



INDIA SPACE ACADEMY

DEPARTMENT OF SPACE EDUCATION
INDIA SPACE WEEK





Artificial Intelligence & Machine Learning in the Space Exploration

ORGANIZED BY INDIA SPACE ACADEMY



INDIA SPACE ACADEMY



India Space Academy is an academic institution under the Department of Space Education of India Space Week.

India Space Week is an autonomous body with support from central and state governments. The role of India Space Week is to promote space education and employment among the students, teachers, and research scholars of schools, colleges, universities, and institutions.

The academy develops workshops that spread awareness about the current requirements of the space industry. Also, it develops various programs to equip the students with the right information, skills, practical exposure, research exposure, and training to make them future-ready.



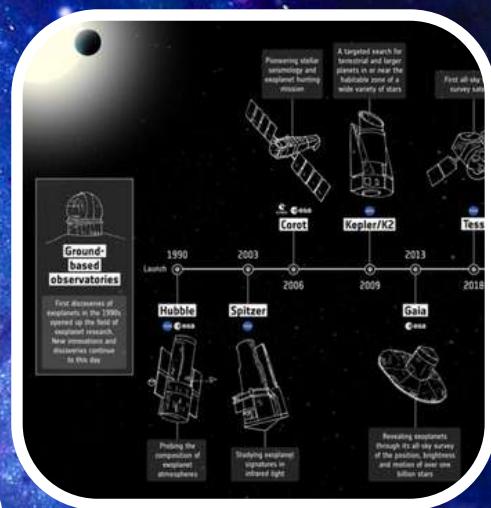
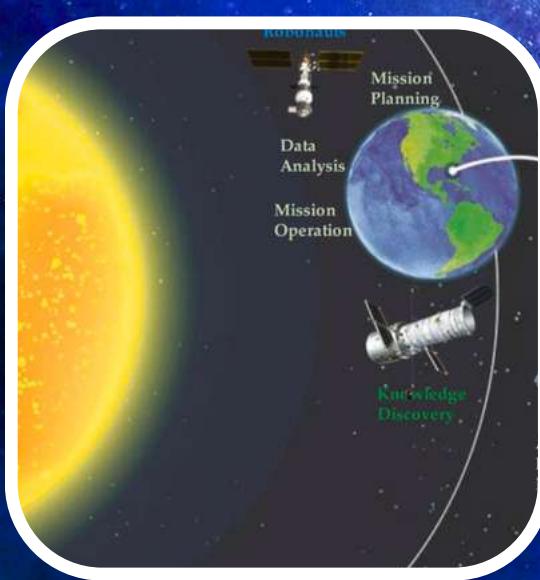


PROGRAM OVERVIEW



This specialized training program is designed to introduce students, faculty, and scholars to the practical applications of Artificial Intelligence (AI) and Machine Learning (ML) in the space Exploration. With increasing mission complexity, vast data volumes from advanced sensors, and the growing need for autonomous systems, AI and ML are becoming indispensable tools in space science and engineering.

The program provides focused instruction on applying AI/ML techniques to real-world space challenges, including mission operations, space data analysis, and onboard autonomy.





OBJECTIVES



- Apply AI & ML algorithms for mission planning and predictive maintenance
- Process and analyze space datasets for telemetry and astronomical problems using Python libraries
- Develop strategies for deploying AI onboard spacecraft under real-time constraints
- Understand implementation frameworks for AI & ML in space systems
- Examine case studies from national and international space missions





TRAINING CONTENT



Day 1 – Foundations of AI & ML in Space

- Introduction to AI & ML: Core concepts, algorithms, supervised vs. unsupervised learning.
- Space Data Characteristics: Big data from satellites, sensors, and telescopes.
- AI Ethics & Reliability: Safety-critical systems in space missions.

Day 2 – Space Exploration & Robotics

- Autonomous Rovers: Path planning, navigation, and decision-making.
- Robotic Arms & Manipulators: AI-driven control for ISS and planetary missions.
- Human-Robot Collaboration: AI-assisted astronaut support.

Day 3 – Satellite Operations

- AI in Satellite Health Monitoring: Predictive maintenance and anomaly detection
- Orbit Prediction & Optimization: ML models for trajectory planning.
- Communication Systems: AI for bandwidth allocation and signal optimization.



TRAINING CONTENT



Day 4 – Spacecraft Systems & Autonomy

- Onboard AI Systems: Real-time decision-making without ground control.
- Fault Detection & Recovery: ML for resilience in spacecraft.
- AI in Propulsion & Power: Efficiency optimization

Day 5 – Space Data Analysis & Pattern Recognition

- Remote Sensing Data: ML for Earth observation and climate monitoring.
- Astronomical Data Mining: Detecting exoplanets, black holes, and cosmic events.
- Image Recognition: AI for star maps and galaxy classification.

Day 6 – Advanced Applications & Case Studies

- Optical Communication: AI-enhanced laser communication systems.
- Mission Case Studies: ISRO's Gaganyaan, NASA's Mars missions, ESA's Gaia project.
- Future Trends: AI in space debris management, interplanetary internet, and quantum ML.



BENEFITS OF PARTICIPATION

- Exposure to emerging technologies in the space domain
- Skill development aligned with national missions such as Skill India and NEP 2020
- Opportunity to engage with experts and practitioners in AI and space science
- Strengthening academic and research credentials in frontier technologies





PROGRAM SUPERVISOR



DR. ASHOK GOPALAKRISHNAN



Chairperson at International Space University, France and Consultant to Spectragaze (An ISRO Company for Satellite Development-Private Sector)

About Dr. Ashok Gopalakrishnan

Dr. Ashok Gopalakrishnan is a senior academician and researcher with over three decades of experience in the fields of computer science, aerospace engineering, artificial intelligence, and environmental modeling, having served in key capacities at institutions such as NASA, IBM, the University of Texas at Austin, and ISRO.

He holds dual PhDs from the Georgia Institute of Technology, an MS from Oxford University, and an M.Tech from IIT Bombay.

His contributions include AI-based space mission planning systems such as Eagle Eye and CASPER at NASA, as well as ongoing research on black hole binaries supported by ISRO.

Dr. Gopalakrishnan has published over 285 research papers in reputed journals and has been recognized with awards such as the IBM WebSphere Champion (2013), the Indian Achievers Award for Excellence in Education (2017), and the Top 100 Global Leaders in Education (2019).

He currently serves as Professor Emeritus and leads multiple national space science outreach and education initiatives at the United Institute of Technology, Coimbatore, in collaboration with ISRO and other agencies.



PROGRAM DETAILS



- **Mode:** Online
- **Start Date of Registration:** 2 January 2026
- **Last Date of Registration:** 21 February 2026
- **Program Start Date:** 23 February 2026
- **Program End Date:** 28 February 2026
- **Total Duration:** 6 Days
- **Session Length:** 90 Minutes per Day
- **Session timing:** 05:00 Pm to 07:00 Pm
- **Eligibility:** Undergraduate & Postgraduate students, Faculty members, research scholars, Enthusiasts.
- **Tuition Fee (Non-Refundable):** ₹1200/- (Per Participant)
- **Certificate:** Participants will receive an official Training Completion Certificate, A Project Completion Letter and Project Evaluation Report will be given to those participants who undergoes project work.
- **Registration Link:** https://indiaspaceweek.org/ai_ml/



CONTACT INFORMATION



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