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GAGAN

Vol.5
February 2025

ISRO Achieves Historic Milestone Successful Docking of SDX-01 and SDX-02 Satellites

ISRO launches historic 100th mission from Sriharikota

New Glenn Ascend A New Era in American Spaceflight

GAGAN

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GAGAN is a **monthly magazine** about astronomy and space science published by **PSIT VYOMNAUTS** targeting amateur astronomers. Each issue includes astronomy news, spacelaunches, what's up in the sky every month, events and announcements done by the space team, astrophotographs and articles on astronomy and astrophysics submitted by readers for the general audience, and articles about historical missions and events of astronomy and more. This comes in an easy-to-understand, user-friendly style that's perfect for astronomers at any level.

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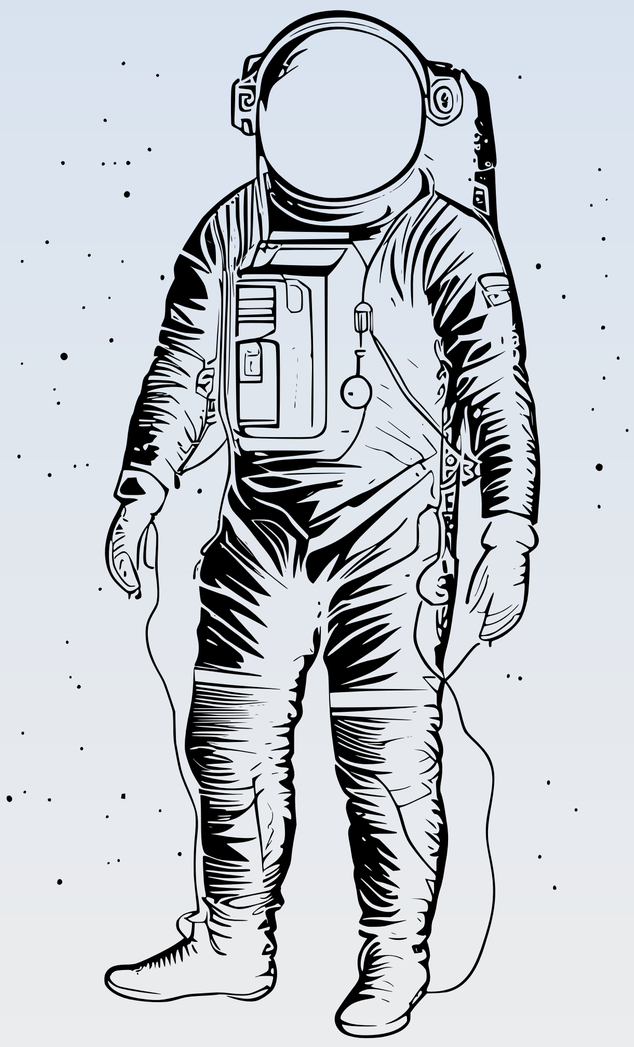

Manifesto

Group director
Dr. Manmohan Singh

Our students are not only unraveling the mysteries of the universe but also setting new benchmarks in national and international competitions. Their relentless pursuit of excellence and innovation is a testament to the bright future of space science and technology. Keep pushing the boundaries of knowledge and achievement!

Director academics
Dr. Raghvendra Singh

As space science and technology continue to emerge as a key area of growth in India, vast opportunities are unfolding. The dedication and efforts of students in this field are truly commendable. Their contributions will play a vital role in shaping the future of the sector.

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Space Insights: Highlights of January 2025

ISRO's START 2025 Program

On January 9, 2025, the Indian Space Research Organisation (ISRO) inaugurated the third edition of its Space Science and Technology Awareness Training (START 2025) program. This initiative, running from January 9 to 29, aims to educate and inspire students in the fields of space science and technology.

Comet G3 ATLAS Visibility

Comet G3 ATLAS became visible from Earth in January 2025, marking its return after a 160,000-year journey. This rare event provided a once-in-a-lifetime opportunity for sky enthusiasts to observe the comet.

Planetary Alignment

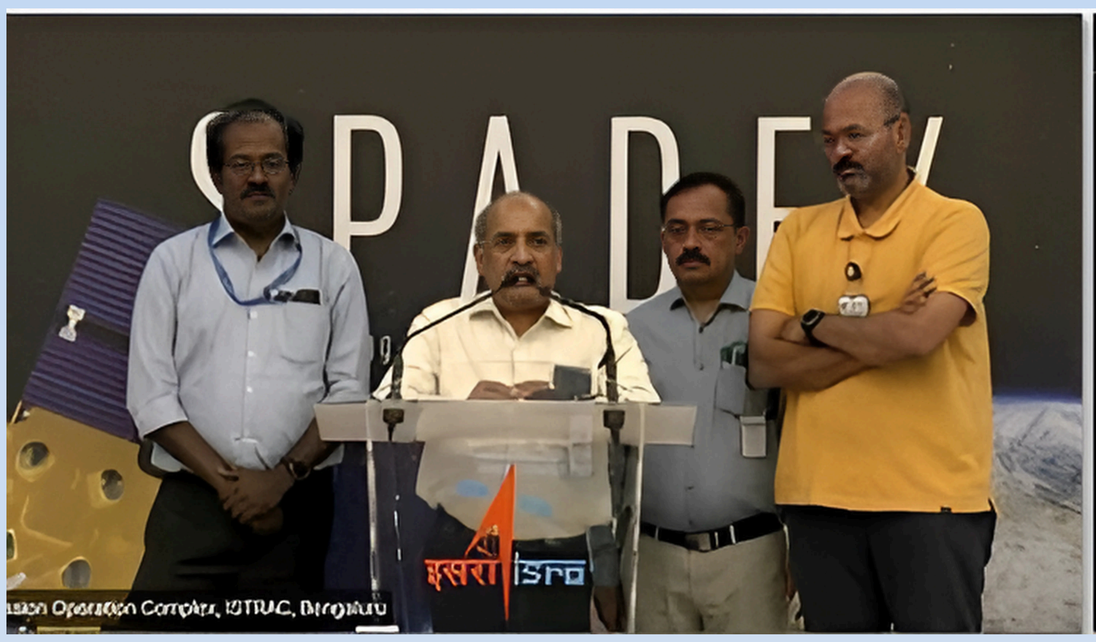
In mid-January 2025, a notable planetary alignment occurred, with Venus, Mars, Mercury, and Jupiter aligning within the elliptical plane. This celestial event offered a striking visual spectacle and was associated with significant astrological energy, potentially influencing emotions and relationships.

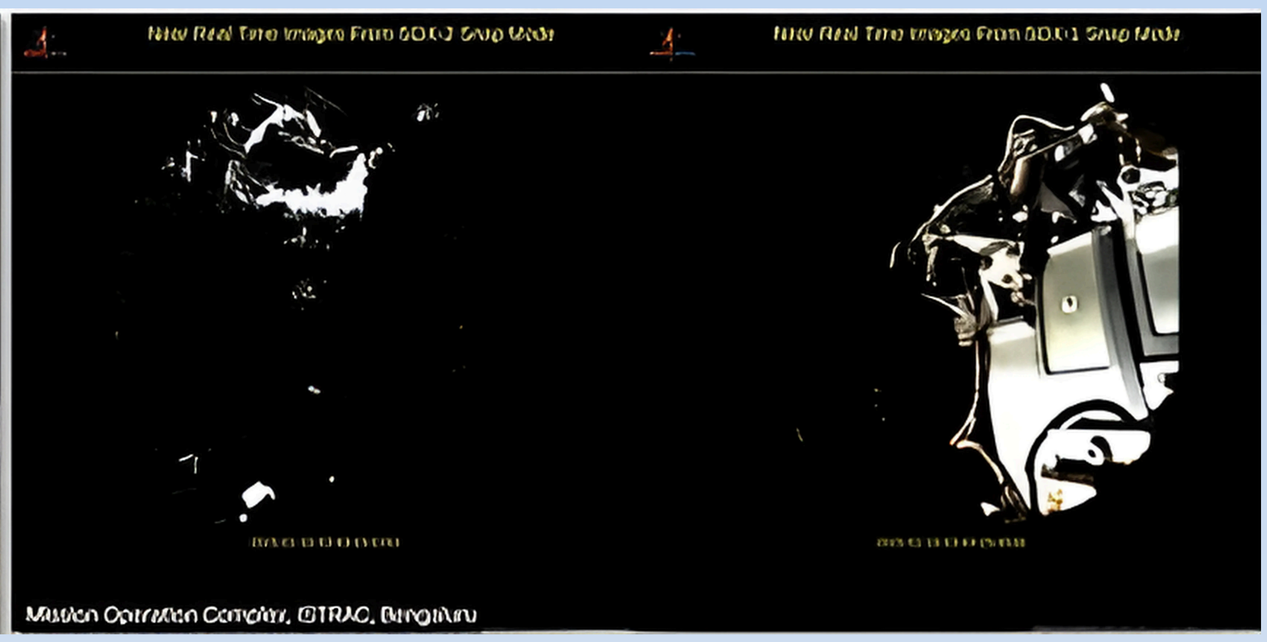
WISeSat.Space's Satellite Launch Preparation

WISeSat.Space, a subsidiary of WISeKey, prepared for the mid-January 2025 launch of its next-generation satellite. This development aims to enhance secure Internet of Things (IoT) connectivity and advance climate change monitoring capabilities.

ISRO Achieves Historic Milestone
Successful Docking of SDX-01 and SDX-02 Satellites

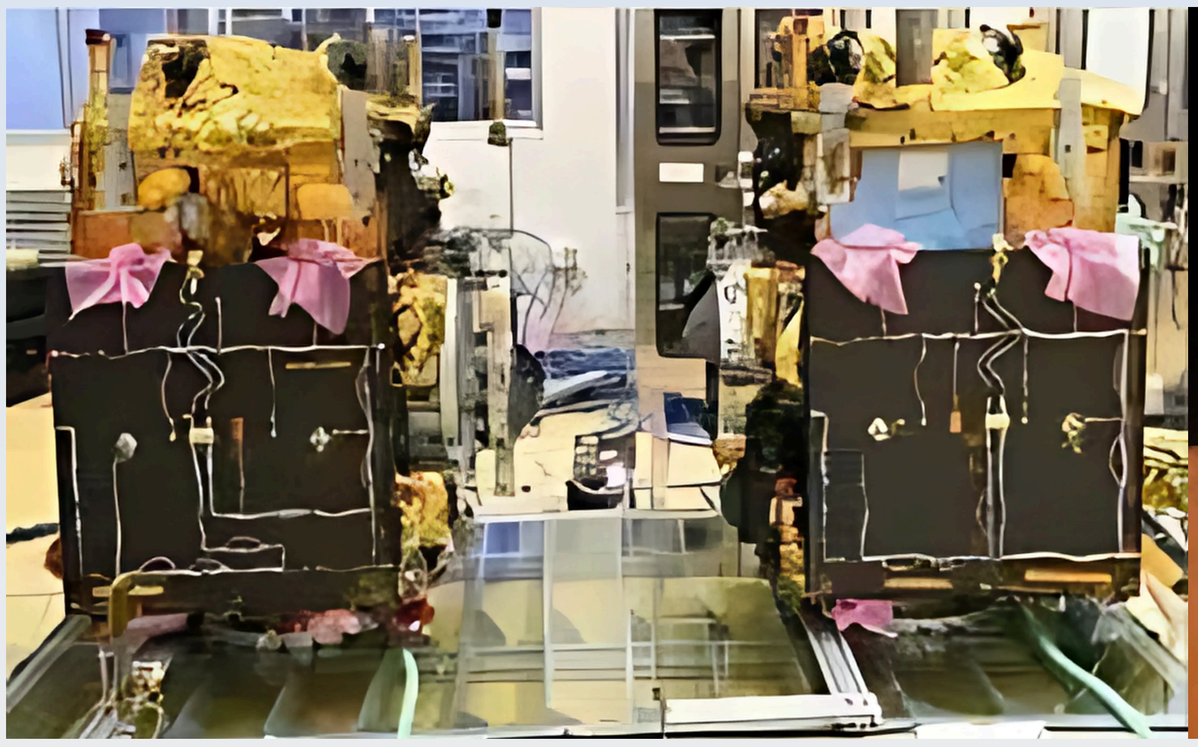
On **January 16, 2025**, the **Indian Space Research Organization (ISRO)** achieved a significant milestone in its space program by successfully performing the first docking between two spacecraft in orbit, fulfilling the primary objective of its **Space Docking Experiment (SpaDeX)** mission. This historic feat places India among an elite group of nations, including the United States, Russia, and China, with the capability to perform this complex maneuver.

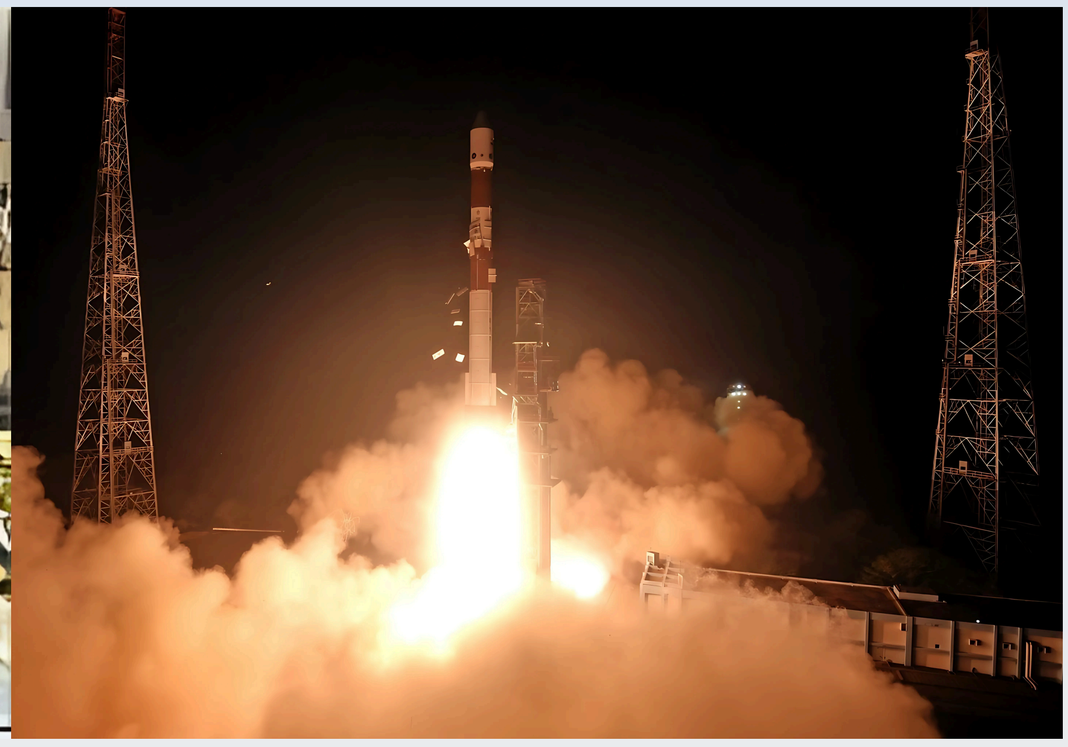




The successful docking, initially planned for **January 9th**, was delayed due to a slight deviation in the approach trajectory, requiring adjustments to ensure a safe and controlled rendezvous.

The two satellites, designated SDX01 (the "Target") and SDX02 (the "Chaser"), were carefully maneuvered closer. On January 12th, they achieved a close rendezvous at a distance of approximately 3 meters, allowing for further data collection and system checks.





Finally, on January 16th, the docking sequence commenced. The Chaser satellite, equipped with advanced sensors and guidance systems, was precisely guided towards the Target. The final approach and capture were executed flawlessly, culminating in a successful docking.

India, the fourth nation in the in-orbit docking club

The first-ever space docking was achieved by **NASA** on **March 16, 1966**, when the **Gemini 8 capsule**, piloted by **Neil Armstrong** and **David Scott**, docked with the Agena target vehicle. While a historic feat, the mission encountered unforeseen challenges, leading to an uncontrolled roll of the combined vehicle.

The Soviet Union followed suit in 1967 with the automatic docking of two uncrewed Soyuz test vehicles, Kosmos 186 and Kosmos 188.

These two nations remained the sole possessors of this technology for over four decades. In 2011, China joined the club with the successful docking of the Shenzhou 8 spacecraft with the Tiangong 1 module. With the SpaDeX mission, India has now entered this elite group, demonstrating its growing expertise in advanced space technologies.

A milestone for the bold Indian space programs

Docking in space is a fundamental technology for ambitious space programs like India's.

- **Chandrayaan-4:** This upcoming lunar exploration mission will leverage the SpaDeX technology. Chandrayaan-4 involves multiple modules, including orbiters, landers, and rovers, that will require rendezvous and docking maneuvers in both Earth orbit and lunar orbit.

- **Bharatiya Antariksh Station (BAS):** The successful SpaDeX mission lays the groundwork for the construction of India's proposed space station, the BAS. Docking technology is crucial for assembling and maintaining modules within the space station.

- **Human Spaceflight Program:** The technology developed for SpaDeX will be instrumental in India's Human Spaceflight Program, enabling the docking of the Ganganyaan crewed orbital spacecraft with the Bharatiya Antariksh Station.

- **Future Space Missions:** Beyond these specific programs, the SpaDeX technology has broader implications. It opens doors for future missions involving satellite servicing, debris removal, and advanced scientific experiments in space.

This historic achievement solidifies India's position as a major player in the global space arena and inspires further exploration and innovation in the years to come.

ISRO Completes Its 100th Mission: A Historic Milestone in Space Exploration

The Indian Space Research Organisation (ISRO) reached a monumental milestone in January 2025, completing its 100th space mission. This achievement not only highlights ISRO's growth as a global leader in space technology but also serves as a testament to India's unwavering commitment to scientific excellence and innovation.

From Humble Beginnings to Global Recognition

ISRO's journey began with the establishment of the Indian National Committee for Space Research (INCOSPAR) in 1962 under the visionary leadership of Dr. Vikram Sarabhai, widely regarded as the father of the Indian space program. The organization was formally established as ISRO in 1969, with the objective of harnessing space technology for national development.

The First Mission: Aryabhata (1975)

India's first foray into space occurred on April 19, 1975, with the launch of the Aryabhata satellite. Named after the ancient Indian mathematician and astronomer, Aryabhata was a scientific satellite primarily designed for conducting experiments in X-ray astronomy and solar physics. Launched aboard a Soviet Kosmos-3M rocket, the mission marked India's entry into the global space community.

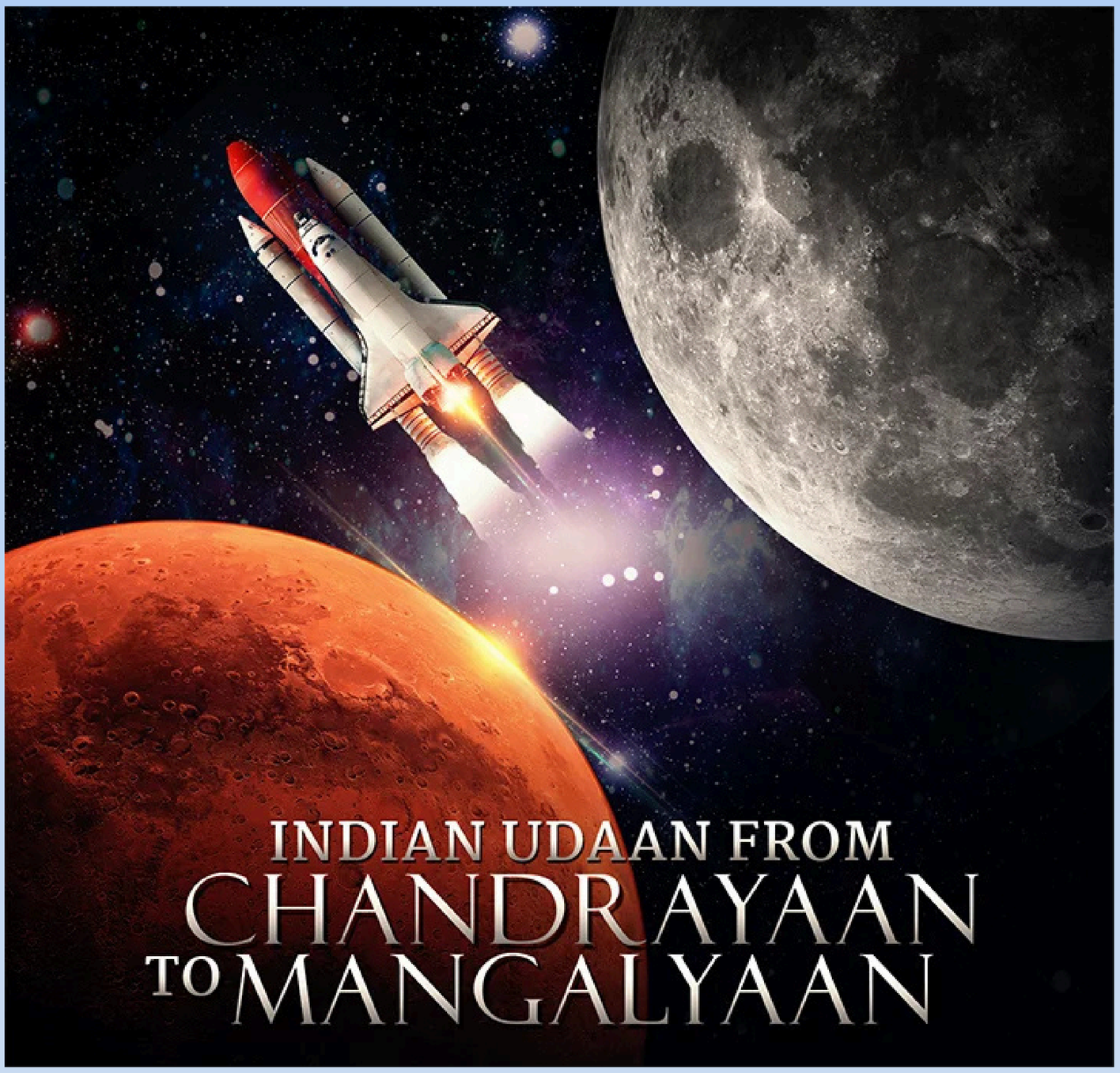
Key Achievements Over the Decades

- **Operational Satellites for National Development-**ISRO's emphasis on practical applications led to the development of operational satellite systems like INSAT (Indian National Satellite System) for telecommunications, broadcasting, and meteorology, and IRS (Indian Remote Sensing Satellites) for natural resource management, agriculture, and disaster monitoring.

- **The Polar Satellite Launch Vehicle (PSLV)-**The PSLV, often called the "workhorse" of ISRO, has been instrumental in launching satellites into orbit. Its maiden flight in 1993 was followed by a series of successes, making it one of the most reliable launch vehicles in the world. The PSLV gained international acclaim in 2017 when it launched 104 satellites in a single mission, setting a world record.

- **Chandrayaan and Mangalyaan-**India's first lunar mission, Chandrayaan-1 (2008), discovered water molecules on the Moon, a groundbreaking finding that redefined lunar science. The Mars Orbiter Mission (Mangalyaan) in 2013 made ISRO the first agency to successfully reach Mars on its maiden attempt, and at a fraction of the cost of similar missions by other nations.

- **Gaganyaan and Beyond-**ISRO's ongoing Gaganyaan mission, aimed at sending humans to space, is another step toward advancing India's capabilities in human spaceflight. The program demonstrates ISRO's commitment to pushing the boundaries of exploration.



The completion of 100 missions is more than a numerical milestone; it is a reflection of India's journey from a developing space nation to a global leader. ISRO’s achievements have inspired millions, proving that determination, innovation, and vision can overcome any obstacle.

The 100th Mission: A Symbol of Progress

The 100th mission, which involved the launch of a cutting-edge Earth observation satellite aboard the GSLV Mk III, represents decades of hard work, ingenuity, and collaboration. This mission underscores ISRO's dual focus on societal benefits and technological innovation.

ISRO’s Global Impact

ISRO has consistently made space technology affordable and accessible. Its commercial arm, Antrix Corporation, and the newer NSIL (NewSpace India Limited) have successfully launched satellites for over 30 countries, showcasing India's capabilities on the global stage.

Looking Ahead

As ISRO embarks on its next phase of growth, it is focusing on missions to explore the Sun (Aditya-L1) and deep space, collaboration with international space agencies, and fostering private participation in India's space sector.

Dr. V. Narayanan Appointed as New ISRO Chief: Ushering in a New Era of Space Exploration

The Indian Space Research Organisation (ISRO) has entered a new chapter with the appointment of Dr. V. Narayanan as its new chairman. Known for his extensive contributions to the field of space technology and a visionary approach to innovation, Dr. Narayanan's leadership promises to steer ISRO toward groundbreaking achievements in the years ahead.

A Proven Leader with Stellar Credentials

Dr. V. Narayanan, an alumnus of the Indian Institute of Technology (IIT), has had a long and illustrious career in space science. Joining ISRO in the early 1990s, he quickly rose through the ranks due to his expertise in satellite design, propulsion systems, and mission planning. Before his appointment as chairman, Dr. Narayanan served as the Director of the Liquid Propulsion Systems Centre (LPSC), where he played a pivotal role in advancing India's launch vehicle technology.

Dr. Narayanan's appointment has been met with widespread acclaim, with experts and stakeholders expressing confidence in his ability to lead ISRO into its next phase of growth. His vision aligns with India's aspirations to become a global leader in space technology, leveraging advancements to address both national priorities and global challenges.

Vision for ISRO's Future

In his inaugural address, Dr. Narayanan emphasized the need for innovation, international collaboration, and private sector engagement to maintain ISRO's position as a leader in space exploration. His strategic priorities include:

- **Expanding Human Spaceflight Capabilities:** Building on the progress of the Gaganyaan mission, Dr. Narayanan aims to establish long-term human presence in space and advance space station initiatives.
- **Deep Space Exploration:** Missions to Venus, Jupiter, and beyond are on the horizon, as ISRO aims to contribute to the global understanding of our solar system and the universe.
- **Commercial Space Ventures:** Under his leadership, ISRO will focus on fostering partnerships with private players through NewSpace India Limited (NSIL) to make India a hub for cost-effective satellite launches and manufacturing.
- **Sustainability in Space:** Dr. Narayanan stressed the importance of addressing the growing problem of space debris and ensuring that ISRO's missions are environmentally responsible.

Key Contributions and Achievements

During his tenure at LPSC, Dr. Narayanan oversaw the development of several critical propulsion systems, including those for the PSLV, GSLV, and the Chandrayaan and Mangalyaan missions. He also played a crucial role in the development of cryogenic engine technology, which elevated India's capability to launch heavier payloads into geostationary orbit.

Dr. Narayanan's work has been instrumental in:

- Enhancing Launch Vehicle Reliability: Ensuring high success rates for ISRO's flagship missions.
- Satellite Innovations: Leading advancements in satellite communication, Earth observation, and navigation systems.
- Global Partnerships: Strengthening ISRO's collaborations with space agencies like NASA, ESA, and Roscosmos.

Group Captain Shubhanshu Shukla: India’s First Astronaut on a Private Mission to the ISS

In a historic milestone for India’s space journey, Group Captain Shubhanshu Shukla of the Indian Air Force (IAF) has been selected to pilot Axiom Mission 4 (Ax-4) to the International Space Station (ISS). This groundbreaking achievement makes him the first Indian astronaut to participate in a private space mission, highlighting India’s growing influence in global space exploration.

Axiom Mission 4: A Step Toward the Future

Scheduled for late 2025, Ax-4 is part of a series of privately-funded missions to the ISS aimed at advancing research and technology development in microgravity. The mission will not only showcase India’s capabilities in human spaceflight but also pave the way for increased participation in international space ventures. Group Captain Shukla’s involvement symbolizes India’s readiness to engage with emerging opportunities in the global space economy.

An Illustrious Career in the Indian Air Force

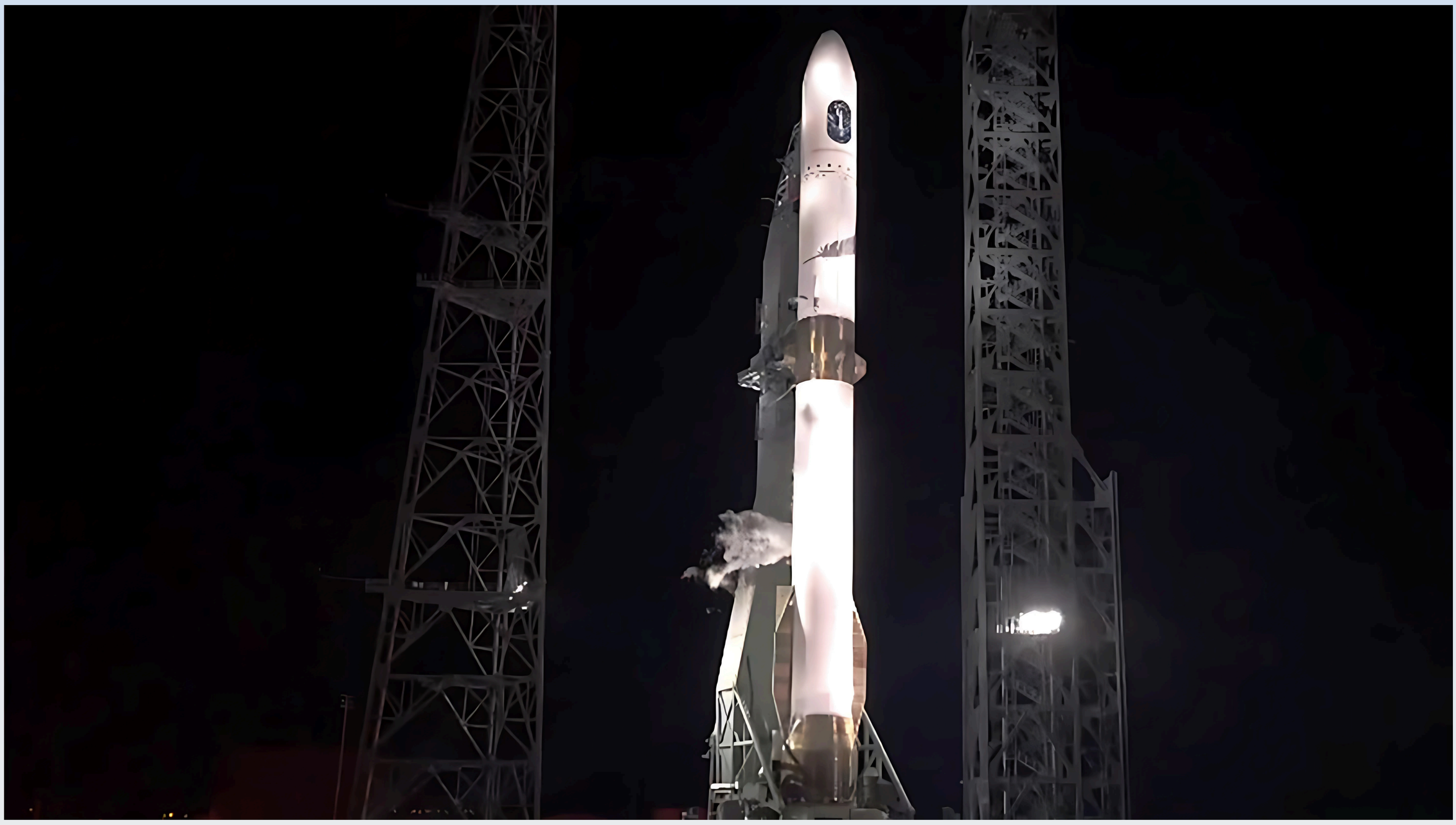
Group Captain Shukla is a decorated officer of the IAF with extensive experience in high-performance aircraft and mission planning. His rigorous training and exceptional track record have prepared him for this challenging role, reflecting the IAF’s tradition of producing world-class aviators. His selection also underscores the growing collaboration between India’s defense services and private space enterprises.

New Glenn Ascend
A New Era in American Spaceflight

On **January 16, 2025**, history was made as **Blue Origin** successfully launched its **New Glenn rocket**, a momentous occasion for the American aerospace industry. This powerful new launch vehicle, years in development, successfully reached orbit, marking a significant milestone for Jeff Bezos' company.

The launch, witnessed by thousands, took place from Launch Complex 36 at Cape Canaveral. While the first stage booster attempted a landing but ultimately failed to recover, the mission achieved its primary objective of successfully delivering the Blue Ring Pathfinder payload to orbit.

"This is a day of immense pride for the entire Blue Origin team," said Jeff Bezos, founder and CEO of Blue Origin. "While we strive for perfection, this successful launch demonstrates the incredible dedication and hard work of our team. We will learn from this experience and continue to refine our technology for future missions."

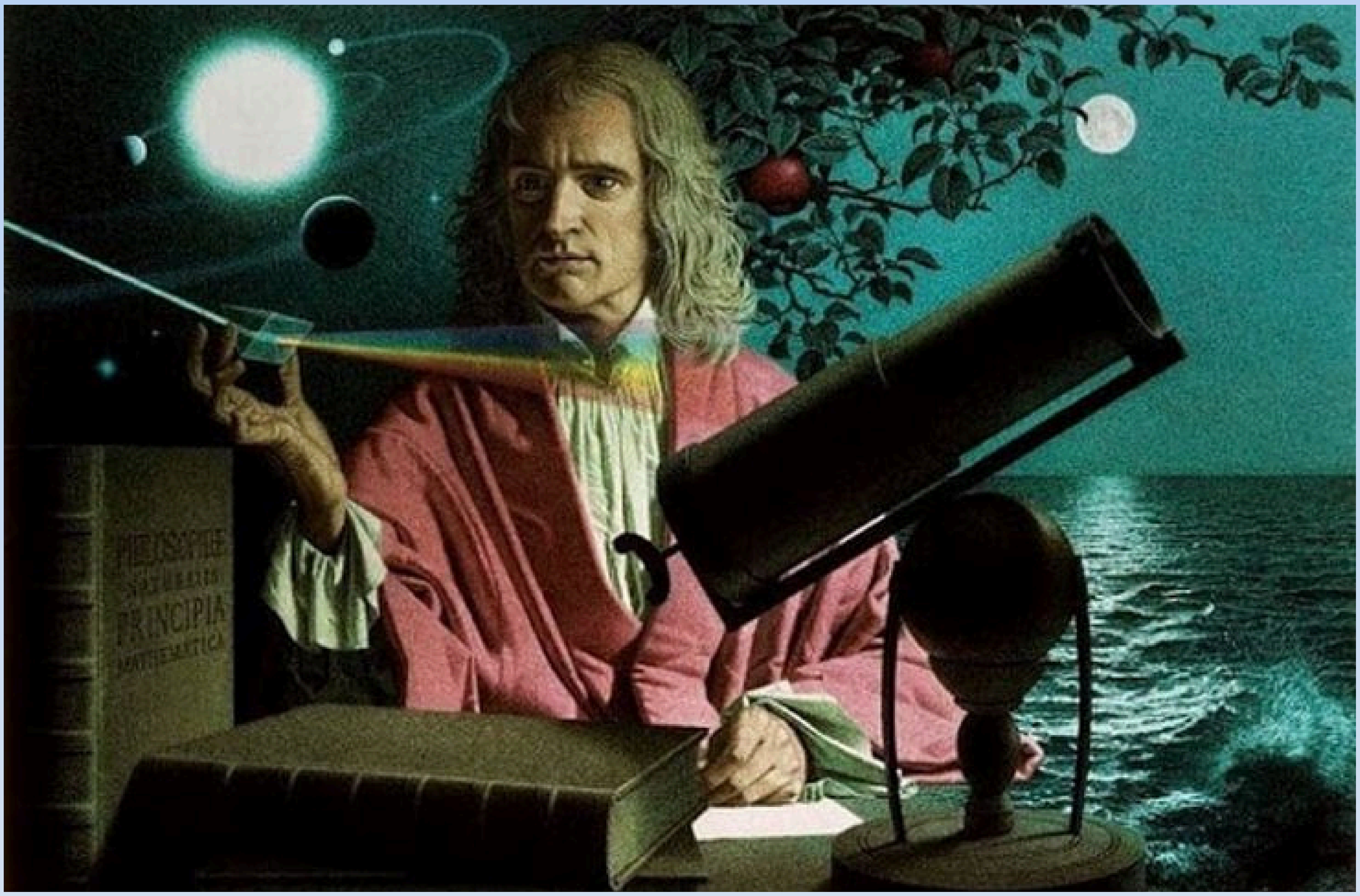


New Glenn, a two-stage monster standing 98 meters tall, is equipped with seven powerful BE-4 engines, capable of delivering substantial payloads to orbit. This launch marks a significant step towards Blue Origin's ambitious goals, including supporting future lunar missions, deep space exploration, and potentially revolutionizing space tourism.

This successful launch not only solidifies Blue Origin's position as a major player in the commercial space sector but also inspires a new generation of engineers and scientists to reach for the stars

MEET THE ASTRONOMER

The Curious Mind That Unlocked the Universe



Sir Isaac Newton
Dec 1642-Mar 1727

Imagine a time before gravity was a household word, when the celestial dance of planets across the night sky remained an inexplicable mystery. This was the reality before Sir Isaac Newton, a curious mind that dared to question the very fabric of the universe.

Born on Christmas Day in 1642, Newton wasn't your typical child. While other children dreamt of becoming knights or explorers, young Isaac was captivated by the world around him. He built intricate contraptions, from sundials to working water clocks, and spent hours lost in thought, pondering the mysteries of nature.

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A pivotal moment arrived during a forced sabbatical from Cambridge University due to the Great Plague of London. Confined to his family estate, Newton found solace in the tranquility of the countryside. And then, legend has it, it happened. A falling apple, a seemingly mundane event, ignited a spark of genius in Newton's mind. If gravity could pull an apple to Earth, he wondered, could it also be the invisible force that governs the celestial ballet of planets around the Sun?

Years of meticulous observation and painstaking calculations followed, leading to the formulation of his groundbreaking law of universal gravitation. But Newton's genius extended far beyond gravity. He delved into the heart of light itself, demonstrating that white light is a symphony of colors, a discovery that revolutionized our understanding of optics. And then there was calculus, a mathematical language he invented almost single-handedly, providing a powerful framework for understanding change and motion.

Newton's crowning achievement, Philosophiæ Naturalis Principia Mathematica, is a masterpiece of scientific thought. In this groundbreaking work, he laid out his three laws of motion, providing a foundation for our understanding of the universe that continues to shape physics today

Sir Isaac Newton, the curious mind that dared to question the heavens, forever changed our perception of the cosmos. His life serves as a powerful reminder that even the most fundamental truths can be unlocked by the relentless pursuit of knowledge and the insatiable curiosity of the human spirit.

“Nature is pleased with simplicity. And nature is no dummy”

~Sir Isaac Newton

MEME-KY WAY
A Cosmic Comedy Competition

The **PSIT Vyomnauts** recently hosted **MEME-KY WAY**, an online meme-making competition that ignited laughter and creativity across the campus. Students were challenged to craft hilarious space-themed memes, showcasing their wit and knowledge of astronomy.

The competition saw an overwhelming response, with participants submitting a galaxy of imaginative and side-splitting memes. Judges evaluated entries based on creativity, originality, humor, and overall impact.

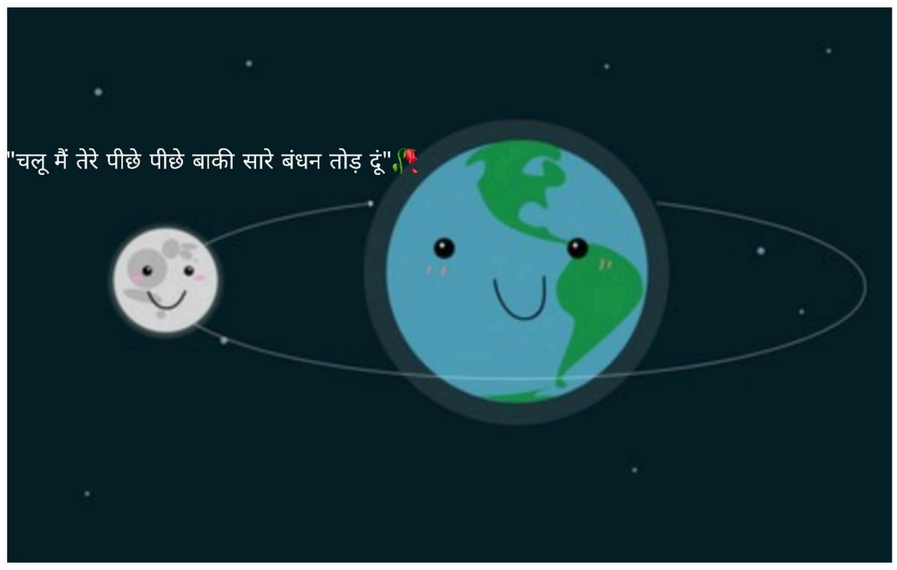
And the winners are...
1st Place: Shahzeb Khan, who captivated the audience with his witty and relatable space puns.
2nd Place: Akash Chaudhary, whose memes were a cosmic blend of humor and clever wordplay.
3rd Place: Sakshi Tiwari, who impressed judges with her unique perspective and hilarious takes on space exploration.

"MEME-KY WAY" proved to be a resounding success, showcasing the vibrant talent and humor within the PSIT community. The competition fostered a sense of camaraderie and provided a platform for students to express their creativity in a fun and engaging way

A Special Note: Shahzeb Khan not only impressed the judges but also garnered the most likes on his submissions, a testament to the widespread appeal of his comedic genius.

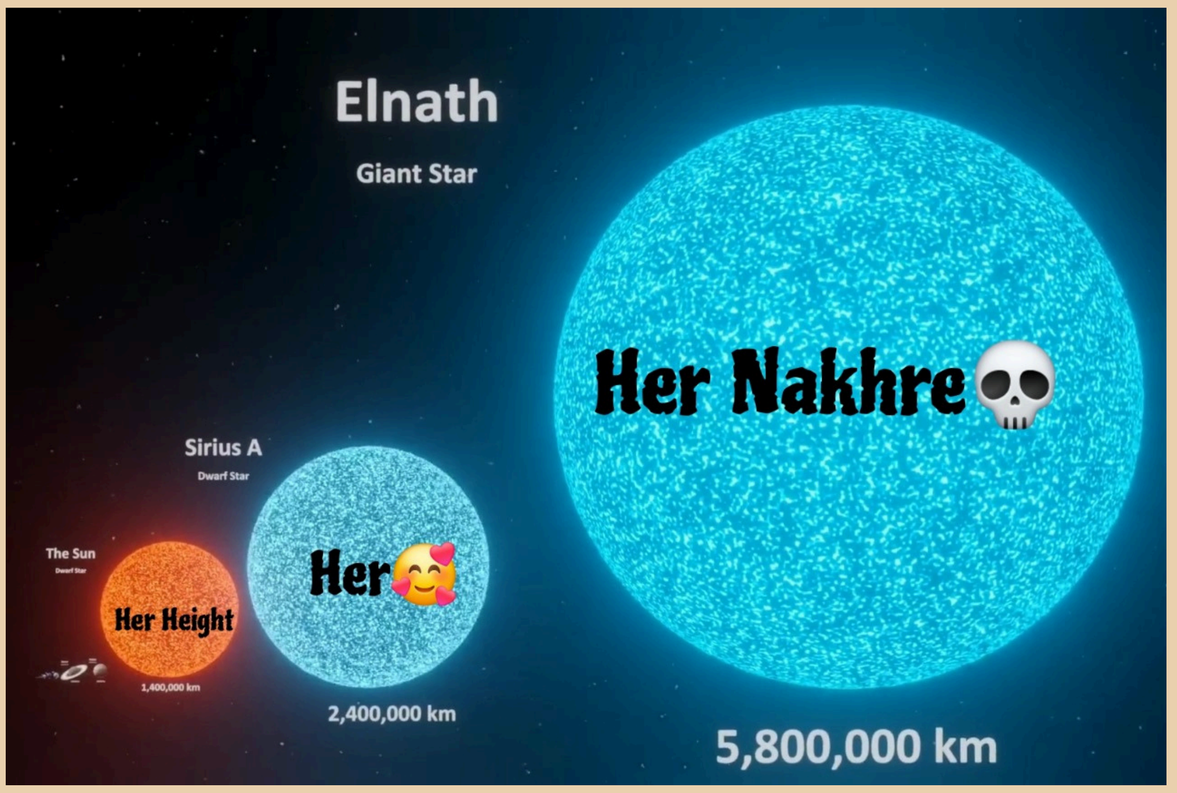
"Love these days doesn't last for a few months."

"Meanwhile, Moon: 4.5B years."



Nowdays In school
There Are 8 Planets in our solar system

Meanwhile 9th One



Shahzeb's Creations

February 2025: A Celestial Calendar

Key Dates and Events

- **February 4:** Last Quarter Moon
- **February 9–10:** Mars and the Moon Conjunction
- **February 11–12:** The Venus-Jupiter Conjunction
- **February 13:** New Moon
- **February 15:** Saturn at Opposition
- **February 20:** First Quarter Moon
- **February 24:** Full Snow Moon

Best Stargazing Nights

- **February 10–13 (New Moon Window):** The absence of moonlight will allow you to view deep-sky objects like the Orion Nebula, the Pleiades, and the Beehive Cluster.

Planetary Highlights

- Venus will shine brightly in the western evening sky throughout February, paired with Jupiter in early February.
- Jupiter dominates the evening sky as it moves higher toward the zenith.
- Mars will be faint but visible in the west, near the crescent moon on February 9.
- Saturn rises in the southeast during opposition and will be visible for most of the night.

Notable Constellations

- **Orion the Hunter** continues to take center stage in the winter sky, with its famous belt and bright stars Betelgeuse and Rigel.
- **Taurus the Bull** hosts the bright star Aldebaran and the stunning Pleiades cluster.
- **Canis Major**, with **Sirius** (the brightest star in the sky), shines brightly near **Orion**.

Want to Join the Cosmic Adventure??

Join the PSIT Vyomnauts Space Club and embark on an extraordinary journey into the cosmos! This club offers unique opportunities for space enthusiasts to dive into hands-on projects, participate in prestigious competitions like NASA's Rover Challenge, and gain industry connections through networking and mentorship. Members can engage in satellite-building, astrophysics workshops, and access internships with organizations like ISRO. Vyomnauts also encourages creative expression through contributions to the space magazine Gagan and participation in cultural events. By joining, you'll help pioneer sustainable and ethical space exploration, working on projects to reduce space debris and innovate eco-friendly aerospace technology.

Scan to connect with PSIT Vyomnauts