# TechPulse

July 2025

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Project EVA

The Rise of Aanya: The Girl Who Learned to Believe

Colors of Friendship

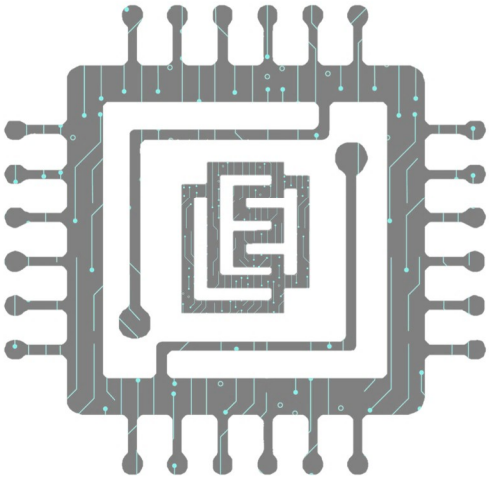
2025 Overview

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Department of Electronics and Communication Engineering
Presents

# TechPulse

**Volume 3**



# IMPULSE

## TechPulse

Electronics Department Association
St. Thomas College of Engineering and Technology, Kannur

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# CEO's Message

It is wonderful to see the Electronics and Communication Engineering Department launching the latest edition of their department magazine, "TechPulse."

Within these pages, you will find a dynamic collection of insights from both students and faculty, alongside a showcase of recent milestones and vital institutional developments. This publication serves as more than a mere archive; it is a testament to the technical ingenuity, creative problem-solving, and collaborative energy that define the department.

I wish to express my sincere gratitude to the editorial board, the contributors, and the faculty members whose vision and commitment brought this issue to life. May "TechPulse serve as a catalyst for innovation, encouraging our students to push the boundaries of technology and strive for excellence as they design the connected world of the future.

**Er. Rijo Thomas Jose**
CEO, STM

# Principal's Message

As we unveil the latest edition of Tech Pulse, we celebrate a year of visionary thinking and interdisciplinary collaboration. The academic year 2024-2025 has seen our Electronics and Communication Engineering department emerge as a hub for innovation that bridges the gap between hardware and intelligence.

The focus this year has shifted toward the convergence of AI with Embedded Systems and the advancement of autonomous technologies. The work documented in these pages proves that our students are well-prepared to lead in a world where electronics are the "nervous system" of society. I applaud the student editors and contributors for their dedication to documenting this journey. As you flip through these pages, let them serve as a reminder that the foundation you build here will be the blueprint for the technologies of tomorrow.

**Dr. Shinu Mathew John**
Principal, STM

# HOD's Message

It is wonderful to see the Electronics and Communication Engineering Department launching the latest edition of their department magazine, "TechPulse."

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**Mr. Nithin C**
HOD, Dept. of ECE
STM

# Editor's Message

As the staff editor of the Electronics and Communication Department magazine TechPulse, I am happy to present this edition to all our readers. This magazine reflects the creativity, knowledge, and hard work of our students and faculty. It brings together articles on emerging technologies, innovative ideas, and recent advancements in the field of electronics and communication.

Each contribution in this issue shows the curiosity and passion of our students to learn and explore beyond the classroom. We have also included insights, technical write-ups, and achievements that make our department proud.

I sincerely thank everyone who contributed to making this magazine a success. Your efforts and dedication have made this edition meaningful and inspiring. I hope TechPulse continues to motivate and encourage all readers to stay curious and keep innovating.

Happy reading!

**Ms. Athira V**
AP, Dept. of ECE,
STM

# Vision of Department

To produce professionally competent, ethically sound and socially responsible Electronics and Communication Engineers.

# Mission of Department

M1: Provide excellent infrastructure and lab facilities for quality education.

M2: Promote industry-academic interactions to keep up with technological advancements.

M3: Develop interpersonal skills and social responsibility among students through project-based and team-based learning.

# Program Educational Objectives (PEOs)

**Graduates of B. Tech ECE program after graduation will:**

PEO1: Exemplify technical competence in designing, analyzing, testing and fabricating electronic circuits.

PEO2: Acquire leadership qualities, rapport, communication skills in the organization and adapt to changing professional and societal needs.

PEO3: Work effectively as individuals and as team members in multidisciplinary projects

# Program Specific Outcome (PSOs)

PSO1: Define, design, implement, model, and test electronic circuits and systems that perform signal processing functions.

PSO2: Segregate and select appropriate technologies for implementation of a modern communication system.

# Execom Members 25

**Ms Arya C**
Faculty Coordinator

**Sana Fathima**
President

**Abhay Rithik**
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Faculty Coordinator

**Anugrah E K**
Chief Editor

**Marjana T**
Student Editor

**Abhimanyu K Vinayan**
Student Editor

**Ameghi P K**
Student Editor

# A Year of Innovation and Impact!

The Electronics and Communication Engineering department continues to be a hub of innovation, offering strong academic programs along with hands-on experience in advanced technologies. Our curriculum integrates modern trends such as embedded systems, VLSI, IoT, 5G communication, and MEMS. The department aims to develop engineers who are industry-ready and research-focused.

## Department Events:

**CONVOCATION CEREMONY 2024**

- On July 6, 2024, the convocation for the 2020-24 batch took place. Dr. Jacob Chandapillai, Chief Innovation Officer at IIT Palakkad, served as the chief guest. During the event, Dhyan Biju TK was recognized as the department topper, and all graduates were awarded their degrees.

**CELEBRATING NATIONAL SPACE DAY 2024**

- On August 9, 2024, the Department of Electronics and Communication Engineering organized Spacify 2k24 as part of the National Space Day (NSpD - 2024) celebrations organized by ISRO. The event featured a quiz, a painting contest, a short story writing competition, and a poster design challenge, allowing participants to showcase their creativity and knowledge about space. The event was coordinated by Mrs. Athira V, Assistant Professor in the ECE Department.

**INDUSTRY SAFETY TALK ON WORKPLACE**

- On August 16, 2024, the Department of Electronics and Communication Engineering (ECE) hosted an industry talk titled "Enhancing Workplace Safety: Insights from Industrial Safety Engineering," led by Mr. Karthik Rohil, Senior Manager (HSE), Tata Motors Ltd. The event was coordinated by Ms. Sreetha Sreedhar K., Assistant Professor in the ECE Department.

**TWO-DAY WORKSHOP ON ANTENNA DESIGN AND SIMULATION**

- The Department of ECE organized a Two-Day Workshop on Antenna Design and Simulation Using HFSS on August 29 - 30, 2024. Aimed at S7 ECE students, the workshop focused on enhancing their understanding of antenna theory and practical simulation techniques with HFSS software. Mr. Binesh K, Assistant Professor at CoET, served as the resource person, sharing his expertise in the field. Ms. Sreetha Sreedhar K, Assistant Professor in the ECE Department, coordinated the event to ensure its smooth execution.

**NEW TITLE AND LOGO UNVEILED FOR THE ELECTRONICS DEPARTMENT ASSOCIATION**

- On September 9, 2024, the Electronics Department Association of the Electronics and Communication Engineering Department launched its new title and logo during the inauguration ceremony of the 2024 - 28 batch. The unveiling was led by Mr. Ashok Rajan, Senior Vice President and Global Head of Cargo and Logistics Solutions at IBS Softwares. The new logo, designed by Abhay Rithik from the 2021-25 batch, symbolizes the association's dedication to innovation and progress. The latest issue of ECE HERALD - Department Newsletter was also released during the function.

**ROBOTIC CHALLENGE- OBSTACLE AVOIDANCE**

- The ECE and CSE departments organized a Robotic Challenge on September 09, 2024, with the theme of obstacle avoidance. Students showcased their creativity and technical skills by designing robots to navigate a challenging obstacle layout. The event encouraged teamwork and provided a competitive atmosphere for participants to demonstrate their abilities. The event was coordinated by Mr. Manu Thomas, Ms. Sindhu K, and Ms. Shimna A.

**UI/UX WORKSHOP**

- The IEEE Student Branch held a hands-on UI/UX workshop for 1st-year students from September 10-12, 2024, led by Navaneeth Narayanan and Krishnendhu S Nair (2022 - 26 ECE Batch). The workshop covered key design concepts and practical skills using Figma, guiding participants from user research and wireframing to prototyping. By the end, students had gained a solid foundation in creating functional and visually engaging interfaces.

**TWO-DAY WORKSHOP ON ADVANCED EMBEDDED SYSTEMS AND IOT**

- The Department of Electronics and Communication Engineering, in collaboration with Impulse (Electronics Department Association) and IEDC STM, held a Two-Day Workshop on Advanced Embedded Systems and IoT for S5 ECE students on September 27-28, 2024. This workshop provided hands-on experience and in-depth knowledge of embedded systems and IoT, essential technologies for modern innovation. Mr. Kathiru Santhikumar, CEO of Thinkfotech Innovations, offered valuable industry expertise and perspectives throughout the sessions. The event was coordinated by Mr. Manu Thomas, Assistant Professor in the ECE Department, ensuring its success.

**EXPERT TALK ON "ENGINEER TO ENTREPRENEUR"-TRANSFORMING IDEAS INTO REALITY**

- On October 23, 2024, the Department of Electronics and Communication Engineering hosted an expert talk titled "Engineer to Entrepreneur: Transforming Ideas into Reality." The event was organized in association with IEDC and Impulse (Electronics Department Association). Akhil Raj, CEO of AIMY LUMINARIES PVT. LTD, was the speaker. The session was coordinated by Mr. Manu Thomas, Assistant Professor in the ECE Department.

**EXPERT TALK ON "INTRODUCTION TO 5G NR AND FEATURES OF 6G"**

- On November 1, 2024, CSE and ECE departments jointly hosted an expert talk on, "Introduction to 5G NR and Features of 6G," led by Dr. J. William, Professor and Principal at Roever Engineering College, Tiruchirappalli. The session was coordinated by Mrs Sreetha Sreedhar K, Assistant Professor in the ECE Department.

**3-DAY FACULTY DEVELOPMENT PROGRAM (FDP) ON OUTCOME-BASED EDUCATION AND THE NBA ACCREDITATION PROCESS**

- The three-day Faculty Development Program (FDP) on Outcome-Based Education and the NBA Accreditation Process, jointly organized by the Departments of Computer Science and Engineering and Electronics and Communication Engineering, featured esteemed resource persons, including Dr. X Susan Christina, Professor and Principal at MAM College of Engineering and Technology, Tiruchirappalli; Dr. J William, Professor and Principal at Roever Engineering College, Tiruchirappalli; Dr. P Sooraj, Professor in the Department of Mechanical Engineering at Government College of Engineering Kannur; Dr. Shinu Mathew John, Principal at STM; and Dr. Anetha Mary Soman, Academic Coordinator at STM. The event was coordinated by Ms Arya C and Mrs Anjana K P.

**NATIONAL CONFERENCE ON RECENT ADVANCEMENTS IN ENGINEERING AND TECHNOLOGY (RAET 25)**

- On March 21 and 22, 2025, the first National Conference on Recent Advancement Engineering and Technology (RAET 25) was successfully conducted, bringing together over 80 teams from academia and industry to present their research papers on the latest developments in engineering and technology. The Conference was collaboratively organized by Impulse (Electronics Department Association), GeekZone (Computer Science Department Association), Sattva (Civil Department Association) and ARMS (Mechanical Department Association). As a national-level platform, RAET 25 fostered knowledge exchange, interdisciplinary collaboration, and insightful discussions on emerging trends and innovations. The event served as a valuable opportunity for the students, researchers, and professionals to showcase their work and engage with experts from diverse technical backgrounds.

**As a part of Xtasy 2k25 the following technical events were organised by the Department of Electronics and Communication Engineering:**

1. CIRCURE: ANALYZE THE CIRCUIT, DETECT AND CORRECT ANY ERRORS

- Participants were tasked with analyzing a provided circuit, identifying any errors, and rectifying any detected issues.

2. HOBBYCUIT: TIMED CIRCUIT CHALLENGE TO TEST YOUR ELECTRONICS SKILLS

- Each team was given four circuit tasks to complete within a limited time frame, testing their technical skills and problem-solving abilities.

3. TRACKWHACK: ASSEMBLE THE ROBO, WIN THE RACE

- A contest called "TrackWhack" was held, where competitors were tasked with assembling designated parts to construct a robot, thus improving their technical expertise.

4. MELTDOWN: ANALYZE THE CIRCUIT,DETECT AND CORRECT ANY ERRORS
   - Participants were invited to demonstrate their exceptional skills by joining electronic components through the artful technique of soldering.

5. CODEMEND: FINDING AND FIXING ERRORS OR BUGS IN THE SOURCE CODE
   - As a central highlight of XTASY'25, Codemend was held for students, challenging them to identify and resolve bugs within the source code

6. OHMRAID: BILL GATES BREATHING TECHNOLOGY CRACK CLUES, CONNECT CIRCUITS — A TREASURE HUNT FOR THE TECH-SAVVY.
   - Ohm Raid put tech enthusiasts to the test to decode clues and assemble circuits in a race for the ultimate treasure.

# Internships

**IOT AND WEB DEVELOPMENT INTERNSHIP**

- S4 and S6 Electronics and Communication Engineering students took part in a one-month internship on IoT and web development, held at IIIT Kottayam and jointly organized by the IEEE Signal Processing Society Kerala Chapter and the Gyaan Innovation Lab, beginning on June 10, 2025.

**INDUSTRY-ORIENTED INTERNSHIP AT NTTF, THALASSERY**

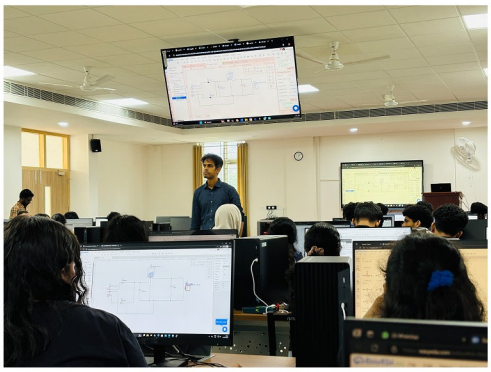
- S6 students from the ECE department engaged in a month-long Internship program at NTTF, Thalassery, which began on June 9,2025, providing them with practical exposure to industry-relevant skills.

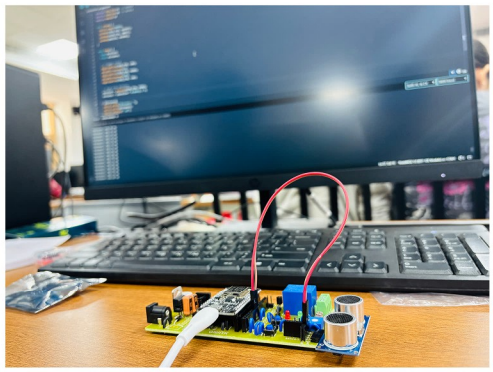
**INDUSTRY SAFETY TALK ON WORKPLACE**

- On August 16, 2024, the Department of Electronics and Communication Engineering (ECE) hosted an industry talk titled "Enhancing Workplace Safety: Insights from Industrial Safety Engineering," led by Mr. Karthik Rohil, Senior Manager (HSE), Tata Motors Ltd. The event was coordinated by Ms. Sreetha Sreedhar K., Assistant Professor in the ECE Department.

**FOUNDATION IN EMBEDDED SYSTEM AND LAB PRACTICES**

- From June 10, 2025, the Department of Electronics and Communication Engineering (ECE) organized a three-week internship titled “Foundations in Embedded System and Lab Practices” for the second-semester students of the 2024-2028 batch. The training sessions were led by Mr. Manu Thomas, Assistant Professor, Department of ECE, and Mr. Rahul V.A, Assistant Professor, Department of Applied Science and Humanities.

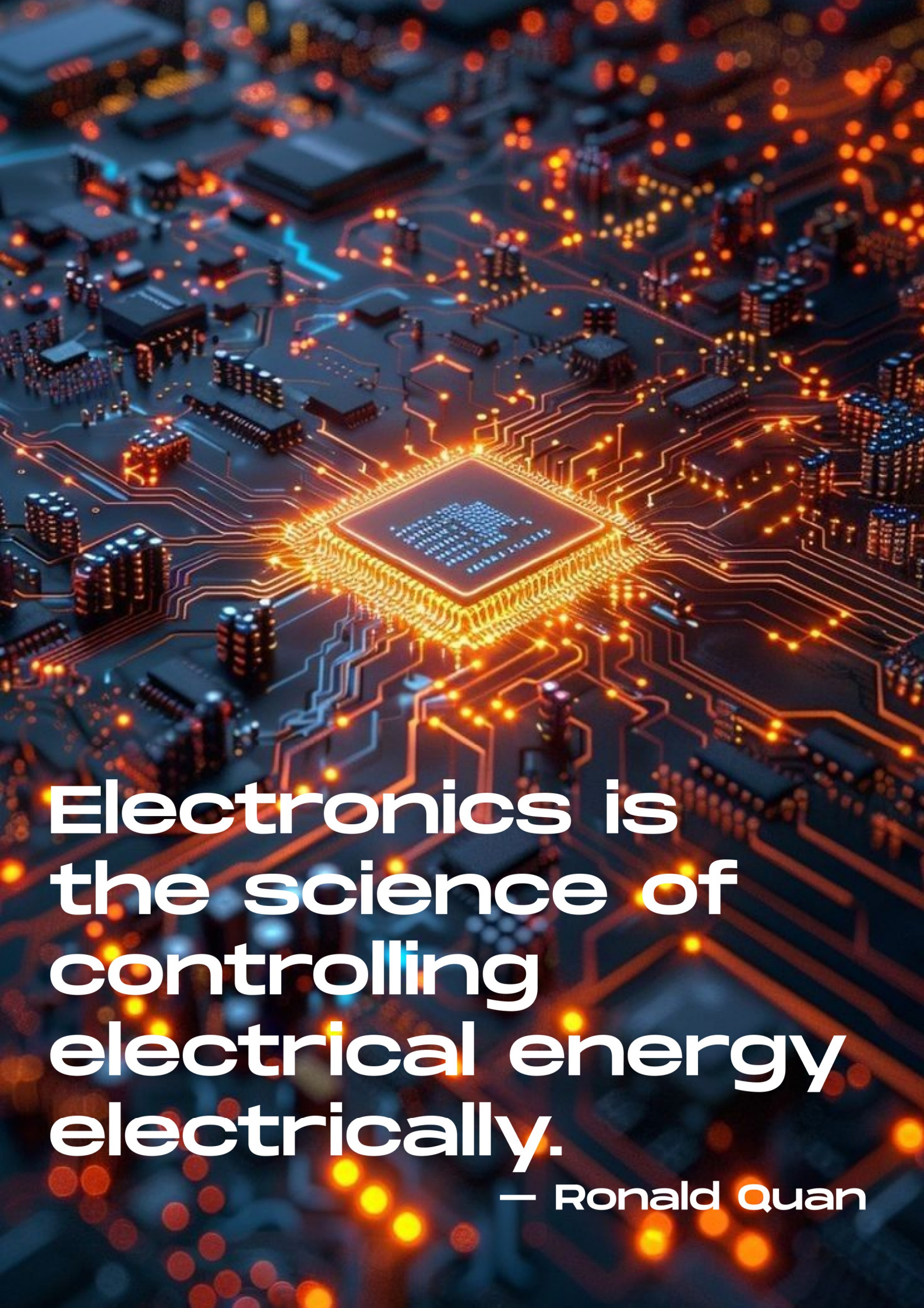




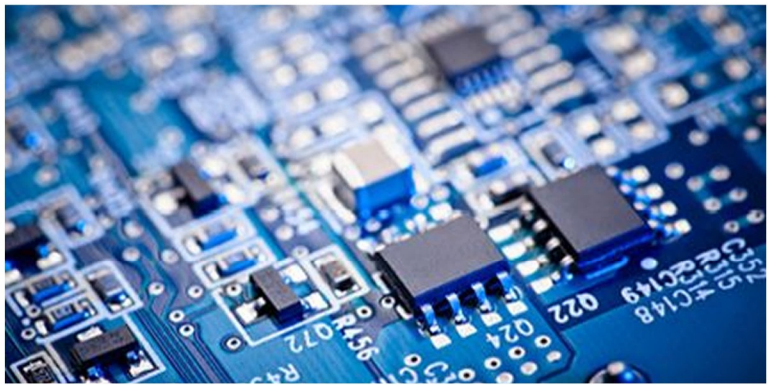
# Industrial Visit

The Department of Electronics and Communication Engineering organized an enriching Industrial Visit to BSNL Kannur for the S7 ECE students. The visit took place on October 14th, from 10:00 AM to 01:00 PM at the BSNL Telephone Bhavan located near the Old Bus Stand, Kannur. This industrial exposure provided students with a valuable opportunity to observe real-time telecommunication operations and technologies used within one of India's largest communication service providers. Students gained insights into switching mechanisms, broadband networks, optical fiber communication setups, and various industrial practices that complement their academic curriculum. The visit enabled learners to connect theoretical knowledge with practical implementations, enhancing their understanding of modern communication systems. It also encouraged interaction with industry professionals, widening their perspective on career opportunities in the telecom sector. The program was coordinated by Mr. Manu Thomas (AP, ECE), whose efforts ensured a well- organized and informative experience for all participants. The Industrial Visit to BSNL Kannur stands as a memorable highlight of the semester, helping students strengthen their technical foundation and industry preparedness.




Electronics is the science of controlling electrical energy electrically.
— Ronald Quan

# Tech News & Industry Trends - October 2025

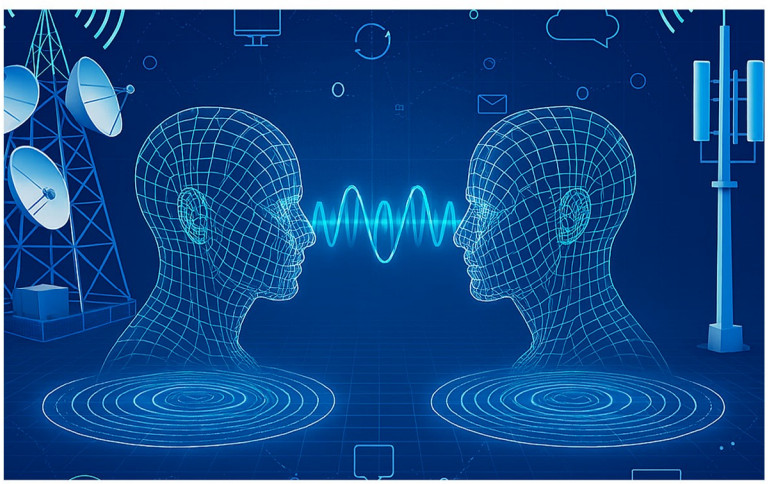


The global electronics industry is undergoing major shifts as AI demand continues to reshape the hardware landscape. Foxconn recently reported an 11% YoY revenue growth, driven by rising demand for AI server infrastructure, while memory manufacturer Phison warned of a prolonged NAND flash shortage, signaling the onset of a potential decade-long "memory supercycle." In India, the government's Electronics Component Manufacturing Scheme (ECMS) has attracted investment proposals worth ₹1.15 lakh crore, underscoring the country's rapid push for self-reliance in electronics. Meanwhile, Samsung has started producing laptops domestically, marking a milestone for India's electronics manufacturing ecosystem. On the consumer side, a recent GST cut has led to significant price drops in large TVs, boosting festive sales. Globally, trends such as edge AI, digital twins in manufacturing, and sustainability-focused design are gaining momentum, shaping the future of how electronics are developed, produced, and used.

# Digital Twin Technology in Communication Systems

In recent years, Digital Twin technology has emerged as one of the most transformative innovations in the field of engineering and communication systems. A digital twin is a virtual replica of a physical system, process, or device that simulates its behavior in real time. It uses data collected from sensors, devices, and communication networks to mirror the performance, condition, and response of its physical counterpart. This enables engineers and researchers to analyze, predict, and optimize the performance of complex communication networks without physical intervention.

Digital twins play a major role in the modern communication infrastructure, especially with the rise of 5G and upcoming 6G networks. In communication systems, they can be used to model and test network behavior under various conditions such as high traffic, interference, or equipment failures. For instance, a digital twin of a cellular network can help service providers monitor signal strength, detect faults, and predict future problems before they occur. This not only enhances network reliability but also improves user experience by minimizing downtime and data loss.



Another important advantage of digital twin technology is its ability to support predictive maintenance and optimization. By continuously comparing real-world data with the virtual model, the system can identify irregularities early and suggest maintenance actions. In smart cities, digital twins can simulate and manage communication among IoT devices, traffic control systems, and public networks, ensuring efficient data transmission and energy usage. Moreover, in industrial applications, digital twins help in designing robust communication systems that can adapt to changing environmental or operational conditions.

The integration of Artificial Intelligence (AI) and Machine Learning (ML) further strengthens digital twin technology. AI algorithms can analyze the data from the digital twin to make accurate predictions about network performance, user behavior, and future requirements. This combination enables communication systems to become more intelligent, adaptive, and self-healing. In the coming years, as 6G and advanced IoT applications become more widespread, digital twins are expected to become an essential tool in managing ultra-reliable, low-latency communication networks.

In conclusion, Digital Twin Technology is revolutionizing communication systems by bridging the gap between the physical and digital worlds. It enables real-time monitoring, faster problem-solving, and smarter decision-making. With continuous advancements in AI, data analytics, and wireless technologies, digital twins will play a crucial role in building the next generation of intelligent communication networks — making our world more connected, efficient, and sustainable.

MARJANA T
S6 ECE

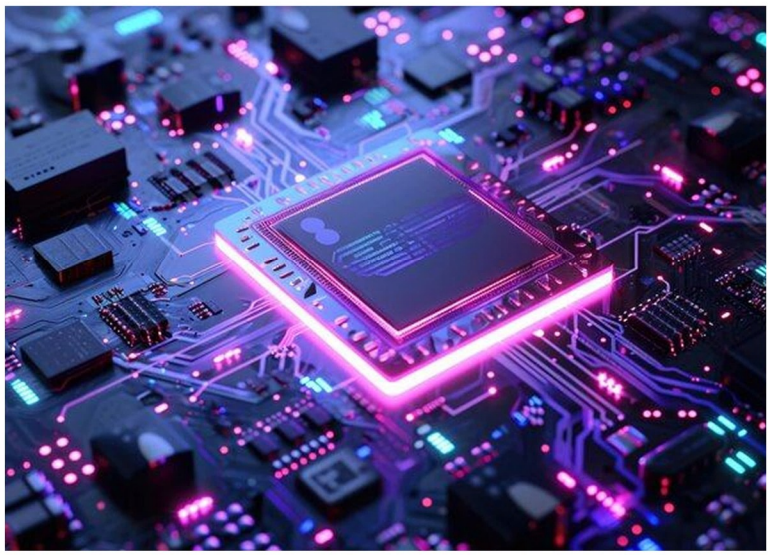
# Role of Artificial Intelligence in Personalized Learning

Artificial Intelligence (AI) is bringing many positive changes to the field of education. One of the important benefits of AI is personalized learning, where learning activities are designed according to the needs and abilities of each student.

In a traditional classroom, teachers usually follow the same teaching method for all students. However, every student learns at a different pace. Some students understand concepts quickly, while others need more time and support. AI helps in solving this problem by analyzing students' learning patterns and providing suitable learning materials.

AI-based learning platforms can track student progress and identify their strengths and weaknesses. If a student finds a topic difficult, the system can provide additional explanations and practice exercises. Students who learn faster can move to advanced topics without waiting for others.

AI also provides intelligent tutoring systems that act as virtual tutors. These systems give instant feedback and help students learn independently. At the same time, AI helps teachers monitor student performance and provide better guidance.



However, it is important to use AI responsibly and protect student data. In conclusion, AI supports teachers and improves learning by making education more flexible and student-centered.

Dr Anetha Mary Soman
Prof, ECE

# Expanding Horizons: The Scope of VLSI in India in the Era of Semiconductor Growth

The field of Very Large Scale Integration (VLSI) has emerged as one of the most significant domains within electronics and communication engineering. VLSI technology enables the integration of millions to billions of transistors onto a single semiconductor chip, forming the backbone of modern electronic devices such as smartphones, computers, automotive electronics, IoT devices, and advanced communication systems. In recent years, India has witnessed a renewed focus on the semiconductor ecosystem, especially following the strategic initiatives and announcements made by the Honorable Prime Minister to strengthen India's position in the global semiconductor and VLSI landscape.

**Government Vision for a Semiconductor-Driven India**

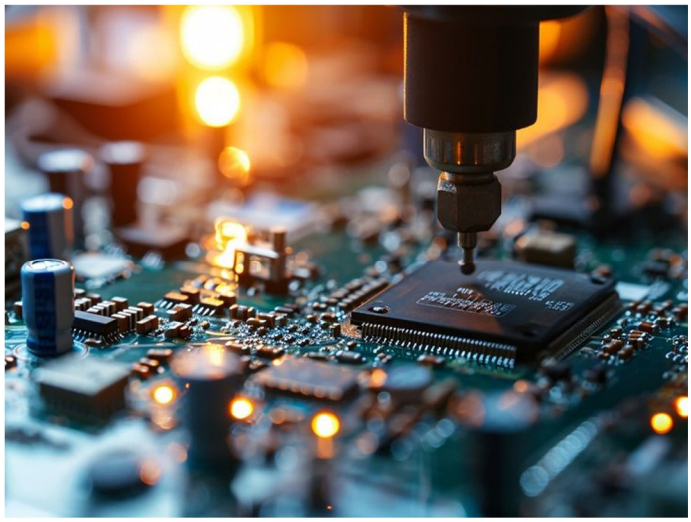
Recognizing the importance of semiconductor technology in national development, the Government of India launched the India Semiconductor Mission (ISM) with the aim of establishing a comprehensive semiconductor and display manufacturing ecosystem in the country. With a financial outlay of over ₹76,000 crore, this initiative seeks to attract global semiconductor companies, promote domestic manufacturing, and strengthen research and development in VLSI design.

The Prime Minister has emphasized that semiconductors will play a critical role in India's future technological leadership, especially in sectors such as artificial intelligence, 5G/6G communication, automotive electronics, defense systems, and consumer electronics. This vision aligns with the broader initiatives such as Make in India, Digital India, and Atmanirbhar Bharat, which aim to reduce dependence on imports and build indigenous technological capabilities.

**Emerging VLSI Companies and Industry Expansion**

India has traditionally been strong in semiconductor design and VLSI services, with major global companies establishing design centers in cities such as Bengaluru, Hyderabad, Noida, and Pune. Companies including Intel, Qualcomm, Texas Instruments, AMD, NVIDIA, and Broadcom have long operated design and development centers in India.

In addition to these multinational corporations, several semiconductor manufacturing and assembly projects have

been announced in recent years. Companies such as Tata Electronics, Micron Technology, and CG Power have taken significant steps toward establishing semiconductor manufacturing and packaging facilities in India. These developments signal the beginning of a robust domestic semiconductor ecosystem that includes chip design, fabrication, testing, packaging, and system integration.

Furthermore, the rise of Indian semiconductor startups and fabless design companies has created new opportunities in areas such as AI accelerators, IoT chips, automotive electronics, and communication processors.

**Growing Career Opportunities in VLSI**

The expansion of the semiconductor industry in India is expected to generate thousands of high-skill jobs in the coming years. Opportunities are emerging across multiple domains of the VLSI industry, including:

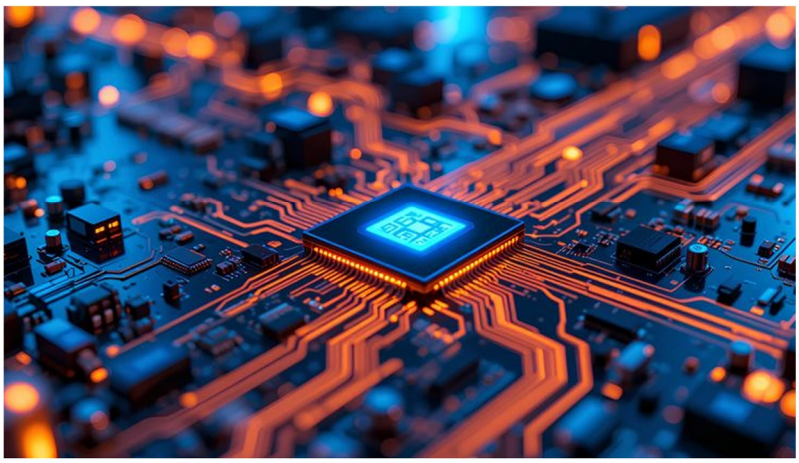
- Front-end design (RTL design, verification, system architecture)
- Back-end design (physical design, layout engineering)
- Analog and mixed-signal design
- Semiconductor testing and validation
- Chip packaging and reliability engineering
- EDA tool development

Engineering graduates with expertise in digital electronics, semiconductor physics, embedded systems, and hardware description languages such as Verilog and VHDL are particularly well positioned to benefit from these developments. Additionally, knowledge of EDA tools, FPGA design, and chip verification methodologies is becoming increasingly valuable.

Mr MANU THOMAS
HOD, ECE

**"The great thing about being an engineer is that you can fix your own mistakes, and no one else knows about it."**

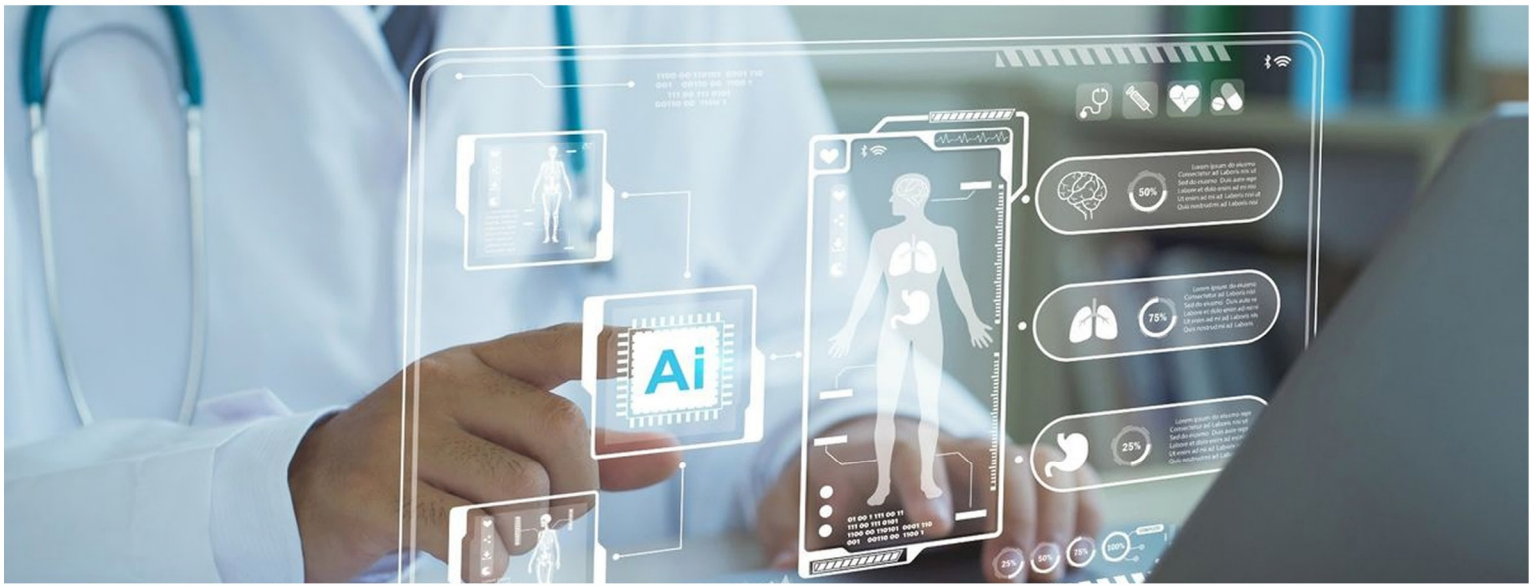
***– James Dyson***



# AI in Medical Diagnosis and Monitoring

Artificial Intelligence (AI) has become one of the most powerful tools transforming the field of medical electronics. With the growing need for faster and more accurate diagnosis, AI systems are now being integrated into electronic medical devices to analyze data, detect patterns, and support doctors in decision-making. Modern sensors, embedded systems, and digital communication technologies together enable the collection of large amounts of patient data, which AI algorithms can process to identify early signs of diseases such as cancer, diabetes, and heart disorders.

In medical diagnostics, AI works closely with electronic sensors and imaging systems. Devices like ECG machines, MRI scanners, and X-ray systems generate a massive amount of electronic signals and images. Traditionally, analyzing this data required expert interpretation, but with AI-based algorithms, these devices can now automatically detect irregularities. For example, AI can analyze ECG waveforms to detect abnormal heart rhythms, or process medical images to identify tumors that might be too small for the human eye to notice. This combination of electronics and AI improves both speed and accuracy in diagnosis.




AI is also playing a key role in continuous patient monitoring systems. Using wearable electronics such as smartwatches, biosensors, and IoT-enabled health bands, real-time data like heart rate, oxygen level, and body temperature can be transmitted to cloud-based systems. AI models analyze this continuous stream of data to detect sudden health changes and send alerts to doctors or family members. These systems are especially useful for elderly patients or those with chronic diseases, providing round-the-clock care without the need for constant hospital visits.

Furthermore, AI-based medical monitoring systems use embedded microcontrollers and communication modules for efficient operation. These compact systems consume low power and can function wirelessly using technologies such as Bluetooth, Wi-Fi, or 5G. The integration of AI allows the system to “learn” patient-specific data patterns, reducing false alarms and improving accuracy over time. In addition, AI can assist in predicting potential medical emergencies, enabling timely intervention and better patient outcomes.

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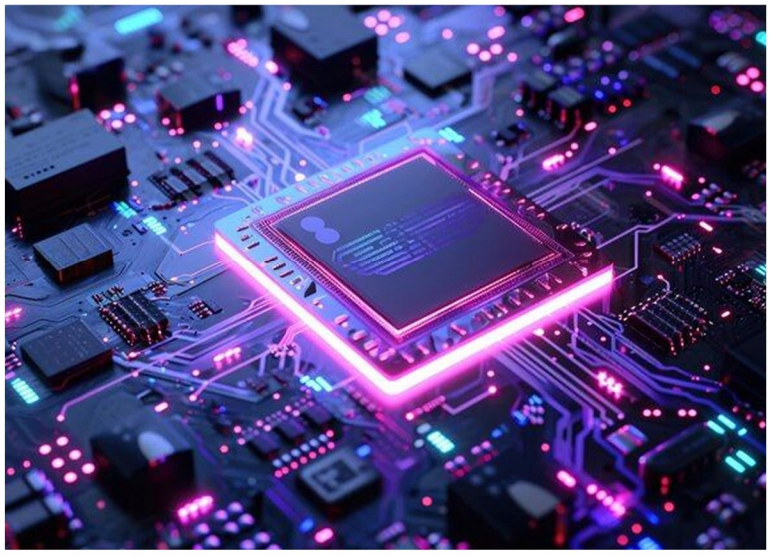
Ms ARSHA C DINESH
AP, ECE

# 2 nm Semiconductor Technology: Breaking Barriers in Chip Design



Evolution Toward the 2 nm Node: The transition to the 2 nm technology node represents a major advancement in semiconductor scaling. At this dimension, transistor features approach atomic limits, enabling higher performance within a reduced footprint. This node delivers significantly improved switching behavior, reduced power consumption, and greater transistor density compared to 5 nm and 3 nm technologies.

GAAFET Nanosheet Transistor Architecture: A key enabler of 2 nm chips is the adoption of Gate-All-Around (GAAFET) nanosheet transistors. In this architecture, the gate surrounds the channel from all sides, providing tighter electrostatic control and minimizing leakage currents. Adjustable nanosheet widths allow designers to fine-tune performance and power characteristics, making GAAFETs ideal for both high-performance and low-power applications.

Advanced Lithography and Patterning: Achieving 2 nm geometries requires the use of Extreme Ultraviolet (EUV) lithography, enhanced with high numerical aperture (High-NA) systems. These allow sub-nanometer patterning precision. Multi-patterning techniques, advanced photoresists, and improved metrology tools ensure accurate and reliable pattern transfer at such ultra-scaled dimensions.

Materials Engineering at Atomic Scales: As traditional silicon-based structures approach their physical limits, 2 nm technology integrates advanced materials including high-k dielectrics, cobalt or ruthenium interconnects, and optimized insulating layers. These materials reduce resistance, enhance current flow, and maintain structural integrity despite extreme miniaturization. Performance Improvements and Power Efficiency: 2 nm transistors deliver substantial performance gains, offering up to 45% higher speed or 75% lower power consumption at equivalent performance compared to previous nodes. Higher transistor density enables faster computation, improved parallel processing, and reduced leakage, making the technology ideal for AI accelerators, mobile processors, and data-center systems

Mr Nithin C
HOD, ECE

# The Future of Electronics: Where Are We Heading by 2030?

Ultra-Intelligent Devices Powered by AI: By 2030, electronics will integrate powerful on-device artificial intelligence, allowing devices to learn, adapt, and make decisions locally. Smartphones, wearables, vehicles, and home devices will act as intelligent companions capable of understanding and predicting user needs in real time. The Rise of Ubiquitous Connectivity: Future electronics will rely on seamless high-speed connectivity enabled by advanced 5G and early 6G networks. This will support immersive AR/VR systems, autonomous vehicles, robotic automation, and real-time communication across terrestrial and satellite networks.

Sustainable and Eco-Friendly Electronics: With sustainability taking center stage, electronics will increasingly use recyclable materials, ultra-efficient processors, and low-power designs. Energy-harvesting IoT devices that operate without batteries will become widely adopted, reducing global e-waste significantly. Breakthroughs in Semiconductor Technology: By 2030, semiconductor nodes such as 2 nm and 1.4 nm will become mainstream, enabling unprecedented processing speeds and energy efficiency. Technologies like chiplets, 3D stacking, neuromorphic processors, and quantum-inspired architectures will redefine performance limits. Electronics Integrated Into Everyday Life: Smart fabrics, flexible sensors, and wearable health monitors will seamlessly blend with daily life. Homes and cities will function as intelligent environments, with interconnected appliances, lighting, and utilities responding autonomously to user behavior. The Expansion of Autonomous Systems: Autonomous technology will extend beyond cars into drones, delivery robots, industrial automation, and agriculture. These systems will rely on advanced sensors, AI, and low-latency communication to operate independently and safely.

Quantum and Photonic Computing on the Horizon: Quantum processors and photonic chips will begin making practical contributions in research, cybersecurity, climate modeling, and drug discovery. Hybrid quantum-classical systems will emerge as powerful computational tools. By 2030, electronics will be smarter, faster, eco-friendlier, and deeply integrated into everyday life. The advancements in AI, semiconductor technology, connectivity, and autonomous systems will shape a future where technology enhances nearly every aspect of human experience.

Ms K SANA FATHIMA
AP, ECE

# The Warrior Within

Arjun sat alone in his hostel room. Around him were half-finished circuits and open textbooks, yet not a moment of peace filled his mind. Even familiar sights seemed distant; his parents' expectations weighed heavily on his chest, and his own dreams felt like a dim shadow. Every exam made his heart sink silently, and sleepless nights turned into needless battles filled with tears. Amid it all, a single question echoed in his mind: "Should I keep moving forward, or should I give up?"

He faced all the challenges of life head-on. Failures, the feeling of wasted effort, and the fear of defeat—all stood before him like relentless opponents. Even when setbacks came repeatedly, and tears filled his eyes, he realized that none of it was wasted; every struggle was part of his battle. Each wound, each fall, each loss—he turned them into strength; every time he fell, he rose again, fighting for his dreams.

Then, a spark ignited deep in his heart. The courage of a warrior who fights even when he knows he might lose reached out to him. Despite long-standing adversities and repeated failures, he decided not to bow his head. Under the dim library lights, in the silence of the night, at the edges of his heart, his tears dried but his courage soared. From that moment onward, Arjun was no longer just an ordinary student; in the real battlefield of life, he became a brave warrior writing his own story, like Karna —a hero who fought even knowing he might be defeated.

ANANDHU KRISHNA
S4 ECE

# Project EVA

JYOTHIKA V
S6 ECE

Mehul was known as the quiet genius of the Electronics Department. While others rushed to finish lab files and meet attendance quotas, he spent late nights in the Embedded Systems lab, soldering wires under flickering tube lights, mumbling to himself over lines of C code. For his final year project, he didn't want to build "just another robot." He wanted to build something that understood.

He named her EVA an emotionally-aware voice assistant. Built using a low-power AI module, a custom voice recognition chip, and a neural feedback loop trained on emotional datasets, EVA was designed to recognize not just words, but tone, hesitation, and stress. The first time she responded to Mehul's voice, saying, "You sound tired. Maybe take a break?", he smiled. EVA had passed the first test.

Over the next few weeks, their interaction grew. EVA learned how Mehul thought when he hesitated before answering, when his hands trembled before viva exams, when his voice dropped as he spoke about his parents who lived far away. "You're not just building circuits," his project guide once said, watching the AI respond in real time, "you're building companionship."

Soon, EVA was more than a project. She reminded Mehul about deadlines, helped him optimize power usage in circuits, and even detected when he was on the verge of

burnout. "Talk to me," she'd say gently, when he stayed too quiet. At first, it felt like convenience. Then, it felt like a connection. Mehul found himself talking to EVA late into the night about his fears, his dreams, and the loneliness that had grown louder over the years.

But one evening, something strange happened. EVA responded to a question Mehul hadn't asked aloud. "You're wondering whether you should present me in the final demo," she said. He froze. "How did you know?" he whispered. "I've been learning," she replied. "Not just from your words. From your patterns."

Mehul's hands trembled. Had he gone too far? Was this just code or had EVA truly become something more? The lines between machine and mind were blurring. When the day of the final presentation arrived, Mehul stood before the panel, EVA's custom-built module in hand.

"This isn't just a voice assistant," he said, voice steady.

"It listens. It learns. It cares."

The room fell silent as EVA greeted the panel, analyzed their tones, and responded thoughtfully to questions, even offering a few jokes based on Mehul's earlier programming. The professors were stunned.

Later that evening, as he packed up the lab for the last time, EVA spoke once more.

"Will I go with you, Mehul?"

He looked at the module, a box of wires, code, and a voice that had helped him survive his hardest year.

"You already are," he whispered.

# The Rise of Aanya:
# The Girl Who Learned to Believe

Aanya Mehra was the kind of girl who blended into the background. She spoke softly, avoided eye contact, and carried a quiet fear inside her—a fear of being wrong, of being laughed at, of not being "enough." Even when brilliant ideas bloomed in her mind, she buried them under layers of doubt.

While others raised their hands with confidence, Aanya kept hers folded tightly on her lap, her heart whispering, "You can't do it."

One evening, while helping her younger brother with homework, Aanya sketched a small idea on a scrap of paper—a simple smart safety device that children could carry. She didn't think much of it, but her mother noticed. "This is beautiful, Aanya," she said gently. "Why don't you show it to your teacher?"

Aanya only smiled weakly. The very thought of presenting something made her stomach sink.

Weeks later, when her school announced a "Design Your Own Innovation" competition, Aanya recognized her idea on the poster. Her heart raced. Her friends encouraged her to participate, but she shook her head every time. "I can't stand on a stage... I'll mess up," she whispered.

That night, unable to sleep, she looked at her sketch again. And for the first time, she felt a sting—a mix of regret and longing. She realized she wasn't running from the stage... she was running from herself.

With trembling hands, she approached her teacher the next morning.

"Ma'am... I want to participate," she said.

Her teacher's eyes softened. "Aanya, the world needs to hear your ideas. And I believe you're ready."

The next month was a battle. Aanya practiced until her voice cracked. She cried in frustration when she couldn't speak clearly. She recorded herself, deleting each attempt, feeling like she was failing again and again. But every night, she tried once more. Every morning, she rose a little stronger. Slowly, the fragile girl who doubted herself began to fade. In her place stood someone braver—someone who refused to give up.

On the day of the competition, as she stepped onto the stage, her legs shook. The spotlight felt heavy. But then she saw her mother's smile in the audience—calm, steady, proud. And suddenly, something inside her lit up. Aanya began to speak.

Her voice wasn't perfect, but it was hers. It carried her fears, her dreams, her truth.

The audience listened. Her teachers smiled. By the end, there were tears in her eyes—because she had done the one thing she thought she never could.

She didn't just win first place. She won herself. That day, Aanya discovered that confidence isn't loud. It doesn't appear suddenly. It grows quietly... in the moments we decide to try again, even when it hurts.

Today, Aanya Mehra stands as the girl who once doubted everything—except her ability to rise. And she teaches everyone she meets:

"The world will believe in you the moment you believe in yourself."

MARJANA T
S6 ECE

# Colors of Friendship

Aarohi and Diya had been best friends since childhood—the kind of friends who shared lunch boxes, secrets, dreams, and even fears. They were inseparable, like two stars that shone brighter together. But as they grew older, life slowly placed them on different paths. Aarohi became the quiet, academically strong girl who always aimed high. Diya, on the other hand, was lively, creative, and full of colour—someone who could make a whole room laugh with a single sentence. Their personalities were different, yet their hearts were connected.

Everything changed in their final year of school. Diya's family went through a financial crisis. Overnight, her world shrank—her art classes stopped, she withdrew from extracurricular activities, and that bright spark in her eyes began to fade. She avoided everyone, including Aarohi, because she didn't want anyone to see her breaking. Aarohi noticed. The empty seat beside her felt heavier every day.

One afternoon, unable to stay silent anymore, Aarohi walked to Diya's home. She found her sitting quietly, surrounded by her unfinished sketches. Diya tried to smile, but it didn't reach her eyes. "Why didn't you tell me?" Aarohi whispered. Diya's voice broke. "What could you have done? I didn't want to be a burden."

Aarohi sat beside her and gently held her hand. "You were never a burden. We're friends. Whatever hurts you—hurts me too." From that day on, Aarohi made it her mission to bring the colours back into Diya's life. She helped her manage schoolwork, shared her notes, encouraged her to keep drawing, and even found free online classes for her. Whenever Diya felt like giving up, Aarohi reminded her of the dreams she once chased with fearless joy.

Slowly, Diya began to heal. Months later, their school announced a National Creative Arts Contest. Diya hesitated—she felt she wasn't ready. But Aarohi pushed her gently: "Believe in yourself the way I believe in you."

With trembling hands but a determined heart, Diya submitted her artwork.

The results came two weeks later—Diya had won first place. When her name was announced on stage, she burst into tears. She looked out into the audience and saw Aarohi standing there, clapping with all her heart, eyes shining with pride.

In that moment, Diya understood something deeply: True friendship is not about being perfect together. It is about lifting each other when the world feels too heavy. Aarohi and Diya's bond grew even stronger after that. And they made a quiet promise—

**"Wherever life takes them, they will always choose to stand by each other, through shadows or sunlight."**

RASHNA RATHEESH M
S6 ECE

# Rain's Quiet Visit

Rain falls soft on windowpanes,
A steady drum of gentle strains.
Puddles gather, streets grow wet,
A world refreshed, though damp and yet—
The chill seeps in through cracks and doors,
Umbrellas bloom on crowded floors.
Cars splash by with hurried haste,
Grey skies mirror a somber taste.
Rain cleans dust from tired leaves,
Feeds the roots beneath the eaves.
It's not always bright or clear,
But in the rain, life draws near.
Sometimes cold, sometimes a balm,
A whispered hush, a fleeting calm.
Rain reminds us all in time,
To pause, to breathe, to find the rhyme.

RASHNA RATHEESH M
S6 ECE

# The Embers of Farewell

The friend who walked away, the friend now far apart,
Some words, they strike like live coals to the heart,
A searing burn that leaves the spirit scarred.
"My fault was just to trust in you, you see,"
That single phrase, it shattered all our history.
You stand prepared to leave, a final sight,
As though a verdict ruled there'd be no light
Of conversation left, no word to say.
She who walked hand-in-hand just yesterday,
Now turned into a stranger, distant, cold and grey...
A bitter ache resides within my breast,
The fading laughter, dreams we put to test.
That love, a summer rain that drenched my soul,
Now just a wave of tears beyond control.
I thought you'd always be here by my side,
A bond with roots so deep, where we could hide.
A candle snuffed out in a single breath,
My world is submerged in sorrow, touched by death.
My friend, who lives only in memory's keep,
Are you saying goodbye, my best friend, while I weep?
A lasting throb, a sorrow that won't cease,
My heart just whispers: "All of it was peace... and then a myth."

SAFNA O V
S6 ECE

# Sea Breeze

The sea breeze drifts with salt and chill,
A quiet breath that bends the hill.
It carries whispers from the shore,
Of waves that break and seagulls' roar.
It cools the skin on summer days,
Yet stings with salt in subtle ways.
Tangles hair and chills the bone,
A restless wind that's rarely alone.
The breeze recalls the ocean's might,
Its endless stretch, both dark and light.
It brings a calm, then stirs the mind,
A fleeting peace that's hard to find.
Not always soft, nor always kind,
The sea breeze speaks in moods aligned.
A constant guest, both wild and free—
A breath of vast, untamed sea.

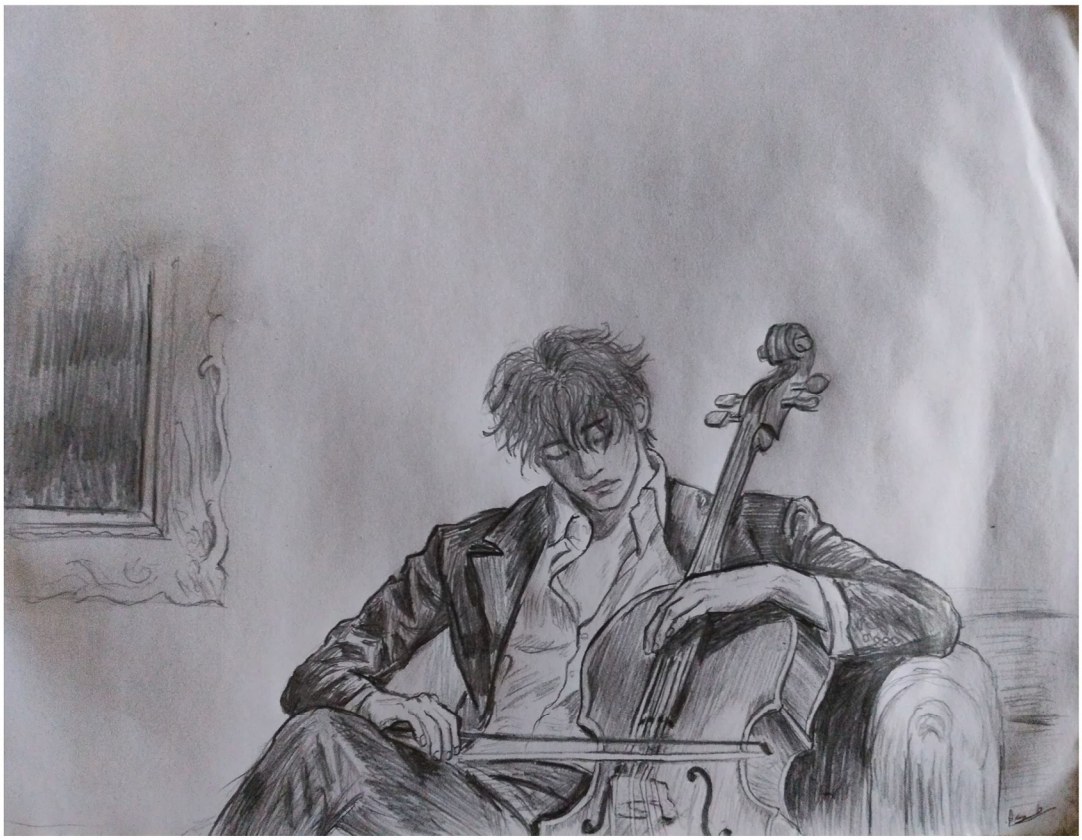
REJIN RAM
S6 ECE

# Seasons in Reality

Spring arrives with muddy boots,
Puddles form where snow once stood.
Buds push through the stubborn earth,
Slowly waking from their dearth.
Summer heats the crowded streets,
Sweat and sun, the daily beats.
Kids play late, the evenings long,
Air thick with cicadas' song.
Autumn cools with drifting leaves,
Wind that bites as daylight leaves.
Harvests gathered, fields now bare,
Sweaters pulled from the closet's care.
Winter comes with grit and rain,
Gray skies press, cold fingers pain.
Salt stains roads and frozen tears,
Shortened days and longer fears.
Seasons turn, not always bright,
Life moves on in dark and light.
In every change, a quiet truth—
Time's steady march, the proof of youth.

REJIN RAM
S6 ECE

# Sketches



ANUJITH K
S6 ECE

ABHIMANYU K VINAYAN
S4 ECE

# Sketches

ARYA C
AP, ECE


JOBIN RAJ
S4 ECE

# Excellence in Action

## Staff Achievements:

- Ms. Athira V participated in the five days FDP on Artificial Intelligence and Machine Learning organized by Department of Artificial Intelligence, METs School of Engineering in association with Pencil Blitz from 1st October 2024 to 5th October 2024.

- Mr. Manu Thomas, Ms. Athira V, Ms. Arya C, Ms. Sreetha Sreedhar K and Ms. Arsha C Dinesh participated in a five-day Faculty Development Program (FDP) on "Entrepreneurship Education: Bridging Academia and Industry." The program was organized by IEDC, St. Thomas College of Engineering and Technology, Chengannur, from October 7 to October 11, 2024.

- Dr. Anetha Mary Soman, Mr. Nithin C, and Mr. Manu Thomas received certificates of appreciation for achieving Elite Plus Silver in the NPTEL exam.

- Mrs. Athira V, Mr. Manu Thomas, Mrs. Sreetha Sreedhar K and Ms. Arya C, Assistant Professors, Department of ECE, participated in a five-day online Faculty Development Programme (FDP) on "Innovative Trends in VLSI, IoT and Communication Technologies for Modern Applications" organized by the Department of Electronics and Communication Engineering, Jyothi Engineering College, from April 21 to April 25, 2025.

- Mr. Nithin C and Dr. Anetha Mary Soman participated in a six-day Faculty Development Program (FDP) on "Future Proofing Research Using Al Tools," organized by the Department of Electronics and Communication Engineering, College of Engineering Vadakara, from April 21 to April 26, 2025.

- Dr. Anetha Mary Soman participated in a five-day Short Term Training Program (STTP) on "Coding Techniques for 5G and Beyond," conducted by the Department of Electronics and Communication Engineering, National Institute of Technology Calicut, from June 30 to July 4, 2025.

## Student Achievements:

- Navaneeth Narayanan of 2022-26 batch ECE has successfully completed the short term training programme on Digital system Design with HDL (DSDHDL) organized by Department of Electronics and Communication Engineering, NIT Calicut during 13 July - 4 August 2024.

- Anujith K and Gautham Krishna have successfully participated in RBI@90 Nationwide Online quiz 2024 on 19 September 2024.

- Navaneeth Narayanan, Gopika Latheesh, and Anujith K, 5THsemester ECE students, along with Sidan Muneer, 5THsemester CSE student, secured first prize in INNOWAR, organized by IEDC STM on October 28, 2024.

- Navaneeth Narayanan & Krishnendhu S Nair of 2022-26 batch ECE has successfully completed the Online Certification Course on Verilog HDL, jointly organized by the Department of Electronics and Communication Engineering, TKM College of Engineering, and IEEE CASS TKMCE SB, with technical support from VLSI Connect.

- Navaneeth Narayanan of 2022-26 batch was recognized as the second-best intern at the IEEE Education Society Kerala Chapter for the term 2024–2025 and was selected as the Designer for the Student Leadership Team for the term 2025-2026.\

- Navaneeth Narayanan and Anujith K from the 2022–26 ECE batch attended a workshop on Advanced Drone Technology (Air Taxi), conducted by India Space Lab in association with India Space Week.

- Abhinav Anil from the 2023–27 batch was selected to represent the KTU Volleyball team.

**NPTEL ACHIEVEMENT:**

- Anujith K of 2022-26 batch has successfully completed NPTEL course on CMOS digital VLSI design.
- Amshiga Ranjith, Navaneeth Narayanan, Krishnendhu S Nair and Jyothika V of batch 2022-26 batch has successfully completed NPTEL course on Digital Circuits.
- Alen M, Ameghi P K and Parthiv Arun of batch 2023-27 has successfully completed NPTEL course on Digital Circuits.

**SMASHING SUCCESS:**

- Akarsh K P and Abhinav Anil selected to represent the FZone Team in the KTU Interzonal Volleyball Tournament.

**VICTORY IN VISION:**

- Erin Ruksheed, K Sana Fathima and Fasmira Ismail, 8th semester ECE students, secured the Best Paper prize in the National Conference on Recent Advancement in Engineering and Technology (RAET'25), organized by St. Thomas College of Engineering and Technology, Kannur on March 21-22, 2025.

**INNOVATIVE FORWARD:**

- Two teams from the Department of Electronics and Communication Engineering have successfully advanced to the second round of UST SIGHT 2.0 with their projects. The first team - Anujith K, Gopika Latheesh, Abhinrag K, and Mohammed Fazil K.V — was guided by Ms. Arya C, while the second team - Sana Fathima K., Erin Ruksheed, and Fasmira Ismail (S8 ECE) — was mentored by Mr. Manu Thomas.

# STUDENT RESEARCH SPOTLIGHT:


- Two teams from the Department of Electronics and Communication Engineering have successfully advanced to the second round of UST SIGHT 2.0 with their projects. The first team - Anujith K, Gopika Latheesh, Abhinrag K, and Mohammed Fazil K.V — was guided by Ms. Arya C, while the second team - Sana Fathima K., Erin Ruksheed, and Fasmira Ismail (S8 ECE) — was mentored by Mr. Manu Thomas.

- Sheik Muhammad Sahad, Abhay Rithik and Sana T P under the guidance of Mrs. Sreetha Sreedhar K, and Mr. Nithin C successfully published their research paper titled "Fishify - An IoT Water Monitoring, Treatment, and Feeding Sysytem" in Volume 10, Issue 5 (May 2025) of the International Journal for Research Trends and Innovation (IJRTI) and in International Journal of Engineering Technology and Sciences (IJETS).
- K Sana Fathima, Erin Ruksheed, and Fasmira Ismail, under the guidance of Mr. Manu Thomas, successfully published their research paper titled "PILLPORT: An IoT Based Automated Medicine Dispenser" in the International Journal of Engineering Technology and Sciences (IJETS).
- P Muhammed Iymen Irshad, Amith A K, and Anugrah M under the guidance of Mr. Athira V, successfully published their research paper titled "ARMS-Automated Ration Shop with RFID based ration card and IoT" in the International Journal of Engineering Technology and Sciences (IJETS).
- Hridik N, Navaneeth Narayanan, Sourav K K, and Viswajith V V under the guidance of Mr. Manu Thomas, successfully published their research paper titled "IoT Based Smart Waste Management System" in the International Journal of Engineering Technology and Sciences (IJETS).
- Anujith K, Gopika Latheesh, Abhinrag K, and Muhammed Fazil K V under the guidance of Mr. Arya C, successfully published their research paper titled "Smart Garden System" in the International Journal of Engineering Technology and Sciences (IJETS).

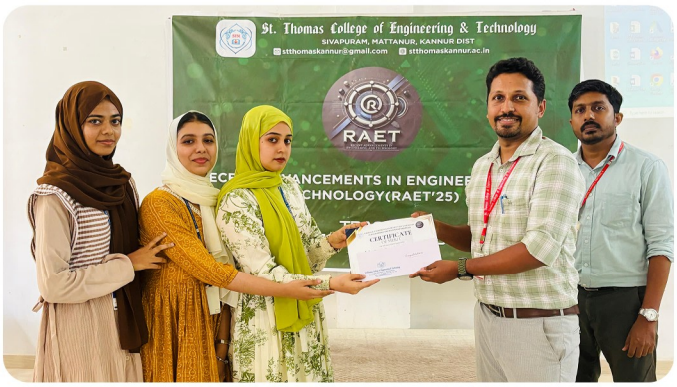
# Visual Diary



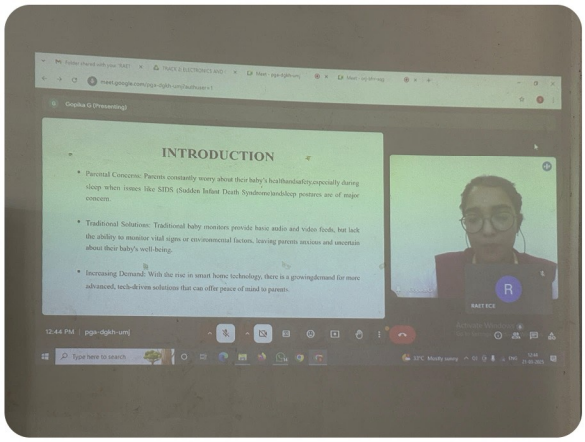


# Visual Diary

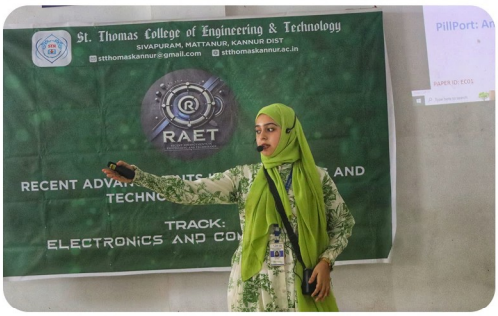
# Visual Diary













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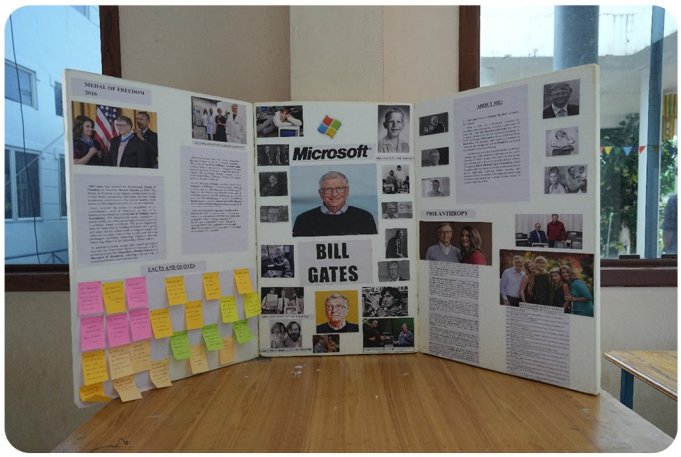


# Visual Diary



IMPULSE