ISSUE 15 I 16 OCTOBER 2024

SPACE BEACON

Stay up-to-date with the latest in spacetech



Extending the Reach of Spacecraft

INDIAN TECHNOLOGY CONGRESS ASSOCIATION

Orbital

Lead with the most significant celestial events and discoveries

Volta Space Technologies: Powering the Moon

Volta Space Technologies, a Canadian startup, is transforming lunar exploration with a satellite network that collects solar power and transmits it via lasers to spacecraft on the moon. This innovative system will enable spacecraft to operate during lunar nights and in shadowed regions, supporting scientific research and resource utilization.

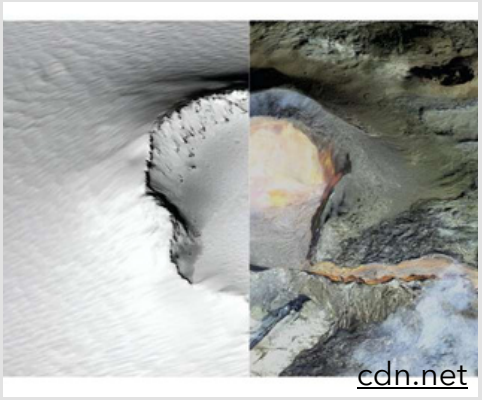

spacenews.com

The company has secured funding from investors with grants from NASA and the European Space Agency. Volta's technology has potential beyond lunar missions, including for terrestrial emergencies and space power transmission, positioning it as a key player in the future of space exploration.

First Spatter Cone Discovered on the Red Planet

Researchers from the University of Idaho have made a groundbreaking discovery on Mars, identifying the first confirmed spatter cone.

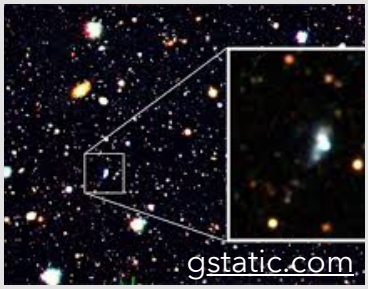
Led by postdoctoral researcher Ian T.W. Flynn and Professor Erika Rader, the team compared a Martian volcanic vent with a spatter cone from Iceland's 2021 Fagradalsfjall eruption. Their analysis revealed striking similarities, shedding new light on Mars' volcanic history.


cdn.net

This discovery suggests that volcanic processes similar to those on Earth occurred on Mars millions of years ago, providing insights into the planet's volcanic activity and environmental conditions during eruptions. The study also highlights the parallels between volcanic activity on both planets, expanding our understanding of Mars' geological past.

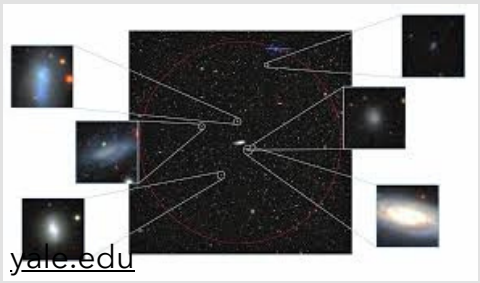
Harnessing Machine Learning for Planetary Exploration

NASA is harnessing machine learning to improve planetary exploration by training algorithms with data from commercial and flight instruments. Led by Victoria Da Poian from NASA's Goddard Space Flight Center, two open science challenges invited the public to analyze chemical data from sources like the Mars rover Curiosity, drawing over 1,150 participants who submitted more than 600 innovative solutions.


gstatic.com

The challenges demonstrated the value of using laboratory data to train algorithms for analyzing planetary data, speeding up the extraction of insights. NASA's open science approach, engaging a global community, has proven essential in advancing its planetary exploration missions.

The Milky Way's Uniqueness: Insights from the SAGA Survey


yale.edu

The decade-long SAGA Survey, which studied 101 satellite galaxy systems, has revealed that the Milky Way is an outlier, with fewer satellite galaxies compared to similar-sized galaxies. Researchers suggest that the Milky Way's recent acquisition of the Large and Small Magellanic Clouds may be influencing its satellite population.

Additionally, the survey found that proximity to host galaxies can suppress star formation in satellite galaxies, offering insights into galaxy evolution.

With redshift measurements for 46,000 galaxies, the SAGA Survey has provided valuable data for further research, enhancing our understanding of the Milky Way's unique characteristics and galaxy formation.

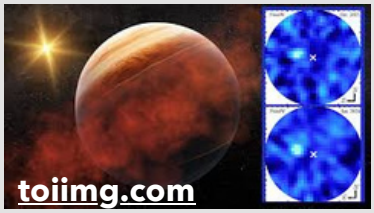
Powering the Future of Lunar Exploration


gstatic.com

Volta Space Technologies is developing the LightGrid network, a groundbreaking system set to launch in 2026 that will use satellites to collect solar energy and transmit it via lasers to lunar facilities. This innovative solution will provide a sustainable power source for lunar exploration, addressing the challenges of operating in the harsh lunar environment and enabling extended missions and more ambitious scientific research.

Volta's technology has attracted significant interest, securing funding from investors and grants from major space agencies. As the company moves forward, they are exploring additional applications, including powering space platforms, terrestrial locations, and emergency services, with the potential to revolutionize both space and Earth-based industries.

James Webb Space Telescope Captures Record-Breaking Exoplanet Image


toiimg.com

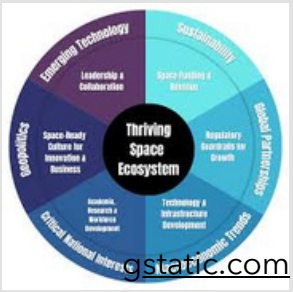
The James Webb Space Telescope (JWST) has achieved another groundbreaking milestone by directly imaging the lowest mass extrasolar planet ever observed. The planet, AF Lep b, is also the closest exoplanet to its star to be captured by the telescope.

This feat was a race against time as AF Lep b was about to disappear behind its star's blinding light. The young exoplanet, estimated to be 23 million years old, is significantly smaller and less massive than previously imaged exoplanets. JWST's advanced capabilities allowed scientists to overcome the challenges of observing such a small and faint object. The telescope's sensitivity and imaging techniques were crucial in capturing this remarkable image. AF Lep b offers valuable insights into the formation and evolution of exoplanets. Studying such young planets provides clues about the early stages of planetary development and the potential for the existence of habitable worlds beyond our solar system.

Genspace

Cover broader space news not fitting into other categories

Building a Thriving Space Economy: A Roadmap for Nations



The space industry is rapidly growing, with over 100 countries involved in space activities, prompting nations to develop strategies to capitalize on this expanding sector.

To succeed, nations must focus on leadership and collaboration among government and industry, secure long-term funding, and establish clear regulatory frameworks to foster innovation.

Key to this growth are investments in space technology and infrastructure, talent development in STEM fields, and promoting an entrepreneurial culture.

By addressing these six components, nations can build a thriving space ecosystem that drives economic growth, scientific progress, and international cooperation.

Cutting-Edge Spacesuit for Artemis Missions



Axiom Space, in partnership with luxury brand Prada, has unveiled the AxEMU spacesuit for NASA's Artemis lunar missions.

This advanced suit features enhanced mobility, redundancy systems, advanced materials, and a customizable design, prioritizing astronaut safety and comfort during lunar exploration.

The collaboration merges space technology with fashion design, showcasing the value of interdisciplinary innovation. Axiom's development of the AxEMU spacesuit reflects its commitment to astronaut safety and mission success, marking a major advancement for future lunar missions as NASA prepares for the Artemis program.

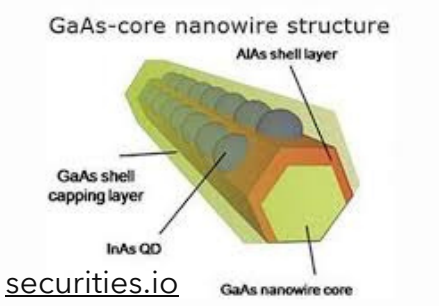
SpaceX Captures Starship Booster in Historic Feat



SpaceX has reached a significant milestone by successfully catching the first-stage booster of its Starship megarocket after a test flight, advancing the company's goal of rapid reusability. The booster launched from SpaceX's Texas launchpad and made a controlled return, being captured by mechanical "chopsticks" from the launch tower, which was celebrated by the SpaceX team and founder Elon Musk.

This achievement highlights SpaceX's innovative approach and commitment to reusability, reflecting their "fail fast, learn fast" strategy that has propelled them to the forefront of the space industry. The successful booster capture is a crucial step towards SpaceX's ambitions to launch humans to Mars, with the Starship rocket designed for long-duration missions beyond Earth.

In Space Solar Energy Innovation



securities.io

The University of Malaga (UMA) is spearheading the ZEUS project, which aims to revolutionize solar energy in space by developing innovative nanowire solar cells capable of withstanding harsh conditions, including high radiation levels.

Led by Professor Enrique Barrigon, these cells feature needle-shaped nanowires that enhance light absorption and durability.

Aiming for efficiency improvements of up to 47%, the ZEUS project will boost power generation for satellite applications and space-based systems. UMA is also focused on environmental sustainability, assessing the ecological impact of these solar cells while promoting decarbonization and efficient use of critical materials, solidifying its leadership in sustainable technology research.

China's Ambitious Space Science Roadmap


origami

China has unveiled an ambitious plan to establish itself as a leader in space science by 2050, outlining three key phases with specific goals. In the initial phase (2023-2027), China aims for world-class achievements in high-energy astronomy and planetary science while exploring emerging fields like dark matter and gravitational waves through multiple missions.

The second phase (2028-2035) will see China conducting around 15 advanced research missions focusing on the early universe, exoplanets, and the solar system's formation. By the final phase (2036-2050), China intends to attain international leadership in space science, making groundbreaking discoveries in areas such as the origins of the universe and crewed deep-space exploration. This comprehensive roadmap highlights China's commitment to advancing research, innovation, and international collaboration in the global space science community.

Harnessing Space Technology to Combat Algal Blooms


gstatic.com

Lough Neagh, Northern Ireland's largest freshwater lake, is increasingly threatened by harmful blue-green algal blooms, which disrupt local ecosystems and impact communities reliant on fishing, recreation, and tourism. In response, the UK Space Agency has launched a competition to develop innovative solutions that leverage space technology for monitoring and managing these algal blooms.

The competition invites participants to utilize satellite data, AI, and other advanced technologies to analyze water quality, identify early-stage blooms, and predict their development. This initiative, in partnership with DAERA and the Northern Ireland Space Office, aims to promote sustainable ecosystem management and address pressing environmental challenges. By fostering cutting-edge solutions, the competition seeks to benefit not only Lough Neagh but also other regions facing similar issues.

Satellogy

Focus on recent and upcoming satellites and launches

Vast Space Unveils Ambitious Plans for Haven-2 Space Station



Vast Space has unveiled plans for Haven-2, a modular space station aimed at competing for NASA's Commercial Low Earth Orbit Destinations (CLD) program. Larger and more capable than Haven-1, Haven-2 will feature a modular design for gradual expansion, double the usable volume, advanced closed-loop life support systems, multiple docking ports, and various lab facilities, including an airlock for spacewalks and an observation cupola.

The first Haven-2 module is set to launch in 2028, with full operational capability expected by 2032. This development aligns with NASA's transition from the International Space Station (ISS) to commercial stations, positioning Vast to maintain a continuous human presence in low Earth orbit after the ISS's retirement.

SWiPS Takes Flight: A New Tool for Space Weather Forecasting



The Southwest Research Institute (SwRI) has successfully integrated its Solar Wind Plasma Sensor (SWiPS) into a NOAA satellite for tracking space weather. SWiPS will measure solar wind ions to provide essential data for predicting geomagnetic storms that can affect Earth's technology. Developed over four years and based on technology from ESA's Rosetta mission, SWiPS will be part of the NOAA Space Weather Follow On-Lagrange 1 (SWFO-L1) satellite, set to launch in 2025 on a SpaceX vehicle.

The SWFO-L1 satellite will also feature a magnetometer from SwRI. SWiPS will enhance space weather forecasting by measuring solar wind ion velocity, density, and temperature, helping predict geomagnetic storm intensity and protecting Earth's infrastructure from solar storms.

AI System to Enhance Deep Space Missions



VISIMO, a Pittsburgh-based technology company, is set to test its autonomous AI system, GRAMS, during an upcoming space mission with ABOVE Space Development Corporation.

GRAMS is designed to help spacecraft autonomously manage and recover from system failures, reducing reliance on ground support.

This partnership provides a practical demonstration of GRAMS in real-world space environments. Equipped with sensors to collect data on avionics, telemetry, and astronaut vital signs, GRAMS aims to enhance spacecraft autonomy and resilience, marking a significant advancement for future deep space missions.

Viasat Paves the Way for Direct-to-Device Satellite Connectivity in India



Viasat, in partnership with BSNL, has demonstrated direct-to-device satellite connectivity in India, enhancing access to satellite services in remote areas. At the India Mobile Congress, the company showcased two-way messaging on a commercial Android smartphone designed for non-terrestrial network (NTN) connectivity, revealing the potential for satellite-to-cell phone communication.

This technology enables standard devices like mobile phones and smartwatches to connect seamlessly to both terrestrial and satellite networks without specialized hardware.

The collaboration aims to transform various sectors in India, improving efficiency, sustainability, and safety across industries such as production, supply chains, and automotive applications.

Satellite IoT: A Revolution in Global Connectivity



Satellite IoT connectivity is revolutionizing industries globally by delivering essential solutions in remote areas with limited terrestrial coverage. The subscriber base for satellite IoT is rapidly growing due to the demand for reliable and widespread connectivity.

Established operators like Iridium, Orbcomm, Viasat, and Globalstar are expanding their networks, while newcomers such as Astrocast, AST SpaceMobile, and Kepler Communications contribute innovative technologies and partnerships. Collaborations between satellite and mobile operators are also fueling this growth, with companies like Skylo merging cellular and satellite services for seamless connectivity across various devices. Despite its advantages, including global coverage and resilience, satellite IoT faces challenges such as cost, latency, and regulatory hurdles. Overcoming these issues will be vital for the continued adoption and advancement of satellite IoT technology, which promises to bring transformative impacts across multiple industries.

“Thousand Sails" Satellites: A Glimmer of Concern for Astronomy



China's "Thousand Sails" satellite project has raised concerns due to the unexpectedly bright visibility of its Qianfan satellites, which are designed to provide global high-speed internet. These satellites, visible to the naked eye, could disrupt nighttime astronomical observations, particularly with plans to deploy up to 15,000 satellites by 2030.

The initial launch of 18 satellites in August succeeded, but a rocket malfunction created over 300 pieces of space debris. Ground observations confirm that the satellites' design, featuring flat antenna panels facing Earth, contributes to their brightness. The growing number of such satellites poses significant challenges for astronomers studying the cosmos.

CubeTech

Showcase innovative CubeSat missions and unique payloads

Kepler's Stellar Leap for Optical Relay Network


spacenews.com

Kepler Communications has secured a €36 million ($39 million) contract from the European Space Agency (ESA) to develop a low Earth orbit (LEO) optical relay network as part of ESA's High Throughput Optical Network (HydRON) program. This network aims to extend terrestrial fiber networks' reach by providing seamless connectivity between LEO satellites.

Kepler's network will consist of 140 satellites in two near-orthogonal planes, enabling real-time data transfer between satellites and ground stations. The contract marks a significant achievement for Kepler and highlights the growing role of private companies in advancing space communication technologies in collaboration with public agencies like ESA.

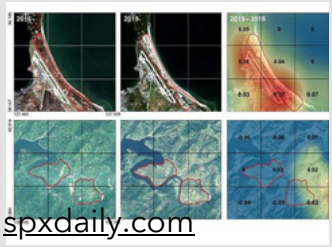
Protecting Earth's Orbit: Advanced space monitoring systems


businesswire.com

The University of Manitoba, Magellan Aerospace, and government agencies from Canada and the UK are collaborating on the Redwing microsatellite mission to safeguard Earth's orbital environment. Funded by Canada's Department of National Defence (DND), the project aims to develop advanced space monitoring systems to track and prevent satellite collisions with debris as the number of objects in orbit grows.

Magellan Aerospace is designing the Redwing satellite to monitor orbital objects, with support from the University of Manitoba's STARLab and the UK's Dstl. Launching in 2027, Redwing aims to improve space situational awareness and foster international cooperation for orbital sustainability.

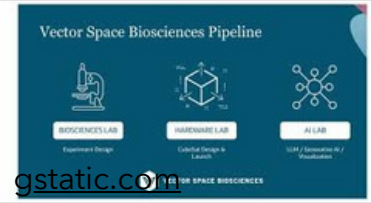
Revolutionizing Disaster Response with AI-Powered Satellites


spxdaily.com

The European Space Agency (ESA) has launched Ciseres, an AI-powered project designed to enhance disaster response by providing critical information to first responders within minutes. As part of ESA's Civil Security from Space (CSS) initiative, Ciseres integrates AI directly into satellites, enabling real-time data analysis and rapid transmission to emergency teams.

Developed with Deimos, Skylabs, and GINA, Ciseres seeks to revolutionize disaster management by quickly delivering critical information, helping save lives and property. The project highlights ESA's commitment to using space technology for societal benefits, especially as climate change heightens the need for faster disaster response.

CubeSat based Space Radiation Research



gstatic.com

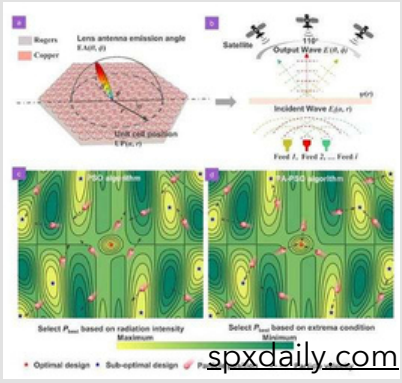
Advacam and Vector Space Biosciences (SBIO) are partnering to send Advacam's Timepix2 radiation detectors into space aboard SBIO satellites, collecting data on space radiation like Galactic Cosmic Rays and High-Z Energy particles.

This data will be analyzed using AI models, providing insights into the effects of space radiation on electronics and biological systems. The collaboration also aims to launch biotechnology payloads and develop space-hardened medical chipsets.

By integrating radiation data with AI analysis, the partnership will drive innovations in biotechnology and space exploration, benefiting various industries, including pharmaceuticals.

Breakthrough in Ka-band Meta-Antenna Design

Researchers from the University of Electronic Science and Technology of China have developed a new approach to designing Ka-band meta-antennas using a Physics-Assisted Particle Swarm Optimization (PA-PSO) algorithm. This algorithm improves the efficiency of designing complex antennas by incorporating physical principles, allowing faster convergence and reducing suboptimal solutions. The team successfully created a hexagonal Ka-band meta-antenna with high gain, wide beam scanning, and compact size.


spxdaily.com

The advanced design is ideal for satellite communications, radar systems, 5G networks, and IoT applications, offering superior performance and cost-effectiveness. This breakthrough has the potential to enhance communication systems across multiple industries.

Hydrosat for Thermal Satellite Data

Hydrosat has secured a significant contract with the U.S. Air Force to provide thermal satellite data from its VanZyl satellites, enhancing the accuracy of the Air Force's weather prediction models. This partnership, part of the AFWERX Tactical Finance (TACFI) program, demonstrates Hydrosat's commitment to innovation in delivering advanced technologies for defense and operational planning.



gstatic.com

In addition to defense applications, Hydrosat's thermal imaging technology is valuable in agriculture, water resource management, and climate change research. This contract underscores Hydrosat's expertise and positions the company as a key player in addressing challenges related to climate change and national security while expanding its operations across various sectors.

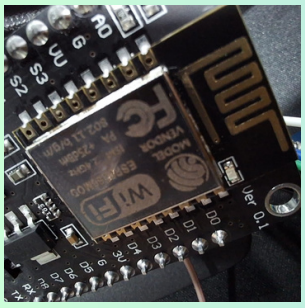
The 75SSM

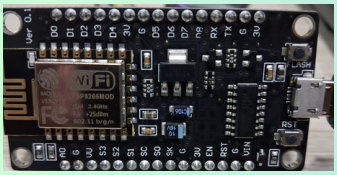
SSM: Students' Satellites Mission

Update readers on our ITCA internal space-based innovations

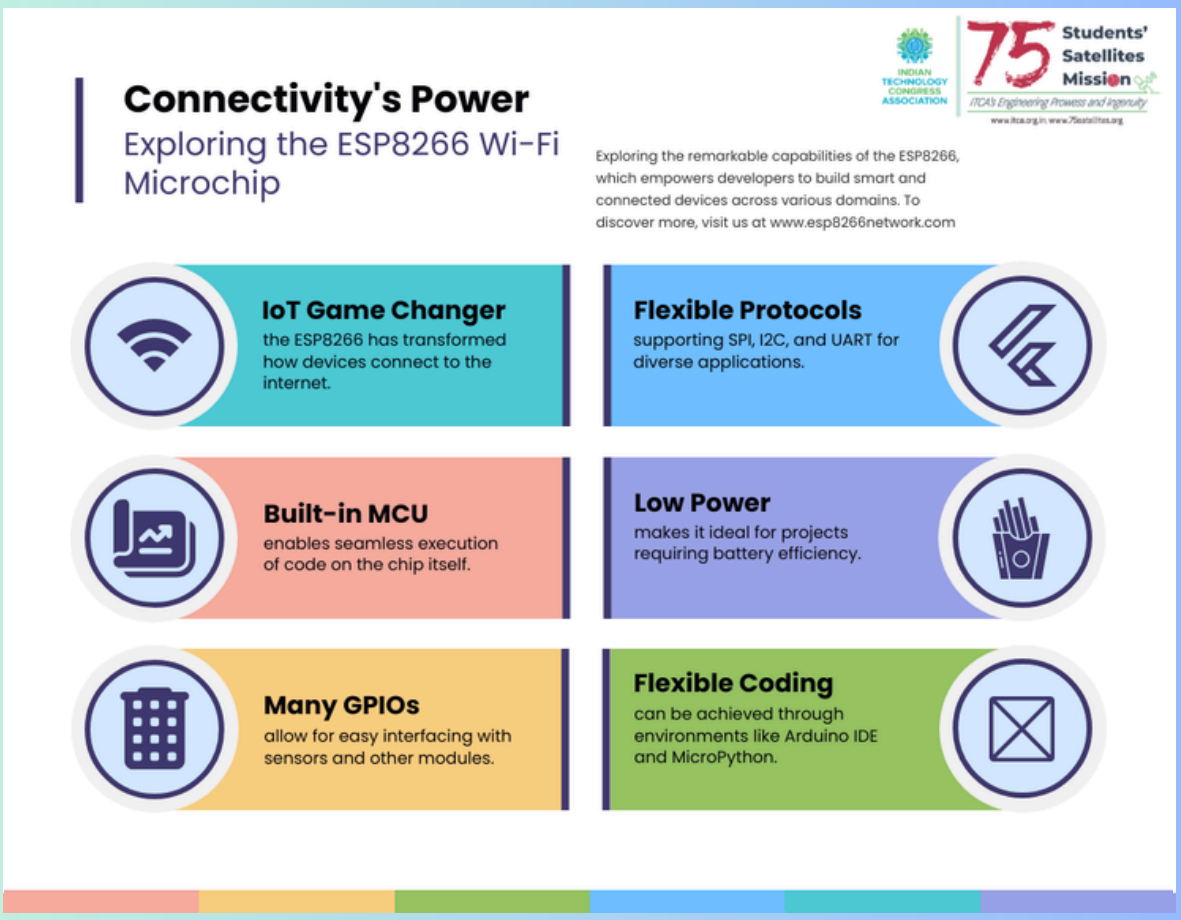
Espressif Systems

The ESP8266 is a low-cost Wi-Fi microchip developed by Espressif Systems, designed for IoT (Internet of Things) applications. It features a built-in microcontroller, allowing developers to run code directly on the chip, and offers full TCP/IP stack capabilities for seamless internet connectivity. With several GPIO pins for interfacing with sensors and actuators, as well as support for multiple communication protocols like SPI, I2C, and UART, the ESP8266 is highly versatile. Its low power consumption makes it suitable for battery-operated devices, and it can be programmed using various platforms, including the Arduino IDE and MicroPython. Widely used in smart home devices, environmental monitoring, wearable technology, and industrial automation, the ESP8266 has gained popularity among hobbyists and professionals alike due to its robustness, community support, and ability to facilitate the rapid development of connected devices.













Space@India

Glimpses into India's space chronicle, every week

The government approves a major boost for spy satellites



According to a report from the Times of India, which references sources from the Indian Space Research Organisation (ISRO), the Modi government has approved an ambitious plan to launch 52 satellites under the SBS III initiative. These satellites are set to be deployed in both low Earth orbit (LEO) and geostationary orbit (GEO) and are projected to cost around ₹27,000 crore.

The upcoming satellites will be outfitted with sophisticated artificial intelligence capabilities designed to significantly enhance their surveillance functions. These advanced technologies will enable real-time data analysis, improving the satellites' ability to monitor various activities in both low Earth and geostationary orbits. This initiative marks a crucial step in bolstering India's space monitoring and intelligence-gathering efforts, addressing the growing need for comprehensive surveillance in an increasingly complex geopolitical landscape.

Moreover, this project underscores the government's commitment to leveraging cutting-edge technology for strategic purposes, thereby strengthening national security and enhancing the country's technological prowess in space. By investing in these state-of-the-art satellites, India aims to ensure a robust defense posture and better situational awareness, crucial for informed decision-making in national security matters. Ultimately, this initiative not only contributes to India's position in the global space arena but also positions the nation as a leader in utilizing innovative technologies for the greater good, fostering collaboration between public and private sectors to achieve ambitious space objectives.

India's Space Strategy: Leveraging Data and Small Satellites Beyond SpaceX.



India aims to establish a foothold in the commercial space sector by focusing on data analytics, building small satellites, and launching them affordably into orbit, rather than directly competing with heavyweights.

The industry has shifted from large satellites to smaller ones, making this a sector where India can excel, leveraging its historical strengths in data mining and interpretation instead of competing in heavy launch capabilities dominated by others.

75 Students' Satellites Mission

ITCA's Engineering Prowess and Ingenuity

ITCA: Pioneering India's Tech Future

Driving India's tech innovation for over 21 years, we've built strong academia-industry partnerships. Pioneer of the '75 Students' Satellites Mission,' we've made a global impact in space tech, precision agriculture, and Industry 4.0. We are shaping the future of India's technology landscape.

Upcoming.....

International Astronautical Congress 2024

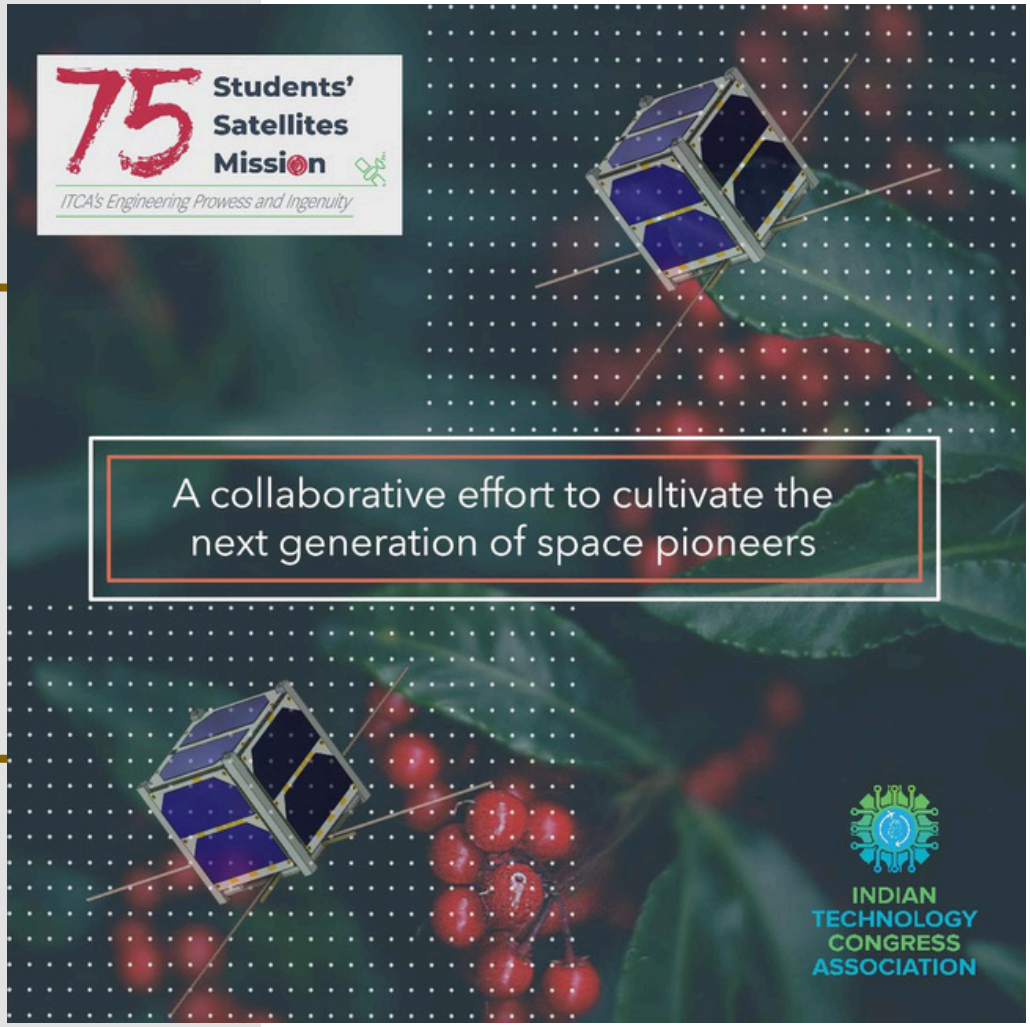
14 - 18 October 2024
Milan, Italy
https://www.iafastro.org

International Conference on Space science and Communication

4 - 6 November 2024
Edinburgh, UK
https://spacenews.com/

SmallSat Symposium 2025

4 - 6 February 2025
Silicon Valley Mountain View, CA
https://smallsatshow.com/



SPACE BEACON
cosmic cadences on our radar

Copyright © 2022. ITCA
All Rights Reserved

Compiled by

Er. Srinivas Durvasula
Er. S. Shanmugam
Er. C. V. Latha
Er. K. Devi Sri Meenakshi

#3, First Main, BDA Layout, HAL 2nd Stage, Bangalore 560008.
www.itca.org.in; contact@itca.org.in

Reader Advisory

This newsletter features curated content from a variety of reputable sources. We strive to bring you the most interesting and informative space news articles each week. The views expressed in the linked articles are those of the sources and do not necessarily reflect the views of this newsletter. We link to the original sources in some cases for further exploration.