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MAGAZINE

**ELECTRONICS AND
COMMUNICATION
ENGINEERING**



Kongunadu

College of Engineering & Technology
[Autonomous]

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

About the Department:

The Department commenced in the year 2007 with an intake of 60 in the undergraduate program (B.E) Electronics and Communication Engineering. In the year 2012, the post graduate program (M.E) commenced with an intake of 18 in Applied Electronics now running the intake of 6 and the intake for the B.E program was increased to 120. The permanent affiliation has been received for (B.E) Electronics and Communication Engineering from Anna University Chennai, from the academic year 2016-2017 onwards. In addition, the department has a research center approved by Anna University, Chennai to enhance the research activities of students and faculty members. The department has been accredited by NBA during the year 2019 and has been further re-accredited during the year 2022. The department holds 18 university ranks in post graduate program. A separate laboratory “Centre for signal processing and networking” has been established exclusively for research oriented activities. The department has signed MoUs with industries and R&D Institutions. The curriculum of B.E. (Electronics and Communication Engineering under Academic Regulations 2020 is prepared in accordance with the curriculum framework of AICTE, UGC and Anna university-Chennai. Further this Outcome Based Education (OBE) is designed with Choice Based Credit and Semester System (CBCSS) enabling the learners to gain professional competency with multi- disciplinary approach catering the minimum requirement of Lead Societies like IEEE, IET, ISTE and other Professional Bodies as per the Engineering NBA.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Graduates shall exhibit the skills and knowledge required to design, develop and implement solutions for real life problems.

PEO2: Graduates shall excel in professional career, higher education and research.

PEO3: Graduates shall demonstrate professionalism, entrepreneurship, ethical behavior, communication skills and collaborative team work to adapt the emerging trends by engaging in lifelong learning

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Students shall have skills and knowledge to work and design on PCB, analog and digital systems, adhoc and sensor networks, embedded and communication systems.

PSO2: Students are able to perform and design in the simulation tools and IoT related modules.

PROGRAM OUTCOMES(POs)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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.
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.

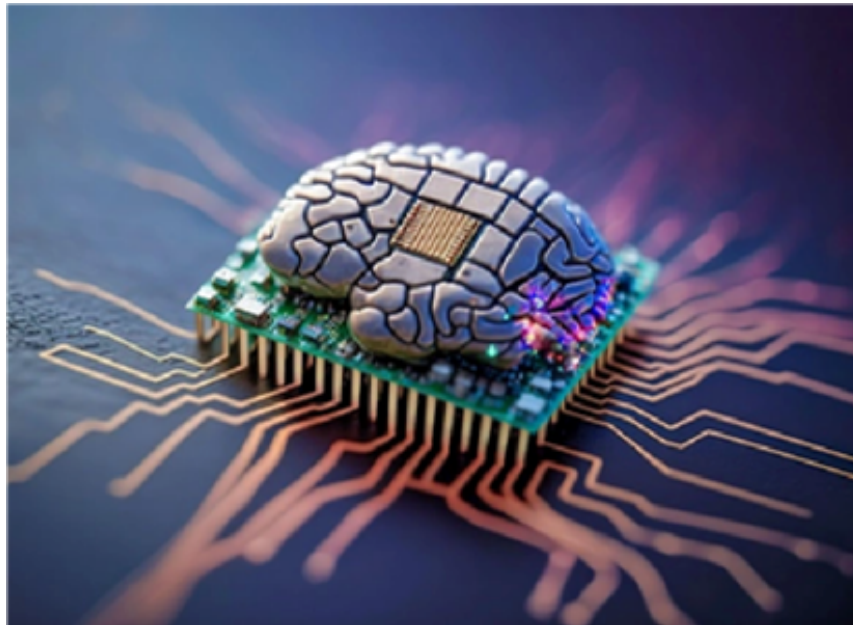
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
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.
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.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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.
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.
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.

Technical Articles

ARTICLE 1

REVOLUTIONIZING COMPUTING AN OVERVIEW OF NEUROMORPHIC TECHNOLOGY

Neuromorphic engineering is for now set apart by the inspiration it takes from the structure and operations of the brain. Neuromorphic engineering translates the brain & its function into computer systems. Work has mostly concentrated on replicating the analog nature of biological computation and the part of neurons in cognition.



The Working of Neuromorphic Computers, Hardware, Software

Neuromorphic computing works by simulating the behaviour of biological neural networks using artificial neurons and synapses. These artificial neurons are organized into layers, similar to the structure of the brain & its cortex. Information is processed in a massively parallel manner, with neurons communicating through spikes or pulses of activity.

Working of Neuromorphic computing

Neuromorphic technology seeks to mimic the structure and function of the human brain in computing system. It typically uses analog circuits to stimulate the behaviour of neurons and synapses. Neuromorphic systems can perform certain tasks, such as sensor data processing, with significantly lower energy consumption compared to traditional computers.

Neurons: Artificial neurons receive input signals, perform computations, and produce output signals. They can be modelled to exhibit various characteristics, such as firing thresholds and activation functions. **Synapses:** Connections between neurons, analogous to biological synapses, transmit signals and modulate the strength of connections. **Spiking Activity:** Neurons communicate through spikes or action potentials, which are brief electrical impulses.

HARDWARE ARCHITECTURE:

Neuromorphic hardware architectures are optimized for energy efficiency and parallel processing. They may consist of specialized chips designed to accelerate neural network simulations or implement neuromorphic algorithms directly in hardware. **Spiking Neural Network:** SNN neurons receive inputs from other neurons or external sources. Instead of continuously updating their activation values, SNN neurons accumulate input signals over time until they reach a certain threshold, at which point they generate a spike or action potential.

- IBM TrueNorth
- Intel Loihi
- SpiNNaker

SOFTWARE TECHNOLOGY:

Several software frameworks and tools are used in neuromorphic technology to design, simulate, and program neural networks on neuromorphic hardware.

- SpiNNaker Software:
- NEST:
- . Brian:
- . Nengo:



Neuromorphic technology represents a ground breaking approach to computing, drawing inspiration from the intricate workings of the human brain to create highly efficient and adaptive systems. Through the emulation of neural networks and the utilization of event-driven processing, Neuromorphic chips and algorithms offer significant advantages in terms of energy efficiency.

EV CHARGING INFRASTRUCTURE

Improvements in charging time, affordability, and convenience greatly affect the adoption of electric vehicles. Charging infrastructures that offer high-wattage and ultra-fast chargers extend a vehicle's range in only a few minutes. Additionally, technologies, like DC fast charging, reduce the crowding of charging points installed along heavy traffic corridors. Further, inductive charging equipment enables wireless charging, improving the flexibility of EV charging. Wireless energy transfer also aids the integration of vehicle-to-grid (V2G) technology at charging stations. Sensors and smart devices track charging activities to further ensure safety and optimize operational costs.



MEREDOT MAKES A WIRELESS CHARGING SYSTEM:

Latvian startup Meredot provides a wireless charging system that allows for charging at contact and over the air. Predominantly catering to electric scooters, the startup's charging pads do not require precise positioning and allow power transfer over a distance of 15 cm. The technology allows power transfer through asphalt, cement, snow, rain, or ice, enabling installations on the surface or underground. Meredot's solution thus provides a single platform for the charging of shared and private mobility companies

CARBON-ION ENABLES FAST CHARGING:

US-based startup Carbon-Ion develops an ultrafast, high-power charging system that offers improvements over commercially available supercapacitors. The system stores energy with a combination of lithium-based batteries and supercapacitors to deliver high performance. It offers high, specific power that extends the lifetime of lithium-based batteries while enabling fast charging.

THE FUTURE OF ELECTRONICS: UNLOCKING THE POWER OF MINIATURIZATION

The latest advancements in miniaturization technology are revolutionizing the electronics industry, enabling the creation of smaller, lighter, and more powerful devices. At the forefront of this innovation are cutting-edge techniques that are redefining the boundaries of what's possible.

KEY TECHNIQUES DRIVING MINIATURIZATION:

1. Ball Grid Arrays (BGAs): This technique enables massive connections between integrated circuits and printed circuit boards, boosting signal routing and processing power.
2. Wafer Level Chip Scale Packages (WLCSPs): By mass-producing micro-scale ICs on a wafer, WLCSPs enable the creation of individual IC-containing dies or chips, paving the way for even smaller devices
3. Chip-on-Board (CoB): This specialized process attaches integrated circuit chips to any substrate or board, streamlining chip integration into devices
4. Organic Transistors: Research into organic transistors holds the promise of replacing traditional transistors, unlocking even smaller device possibilities.
5. Quantum Transistors: The exploration of quantum transistors could revolutionize electronics, enabling the creation of smaller, more powerful devices that were previously unimaginable.



6. 3D Stacked Integration: This technique involves stacking multiple layers of transistors and interconnects, reducing device size and increasing performance.

TRANSFORMING INDUSTRIES :

These groundbreaking technologies are driving innovation in various fields, including:

1. Autonomous Vehicles: Miniaturization enables the creation of compact, highperformance devices that power autonomous vehicles.
2. Medical Technology: Smaller devices are improving medical diagnostics, treatment, and patient care.
3. Internet of Things (IoT): Miniaturization is fueling the growth of IoT, connecting devices and transforming industries.
4. Wearable Technology: Miniaturization has enabled the creation of compact, wearable devices that track fitness, health, and lifestyle metrics.
5. Aerospace and Defense: Miniaturization is critical for the development of compact, highperformance devices used in aerospace and defense applications.



With each passing year, devices become more compact and efficient, integrating seamlessly into our daily lives. From wearable technology that monitors our health in real-time to smart home systems that optimize energy use and enhance security, the potential applications are vast and varied. In the realm of medicine, miniaturized electronics are paving the way for advanced diagnostic tools and minimally invasive procedures, offering patients quicker recovery times and more accurate results. Similarly, in the field of communication, smaller, more powerful components are facilitating faster data transmission and improved connectivity, bringing people closer together across the globe. Moreover, the environmental impact of electronics is being addressed through innovations in sustainable materials and energy-efficient designs. As we continue to develop technologies that are not only smaller but also smarter, we are moving towards a future that is both connected and conscious of its ecological footprint.

6TH GENERATION MOBILE NETWORKS

As the world anticipates the next leap in wireless communication technology, 6G development is poised to transform the digital landscape with unprecedented speed, reliability, and connectivity. Building on the advancements of 5G, the development of 6G involves a series of sophisticated components that aim to achieve ultra-high-speed data transmission, ultra-low latency, and truly ubiquitous connectivity. Here, we explore the main components that are shaping the future of 6G.

MAIN COMPONENTS OF 6G DEVELOPMENT:

Terahertz (THz) Communication:

Utilizes frequencies in the terahertz range (0.1 - 10 THz) for ultra-high-speed data transmission up to 1 Tbps. It provides large bandwidths, supporting advanced applications like AR, VR, and holographic telepresence.

Artificial Intelligence (AI) and Machine Learning (ML):

AI and ML are integrated into 6G for network optimization, automation, and intelligent resource management. They enable predictive maintenance, dynamic spectrum management, and improved user experience.

Reconfigurable Intelligent Surfaces (RIS):

RIS involves surfaces that control electromagnetic waves to enhance signal strength, extend coverage, and reduce interference. They are useful in environments where signal penetration is challenging.



Massive MIMO and Advanced Antenna Technologies:

Expands on MIMO technology with larger antenna arrays, improving capacity, coverage, and beam forming. Supports high-frequency bands and directional communication, reducing interference.

Ultra-Reliable Low-Latency Communications (URLLC):

Ensures extremely low latency (microseconds) and high reliability for applications for autonomous vehicles, remote surgery, and other real-time operations



Key Demerits of 6G Development High Development and Deployment Costs:

Significant investment is required for research, infrastructure, and widespread deployment.

Technical Challenges:

Using terahertz frequencies poses challenges such as signal attenuation and limited range.

Energy Consumption:

Advanced technologies and high data rates may lead to increased energy use, impacting sustainability.

Complex Infrastructure Requirements:

Requires dense networks of base stations and advanced infrastructure, complicating deployment, especially in rural areas.

Privacy Concerns:

Integration of sensing with communication can raise significant data privacy and surveillance issues.

Current Implementations in 6G Technology Hexa-X Project (Europe):

Led by Nokia and European partners, focusing on AI, THz communication, and Reconfigurable Intelligent Surfaces (RIS), with early-phase research and prototypes.

SMART CITIZEN APP



Empowering Citizens, Enriching Communities

The Smart Citizen App is a revolutionary platform that empowers citizens to take an active role in shaping their community. By providing a range of innovative features and tools, the app enables citizens to engage with their community in meaningful ways, fostering a sense of belonging, social responsibility, and civic pride.

Unlocking Job Opportunities

The Smart Citizen App offers a unique job matching feature that connects citizens with employment opportunities that align with their skills, interests, and experience. This feature not only helps individuals find fulfilling work but also contributes to the economic growth and development of the community.

Collecting Organizers and Volunteers for Social Events

The app serves as a hub for collecting organizers and volunteers for social events, such as festivals, concerts, and charity events. This feature enables citizens to come together, share ideas, and collaborate on projects that benefit the community, promoting a sense of community engagement and social responsibility.

District News and Emergency Features

The Smart Citizen App keeps citizens informed about local events, news, and updates through its district news feature. In times of crisis, the app provides real-time alerts and updates, enabling citizens to take necessary precautions and stay safe. This feature is particularly useful during natural disasters, such as hurricanes, floods, or wildfires.

Community Engagement and Volunteer Opportunities

The app facilitates community engagement by providing a platform for citizens to connect with each other, share ideas, and collaborate on projects. Citizens can also discover and participate in volunteer opportunities, giving back to their community and making a positive impact.

Building a Connected and Resilient Community

The Smart Citizen App is more than just a platform – it's a catalyst for building a connected and resilient community. By leveraging the power of technology, the app enables citizens to interact with their community in new and innovative ways, fostering a sense of belonging, social responsibility, and civic pride.

Social Events and Activities

The app allows citizens to discover and participate in a wide range of social events and activities, including:

Festivals and Concerts:

Citizens can find and attend festivals and concerts that celebrate the community's diversity and creativity.

Community Meetings:

Citizens can attend community meetings to discuss local issues, share ideas, and collaborate on projects.

Emergency Preparedness and Response

The Smart Citizen App provides citizens with the tools and resources they need to prepare for and respond to emergencies. The app offers:

Real-time Alerts: Citizens receive real-time alerts and updates during emergencies, enabling them to take necessary precautions and stay safe.

Emergency Resources: Citizens can access emergency resources, such as evacuation routes, shelter locations, and emergency contact numbers.

Conclusion:

The Smart Citizen App is a powerful tool for building a connected and resilient community. By empowering citizens to engage with their community, the app fosters a sense of belonging, social responsibility, and civic pride. Whether it's finding job opportunities, volunteering for social events, the Smart Citizen App is the ultimate platform for citizens who want to make a positive impact on their community.

NON TECHNICAL ARTICAL

ARTICAL -1

DO'S & DON'T'S OF GOVERNMENT:

According to the 16 th U.S. president Abraham Lincoln, Government is defined as of the people A good government doesn't let the people to earn money but they provide all people necessities by only through the collection of taxes.



DO'S:

A Government ,

- Should impose proper taxes by analyzing its GDP
- Should take immediate actions if any silence/offense occurred
- Oppressive laws should be made to reduce wrongs & crimes
- Laws should be made equal to all the country citizens. N
- Should provide all the necessities equal to citizens without any injustice.
- Should distribute all the facilities to people without any comparison.
- There should be a direct connection between people the government

DON'TS:

A Government,

- Shouldn't support corruption for both politicians & authorities
- Shouldn't allow the private sectors
- Corporate MNC's to enter into the Government
- Shouldn't involve in commercial & trading activities
- Shouldn't give extra independence to citizens
- Should prefer people welfare instead of showing interest in any other illegal activities.

E.PRASANTH
III YEAR – ECE(B)

ARTICAL 2

PAPER BATTERY

Battery plays a vital role in almost all the electronic machines and a necessary component in all the devices. It is aidful to the people to work in the absence of electricity but there are few issues with the present of electrochemical battery.



The batteries are of two types, they are primary and secondary which are rechargeable and non-rechargeable respectively. For a limited lifespan, the batteries provide electrical energy and whereas the rechargeable batteries can be recharged by providing electrical energy to the cell but they are very expensive.

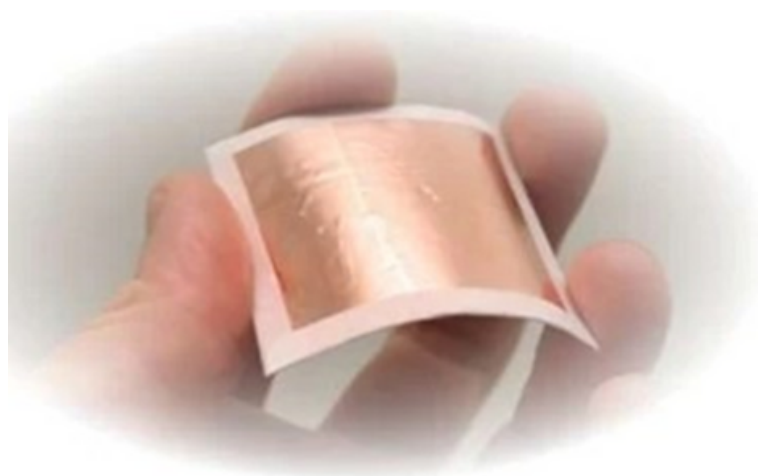
Sometimes the batteries may leak and the chemical components released by them may be dangerous. The large use of batteries may lead to toxic metal pollution.

Now, let us know in detail about the paper battery: "It is defined as pliable, extremely thin energy storing and producing device made by associating carbon nanotubes with a sheet of cellulose based paper."

The qualities of the components of paper batteries are described as the properties of paper batteries

Paper Battery = Paper Cellulose + Paper Nanotubes

The working principle of paper batteries is Once the paper of the battery is dipped in electrolytic liquid, the battery starts working when the electricity is generated by the movement of electrons from cathode terminal to anode terminal. This is due to the chemical reaction between the electrodes of paper battery and liquid.



Paper batteries have the wide range of applications in electronic equipment like laptops, mobile phones, cameras, calculators, wrist watches, speakers, Bluetooth, printed circuit boards etc. They are also used in pacemakers, artificial tissues, cosmetics, and sugar meters and in many more medicinal appliances. Automobiles and aircraft also have the need of paper batteries like in hybrid cars, charging electronic machines in satellite programs. The advantages of using paper batteries are The paper battery is degradable and also nonpoisonous because many elements are organic. They are biocompatible because if they are fixed in a human body then the human body doesn't reject it easily. As it is the cellulose based product it can be easily reused, recycled and can be recharged nearly 300 times. It has the lifespan of three years. They have very less weight, very bendable and because of this feature they can possess any shape.

“DOG LOVERS”

Everybody loves dogs, isn't it?!

That soo chubby, fluffy dogs with a beautifully wagging fluffy tails, doesn't that feel so cute?

Have you ever looked into a stray dogs eyes, that holds a trillion stories hidden within.

From the story of a angry tea master's boiling water to the story on striving for food while healing their vehicle hitten wounds :)

In my opinion a person who loves and adores a beautiful dog.. ohh ohhh wait.. i think we have no rights to call any dog as beautiful or ugly.

How could a person who adores a dog that looks clean and groomed can be addressed as a dog lover, isn't that so pointless?!

Dogs are such an amazing creatures that gives love with no expectation of getting it back!

So please, if you call yourself a dog lover kindly stop spending money on buying dogs and instead spend that for feeding stray dogs.

With a strong notion,

“Design of Mind Machine Interface (MMI) based Smart Digital Nursing Robot for Quadriplegic and Paraplegic Patients”



This project work mainly focuses on developing a smart digital nursing robot using brain computer interface technology (BCI) for people affected by hand, leg, and speech impairment. BCI technology provides a direct interface between the human brain and a computer. It acquires the brain signals and converts them into control signals. The proposed smart digital nursing robot is used for physically Quadriplegic and Paraplegic Patients to move in required direction by taking the commands based on brain signals of the person through Mind Machine Interface Technology.



And to monitor the health status like temperature, heart rate and blood pressure by sensors through Nursing Robot. The prototype is developed for Health monitoring module with emergency alert and GPS tracking. Robot has been designed and it moves in the required direction by mobile app. To move the wheelchair in the required direction based on motion by gyroscopic accelerometer. To convert brain signals into command signals, brain signals are acquired by Muse headband and EPOC Headset. The machine learning module is also developed to acquire and analyse the brain thoughts and states which has been launched as API.

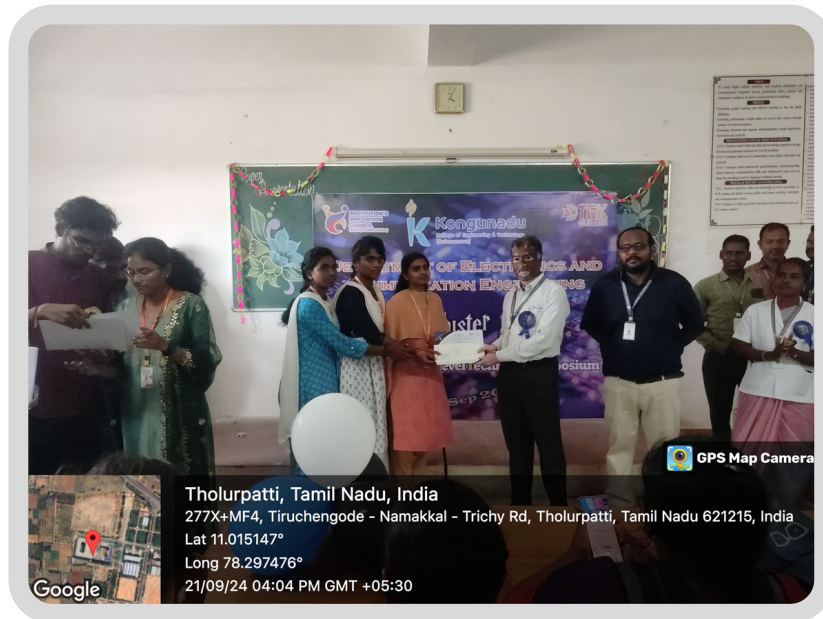
TEKCLUSTER-2K24



The Symposium TekCluster, an eagerly anticipated event, was organized by the final year Electronics and Communications Engineering (ECE) students on September 21, 2024.



The event not only highlighted the skills and creativity of the graduating students but also strengthened the bond between academia and industry, paving the way for future collaborations and career opportunities in the ever-evolving tech landscape.



This symposium served as a vibrant platform for students, industry professionals, and academics to exchange ideas, showcase innovative projects, and explore the latest advancements in the field of electronics and communications. Participants had the opportunity to attend various sessions, including keynote speeches, technical paper presentations, and interactive workshops, all designed to foster collaboration and inspire future innovations.

POSTER MAKING



M.V.DAYANITHI
IV YEAR-ECE(A)



T.HEMNATH
IV YEAR-ECE(A)



S.SANJAY SUDHAN
IV YEAR-ECE(A)



M.SUKESH
III YEAR-ECE(B)



P.PRABHAKARAN
II YEAR-ECE(B)



S.ESWAR
IV YEAR-ECE(A)



D.SAMSON
II YEAR-ECE(B)

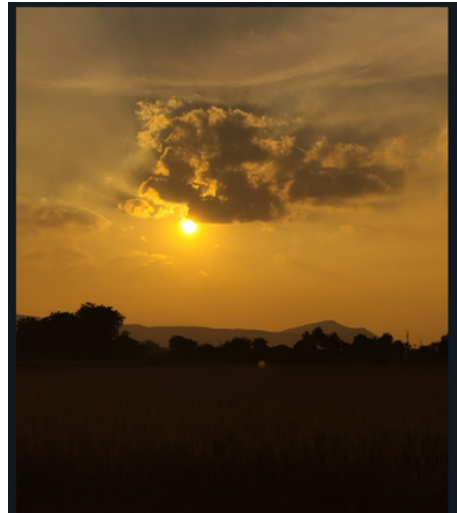


G.YOHENDRA PRAKASH
III YEAR-ECE(B)

PHOTO GALLERY



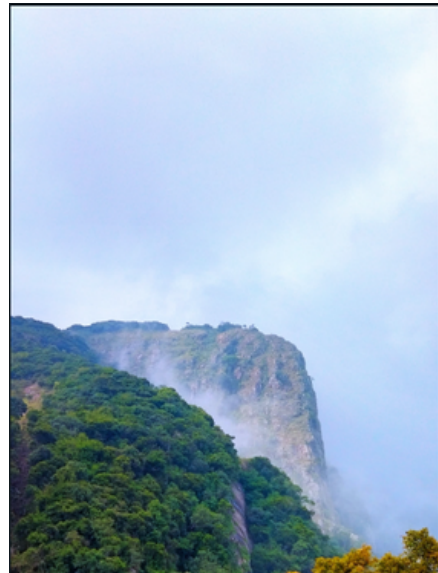
R. SRINATH
III YEAR-ECE(B)



C. NAVEEN
III YEAR-ECE(B)



B. PRATHAP
III YEAR -ECE(B)



S. SARATHI
III YEAR-ECE(B)



B. PRAVEEN
III YEAR-ECE(B)

Tour

“II ECE A”



This pic was taken in Munnar on 6th sep 2024 and we spend 7th sep 2024 in kochi .It was an amazing trip where we enjoyed the most. It was an adventure in our life we explore more and this trip was filled with happiness and joy. This pic was taken in the eco point in Munnar. This was a memorable pic in all our life. Each pic has an own story this pic has a memorable story in our life. I'm having an amazing time on this trip with my friends! The vibe is so chill, and we're all just soaking in the moments together.



Every day feels like a new adventure as we explore different places, try new foods, and share endless laughs. There's something so special about experiencing everything with the people you care about, and it's the little moments like watching a beautiful sunset or stumbling upon a hidden gem that make the trip unforgettable. I'm so grateful for the memories we're creating together, and it's amazing how much closer we've all become. This trip is definitely one for the books! I'm having an incredible time on this trip with my friends. Every day brings something new and exciting whether it's exploring vibrant streets, hiking up scenic trails, or discovering hidden spots that we never expected. We've been trying so many new foods, and it's been a blast debating which dish is the best. The laughter never stops, from funny mishaps to spontaneous dance-offs in the middle of the street.

III ECE A



The students of III-ECE organized a tour to Kerala on 06.09.2024 to 07.09.2024. The first day of the tour began with a visit to Vagamon, a serene hill station nestled amidst lush greenery. We started our day by exploring a tea factory, where we got a firsthand look at the tea production process—from plucking the tea leaves to processing and packaging. It was an enriching experience that gave insights into the world of tea-making.



Later in the day, we embarked on a thrilling jeep ride through Vagamon's rugged terrains and steep hills. This adventurous ride offered breathtaking views of the misty valleys and rolling meadows, making it an unforgettable experience for everyone.

II ECE B



Day 1: We went to Cochin and visited Chottanikkara Temple in the morning. Then we went to LuLu Mall and had lot of fun. Later that evening around the time of sunset, our destination was at Cherai beach. At the end of the day there was a wonderful DJ boating experience.

Day 2: We took our route off to Vagamon and the first destination was Pine forest followed by Jeep off road trekking which was very adventurous one then, the day and as well out trip ends with Campfire and DJ.





KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

VISION

To create highly skilled, proficient and excellent electronics and communication engineers having professional ethics, passion and competence to adapt to the latest transformations in technology

MISSION

- Promoting quality teaching and effective learning to face the global challenges.
- Enriching professionals of high caliber to excel in their in their careers through students' overall development.
- Promoting education that imparts multidisplinary design approaches, innovation and creativity.

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