ISRO Missions List, Axiom 4, Chandrayan, Mangalyaan, Aditya L1

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The Indian Space Research Organisation (ISRO), established on 15 August 1969 under the leadership of Dr. Vikram Sarabhai, has grown into one of the world's most efficient space agencies. From its first satellite Aryabhata to complex interplanetary and human spaceflight missions, ISRO has focused on low cost, high impact science and national development. Till now, **ISRO** has completed 133 spacecraft missions and 104 launch missions, while also launching 434 foreign satellites. Its missions span Earth observation, lunar and planetary exploration, astronomy, solar science, navigation and human spaceflight, reflecting India's expanding technological and scientific capabilities.

Top ISRO Missions List

ISRO's Mission portfolio includes completed, ongoing and planned missions across multiple domains such as Earth observation, lunar exploration, interplanetary science, astronomy, solar studies, navigation and human spaceflight. Major achievements include:

- Total Spacecraft Missions: 133 (including 3 Nano and 1 Micro Satellite)
- Launch Missions: 104

- Foreign Satellites Launched: 434
- Re-entry Missions and POEMS: 9
- Satellites realised by private players or students: 18
- Other Launch missions facilitated by ISRO: 2
- Human Spaceflight Missions: 1 (Gaganyaan programme)

1. Axiom Mission 4

Axiom Mission 4 marked India's first human presence on the International Space Station through a commercial mission linked to Gaganyaan objectives.

- Mission Overview: Launched on 25 June 2025, Ax-4 enabled Indian astronaut Shubhanshu Shukla to spend 18 days aboard the ISS until 15 July 2025.
- Scientific Experiments: Experiments included studies on muscle atrophy, microbial behaviour, cognitive effects of screen exposure and crop growth under microgravity conditions.
- Strategic Importance: The mission provided hands-on human spaceflight experience supporting ISRO's independent Gaganyaan human spaceflight programme.

2. NISAR

NASA-ISRO Synthetic Aperture Radar (NISAR) is a landmark Earth observation mission jointly developed by India and the United States.

- Mission Objective: Launched on 30 July 2025, NISAR studies Earth's surface changes related to earthquakes, landslides, glaciers, forests and agriculture.
- Unique Technology: It is the world's first dual frequency radar imaging satellite using both L-band and S-band radar systems.
- Global Impact: NISAR provides high resolution data for climate change monitoring and disaster management worldwide.

3. Chandrayaan-1

Chandrayaan-1 was India's first mission to the Moon and a major breakthrough in lunar science.

- Launch Details: Launched on 22 October 2008, the orbiter entered lunar orbit on 8 November 2008 and operated until August 2009.
- Scientific Discovery: The mission confirmed the presence of water molecules on the Moon, especially near the lunar poles.
- Technological Gain: Chandrayaan-1 established India's capability in deep space navigation and lunar mission design.

4. Chandrayaan-2

Chandrayaan-2 aimed to explore the Moon's south polar region with advanced instruments.

- Mission Composition: Launched on 22 July 2019 using LVM3, it included an orbiter, Vikram lander and Pragyan rover.
- Lander Outcome: The lander crashed during descent due to a software issue, but the orbiter remains functional.
- Scientific Output: The orbiter continues mapping lunar water ice and surface mineral composition with high resolution data.

5. Chandrayaan-3

Chandrayaan-3 demonstrated India's capability for safe lunar soft landing and surface operations.

- Launch and Landing: Launched on 14 July 2023, it successfully landed on 23 August 2023 near the Moon's south pole.
- Mission Focus: The mission focused on landing and roving technology without carrying a new lunar orbiter.
- Extended Operations: The propulsion module was later shifted from lunar orbit to Earth orbit, operating till August 2024.

6. Aditya-L1

Aditya-L1 is India's first dedicated solar observatory mission.

- Mission Objective: Launched on 2 September 2023, it studies the Sun's corona, chromosphere and solar wind behaviour.
- Orbital Location: The spacecraft entered orbit around the Sun-Earth L1 point, 1.5 million kilometres from Earth, in January 2024.
- Scientific Value: Data supports understanding of solar storms and space weather impacts on Earth.

7. Mars Orbiter Mission

Mars Orbiter Mission, also known as Mangalyaan, established India as a major interplanetary power.

- Historic Achievement: Launched on 5 November 2013, it reached Mars orbit on 24 September 2014 in the first attempt.
- Cost Efficiency: The mission cost around ₹450 crore, making it one of the most economical Mars missions globally.
- Mission Duration: Operated successfully till October 2022, studying Martian atmosphere, dust storms and surface features.

8. AstroSat

AstroSat is India's first multi-wavelength space observatory for astronomy.

- Launch Details: Launched on 28 September 2015, AstroSat enables observations in visible, ultraviolet and X-ray bands.

- Scientific Coverage: It studies black holes, neutron stars, galaxies and cosmic radiation across wide energy ranges.
- Global Significance: AstroSat places India among select nations with advanced space based astronomy capability.

9. XPoSat

XPoSat is India’s first mission dedicated to X-ray polarimetry of cosmic sources.

- Mission Launch: Launched on 1 January 2024 aboard PSLV-C58 for studying high energy astrophysical phenomena.
- Scientific Targets: It observes pulsars, black hole binaries, active galactic nuclei and supernova remnants.
- Research Impact: XPoSat improves understanding of extreme cosmic environments and radiation mechanisms.

10. Gaganyaan

Gaganyaan represents India’s ambitious human spaceflight programme.

- Spacecraft Design: Developed jointly by ISRO and HAL, it is designed to carry three astronauts to low Earth orbit.
- Test Missions: Gaganyaan-1, 2 and 3 are uncrewed test flights planned between 2025 and 2026.
- Crewed Mission: Gaganyaan-4 in 2026 aims to make India the fourth nation to independently send humans to space.

11. Chandrayaan-4

Chandrayaan-4 is a planned lunar sample return mission enhancing India’s lunar exploration capability.

- Mission Timeline: Scheduled for 2027, it represents the fourth mission in the Chandrayaan programme.
- Mission Modules: It includes transfer, lander, ascender and re-entry modules for sample collection and return.
- Scientific Value: Lunar samples will provide detailed insights into Moon’s geology and evolution.

12. Venus Orbiter Mission

The Venus Orbiter Mission focuses on studying Venus’s atmosphere and surface conditions.

- Expected Launch: Planned for 29 March 2028, it will orbit Venus for long term atmospheric observations.
- Research Goals: It studies cloud dynamics, greenhouse effects and surface atmosphere interactions.
- Strategic Importance: The mission expands India’s interplanetary exploration beyond Mars and the Moon.

13. Lunar Polar Exploration Mission

Lunar Polar Exploration Mission, also known as Chandrayaan-5, is a joint ISRO-JAXA initiative.

- Mission Timeline: Planned for 2028-29, it targets the Moon’s south polar region.

- Mission Components: Includes a lander and rover designed for extreme polar conditions.
- Scientific Focus: The mission aims to study water ice and lunar resources for future human missions.

14. Bharatiya Antariksh Station

Bharatiya Antariksh Station is India’s proposed space station project.

- Development Period: Planned between 2028 and 2035, it represents India’s long term human spaceflight vision.
- Station Design: The station will weigh about 20 tonnes and orbit Earth at approximately 400 kilometres altitude.
- Operational Use: Astronauts may stay for 15 to 20 days conducting scientific experiments in microgravity.
