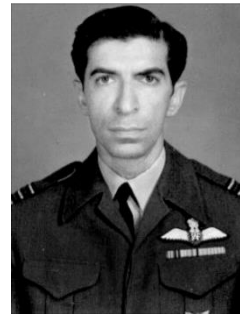


Covering the period from 01 May 2024 to 31 May 2024

Eminent Indian Aeronautical and Aerospace Personalities in India

Series: 16

Wing Commander Inder Mohan Chopra, AVSM



(03 May 1932 - 30 March 2015)

Wing Commander Inder Mohan Chopra was commissioned in the flying branch of the Indian Air Force (IAF) on June 16, 1951 and was awarded the Sword of Honour for standing First in the course. He became a flying instructor in August 1953. I M Chopra graduated from Empire Test Pilots School UK in December 1957. Immediately after graduation he flew Hunters for production testing with Hawker Aircraft Ltd at Dunsfold, UK for six months. He was on deputation from the IAF to Hindustan Aeronautics Ltd. Bangalore (HAL) from January 1961 to May 1966. During this period, he was actively involved in prototype development of the Combat aircraft Marut HF 24. He carried out the first flight of HF24 Mk 1A with Orpheus Engine Reheat. Marut HF 24 Mk 1BX was modified for fitment of the Egyptian E300 engine on the right side with normal Orpheus engine on the left. It was the first Marut with twin hydraulic systems with no manual reversion. The tail plane and elevator were split but both were hydraulically operated. I M Chopra was deputed to the Egyptian Aero General Organization, Helwan for flight development of the E300 engine in June 1966. A HAL team of about 25 headed by Gp.Capt C S Naik (Retired as Air Marshal) was also sent to maintain the aircraft. The first flight with E300 engine fitted was done on March 29, 1967. A total of about 180 flights were done with the E 300 engine on the right and Orpheus on the left. I M Chopra retired from the IAF and joined HAL as the Chief Test Pilot. He carried out the first flight of Basant HA 31 on March 30, 1972. The aircraft was designed for agricultural spraying. He carried out the first flight of HPT 32 (piston engine basic trainer) on January 6, 1977. The aircraft was designed for the IAF and has been in use for a long time. In July 1980 he gave up flying and took the opportunity to work in management. He worked as General Manager of Overhaul Division and then the Aircraft Division, later he became a Director on the Board of HAL and was the Chairman of the Company from April 1989. Grateful Aeronautical Society acknowledges the vital role played and guidance given by Wing Commander I M Chopra for the Bengaluru Branch to have its own building to function, to make wider reach and to grow with time. I M Chopra was President of the society during the year 1989-90.

Publisher

Journal of Aerospace Sciences and Technologies
The Aeronautical Society of India
Bengaluru Branch Building
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Advertisement - Tariff

A4-1 Full Page: Rs.2000
Draft Drawn in Favour of
"Journal Office, The Aeronautical Society of India"
Payable at Bengaluru

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PRESIDENT'S VISIT



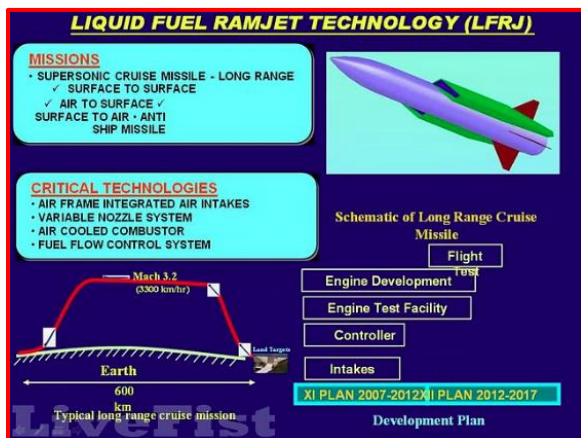
Dr. G Satheesh Reddy, President, Smt U Jeya Santhi, Honorary Secretary General, Shri Ravindra Kumar Jain, Honorary Treasurer and Shri APVS Prasad, Chairman, Bengaluru Branch with other Council Members at The Aeronautical Society of India, Bengaluru Branch on 26th May 2024.

DRDO

DRDO makes a step forward in making India's very own 'BrahMos-like' Supersonic Cruise Missile, tests its Liquid Ramjet Fuel

India took a step towards developing another completely Made-in-India 'BrahMos'- like supersonic missile. The Defence Materials and Stores Research and Development Establishment (DMSRDE) Kanpur, a lab of the Defence Research and Development Organisation (DRDO), tested a domestically developed liquid ramjet fuel that can power air-breathing engines.

This liquid fuel will not only replace the Russian-imported fuel in the BrahMos missile but is also an important component in developing a completely indigenous long-range supersonic cruise missile, until now, the fuel for the BrahMos missile was imported from Russia.



The Liquid Fuelled Ramjet Engine plan of DRDO

The BrahMos supersonic cruise anti-ship and land-attack cruise missile is a joint development between the DRDO of India and NPO Mashinostroyeniya of Russia, where DRDO holds 50.5 per cent equity of the joint venture company, BrahMos Aerospace Private Limited (BAPL), while the Russians hold the remaining 49.5 per cent. Under this agreement, India imports the ramjet engines of the BrahMos missile, and its fuel, seeker, and various other components from Russia. The BrahMos missile is capable of striking targets at ranges between 290 kilometres to 800 kilometres at a maximum speed of 2.9 Mach. There is an air-launched version called BrahMos-A in the Indian Air Force (IAF) inventory which can be fired from Sukhoi Su-30 MKI fighter jets. Another lighter variant, BrahMos-NG, which can be fired from Tejas and MiG-29 fighter jets is under development as well.

India is now working on developing an entirely Indian liquid-fuelled ramjet (LFRJ) engine which can power Supersonic Target (STAR) and a long-range supersonic cruise missile. The supersonic target missile is a type of missile which the Indian Air Force, Indian Army and Indian Navy can use to test the efficacy of their air defence systems as well as a target for IAF's A2A missile tests. An anti-radiation and anti-AWACS missile derived from STAR will also be developed. The long-range supersonic cruise missile is also under development, which is expected to hit targets at ranges of more than 600 kilometres. This missile will serve alongside the BrahMos missile in the IAF inventory.

Source:<https://swarajyamag.com/defence/drdo-makes-a-step-forward-in-making-indias-very-own-brahmos-like-supersonic-cruise-missile-tests-its-liquid-ramjet-fuel>

India successfully carries out trials of supersonic missile- assisted torpedo system

Indian army conducted trials of supersonic missile-assisted torpedo system (SMART) system in Balasore, Odisha. The system, developed by DRDO for Indian Navy, offers extended range and advanced technologies for precise targeting against enemy submarines. The SMART system is a next generation standoff torpedo delivery system designed to enhance the Navy's anti-submarine warfare capabilities. The medium-range supersonic missile carries a torpedo, parachute delivery system and release mechanisms. The indigenous SMART system has a far greater range than conventional torpedoes to target enemy submarines. The SMART system has a range "several times" that of the 20-40-km conventional torpedoes. The canister-based missile system consists of several advanced sub-systems, namely a two-stage solid propulsion system, electromechanical actuator system, precision inertial navigation system etc. The system carries advanced light-weight torpedo as payload along with parachute-based release system. The missile was launched from the ground mobile launcher. Several state-of-the-art mechanisms such as symmetric separation, ejection and velocity control have been validated in this test. A number of DRDO laboratories developed various technologies for this system while the industry participated in the development and production of various sub-systems.



SMART missile successfully being tested

Source:<https://timesofindia.indiatimes.com/india/india-successfully-carries-out-trials-of-supersonic-missile-assisted-torpedo-system/articleshow/109748287.cms>

RudraM-II air-to-surface missile successfully flight-tested by DRDO from Su-30 MK-I off the Odisha coast

Defence Research & Development Organisation (DRDO) successfully flight-tested the RudraM-II air-to-surface missile from Su-30 MK-I platform of the Indian Air Force (IAF). The flight-test met all the trial objectives, validating the propulsion system and control & guidance algorithm. The performance of the missile has been validated from the flight data captured by range tracking instruments like electro-optical systems, radar and telemetry stations deployed by Integrated Test Range.

RudraM-II (Representative image above) is an indigenously developed solid-propelled air-launched missile system meant for Air-to-Surface role to neutralise many types of enemy assets. A number of state-of-the-art indigenous technologies developed by various DRDO laboratories have been incorporated in the missile system.

Source:[https://pib.gov.in/PressReleasePage.aspx?PRID=2022076#:~:text=Defence%20Research%20%26%20Development%20Organisation%20\(DRDO, hours%20on%20May%2029%2C%202024.](https://pib.gov.in/PressReleasePage.aspx?PRID=2022076#:~:text=Defence%20Research%20%26%20Development%20Organisation%20(DRDO, hours%20on%20May%2029%2C%202024.)

DRDO, HAL to integrate new surveillance and reconnaissance radar with Dornier aircraft

The integration of an aerial surveillance and reconnaissance radar (SAR), being developed by the Defence Research and Development Organisation (DRDO) with a Dornier light transport aircraft, is expected to commence soon with the industry being roped in to execute the project. DRDO's Electronics Research and Development Establishment is developing a high-resolution radar which will be retrofitted on the Dornier-228 aircraft licence-produced by Hindustan Aeronautics Limited (HAL).

The integration of the radar with the aircraft will enable evaluation and validation of the system's functionality and performance in the desired airborne operating environment, which in turn will pave the way for modifying and retrofitting the required number of platforms with SAR. The microwave-based X-band SAR will be used to provide real time intelligence inputs to decision makers. It will have all-weather, day and night capability to map static and moving targets and guide weapons to their targets.

The SAR system weighs about 230 kg, which includes its antenna that would be mounted under its belly, data processing and data transfer units and other paraphernalia like cooling systems and GPS. The project entails certain modifications to the Dornier's airframe, installation of additional frames and support structures, rewiring the electrical systems and calibrating the SAR with the aircraft's avionics and navigation system, which would be undertaken in collaboration with HAL. Of German origin, the twin-turboprop Dornier is manufactured in India by HAL and is used by the Indian Air Force (IAF), Navy and Coast Guard for communication, survey, maritime surveillance and training.

Source:<https://www.tribuneindia.com/news/india/drdo-hal-to-integrate-new-surveillance-and-reconnaissance-radar-with-dornier-aircraft-621176>

DRDO hands over nine defence tech projects to IIT-Bhubaneswar

Nine projects sanctioned from the electronics and communication systems (ECS) cluster of Defence Research and Development Organisation (DRDO) were handed over to IIT-Bhubaneswar at a collaboration meeting. Seven more projects are in the process of being sanctioned from ECS with a funding of Rs 18 crore. The IIT-Bhubaneswar will work on these sanctioned projects, which would be beneficial in electronics warfare, AI-driven surveillance, power systems and radar systems. This collaboration of IIT-Bhubaneswar and DRDO will contribute to the emerging research and development need of defence applications, creating platform for 'Atma Nirbhar Bharat' and will enhance the sustainability of defence research programmes and will be part of the ecosystem for nation building. On the collaboration with DRDO, director of IIT-Bhubaneswar Shri Shreepad Karmalkar said the IITs across the country have moved beyond knowledge generation and dissemination to knowledge application, wealth generation through start-ups, entrepreneurship and producing quality teachers. In such a scenario, collaborations with DRDO for research in the field of defence mechanism and technology will pave a new path towards excellence; Karmalkar emphasised on the role of research scholars in coming up with innovative ideas and DRDO officials informed that they are looking forward to having collaborations with the academia for research and industry for taking the projects forward to the application level and aim at developing cutting-edge, next generation technologies.

Source:<https://www.newindianexpress.com/states/odisha/2024/May/08/drdo-hands-over-nine-defence-tech-projects-to-iit-bhubaneswar>

Golden Jubilee Celebrations of CVRDE (DRDO), Avadi, Chennai

The inaugural event of Golden Jubilee celebrations was held with great enthusiasm in the presence of Dr Samir V Kamat, Secretary, Department of Defence Research & Development and Chairman, Defence Research & Development Organisation (DRDO) at Combat Vehicles Research & Development Establishment (CVRDE), Avadi, Chennai.

Combat Vehicles Research & Development Establishment (CVRDE), one of the premier establishments of DRDO, under Ministry of Defence, has played a significant role for enhancement of country's self – reliance in defence cutting edge technologies for the past 50 years. To commemorate this momentous journey, the inaugural event of Golden Jubilee celebrations was commenced at CVRDE, Avadi, Chennai on 16 May 2024.



Dr Samir V Kamat, Chairman & Secretary, DRDO at CVRDE Expo

The event was started with traditional welcome dance. The achievements of CVRDE were highlighted by eminent veterans through the recorded video, which was telecasted during the function. While addressing the gathering, the chief guest Dr Samir V Kamat appreciated the CVRDE's efforts for achieving the self-reliance in Armored Fighting Vehicle (AFV) categories and insisted to focus more on innovations, to adapt the emerging scenario in Defence Ecosphere. During his special address, the guest of honor expressed his gratitude to all the veterans who have immensely contributed to the success of the establishment. Following the golden jubilee celebrations, the CVRDE

flagship products were displayed in the form of exhibition and the features of each systems' were explained to the delegates, a panel discussion was held in the topic "Tank Warfare in 21st Century – The operational & technological requirements" wherein, the expert's perspective was shared between the eminent personalities of Indian Armed forces, DRDO & Industry partners, which is beneficial for CVRDE fraternity to meet the futuristic challenges.

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=2020804>

ISRO

The Laser Powder Bed Fusion Technique (LPBF) for 3D-printed rocket engine, ISRO adds another feather to cap

With the successful hot testing of a liquid rocket engine manufactured using additive manufacturing or 3D printing – technology, the engine, designated for use in the PS4, is used in the upper stage of ISRO's workhorse rocket, the Polar Satellite Launch Vehicle ISRO redesigned the conventionally manufactured PS4 engine to make it compatible with additive manufacturing techniques. It said its innovative approach, known as Design for additive Manufacturing has yielded remarkable advantages. The Laser Powder Bed Fusion technique employed in the manufacturing process reduced the number of engine components from 14 to a single piece, eliminating 19 weld joints. This also cut the overall production by 60%. The PS4 engine, which uses a bipropellant combination of nitrogen tetroxide as the oxidizer. and monomethyl hydrazine as the fuel was developed by ISRO's Liquid Propulsion Systems Centre. Prior to the successful 665- second hot test, ISRO conducted a comprehensive development programme that included detailed flow and thermal modelling structural simulations, cold flow characterization of the proto



3D printed rocket engine

hardware, and four successful developmental hot tests of the integrated engine for a cumulative duration of 74 seconds, these rigorous tests validated the engine's performance parameters.

Source: <https://timesofindia.indiatimes.com/india/with-3d-printed-rocket-engine-isro-adds-another-feather-to-cap/articleshow/110019883.cms>

Successful ignition test on Semi Cryogenic Pre-Burner Ignition Test Article (PITA)

ISRO is developing a 2000 kN thrust semi-cryogenic engine working on an LOX Kerosene propellant combination for enhancing the payload capability of LVM3 and for future launch vehicles. Liquid Propulsion Systems Centre (LPSC) is the lead centre for the development of semi-cryogenic propulsion systems with the support of other launch vehicle centres of ISRO. The assembly and testing of the propulsion modules were done at the ISRO propulsion complex (IPRC), Mahendragiri. As part of the engine development, a pre-burner ignition test article, which is a full complement of the engine power head system excluding the turbopumps is realized. The first ignition trial was conducted successfully on May 2, 2024, at semi cryo integrated engine test facility (SIET) at IPRC, Mahendragiri, which was dedicated to the nation recently by the honorable Prime Minister of India. Smooth and sustained ignition of the preburner is demonstrated which is vital for the starting of the semi-cryogenic engine.

Semi-cryogenic engine ignition is achieved using a start fuel ampule which uses a combination of Triethyle Aluminate and Triethyle Boron developed by VSSC and used for the first time in ISRO in the 2000 kN semi-cryogenic engine. Preburner ignition test article and Hot test are shown below.



Pre-Burner Ignition Test Article and Hot test being performed

Many injector elemental level ignition tests were conducted at the Propulsion Research Laboratory Division (PRLD) facility of Vikram Sarabhai Space Centre (VSSC) for characterization. The ignition process is one of the most critical parts in the development of liquid rocket engine systems, with the successful ignition of the semi-cryo pre burner, a major milestone in the semi-cryo engine development has been achieved. This will be followed by development tests on the engine powerhead test article and fully integrated engine. The development of a semi-cryo stage with 120 tons of propellant loading is also under progress. The successful ignition of a semi-cryo preburner is a major accomplishment of ISRO in the development of semi-cryogenic propulsion systems.

Source: https://www.isro.gov.in/Successful_ignition_test_on_semi_cryogenic_PITA.html

Chandrayaan -2 discovers water reserves inside Lunar polar crater

ISRO's Chandrayaan-2 mission unveils a groundbreaking discovery. significant water reserves within lunar polar craters. This finding, a collaboration with esteemed institutions, holds vast implications for future lunar exploration and human habitation. Detailed analysis indicates regional disparities in water ice distribution, with potential origins dating back billions of years. This discovery is a scientific triumph and opens future possibilities of Lunar exploration and long-term human habitation on the Moon, the efforts are a

collaboration between ISRO's Space Applications Centre (SAC) and esteemed institutions such as IIT Kanpur, IIT (ISM) Dhanbad and The Jet Propulsion Laboratory. The finding indicates that the subsurface ice in lunar polar craters is estimated to be 5 to 8 times more abundant than surface ice, particularly within the first couple of meters. The finding also sheds light on the regional disparities, since the northern pole region of the moon boasts twice the amount of water ice compared to southern pole region which approximately dates back to 3.8 to 3.2 billion years ago, also, the primary resource of water is believed to be outgassing during the period of volcanism. The methodology employed by the research team was comprehensive, utilizing seven instruments aboard NASA's Lunar Reconnaissance Orbiter (LRO) which included radar, laser, optical, neutron spectrometer, ultra violet spectrometer and thermal radiometer which collectively contributed to a deeper understanding of the origin.

Source:<https://timesofindia.indiatimes.com/etimes/trending/chandrayaan-2-discovers-water-reserves-inside-lunar-polar-crater/articleshow/109837400.cms>

ISRO designing docking ports for Indian Space Station as per international standards

ISRO has plans to assemble a modular space station in Earth orbit by 2035. This space station will demonstrate ISRO's capabilities of sustained human presence in Earth's orbit, paving the way for landing crew on the Moon. During an Event on National Technology Day held earlier this month, Director of ISRO's Space Application Centre Shri Nilesh M Desai provided additional details on Bhartiya Antariksh Station (BAS) or Indian Space Station, which will be through a series of missions where the first module will be launched by 2028, followed by other modules which will be integrated in Space. This mission includes Astronauts from India being in Space for three- six months, also, there would be a resupply mission which is planned for about once every three months. This space station will be assembled in Earth's orbit by docking multiple modules together. This will also allow for international cooperation and collaborations with other spacefaring nations, also this Space Station will be used as a staging ground for missions to the Moon and beyond, also enabling and promoting microgravity research.

Source:<https://www.news9live.com/science/isro-is-designing-docking-ports-for-indian-space-station-as-per-international-standards-2535014>

ISRO announced, Mangalyaan- 2, Mars mission includes helicopter, sky crane, rover and more

ISRO is already working on the second Mars mission which will feature a rover and helicopter combination. The Indian space agency is working on developing a supersonic parachute, allowing for a controlled and precise landing, avoiding the need for airbags or ramps and a sky-crane for deploying the rover on the Red Planet. The Sky Crane ensures that the rover lands upright and ready to begin its mission, even in challenging terrain. Indian engineers are also working on the design and development of a fully functioning helicopter to fly in the thin Martian air up to 100 meters. The rotorcraft is in the conceptual stage and will carry several instruments. Meanwhile, to ensure proper communication with the Mars mission, ISRO is also planning to deploy a relay communication satellite ahead of the mission launch. The satellite will be launched aboard the Polar Satellite Launch Vehicle to act as a relay between Mars and Earth to ensure smooth uninterrupted communications. The mission will be launched aboard the heavy-lift LVM3. India aims to become the third country on Earth to land a spacecraft on another planet and join the elite club.

Source:<https://www.indiatoday.in/science/story/mangalayaan-2-isro-mars-mission-sky-crane-helicopter-rover-2538652-2024-05-13>

Mission with India to search for water on moon is on track, launch in few years - Japan space agency

The India-Japan partnership for their joint moon mission, Lunar Polar Exploration Mission (LUPEX), is likely to take flight in a few years, the Japan Aerospace Exploration Agency (JAXA). The mission's primary objective is to explore the lunar surface and search for subsurface water. LUPEX marks Japan Aerospace Exploration Agency's (JAXA) first attempt to send a large rover to the moon. While the Japanese space

agency is responsible for the lunar rover, the Indian Space Research Organisation (ISRO) is handling the lander that will carry the rover.

Currently, the lander for the mission is awaiting approval from India's department of space. The mission will also carry observation instruments from US' National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA), further enhancing its scientific capabilities. Both agencies — ISRO and JAXA — LUPEX will not only confirm the presence of water but will also investigate its quantity, distribution on the lunar surface and below ground, and form, such as the level of mixing with dry regolith, the layer of loose unconsolidated rock and dust that sits atop a layer of bedrock. Japan's Smart Lander for Investigating Moon (SLIM) continued this trend, with Japan becoming the fifth country to land on the moon this January 2024.

The Smart Lander for Investigating Moon (SLIM) mission aimed to demonstrate accurate lunar landing techniques embodied in a small explorer and to accelerate the study of the moon and other planets using the lighter exploration system. In Japan, the rover has started to manufacture an engineering model (EM) to verify the design results, and the two instruments have started EM testing.

Source: <https://theprint.in/science/mission-with-india-to-search-for-water-on-moon-is-on-track-launch-in-few-years-japan-space-agency/2083007/>

Space Science Roadmap Formulation meeting

The Space Science Roadmap Formulation (SSRF) meeting was held at the U R Rao Satellite Centre (URSC)/ISRO in Bengaluru during April 22-23, 2024. The meeting was organized by URSC and Space Science program office of ISRO HQ. It drew over 200 scientists from various research centres and universities nationwide. Six distinct space science themes were deliberated



Dr. S Somanath, Chairman, ISRO, outlines the meeting goals

during the meeting: Astronomy, Astrophysics & Exoplanets, Cosmology & Gravitation, Astrobiology, Astrochemistry & Spacebiology, Heliophysics & Space Weather, Solar System Exploration & Near-Earth Space Exploration. Shri M Sankaran, Director, URSC extended a warm welcome to the participants and provided introductory remarks. Shri A S Kiran Kumar, Chairperson of the APEX Science Board (ASB) of ISRO, delineated directions for ISRO's future space science program. Dr. S Somanath, Chairman, ISRO / Secretary, DoS contextualized the meeting's objectives and outlined the anticipated outcomes, which aimed to formulate the nation's space science roadmap with inputs from eminent scientists. Experts from research institutes across the country delivered plenary talks on open scientific issues and global trends within the six themes. Subsequently, splinter groups engaged in focused discussions with domain experts to identify significant scientific problems for exploration in the near (2030), mid (2031-2035), and long (2035-2045) terms. Suggestions were made for splinter group members to identify scientific overlaps and enhance the capacity dedicated to the space science program. During the concluding session, Shri M Sankaran, Director, URSC urged academicians to collaborate with industries to keep pace with the rapid changes in the Indian space program.

Source: https://www.isro.gov.in/Space_Science_Roadmap_Formulation_meeting.html

Yuva Vigyani Karyakram (YUVIKA-2024) - Inauguration

Young Scientists Programme YUva Vigyani Karyakram (YUVIKA) 2024 is inaugurated by Chairman ISRO / Secretary DoS Dr. S Somanath on 13th May, 2024 at URSC Bengaluru with virtual participation of 6 other hosting ISRO centres. Centre Directors, Scientific Secretary, ISRO and Senior scientists from various ISRO centres participated in the event. A total of 355 students representing 28 states & 8 union territories are selected for the two weeks residential programme scheduled from May 13 - 24, 2024 at seven ISRO / DoS Centres viz. VSSC Thiruvananthapuram, SAC Ahmedabad, URSC Bengaluru, SDSC-SHAR Sriharikota, NRSC Hyderabad, IIRS Dehradun and NE-SAC Shillong.

Dr. S Somanath, Chairman ISRO / Secretary DoS addressed and interacted with the students across the centres in hybrid mode. During the inaugural programme Chairman, ISRO spoke about ISRO's future endeavours like Chandrayaan-4, Bharatiya Antariksh Station, Gaganyaan. He emphasized that space is a multi-disciplinary domain comprising of engineering, medical, physics, agriculture, remote sensing, law, etc., and hence there are avenues for professionals other than engineering & science to work for space. YUVIKA participants will be given an exposure to space science, technology and applications through classroom lectures, hands-on activities such as assembly & launch of model rockets, sky gazing, robotic challenges, Chandrayaan-3 DIY kits, technical facility visits and interaction with eminent scientists, etc. Extra-curricular activities like yoga & meditation, sports, cultural activities, local sightseeing tours and much more planned as part of the programme.

Source: https://www.isro.gov.in/YUVIKA2024_Inauguration.html

NewSpace India Limited (NSIL) scouts for partners to produce India's biggest rocket yet; Private firms may get to build 60-65 LVM3s

A year after ISRO's biggest rocket Launch Vehicle Mark-3 (LVM3) entered global market launching 72 commercial satellites, India's space PSU NSIL has invited private industry to partner in end-to-end production to launch vehicle, envisaging the need to double the annual production. NSIL has released a request for qualification (RFQ) inviting potential bidders. NSIL is also interested in collaborating with Indian industries to leverage their expertise towards production of LVM3 in increased numbers for a longer period. A single Indian industry partner will be selected through the process to execute the envisaged LVM3 production programme with NSIL as the overall system integrator responsible for end-to-end realization. The reason NSIL is looking at private players for LVM3 — which was earlier called GSLV-Mk3 — is to meet increased demand for launches. The PSU is aiming to increase the number of vehicles produced annually. The global launch service market indicates substantial demand for communications satellites and satellite constellations. Further, NSIL is also considering the option to seek investment from the partnering Indian industry for the same. LVM3 production programme under a PPP is proposed over a period of fourteen years with the Indian industry expected to produce up to six LVM3 annually from the sixth year of commencement of the programme. LVM3, the heavy lift launcher of ISRO, has successfully accomplished seven missions till date. Approximately 60 to 65 launch vehicles are projected to be realised through Indian industry during this proposed period. LVM3 made its successful entry into the global commercial launch service market, launching 72 satellites belonging to OneWeb. As part of payload improvement for LVM3, ISRO has outlined plans which among several others, include induction of a semi-cryogenic stage. The planned technological advancements are expected to significantly improve the LVM3's payload capability in the coming years.

Source: <https://timesofindia.indiatimes.com/india/nsil-scouts-for-partners-to-produce-indias-biggest-rocket-yet-pvt-firms-may-get-to-build-60-65-lvm3s/articleshow/110061111.cms>

India Space Congress 2024 to be held in June

Policymakers, representatives of space agencies from different countries, innovators and business leaders will attend the India Space Congress scheduled to be held here in the month of June 2024. The theme of the three-day event, organised by Satcom Industry Association India, is 'Bridging Boundaries, Transforming

Tomorrow'. The event will be held from June 26-28 and is expected to be attended by more than 800 people from across the globe. "The recent liberalization of policies, including the Indian Government's decision to allow up to 100 per cent foreign direct investment (FDI) in select space sectors and the unveiling of space authorization guidelines by INSPACe, has created vast potential and opportunities for global collaboration. ISRO Chairman Dr. S Somanath, IN-SPACe Chairman Shri Pawan Kumar Goenka, Global Space Operations Association Director General Ms. Isabelle Mauro, Leaolabs Australia President Mr. Terry Van Haren, Co-Founder and CEO of Quantum Orbit IIST Ben Moussa Abdoulahi Dia among others are expected to attend the ISA. With an extensive program featuring approximately 35 thematic sessions and a special session on the Indo-Pacific coalition, the conference showcases collaborations with over 30 countries, including Australia, the Philippines, Indonesia, Singapore, Japan, Africa and the United States. The India Space Congress 2024 offers unparalleled opportunities for the attendees to engage, learn and shape the future of space exploration.

Source:<https://indianexpress.com/article/technology/science/india-space-congress-to-be-held-in-june-9328994/>

Institutions

Short course on rocket systems and technologies at IISc

The Department of Aerospace and the Centre for Continuing Education at the Indian Institute of Science (IISc) are offering a course on Rocket Systems and Technologies between June 10 and 15.

The course is being offered to a limited number of participants on a first-come, first-serve basis. It is designed for academic faculties, industry professionals, graduate, undergraduate and PhD students, Scientists and engineers. The student participants are required to have completed the third or fourth year BTech. Among the course topics are configuration and staging of launch vehicle systems, rocket propulsion, mission design, system engineering in rocket systems, navigation and control of rockets, classical and advanced guidance of missiles, aerodynamics and flight mechanics for rockets, design of re-entry systems, guidance for soft-landing missions and hypersonic technologies. Professionals can register with a fee (excluding GST) of Rs 22,000 until May 31 and Rs 25,000 after May 31. The course fees for PhD, MTech and BTech students are Rs 15,000 and Rs 17,500, Rs 10,000 and Rs 12,000 and 6,000 and 7,500, respectively. For more information, check the link <https://shorturl.at/1BEEL>. The charges for accommodation, arranged outside the IISc campus, are not included in the course fee. Dr S Unnikrishnan, Director, VSSC, ISRO, Prahlada Ramarao, former Director, Defence Research and Development Laboratory, and B N Suresh, former Director, VSSC, ISRO, are among the speakers.

Source:<https://www.deccanherald.com/india/karnataka/short-course-on-rocket-systems-and-technologies-at-iisc-3027802>

Private Sector

World's first single-piece 3D printed engine from AgniKul Cosmos launched successful

AgniKul Cosmos first flight - Mission 01 of Agnibaan SOrTeD has lauched success. Chennai-based space start-up Agnikul Cosmos Private Limited successfully launched Agnibaan Sub Orbital Technology Demonstrator (SOrTeD) from the Satish Dhawan Space Centre, Sriharikota. This historic launch marks India's first from a private launchpad and features the world's first single-piece 3D printed engine, powered by a semi-cryogenic system.

Source:<https://www.thehindu.com/sci-tech/agnibaan-sorted-indias-second-privately-developed-rocket-takes-off/article68231253.ece>

Bengaluru firm GalaxEye Space tests SAR technology on NAL's pseudo satellite



The GalaxEye team tested SAR tech on HAPS

GalaxEye Space, a space-tech startup based in Bengaluru, has successfully tested its cutting-edge Synthetic Aperture Radar (SAR) technology on a high altitude pseudo-satellite (HAPS) platform developed by National Aerospace Laboratories (NAL). This positions GalaxEye as the world's first private entity to conduct SAR trials on a HAPS system. HAPS are stratosphere-operating, solar-powered drones capable of extended aerial surveillance missions. By integrating its novel SAR sensor, GalaxEye Space has overcome a major challenge faced by traditional electro-optical cameras— the inability to capture clear imagery through cloud cover. The SAR technology enables

high quality, all-weather, day and night imaging capabilities. This marks a successful partnership between GalaxEye Space and NAL, which is formalized through a MoU. [Figure] The GalaxEye Space team (R-L) - Suyash Singh (Co-founder & CEO), Prathith Vasudev, Sriram Iyer, Prakhar Doshi and Denil Chawda with the solar-powered Unmanned Aerial Vehicle (UAV) HAPS. The company also has worked in collaboration with ISRO & DRDO in radar imaging through unmanned Aerial Vehicles (UAVs).

Source: <https://timesofindia.indiatimes.com/india/bengaluru-firm-galaxeye-tests-sar-technology-on-nals-pseudo-satellite/articleshow/110293549.cms>

Garuda Aerospace & GSFC University to jointly run Drone courses

Indian students can get a degree in the area of drones. Garuda Aerospace and Gujarat State Fertilizers and Chemicals University (GSFC) have signed a partnership to advance aerospace entrepreneurship, research and innovation, the drone major said in a statement. Garuda Aerospace has entered into a MoU with GSFC university, aimed at propelling advancements in aerospace research and fostering educational excellence. This agreement was signed by Mr. Vijayakumar Rajarathinam, Garuda Aerospace COO and Mr. Bimal Bhayani, Advisor at GSFC University. The MoU symbolises a strategic alliance poised to enhance research capabilities and innovation in the Aerospace Division, which also might cultivate a robust ecosystem that supports innovative research, practical application and skill development for the next generation of Aerospace professionals. The agreement also encompasses a spectrum of initiatives, including joint research projects, student internships, faculty exchange and collaborative workshops which will help in knowledge transfer between academic and industrial realms.

Source: <https://timesofindia.indiatimes.com/india/garuda-aerospace-gsfc-university-to-jointly-run-drone-courses/articleshow/110213874.cms>

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