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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EXPLORE, DREAM, DISCOVER

ISSUE 63 MONTHLY NEWSLETTER JUNE 2023

GENESIS

IGNITING THOUGHTS

Contents

Vision

- To be recognized at the national and international level for excellence in education and research in Electronics and Communication Engineering.

Mission

- Inculcating leadership qualities, adaptability, and ethical values
- Imparting quality education in the field of electronics, communication, and related areas to meet the challenges in the industry, academia, and research
- Nurture the growth of each individual by providing a dynamic and conducive learning environment.

DEPARTMENTAL ACTIVITIES

SAMAVARTHANA 2023- GRAND FINALE

The Grand Finale " SAMAVARTHANA 2023" the Passing Out Ceremony of our 2019-23 B.Tech, 2020-23 MBA & M.Tech batches was conducted on 27/06/2023 at College Central Courtyard. The Chief Guest for the event was Dr. R Velraj, Vice Chancellor, of Anna University. The ceremony brought together a diverse community of students, faculty, parents, and esteemed guests to celebrate their accomplishments and honor their hard work and dedication.

INDUSTRY-INSTITUTE INTERACTION

On June 21, 2023, a project discussion took place at ASIET Campus, involving prominent experts Dr. Seema and Dr. Muralidharan from the Centre for Materials for Electronics Technology (C-MET), Thrissur. C-MET functions as an autonomous scientific society under the Ministry of Electronics & Information Technology (MeitY), Government of India. The purpose of the discussion was to explore various aspects related to Technology Business Incubation (TBI), funding opportunities, and fostering entrepreneurial endeavors. The meeting included key participants such as Dr. Sripriya, Principal of ASIET, Dr. Ajay Kumar, Head of the Department of Electronics and Communication Engineering (ECE), Prof. Manesh, Head of the Department of Computer Science and Engineering (CSE), Professor P.V. Rajaraman, Head of the Department of Computer Science and Engineering (Artificial Intelligence), and Prof. Albins Paul, Assistant Professor, Department of Electronics and Communication Engineering (ECE).

PROJECT EXHIBITION-ASPEREN

Exhibition and competition of students' projects from Adi Shankara Institute of Engineering and Technology (ASPRN' 23) were held on June 23, 2023, at the ASIET campus. The exhibition featured approximately 100 selected projects from final-year B.Tech students. The projects were designed by the students themselves in the various labs of the college. Some projects proposed practical solutions to some of the day-to-day problems society faces. The aim of the exhibition is to encourage innovative ideas from the students. School students had the opportunity to visit the exhibition and learn about it. About 1,500 students from various schools came to visit the exhibition.


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PROJECT EXHIBITION-AAVISHKAR

The department of Electronics and Communication engineering conducted a project Exhibition of the Final year projects. The students demonstrated the features of their projects to junior students and staff in the department.

FAREWELL TO 2019-23 BATCH- OKE-BEI

The 3rd year students of ECE Department of Adi Shankara Institute of Engineering and Technology organized a memorable farewell day to bid adieu to the 2023 pass out seniors. The event took place on 21st June 2023 and consisted of various fun activities and heartfelt moments.

The farewell day commenced with a series of fun games that were organized by the third year students of ECE Department and tailored to create an atmosphere of joy and camaraderie. These games provided an opportunity for the senior students to reminisce about their journey together and created a lively and engaging environment. Following the games, gift distribution took place. The representatives of the senior class, along with the Head of the Department (HOD) and tutors spoke a few words about the event and their 4 years of college.

The highlight of the farewell day was the cake-cutting ceremony. The representatives of the senior class, accompanied by the HOD and tutors, came together to cut a beautifully designed cake. This momentous occasion symbolized the transition from their time as students to becoming alumni of the institution.

The farewell day organized by the 3rd year students of ECE Department for the batch of 2023 students was a grand success. The event offered a mix of enjoyable activities, heartfelt moments, and opportunities for reflection. It provided the graduating students with an occasion to commemorate their journey, bid farewell to their peers and mentors, and cherish the memories made throughout their time at the institution.

CONGRATULATIONS

BEST PROJECT AWARD

Project titled "Integrated Intelligent Surveillance using Deep Learning" guided by Ms. Arya paul, Assistant professor, Dept of ECE with team members Manikandan A R, Sona Paul, Sabarinath M Sand Katharin P Jose won the best project award from the department.

BATCH OF 2019-23

Congratulations to the graduating batch of 2023. May this moment mark the beginning of a successful journey as you embark on your new chapter. Farewell and best wishes to all!

ECE A - BATCH OF 2019-23

ECE B - BATCH OF 2019-23

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WARM WELCOME

We are thrilled to introduce and warmly welcome our newest additions to the teaching team at the Department of ECE. These talented individuals bring a wealth of experience, passion, and dedication to our department, and we are excited to have them join our team.

Dr. Ramu R

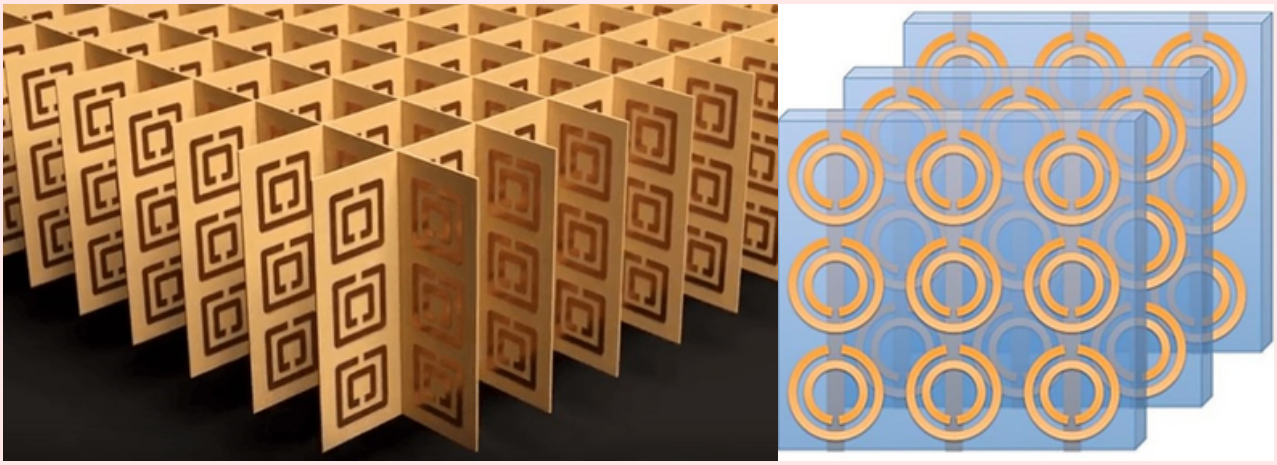
Mr. Manesh V M

STAFF ZONE

Metamaterials: The Magic Behind Modern Wireless Communication

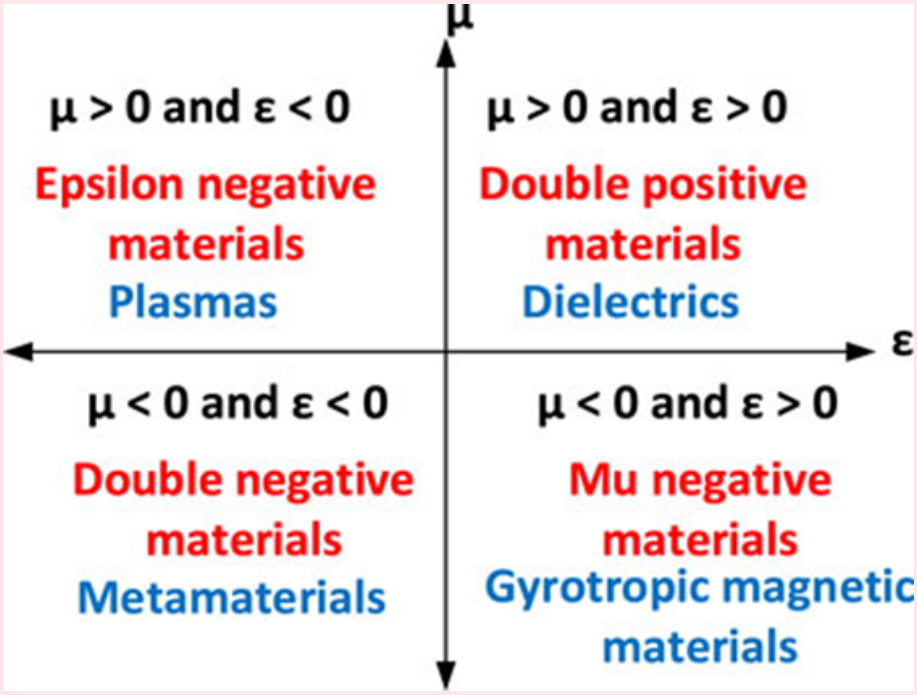
Ms. Reshma Lekshman,
Assistant Professor, Dept of ECE

Metamaterials are artificially engineered materials with unique electromagnetic properties that do not exist in nature. These materials are created by arranging sub-wavelength unit cells in specific patterns to control and manipulate the behaviour of electromagnetic (EM) waves. The term "meta" in metamaterial refers to the fact that these materials go beyond the natural properties of materials and exhibit extra-ordinary characteristics that can be precisely designed and controlled. One of the most remarkable properties of metamaterials is the ability to exhibit a negative refractive index, meaning that they can refract light or other electromagnetic waves in the opposite direction compared to regular materials.



Metamaterial structures [1]

The materials are divided into four categories based on their permittivity and permeability characteristics, which are specified in the figure classification of materials. The first group of material is named double positive (DPS) material, as both ε and μ of the material are greater than zero. This category primarily contains dielectrics. Permittivity is less than zero and permeability is larger than zero in the second category, which is why it is termed epsilon negative (ENG) material. Many plasmas exhibit these properties at certain frequency regimes. The third group materials possess a permittivity greater than zero and permeability less than zero. Gyro tropic magnetic materials display these characteristics and are called mu negative (MNG) materials. The fourth group contains the double negative (DNG) material, which can only be produced artificially. This class of material has both permittivity and permeability less than zero, or negative. When an EM wave enters such media, the direction of wave propagation reverses. No naturally available material has both negative permeability and permittivity. From the above classification, metamaterials can be defined as a special class of materials that are artificially designed to display negative permittivity and negative permeability [2]. However, with the continuous design and development of more structures with unique properties and applications, a broader definition is used to classify them as metamaterials. The metamaterial is a man-made macroscopic composite designed with a periodic cellular architecture to produce a complex interaction with electromagnetic waves to achieve the desired performance, which cannot be obtained using naturally available material.



Classification of materials [3]

The concept of metamaterials was first proposed in the late 1990's, and since then, they have become an active area of research in various fields of science and engineering, especially in electromagnetics and optics. Metamaterials have the ability to interact with electromagnetic waves in ways that traditional materials cannot, leading to a wide range of novel and practical applications.

One of the most significant impacts of metamaterials in wireless communication is their role in antenna design. By integrating metamaterials into antennas, we can create compact and high-performance devices that offer improved coverage and efficiency. Metamaterial antennas are now widely used in 5G networks, where they enable faster data rates and seamless connectivity.

In addition to their contributions in antenna design, metamaterials have unlocked new sensing and imaging capabilities. In wireless sensing applications like radar and lidar systems, metamaterials enhance resolution and target detection, enabling more accurate and reliable measurements.

Furthermore, metamaterials have also found applications in wireless security. By harnessing their electromagnetic manipulation abilities, we can create novel encryption techniques to protect wireless communication from eavesdropping and interference, ensuring secure and private data transmission.

Metamaterials have brought magic to modern wireless communication. Their unique properties and versatile applications have significantly improved antenna performance, enabled advanced beam steering, enhanced sensing and imaging capabilities, and bolstered wireless security. As research and development continue, we can expect metamaterials to continue shaping the future of wireless communication, offering exciting possibilities for even more efficient and reliable wireless networks.

References:

[1] Suresh Kumar, N.; Naidu, K.C.B.; Banerjee, P.; Anil Babu, T.; Venkata Shiva Reddy, B. A Review on Metamaterials for Device Applications. Crystals 2021, 11, 518.

[2] Walser RM. Electromagnetic Metamaterials. Complex Mediums II: Beyond Linear Isotropic Dielectrics (2001) 4467:1–15.

[3] Abdulkarim YI, Mohanty A, Acharya OP, Appasani B, Khan MS, Mohapatra SK, Muhammadsharif FF and Dong J (2022) A Review on Metamaterial Absorbers: Microwave to Optical. Front. Phys. 10:893791.

STUDENT ZONE

The Chandrayaan-3

Cristina Jisso, S2 ECA

Chandrayaan-3 is the third and most recent lunar exploration mission by the Indian Space Research Organisation, ISRO. Before the Chandrayaan-3 ISRO successfully conducted the Chandrayaan-1 and 2. It consists of a lander and the Pragyan rover similar to Chandrayaan-2, but does not have an orbiter. Its propulsion module behaves like a communication relay satellite. The propulsion module carries the lander and rover configuration until the spacecraft is in a 100km lunar orbit.

Chandrayaan 3 [1]

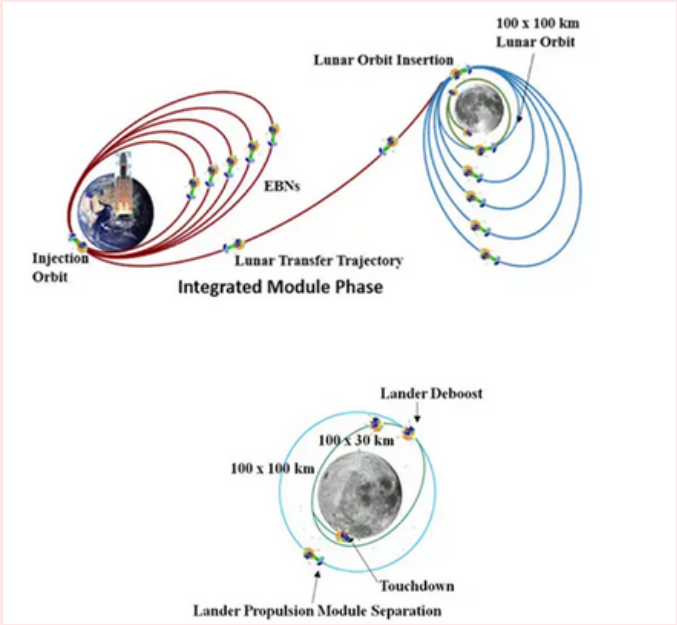
Just under four years after the launch of Chandrayaan-2, Chandrayaan-3 takes off from the Satish Dhawan Space Centre, Andhra Pradesh perched on the back of a Geosynchronous Satellite Launch Vehicle Mark III (GSLV-MK III) heavy-lift rocket, on July 14, 2023. The mission is a prime example of India's growing commitment to advancing its presence in the global space community.

According to ISRO, the Chandrayaan-3 mission has three major objectives:

1. Demonstrate a safe and soft landing on the surface of the Moon,
2. Conduct rover operations on the Moon, and
3. Conduct on-site experiments on the Lunar surface.

In 2019, Chandrayaan-2, captured the world's attention when it successfully placed the Vikram lander and Pragyan rover near the Moon's South Pole. But the mission experienced partial setbacks. The Vikram lander on Chandrayaan-2 had crashed on the lunar surface while attempting to land. Despite the mishap, it still marked a significant achievement in India's space history.

The Vikram lander of the mission is planned to soft-land on the surface of the South Pole region of the Moon on August 23 at 5.47 p.m., according to S. Somanath, Chairman of the Indian Space Research Organisation (ISRO). Mr. Somanath also said that the space agency has incorporated major improvements in the lander for the upcoming mission. This includes stronger 'legs' for the lander, the ability to withstand a higher descending velocity, and a reduction in the number of engines from five to four. "We have also increased the quantity of the propellant, and solar panels cover a larger area. New sensors also have been added," he said.

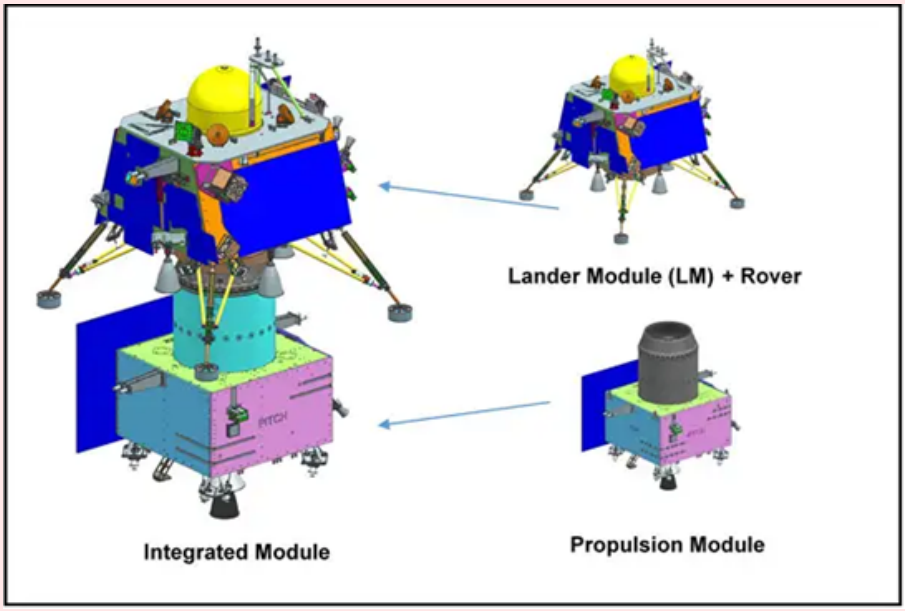


To achieve the mission objectives, several advanced technologies are present in Lander such as,

1. Altimeters: Laser & RF based Altimeters
2. Velocimeters: Laser Doppler Velocimeter & Lander Horizontal Velocity Camera
3. Inertial Measurement: Laser Gyro based Inertial referencing and Accelerometer package
4. Propulsion System: 800N Throttleable Liquid Engines, 58N attitude thrusters & Throttleable Engine Control Electronics
5. Navigation, Guidance & Control (NGC): Powered Descent Trajectory design and associate software elements
6. Hazard Detection and Avoidance: Lander Hazard Detection & Avoidance Camera and Processing Algorithm
7. Landing Leg Mechanism.

Several Lander special tests have been planned and carried out successfully to demonstrate the above-advanced technologies in earth conditions.

1. Integrated Cold Test - For the demonstration of the Integrated Sensors & Navigation performance test using a helicopter as a test platform
2. Integrated Hot test – For the demonstration of closed-loop performance test with sensors, actuators, and NGC using a Tower crane as a test platform
3. Lander Leg mechanism performance test on a lunar simulant test bed simulating different touch-down conditions.

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