RAMDEOBABA UNIVERSITY, NAGPUR

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Formerly Shri Ramdeobaba College of Engineering & Management (RCOEM) Est. 1984

NEWSLETTER

IETE Student Forum (ISF)

2024-25

सह वीर्यं करवावहै

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Introduction to IETE

Namaste Readers!

The committee was set up in 2024 under the School of Electronics and Electrical Engineering (SEEE), Ramdeobaba University.

The vision of IETE is to establish the school as a centre of excellence in technical affairs and foster a quality environment for enthusiasts to learn about advanced technologies.

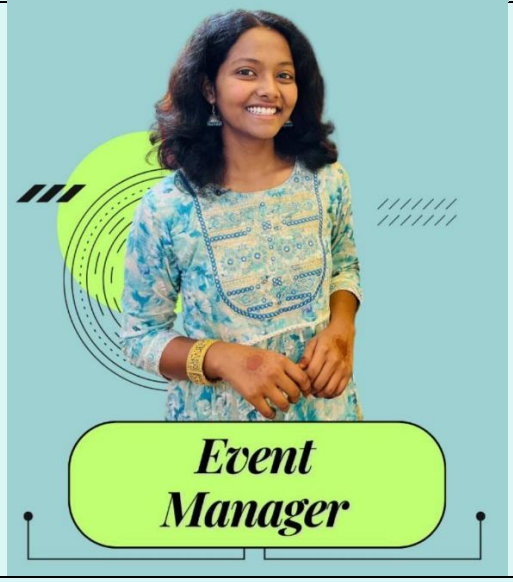
The committee is formed under the guidance of Dr. (Mrs) A.H. Harkare, Assistant Professor at school of EEE, RBU.

The body comprises of 10 members, with the President binding everyone together.

COMMITTEE 2024-25

	Pankaj Kumar Singh Sem-VIII, ECE
	Yugal Nasare Sem-VIII, ECE

	Ved Jaiswal Sem-VIII, ECE
	Samyak Tundurwar Sem-VIII, ECE
	Advait Jog Sem-VI, ECE

	Aryan Puri Sem-VI, ECS
	Ansh Shahu Sem-VI, ECE
	Anushka Pote Sem-VI, ECE

	Priyanshi Dongre Sem-IV, ECE
	Tanisha Deshpande Sem-IV, ECE

ISF COMMITTEE- At a Glance

EVENTS

1.<u>Techwings</u>: A 3-day tutorial session

Objective:Hands-on experience in some emerging technologies, from basic components to autonomous delivery drones and PCB designing.

<u>Students registered – 72</u>

Day-1: Basic electronic components

Day-2: Drone assembly

Day-3: PCB Designing

Outcomes:

Certified participation, enthusiastic involvement, and overwhelmingly positive feedback**.**

2.Sentient Circuits:

The first mega event of IETE in collaboration with Communique Student's Society!

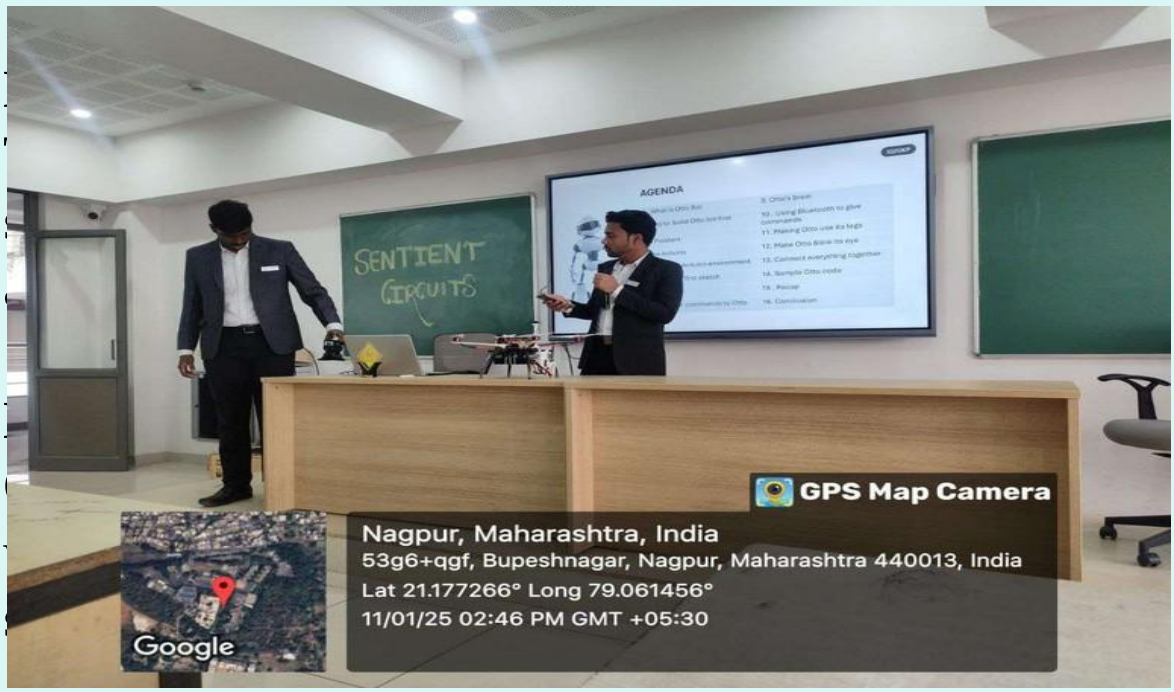
This milestone event marked the beginning of an exciting journey towards technical innovation, collaboration, and fostering excellence within our community.

Students registered – 98

With 3 action packed stages–Orientation, Documentation and hands-on bot making– Participants showcased remarkable creativity and enthusiasm!!

Orientation round:

Participants were introduced to the fascinating world of bot-making, with special focus on Ottobot.



These teams demonstrated their skills by creating their bots within a stipulated time frame, embodying innovation and teamwork.


SENTIENT CIRCUITS


SENTIENT

Special Congratulations to the winners!

1st Prize – "Team 404 Not Found" led by Yogiraj Chauhan

2nd Prize – "Team Tech Nexus" led by Aymaan Khan

3rd Prize – “Team Bot Makers” led by Aryan Salve

Felicitation Ceremony

Guest Lectures

1) Agile Project Management in Electronics and Communication

Date: September 25th , 2024

Speaker: Mr. Divyanshu Sinha, Senior Consultant (Assistant Manager), EY, Hyderabad, and our proud 2019 batch alumnus.

Audience: 90 ECE+ENCS third-year students

Key Takeaways: Practical insights into managing complex projects with agility and a roadmap for EC professionals to navigate dynamic workflows.

2) Navigating Cloud Technology - A Path for EC Students

🗓 Date: January 3rd , 2025

🎤 Speaker: Mr. Shubham Deshpande, Technical Team Lead SOC, Irdeto, Noida, and a 2017 batch alumnus.

📢 Audience: 80 ECE+ENCS third-year students

💡 Key Takeaways: A deep dive into the transformative world of cloud technology, focusing on its relevance and opportunities for EC engineers.

3) Dealing with Peer Competition

Date: January 30th, 2025

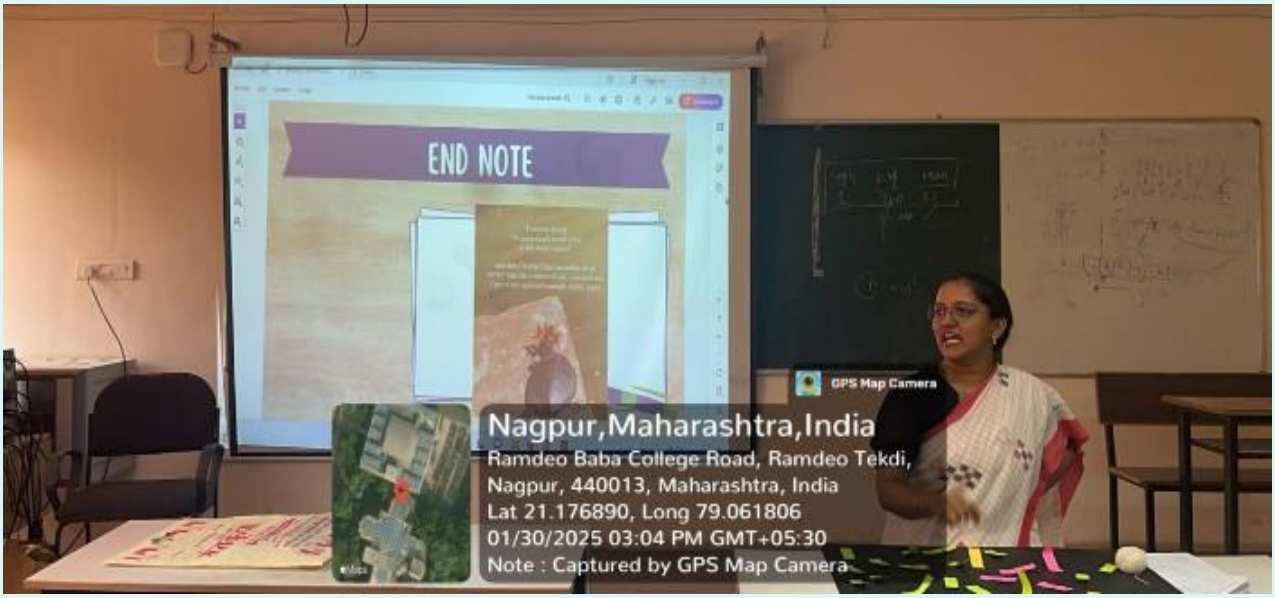
Speaker: Dr. Vaidehi Chilwarwar, TISS, Mumbai

Audience: 56 ECE third-year students

Key Takeaways:

They have co-created activities to focus on

1. Ways to shift the ‘competitive’ mindset.
2. Ways of practicing collaborations.
3. Ways of dealing with the ‘RACE’ culture



4) Life of a Techie (Coding, Career, Placements)

🗓️ Date: March 11th, 2025

🎤 Speaker: Mr. Vatsalya Mathur, Principal Engineering Manager at Autodesk Inc. and a 2013 batch alumnus.

📢 Audience: 111 ECE second-year students

💡 Key Takeaways: A deep dive into the life of a technical professional, focusing on its relevance for EC engineers.

Students' Corner

AI in Telecom: Revolutionizing Network Efficiency

Submitted by :Ujwal Prakash Hiwase, IV Sem ECE

Artificial Intelligence (AI) is transforming telecommunications, enabling intelligent, scalable, and user-centric networks. As 5G expands and 6G research gains momentum, AI's role in optimizing performance and enhancing connectivity is critical. Mastering AI's telecom applications is key to driving innovation and positioning India as a global leader in next-generation networks.

AI transforms telecom through machine learning (ML), deep learning, and neural networks, which process massive amounts of network data in real time. Predictive maintenance monitors base station health using time series analysis, detecting anomalies before they cause problems. Reliance Jio's AI technologies, for example, reduced downtime by 35% in 2024 trials while maintaining 95% fault prediction accuracy. Dynamic spectrum management, based on reinforcement learning, optimizes frequency allocation, increasing bandwidth efficiency by 20% for IoT applications such as smart grids.

At the network edge, edge AI reduces latency. Convolutional neural networks (CNNs) improve beamforming in large MIMO(Multiple Input Multiple Output) systems by altering antenna layouts to keep signal intensity consistent in dense metropolitan settings. Airtel's 5G deployments in Mumbai have reported 15% coverage increases. AI-enabled network slicing generates virtualized portions for low-latency gaming and high-throughput industrial IoT. Customer engagement is also beneficial: Natural Language Processing (NLP) powers BSNL's chatbots, which answer 90% of queries, while recurrent neural networks (RNNs) anticipate customer churn with 88% accuracy, thereby supporting retention initiatives.

AI has high energy demands, with 5G base stations requiring 10-15% extra power for AI computation. Federated learning minimizes energy and privacy problems by training models locally. AI-based intrusion detection and quantum-safe encryption help to mitigate cybersecurity concerns such as adversarial assaults.

AI is the foundation of modern telecommunications, enabling efficiency, resilience, and customisation. As 6G envisions AI-native networks, IETE's AMIETE and DIPIETE programs, which focus on AI and signal processing, train engineers for these breakthroughs. The 2024 Bangalore Symposium on Next-Generation Networks, held by IETE, encouraged industry-academia collaboration. Members are encouraged to contribute to the IETE Technical Review and participate in seminars to build AI's telecom future, ensuring India's leadership in global connectivity.

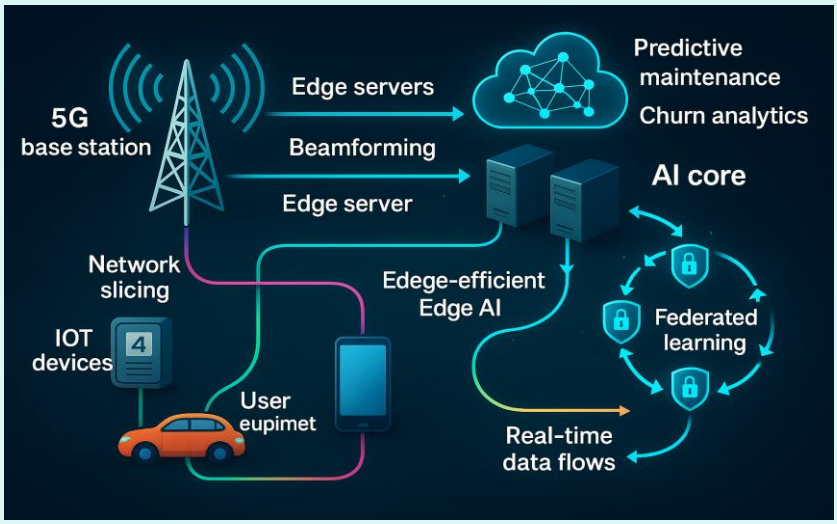


Figure:AI-optimized 5G network ecosystem

References

- IETE Technical Review, “AI for 5G Network Optimization,” Vol. 41, 2024.
- Reliance Jio, “AI-Powered Predictive Maintenance Report,” 2024.
- Airtel, “Edge AI in 5G Deployments,” Technical Whitepaper, 2025.

New Research Patterns and Issues in Dielectric Resonator Antenna (DRA) Design

Submitted by: Ritika Chouksey, VI Sem ECE

With the advent of ultra-fast, low-latency wireless communication, Dielectric Resonator Antennas (DRAs) are gaining considerable interest due to their capacity to operate effectively at high frequencies, especially in the millimetre-wave (mm Wave) and terahertz (THz) regime. As opposed to conventional metallic antennas with high conductor losses in these frequencies, DRAs use low-loss dielectric materials that offer radiation efficiency, miniaturization, and design flexibility.

This renders DRAs especially suitable for 5G/6G systems, satellite communications, wearables, and advanced radar technologies, where miniature form factors with high performance are a major requirement.

Challenges in Major DRA Construction for Deployment:

1. Precision of Fabrication of Dielectric Material

The electromagnetic response of a DRA is extremely sensitive to the accurate value of the dielectric constant (εr) and loss tangent (tanδ). Small variations during material synthesis (e.g., ceramic sintering) can cause a significant shift in resonant frequency or bandwidth.

2. Geometric Accuracy and Surface Finish

DRAs usually rely on accurate shapes—cylindrical, rectangular, or hemispherical—to support specific modes of resonance. Maintaining geometric tolerances and smooth surfaces very tightly during machining or 3D printing is challenging, especially at mm Wave and THz frequencies where even sub-millimetre imperfections become significant.

3. Bonding and Mounting Without Performance Degradation

Mounting the dielectric resonator to the ground plane or substrate is usually done by adhesives or mechanical fasteners. Preventing these from causing unwanted air gaps, parasitic, or thermal expansion problems is a not-trivial construction task.

Material Compatibility with Packaging and Substrates

DRAs have to be integrated, in many cases, with PCBs, randoms, or metal enclosures. But thermal expansion coefficient mismatches or electromagnetic behaviour mismatches between the DRA and hosting materials can impact reliability, particularly in extreme environments (e.g., aerospace or industrial IoT).

4. Integration with Feed Mechanisms in a Compact Form

The coaxial probes, aperture slots, or microstrip feeds need to be embedded in the dielectric structure or coupled by accurately controlled gaps. Mechanical assembly of these components as well as electromagnetic assembly is a tedious and faulty process.

5. Temperature and Humidity Resistance During Operation

Most dielectric materials (such as ceramics or composites) tend to absorb moisture or exhibit dimensional change due to temperature cycling. Environmental stresses can change dielectric properties, detune the antenna, and impact long-term reliability.

6. Scalable Manufacturing of Arrays and Conformal DRAs

Whereas single-element DRAs are easily prototyped in the lab, increasing to array topologies or conformal shapes needs reproducible, affordable manufacturing processes—something that existing ceramic and composite fabrication techniques fail to provide.

Scope for Future Research:
In order to address these challenges and realize the full potential of DRAs, some research directions are emerging:

1. Additive Manufacturing of DRAs
3D printing technologies for high-εr, low-loss dielectric materials can enable more accurate, tunable, and scalable antenna shapes.

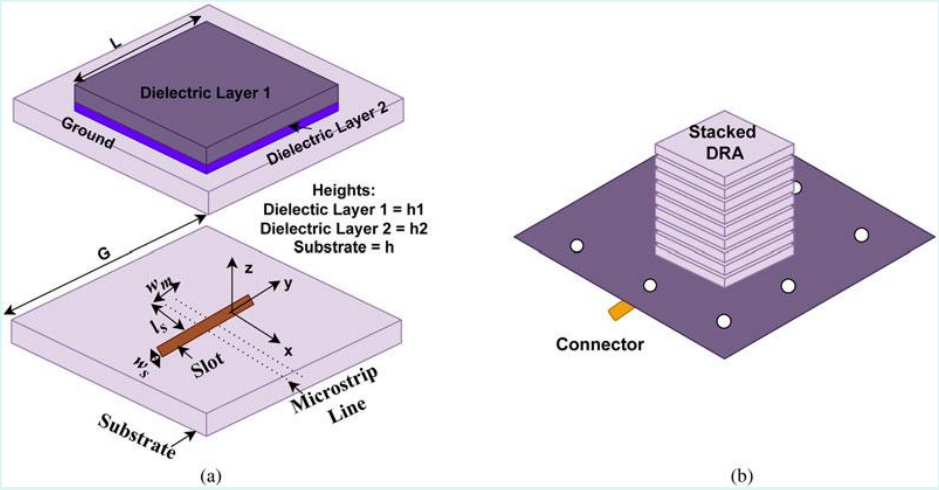
2. Flexible and Biocompatible DRAs
Investigating polymer-ceramic composites and biocompatible dielectrics can enable wearable antennas and implantable biomedical sensors.

3. Self-aligning Feed Structures
Designing an integrated feed system which is capable of auto-tuning or self-alignment during assembly can reduce performance variability and simplify manufacturing.

4. Smart Packaging and Environmental Coatings
Developments in nano-coatings or self-healing materials can enhance resistance to humidity, thermal cycling, and chemical exposure in extreme environments.

5. AI-Assisted Manufacturing Optimization
Employing AI and ML algorithms for deformation prediction, feed placement optimization, and automatic quality control has the potential to minimize error margins throughout fabrication dramatically.

6. Conformal and Multi-layered DRAs for Aerospace Applications
Light, curved DRA arrays with customized resonance for drone and satellite systems are a hot research topic, providing a compromise between efficiency and aerodynamic performance.



(a) High gain stacked DRA with microstrip coupled slot. (b) An anisotropic stacked DRA