

Space missions: service, experiment and training

Classify space programmes by whether they navigate, dock, observe or simulate

• Four distinct space-programme roles

◆ NavIC · navigation

- ISRO’s NavIC provides regional positioning, navigation and timing services.
- Provides positioning, navigation and timing over India and a 1500 km surrounding belt.
- Uses geostationary and inclined geosynchronous satellites for continuous regional cover.

◇ Roman · observation

- Space telescopes observe above Earth’s atmosphere to avoid blurring and absorption.
- NASA’s Nancy Grace Roman Space Telescope honours the astronomer called 'Mother of Hubble'.
- Roman is designed for wide-field infrared surveys, including dark-energy and exoplanet studies.

○ SpaDeX · docking

- SpaDeX demonstrated orbital docking in 2025.
- Two satellites (Chaser and Target) rendezvoused and docked in low Earth orbit.
- Made India the fourth country with space-docking capability (after US, Russia, China).

□ HOPE · ground analog

- Analog missions test habitats, crew protocols and instruments in Earth environments.
- ISRO inaugurated the HOPE analog setup in Tso Kar Valley, Ladakh in July 2025.
- Earth analog sites reproduce selected challenges, not the full lunar or Martian environment.

REMEMBER Purposes: NavIC—navigation; SpaDeX—docking; Roman—infrared astronomy; HOPE—ground analog trials.