KAMMAVARI SANGHAM (R) - 1952

K S INSTITUTE OF TECHNOLOGY

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One Day Academic Visit to Centre of Excellence (COE)

R V College of Engineering, Bengaluru on "Real-time Exposure to Emerging Technologies"

22nd April 2025

In association with

Academic visit Report

Venue: R V College of Engineering, Bengaluru

Date of workshop: 22nd April 2025

Faculty attended: Mr. Satish Kumar B & Mr. Naveen Kumar S

Total no of participants: 50

Department of Electronics and Communication Engineering under **IETE student's forum**, **IEEE, ISTE and IEI** in association with **IIC** (**Institution Innovation Council**) organized one day academic visit to **R V College of Engineering, Bengaluru on "Real-time Exposure to Emerging Technologies"**

Objectives:

1. **To motivate students to upgrade the knowledge on emerging technologies**
2. **To motivate students to learn simulation tools in the emerging technologies**
3. **To bridge the gap between curriculum and teaching learning process**

INTRODUCTION

As part of our academic curriculum aimed at enhancing industry interaction and providing real-time exposure to emerging technologies, Department of ECE, KSIT, Bengaluru organized an academic visit to **RV College of Engineering, Mysore Road Campus, Bangalore.** This visit was meticulously planned to bridge the gap between academic learning and practical industry applications, offering us a platform to observe, understand, and engage with cutting-edge technologies and research practices.

Throughout the visit, students were introduced to a wide range of advanced engineering domains. Began with a detailed session on **Smart Antenna Systems,** understanding their role in modern wireless communication followed by detailed session on **Electromagnetic Shaped Lens-Based Array Antennas** and **Electric Vehicle Technologies.**

The visit continued with an introduction to **Autonomous Vehicle Systems,** focusing on the use of sensors, actuators, and control mechanisms critical for self- driving technologies. Additionally, the students were explored the **Ashwa Racing Team**, learning about the design and development of Formula-style race cars by students, and finally visited the **EC Academy Maker Space Lab**, a facility fostering innovation through hands-on projects, with a particular focus on battery technologies and rapid prototyping.

This industrial visit provided us with invaluable practical exposure, broadened our technical perspective, and motivated us to pursue deeper learning and research in our respective fields. It also highlighted the importance of interdisciplinary collaboration and innovation in shaping the future of engineering and technology.

Smart Antenna Systems:

The session started with Smart Antenna Systems, where the students were given insights into their working principles and importance in modern wireless communication. Also learned that smart antennas use advanced signal processing techniques to dynamically adjust their radiation patterns, focusing signals toward the intended users while reducing interference. The session covered the two main types of smart antenna systems: switched beam and adaptive arrays. This exposure helped us understand how smart antennas enhance network capacity, signal quality, and coverage, making them essential for technologies like 5G, Wi-Fi, and satellite communication.

EM based shaped lens array antennas:

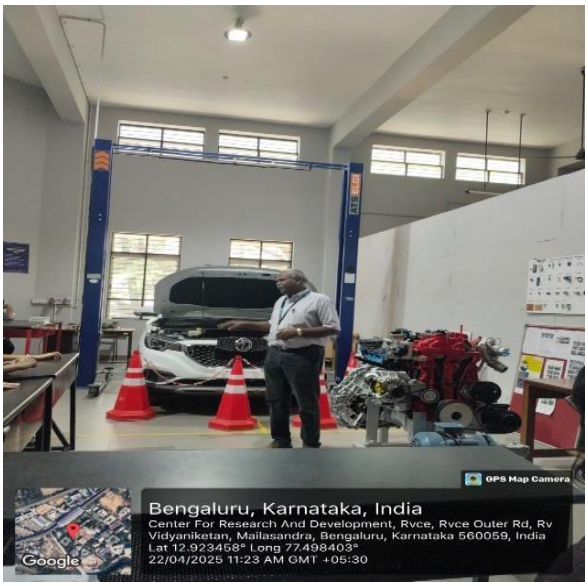
Next, we were introduced to EM-based Shaped Lens Array Antennas, where we gained insights into their structure and applications. These antennas use specially designed electromagnetic (EM) lenses to focus and direct radio waves efficiently. The shaped lens helps in controlling the beam direction and improving signal strength with minimal loss. We learned that lens-based array antennas offer high directivity, wide bandwidth, and are particularly useful in satellite communication, radar systems, and next-generation wireless networks. The session highlighted how EM lens technology simplifies complex antenna designs while achieving better performance compared to traditional arrays.

MG Electric Vehicle:

Following this, we explored the MG Electric Vehicle section, where we were provided with detailed insights into electric vehicle technology, specifically focusing on MG's advancements. We learned about the major components including the high-capacity lithium-ion battery pack, typically rated around 40–50 kWh, which provides an impressive driving range on a single charge. The battery is designed with advanced Battery Management Systems (BMS) ensuring safety, efficient thermal management, and longer life cycles.

The electric motor specifications were also discussed — MG electric vehicles generally use permanent magnet synchronous motors (PMSM), capable of delivering power outputs of around 100–150 kW (equivalent to approximately 134–201 horsepower) and offering instant torque for rapid acceleration. The system also incorporates regenerative braking to recover energy during deceleration, further improving overall efficiency. Additionally, the session highlighted fast-charging capabilities, with the vehicles supporting DC fast charging that can charge the battery up to 80% in about 30–40 minutes. Other features such as vehicle connectivity, advanced driver-assistance systems (ADAS), and smart energy recovery mechanisms were also discussed, showcasing MG's commitment to innovation, sustainability, and performance in the electric vehicle sector.

This session helped us understand not just the working principles of EVs but also the engineering challenges and innovations driving the future of green mobility.



Ashwa Racing:

Next, we visited the Ashwa Racing section, where we were introduced to the student-led team specializing in the design and fabrication of Formula-style race cars. Ashwa Racing, one of India's premier Formula Student teams, represents RV College of Engineering at national and international competitions like Formula SAE.

During the session, we gained insights into the complete vehicle development process, including conceptual design, computer-aided design (CAD) modeling, structural analysis, aerodynamics, powertrain integration, and manufacturing techniques. The team demonstrated how they build lightweight chassis systems using materials like carbon fiber and high-strength alloys to achieve superior performance and safety standards.

We also learned about their electric vehicle project, where they are developing fully electric race cars equipped with high-performance lithium-ion battery packs, custom-built electric motors, and efficient cooling systems. Key aspects such as battery capacity (typically 5–7 kWh for race applications), motor power ratings (around 80–100 kW), torque distribution, and regenerative braking strategies were explained in detail.

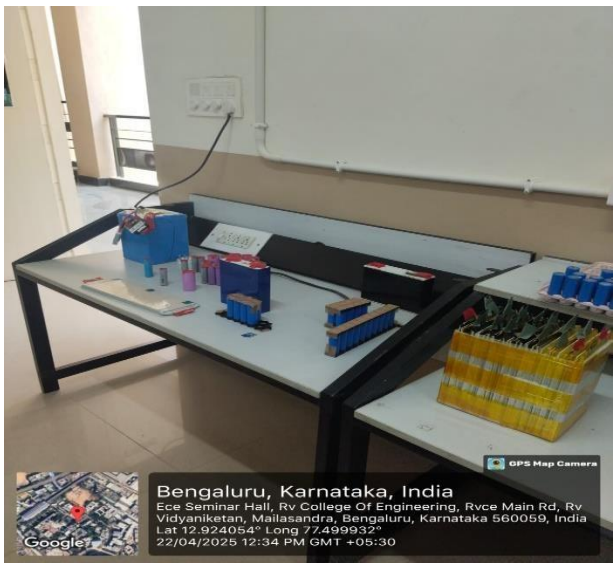
Autonomous Car Manual:

Next, we delved into the Autonomous Car Manual, where we learned about the key components enabling self-driving vehicles. Autonomous cars rely on a combination of sensors—such as LiDAR, radar, ultrasonic sensors, and high- definition cameras—to perceive their surroundings and collect real-time data. These sensors work together through sensor fusion to provide a comprehensive view of the environment, enabling safe navigation and decision-making.

We also explored the role of actuators, including steering, braking, and throttle actuators, which control the vehicle's movement based on inputs from the vehicle's control system. These actuators are critical in ensuring the vehicle can adjust its speed, direction, and stop as needed.

The session highlighted the importance of the manual override system, which allows human intervention if the autonomous system encounters uncertainties. We also learned about the levels of autonomy defined by the SAE, ranging from Level 1 (driver assistance) to Level 5 (fully autonomous). This exploration helped us understand the complexity and integration of sensors, actuators, and control systems in the development of autonomous vehicles.

EV Academy Maker Space:



We then visited the EC Academy's Maker Space Lab, where we were introduced to a dynamic environment designed to encourage innovation and hands-on learning in electronics and hardware development. The lab is equipped with cutting-edge tools like 3D printers, CNC machines, oscilloscopes, soldering stations, and circuit design software, enabling students to prototype, design, and tests their ideas.

A significant focus of the session was on battery technologies and their integration in various projects. We learned about different types of batteries used in electronic devices, including lithium-ion and lead-acid batteries, and how they are employed in prototype designs for robotics, renewable energy systems, and electric vehicles. The lab also provided insights into the design of battery management systems (BMS), which are critical for ensuring safe operation, longevity, and performance in battery-powered systems.

The Maker Space promotes practical experimentation with various components, from microcontrollers to actuators, and the importance of efficient power management. We observed how teams work collaboratively on projects involving energy storage solutions and their applications in IoT devices and electric mobility. The session emphasized the value of such labs in honing practical skills and fostering innovation in emerging technologies.

Library:

During the visit, we also had the opportunity to explore the library of RV College of Engineering, which stands out as a center of academic excellence and resourcefulness. The library is spacious, beautifully designed, and offers a serene environment ideal for focused learning and research. It is well-equipped with an extensive collection of books, journals, research papers, technical magazines, and digital resources covering a wide range of engineering, science, management, and humanities subjects.

The library features modern facilities including digital libraries, online databases, e-books, and access to reputed international journals. It provides separate reading spaces for undergraduate, postgraduate, and research students, along with discussion rooms for collaborative learning. The library is fully computerized, with an efficient cataloging system, enabling students to easily access and borrows resources.

CONCLUSION

The industrial visit to RV College of Engineering was an immensely enriching and inspiring experience. It provided us with valuable exposure to emerging technologies, innovative research, and practical applications across multiple domains such as smart antenna systems, electric vehicles, autonomous vehicles, and advanced prototyping. The sessions helped bridge the gap between theoretical learning and real-world practices, motivating us to deepen our technical skills and knowledge.

We would like to express our heartfelt gratitude to our KSGI management, CEO **Dr. KVA Balaji** sir, **Dr.PN Sudha** madam, HOD ECE, the department faculty, and the industrial visit coordinators Dr.Dinesh Kumar D S & Mr.Satish Kumar B for organizing this visit and giving us the opportunity to explore one of the premier engineering institutions in the country.

We are also thankful to the faculty and staff of RVCE for their warm hospitality, informative sessions, and efforts in making this visits a truly memorable and educational experience. Such initiatives play a vital role in shaping our academic and professional journeys, and we look forward to many more such opportunities in the future

Outcomes of the visit:

- Learning about technological innovations in the field of design, development, assembly & integration of communication, navigation and remote sensing applications
- Gaining the knowledge about various smart antennas developed and their use in wireless communication
- Gaining the knowledge about design of Electric vehicles used in automotive sector

Mapping of FDP with PO'S and PSO'S

Program	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1
Industrial /Acadenic visit	-	-	-	3	-	-	-	-	3	3	2	2	2

- **PO4:** Participants can identify complex problems for project work
- **PO9:** Individual & Team work
- **PO10:** Participants can communicate effectively by gaining knowledge about antennas and electric vehicle design
- **PO11:** Project Mgmt. & Finance
- **PO12:** Participants can apply the basic knowledge in lifelong learning.
- **PSO1:** Participants are able to understand and apply communication tools to various fields of Radar, Antenna and satellite communication and electric vehicles

Industrial visit coordinators

Dr. Dinesh Kumar D S

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