Please be informed that due to a few delays in launch:
-A 30-day STA was granted from January 10th to Feb. 8th 2026 (SES-STA-20250707-00772) but was surrendered.
-Another submitted filing, SES-STA-20260109-00589, was withdrawn on Jan. 12th for the same reason.
-And SES-STA-20260304-00602 was granted from from July 20th to Aug. 18th 2026
-As per latest information, launch is now planned to between Sep. 30th and Oct. 4th

Gaganyaan-1 LEOP Support from Hawaii

Mission Description:
The Gaganyaan mission, spearheaded by the Indian Space Research Organization (ISRO) and supported by ISTRAC (ISRO Telemetry, Tracking and Command Network), is India's first human spaceflight program. Gaganyaan mission is consisting of three unmanned flights (G1, G2, G3) followed by a manned mission (H1). This application covers only G1 and G2.

ISRO has comprehensive cooperation and agreements with NASA including the Gaganyaan mission. Please find appended many examples of ISRO/Gaganyaan-NASA cooperation.

Gaganyaan project envisages demonstration of human spaceflight capability by launching crew of 3 members to an orbit of 400 km for a 3-day mission and bring them back safely to earth, by landing in Indian sea waters. The objective of Gaganyaan program is to demonstrate indigenous capability to undertake human space flight mission to LEO.
Develop critical technologies such as a human-rated launch vehicle, crew escape system, and orbital module.

The LEOP support lasts for ca 7 days and testing is to start 2 weeks ahead of launch. As per latest update, the launch is now planned to take place between Sep. 30th and Oct. 4th 2026. This requested 30-day STA is to commence on Sep. 15th 2026.

Gaganyaan' s ITU name is HSPI
The frequency coordination report is attached.

S/C Gaganyaan-1

Uplink Beam Designation	Center Freq. MHz	Min Freq. MHz	Max Freq. MHz	Occupied BW [kHz]	Emission designator
SDR1, G1	2103.7	2103.52	2103.87	350	350KG2D--
SDR1, G1	2066.35	2066.18	2066.53	350	350KG2D--
SDR1, G1	2088.45	2088.28	2088.63	350	350KG2D--

SDR1, G1	2085.65	2085.48	2085.83	350	350KG2D--
SVR1, G2	2040	2038.65	2041.35	2700	2M70G1D--
SVR1, G2	2053	2051.65	2054.35	2700	2M70G1D--

Downlink Beam Designation	Center Freq. MHz	Min Freq. MHz	Max Freq. MHz	Occupied BW kHz	Emission designator
SDT1, G1	2284.56	2281.36	2287.76	6400	6M40G1D--
SDT1, G1	2268	2264.8	2271.2	6400	6M40G1D--
SDT1, G1	2244	2240.8	2247.2	6400	6M40G1D--
	2265	2261.8	2268.2	6400	6M40G1D--
SVT1, G2	2210	2207.35	2212.65	5300	5M30G1D--
	2223	2220.35	2225.65	5300	5M30G1D--

Flux Density impinging on the ground in Hawaii from Gaganyaan-1

The Flux density is calculated as: EiRP/($4\pi R$SE^2))

where RSE is the distance from spacecraft to the ground,
and EIRP is the Effective Isotropic Radiated Power of the spacecraft.

Data from the spacecraft vendor indicates that the nominal EIRP of the Gaganyaan-1 spacecraft is 0 dBW. The closest distance to earth during an overhead pass is = 408 km.

Converting 0 dBW to scalar watts = 1 Watt transmitted at
2284.56/2268/2244/2265/2210/2223 MHz

Therefore:
Flux Density = EiRP/($4\pi R$SE^2)) = $1/(4\pi(408000)^2)$

Flux density = 44. 78 × 10^{-13} Watts/meter^2
Or
Flux density = 44. 78 × 10^{-14} mW/cm^2

Inclination: 51.5 °
Apogee: 408 km
Perigee: 408 km
Number of Orbital Planes: 1

Exhibit C

I. PETITION FOR WAIVER OF SECTION 25.137 AND 25.114 AND OF THE U.S. TABLE OF FREQUENCY ALLOCATIONS

TO THE EXTENT THEY APPLY, GOOD CAUSE EXISTS FOR A WAIVER OF CERTAIN PORTIONS OF SECTIONS 25.137 AND 25.11

Universal Space Network, Inc. (USN) is provided limited legal and technical information for the Gaganyaan-1 Satellite.[1] Pursuant to Section 25.137 of the Federal Communications Commission's ("Commission" or "FCC") rules, the same technical information required by Section 25.114 for U.S.-licensed space station, and certain legal information, must be submitted by earth station applicants "requesting authority to operate with a non-U.S. licensed space station to serve the United States…"[2] USN seeks authority to support a critical event during LEOP support of Gaganyaan-1 spacecraft, and not commercial service to the United States, and thus believes that Section 25.137 does not apply.

To the extent the Commission determines, however, that USN's request for authority to provide critical spacecraft risk mitigation support on a special temporary basis is a request to serve the United States with a non-U.S-licensed satellite, USN respectfully requests a waiver of Sections 25.137 and 25.114 of the Commission's rules, to the extent that USN has not herein provided the information required by these rules. [3] The Commission may grant a waiver for good cause shown.[4] A waiver is therefore appropriate if special circumstances warrant a deviation from the general rule, and such a deviation will serve the public interest. The US public interest is supported by the sharing of collected data and cooperation with NASA in several space programs including this Gaganyaan-1 mission.

In this case, good cause for a waiver of portions of Section 25.114 exists. USN seeks authority to conduct LEOP support for Gaganyaan-1. Thus, any information sought by Section 25.114 that is not relevant to the critical support – e.g., antenna patterns, energy and propulsion and orbital debris - USN does not have. In addition, USN would not easily be able to obtain such information because USN is not the operator of the Gaganyaan-1 satellite, nor is USN in contractual privity with that operator. Rather, USN has contracted with Swedish Space Corporation, Solna Sweden (SSC) to support the LEOP operation of Gaganyaan-1 satellite.

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[1] FCC Form 312 Section B

[2] 47 C.F.R. § 25.137(a)

[3] 47 C.F.R. §§25.137 and 25.114

[4] 47 C.F.R. §1.3

Because it is not relevant to the service for which USN seeks authorization, and because obtaining the information would be a hardship, USN seeks a waiver of all the technical and legal information required by Section 25.114, to the extent it is not provided herein. As noted above, USN has provided the required information to the extent that it is relevant to the testing service for which USN seeks authorization.

Good cause also exists to waive portions of Section 25.137, to the extent the information required is not herein provided. Section 25.137 is designed to ensure that "U.S.-licensed satellite systems have effective competitive opportunities to provide analogous services" in other countries. Here, there is no commercial service being provided by the satellite; USN is providing TT&C data while the satellite is moving to its orbit. Thus, the purpose of the information required by Section 25.137 is not implicated here. For example, Section 25.137(d) requires earth station applicants requesting authority to operate with a non-U.S.-licensed space station that is not in orbit and operating to post a bond. [5] The underlying purpose in having to post a bond – i.e., to prevent warehousing of orbital locations by operators seeking to serve the United States – would not be served by requiring USN to post a bond in order to conduct the 180 days critical support of the Gaganyaan-1 satellite.

It is USN's understanding that Gaganyaan-1 is licensed by ISRO (Indian Space Agency) and the country of India. Gaganyaan-1 is spacecraft meant to serve joint India, US and international space missions (International Space Stations), with data shared with the US. Thus, the purpose of Section 25.137 – to ensure that U.S. satellite operators enjoy "effective competitive opportunities" to serve foreign markets and to prevent warehousing of orbital locations service the United States – will not be undermined by grant of this waiver request.

Finally, USN notes that it expects to communicate with the Gaganyaan-1 satellite using its U.S. earth station for a period of 10 days. Requiring USN to obtain technical and legal information from an unrelated party, where there is no risk of interference. Given these particular facts, the waiver sought herein is appropriate.

I. GOOD CAUSE EXISTS FOR A WAIVER OF THE UNITED STATES TABLE OF FREQUENCY ALLOCATIONS

USN further requests a waiver of the United States Table of Frequency Allocations ("U.S. Table") as described in section 2.106 of the rules for the frequency bands 2025 – 2110 MHz (Earth-to-Space) and 2200 – 2290 MHz (Space-to-Earth).[6] Section footnote US96 allow for non-federal Government use of these bands in the United States on a case-by-case non-interference basis. Such use by USN necessitates a waiver of the U.S. Table.

Good cause exists to grant USN a limited waiver of the U.S. Table to allow critical support LEOP operations for the Gaganyaan-1 satellite. In considering request for case-by-case spectrum uses, the Commission has indicated that it would generally grant such waivers "where there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the case-by-case operator accepts any interference from authorized services." [7] USN will coordinate with other parties operating communication systems in compliance with the Table of Frequency Allocations to ensure that no harmful interference is caused. USN seeks to operate only pursuant to special temporary authorization and thus agrees to accept any interference from authorized services. In summary, USN's

operation on a non-interference, non-protected basis support waiver of the U.S. Table.

[5] 47 C.F.R. §25.137(d)(4)

[6] 47 C.F.R. §2.106

[7] Previously approved STAs for Universal Space Network SES-STA-20020725-01174; SES-STA-20021112-02008; SES-STA-20040315-00475; SES-STA-20220512-00477

With respect to Space Launch Services

Pursuant to Section 1.3 of the Commission's rules (47 CFR § 1.3), USN respectfully requests a waiver of certain provisions of Part 25 and Part 26 of the Commission's rules to permit the licensing and operation of a satellite earth station using the 2025–2110 MHz and 2200–2290 MHz frequency bands for Part 25, telemetry, tracking, and command (TTC) operations.
Under 47 CFR § 1.3, the Commission may waive its rules for good cause shown. USN submits that:

The proposed earth station will support the Gaganyaan mission, which cannot be accommodated in other bands due to technical/operational constraints. Besides these bands have been published already by the ITU, they are also technically suitable due to their propagation characteristics and compatibility with existing ground infrastructure.

These bands have been partially reallocated to space launch services under Part 26.
As per 47 CFR § 25 section 2.106, this application would not comply without a waiver due to limitations on non-federal use or non-space launch service in these bands which currently restrict or limit the use of the referenced bands due to the reallocation referenced above.

USN believe this is in the public interest, technically feasible, non-disruptive to existing services, supporting scientific research.
It is also consistent with the FCC's goals of promoting innovation, efficient use of spectrum and being in line with FCC orders and rulemakings that support flexible use of these bands (e.g., the FCC's 2023 Report and Order on commercial space launch operations 1).

This request is also consistent with prior FCC-authorized STAs, including:

- Lynk Global, Inc. (File No. SES-STA-20220512-00477), which was granted temporary authority for TT&C in both bands;
- Space Telecommunications, Inc. (CTC-0 CubeSat, File Number: 1082-EX-ST-2024) which was granted temporary authority for TT&C in both bands.
- Geometric Energy Corporation, which received STA for TT&C in these bands for a lunar mission via a UK-based earth station.

These precedents demonstrate the FCC's established practice of granting temporary, coordinated use of these bands for TT&C under appropriate conditions.

USN request a waiver to permit temporary earth station operations and continued use of the referenced bands for Part 25 TT&C satellite communications. A waiver is necessary due to the relocation of these bands.

Summary of Technical Information
For Coordination with NTIA/FAS/IRAC

Applicant: Universal Space Network, Inc.

File No.: _____
Call Sign: No Call Sign
Special Temporary Authority ("STA")

Purpose of operation: LEOP Support of Gaganyaan-1.
Start Date: Sep. 15th, 2026 End Date: Oct. 15th, 2026

Site Location: Naalehu, HI

Latitude: 19 deg 00' 50.056" N (NAD-83)
Longitude: 155 deg 39' 47.884" W (NAD-83)

Transmit frequency: 2103.7/2066.35/2088.45/2085.65/2040/2053 MHz
Polarization: M
Antenna manufacturer: Datron
Antenna Size in meters: 13m
Antenna model: 1453
Antenna Gain Transmit: 46.3 dBi 2103.7/2066.35/2088.45/2085.65/2040/2053 MHz

Frequency Band (MHz)	Emissions	Max.EIRP (dBW)	Max.EIRP Density (dBW/4KHz)
2103.52 – 2103.87	350KG2D-	68	48.58
2066.18 – 2066.53	350KG2D-	68	48.58
2088.28 – 2088.63	350KG2D-	68	48.58
2085.48 – 2085.83	350KG2D-	68	48.58
2038.65 – 2041.35	2M70G1D--	68	39.7
2051.65 – 2054.35	2M70G1D--	68	39.7

Satellite: Gaganyaan-1

Content

India, ISRO, Gaganyaan Cooperation with USA & NASA

Boosting ISRO-NASA ISS Cooperation-Gaganyaan, downloaded on May 6th, 2025.

ISRO NASA & International Cooperation, downloaded on May 6th, 2025. Gaganyaan

NASA collaboration, downloaded on May 6th, 2025.

more India-USA and ISRO-NASA-Gaganyaan-1 Cooperation, downloaded May 19th, 2025.

https://www.financialexpress.com/business/defence-boosting-isro-nasa-iss-cooperationnbspgaganyaan-astronauts-to-ride-aboard-axiom-4nbspcrew-dragon-3572810/

Boosting ISRO-NASA ISS Cooperation: Gaganyaan astronauts to ride aboard Axiom-4 crew dragon

This collaboration will contribute to shared goals and initiatives in space, benefiting everyone involved

Written by **Huma Siddiqui**

Updated: August 3, 2024 15:25 IST

Set to launch no earlier than in October 2024, Ax-4 will build on Axiom Space's previous efforts to establish a lasting human presence in low-Earth orbit (Image: Twitter)

Axiom Mission-4 (Ax-4), a private spaceflight planned for the International Space Station (ISS), organized by Axiom Space Inc., based in Houston, Texas, will bring together a diverse crew, aiming to strengthen relationships between nations. This collaboration will contribute to shared goals and initiatives in space, benefiting everyone involved.

This 14-day mission is part of Axiom Space's ongoing partnership with NASA and marks their fourth mission, following Axiom Missions 1, 2 and 3. The mission will be launched using a *Falcon*

9 rocket from Launch Complex 39A at the Kennedy Space Center, Florida.

Set to launch no earlier than in October 2024, Ax-4 will build on Axiom Space's previous efforts to establish a lasting human presence in low-Earth orbit (LEO). The mission aims to further advance the technology and expertise required for sustainable space living.

Wholly Global Space Collaboration

Axiom-4, utilizing a SpaceX *Crew Dragon* spacecraft, will have four astronauts from several nations, showing increasing global interest in space exploration. This mission highlights the importance of international teamwork and will help boost worldwide space efforts. According to the latest reports, the prime flight crew will feature veteran astronaut Peggy Whitson from Axiom Space, US, serving as Space Commander on her fifth spaceflight.

The crew will also include Shubanshu Shukla from ISRO, India, on his first spaceflight; Sławosz Uznański from the European Space Agency (ESA), a Polish astronaut, on his inaugural mission; and Tibor Kapu Hunor from the Hungarian space agency Hunor, also embarking on his first spaceflight. As back-up members of the

crew, astronauts Michael López-Alegría from Axiom Space and Prasanth Balakrishnan Nair from ISRO, India, have been selected.

Bolstering ISRO-NASA Collaboration

During Prime Minister Narendra Modi's official visit to the US in June 2023, India and the US announced plans for a joint ISRO-NASA mission to the ISS. To achieve this goal, ISRO's Human Space Flight Centre (HSFC) has signed a Space Flight Agreement (SFA) with NASA's chosen service provider, Axiom Space Inc., for the forthcoming Axiom-4 mission to the ISS, according to ISRO.

The selected *Gaganyatri*s will begin their training for the mission in the first week of August 2024. The knowledge and experience gained from this mission will benefit India's *Human Space Program* and enhance the collaboration between ISRO and NASA in human spaceflight, according to ISRO.

An Extensive NASA-Axiom Partnership

The Ax-4 crew members will train with NASA, international partners and SpaceX for their mission. Axiom Space has hired SpaceX to provide transportation to and from the space station. The training will ensure that the private astronauts are familiar

with the *Dragon* spacecraft's systems, procedures and emergency protocols.

Axiom Space is getting NASA's help through two agreements

A Mission-Specific Contract, and A Reimbursable Space Act Agreement

What does it mean?

This means NASA will provide specific services for the mission and Axiom will pay NASA for these services.

Through the Mission-Specific Contract, Axiom Space is getting crew supplies, cargo delivery, storage and daily-use resources from NASA. The contract also includes up to seven extra contingency days on the space station. The cost of these services follows NASA's pricing policy for anything beyond the basic space station capabilities. The contract also outlines services that NASA may get from Axiom Space. These include returning scientific samples that need to be kept cold, transporting other cargo and utilizing the private astronaut mission commander's time to help with NASA science or other tasks.

Under the Space Act Agreement, Axiom Space will pay NASA for services that support the mission. These services include training for members of the crew and the use of facilities at NASA's Johnson Space Center in Houston and Kennedy Space Center in Florida. Additionally, SpaceX has a similar agreement with NASA Kennedy for launch services.

https://www.isro.gov.in/InternationalCoOperation.html

International CooperationHome / Activities / International Cooperation

Long Term Sustainability (LTS)

Space is not confined to national boundaries. Like other space agencies in the world, the Department of space is having international, presence cooperation, coordination.

International cooperation is a strategic area for a space programme because relationships with other countries are influenced by political, economic, cultural, and human personality factors as well as scientific and technological factors. India has always recognized that space has dimension beyond national considerations, which can only be addressed along with international partners. Over the years, as ISRO has matured in experience and technological capabilities, the scope for cooperation has become multifaceted. While exploratory missions beyond the earth are the natural candidates for such cooperative efforts, there are many other themes like climate change impacts on earth, space science and planetary exploration that are of interest to international cooperation because of their global impact.

International cooperation has been part of Indian space programme since inception. Establishment of Thumba Equatorial Rocket Launching Station (TERLS), conduct of Satellite Instructional Television Experiment (SITE) and Satellite Telecommunication Experiment Project (STEP), launches of Aryabhata, Bhaskara, Ariane Passenger Payload Experiment (APPLE), IRS-IA, IRS-IB satellites, INSAT series of satellites, Mission to Moon, etc., have the components of international cooperation.

ISRO is pursuing bilateral and multilateral relations with space agencies and space related bodies with the aim of building and strengthening existing ties between countries; taking up new scientific and technological challenges; refining space policies and defining international frameworks for exploitation and utilization of outer space for peaceful purposes. Internationally India is viewed by space faring nations as an emerging space power, capable of achieving its goals in a more cost effective and time-efficient manner. Specifically, the developing countries look to India for assistance in building up their capabilities to derive benefits of space technology. The scope of international cooperation has become wider and diverse, as ISRO has made tremendous progress in recent time.

Formal cooperative arrangements in the form of either Agreements or Memoranda of Understanding (MoU) or Framework Agreements have been signed with Afghanistan, Algeria, Argentina, Armenia, Australia, Bahrain, Bangladesh, Bhutan, Bolivia, Brazil, Brunei Darussalam, Bulgaria, Canada, Chile, China, Egypt, Finland, France, Germany, Hungary, Indonesia, Israel, Italy, Japan, Kazakhstan, Kuwait, Maldives, Mauritius, Mexico, Mongolia, Morocco, Myanmar, Nepal, Nigeria, Norway, Peru, Portugal, Republic of Korea, Russia, Sao-Tome & Principe, Saudi Arabia, Singapore, South Africa, Spain, Sultanate of Oman, Sri Lanka, Sweden, Syria, Tajikistan, Thailand, The

Netherlands, Tunisia, Ukraine, United Arab Emirates, United Kingdom, United States of America, Uzbekistan, Venezuela, Vietnam. Also formal cooperative instruments have been signed with international multilateral bodies like European Centre for Medium Range Weather Forecasts (ECMWF), European Commission, European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), European Space Agency (ESA) and South Asian Association for Regional Cooperation (SAARC).

Highlights of a few achievements through international cooperation

Chandrayaan-1

ISRO's maiden mission to Moon, the Chandrayaan-1, has been an exemplary example of international cooperation with its international payloads. It has also earned several national and international laurels and was instrumental in the ISRO-NASA joint discovery of water molecules on the moon surface, unattained by any of the previous missions of such nature.

Megha-Tropiques

The Indo-French joint satellite mission called MEGHA-TROPIQUES was launched in 2011 for the study of the tropical atmosphere and climate related to aspects such as monsoons, cyclones, etc. The data products from this satellite are made available to the international Scientific community.

Saral

Another joint mission with France, named SARAL (Satellite for ALTIKA and ARGOS) for studying ocean from space using altimetry was successfully launched on February 25, 2013. CNES provided a radar altimeter instrument called ALTIKA and an onboard relay instrument for the international ARGOS data collection system, while, ISRO provided the satellite platform, launch and operations for this joint mission. The data from the altimeter is currently made available to global scientific community.

Ongoing and future activities

ISRO and NASA are realizing a joint satellite mission called NISAR (NASA ISRO Synthetic Aperture Radar) for earth science studies. As part of the Indo-French cooperation, ISRO and CNES have completed the feasibility study on realizing an earth observation satellite mission with thermal infrared imager, named as TRISHNA. ISRO and JAXA scientists are conducting the feasibility study to realize a joint satellite mission to explore the moon's polar region.

As part of ISRO's prestigious Gaganyaan programme, the cooperation opportunities with countries and space agencies having expertise in human space flight are being explored. The cooperation activities are focused in astronaut training, life support systems, radiation shielding solutions etc.

Unnati

ISRO has announced an 8-week capacity building programme on nano satellite development, named as UNNATI (UNispace Nanosatellite Assembly & Training by ISRO) as an initiative of UNISPACE+50 (the 50th Anniversary of the first United Nations conference on the exploration and peaceful uses of outer space) . The programme will be conducted at UR Rao Satellite Centre (URSC) of ISRO at Bengaluru for three years. In the first batch, 30 participants from 17 countries were successfully trained during Jan 15 - Mar 15, 2019. The second batch was conducted during Oct 15
- Dec 15, 2019 and had 30 participants from 16 countries.

Participation in international bodies in the field of Space

India continues to play active role in deliberation on Scientific and Technical and Legal sub-committees of the United Nations Committee on the Peaceful Uses of Outer Space (UN-COPUOS). India also plays major role in other multilateral fora including United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP), International COSPAS-SARSAT system for search and rescue operations, International Astronautical Federation (IAF), International Academy of Astronautics (IAA), International Institute of Space Law (IISL), Committee on Earth Observation Satellites (CEOS), Committee on Space Research (COSPAR), Inter Agency Debris Coordination Committee (IADC), Space Frequency Coordination Group (SFCG), Coordinating Group on Meteorological Satellites (CGMS),International Space Exploration Coordination Group (ISECG), International Space University (ISU), Asian Association for Remote Sensing (AARS), International Society for Photogrammetry and Remote Sensing (ISPRS), etc.

Internationally, ISRO plays active role in sharing its expertise and satellite data for the management of natural disasters through various multi-agency bodies like International Charter for Space and Major Disasters, Sentinel Asia and UNSPIDER.

The Centre for Space Science and Technology Education for Asia and the Pacific (CSSTE-AP) has been set up in India under the initiative of UN Office for Outer Space Affairs (UN OOSA) and offers nine month post graduate diploma courses in Remote Sensing and Geographic Information Systems (every year), Satellite Communication (every alternate year), Satellite Meteorology and Global Climate (every alternate year) and Space and Atmospheric Science (every alternate year). After completion of the course, students have opportunity to carry out research in their own country for one year leading finally to the award of a Master's Degree from Andhra University.

The Indian Institute of remote sensing IIRS Runs few courses that are affiliated Internationally.

https://www.iirs.gov.in/internationalcollaborations

In response to the UN General Assembly Resolution (45/72 of 11th December, 1990) endorsing the recommendations of UNISPACE-82, the United Nations Office of Outer Space Affairs (UN-OOSA) prepared a project document (A/AC.105/534) envisaging the establishment of Centres for Space Science and Technology Education in the developing countries. In 1994, a UN team conducted an evaluation mission of six countries in Asia-Pacific region. Based on the report of the evaluation mission, UN-

OOSA notified India as the host country for establishment of Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP).

https://www.cssteap.org/

HTTPS://IPPMEDIA.COM/THE-GUARDIAN/NEWS/WORLD/READ/ISROS-AMBITIOUS-2025-GAGANYAAN-NASA-COLLABORATION-AND-INDIAS-LEAP-IN-SPACE-EXPLORATION-2025-01-16-161252

THE GUARDIAN

ISRO's ambitious 2025:

Gaganyaan, NASA collaboration, and India's leap in space exploration

By News Agency , Agency
Published at 04:12 PM Jan 16 2025

Gaganyaan, NASA collaboration, and India's leap in space exploration.

The Indian Space Research Organisation (ISRO) is set to continue its ground-breaking contributions to space exploration in 2025 with a robust line-up of missions.

From the much-anticipated Gaganyaan orbital test to collaborative efforts with NASA, ISRO's plans underscore India's growing prowess in space technology.

On January 9, 2025, Jitendra Singh, India's Minister of State (Independent Charge) for Science and Technology, Earth Sciences, and Minister of State for Space, chaired a high-level review of ISRO's major missions planned for 2025.

The meeting included outgoing ISRO Chairman S. Somnath, his successor V. Narayanan, and senior officials like Pawan Kumar Goenka, Chairman of IN-SPACe.

India's space programme is set for a transformative year, with ambitious projects such as the first uncrewed orbital mission under the "Gaganyaan" programme, which marks a significant step toward human spaceflight.

ISRO is gearing up for a packed schedule in the first half of 2025, showcasing its technological capabilities and fostering international partnerships.

In January, the GSLV-F15 mission will carry the NVS-02 navigation satellite to enhance the NavIC constellation, incorporating domestically developed atomic clocks to improve India's navigation and positioning systems.

February will see the GSLV-F16 mission launch NISAR, an advanced Earth observation satellite co-developed with NASA.

In March, ISRO will undertake the commercial LVM3-M5 mission to launch BlueBird Block-2 satellites for AST SpaceMobile, a U.S.-based company.

This mission highlights ISRO's expanding presence in the global space economy.

Jitendra Singh commended ISRO for its innovative advancements and its role in strengthening India's position as a leading space-faring nation.

The minister also emphasised the importance of public-private partnerships in accelerating India's space ambitions.

Gaganyaan Orbital Test: India's gateway to human spaceflight

The Gaganyaan mission represents India's ambitious foray into human spaceflight.

After the successful completion of uncrewed missions and abort tests in 2023 and 2024, ISRO plans to conduct the Gaganyaan Orbital Test in 2025. This test is a critical step toward the first crewed Gaganyaan flight.

The Gaganyaan orbital test aims to validate the spacecraft's systems under actual space conditions.

This includes testing the crew module's re-entry capabilities, environmental control systems, and emergency measures.

The test will involve placing the spacecraft into low Earth orbit (LEO) using the GSLV Mk III (also known as LVM3) rocket.

The mission will carry a suite of sensors and experimental payloads to simulate real-life scenarios for crew safety and mission efficacy.

If successful, the Gaganyaan programme will make India the fourth country to achieve independent human spaceflight capabilities, joining the United States, Russia, and China.

It also lays the foundation for India's future manned lunar and interplanetary missions.

GSLV launches: Advancing satellite deployment

The Geosynchronous Satellite Launch Vehicle (GSLV) remains a cornerstone of ISRO's satellite deployment strategy.

In 2025, ISRO plans multiple GSLV launches to bolster its communication, navigation, and Earth observation infrastructure.

These missions will include deploying advanced satellites into geostationary orbits, ensuring seamless connectivity and enhancing disaster management capabilities.

One notable mission in the GSLV pipeline is the launch of the GSAT-24A, a high-throughput communication satellite.

GSAT-24A will play a crucial role in meeting the country's growing demand for high-speed internet and broadcasting services.

Another key mission involves an advanced weather observation satellite equipped with state-of-the-art imaging technology to improve India's ability to monitor climate patterns and respond to natural disasters.

With each GSLV mission, ISRO continues to refine its cryogenic engine technology, further solidifying its position as a reliable partner in the global space launch market.

LVM3 commercial flight: Strengthening global partnerships

The LVM3, India's heaviest launch vehicle, has become a preferred choice for commercial satellite launches.

In 2025, ISRO will execute a major commercial mission using the LVM3, carrying a payload comprising satellites from multiple countries.

This mission highlights India’s growing stature in the global commercial space sector.

By offering cost-effective and reliable launch services, ISRO attracts clients from Europe, North America, and Asia.

The LVM3 commercial flight will demonstrate its versatility by accommodating satellites of various sizes and functionalities, showcasing ISRO’s adaptability to diverse customer needs.

These commercial ventures not only generate significant revenue but also strengthen India’s international partnerships in space exploration.

They contribute to the global space ecosystem while reaffirming India’s commitment to fostering global cooperation.

ISRO-NASA NISAR collaboration: Pioneering earth observation

One of the most anticipated missions of 2025 is the launch of the NASA-ISRO Synthetic Aperture Radar (NISAR) satellite.

This joint venture between ISRO and NASA marks a milestone in international collaboration for Earth observation.

NISAR is designed to provide unparalleled data on Earth's surface changes. It uses advanced radar technology to monitor natural hazards, ice-sheet dynamics, and ecosystem disturbances with unprecedented precision.

The satellite will operate in dual frequency bands, allowing it to capture high-resolution images regardless of weather conditions or daylight.

The mission’s applications are vast, ranging from agricultural monitoring and water resource management to disaster response and climate change research.

By combining the expertise of NASA and ISRO, NISAR exemplifies the potential of collaborative efforts in addressing global challenges.

India’s role in the NISAR project includes developing the satellite’s S-band radar and launching it aboard an Indian rocket.

This partnership not only strengthens India-US relations but also enhances ISRO's technical capabilities and global reputation.

A leap toward technological self-reliance

ISRO's 2025 missions underscore its commitment to achieving technological self-reliance.

The development of indigenous cryogenic engines, advanced spacecraft systems, and cutting-edge radar technology highlights India's ability to compete with established spacefaring nations.

Economic benefits

The commercial LVM3 flight is expected to generate substantial revenue, contributing to India's growing space economy.

With an increasing number of international clients, ISRO is poised to capture a larger share of the $500 billion global space market.

Global leadership in space exploration

Collaborations like NISAR and the ambitious Gaganyaan programme position India as a key player in global space exploration.

These missions showcase ISRO's ability to execute complex projects and foster meaningful international partnerships.

As India's space exploration efforts reach new heights, these missions are poised to enhance the nation's technological capabilities and reaffirm its status as a global leader in space science.

For millions of space enthusiasts, 2025 is shaping up to be a historic year for ISRO and Indian science.

Cooperation between ISRO and NASA for Gaganyaan

Source: https://www.google.com/search?q=gaganyaan-1+cooperation+with+NASA+or+USA%3F&safe=active&ssui=on

Yes, there is cooperation between ISRO and NASA for Gaganyaan. Specifically, an Indian astronaut will travel to the International Space Station (ISS) as part of a joint mission with NASA, designated as Axiom Mission 4 (AM4). This collaboration is part of a broader effort to strengthen human spaceflight cooperation between the two space agencies.

The India-U.S. TRUST Initiative, ISRO-NASA-AXIOM mission, NASA-ISRO Synthetic Aperture Radar (NISAR)..etc.

Source: https://carnegieendowment.org/posts/2025/04/the-india-us-trust-initiative-in-space-we-trust-new-horizons?lang=en

The India-U.S. TRUST Initiative: In Space We TRUST: New Horizons
One of the key areas of collaboration under the TRUST initiative, as highlighted in the joint statement, was civil space cooperation. Following the leaders' statements, this essay will explore the potential opportunities for both countries to take civil space cooperation forward.

by Tejas Bharadwaj Published on
April 23, 2025 additional links
100 Days of TRUST and Trump: Policy Recommendations for the India-U.S. TRUST Initiative

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On February 13, 2025, Indian Prime Minister Narendra Modi and United States President Donald Trump met at the White House. Prime Minister Modi was on an official working visit to the United States. A seven-page-long joint statement followed. It covered a range of issue areas for cooperation: defense, trade and investment, energy security, technology and innovation, multilateral cooperation, and people-to-people cooperation. Importantly, the "leaders announced the launch of the U.S.-India TRUST (Transforming the Relationship Utilizing Strategic Technology) initiative."

One of the key areas of collaboration under the TRUST initiative, as highlighted in the joint statement, was civil space cooperation. The joint statement described 2025 as the pioneering year for both countries in civil space cooperation with the ISRO-NASA-AXIOM mission that will place Indian astronauts aboard the International Space Station for the first time and the launch of the NASA-ISRO Synthetic Aperture Radar (NISAR) mission that will study changes to Earth's surface using L & S-band radars.

The leaders emphasized cooperation on human spaceflight missions, spaceflight safety, and working on emerging areas like planetary protection. Furthermore, there were commitments toward commercial space collaboration in areas like connectivity, advanced spaceflight, satellite and space launch systems, space sustainability, space tourism, and advanced space manufacturing. Finally, both leaders announced INDUS Innovation, replicated after the INDUS-X defense platform, to promote industry and academic participation in space.

Following the leaders' statements, this essay will explore the potential opportunities for both countries to take civil space cooperation forward under the TRUST initiative.

New Horizons: What are the Opportunities? Strengthening Human Spaceflight Cooperation

Both India and the United States have increasingly converged on human spaceflight cooperation in the last two years, aligning with their envisaged Gaganyaan and Bhartiya Antariksh Station and NASA Gateway programs,

respectively. With NASA's decision to build new space stations through private sector involvement, after the retirement of the International Space Station in 2030, the collaborative opportunities are aplenty for both countries in this area. In 2024, both countries concluded the Strategic Framework for Human Spaceflight Cooperation to deepen interoperability and facilitate advanced training for ISRO astronauts at the NASA Johnson Space Centre. Later in August, two Indian astronauts completed their initial training and familiarization sessions with various onboard systems and the spacecraft. With ISRO successfully testing rendezvous, docking, and undocking capabilities with its SPADEX mission in March and April 2025, both countries can explore opportunities for performing a joint docking mission as well as a roadmap for ISRO's participation in the NASA Gateway Program, a commitment from their June 2024 statement.

Moreover, for Indian space ecosystem to truly realize the value of investing in human spaceflight and space station to achieve socioeconomic goals, both NASA and ISRO could consider organizing a joint workshop on identifying various experiment opportunities aboard the International Space Station, end applications, and spinoff technologies, including unlocking commercial opportunities for both countries' private ecosystems to participate in such joint missions.

Collaboration on Spaceflight Safety and Planetary Protection

The leaders' joint statement expands to cover other collaborative areas of human spaceflight, such as spaceflight safety and planetary protection. Spaceflight safety encompasses the protection of astronauts and human crew module in all phases of space missions. The Office of Safety and Mission Assurance, which supervises spaceflight safety in all of NASA's programs, can consider setting up a working group with ISRO Human Space Flight Centre in Bengaluru to exchange expertise and standards on spaceflight safety. Developing a common space safety standard for joint spaceflight missions will be pertinent for both countries to expand their coordination on any joint human spaceflight missions.

Planetary protection involves the protection of celestial bodies from contamination by Earth life and Earth from any alien contamination from these celestial bodies. With the United States and India being parties to the Outer

Space Treaty, collaboration on planetary protection will be a vital part of their international obligation to prevent harmful contamination of celestial bodies as well as Earth during spaceflights or sample returns from celestial bodies. To this end, NASA's Office of Planetary Protection and Planetary Protection Center of Excellence can work with ISRO to share expertise on infrastructure and validation technology to ensure spacecraft sterilization, cleanliness, and quarantine facilities. Finally, both countries can look to set up a joint lab for planetary protection in view of its importance for joint human space flight missions as well as joint missions on sample returns from the Moon, Mars and asteroids in the future.

Unlocking the Potential of Earth Observation Through NISAR and Other Remote Sensing Programs

The NASA-ISRO Synthetic Aperture Radar (NISAR) mission, scheduled for launch in June 2025, offers an opportunity for both countries to leverage the rich datasets of Earth mapped by the dual radars. Acknowledging the benefits, NASA conducted a workshop to raise awareness for its scientific community to leverage NISAR datasets and related funding opportunities in 2022. Similarly, on April 29, 2025, ISRO's Space Application Centre (SAC), with IN-SPACe and New Space India Limited, has planned to organize a NISAR awareness workshop for Indian non-governmental entities "to inform, engage, and encourage" them to utilize NISAR's capabilities and datasets for technical and commercial opportunities to build Earth observation applications.

To expand on the workshops, both the U.S. Office of Space Commerce and the Indian Department of Space can release joint challenges under the newly proposed INDUS innovation to build applications, leveraging datasets from the NISAR mission. Furthermore, both the United States and India can look to build applications from NISAR datasets for other countries in the Indo-Pacific by roping in the private sector, complementing their vision for space under the Quad. Finally, considering that Indian space startups and companies are rapidly advancing on their Earth observation capabilities like hyperspectral imagery, synthetic aperture radar, as well as edge computing and data fusion, both countries can explore possibilities of having the Indian private sector participate in programs like NASA's Commercial SmallSat Data Acquisition Program.

This will ensure access of market for many Indian space companies that have expanded or are looking to expand their footprint to the United States while enabling NASA and the United States to benefit from these Indian technological advancements in Earth observation.

Fostering Academic and Industrial Collaboration Through INDUS Innovation Considering that the joint statements emphasized on commercial space collaboration in connectivity, advanced spaceflight, satellite and space launch systems, space sustainability, space tourism, and advanced space manufacturing, these areas can be pursued under the newly announced INDUS Innovation.
Replicating the INDUS-X, a defense innovation bridge that has led to several accelerators and academic and private sector collaborations between Indian and
U.S. defense innovation ecosystems, the INDUS Innovation can serve as a space innovation bridge to foster commercial space collaboration in the aforementioned areas between both countries.

Easing Restrictions on Exchange of Communication Between Indian and U.S. Companies Under the Same Holding
Both countries initiated the India-U.S. Strategic Trade Dialogue in 2023 to address long-standing barriers to strategic trade and technology and industrial cooperation, including in commercial and civil space sectors. Currently, following India's space sector reforms in 2020, many Indian companies and startups are expanding to the United States.

Amidst these developments, these Indian startups find it difficult to communicate or exchange information with their U.S. counterparts owing to International Traffic in Arms Regulations (ITAR) compliance. Such restrictions will curb technological collaboration between both countries' commercial space sectors, a goal envisioned by the leaders' joint statement. Pursuantly, the India-
U.S Strategic Trade Dialogue may look to address these concerns and ease restrictions on the exchange of communications between Indian and U.S. entities of the same holding company.

Conclusion

The India-U.S. civil space cooperation under the TRUST initiative represents opportunities for both countries to deepen their ties built on mutual trust and build technologies for a better future. Strengthening human spaceflight cooperation and collaborating on remote sensing programs and applications—not only for themselves but also for the world—will yield significant benefits and capacities for the global community to address global challenges. Most importantly, leveraging the respective private space sectors through the recently launched INDUS Innovation promises growth for both countries' space industries. Easing restrictions on the exchange of communications between Indian and U.S. companies of the same holding will catalyze commercial collaboration.

Tejas Bharadwaj
Senior Research Analyst, Technology and Society Program

Gaganyaan must trigger more iCET-like bilaterals

Source: https://www.orfonline.org/expert-speak/gaganyaan-must-trigger-more-icet-like-bilaterals#:~:text=In%20a%20pathbreaking%20announcement%20by%20the%20Minister,is%20scheduled%20for%20launch%20in%20October%202024.

Gaganyaan must trigger more iCET-like bilaterals Author :
Chaitanya Giri
Expert Speak Space Tracker
Published on Aug 08, 2024 Gaganyaan Must Trigger More Icet Like Bilaterals As India treads on the path of expanding its human spaceflight diplomacy, it will be fructifying for it to work on a few iCET-like bilateral initiatives with other countries

Gaganyaan must trigger more iCET-like bilaterals
Call it a tale of two 'Axioms'—'Axiom Research Labs', better known as Team Indus, founded in 2010 in Bengaluru; and the second, 'Axiom Space', founded in 2016 in Houston. Both are related to the India-United States (US) space cooperation, and both intend to play in the realms of emerging global cis-lunar

architecture. The Indian Axiom was built by Indians, but due to a lack of opportunities for commercial space entities, back in 2017, it got assimilated into the US commercial space ecosystem. The American Axiom was built by American and international talent who were magnetically attracted to the flourishing US commercial space sector. The story and fate of both entities call for an analysis as India is on the cusp of reaching an important milestone on the path of its human spaceflight diplomacy.

In a pathbreaking announcement by the Minister of State, Dr Jitendra Singh, the Indian Space Research Organisation (ISRO) has signed a Space Flight Agreement with Axiom Space as part of a joint mission with the National Aeronautics and Space Administration (NASA), to transport one Gaganyatri (Indian astronaut) to the International Space Station.

The Indian Gaganyatri—prime candidate Group Captain Shubhanshu Shukla or reserve candidate Group Captain Prasanth Nair (both from the Indian Air Force)—will pilot the mission, which is now designated as Axiom Mission 4 (AM4) and is scheduled for launch in October 2024. The spacecraft commander is the former Chief of the US Astronaut Office, Peggy Whitson, who, at present, is the world's longest space-residing astronaut. The mission would be joined by two non-career astronauts from Poland and Hungary. AM4 is among the crucial precursor missions for Axiom Space as it prepares to launch three modules of its space station in the next five years—the first module branching from the existing ISS structure. In the long run, Axiom Space intends to raise and operate a commercial space station.

The Indian Gaganyatri—prime candidate Group Captain Shubhanshu Shukla or reserve candidate Group Captain Prasanth Nair (both from the Indian Air Force)—will pilot the mission, which is now designated as Axiom Mission 4 (AM4) and is scheduled for launch in October 2024.

Since the announcement of India's human spaceflight programme, and in particular, the Gaganyaan mission in 2018, ISRO has received cooperation on space medicine from the French space agency, CNES, and spaceflight training by the Russian Roscosmos. The US was conspicuously absent on these matters despite an active India-US Joint Working Group on Civil Space Cooperation,

established in 2005. The Working Group tremendously helped the Indian Chandrayaan missions, but it had no human spaceflight component. Later, in 2014, after the near-simultaneous launch of ISRO's Mars Orbiter Mission and NASA's Maven spacecraft to Mars, both ISRO and NASA established the Mars Working Group, but no human spaceflight component was attached. The missing element of the bilateral space cooperation demanded convergence of political visions that are beyond the remit of national space agencies. That role was best suited for the National Security Advisor position in both nations.

As is evident from the bilateral space cooperation, human spaceflight requires the convergence of talents from civilian space and scientific agencies, defence establishments, and commercial entities. Space agencies do not have powers vested in them to bring these cohorts together. In the US, it is the National Space Council within the Executive Office of the President of the United States that has this converging ability.

In India, it is the Space Commission within the Prime Minister's Office that has the ability. And in both these bodies, the professional position with the convening power is that of the National Security Advisor. To that end, the NSA-led US-India initiative on Critical and Emerging Technology (iCET), established in May 2022, gave tremendous emphasis on human spaceflight, commercial lunar exploration, and commercial space partnerships, something that was not possible within the ambits of their civil space cooperation framework.

Given the natural affinity between India and the US tech ecosystems, it is natural for the bilateral to proceed exceedingly well compared to any of India's space cooperation bilaterals. However, in the long run, India will have to chart its course when it comes to making the domestic commercial space ecosystem globally competitive.

Given the natural affinity between India and the US tech ecosystems, it is natural for the bilateral to proceed exceedingly well compared to any of India's space cooperation bilaterals.

When it comes to the space sector, the US is a resource magnet, attracting talent and investments. The case in point is the Indian company Axiom Research Labs

(ARL) or Team Indus. It participated in the 2010 Google Lunar X Prize contest and was among the finalists selected in this contest to launch its in-house built lander and rover. Despite its success, ARL did not find much traction for its futuristic services in India prior to 2018. But the US ecosystem found it useful and ARL moved its attention to the NASA Commercial Lunar Payload Services (CLPS) programme that contracts companies partaking in the development of payloads assisting exploration of the lunar south pole, extraction of resources, and developing technologies necessitated for long-duration lunar habitation. On different occasions, it partnered with American companies OrbitBeyond and Ceres Robotics, both interested in CLPS and intending to share its expertise and intellectual property. India's lunar exploration programme was too nascent to then accommodate ARL's commercial services.

Likewise, the US has created the Artemis Program for the same purpose of attracting financial, human resource, and technological resources that its partner countries generate. China thinks the same when it attracts international partners to side with its International Lunar Resource Station megaproject. The unhealthiness comes from the inability of Indian private players to undergo the experiential learning that happens when they work with space ecosystems of various countries. This experience with multiple players is extremely crucial from the standpoint of strategic autonomy.

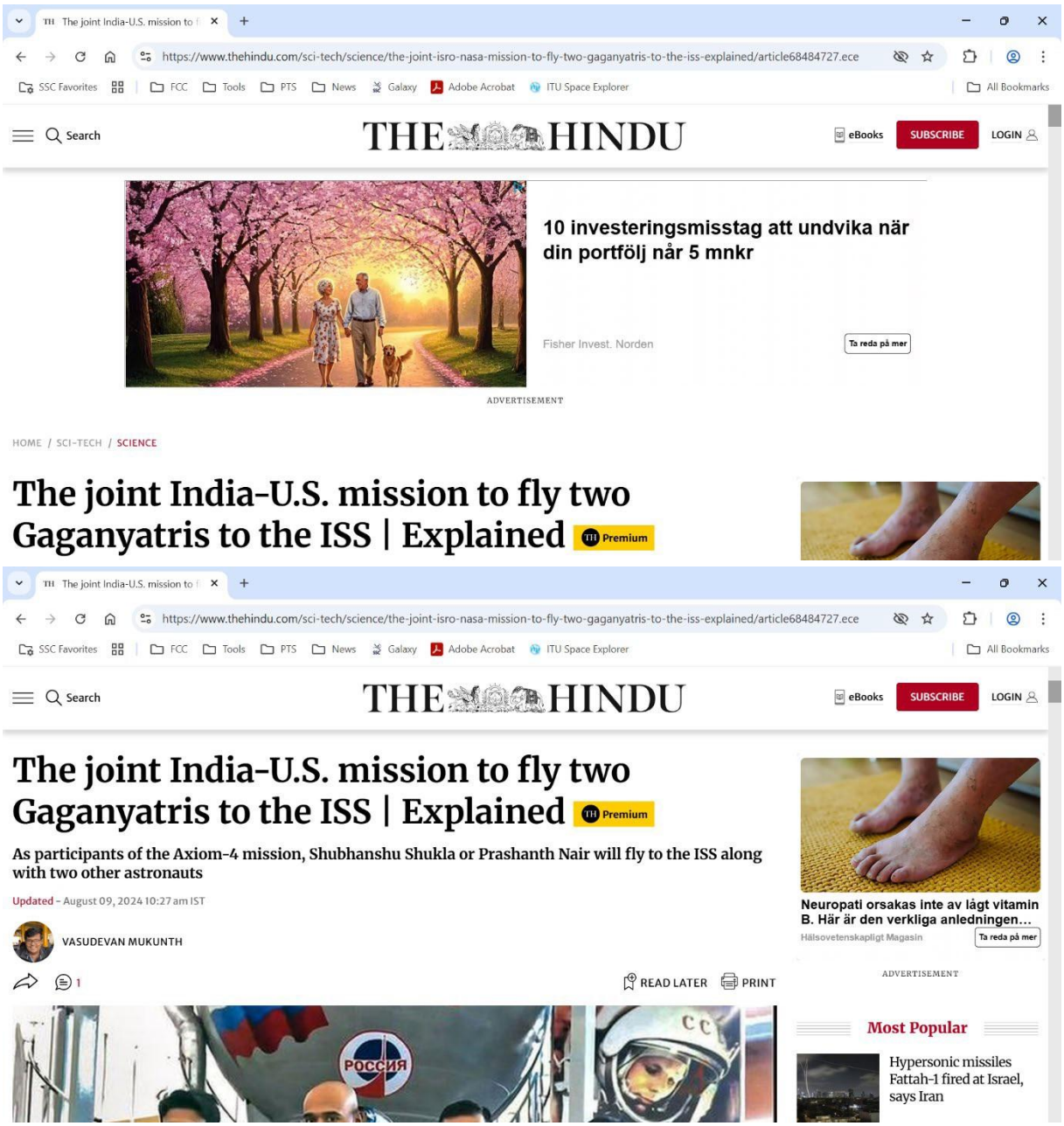
India's human spaceflight diplomacy, at a space agency level, is not one-sided. It has engagements with Paris through the India-France Strategic Space Dialogue and Moscow through the India-Russia Special and Privileged Strategic Partnership. As India proceeds with the R&D of the Bharatiya Antariksh Station (BAS), it will definitely have to avail commercial space partnerships with entities emerging from countries across geopolitical blocs. Just like AM4 is carrying Hungarian and Polish astronauts, India will also have to bring astronauts and the commercial ecosystems of their countries to its BAS fold.

India's human spaceflight diplomacy, at a space agency level, is not one-sided. It has engagements with Paris through the India-France Strategic Space Dialogue and Moscow through the India-Russia Special and Privileged Strategic Partnership.

India’s partnership with the US ecosystem is undoubtedly helpful. Still, if India intends to engage multi-country astronauts on the BAS, it will have to plug its human spaceflight diplomacy—and through it, its civil, commercial, and defence ecosystems—crisscrossing international geopolitical blocs. Let us not assume this to be merely a peaceable overture. The core of human spaceflight diplomacy is to ensure operational interoperability, psychosocial familiarity with diverse, competent cohorts working in the extreme, demanding and confined environments of outer space, and always developing commercially available contingencies with various partners in the network. Treat these like the military exercises that our forces engage in.

India’s ability to work with compatible partners on human spaceflight will be an indicator of our high-tech strategic autonomy. That strategic autonomy is not restricted to the realms of ISRO; it extends into our commercial space ecosystem. It will be fructifying for India to work on a few other iCET-like bilateral ‘human spaceflight’ initiatives with other countries. After all, Indian commercial space entities must be enabled to get into the global human spaceflight and cis-lunar architecture business and become multinational giants.

Chaitanya Giri is a Fellow with the Centre for Security, Strategy, and Technology at the Observer Research Foundation.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As participants of the Axiom-4 mission, Shubhanshu Shukla or Prashanth Nair will fly to the ISS along with two other astronauts
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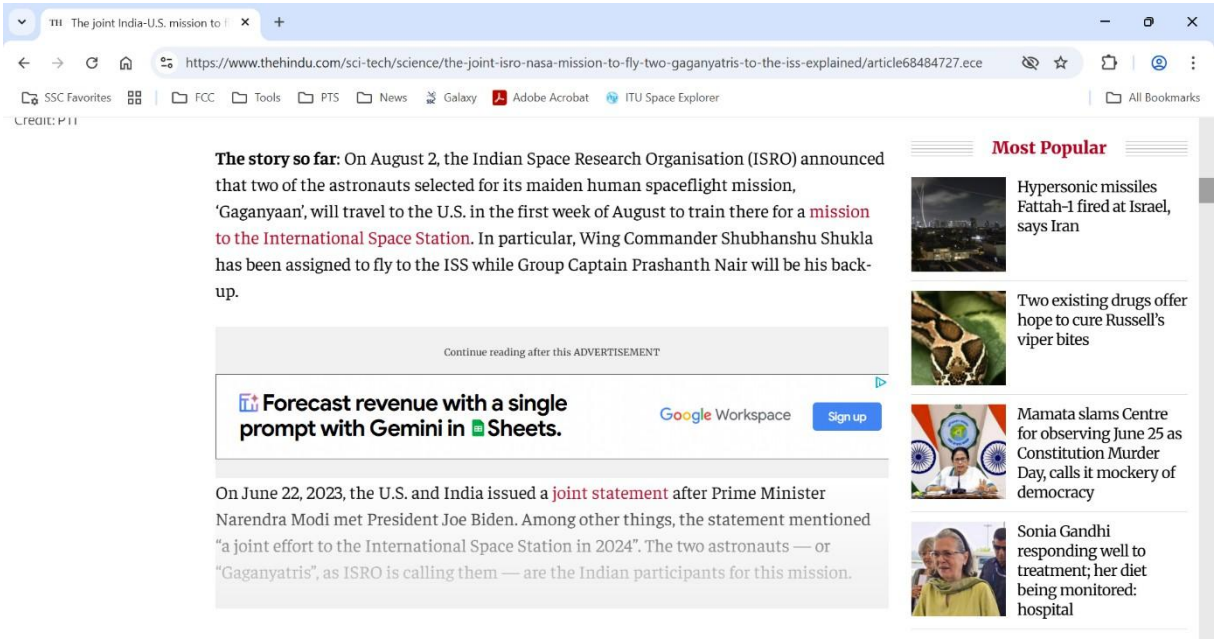

Credit: PTI

The story so far: On August 2, the Indian Space Research Organisation (ISRO) announced that two of the astronauts selected for its maiden human spaceflight mission, 'Gaganyaan', will travel to the U.S. in the first week of August to train there for a mission to the International Space Station. In particular, Wing Commander Shubhanshu Shukla has been assigned to fly to the ISS while Group Captain Prashanth Nair will be his back-up.

On June 22, 2023, the U.S. and India issued a joint statement after Prime Minister Narendra Modi met President Joe Biden. Among other things, the statement mentioned "a joint effort to the International Space Station in 2024". The two astronauts — or "Gaganyatris", as ISRO is calling them — are the Indian participants for this mission.

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