirelessly send information, including identification codes, to RFID readers or receivers. The sensors are arranged in this way to provide the highest output voltage possible. The system's essential component, the boost converter, elevates the low voltage generated by the energy collecting mechanism to the higher voltage level required to power the device. Then, this is sent to the circuitry in charge of monitoring. The circuit is a microcontroller-based monitoring system that maintains track of the steps applied to the weighted plate as well as the voltage across the capacitor in the rectifier circuit. The information is then displayed on an LCD screen and sent to the cloud using an IoT device.

**-ANITHA C
ROSHINI S
VARUNKUMAR N
IV BE ECE**

CROP PREDICTION USING IOT AND MACHINE LEARNING

Agriculture is one of the most important factors for economic growth for any country. Agriculture plays a very crucial role in increasing the economy of many developing countries. India, being one of the major countries in the world for producing vast amounts of different crops, still uses traditional techniques in the field of

agriculture. Farmers not only face problems in coping with the changing climatic conditions but also need to meet up the rising demands of higher food production with good quality. As a matter of fact, Farmers need to be aware of the changing climatic conditions in order for them to yield quality crops. IoT and Machine Learning based Smart Agriculture would not only help farmers monitor their crops in real time but also would help in recommendations regarding crops and fertilizers. This project focuses on proposing an IoT based Smart Agriculture system, which would help farmers, get recommendations based on various factors like humidity, temperature, pH, moisture and rainfall. Agriculture is a primary supply of Income. It keeps track of a multitude of characteristics, including humidity, temperature, and soil, and displays them in crystal clear real-time. In the agricultural sector, machine learning is utilized to increase crop output and quality. The application of appropriate algorithms to sensed data can aid in crop recommendation.

**-KARTHIK K
SARAVANAN S
NARMATHA S
IV BE ECE**

ACL INJURY INDICATOR FOR SPORTS PERSON

Nowadays growth of technology helps to identify the flaws even before the symptom is seen. In a similar manner this ACL. injury indicator is designed in such a way that it warns the sport person who is more prompt to tear or sprain in the Anterior Cruciate Ligament (ACL). Only 45% of the athletes return back to their passion whereas 55% of the athletes retain back at their home. The Proposed solution includes Force sensor. Flex sensor, and

Accelerometer. The Force Sensor calculates the ground reaction force, muscle force and flex produced during stretches. Then this is converted into a Tibial Shear Force, which indicates the Anterior Cruciate Ligament injury. From the applied strain, the proposed framework cautions the competitor when they are moving toward a hazardous Tibial Shear Force level. The Flex sensor have a variable printed resistor, the Flex Sensor achieves great form-factor on a thin flexible substrate. When the substrate is bent, the sensor produces a resistance output correlated to the bend radius the smaller the radius, the higher the resistance value. Accelerometers are widely used to measure inert acceleration due to gravity, the low-frequency module of the acceleration and the dynamic acceleration due to knee movement. This warning is in the form of beep, light and notification from IoT based mobile application. The inputs are obtained from the sensors present in the prototype and the output is determined by running the values through the TSF algorithm.

Keywords -- Anterior Cruciate Ligament (ACL), Tibial Shear Force (TSF), sensor network, IoT.

**-NIVETHA M
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RISHNIKA M
SELVANAYAKIS
IV BE ECE**

AI BASED VOICE CONTROLLING ROBOT

Personal robotic assistants help reducing the manual efforts being put by humans in their day-to-day tasks. In this paper we developed a voice-controlled personal assistant robot. The human

voice commands are given to the robotic assistant remotely by using a smart mobile phone. The robot can perform different movements, turns, start/stop operations and relocate an object from one place to another. The voice commands are processed in real time, using an online cloud server. A speech signal commands converted to text form are communicated to the robot over a Bluetooth network. The personal assistant robot is developed on a micro controller based platform and can be aware of its current location. The effectiveness of the voice control communicated over a distance is measured through several experiments. Performance evolution is carried out with encouraging result of the initial experiments. Possible improvements are also discussed towards potential applications in home, hospitals and industries. The aim of this project is to demonstrate the implementation of a Voice Command System as a Personal Assistant that can perform various tasks or services for an individual. It is based on the concepts of IOT, Speech Recognition, Natural Language Processing and AI. Using Raspberry pi as a main hardware to implement this model which works on the primary input of a user voice. The Device will respond to the user in a casual manner so that the user has a friendly experience with the device and feel it like his or her own assistant.

**-AAKASH P
ARAVIND M
BOOPATHI G
IV BE ECE**

**ARDUINO BASED VEHICLE THEFT ALCOHOL DETECTION USING
GSM AND GPS MODULE**

This project aims to design an Arduino-based system for vehicle theft prevention and alcohol detection using GSM and GPS modules,

along with a tilt sensor for rash driving and theft key detection. The proposed system consists of an alcohol sensor, tilt sensor, GPS module, GSM module, and Arduino microcontroller. The alcohol sensor detects the presence of alcohol in the driver's breath and sends an alert message to the owner's mobile phone via the GSM module. The GPS module continuously tracks the vehicle's location and sends real-time location updates to the owner's mobile phone in case of theft. The tilt sensor detects the tilting of the vehicle, which can be an indication of rash driving, and sends an alert message to the owner's mobile phone. Furthermore, the system includes a key detection mechanism that sends an alert message to the owner's mobile phone if the vehicle is started without the original key. This system can significantly reduce the chances of vehicle theft and promote safe driving practices.

DHARSHINI PRIYA S
BRAMALATHA S
GODSON VJ
MARUTHI VARA PRASAD C
IV BE ECE

IOT BASED CAR PARKING SYSTEM

The Advanced Parking System using IoT, GSM, and RFID technologies is designed to provide an automated and hassle-free parking experience to users. The system consists of four IR sensors, a GSM module, an EM18 RFID module, and a Blynk application. The sensors detect the presence of a car in the parking slot and send the data to the Blynk application, which displays the real-time parking slot availability information on a virtual LED. The GSM module

sends an SMS to the user confirming the booking and clearing of a parking slot. The EM18 RFID module is used to collect the parking fee from the users. The system provides an efficient solution to the challenges faced by conventional parking systems by automating the parking slot booking and fee collection process, reducing the time and effort required for parking management. The system can be implemented in various parking facilities such as shopping malls, airports, and hospitals to improve the parking experience of users.

Keywords-- Smart Car Parking, NODE MCU, IR Sensor, GSM module, RFID module, Blynk application and LED.

**SNEHA M
SWATHI S
THAILA UMA A
VAISHNAVIR
IV BE ECE**

LONG RANGE MILITARY PURPOSE MULTIFUNCTIONAL ROBOT

This presents a modern approach for surveillance at remote and border area using multifunctional robot based on current 4G technology used in defence and military applications. This robotic vehicle has ability to substitute the soldier at border area to the provide surveillance. The robotic vehicle works both as autonomous and manually to controlled vehicle using internet as communication medium. This multi sensory robot are used to detect metal guns, metal bombs and fire at remote and war field areas. Wireless security robot obsoletes due to limited frequency range and the limited manual control. These limitations are surmounted by using 4G technology which has cellular range Autonomous operation is controlled by ultrasonic sensor and fire

flame sensor, metal sensor. Manual operation is controlled by DTMF decoder and cell phones which used to send the location using GPS, GSM module and also helps to operate the robot direction according to real time information of surrounding. Robot motion is done by DTMF Technology. The system uses two mobile phones, one to the control the robot that sends DTMF commands via call to another mobile phone be mounted on the robot vehicle. This robotic vehicle is designed for reconnaissance as well as surveillance under certain circumstances.

**-HARIPRIYA U
HARIPRIYA J
SAMYUKTHA PRITHYANKARA K
HARIKRISHNAN S
IV BE ECE**

SATELLITE TV

Satellite TV is a kind of television content that is transmitted wirelessly via a network of broadcast centers, communications satellites, radio signals, and outdoor antennas to TV sets all over the world. Satellites in orbit around the Earth send out broadcast signals, which local and localized satellite television networks.

Direct-broadcast satellite (DBS or DBSTV) service is another name for satellite TV service. A DBS provider will transmit content to satellite TV subscribers as part of a broader TV package after choosing programming, which is often a wide variety of channels and services. An analog satellite receiver or a digital satellite receiver can receive DBS programming. Digital satellite programming is gradually taking the role of analog satellite television. HD TV, or high-definition television, is a type of digital satellite television that is becoming more widely available in higher resolution. Content that is broadcast digitally has better audio and

visual quality. Radio transmissions are used by both broadcast television stations and satellite stations to deliver TV content. The C-band radio frequency was used for the earliest satellite television broadcasts in the past.

AFSAL T A
ABISHEK V
ASARUDEEN T
III BE ECE

SILICON MEMORY

We investigate the boundaries of achieving storage density at the atomic scale. It has a memory that retains information based on the presence or absence of a single silicon atom. These atoms are arranged along self-assembled pathways at lattice locations having five rows of atoms in pitch. One can initialize the RAM and reformatted through well regulated silicon deposition. Composing entails Si atoms are transferred to a scanning tunneling microscope's tip.

The limits on dependability and speed are contrasted with DNA and magnetic hard drive data storage. According to renowned physicist Richard Feynman, "all of the information that man has carefully accumulated in all the books in the world can be written in a cube of material one two-hundredth of an inch wide." Thus, he stores a bit using a cube of $5 \times 5 \times 5 = 125$ atoms, which is similar to the 32 atoms that store a bit in DNA. This kind of quick, back-of-the-envelope calculation provided a first indication of the potential for increasing the density of stored data at the atomic level.

In the meantime, there has been great progress towards miniaturizing electronic devices all the way down to single molecules or nanotubes as active elements. Memory structures have been devised that consist of crossed arrays of nanowires linked by switchable organic molecules or crossed arrays of carbon nanotubes with electro statically switchable intersections. The purpose is to push the storage density to the atomic limit and to

test whether a single atom can be used to store a bit at room temperature.

**HARSHITHA S
MEENALOCHANI M
SAMPATH K
VISHNU ASHOK A
III BE ECE**

ELECTRONIC TOLL COLLECTION

Highway tolls may be paid electronically thanks to a generally developed technology called electronic toll collection. It uses technologies for vehicle-to-roadside communication to conduct an electronic money transfer between a car going through a toll station and the toll agency. The cutting-edge technology known as radio frequency identification (RFID) is being used to carry out this undertaking.

The technique known as radio-frequency identification (RFID) exchanges data between electronic tags affixed to an object and a terminal using electromagnetic waves in order to facilitate tracking and identification.

Readers and transponders make up an RFID system. Transponders, which are named from the terms "transmitter" and "responder," are fastened to the objects that need to be recognized. Frequently, they are referred to as "tags". RFID (Radio Frequency Identification) uses contactless reading.

The data carrier in an RFID system is an RFID tag, also known as a transponder, which is attached to the object that has to be recognized.

Typical transponders, also known as transmitters or responders, are made composed of a microchip for data storage and a coupling element for radio frequency communication, like a coiled antenna. Transponders come in two varieties: passive and active. Active transponders actively transmit an RF signal for communication while having an on-tag power source, such as a

battery.

Passive transponders either load or reflect data using the transceiver's interrogation signal as their sole source of power.

GEORGE NICHOLAS A

ARJUN M

GOWTHAM A

PRAVEEN KUMAR S

III BE ECE

TAG COUPLING AND COMMUNICATION

The electromagnetic field of the communication signal from the reader powers passive RFID tags. Because of its limited resources, a passive tag must both gather energy and interact with a reader within an approved frequency range as set by regulatory bodies. Passive tags usually use far field energy harvesting or inductive coupling to draw power from the radio signal.

Inductive coupling creates a current in its coupling element—typically a coiled antenna and a capacitor—by using the magnetic field produced by the transmission signal. The on-tag capacitor that supplies the tag's operating voltage and power is charged by the current induced in the coupling element. Thus, the behavior of inductively coupled systems is similar to that of weakly coupled transformers. As a result, inductive coupling is limited to the communication signal's near-field. The operating voltage at a distance d from the reader for a given tag is directly proportional to the flux density at that distance.

The power sensed at a distance d from a reader antenna is fundamentally limited. The reader's power transmission in a lossless medium is proportional to the inverse square of the reader antenna's distance from it in the far field. Using the same signal, a reader powers and interacts with a passive tag. There are several

difficult trade-offs when power and data are communicated over the same signal.

Semiautomatic lanes and fully automated toll collection systems are combined to form the electronic toll collection systems. As cars go by, the system gathers and stores various traffic and payment data. The various technologies are rationally connected with one another while still being adaptable to future developments. In addition, they have advanced cameras and photo technology for round-the-clock enforcement of infractions. Therefore, with the appropriate alterations, this basic design that we developed will be adaptable to future improvements in vehicle travel. RFID technology is well-established in the field of automatic identification. In the near future, the system will be affordable and devoid of obstacles.

**MOUNI SHREE H
MADHUMITHRA M
JENAT PRAICY K
MOHAMMED ASLAM A
III BE ECE**

5G TECHNOLOGY

4G is the global mobile network used for web browsing, messaging, and phone calls. There are currently plans for 5G to replace 4G. The internet may change as a result of 5G, a new, speedier network. 5G stands for "software defined network," which implies that although it won't completely replace wires, it may do away with the necessity for them by running mostly on the cloud. This implies that it will significantly increase internet speed because it will have a 100 times larger capacity than 4G. A two-hour movie, for instance, would take almost 26 hours to download over 3G, six

minutes to download over 4G, and little over three and a half hours to watch over 5G.

HARSHA VARDHAN D
VASUDEVANS V
SANTHOSH J
MADHAN KUMAR S
III BE ECE

HYPERLOOP

A high-speed passenger and freight transportation system called the Hyperloop is being considered. The three main components of a hyperloop system are tubes, pods, and terminals. The tube, which is usually a long tunnel, is a sizable sealed low-pressure system. The pod is an atmospheric pressure coach that uses magnetic propulsion (in the original design, enhanced by a ducted fan) to experience minimal air resistance or friction inside the tube. Arrivals and departures of pods are managed by the terminal.

With pods moving at extremely high speeds in a vacuum, the hyperloop system is made up of a network of tubes that connect mobility hubs all over the world. Low aerodynamic drag in the low-pressure environment guarantees energy-efficient operation. Passengers can travel in comfort and silence thanks to contactless magnetic levitation and propulsion technology. The main advantages of the hyperloop are sustainability, comfort and safety, and speed and adaptability. With pods moving at extremely high speeds in a vacuum, the hyperloop system is made up of a network of tubes that connect mobility hubs all over the world. Low aerodynamic drag in the low-pressure environment guarantees energy-efficient operation. Passengers can travel in comfort and silence thanks to contactless magnetic levitation and propulsion technology. The primary advantages of speed and flexibility, comfort and safety are all included in the Hyperloop.

**VIDHYA BHARATHI J
AMIRTHA YOHALAKSHMI A
DEEPIKA A
VIGNESH L
III BE ECE**

OLED

An innovative display device called an Organic Light Emitting Diode is created from thin layers of organic materials that produce light. A succession of organic thin films are positioned in between two conductors to create OLEDs. Applying electrical current causes a brilliant light to be released. OLED displays are currently created by evaporating gasses in a vacuum chamber, but in the future, a quick and affordable method called ink-jet printing will be able to create OLED displays. OLED displays don't need to be filtered or backlighted, making them easier to use than LCD screens. OLEDs are far more advanced than LCDs. Ultra-thin, flexible, foldable, and transparent displays are made possible by its lower power consumption, brighter brightness, faster refresh rates, improved contrast, and simpler construction.

**- MANJU J
HARINATH M
PRIYADHARSHINI A
SRIKRISHNAN P
III BE ECE**

A INTERACTIVE RESEARCH DOCUMENT AND DATA ANALYSIS **REPORT ON EXTRA-SOLAR PLANETS.**

Earth is and has been our home since our existence. But not too far in the future! Don't you think we might migrate to a new home that is probably a new star system? They will help us answer one of the most fundamental questions in science and philosophy: are we alone? Current or next generation telescopes could very well identify terrestrial planets in the liquid water habitable zones of their planets that have atmospheric spectra indicating the presence of gases that would only exist in those combinations with the presence of life. Alternatively, we may find that life is much harder to find than we expect. This'll mean either that life is rare or that we don't understand its impacts on its surroundings well enough to detect it. Whatever happens, we'll learn something profound about our place in the universe.

The goal of Exoplanet Explore is to analyze exoplanets visually using different visualization frameworks. It is a data-driven visual analysis of exoplanets.

Tech Stack:

D3.js (A Javascript Data Visualisation Library)

- VanillaJS {Just plain old Javascript}
- HTML, CSS (the skeleton and the makeup)
- Python (Heavy lifts the data and processes complex calculations)
- Pandas (A Python module to lift large data)
- Bulma (A CSS framework for fancy views) AdobeXD (A mockup making software)
- p5.js (A javascript canvas library)
- now.sh (free serverless hosting)

The exploration of space will go ahead, whether we join in it or not, and it is one of the great adventures of all time, and no nation which expects to be the leader of other nations can expect to stay behind in the race for space.

- ANANDHA KUMARAN M
AYYANAR DHANUSH K
CEBIN RAJA CS

**DHEEPAN SATHYA P
III BE ECE**

**WHOLE CLASS ATTENDANCE USING FACE DETECTION WITH
RASPBERRY PI**

Attendance is critical for both teachers and students in a learning environment. It is critical to maintain track of attendance since it reveals a student's consistency in attending classes and learning from the teachers in those subjects. In addition, the institute can keep track of students and notify parents on their children's behavior and punctuality. In some countries, students are not required to attend class, and the stipend is only awarded to pupils who pass all of the previous year's examinations with no backlogs. Therefore, the students must study on their own, or to simplify the learning process they must attend the classes.

The proposed system meets the needs of accuracy, speed, and cost effectiveness. The used algorithms, CNN, used for locating faces, and k-NN, used for the facial features classification is already proved to have an accuracy of 99.27% and have low complexity in terms of computation. Finally, in our 3 method, we integrated the CNN object detection method for detecting faces in classrooms and deep residual learning for face recognition to overcome the problems faced with the current face recognition-based solutions. And we met our goal of faster execution time, less development time, simple data collection.

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III BE ECE**

SCALABILITY ANALYSIS OF LORAWAN TECHNOLOGY

The number of Internet of Things (IoT) application domains and deployments is growing along with the IoT's ongoing expansion. Market projections supporting this increase predict that there will be 20.8 billion linked IoT devices by the end of the year, growing at a rate of 32% annually. A billion IoT endpoints by the year 2020. Certain innovative IoT applications necessitate low rate, long-range, low-cost, delay-tolerant wireless communication with little energy consumption. These kinds of such need are difficult to satisfy with conventional machine-to-machine technologies, as cellular or WPAN. New technologies called low power wide area networks (LPWANs) are made to close the gap left by conventional technology. They claim to provide connection that is suitable for large-scale, low-power, and low-cost Internet of Things installations with battery lives of up to ten years by fusing low energy consumption with long-range communication. Developed by Sem-tech, LoRaWAN is an LPWAN technology that expands upon the LoRa modulation scheme. For the majority of the world, the LoRa alliance has standardized the use of LoRa radios in unlicensed sub-GHz spectrum. Large-scale coverage with minimal infrastructure is possible with LoRaWAN networks thanks to the combination of sub-GHz propagation and LoRa modulation. These days, LoRaWAN networks are being set up.

A multitude of components make up our ns-3 LoRaWAN network modeling. Initially, an error model for the LoRa modulation for various coding rates and spreading factors (SFs) will be constructed. Second, we will provide a thorough implementation of the LoRaWAN standard in the ns-3 simulator that supports multiple gateway networks; class end devices, and a basic network server (NS). Third, we'll carry out a scalability research that focuses on how downstream traffic and verified versus unconfirmed messages affect large-scale LoRaWAN networks.

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GAS LEAKAGE & TEMPERATURE MONITORING SYSTEM

Global warming, climate change, energy imbalances, ecosystem degradation, and other problems with environmental contamination are caused by rapid urban and economic expansion. Carbon dioxide is produced as fuel burns, while methane and carbon monoxide also contribute to global warming. There were significant emissions of nitrogen oxide and sulfur dioxide. are the main causes of air pollution, along with particulate matter. The main goal of the prototype is to prevent dangerous gas leaks from taking human lives. After reading multiple articles about the Bhopal gas disaster and the Vishakhapatnam gas leak instances, we decided to develop this prototype. In order to locate the gas leak and transmit a warning, the prototype mainly relies on GPS and GSM modules.

The issue of air pollution has been brought up recently by the high pace of population expansion and urbanization. Recent increases in population and urbanization have brought attention to the problem of air pollution. As the project moves forward, we are utilizing gas, smoke, and flame to assess the air quality sensors to monitor the surroundings. When toxic gas is found, the system recognizes it, triggers the exhaust fan, rings the bell, and then alerts our neighbors and the local government. It helps to reduce the probability of mishaps. According to data, the most common type of accidents in today's modern world is fire-related ones, and their number is rising daily.

Therefore, in an effort to prevent accidents, we are creating a prototype that will use a sensor to read values, and if gas is detected, a buzzer will automatically sound and a message will be sent to the appropriate authority. If the fire gets out of control, the motor that pumps water into the fire will start in an attempt to put it out, and a message along with the location tag will be sent to the appropriate authority.

**-Gobikaa .V
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**FPGA IMPLEMENTATION OF CONGENITAL HEART DISEASES
FROM FETAL ECG**

The task of extracting the fetus's Electrocardiogram (ECG) from the mother's abdomen's ECG signal is difficult because of several artifacts. The study suggests an N-tap non-causal adaptive filter (NCAF), which updates the weight by taking into account N minus 1 reference signal and error signal samples following processing sample number n, as well as N number of previous weights. The output, $e(n)$, is produced from the mean of N number of errors using the maternal abdominal signal as the primary signal and the thorax signal as the reference input.

Using metrics like correlation coefficient (γ), peak root mean square difference (PRD), output signal to noise ratio (SNR), root mean square error (RMSE), and fetal R-peak detection accuracy (FRPDA), the filtering performance of NC-AF was assessed using the Synthetic and Daisy datasets. The NC-AF design that can be implemented on FPGA hardware is also suggested in the report. Additionally, Vivado 2019 saw the implementation of the NC-AF. The performance of the 2 FPGA is assessed in terms of power consumption, throughput, and resource usage.

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SMART LORA WAN BASED WATER QUALITY MONITORING SYSTEM

Water contamination is a severe issue that requires quick attention. The ecosystem is endangered by water pollution. An essential component of our ecology is water. Our entire ecosystem will eventually be destroyed as a result of this contamination harming the aquatic ecosystem. We can now use analog and digital sensors to monitor the water quality in real time in the current era thanks to the development of IOT. By placing the devices in overhead tanks, rivers, reservoirs, lakes, and other locations, we may gather data on the quality of the water, which aids in determining the location and source of pollution as well as the need for water treatment.

The suggested gadget will gather data on water quality parameters such as pH, turbidity, conductivity, temperature, and water level in tanks and rivers. These are the fundamental variables needed to gauge the water's quality. Because of its long range coverage, extremely low power consumption, affordability, and robust security, the IOT device employs LoRa WAN, or Long Range Wide Area Network, and LP-WAN, or Low Power Wide Area Network. With the use of a gateway, the gadget gathers data on water quality and transmits it to a cloud server, where it is accessible to us through server access.

Here, we use the LPS8 gateway to send the sensor node data to the cloud server using LoRa shield. The end device must be registered with the relevant key details when an application has been created for it using TTN, the Things Network. The device node and gateway must first be configured.

**PRABU M
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SMART WATER METRE WITH SENSOR

As can be seen, water waste poses a major concern to the planet, which is why numerous techniques have been developed to save water. The purpose of the creation of automatic taps was to increase water waste. However, it is not always advantageous, such as in home bathrooms. Our technology solves this issue by adding a delay, which causes the tap to shut off automatically after a set amount of time. It is indisputable that real-time monitoring is essential to efficient management. This is particularly crucial in this fast-paced environment. The data acquisition devices' data is supplied straight to the cell phones in this application. Their data collection module was constructed using Raspberry Pi or Arduino UNO micro-controllers rather than our NodeMCU, making their approach significantly more expensive than ours, even though they had used the Cloud platform in other recent research. However, cloud computing is used in our architecture, which offers several other benefits, such as the ability to ensure server-less architecture, ease of scalability, the ability to visualize multiple users simultaneously through mobile computing devices, the application of machine learning techniques, and efficient centralized data storage, among others.

An inexpensive, open-source Internet of Things platform called NodeMCU will be used in our data collection system. It consists of hardware built around the ESP-12 module and code that operates on the Espressif Systems ESP8266 Wi-Fi system on chip (SoC). We interfaced the NodeMCU ESP8266 Board with the YFS201 Hall Effect Water Flow Sensor. This shows the total volume and water flow rate on the serial monitor. The hardware and IoT Server were then integrated. ThingSpeak was used for the IoT server. You may submit the water flow rate and volume data to ThingSpeak Server, where it can be viewed or tracked from anywhere in the world.

It needs less assistance from people. Due to the fact that the water flow sensor and the NodeMCU were the sole devices used for recording, displaying, and examining the trends in water flow, our intelligent water meter has a low infrastructure cost. There would be a cost associated with utilizing the Cloud'

s resources for a large-scale installation.

As the information might be readily available and storable. It is possible to monitor leak detection to keep an eye on how much water is used in various households.

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