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GLOBAL SPACE BUSINESS BULLETIN

(A Digital Newsletter for Space Exploration, Technology & Space Education)

September 2024

GSLV- Mark - III
ISRO

The Global Trade Driver
(An International Forum on Industry and Education)

Explore The Space
(Promoting STEM Education & Space Exploration awareness in Schools & Colleges across Geographies)

For readers across the World - Government Space Agencies, Space Companies, SMEs, Research Institutions, Universities, Investment Agencies & Others

Global Space Business Bulletin is an initiative of

The Global Trade Driver & Explore The Space

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Global Space Business Bulletin

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The Global Trade Driver

(An International Forum on Industry and Education)

Established in 2010, The Global Trade Driver (TGTD), is a niche facilitator of Businesses connecting Indian companies within the domestic market and International Markets, particularly USA through Business Delegations, B2B meetings, Strategic Consultancy, Advocacy and other programmes.

Explore The Space

(Promoting STEM Education & Space Exploration awareness in Schools & Colleges across Geographies)

Explore The Space is an "ISRO - Registered Space Tutor"

"Explore The Space (ETS)" is an NGO and **"ISRO - Registered Space Tutor",** promoting awareness on Space Sciences and Technology among Schools and Colleges through seminars, quiz programmes, study tours and research. ETS connects Institutions and Industry through its programmes.

A New Space Port in INDIA – Kulasekarapattinam

Unleashing new opportunities for the Space Industry Supply Chain

In a land area spread over 2,000 acres, a new spaceport is coming up at Kulasekarapattinam in Thoothukudi district in Tamil Nadu. A spaceport at Kulasekarapattinam will provide a strategic advantage to ISRO as small satellites launched from this place need not fly a circuitous path to avoid the land mass of Sri Lanka, which is currently the case for launches from Sriharikota. The new launchpad will help ISRO save fuel and have a dedicated space for launching Small Satellite Launch Vehicles (SSLV).

Speaking at an event in Coimbatore, Tamil Nadu, Mr. S. Somanath, Chairman, ISRO, said, *"It will take two years to set up the facility, which will have a new launchpad, radar, ground stations, tracking systems and safety systems, among others."*

The new space port will be used to primarily launch small satellites that weigh less than 500 kilos. Smaller rockets are easier to build, assemble, and launch with less time in comparison to their larger counterparts. Further as the demand for utility and hence the demand for small satellites are expected to be much larger than that of the currently used large ones, it is important for India to have a dedicated spaceport for such smaller rockets. Smaller rockets are also attractive to foreign and domestic customers who are looking to launch small satellites at low costs.

The growing demand for small satellites

The small satellite market revenue totalled ~US$ 3.05 Bn in 2020, according to Future Market Insights (FMI), and is expected to reach ~US$ 12.9 Bn by 2031. Small satellite deployments will continue to accelerate due to the development of satellite communication and automation technologies. This is driven by factors such as increasing small satellite missions, need for earth observation and remote sensing, uninterrupted satellite communication, and developments in Global Navigation Satellite System (GNSS).

Small satellites find numerous applications in the field of weather forecast, satellite communication, defence, space research, GPS, etc.

Remote sensing technology and its applications - Driving India's growth

Dr. Shailesh Nayak

Dr. Shailesh Nayak is currently the Director, National Institute of Advanced Studies, Bengaluru, Chancellor, TERI School of Advanced Studies, New Delhi, and Editor-in-Chief, Journal of the Indian Society of Remote Sensing, Dehradun. He obtained his PhD degree in Geology from the M.S University of Baroda in 1980. He was Secretary, Ministry of Earth Sciences, during 2007-2015 and provided leadership for programs related to earth system sciences. His current research interest includes building strategy for blue economy, sustainable development and promoting research in the Indian Ocean and polar regions.

What kind of role can remote sensing technology and its applications play to speed up and sustain the growth of India?

The remote sensing technology has tremendously helped to provide data, information, knowledge and services on weather, natural resources, environment and infrastructure and facilitate in decision making. The first use of the satellite images from TIROS-8 was initiated by the India Meteorological Department (IMD) in 1965 to study monsoon and cyclones.

Today, the satellite data are integral part of weather forecasting and various services to about 30 sectors in the country. Large amount of satellite data is assimilated in weather, cyclone, thunderstorm forecasting and models. INSAT data provided every 15 minutes, is the backbone of IMD today. The other applications include implementation of Coastal Regulation Zone (CRZ) Notification where it is mandatory to use satellite data for delineation of reliable and accurate high-water line which is designated as construction setback line. India is one of the few countries where coastal management plans and vulnerability assessment are made for the entire country's coastline.

"The services developed based on the remote sensing data such as weather forecasting, hazard response, oceanographic services, groundwater targeting etc., have provided transformative economic and social benefits"

Bengaluru Space Expo – 2024

India's space sector has seen tremendous growth over the past decade. Our advances in space programs have been highly remarkable, with vigorous and determined efforts by ISRO. Taking the vision of the Government of India in enhancing private sector participation in the space sector, the Confederation of Indian Industry (CII), in association with the Indian Space Research Organization (ISRO), has been organising the Bengaluru Space Expo 2024 (BSX) from September, 18-20, a Biennial International Exhibition and Conference since 2008.

The 8th edition of BSX 2024, which will be organised in association with ISRO, Indian National Space Promotion, and Authorisation Centre (IN-SPACe) and New Space India Limited (NSIL) is scheduled to start in September 2024 at BIEC in Bengaluru, India. The Bengaluru Space Expo 2024 serves as a premier platform for industry leaders, innovators, and enthusiasts to gather, exchange ideas, and explore the most recent advancements in space technology. The cutting-edge technologies and capabilities driving the future of space exploration will be showcased at BSX ,2024, with an exciting line-up of exhibits, workshops, and networking opportunities.

Event Highlights

- 8th Edition/Biennial
- 3 Day Exhibition and 2 Day Conference
- ISRO Pavilion
- 250+ Delegates
- Visit of Officials from Various ISRO Centers Across India
- New Product Launches
- Latest Trends, Technologies, Equipment and Products on Space and Satellite
- 250+ Space Companies
- 10+ Country Pavilions
- 10,000+ Business Visitors
- Visit by Department of Space, GOI Officials
- Innovation and Start-Up Pavilion

Israel - "The Drone Capital of the World"

The Aerospace industry is a multi-discipline sector that includes manufacturing of the primary components of the industry and other production activities such as R&D as well as propulsion, navigation and communications and software development in addition to maintenance.
Israel's aerospace industry sector is well known with capabilities in UAV production and advanced space-launching. In addition, Israel has classic advantages in fields such as relatively low-cost but high-quality manufacturing for Western countries, innovation and entrepreneurship that produce advanced technologies and with operational experience of products.

Mr. Joseph Avraham
Consul – Trade &
Economics Affairs
Consulate General of Israel
in Bengaluru

Many Israeli companies are sub-suppliers that specialize in fields such as machining, electronic systems and components, and composite materials. Israeli companies collaborate with leading international enterprises, said Mr. Joseph Avraham, Consul Trade & Economics Affairs, Consulate General of Israel in Bengaluru. Although the majority of satellite, defense and electronics technology development is conducted by the large Israeli corporations, the UAV segment is promoted by smaller Israeli manufacturers that develop exclusive technology.

Israel is a significant UAV exporter in the world, with many advantages, such as manufacturing high- quality products at low cost; the innovation and entrepreneurship that produce highly sophisticated technologies. Israel is known as a world leader in the satellite industry, with the first mini satellites to be developed, and is one of a few countries in the world with independent launching capabilities. The Israel space industry has also developed installed equipment capabilities as well as developing satellites and launching systems. The capabilities that Israel has developed make it a leader in nanosatellite technology, just as it was a leader in mini satellite technology. There are a number of Israeli start-ups developing new, ground-breaking civil commercial applications. Simulators are another area of expertise due to the increase in commercial air traffic and the higher demand for training tools and simulators with advanced technological capabilities.

The Israel Space Agency cooperates with many space organizations around the world, including cooperation agreements. Among the reasons the Israeli space and satellite industry is a global pioneer in small satellite technologies are the fact that it features high-quality human resources and highly effective work processes, the fact it is supported by Israeli cuing-edge academic activities, and that it constantly interacts with the renowned world-leading Israeli hi-tech sector.

ETS – Online Certificate Course on Career Opportunities in Space and Allied Industries

Explore The Space - Global Space Career Forum is an exclusive programme for College Students to motivate and guide them for careers in Space.

Space industry provides employment opportunities in a diverse number of fields and one can explore job prospects in ISRO, DRDO, HAL, NAL and a growing number of private companies. With the space industry being opened for Private sector participation, there is a growing number of new avenues for fresh graduates in the space sector.

Explore The Space - Global Space Career Forum is an exclusive programme for College Students to motivate and guide them for careers in Space.

The advantages / features of this forum are:

1. ETS-Global Space Career Forum Membership Card
2. Two webinars will be conducted by experts to the enrolled students.
   A. Technical Webinar
   B. Personality Development (Interview Skills) Webinar
3. Study Material (Digital Copy and Hard Copy)
4. Objective Test 5. Certificate 6. Industry Linkages & Career Guidance

World Space Industry - Company Profiles

S.No	Company Name	Country	Product / Service	Contact Details
1	SpaceX	USA	Falcon rockets, Starship, Starlink satellites, launch services.	Phone: +1 310 363 6000 Email: sales@spacex.com
2	Blue Origin	USA	New Shepard rocket, orbital launch vehicles, space tourism.	Phone: +1 253 437 9300 Email: info@blueorigin.com
3	Northrop Grumman	USA	Satellites, spacecraft, launch vehicles, missile systems.	Phone: +1 703 280 2900 Email: space@ngc.com
4	Airbus Defence and Space	France	Satellites, launch vehicles, Earth observation systems.	Phone: +33 5 82 08 00 60 Email: contact@airbus.com
5	Mitsubishi Heavy Industries (MHI)	Japan	H-IIA rocket, space systems, satellites.	Phone: +81 3 6275 6200 Email: info@mhi.co.jp
6	Rocket Lab	New Zealand	Electron rocket, Photon satellite platform.	Phone: +1 714 465 5737 Email: contact@rocketlabusa.com
7	Thales Alenia Space	France/Italy	Satellites, space exploration modules, telecommunications systems.	Phone: +33 4 92 92 70 00 Email: contact@thalesaleniaspace.com
8	**OneWeb**	UK	Satellite internet systems, constellation satellites.	Phone: +44 20 3744 1800 Email: info@oneweb.net
9	OHB System AG	Germany	Satellite systems, planetary exploration modules.	Phone: +49 421 2020 800 Email: info@ohb.de
10	Roskosmos	Russia	Soyuz rockets, crewed spacecraft, space station components.	Phone: +7 495 631 92 46 Email: info@roscosmos.ru

Indian Space Industry - Company Profiles

S.No	Company Name	Country	Product / Services	Contact Details
1	Ananth Technologies	India	Satellite systems, launch vehicle integration, electronics for space applications.	Phone: +91 40 2717 4723 Email: info@ananthtech.com
2	Godrej Aerospace	India	Satellite launch vehicle components, propulsion systems.	Phone: +91 22 6796 5656 Email: aerospace@godrej.com
3	BEL (Bharat Electronics Limited)	India	Satellite communication systems, radar systems, avionics.	Phone: +91 80 2503 9033 Email: contactus@bel.co.in
4	L&T Defence & Aerospace	India	Aerospace systems, missile components, satellite structures.	Phone: +91 22 6752 5656 Email: contactus@larsentoubro.com
5	Centum Electronics	India	Space electronics, subsystems for satellite systems.	Phone: +91 80 4143 6000 Email: info@centumelectronics.com
6	Alpha Design Technologies Pvt Ltd	India	Aerospace and defense electronics, satellite systems, launch vehicle support.	Phone: +91 80 2362 8703 Email: info@adtl.co.in
7	Astra Microwave Products Limited	India	RF and microwave components, satellite communication systems.	Phone: +91 40 3061 6769 Email: info@astramwp.com
8	Data Patterns (India) Pvt. Ltd	India	Embedded systems, electronics for satellites, avionics systems.	Phone: +91 44 4741 0000 Email: sales@datapatternsindia.com
9	Tata Advanced Systems Ltd. (TASL)	India	Aerospace systems, satellite components	Phone: +91 40 4426 6300 Email: tasl@tata.com
10	Walchandnagar Industries Ltd (WIL)	India	Launch vehicle components, aerospace manufacturing, satellite systems.	Phone: +91 22 2261 1281 Email: info@walchand.com

“Space Education for Youth all over the World... Space Unites the World !”

Explore The Space

(NGO Promoting STEM Education & Space Exploration awareness in Schools & Colleges across Geographies)

ISRO - Registered Space Tutor

ETS - ONLINE CERTIFICATE COURSE ON

“STEM AND BASICS OF GLOBAL SPACE TECHNOLOGY & EXPLORATION” -

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- Digital Study Material
- Booklet on Space Technology
- Two Webinars
- Objective Test
- Certificate
- Networking Opportunity

Global Space Industry Leaders Opinion -

Dr. Jayadeep Mukherjee
Director,
NASA FSGC, USA

Dr. Jaydeep Mukherjee is the Director of the NASA Florida Space Grant Consortium (FSGC), an association of eighteen public and private Florida Universities and colleges led by the University of Central Florida and administered by the Florida Space Institute. Dr. Jaydeep Mukherjee received his Bachelor's degree in Physics from St. Xaviers College, Mumbai and Master's degrees in Physics from Mumbai University (University of Mumbai), India, and his M.S and Ph.D degrees in Astronomy from the University of Florida. Jaydeep has been passionately working over the past many years in promotingSTEM education and is an avid speaker and writer on Space Sciences.

His illustrious career has been filled with many awards and recognitions for promoting Space Education. In this insightful interview with D. V.Venkatagiri, CEO, Explore The Space, Jaydeep talks about Space Education in Schools, future of Space Exploration, role of teachers in spreading awareness on Space Sciences and related matters.

Dr. Lalit K. Sharma
CEO, Mahamana Ceramic Development Organization & Former Chairman, Indian Ceramic Society

Advancement in Industrial Ceramics in the World & Importance of Ceramics to Space Missions..

Latest Developments and advancements in industrial ceramics are taking place throughout world. Wear resistance and lubricates Alumina/ Silicon nitride components are being used by automobile industry. Alumina substrates are being used by electronic industries for circuit printings. Ceramic pistons, ceramic metal composite seal, ceramic bullet proofs, optical fiber for communication, ceramic implants for body parts replacements, reduction of super refractories utilization ton of metal cast for ferrous and nonferrous industry, reduction in thermal energy consumption per kgs of white wares production through energy efficient refractory kiln furniture, Wear resistance rollers for wall & floor tiles industry by contributing to reduction in thermal energy consumption. Ceramic Materials like wear resistance coatings & products are finding use in aerospace like Re-entry, radoms, turbine components and in emission control because they are lighter than metals enabling faster speeds, reduced fuel consumption, larger payloads, and longer times in space for exploration vehicles.

Global Space Business Bulletin

India is Exciting, Communication is the key for bigger success

Tim Dyer,
Executive Director, Fralock, USA

Space Exploration unites the planet.

Space Exploration requires hardware designs that are reliable and long lasting.

Ion engines in Space Craft, Micro Satellites, Direct Imaging Systems for Photo Lithography, Advanced Inspection Equipment, 3d printing of high entropy alloys, Semi conductor innovations are some of the path-breaking recent developments in the space industry.

What is the contribution / role of Fralock group to the Space / Aerospace Industry?

Fralock provides flexible circuits and connectors for commercial and military satellites. Flexible circuits can be up to 2 meters long. They have developed non adhesive bonding methods to eliminate circuit outgassing in space. In addition, the ceramics division offers many products in the space and aerospace market: Aluminum Nitride ceramic temperature control devices for space and electrical ceramics for naval projectile systems, Zerodur lightweight optics for mirrors used in space telescopes, and aluminum oxide ceramics for sensors and electrical packaging

b) What do you have to offer for the Indian market and what kind of products are you seeking from the Indian market?

Fralock can offer lightweight high thermal conductivity Aluminum Nitride ceramics and high density alumina ceramics for severe environment, and or high voltage, electrical applications. Fralock can also metallize both alumina and aluminum nitride ceramics to enable metal to ceramic assemblies. Aluminum nitride composite heaters can heat a rates upon to 300C per second, and would be idea for chemical sublimation based braking systems like the ones envisioned for Mars landings.

Your piece of advice for the young Engineers and Science Graduates who want to join the Space Industry.

a) The concept of Space exploration unites the planet.Everyone is curious and interested in learning more about our world and the universe that surrounds it. This passion crosses cultures, boarders, and oceans. Please seek others who share your passion and collaborate.

b) Accept that failures are normal and part of the learning process. In the end, space exploration requires hardware designs that are reliable and long lasting. Technical advancements are difficult to develop and come because of many experiments. Any experiment that teaches you something is a successful one.

Silicon Valley and the Space Industry: Driving the New Space Revolution

Silicon Valley, known as the global hub of technology and innovation, has played a transformative role in the space industry over the past two decades. Originally famous for its contributions to computing, software, and the internet, Silicon Valley has increasingly turned its attention to the cosmos, driving the new era of commercial space exploration known as "New Space." This intersection of technology and space has given rise to a dynamic ecosystem where ambitious startups and established tech giants are redefining what's possible in space.

Investment and Innovation Hub: Silicon Valley's vibrant investment environment has fueled the growth of the space industry. Venture capital firms, angel investors, and tech billionaires are pouring billions of dollars into space startups, fostering rapid innovation. This investment ecosystem supports a broad range of companies, from those developing advanced propulsion systems to startups working on satellite-based Earth observation and space debris management. The infusion of Silicon Valley's entrepreneurial spirit into the space industry has led to faster product development cycles, leaner business models, and a greater emphasis on commercial viability. Technologies such as 3D printing, artificial intelligence, and advanced robotics are being leveraged to develop more efficient spacecraft and satellite systems, pushing the boundaries of what space missions can achieve.

An Illustrative list of Space Tech Companies in Silicon Valley

1. SpaceX
2. Planet Labs
3. Rocket Lab
4. Astra
5. Made In Space
6. Varda Space Industries
7. Leo Labs
8. Skybox Imaging
9. Maxar Technologies
10. Astranis

Silicon Valley's involvement in the space industry represents a new frontier in human innovation. By blending technology, entrepreneurship, and investment, Silicon Valley is not just participating in the space race; it is leading it. This convergence is driving down costs, accelerating innovation, and opening up space to a wider array of participants, making the dream of a multi-planetary existence more feasible than ever before. As we look to the stars, the collaborative spirit and technological prowess of Silicon Valley will undoubtedly play a crucial role in shaping the future of space exploration.

Global Space Business Bulletin

Space Education & Industry - Collaboration is the Key

ISRO, the Indian Space Agency has revolutionised Space Usage by cutting edge research, very competitive costs and meticulous planning. This has made ISRO, a very key player in shaping the Space Industry of the future.

D.V. Venkatagiri
CEO
Explore The Space

Space Exploration has come a very long way since 1969 when Neil Armstrong set his foot on the Moon. High levels of private funding, advances in technology and growing public-sector interest are driving the Space Exploration Industry toward the stars. According to an estimate, the revenue generated by the global space industry may increase to more than $1 trillion by 2040.

While aerospace technology used to be limited in a few countries, over the years, the scenario has changed quite a bit. A host of ambitious nations are boosting their space exploration programs, ensuring major competition in the field. The United States remains the leader of space activity, but many more countries are getting involved and increasing their investments. US accounts for approximately one-third of the operational spacecraft currently in orbit around Earth. With the help of the National Aeronautics and Space Administration (NASA), they have led many space exploration efforts-- from the Apollo moon-landing missions, the Skylab space station, International Space Station (ISS) to the Mars Exploration Rover and the latest Artemis Mission to Moon.

Investors have recently focussed on space ventures in low-Earth orbit, and there is growing interest in Moon and other Celestial bodies. An increasing number of investors are showing interest in the Space Exploration Industry as rocket launches have become much less expensive and the applications of are growing rapidly. This is resulting in thousands of more satellites—and many more people than ever before—venturing into orbit. Of Course, more objects in space also mean more space debris and higher risks of collisions. With more satellites and space debris in orbit, it's time for a new approach for mitigating collisions.

New satellite constellations are on anvil, but their long-term success depends on substantial cost reductions. Advanced materials, Micro Satellites, Reusable launch vehicles, Small Satellite Launch Vehicles are some of the key areas fuelling more research and investments.Space as an investment theme is also likely to impact a number of industries beyond Aerospace & Defense, such as IT Hardware and Telecom sectors, Online Education etc. According to an estimate from Morgan Stanley, the global space industry could generate revenue of $1 trillion or more in 2040, up from $350 billion, currently. Yet, the most significant short and medium-term opportunities are expected to come from satellite broadband Internet access. Both Space Education & Space Industry offer huge opportunities for all the stakeholders. A Collaborative approach, with domestic and International partners, is the key for the Success.

Explore The Space

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ISRO - Registered Space Tutor

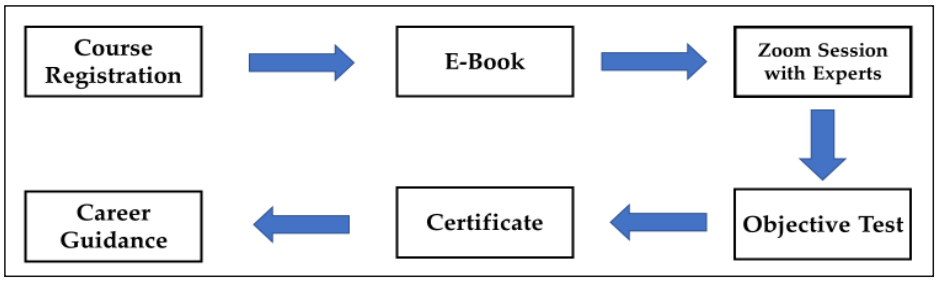
ETS-GLOBAL SPACE CAREER FORUM

(Your passport for a Career in Space Industry !)

Online Certificate Course on "Career Opportunities in Space & Allied Industries"

ETS-Global Space Career Forum

Specially Designed for College Students



₹ **COURSE FEE 950**

Glimpses of Albert Einstein STEM and Space Science Lab K.K Nagar, Chennai

Exclusively for School Students

Interesting Questions from Children at the Workshop

1. What is the center of gravity of earth?
2. How far we should go to escape from gravity?
3. If oxygen increases in earth, what will happen?
4. Which is the deepest place in earth?
5. What is meant by solo star and group of stars?
6. How satellites stay in their orbit without falling?

Features of the Workshop

1. STEM Experiments
2. Group Discussion
3. Objective Test
4. Quiz
5. Videos
6. Certificate
7. Pledge

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Glimpses of Explore The Space

Prof. V. Sumitrra Devi, CAO, ETS presents STEM & Space poster to Mr. Prakasha Rao P.J.V.K.S., Outstanding Scientist & Director - Space Infrastructure Programme Office, ISRO (Retd.) at the ETS - Albert Einstein STEM & Space Science Lab, Chennai on 20.10.2023

Mr. D. V. Venkatagiri, CEO, ETS welcoming Mr. S. Somanath, Chairman, ISRO at the ETS stall at Bengaluru Space Expo - September 2022

ETS was conferred the title "ISRO - Registered Space Tutor" by Mr. N. Sudheer Kumar, Director, CBPO, Dr. A.S. Kiran Kumar, Former Chairman & Mr. Shanthanu Bhatawdekar, Scientific Secretary ISRO at ISRO Headquarters, Bengaluru – August 2022

Explore The Space participating at Space Tech Expo, Long Beach, California, USA in May 2022

Global Space Business Bulletin

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Disclaimer

The information provided in this publication has been gathered with lot of efforts and due dilligence. However, readers are advised to make their own assessment in coming to have any relationships or commercial transactions with the companies / personalities mentioned in the bulletin.

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