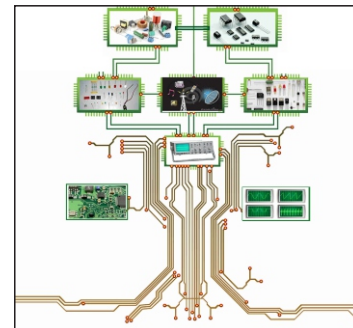


ELECTRONICA

Newsletter

Department of Electronics & Communication
Engineering



Volume 10

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Vision and Mission of the Institute

Vision

- To be one of the premier Institutes of Engineering and Management education in the country

Mission

- To provide Engineering and Management education that meets the needs of human resources in the country
- To develop leadership qualities, team spirit and concern for environment in students

Objectives

- To achieve educational goals as stated in the vision through the mission statements which depicts the distinctive characteristics of the Institution
- To make teaching-learning process an enjoyable pursuit for the students and teachers

Vision and Mission of the Department

Vision

- To be a renowned department for education in Electronics and Communication Engineering in Karnataka State, moulding students into professional engineers

Mission

- To provide teaching - learning process in Electronics and Communication Engineering that will make students competitive and innovative to adapt to the needs of the industry and higher learning
- To imbibe professional ethics, team spirit and leadership qualities to succeed in changing technological world
- To inculcate empathy for societal needs and concern for environment in engineering design and practice

Program Education Objectives

After 2 to 3 years of graduation, the students will have the ability to:

- Analyze, design and implement solutions in Electronics and Communication Engineering and adapt to changes in technology by self/continuous learning
- Engage in higher learning and contribute to technological innovations
- Work with professional ethics as an individual or as a team player to realize the goals of the project or the organization
- Work with respect for societal values and concern for environment in implementing engineering solutions



*This edition of Electronica is dedicated to **Manali Kallat Vainu Bappu**, born in 1927, who was inspired by his astronomer father and published papers on variable stars even as an undergraduate. He pursued his Ph.D. at Harvard, where he co-discovered the Bappu-Bok-Newkirk comet and later the Bappu-Wilson effect, linking star luminosity to spectral lines. Returning to India, he founded the Uttar Pradesh State Observatory and transformed the Kodaikanal Observatory, before leading the creation of a 2.3-meter telescope in Kavalur. Bappu received several honors for his contributions, including the Donhoe Comet-Medal and presidency of the International Astronomical Union.*

What's inside...

- About the Department
- Technical Articles
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- Departmental Events

And more...



Vidyayāmruthamashnute

B. N. M. Institute of Technology

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"The future belongs to those who believe in the beauty of their dreams." – Eleanor Roosevelt

Greetings from the heart of the Electronics and Communication Engineering Department! With this new edition of Electronica, we open yet another chapter in our shared journey through circuits, codes, signals, and stories that shape the technological landscape. Every breakthrough begins with a spark, an idea, a question, a challenge that refuses to be ignored. This edition celebrates that spark. From innovative projects and insightful research to the remarkable achievements of our students and faculty, these pages capture the pulse of a discipline that never stands still.

As technology advances at lightning speed, so does our responsibility to imagine, design, and implement solutions that matter. You will find not only technical insights but also narratives of perseverance, collaboration, and creativity because engineering is as much about human ingenuity as it is about precision and logic. To all those who contributed, your work is the energy that keeps Electronica vibrant. To our readers, your curiosity is the circuit that keeps this initiative alive. Together, we create more than just a newsletter; we create a chronicle of ideas and aspirations. So, immerse yourself in these pages. Let the innovations inspire you, let the challenges provoke you, and let the possibilities excite you because the story of ECE is still being written, and you are part of it.

Happy Exploring!



Editorial Team

ABOUT THE DEPARTMENT

The Department of Electronics & Communication Engineering, established in 2001, admits 120 UG students (plus 12 lateral entry) and 24 PG students specializing in VLSI and Embedded Systems annually. The department boasts of a highly qualified faculty with an average of nineteen years of experience, including alumni from premier institutes like IITs and universities from Netherlands and Germany and professionals with rich industry exposure. The department provides a vibrant academic environment, enabling students to achieve distinctions, high pass percentages, and excellent placements in reputed companies such as Aisan Industry Co., Ltd., ICHINOSE Co., Ltd., Aisin Automotive, National Instruments, Nokia, Siemens, and IT giants like TCS, Infosys, and Wipro. Its autonomous syllabus emphasizes practical learning, project-based teaching, and research, preparing students for MS programs in top international universities. The department organizes international IEEE conferences, workshops, and seminars, ensuring continuous learning through professional bodies like IEEE, ISTE, and IEI. Students benefit from technical skill development programs, internships, and industrial visits that enhance their industry readiness. Soft skills and personality development classes are conducted to support students' holistic growth. Over the years, students have secured 23 university ranks (17 UG, 6 PG) and 11 gold medals, reflecting their outstanding academic performance. The department has established 14 industry MOUs, Centers of Excellence in Healthcare and Smart Technologies, and fosters innovative lab projects and internships at reputed institutions. Students actively participate in technical, cultural, and sports events, bringing accolades to the department and enriching their overall experience. The first batch of autonomous graduated in the year 2025 with excellent results and good placement packages.

Dr. Yasha Jyothi M Shirur
Professor & Head, Dept. of ECE

Technical Articles

Photonic Chips for Ultra-Fast Data Processing

As digital applications demand faster and more efficient data processing, traditional electronic chips face significant limitations in terms of speed, energy efficiency, and heat dissipation. Photonic chips, which use light instead of electricity to transmit and process data, are emerging as a transformative technology. These chips offer ultra-fast data transfer speeds, minimal energy consumption, and the potential to revolutionize fields such as high-performance computing (HPC), Artificial Intelligence (AI), and telecommunications.

What Are Photonic Chips?

Photonic chips, also known as photonic integrated circuits (PICs), integrate optical components such as waveguides, lasers, and detectors onto a single chip. Unlike conventional electronic chips that rely on electrical signals, photonic chips use light (photons) to perform computations and data transfers. This shift from electrons to photons enables unparalleled processing speeds and efficiency.

Advantages of Photonic Chips

Ultra-Fast Data Transfer: Light travels much faster than electrical signals, enabling near-instantaneous communication between processing units. Optical interconnects reduce latency in data centers and supercomputers.

Energy Efficiency: Photonic chips consume significantly less power compared to traditional silicon-based processors, reducing overall energy costs. They generate minimal heat, eliminating the need for bulky cooling systems.

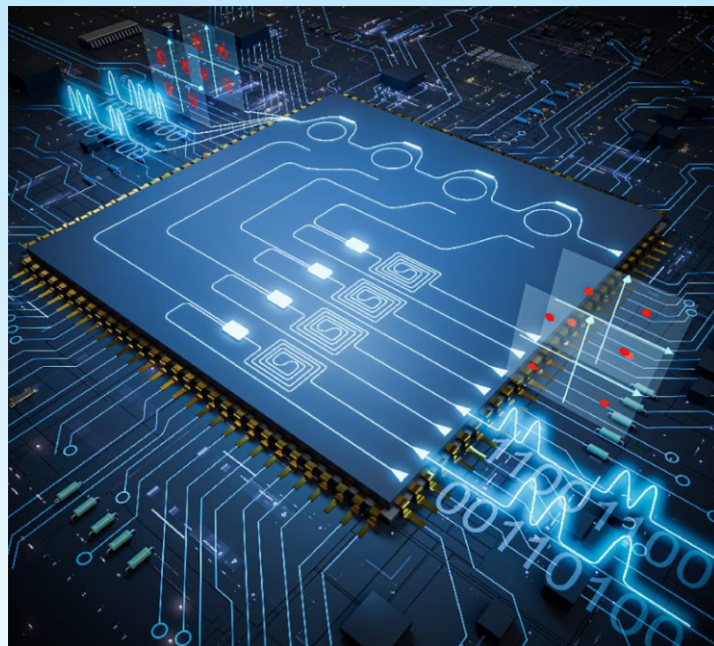
Scalability and Miniaturization: PICs can be integrated into compact and scalable architectures, supporting the growing demand for miniaturized, high-speed devices.

Higher Bandwidth: Optical communication allows for multiple data streams to be transmitted simultaneously through different wavelengths, vastly increasing data throughput.

Applications of Photonic Chips

High-Performance Computing (HPC) and AI: Photonic chips accelerate AI model training and inference by enabling parallel processing. Companies like Lightmatter and Lightelligence are developing AI-focused photonic processors that outperform traditional GPUs and TPUs.

Data Centers and Cloud Computing: Photonic interconnects enhance the efficiency of cloud computing



by reducing bottlenecks in data transmission. They enable seamless communication between servers, lowering latency and power consumption.

Telecommunications and 6G Networks: Photonic chips power ultra-high-speed optical fiber communication networks. They will play a crucial role in enabling next-generation wireless technologies, such as 6G, which require massive data transfer capabilities.

Quantum Computing: Photonic chips are integral to the development of quantum processors that leverage light-based qubits for unparalleled computational power. Startups and research institutions are exploring quantum photonic computing as a pathway to overcoming the limitations of classical computing.

Challenges in Photonic Chip Development

Despite their advantages, photonic chips face several challenges:

Manufacturing Complexity: Integrating optical components on a silicon platform requires precise fabrication techniques.

High Initial Costs: The development and production of photonic chips are still expensive due to limited large-scale manufacturing facilities.

Integration with Existing Systems: Transitioning from electronic to photonic computing requires redesigning computing architectures and software frameworks.

The Future of Photonic Chips

As research and development in photonics continue to advance, the commercialization of photonic chips is expected to grow. Companies like Intel, IBM, and startup ventures are investing heavily in silicon photonics to

bring these chips into mainstream applications. With continued innovation, photonic chips could soon become the backbone of ultra-fast, energy-efficient computing, enabling breakthroughs in AI, cloud computing, and next-generation communications.

Conclusion

Photonic chips represent the future of high-speed,

energy-efficient computing. By leveraging the power of light, they overcome the limitations of electronic chips, offering unprecedented processing speeds and scalability. As the technology matures, photonic chips will reshape industries ranging from AI and telecommunications to quantum computing, paving the way for the next era of data processing.

Sriharini Suresh
1BG23EC110

Quantum Radar for Stealth Detection The Future of Military Surveillance

Introduction

The emergence of stealth technology has revolutionized contemporary military warfare, enabling aircraft and missiles to evade traditional radar detection systems. Well-known advanced fighter aircraft, such as the F-22 Raptor and B-2 Spirit, utilize radar-absorbing materials and designs that minimize Radar Cross Section (RCS) to evade detection from normal radar systems. Nevertheless, the emergence of Quantum Radar may herald a potential paradigm shift in stealth detection technology, with enhanced sensitivity, accuracy, and immunity to countermeasures.

Before we dive into the topic, let's answer the burning question on mind - What is **Quantum Radar**?

Quantum Radar utilizes the principles of quantum mechanics, particularly quantum entanglement and quantum illumination, to detect stealth targets that are undetectable by traditional radar systems. As opposed to traditional radar systems, which depend on the transmission and reflection of electromagnetic waves, Quantum Radar improves detection efficiency with correlated quantum states applied, leading to an improvement in the signal-to-noise ratio and overcoming electronic warfare strategies.

How Quantum Radar Works?

1. **Quantum Entanglement:** Quantum Radar operates by creating a pair of entangled photons; one photon is sent towards the target (signal photon), while the other is kept within the radar device (idler photon). Due to the principles of quantum mechanics, these photons retain their correlation irrespective of the space between them.
2. **Quantum Illumination:** When the signal photon interacts with an object, it changes its information and is subsequently reflected back to the radar receiver. Since the idler photon still retains quantum characteristics with the signal photon, the analysis of their correlation enables enhanced target detection, even in the presence of high-noise environments.



3. **Detection & Processing:** By making use of comparative analysis of the back-scattered signal photon and the idler photon, Quantum Radar acquires the capability to detect stealth aircraft and low-RCS targets with incredible accuracy, irrespective of the use of radar-absorbing materials.

Advantages of Quantum Radar over Traditional Radar

1. **Detection of Stealth Aircraft and Missiles:** Stealth technology can absorb or deflect traditional radar waves, making aircraft and missiles virtually invisible. Quantum Radar, however, does not rely on reflected signals; rather, it utilizes quantum correlations, thus making stealthy targets much harder to evade detection.
2. **Electronic Warfare and Jamming Immunity:** Conventional radar systems are vulnerable to disruption or deception by electronic countermeasures. Quantum Radar, however, exhibits immunity to attacks, as quantum entanglement guarantees that any interference with the signal photon will change the correlation with the idler photon, thus facilitating the detection of jamming attempts.
3. **Enhanced Sensitivity in Low-Signal Environments:** Quantum Radar functions well in low-power or cluttered

environments where traditional radar falters, like congested urban environments, mountainous landscapes, and adverse weather conditions.

4. Expanded Range and Resolution: Quantum Radar can detect objects at longer ranges with higher resolution than conventional radar systems. This feature has significant implications for early-warning missile defense systems and space surveillance.

Challenges in the Development of Quantum Radar

Despite its promise of an upgrade in performance and technicality, Quantum Radar faces many challenges:

1. Technological and Complexity Hurdles: Entanglement in quantum systems is difficult to maintain over large distances due to decoherence, which is caused by environmental disturbances fractioning the entangled state.

2. Cryogenic Cooling Needs: Many quantum systems, including those utilizing superconducting photon detectors, require extremely low temperatures, making practical applications difficult.

3. High Cost and Resource Intensive: The infrastructure needed for the development of Quantum Radar is expensive, requiring advances in quantum optics, photonics, and quantum computing.

Future Prospects and Military Applications

Top research centers, defense departments, and private companies are actively working on the development of Quantum Radar prototypes. Countries such as China, the

United States, Canada, and Russia are investing in quantum sensing technologies to gain a strategic military advantage.

Key Applications:

- **Stealth Aircraft Detection:** Quantum Radar will allow early detection of advanced fighter jets and stealth bombers.
- **Missile Defense Systems:** Improved accuracy in tracking hypersonic missiles and cruise missiles.
- **Space Surveillance:** Use of Quantum Radar on satellites for global defense surveillance.
- **Detection of Underwater Submarines:** Improved ability to detect submarines using quantum-based sonar methods.

Conclusion

Quantum Radar is a revolutionary change in military surveillance and detection of stealth technologies. As technology continues to evolve, it is sure to overcome the limitations inherent in traditional radar systems, offering a reliable, high-resolution, and anti-jamming technology that will redefine modern warfare. While there are challenges with implementation and scalability, Quantum Radar is a disruptive technology that will shape the future of global defense systems. As countries race to develop and deploy Quantum Radar, the balance of military power may change, and adjustments and innovations in the aviation, aerospace, and defense industries may be required in this quantum age.

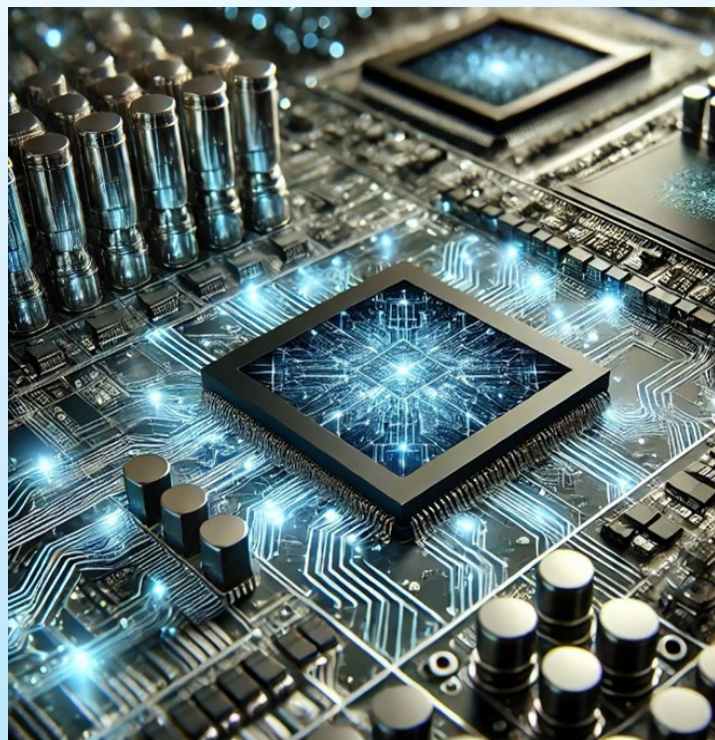
Manish L
1BG23EC057

India's Semiconductor Ecosystem: Catching Up with the West

The semiconductor industry is the backbone of modern electronics, powering everything from smartphones to defence systems. While Developed nations like the United States, Germany, and Taiwan Geography have long dominated semiconductor design and manufacturing, India is still striving to establish itself as a key player in this sector. Understanding the differences between these ecosystems can provide insights into India's challenges and aspirations in the semiconductor race.

The Western Dominance in Semiconductors

For years, Western countries, particularly the U.S., have been at the forefront of semiconductor innovation. Giants like Intel, NVIDIA, AMD, and Qualcomm dominate chip design, while manufacturing powerhouses such as Taiwan's TSMC and South Korea's Samsung handle large-scale production.



Key factors contributing to Western dominance include:

Advanced R&D - Heavy investments in research and cutting-edge innovation keep Western firms ahead in chip technology.

Robust Supply Chains - A well-oiled system of logistics, raw material sourcing, and skilled labour keeps production smooth.

Government Support - Policies like the CHIPS Act in the U.S. provide massive funding and incentives for semiconductor growth.

Established Foundries - With decades-old, cutting-edge fabrication plants, these nations produce chips at some of the smallest nanometre scales.

India's Semiconductor Hustle

While India is a global leader in software services, its semiconductor industry is still in its early stages. The country depends heavily on imports, leaving it vulnerable to supply chain disruptions. However, the Indian government and private sector are working aggressively to change this.

Challenges India faces in building its semiconductor ecosystem:

Lack of Fabrication Plants (Fabs) - Unlike Taiwan or the U.S., India lacks high-end fabs, which are critical for manufacturing chips.

Investment Gaps - Setting up a semiconductor fabrication unit requires billions of dollars, and India is still attracting global investors.

Supply Chain Dependencies - India relies on imports for raw materials, semiconductor equipment, and skilled labour.

Skilled Workforce - India has a strong IT workforce, and semiconductor design and manufacturing require niche expertise, which is still developing

Bridging the Gap: India's Road Ahead

India has launched initiatives like the Semicon India Program, offering \$10 billion in incentives to encourage semiconductor manufacturing. Partnerships with global players like **TSMC, Intel, and Foxconn** are being explored to set up chip plants in India. Additionally, institutions like IITs are strengthening semiconductor research to build a skilled workforce.

Key strategies for India's semiconductor growth:

- **Attracting Global Investments** - Partnering with top chipmakers to set up fabs in India.
- **Building Local Foundries** - Developing domestic manufacturing to cut down on import reliance.
- **Strengthening R&D** - Enhancing research facilities to innovate chip designs domestically.
- **Government-Industry Collaboration** - Ensuring strong policies that incentivize private sector participation in semiconductor manufacturing.

While India is still playing catch-up with Western nations, the foundation for a thriving semiconductor ecosystem is being laid. With government backing, global collaborations, and a focus on research, India could soon emerge as a semiconductor powerhouse. The coming decade will be crucial in determining whether India can bridge the gap and secure a strong foothold in the global semiconductor industry.

Gaayana G R
1BG23EC032

IoT Security: Safeguarding the Connected Future

The Internet of Things (IoT) has revolutionized the way we interact with technology, connecting everyday devices, from smart home assistants to industrial automation systems. However, as IoT devices become more integrated into our lives, they also pose significant security challenges. A single vulnerability in an IoT network can be an entry point for cybercriminals, leading to data breaches, unauthorized surveillance, or even operational disruptions in critical infrastructure.

The Weakest Link: Why IoT Devices Are Vulnerable

Unlike traditional computing systems, many IoT devices are designed with minimal security measures. Manufacturers often prioritize cost and functionality over cybersecurity, leading to weak encryption, hardcoded passwords, and outdated firmware. Moreover, IoT devices frequently operate on unsecured networks, making them easy targets for hackers.



Common IoT Threats:

- **Botnet Attacks** – Malware like Mirai hijacks IoT devices, forming massive botnets to launch DDoS attacks, overwhelming online services.
- **Data Breaches** – IoT devices collect vast amounts of sensitive user data, which can be exploited if not properly secured.
- **Man-in-the-Middle Attacks** – Weak encryption allows hackers to intercept and manipulate communication between IoT devices.
- **Unauthorized Device Control** – Cybercriminals can remotely hijack smart devices, such as home security cameras or medical implants.
- **Ransomware on IoT** – Attackers can lock IoT devices or entire networks, demanding ransom for restored access.

Strengthening IoT Security: A Multi-Layered Approach

- **Strong Authentication and Encryption**
Adopting robust authentication measures, including multi-factor authentication (MFA) anomalies can assist in detecting and deflecting threats before they lead to harm.
- **Better Hardware Security**
Secure boot mechanisms and hardware resistant to tampering should be integrated by manufacturers to stop unauthorized alterations.

Regulatory Compliance and Standards

Industry organizations and governments need to implement rigorous security standards for IoT makers to abide by and end-to-end encryption, can shut out unauthorized users.

Network Segmentation

Segmenting IoT devices from key systems via isolated networks may reduce the consequences of a security incident.

AI-Driven Threat Detection

Use of artificial intelligence for real-time detection of anomalies can assist in detecting and deflecting threats before they lead to harm.

The Future of IoT Security

As IoT adoption grows, security strategies must evolve accordingly. Researchers are exploring blockchain-based authentication, quantum cryptography, and self-healing networks to create more resilient IoT systems. Additionally, awareness and proactive cybersecurity measures at both user and enterprise levels will be crucial.

In the world of connected devices, security cannot be an afterthought. It is time to build a future where innovation and protection go hand in hand, ensuring that IoT remains a force for progress rather than a gateway for cyber threats.

Gaayana G R
USN-1BG23EC032

Staff Achievements

Awards and Recognition

- **Dr. Rekha P** and **Dr. Jyoti R Munavalli** received a funding of Rs. 5 Lakhs from M/s Infineon under CSR funding to carry out the project titled "Drone: The Sanjeevini". This project is carried out under Robotics and Drone Students Club.
- **Dr. Priyadarshini K Desai** was recognised as Research supervisor under VTU in the Dept. of ECE on 23rd May 2025.
- **Dr. Lakshmi Bhaskar** received the "Special Gold Medal" award for completing her Ph.D. by Vasavi Union Charitable Trust on 22nd June 2025.

Patents

- Faculty inventors **Dr. Smitha Gayathri D**, **Dr. Yasha Jyothi M Shirur**, **Dr. Kavitha Jayram** published a patent titled "**Adaptive AI-Enhanced Smart Mirror for Real-Time Health Diagnostics and AR Personalization**" on 28th March 2025.
- Faculty inventors **Dr Bindu S**, **Dr. Pratibha B S**, **Dr. Swetha** have been granted a patent titled "**A Solar Assisted Water Purification System**" on 14th April 2025.
- Faculty inventors **Dr. Yasha Jyoti M Shirur**, **Dr. Rekha P**, **Dr. Ashwini S Savanth**, **Dr. Sujaya B L** and student inventors **Maaz Hussain**, **Misrah Naveed**, **Nidhi Girish** filed a patent titled "Light Weight Nano Drone for Advanced Indoor Surveillance and Monitoring" with Patent no 202541044560 on 30th May 2025.
- Faculty inventors **Dr. Keerti Kulkarni**, **Dr. Priyadarshini K Desai**, and **Dr. Yasha Jyothi M Shirur** along with student inventor **Vinay Gowda** published a patent titled "**Household Power Consumption Monitoring and**

Prediction using Real-Time Sensing and Machine Learning” on 6th June 2025.

- Faculty inventors **Dr. Bindu S and Dr. N Sheshaprasad** published a patent titled “**System and Method for Dispensing Medication Based on Biometric Authentication, Emotional State Detection, and Temperature Monitoring**” on 20th June 2025.

Journal Publications

- **Bindu S**, and M K Prashanth published a paper titled “Exploring the cytotoxicity and DNA binding studies of green synthesized europium stannate nanoparticle through experimental and computational approach” in Materials Chemistry and Physics, Volume 333, 2025, 130327, ISSN 0254-0584, doi.org/10.1016/j.matchemphys.2024.130327.
- S. Chandrasekhar, B. S. Prathibha, **S. Bindu**, and M. K. Prashanth published a paper titled “Synthesis, Computational, DFT Calculations, Photophysical and Docking Studies of Novel Fluorescent Pyrimidine-Chlorothymol Hybrid as Potent Antimicrobial Agent”, in J Fluoresc, March 2025, doi.org/10.1007/s10895-025-04274-2.
- R Vijaya Arjunan, Ruppikha Sree Shankar, **Manjunath G Asuti**, Nirmalkumar S Benni, Nijaguna Gollara Siddappa, Praveen S Challagidad, Venkatesh Bhandage,” Deciphering Ancient Tamil Epigraphy: A Deep Learning Approach for Vatteluttu Script Recognition,” Journal of Internet Services and Information Security, Vol.15, Issue 1, page no.451-467, 2025.
- Venkatesh Bhandage, **Manjunath G. Asuti**, Nijaguna Gollara Siddappa, Praveenkumar S Challagidad, Nirmalkumar S. Benni, D. Cenitta, and R. Vijaya Arjunan,” HRAESN-IoT: A Hybrid Residual Attention and Echo State Network Approach for IoT-Enabled Heart Disease Prediction,” Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JoWUA), Vol. 16, Issue 1, page no. 375-389, 2025.
- Aruna R, Pushpa Mala S, **Keerti Kulkarni** published a paper titled “Hybrid Method for Wireless Channel Estimation” in International Journal of Engineering Trends and Technology, vol. 73, no. 3, pp. 315-323, 2025. Crossref, doi.org/10.14445/22315381/IJETT-V73I3P123.
- **Keerti Kulkarni, Priyadarshini K Desai**, Champa P N, and S. Raksha published a paper titled “Comparison of Pixel-based and Object-based Image Analysis for LULC Classification of Satellite Images”, in International Journal of Engineering Trends and Technology, vol. 73, no. 2, pp. 177-184, 2025. Crossref, doi.org/10.14445/22315381/IJETT-V73I2P115.
- Kumar Puttaswamy Gowda, Smitha Gayathri Devarajulu, Babitha Sundar Rajan, Sheela Sadashiviah published a paper titled " Energy-Efficient Clustering and Routing in Wireless Sensor Network Using Random Differential Leader Pool Strategy with Electric Eel Foraging Optimization Algorithm” in International Journal of Intelligent Engineering and Systems, Vol.18, No.6, 2025

Conference Publications

- M Bharathi, and **Dr. Yasha Jyothi M Shirur** presented a paper titled “Efficient Signal Processing: Harnessing Distributed Arithmetic for High-Speed FFT Operations” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Bindu S, Sarala T**, and Prashanth M K presented a paper titled “Diabetes Detection Using Iris Image” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025, doi: 10.1109/IITCEE64140.2025.10915346.
- **Sarala T**, Prashanth M K, and Bindu S presented a paper titled “Intelligent Iris based chronic kidney identification system” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025, doi: 10.1109/IITCEE64140.2025.10915256.
- **Sumathi A, Priya R Sankpal and Jyoti R Munavalli** presented a paper titled “Development and Performance Evaluation of a 13GHz Ultra-Wide Band Patch Antenna” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of

Technology during 16th and 17th January 2025.

- Amogh G Hampiholi, **Vrunda Kusanur**, **Sujaya B L** presented a paper titled “Automated Dental Caries Detection in Front Teeth using Image Processing” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Rashmi S Bhaskar**, **Vrunda Kusanur**, and **Sujaya B L** presented a paper titled “Predictive Framework to Assess Global” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Priyadarshini K. Desai** and **Keerti Kulkarni** presented a paper titled “Reflecting Intelligent Surface Performance Evaluation with Different Reflector Elements Operating at mm Wave Frequency” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- Aruna R, Pushpa Mala S and **Keerti Kulkarni** presented a paper titled “5G Channel Estimation for downlink SISO channels using Convolutional Neural Networks” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Mrs. Arpitha Kulkarni**, **Dr. Subodh Kumar Panda**, **Dr. Smitha Gayathri D** presented a paper titled “Soil Nutrient Prediction and Crop Recommendation System: Conventional to Modern Methods of Soil NPK Sensing” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- Dr. Ramsathish K V, Dr. Narendra Kumar, **Dr. Smitha Gayathri D** presented a paper titled “Predictive and Preventive Fire Safety System” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- Dr. Monica, **Dr. Smitha Gayathri D** presented a paper titled “IOT based health Monitoring system with Disease Prediction using ML” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.

Books

- **Dr. Smitha Gayathri D**, **Dr. Yasha Jyothi M Shirur**, Dr. Narendra Kumar authored the book “Fundamentals of Electrical and Electronics Circuits” in 2025.

Book Chapters

- **Yasha Jyothi M. Shirur**, **S. Bindu**, **Munavalli J.R** contributed a chapter titled “Case Study on Real-Time Smart Meter” in book “Cloud Computing in Smart Energy Meter Management” published by Scrivener (Wiley) publication on Feb 2025.
- **Bindu S**, M K Prashanth contributed a chapter titled “Integration of Nanotechnology and Machine Learning in Healthcare: Fundamentals, Applications, and Future Scope” in book titled “Smart Chips for Smart Devices: VLSI Design for Next-Generation IoT Solutions”, published by Wiley-Scrivener.
- **Manjunath G. Asuti**, S. Ramesh, D Prabakar, G. Balachandran, T. Anuja, A Rajaram, Haider Khalaf Jabbar contributed a chapter titled “Innovative Approaches to Remote Health Monitoring Systems for Enhanced Patient Care and Accessibility” published by IGI Global, Scientific Publishing 2025.
- Umesha Raddy, **Manjunath G. Asuti**, G. Michael, A Divya, M. Manickam, A Rajaram contributed a chapter titled “Achieving Seamless Interoperability of Health Data Across Digital Healthcare Systems” published by IGI Global, Scientific Publishing 2025
- **Dr. Smitha Gayathri D**, **Dr. Yasha Jyothi M Shirur**, and Dr. Usha Rani K R contributed a chapter titled “Vehicular Powerline Communication” published by Wiley-Scrivener 2025

Guess the Component

My reactance falls as frequency climbs, yet I block DC every time — who am I?

With three terminals and a gain factor β , I toggle and amplify — who am I?

I emit photons via electron-hole recombination, but only in forward bias — who am I?

My impedance grows with rate of change in current, thanks to $L \cdot dI/dt$ — who am I?

I'm used in reflow and hand processes, melt metal, and never enter the circuit — who am I?

Harsha M S
1BG23EC037

Student Achievements

Awards and Recognition

"Hive Destruction Protocol" won the Best Paper Award in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025). The authors were **Vyshak T M, Gaayana G R and Sarala T**.



Tilak Naidu won the 3rd place in Triple Jump in the VTU 26th State Level Inter Collegiate Athletic meet 2025 held on 16th March 2025.



Pragnya S from 7th Sem, ECE won a silver medal in One act play and bronze medal in the Skit events held in the VTU Youth Festival 2025 from March 24th to 27th 2025.

Journal Publications

- **Sakshi Shivakumar, Vivek Raviraj D** published a paper titled "Vocal Chameleon" in International Journal of Advanced Research (IJAR) in March 2025.
- **Tanzeem Pasha, Shri Hari M, Shreeram K R, Bhuvana Suganthi D** published a paper titled "Multi-UAV Path Planning Using Grey Wolf Optimization and RRT Algorithm" in the Journal of Soft Computing Paradigm 7, no. 2 (2025): 90-102

Conference Publications

- **Abhi A Bharadwaj, Arvind R, Daksh Pankaj Patel, and Dr. Yasha Jyothi M Shirur** presented a paper titled "Design of Low Power 4-Bit Adder for DSP Applications Using Custom 45nm Technology CMOS Standard Cell Design" in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Hemanth Prasad N, Hrishikesh G Rayasa, and Dr. Yasha Jyothi M Shirur** presented a paper titled "Synthesis of AMBA APB Bus Protocol" in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Anaghaa R, Unnathi G D, Hiharika J, and Bindu S** presented a paper titled "Design and Implementation of Delta Modulation Transceiver in MATLAB, SIMULINK and DSP Processor" in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025, doi: 10.1109/IITCEE64140.2025.10915256.
- **Maaz Hussain, Anuradha Shenoy, Keerti Kulkarni and Jyoti R Munavalli** presented a paper titled "Evaluation of CNN Architectures for Brain Tumor Identification and Classification" in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Vyshak T M, Varun S N, Unnathi G D, Sujaya B L and Jyoti R Munavalli** presented a paper titled "Real-Time Global Parcel Tracking System in the Supply Chain using RFID and GPS" in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B

N M Institute of Technology during 16th and 17th January 2025.

- **Tanzeem Pasha, Shri Hari M, Shreeram K R, Bhuvana Suganthi D** and Jyoti R Munavalli presented a paper titled “Evaluation of UAV Path Planning Approaches for Urban Air Mobility” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Rohan, Sanath, Neeraj, Bhuvana Suganthi D** presented a paper titled “Shelf Optimization Technology” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Rekha P, Lavanya Rao U B, Manjunath G Asuti, Sumit Kumar, Mehak Nadaf, and Shashank K Bedre** presented a paper titled “Empowering Communication: Emergency Hand Recognition for the Differently Abled” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Sudarshan Bhat, Divyam Arora, Anika Venkat, Manjunath G. Asuti** presented a paper titled “Knock Detecting Door Unlock System using IOT” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Prashant V Joshi, Sudharshan K M, Majunath G Asuti, Poornashree S J, Sunitha K** presented a paper titled “Real-Time Aerial Image Edge Detection with MicroWatt Power ISA on FPGA” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Sriraksha Srinivas, Parinitha DK, Pujitha Padmanabha, Sudip Paul, and Priya R Sankpal** presented a paper titled “Quantum Dots in Modern Medicine: Advancing Imaging, Diagnostics, and Drug Delivery” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Srinivas BV, S V Vikas, K. Satish and K. Kulkarni** presented a paper titled “Predictive Analytics for Energy Demand and Renewable Resource Optimization” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **M. Hussain, A. Shenoy, Keerti Kulkarni and J. R. Munavalli** presented a paper titled “Evaluation of CNN Architectures for Brain Tumor Identification and Classification” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **A. K. Venkat and Keerti Kulkarni** presented a paper titled “Enhanced Super-Resolution with EDSR: Optimizing Image Quality across Multiple Scaling Factors” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Sunitha S V, Vijay Aditya, Srikanth B R** presented a paper titled “IOT Based Energy meter” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Gaganashree, Monika, Rekha, Sunitha S V** presented a paper titled “Smart sort and GPS alerts for efficient waste management system (Best paper award)” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Sunitha S V, Unnathi G D, Priyanshi Dwivedi, R C Chinmayi, Ruthvik L Gowda** presented a paper titled “Kidney stone image analysis for Diagnosis” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of

Technology during 16th and 17th January 2025.

- **Shriparna Praveenkumar Hegde, Pragnya S, Lakshmi Bhaskar, Kiran K N** presented a paper titled “SteganoWave” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Shri Hari M, Tanzeem Pasha, Shreeram K R, Sarala T** presented a paper titled “Packet Sniffer for Securing Network Communication Through Real-Time Decoding and Authentication” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Vyshak T M, Gaayana G R, Sarala T** presented a paper titled “Hive Destruction Protocol: An Automated Defense System Utilizing YOLO Human Recognition and Real-Time GPS Tracking” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by BN M Institute of Technology during 16th and 17th January 2025.
- **Neha N, Monisha G Urs, Nayan N, Kiran K N, Sarala T** published a paper titled “Smart Ventilator for affordable health monitoring system” in the 3rd International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics (IITCEE-2025) organized by B N M Institute of Technology during 16th and 17th January 2025.
- **Ujwal B, Sanjana H, Thanishka K, Yasha Jyothi M Shirur, and Jyoti R Munavalli** presented a paper titled “Evaluation of Design and Verification Techniques for Synthesizable Low Power 8-Bit RISC Microprocessors” in 1st International Conference on Sustainable Computing and Intelligent Systems (ICSCIS 2025) organized by Research & Development Cell, Poornima University, Jaipur, Rajasthan, India on 21st and 22nd March 2025.
- **Rakshitha A, Shilpa R, Bindu S, and Jyoti R Munavalli** presented a paper titled “High Efficiency 16-Bit Kogge Stone Adder Design Utilizing Gate Diffusion Input Technique” in 1st International Conference on Sustainable Computing and Intelligent Systems (ICSCIS 2025) organized by Research & Development Cell, Poornima University, Jaipur, Rajasthan, India on 21st and 22nd March 2025
- **Mrs. Poornima M.R., Yashaswini Mohan, Srujan M N, Manasa H S, and Dr. Yasha Jyothi M Shirur** presented a paper titled “Design and Comparative Analysis of Adders in 45 nm Technology using MTCMOS for High Speed Applications” in International Conference on Distributed Computing and Communication Systems (ICDCCS - 2025) is being organized by the Department of Electronics and Communication Engineering, Kalpataru Institute of Technology, Tiptur, India during 18th and 19th April 2025.
- **Dr. Sujaya B L, Sakshi N Sunil, Dr. Rashmi S B Bhaskar, Vyshak T M** published a paper titled “Efficient Farmland Protection System Using Machine Learning Technique for Animal Identification” in International Conference on Emerging Technologies in Computing and Communication (ETCC) held on 26th and 27th June 2025.
- **Suhaas B R, Sharan Sheshadri, Shamanth Vasishta** published a paper titled “Assessing Urban Heat Vulnerability Through Remote Sensing and AI” in International Conference on Emerging Technologies in Computing and Communication (ETCC) held on 26th and 27th June 2025.

Answers to Guess the Component

- Capacitor
- Bipolar Junction Transistor (BJT)
- Light Emitting Diode (LED)
- Inductor
- Soldering Iron

Departmental Events

Faculty Development Program on Innovative AI/ML Solutions for Advanced VLSI Design and Verification

The Department of Electronics and Communication Engineering at BNMIT, in association with Entuple Technologies Pvt. Ltd. and supported by ISTE, IEEE Nanotechnology Council, and IEEE Signal Processing Society, organized a five-day FDP on “Innovative AI/ML Solutions for Advanced VLSI Design and Verification” from 10th to 14th February 2025.



The program was inaugurated by dignitaries from ISTE and BNMIT and featured expert sessions by resource persons from academia and industry, including Intel, Microsoft, and REVA University. Topics included System Verilog, UVM, low-power verification, RISC-V architecture, and AI/ML integration in VLSI design. Hands-on sessions helped participants gain practical exposure to verification techniques, SoC design, and functional coverage.

Technical Talk on Eye-Care in the Modern World: Innovative Solutions for Dry Eye Diagnosis and Prevention

The Department of Electronics and Communication Engineering at BNMIT, in collaboration with Autoyos Pvt. Ltd., IEEE-SPS, and IEEE-EMBS BNMIT Student Chapters, organized a technical talk on “Eye-Care in the Modern World: Innovative Solutions for Dry Eye Diagnosis and Prevention” on 18th February 2025.



The session was delivered by Dr. Bharathkumar Hegde, Director, Autoyos Pvt. Ltd and attended by 60 students from the 4th and 6th semesters. The talk aimed to raise awareness about the dry eye syndrome, a growing public health concern due to modern lifestyle habits such as prolonged screen time, poor eye care, and environmental conditions. The speaker highlighted the importance of early diagnosis, preventive care, and how technology is playing a key role in developing innovative solutions for eye health monitoring.

Screening Program on Ocular Surface Assessment

The Department of Electronics and Communication Engineering at BNMIT, in association with Autoyos Pvt. Ltd., IEEE-SPS, and IEEE-EMBS BNMIT Student Chapters, organized a screening program on “Ocular Surface Assessment” on 19th February 2025.



The session was led by Dr. Bharathkumar Hegde, Co-Founder & CEO of Autoyos Pvt. Ltd and his team. The session focused on the early detection of dry eye conditions using advanced diagnostic tools. A total of 41 students from the 4th and 6th semesters participated in the screening, which emphasized the importance of preventive eye care and early diagnosis to reduce the risk of long-term visual complications.

Training Session on Exploring IEEE vTools: A Guided Session

The Department of Electronics and Communication Engineering at BNMIT, in association with IEEE BNMIT Student Branch conducted a training session on “Exploring IEEE vTools: A Guided Session” on 28th March 2025.



The session was led by Anaghaa R, former IEEE BNMIT Student Chair and was attended by 50 office members and society chairs. The workshop was created with the purpose of improving the operating effectiveness of IEEE BNMIT and equipping the members with appropriate skills to deal with their respective roles efficiently. It focused on enhancing familiarity with IEEE vTools through step-by-step guidance on record updates, event management, and tracking Organizational Unit (OU) analytics for better decision-making. Participants also explored best practices for planning technical talks, hackathons, and networking sessions. The session concluded with a collaborative brainstorming activity, encouraging members to share innovative ideas for future IEEE events.

Project Exhibition – Avinya 2025

The Department of Electronics and Communication Engineering at BNMIT in association with IEI, IEEE ComSoc, IEEE Nanotechnology Council, and IEEE CAS organized the annual Project Exhibition - Avinya 2025 on 12th April 2025.



The event provided a platform for final-year ECE students to showcase innovative projects across domains such as Embedded Systems, VLSI, Signal Processing, IoT, Wireless Communication, Robotics, and AI/ML applications. A total of 137 students participated, demonstrating creativity, teamwork, and technical skills through real-world engineering solutions. Projects were evaluated by an expert panel including Mr. Mayur Kulkarni (Ashok Leyland), Dr. Narendra Kumar (GTTC), and Mr. Mahesh Devgiri (Industry Expert), who offered valuable feedback.

Hackathon on Signal Processing Applications using MATLAB

The Department of Electronics and Communication Engineering at BNMIT, in association with IEEE-SPS, IEEE-EMBS, and IEEE-GRSS BNMIT Student Chapters, organized a hackathon on “Signal Processing Applications using MATLAB” on 23rd April 2025.



The hackathon witnessed the participation of 137 students from the 4th semester. The event aimed to foster innovation and collaboration by challenging students to solve real-world problems in a time-bound environment using MATLAB, the Signal Processing Toolbox, DSP System Toolbox, and other tools. Participants gained hands-on experience with signal filtering, spectral and time-frequency analysis, feature extraction, and real-time signal processing. The event also encouraged the application of machine learning and deep learning techniques in signal interpretation, while emphasizing teamwork, role management, and effective communication.

Internship on Design Verification using System Verilog

The Department of Electronics and Communication Engineering at BNMIT in association with Cranes Varsity, Bangalore conducted an Internship on “Design Verification using System Verilog” from 2nd to 20th June 2025 for 3rd year undergraduate students.



The internship program was structured to provide a comprehensive journey from foundational Verilog concepts through advanced System Verilog features and concluded with a hands-on mini-project. This program exposed the students not only to the theoretical concepts of hardware description and verification languages, but also practical proficiency with real-world testbench architectures, coverage-driven verification, and assertion-based methodologies that are critical in modern VLSI design flows. The Quiz, assignments were conducted by the trainer to evaluate the understanding level of students during the internship.

Internship on Cyber Security

The Department of Electronics and Communication Engineering in association with ISTE students Chapter-BNMIT and IEEE Student Branch organized a four-week internship on “Cyber Security”, from 2nd to 20th June 2025 for 5th semester B.E. students.



Mr. Gajendra Deshpande and Dr. Sandeep C from Theta Dynamics carried out the Internship program. The program emphasized real-world scenarios such as SQL injection, XSS, CSRF, and access control flaws, while also covering secure API development, static code analysis, and DevSecOps pipelines. A highlight was the exploration of AI security threats like prompt injection and model manipulation. An exposure to embedded system security using microcontrollers, analog electronics, and firmware protection techniques was provided.

Internship on Advanced Robotics-ROS

The Department of Electronics and Communication Engineering in association with IEEE RAS organized a four-week internship on “Advanced Robotics-ROS”, from 2nd to 20th June 2025 for 5th semester B.E. students.



The internship provided a mastery of ROS installation, debugging, and workspace management. Students gained Hands-on experience with simulation tools like Gazebo & Rviz. Practical exposure to robot modeling, microcontroller communication, and real-time robotic control was given. The internship enabled the development of problem-solving skills through debugging and collaborative troubleshooting for the students.

Technical talk on VLSI Industry Prospects: Core opportunities for ECE graduates

The Department of Electronics and Communication Engineering at BNMIT in association with IEEE CAS and IEEE Nanotechnology Council organized a technical talk on VLSI Industry Prospects: Core opportunities for ECE graduates on 27th June 2025.



The session was designed to provide students with deeper industry insights, particularly in the field of VLSI and semiconductor technology. The session was delivered by Mr. Santosh M S, SoC Functional Lead validation Engineer at Intel, a highly experienced Lead Validation Engineer with more than 10 years in the semiconductor domain, specializing in Pre- and Post-silicon SoC functional validation.

Answers to Unscramble [Previous edition]

- Modulation
- Frequency
- Oscillator
- Capacitance

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