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Department of Electronics and Communication Engineering

Dhritvan Space Lab

Report on AMSAT-India Expert Interaction at Dhritvan Space Lab

Date: 07-08-2025

Venue: Dhritvan Space Lab

Resource Person: Mr. Subramani B A – Founder & Director, Educational Outreach, AMSAT-India

1. Introduction

Dhritvan Space Lab organized an expert interaction session with AMSAT-India, aimed at enhancing students' understanding of amateur radio communication, satellite systems, and real-time applications in emergency communication. Mr. Subramani B A, Founder & Director, Educational Outreach, AMSAT-India, delivered an informative session covering the fundamentals of ham radio, wireless communication, satellite orbits, and practical applications in disaster management.

2. Overview of the Session

2.1 Introduction to Amateur (Ham) Radio

- Amateur Radio, commonly known as Ham Radio, is a 100-year-old hobby based on wireless communication using electromagnetic waves.
- Marconi and J.C. Bose were highlighted for their pioneering work in radio communication.
- Ham radio works even without commercial networks, making it vital during emergencies.

2.2 Importance of Ham Radio

- Works efficiently even during network failures.
- Used for one-to-one communication with no intermediaries and no commercial intent.
- Regulated by the International Telecommunication Union (ITU).
- In India, a license is required; minimum age to become an operator is 12 years.

3. Applications and Real-World Use Cases

- Ham radio played a crucial role during the 2004 Tsunami in East Coast India.
- Used during the New York terrorist attacks when networks failed.
- Walkie-talkies are used by police due to direct line communication.

4. Concepts Related to Radio & Frequency

- AM – 612 kHz
- FM – 88–108 MHz
- Domestic electricity – 50 Hz
- VHF signals do not reflect from the ionosphere; hence satellites are essential.

5. Fundamentals of Satellite Communication

5.1 Satellite Orbits and Motion

- Types of orbits: LEO, MEO, GEO.
- Factors affecting satellites: solar pressure, gravity, shape.
- GEO satellites remain stationary due to synchronization with Earth's rotation.

5.2 Coordinates and Tracking

- Satellite tracking uses Azimuth and Elevation coordinates.
- Stationary satellites do not require continuous antenna movement.

5.3 Indian Satellite Systems (IRNSS – NavIC)

- IRNSS/NavIC consists of seven satellites.
- Three are in GEO and four in GSO.
- System is used for regional navigation.

5.4 Satellite Signal Characteristics

- Music bandwidth: 12.5 kHz
- Voice bandwidth: 2.5 kHz
- Satellite coverage is approximately 400 km; total bandwidth around 196 kHz.

6. Additional Key Points Discussed

- Satellite cameras should use high-resolution sensors and steering systems.
- Lower orbit satellites rise and set at different points with 14–16 minutes of visibility.
- Payloads include IR sensors for night applications.
- Transponders act as combined transmitters and responders.
- AIS and ADSB aircraft systems discussed.

7. Motivational Insights Shared

- Success requires three key qualities:
- Interest
- Involvement
- Determination

8. Important Dates Highlighted

- 23 August – National Space Day
- 28 February – National Science Day
- 3rd to 10th October – World Space Week

9. Conclusion

The AMSAT-India session at Dhritvan Space Lab provided students with valuable exposure to wireless communication, satellite principles, and amateur radio operations. The interaction enriched their understanding of real-time applications,

emergency communication, and modern space technology. The session encouraged curiosity, scientific interest, and practical learning.

Photos









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