

GAGAN

Vol. 1 Issue 1
October, 2024



SPACEX'S RECENT
SPACEWALK ADVANCED SPACE EXPLORATION,
WITH ASTRONAUTS COMPLETING KEY TASKS OUTSIDE
THE SPACECRAFT. THIS MARKS ANOTHER STEP IN SPACEX'S
INNOVATION IN HUMAN SPACEFLIGHT.

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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, space launches, 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.

OUR TEAM

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List of Content

About space.....	2
Space insights Highlights of september 2k24.....	3
Our Inauguration.....	4
Bharatiya Antariksh Station.....	8
Close call.....	10
Nasa's Artemis III mission.....	11
SpaceX starship.....	13
Beyond our solar system.....	14
Meet our Anstronomer.....	16
Want to join Cosmic Adenture.....	18

ABOUT SPACE:

Space is the final frontier, a vast and mysterious expanse that has captivated human imagination for millennia. From ancient stargazers to modern astronauts, humanity has always looked to the skies for answers about our place in the universe. Today, space exploration goes beyond the stars, unlocking discoveries about our solar system, distant galaxies, and even the fundamental nature of the cosmos. Whether it's through scientific missions, the study of celestial phenomena, or the dream of colonizing other planets, space offers endless opportunities for learning and innovation.



At **PSIT Vyomnauts**, we are on a mission to ignite the curiosity of a new generation of space enthusiasts through our flagship magazine, *Gagan*. Our publication is more than just a collection of articles; it's a portal to the cosmos, designed to engage readers with a diverse array of content that stretches the imagination and challenges conventional thinking.

wide range of topics, from the latest **astronomical discoveries** to the exploration of **space technologies** shaping the future. We delve into the mysteries of space with discussions on **celestial phenomena**, including upcoming eclipses, meteor showers, planetary transits, and more, making sure our readers never miss an opportunity to gaze at the wonders of the night sky.

In addition to tracking real-time advancements in space exploration, *Gagan* highlights the **cutting-edge research** happening across the globe—bringing you closer to the scientists, engineers, and innovators who are pushing the boundaries of what humanity can achieve. Through **in-depth interviews** with space professionals and **thought-provoking essays**, we spark conversations that inspire critical thinking and encourage young minds to pursue careers in the space sciences.

Beyond the realm of science, *Gagan* aims to fuel **imagination and creativity**, exploring the cultural and philosophical implications of humanity's journey into space. From space art to speculative fiction, we celebrate the role of storytelling in shaping our collective vision of the stars.

SPACE Insights Highlights of September 2K24:

1. Conjunctions and Occultations:

- **Sep 1:** Conjunction of the Moon and Mercury, and Uranus enters retrograde motion.
- **Sep 5:** Close approach and occultation of the Moon and Venus.
- **Sep 17:** The **Full Harvest Moon** occurs with a partial lunar eclipse, making it a perfect night for lunar observation.

2. Planetary Events:

- **Sep 8: Saturn at opposition**—the best time to observe Saturn's rings, as the planet will be fully illuminated by the Sun.
- **Sep 10:** Occultation of Antares by the Moon.
- **Sep 17:** Close approach of the Moon to Saturn and Neptune.
- **Sep 20: Neptune at opposition**—ideal conditions for viewing this distant planet.

3. Meteor Showers:

- **Sep 9:** The **September ε-Perseid meteor shower** peaks.
- **Sep 27:** **Daytime Sextantid meteor shower**, visible in daylight for those with special equipment.

4. Equinox:

- **Sep 22:** The **September Equinox** occurs, marking the start of autumn in the Northern Hemisphere and spring in the Southern Hemisphere.

5. Space missions and conferences:

- **Sep 15-17: AMOS Conference** in Maui, discussing space surveillance technologies and mentoring students.
- **Sep 17-19: SPACE 2024**, a conference in the UK focussing on AI in space missions.

Our Inauguration:



PSIT Vyomnauts Space Club: Blazing a Trail to the Stars

A Cosmic Adventure Begins

The inauguration of the PSIT Vyomnauts Space Club marked the beginning of a thrilling journey into the vast expanse of the cosmos. Held on [Date] at [Time], the event was a celestial spectacle attended by enthusiastic students and distinguished guests.

The club's mission is to ignite the passion for space exploration among young minds, providing them with a platform to learn, discover, and contribute to the advancement of space sciences.

Highlights of the Inauguration

Here's a summary of the highlights from the inauguration of the PSIT Vyomnauts Space Club held on 14th September 2024:

1. Grand Launch Ceremony:

- The inauguration kicked off with an enthusiastic gathering of students, faculty members, and space enthusiasts, all eager to witness the official launch of PSIT Vyomnauts, the institution's first space club.

- The club was introduced with an inspiring vision of making space exploration more accessible to students and fostering a community driven by curiosity and innovation in the field of space science.



2. Presentation of the Club's Vision and Goals:

- The core members of the club presented the mission, vision, and goals of PSIT Vyomnauts, emphasizing upcoming projects, workshops, and competitions that the club will participate in.
- Key initiatives announced include student-led satellite development, participation in national and international space challenges, and the launch of the club's digital platform for space science enthusiasts.

3. Unveiling of the Club Logo and Merchandise:

- The official **PSIT Vyomnauts logo** was unveiled, symbolizing the club's mission to explore the vastness of space.
- Along with the logo, club-branded merchandise such as t-shirts, badges, and notebooks was introduced, giving members a sense of identity and pride.

4. Interactive Session and Q&A:

- A highly engaging Q&A session followed, where students posed insightful questions about space careers, satellite technology, and upcoming club projects. The expert speaker, along with faculty advisors, offered guidance and encouragement to budding space enthusiasts.

5. Introduction of 'Gagan' Magazine:

- The space club's official magazine, Gagan, was introduced as a platform for students to express their views, share research, and report on space exploration trends.

A Glimpse into the Future

As the PSIT Vyomnauts Space Club takes flight, it promises to be a hub for innovation, creativity, and the pursuit of knowledge. With the support of the institution and the enthusiasm of its members, the club is poised to make a significant impact on the world of space exploration.

A glimpse into the future of the PSIT Vyomnauts Space Club can envision a dynamic and inspiring community that drives interest and engagement in space exploration, scientific curiosity, and aerospace innovation. Here's how the future could unfold:

1. Innovative Projects and Research Initiatives

- Student-Led Satellite Programs: With advancements in CubeSats and low-cost space technology, the club could initiate small satellite projects, enabling members to gain hands-on experience with real-world space missions.

2. Competitions and Challenges

- National and International Competitions: The club could regularly participate in space and aerospace competitions such as NASA's Rover Challenge, the CANSAT competition, or ISRO's student challenges, fostering a competitive spirit and technical excellence.

- Hackathons and Innovation Challenges: Hosting hackathons around space technology, like designing the next Mars rover or space-based systems, can attract talent and generate novel ideas.

3. Workshops and Training Programs

- Technical Workshops: Topics could include satellite design, orbital mechanics, coding for space applications, and 3D printing for aerospace. These would enhance the technical skill sets of the members.

- Astronomy and Astrophysics Sessions: Regular stargazing nights, guided by astronomers, and workshops on celestial observation and telescope handling could deepen the understanding of the universe.

4. Outreach and Education

- Public Lectures and Seminars: Bringing in space scientists, astronauts, and engineers to speak at the club would inspire members and the wider college community to think big about space exploration.

- School Outreach Programs: The club could visit schools to inspire younger students, conducting workshops on space science and rocketry to cultivate future generations of space enthusiasts.



Words from the club ambassador:

Greetings of the day, fellow space enthusiasts!

I'm honored to stand before you today as our space club ambassador. As a member of this vibrant community, I've had the privilege of exploring the wonders of the universe and inspiring others to do the same.

Our club is more than just a place to learn about astronomy and space exploration. It's a community where we come together to share our passion, collaborate on projects, and dream of the future.



Dr. Manish Kumar



Words from Co-club ambassador:

Dear Space Enthusiasts,

As the Co-Club Ambassador for *Gagan*, the official magazine of PSIT Vyomnauts, I am thrilled to share a vision for the exciting future of our space club. PSIT Vyomnauts stands at the forefront of space exploration and innovation at our institution, and together, we are set to embark on a journey filled with groundbreaking opportunities.

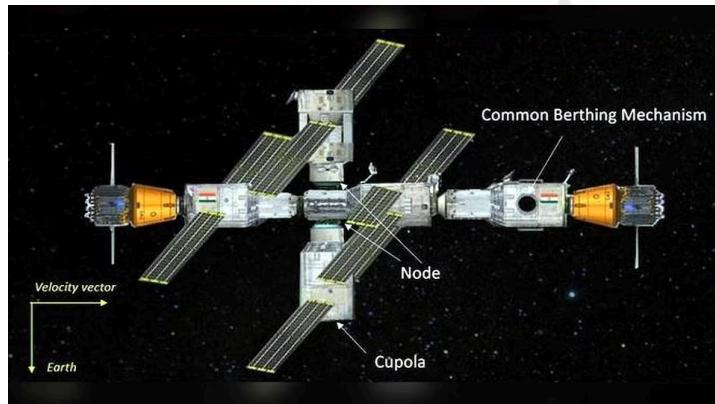
In the coming years, PSIT Vyomnauts could grow into a vibrant hub where innovation, education, research, and passion for **space converge**, influencing not only the campus but also the wider space community.

Mr. Sandeep Kumar Khare

Bharatiya Antariksh Station: India's Leap into Space

Introduction

India's space program has witnessed remarkable growth in recent years, with significant achievements in lunar missions, satellite launches, and planetary exploration. The next ambitious goal for the Indian Space Research Organisation (ISRO) is to establish its own space station, the Bharatiya Antariksh Station (BAS). This article delves into the details of this exciting project, exploring its objectives, timeline, and potential benefits.



Objectives of the Bharatiya Antariksh Station

The BAS aims to serve as a platform for various scientific experiments and research activities in microgravity conditions. Some of the key objectives include:

- **Scientific Research:** Conducting experiments in fields such as materials science, biotechnology, and astrophysics.
- **Technological Development:** Developing and testing new technologies for space exploration and applications.
- **International Collaboration:** Fostering international cooperation in space research and exploration.
- **Human Spaceflight:** Providing a platform for training astronauts and conducting long-duration human space missions.

Timeline and Development

The development of the BAS is a multi-phased project with a target completion date of 2035. The key milestones include:

- **Gaganyaan Mission:** The successful completion of the Gaganyaan mission, India's first human spaceflight program, will lay the groundwork for the BAS.
- **Module Development:** The development and launch of individual modules that will form the core of the space station.
- **Assembly in Orbit:** The assembly of the modules in low Earth orbit using robotic systems.
- **Crew Missions:** The deployment of astronauts to the BAS for scientific research and maintenance activities.

Potential Benefits of the Bharatiya Antariksh Station

The establishment of the BAS will bring numerous benefits to India and the global scientific community. Some of the potential benefits include:

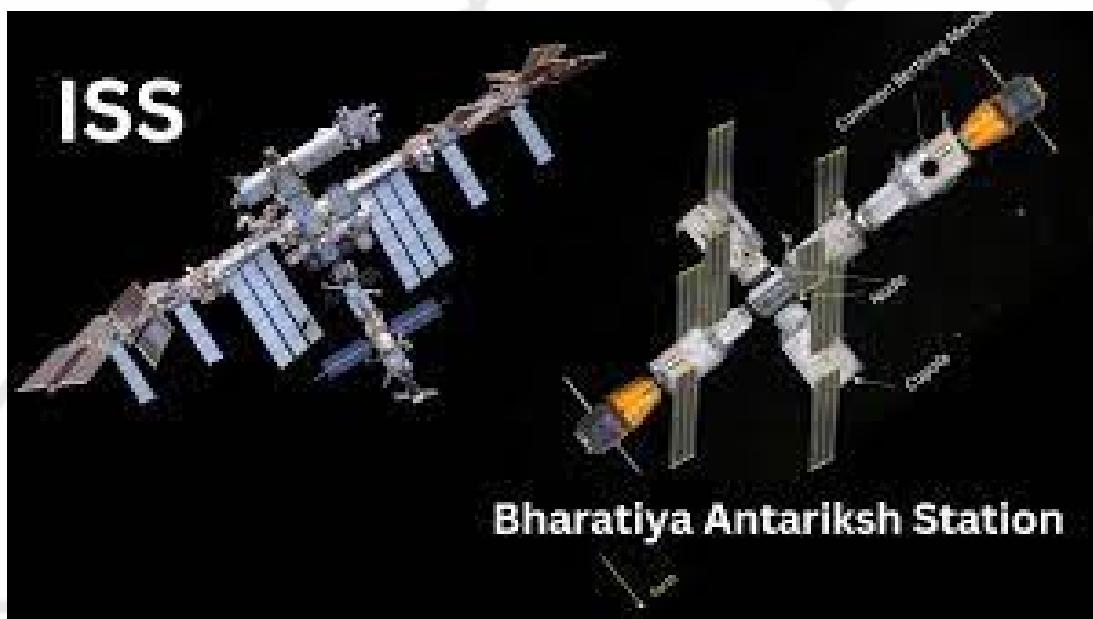
- **Technological Advancements:** The development of new technologies for space exploration and applications, such as life support systems, propulsion systems, and robotics.
- **Scientific Discoveries:** The opportunity to conduct groundbreaking research in various fields, leading to new discoveries and innovations.
- **Economic Growth:** The creation of new jobs and industries related to space exploration and technology.
- **International Prestige:** Strengthening India's position as a global leader in space exploration and technology.

Challenges and Opportunities

The development of the BAS also presents significant challenges, such as the high costs involved, technological complexities, and the risks associated with human spaceflight. However, these challenges also offer opportunities for innovation and collaboration. By overcoming these hurdles, India can position itself as a major player in the global space economy.

Conclusion

The Bharatiya Antariksh Station represents a significant milestone in India's space program. It is a testament to the country's ambition and its commitment to scientific research and technological advancement. The successful establishment of the BAS will not only benefit India but also contribute to the global understanding of space and its potential for human exploration and development.



Close Call: Meteor Passes Earth on September 15th

Introduction

In a thrilling celestial event that captivated astronomers and the public alike, a meteor made a remarkably close approach to Earth on September 15, 2024. While the meteor posed no immediate threat, this near-miss offered a unique opportunity to study near-Earth objects (NEOs) and understand the potential risks they pose to our planet.



Details of the Encounter

The meteor, estimated to be roughly the size of a small car, passed within a distance of approximately 36,000 kilometers of Earth. This is considered a relatively close encounter, as any object that comes within about 7.5 million kilometers of Earth is classified as a potentially hazardous asteroid.

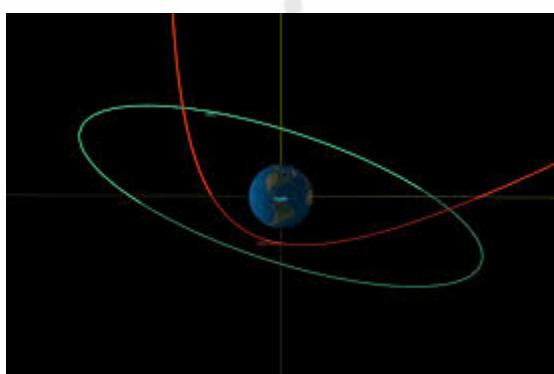
The meteor was traveling at a high speed of 70 kilometers per second, making it difficult to observe with the naked eye. However, astronomers were able to track its trajectory using telescopes and other specialized equipment.

Scientific Implications

This near-Earth meteor encounter provides valuable data for scientists studying NEOs. By analyzing the meteor's trajectory, size, and composition, researchers can gain insights into the origin and evolution of these celestial objects.

The event also serves as a reminder of the potential risks posed by NEOs. While the majority of these objects pose no threat to Earth, there is always a possibility of a catastrophic impact.

Early detection and tracking of NEOs are crucial for developing effective mitigation strategies.



Public Interest and Engagement

The close approach of the meteor generated significant public interest and media coverage. Many people around the world were eager to learn more about the event and its implications. This increased awareness of space exploration and the potential dangers posed by NEOs is a positive development.

Conclusion

The meteor encounter on September 15, 2024, serves as a reminder of the dynamic nature of our solar system and the importance of ongoing research into near-Earth objects.

NASA's Artemis III Mission: A Giant Leap for Humanity

Introduction:

The Artemis III mission, NASA's ambitious plan to return humans to the Moon, is steadily progressing. With a targeted launch date in November 2024, this historic mission promises to be a watershed moment in space exploration.



Key Highlights:

- **Launch Date:** The Artemis III mission is currently scheduled to launch in November 2024.
- **Crew:** The mission will carry four astronauts, including the first woman and the first person of color to set foot on the Moon.
- **Destination:** The Artemis III crew will land at the Moon's South Pole, a region of particular scientific interest due to its potential for water ice.
- **Objectives:** The mission's primary objectives include conducting scientific experiments, collecting lunar samples, and exploring the potential for future human settlements on the Moon.

Mission Overview:

- **Space Launch System (SLS):** The Artemis III mission will be launched atop NASA's powerful Space Launch System (SLS) rocket.
- **Orion Capsule:** The crew will travel to the Moon in the Orion spacecraft, which has undergone extensive testing and development.
- **Lunar Gateway:** The mission will utilize the Lunar Gateway, a planned space station in lunar orbit, as a staging area for lunar landings.

Scientific Experiments:

- **Lunar Surface Exploration:** The astronauts will conduct a series of scientific experiments to study the Moon's surface, geology, and potential resources.
- **Water Ice Search:** One of the primary goals of the mission is to search for water ice in the Moon's polar regions, which could be used to produce rocket fuel and sustain human life.
- **Sample Collection:** The crew will collect lunar samples that can be analyzed on Earth to provide valuable insights into the Moon's history and formation.

International Collaboration:

- **Artemis Accords:** The Artemis III mission is part of the Artemis Accords, a set of principles for peaceful exploration and utilization of the Moon.
- **Partnerships:** NASA is collaborating with international partners, including the European Space Agency (ESA), Canadian Space Agency (CSA), and Japanese Aerospace Exploration Agency (JAXA), to support the Artemis program.

Conclusion:

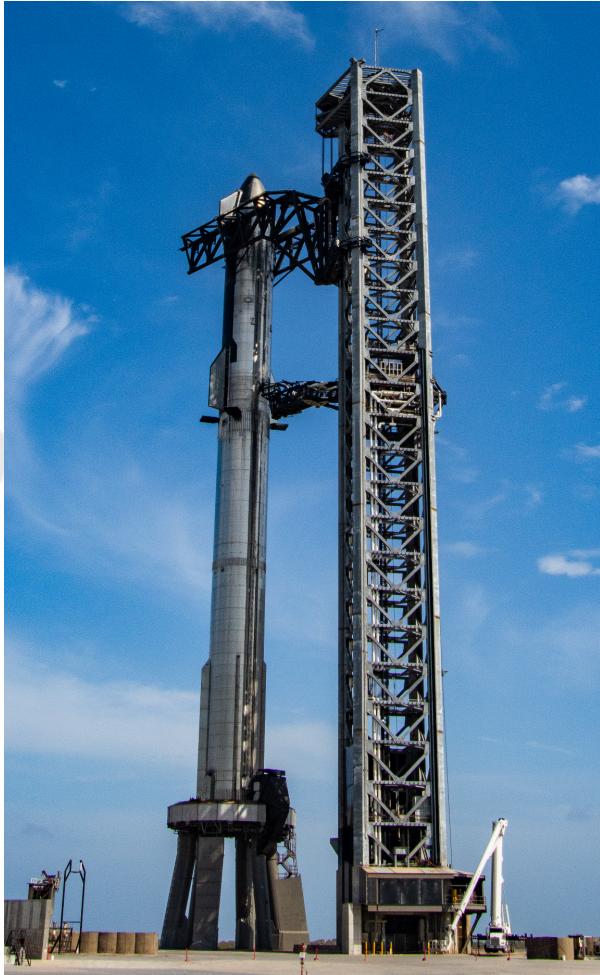
The Artemis III mission represents a significant step forward in human space exploration. By returning to the Moon, NASA aims to establish a sustainable presence on the lunar surface and pave the way for future missions to Mars. As the launch date approaches, the world eagerly awaits this historic event.

SpaceX Starship: A Rocket Ready to Reach for the Stars

Introduction:

SpaceX's Starship spacecraft has been making significant strides towards becoming a fully reusable, powerful rocket capable of transporting humans and cargo to the Moon and Mars.

This ambitious project has captured the attention of the world, and recent developments have showcased the company's progress.



Key Achievements:

- **Successful Test Flights:** SpaceX has conducted several successful test flights of the Starship prototype, demonstrating its capabilities and refining its design.
- **Orbital Launch Attempts:** The company has made multiple attempts to launch Starship into orbit, although challenges have been encountered.
- **Reusable Rocket Technology:** Starship is designed to be fully reusable, which could significantly reduce launch costs and increase mission frequency.
- **Payload Capacity:** The spacecraft has a massive payload capacity, making it suitable for transporting large amounts of cargo to the Moon and Mars.

Challenges and Future Plans:

- **Technical Hurdles:** SpaceX has faced several technical challenges during Starship development, including issues with landing and engine performance.
- **Regulatory Hurdles:** The company has also encountered regulatory hurdles, particularly related to environmental impact assessments.
- **Future Missions:** SpaceX plans to use Starship for a variety of missions, including commercial satellite launches, lunar landings, and ultimately, human missions to Mars.

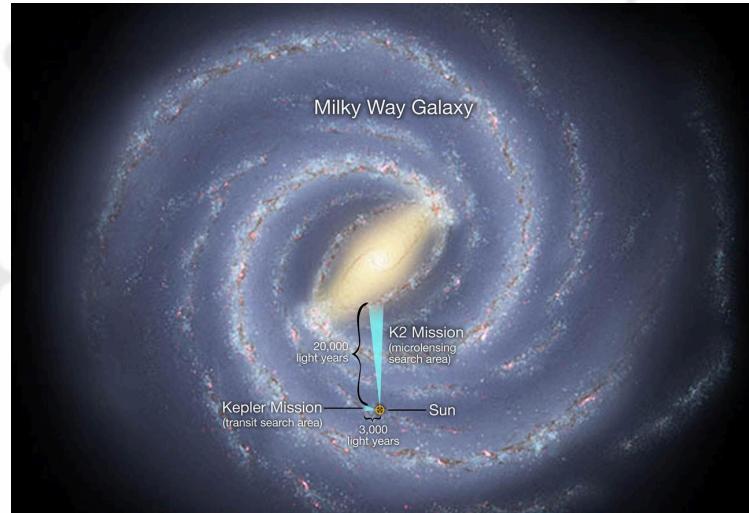
Conclusion

SpaceX's Starship project represents a bold vision for the future of space exploration. While challenges remain, the company's progress to date has demonstrated its commitment to pushing the boundaries of human innovation. The successful development of Starship could pave the way for a new era of space exploration and discovery.

Beyond Our Solar System: The Exciting World of Exoplanets

Introduction:

The discovery of exoplanets, planets orbiting stars outside our solar system, has revolutionized our understanding of the universe. In recent years, astronomers have made significant strides in detecting and characterizing these distant worlds, revealing a vast array of planetary systems.



Recent Discoveries:

- **TOI 700 e:** This recently discovered exoplanet is a potentially habitable world orbiting a nearby star. It is the smallest exoplanet yet detected in the habitable zone of a star.
- **Kepler-1649c:** Another promising exoplanet, Kepler-1649c, is also located in the habitable zone of its star and is similar in size to Earth.
- **TRAPPIST-1 System:** The TRAPPIST-1 system, with its seven Earth-sized planets, continues to be a hotbed of exoplanet research.

Methods of Detection:

- **Transit Method:** This method involves detecting the slight dimming of a star's light as an exoplanet passes in front of it.
- **Radial Velocity Method:** This method measures the wobble of a star caused by the gravitational pull of an orbiting exoplanet.
- **Direct Imaging:** This method involves taking images of exoplanets directly, although it is challenging due to the faint light emitted by these distant worlds.

Implications for Life:

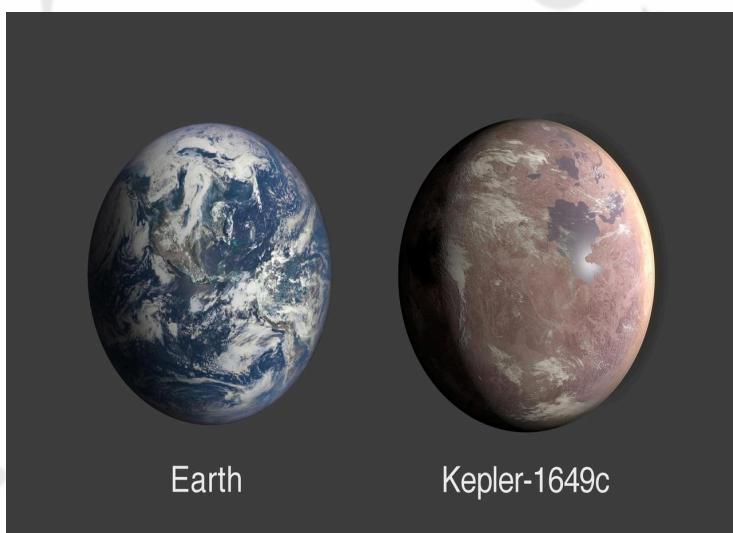
The discovery of exoplanets has raised the intriguing possibility of extraterrestrial life. While we have not yet found definitive evidence of life beyond Earth, the existence of habitable planets suggests that the conditions necessary for life may be more common than previously thought.

Future Research:

As technology continues to advance, astronomers are developing new methods for detecting and characterizing exoplanets. These advancements will allow us to explore a wider range of planetary systems and search for signs of life.

Conclusion

The study of exoplanets is an exciting and rapidly evolving field of astronomy. With each new discovery, we gain a deeper understanding of the universe and our place within it. As we continue to explore the cosmos, the search for extraterrestrial life remains one of the most compelling scientific quests of our time.



In a global experiment in exoplanet observation, the K2 mission and Earth-based observatories on six continents will survey millions of stars toward the center of our Milky Way galaxy.

MEET THE ASTRONOMER

Sunita Williams: A Beacon of Inspiration

A Trailblazer in Space Exploration

Sunita Williams, an American astronaut of Indian descent, has etched her name in the annals of space exploration. Her remarkable journey to the International Space Station (ISS) and her significant contributions to scientific research have inspired countless individuals around the world.

Early Life and Education



Born in Salem, Massachusetts, to Indian immigrant parents, Sunita Williams developed a passion for science and exploration at a young age. She excelled in academics and pursued a degree in engineering from the United States Naval Academy.

A Continuing Legacy of Exploration and Advocacy

Sunita Williams, the trailblazing American astronaut continues to inspire generations with her unwavering dedication to space exploration and her commitment to STEM education. Even in 2024, her influence remains profound, as she continues to advocate for the future of space travel and inspire young minds to reach for the stars.

Mentoring the Next Generation

Williams has become a mentor to countless aspiring astronauts, sharing her invaluable experiences and offering guidance to those who dream of following in her footsteps. Her mentorship has helped to cultivate a new generation of space explorers, ensuring that the legacy of human spaceflight will continue for years to come.

Advocating for STEM Education

As a passionate advocate for STEM education, Williams has dedicated much of her time to inspiring young people to pursue careers in science, technology, engineering, and mathematics. Her outreach efforts have played a crucial role in encouraging diversity and inclusivity in the field of space exploration.

Reflecting on a Remarkable Career

In recent interviews, Williams has shared her reflections on her remarkable career, offering insights into the challenges and rewards of spaceflight. Her candid accounts have captivated audiences and inspired countless individuals to dream big and pursue their passions.

A Lasting Impact

Sunita Williams' legacy extends far beyond her individual accomplishments. Her courage, determination, and unwavering commitment to exploration have left an indelible mark on the field of spaceflight. As we look to the future of space exploration, Williams' contributions will continue to inspire and guide us on our journey to the stars.

Want to Join the Cosmic Adventure??

Are you ready to embark on a journey beyond the stars? Become a member of the PSIT Vyomnauts Space Club and be part of something extraordinary.

Are you fascinated by the mysteries of the cosmos? Do you dream of contributing to space missions, building satellites, or even one day reaching for the stars? Then PSIT Vyomnauts is the place for you!

As the official Space Club of PSIT, we are on a mission to explore the unknown, push the boundaries of space science, and inspire the next generation of astronauts, engineers, and space enthusiasts. By joining us, you will have access to unique opportunities, including:

1. Hands-on Projects

- Be part of student-led satellite programs, where you can learn to design, build, and launch small satellites.
- Work on real-world space research and innovative space technology, gaining hands-on experience alongside like-minded peers.

2. Competitions and Challenges- Participate in national and international space competitions like NASA's Rover Challenge, CanSat, and many more.

- Join space hackathons and innovation contests, where you can develop cutting-edge solutions for the future of space travel.
- Discover the wonders of the universe with guided sessions and astrophysics workshops led by experts in the field.

3. Networking and Mentorship

- Connect with space scientists, engineers, and industry professionals through our events and guest lectures.
- Explore internship opportunities with prestigious organizations like ISRO and private aerospace companies.

4. Creative Expression - Contribute to our space magazine, Gagan, where you can write about the latest space innovations, research, and your personal space-related experiences.

- Engage in space-themed cultural events and showcase your creative talents.

5. Shape the Future

- Be a part of projects that pioneer sustainable and ethical space exploration, contributing to real-world solutions like reducing space debris and developing eco-friendly aerospace technologies.
- Collaborate on research and innovation that could shape the future of human spaceflight and space travel.

Why PSIT Vyomnauts?

By joining PSIT Vyomnauts, you're not just becoming a member of a space club—you're joining a community of dreamers and doers who are passionate about exploring the vast unknown. Whether you want to build the next generation of space tech, gaze at the stars, or become an astronaut, this is your opportunity to turn that passion into reality.

The universe is waiting for us. Are you ready to launch your journey?

Join PSIT Vyomnauts today!

Together, we'll reach for the stars and beyond.