E-NEWS

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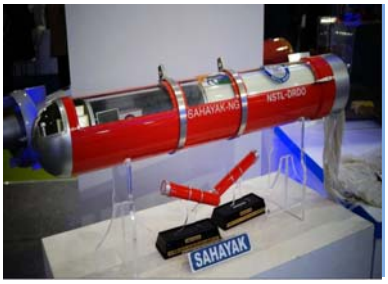

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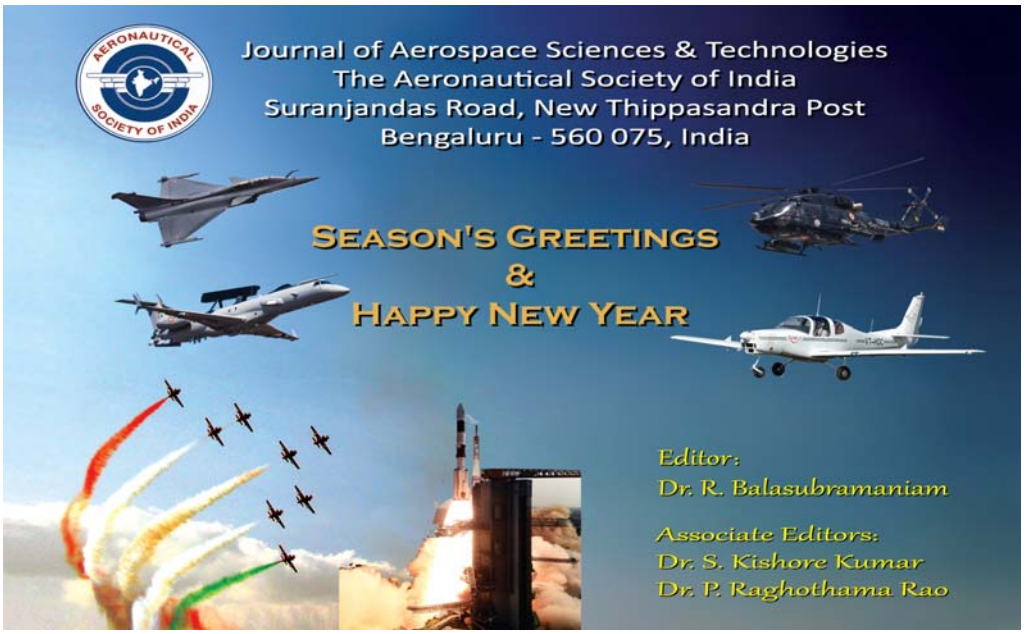

Prof Roddam Narashima : Conscientious Virtuoso of Indian Science

(20-07-1933 to 14-12-2020)

Article on Page No. 1

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E-NEWS

Prof Roddam Narasimha: Conscientious Virtuoso of Indian Science

Prof Roddam Narasimha, who died on December 14, 2020 belongs to an elite class as a teacher, researcher, scientific administrator and a gentle person. He inspired a generation of students who later made their own contributions to Indian science. Besides, he was an effective public speaker who convincingly explained complex scientific concepts in a simple way which a common man could easily comprehend.

Son of a scholarly father, Prof Narasimha had his secondary education in Acharya Patashala of Bangalore South and later graduating with a mechanical engineering degree from the University of Visveswaraya College of Engineering (UVCE) in Bangalore. Subsequently, he obtained his Master's in engineering at the Indian Institute of Science (IISc) under the legendary Prof Satish Dhawan andsubsequently followed Dhawan's footsteps to California Institute of Technology for his doctorate. This was the famed university in which Prof Dhawan had studied and taughtlater.

After coming back from Caltech, Prof Narasimha joined the faculty of the aeronautical engineering department and endeavoured in earnest to carry out research in fluid dynamics, which was his specialisation.

Prof Narasimha's contributions to scientific administration began when he assumed the Directorship of the famous National Aeronautical Laboratories (NAL) in Bangalore in 1984. In that institution too, he facilitated front ranking research, including the use of parallel computing in solving highly demanding fluid dynamics related problems.

During his long career spanning six decades, Prof Narasimha was a member of many national important committees in the civilian as well as defence sectors and made insightful contributions.Besides, he was the longest serving member of the policy making Space Commission of the country. And, he steered the activities of the Bangalore based National Institute of Advanced Studies (NIAS) as its director for seven years. Additionally, for nearly one and a half decades, he served as the Chairman of the engineering mechanics unit of the Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru.

Besides being a serious scientist who worked dedicatedly in his chosen field as well as an enlightened scientific administrator,Prof Narasimha was an effective science communicator too. Even today, many people reminisce his popular lectures at Bangalore Science Forum in National College, Bangalore, including the one on the flight of Boomerang. In that lecture, Prof Narasimha brought out the limitations on the flight of a Boomerang in a small closed space where the lecture was held.

Prof Narasimha's affable persona was exemplary. The author sentimentally reminisces the day way back in 1986 when Prof Narasimha released his Kannada book 'Antarikshayaana: Eke, Hege' (Spaceflight: Why, How). Even after realising that the author was a novicein his twenties, Prof Narasimha, who was the Director of NAL, told the author that he had read the book twice before coming to the function and treated the author respectfully besides encouraging him to write a similar book on aviation.

Prof Narasimha had a genuine interest in the relationship between science and spirituality. He seriously pursued that relationship from a philosophical perspective and spoke about it with conviction.

In recognition of his outstanding service, Prof Narasimha was bestowed with many awards including Padma Vibhushan, India's second highest civilian award. He was a member of many renowned professional institutions including the royal societyand American Academy of Arts and Sciences.

In September this year, as the country celebrated the centenary of his 'Guru' Prof Dhawan, the 87-year-oldProf Narasimha spoke nostalgically about him. And nowwith his passing away, his students as well as the people who were inspired by and interacted with him, are paying their tribute to this world-famous fluid dynamicistwho led a meaningful life,with the same nostalgia.

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CURRENT AFFAIRS

HAL Delivers Biggest Ever Cryogenic Propellant Tank to ISRO

HAL has delivered the biggest cryogenic propellant tank (C32 LH2) ever fabricated by the Company to ISRO much ahead of the contractual schedule at a program held here recently. The C32-LH2 tank is a developmental cryogenic propellant tank of aluminium alloy designed for improving the payload capability of GSLV MK-III launching vehicle.The propellant tank was handed over by Mr M S Velpari, Director (Operations), HAL to Dr V Narayanan, Director (LPSC), ISRO in the presence of Mr S Somanath, Director (VSSC) with other senior scientists from ISRO, participating in virtual mode and other senior officials of HAL.Mr Somanath, Director, VSSC, ISRO acknowledged HAL's contributions to India's space program as one of the valuable partners of ISRO in its long journey. While appreciating HAL's capability in absorbing any technological advancements and developments in productionizing any types of space hardware and structures for the space launch vehicle, he highlighted HAL's role in developing eco-system by sharing the knowledge among private players towards strengthening the supply chain. Dr. V Narayanan, Director (LPSC), while receiving the hardware, thanked the entire workforce of HAL for successful production of the developmental project.Mr. Velpari reiterated HAL's commitment to bring this mutual cooperation and support to the utmost level. He also explained HAL's preparedness to venture into complete realization of PSLV & GSLV launch vehicles progressively from raw material stage to launch stage including managing the entire supply chain of ISRO.The four meter diametric tank is of eight meter length to load 5755 Kg propellant in the 89 cubic meter volume. Total length of weld carried out in the tank was 115 meter at different stages to the quality requirement of 100% tests on radiography, Die penetrant check and Leak proof. HAL has mastered the skills and technologies required for fabricating welded propellant tank of Aluminium ally to such stringent quality requirement.HAL as a strategic reliable partner, has been associating with ISRO for the prestigious space programs since last five decades. HAL has supplied critical structures, tankages, satellite structures for the PSLV, GSLV-MkII and GSLV-MkIII launch vehicle. Various new projects like PS2/GS2 integration, Semi-Cryo structure fabrication and manufacture of cryo & semi cryo engines are being taken up at HAL, for which setting up of necessary infrastructure & facilities is nearing completion.HAL has also supported ISRO right from the developmental phase of Crew Atmospheric Re-entry Experiment, PAD Abort test for Crew Escape for Human Space Mission and is currently building hardware for full-fledged launch vehicle GSLV Mk-III for Gaganyaan program.

Source: https://hal-india.co.in/

India's heaviest communication satellite GSAT-11 launched successfully from French Guiana

Indian Space Research Organisation's (ISRO) heaviest and most-advanced high throughput communication satellite GSAT-11 was successfully launched from the Spaceport in French Guiana during the early hours today.The launch vehicle Ariane 5 VA-246 lifted off from Kourou Launch Base, French Guiana at 02:07 am (IST) carrying India's GSAT-11 and South Korea's GEO-KOMPSAT-2A satellites, as scheduled. Ariane 5 is one of three launch vehicles operated by Arianespace along with Soyuz and Vega.After a 30-min flight, GSAT-11 separated from the Ariane 5 upper stage in an elliptical Geosynchronous Transfer Orbit. The achieved orbit was very close to the intended one.The 5854-kg GSAT-11 will provide high data rate connectivity to users of Indian mainland and islands through 32 user beams in Ku-band and 8 hub beams in Ka-band."GSAT-11 will boost the broadband connectivity to rural and inaccessible Gram Panchayats in the country coming under the Bharat Net Project, which is part of Digital India Programme," ISRO Chairman Dr K Sivan said.The Bharat Net Project aims to enhance the public welfare schemes like e-banking, e-health, e-governance among others.He said GSAT-11 will act as a forerunner to all future high throughput communication satellites. "Today's successful mission has boosted the confidence of the entire team," Dr Sivan added.Post-separation, ISRO's Master Control Facility at Hassan in Karnataka took over the command and control of GSAT-11 and found its health parameters normal.The scientists will undertake phase-wise orbit-raising manoeuvres in the days ahead to place the satellite in the Geostationary Orbit (36,000 km above the equator) using its on-board propulsion systems. GSAT-11 will be positioned

at 74-degree east longitude in the geostationary orbit.Subsequently, the two solar arrays and four antenna reflectors of GSAT-11 will be deployed in orbit. The satellite will be operational after the successful completion of all in-orbit tests.In the last 21 days, ISRO successfully completed three satellite and two launch vehicle missions.

Source: https://www.ISRO.gov.in/

GSLV-F11 successfully launches GSAT-7A

Indian Space Research Organisation's (ISRO) Geosynchronous Satellite Launch Vehicle (GSLV-F11) successfully launched the communication satellite GSAT-7A from the Satish Dhawan Space Centre (SDSC) in Sriharikota today.The GSLV-F11 lifted off from the Second Launch Pad at SDSC at 04:10 pm IST, carrying 2250 kg GSAT-7A and about 19 minutes later, injected GSAT-7A into a Geosynchronous Transfer Orbit (GTO) of 170.8 km x 39127 km which is very close to the intended orbit.An ISRO team lead by Chairman Dr K Sivan, Vikram Sarabhai Space Centre (VSSC) S Somanath, U R Rao Satellite Centre (URSC) Director P Kunhikrishnan, Space Applications Centre (SAC) Director D K Das, SDSC Director S Pandian, Liquid Propulsion Systems Centre (LPSC) Dr V Narayanan and ISRO Propulsion Complex (IPRC) Director T Mookiah witnessed the launch.Mission Director Mohan M and Satellite Director Killedar Pankaj Damodar oversaw the launch proceedings.Soon after the separation of the satellite, ISRO's Master Control Facility (MCF) at Hassan in Karnataka took over the command and control of GSAT-7A.The satellite's health parameters are normal.In the next few days, scientists at MCF will perform various orbit-raising manoeuvres, using GSAT-7A's onboard propulsion system, to place the satellite in its final geostationary orbit.In his post-launch televised address, Dr Sivan said the team has achieved another spectacular milestone by launching GSAT-7A."In the last 35 days, ISRO has successfully launched three missions from SDSC starting with GSLV MkIII-D2 on November14, PSLV-C43 on November 29 and finally GSLV-F11 today. GSLV has successfully injected GSAT-7A into a super synchronous transfer orbit," Dr Sivan said.He said GSAT-7A is the heaviest satellite being launched by GSLV with an indigenously developed cryogenic stage."The cryogenic stage of this vehicle has been modified to increase the thrust rate. GSAT-7A is an advanced communication satellite with a Gregorian Antenna and many other new technologies. The testing and realisation of this satellite has been carried out meticulously by ISRO team. We have signed off year 2018 on a high and positive note," Dr Sivan added.GSLV is ISRO's fourth generation launch vehicle with three stages. The four liquid strap-ons and a solid rocket motor at the core form the first stage. The second stage is equipped with a high thrust engine using liquid fuel. The cryogenic upper stage forms the third and final stage of the vehicle. GSLV-F11 was the seventh flight carrying indigenously developed cryogenic upper stage.GSAT-7A is the 39th Indian communication satellite of ISRO to provide services to the users in Ku-band over the Indian region. Most of the functional requirements of the communication payloads and the other systems have been derived from ISRO's earlier geostationary INSAT/GSAT satellites.Today's launch was the 7th mission of ISRO from SDSC in the year 2018. This was the 13th flight of GSLV-MkII.

Source: https://www.ISRO.gov.in/

Successful Test Firing of BrahMos by Indian Navy

BrahMos Supersonic Cruise Missile in Anti-Ship mode was successfully test fired today at 0900 hrs against a decommissioned Ship. The test firing was carried out by Indian Navy. The missile performed highly complex manoeuvres and hit Bull's eye of the target. BrahMos is the supersonic cruise missile jointly developed by DRDO and NPOM of Russia as a Brahmos Aerospace joint venture, which became Brahmos Aerospace Private Limited. The missile has established itself as a major force multiplier in modern-day complex battlefields with its impeccable anti-ship and land-attack capabilities with multi-role and multi-platform abilities and has been deployed in all the three wings of the Indian Armed Forces. The first launch of Brahmos took place in 2001 and till date numerous launches have taken place from various ships, Mobile Autonomous Launchers and Su-30 MKI aircraft, making it a versatile weapon. Secretary DDR&D & Chairman DRDO Dr G Satheesh Reddy congratulated Indian Navy for the successful test.

Source: https://www.pib.gov.in/PressReleasePage.aspx?PRID=1677433

Raksha Mantri Shri Rajnath Singh hands over DRDO systems to Armed Forces Chiefs

Raksha Mantri Shri Rajnath Singh today handed over three indigenously developed Defence Research and Development Organisation (DRDO) systems to Army, Navy and Air Force at a function held in DRDO Bhawan.Shri Rajnath Singh handed over the Indian Maritime Situational Awareness System (IMSAS) to the Chief of Naval Staff Admiral Karambir Singh, ASTRA Mk-I Missile to Air Chief Marshal Rakesh Kumar Singh Bhadauriaand Border Surveillance System (BOSS) to the Chief of Army Staff General MM Naravane. The handing over of these products was done in the presence of Raksha Rajya Mantri Shri Shripad Yesso Naik, the Guest of Honour and Chief of Defence Staff General Bipin Rawat.Raksha Mantri Shri Rajnath Singh also gave away awards to DRDO scientists for outstanding contributions in various categories during the function.The awards include DRDO Lifetime Achievement Award – 2018 to Shri N V Kadam for his contributions for developing control and guidance schemes for missiles. Excellence awards were given to academia and industry for technology absorption. Besides, individual awards, team awards, technology spin-off awards, techno managerial awards and awards in other categories were also given.Complimenting the DRDO scientists for their outstanding work in developing defence systems, Raksha Mantri said that DRDO has been developing high level technologies for defence systems for increasing the capacity and capability of armed forces.Shri Rajnath Singh lauded the role of DRDO scientists in combating COVID-19 pandemic. He congratulated all the scientists who received the awards and wished them the very best for their future endeavours.Speaking on the occasion, Raksha Rajya Mantri Shri Shripad Naik said that DRDO is playing an important role in self-reliance of Defence. He appreciated the efforts of DRDO towards development of technologies and products for combating COVID-19.Chief of Defence Staff General Bipin Rawat in his address congratulated the scientific fraternity for their achievements and emphasised on the need of working at the fast pace so that the country will have most of the indigenous systems.The development of these high technology systems has led to higher self-reliance in Defence technologies. These three systems which have completed the design and development cycles and are being deployed were handed over to the services.Among the systems handed over was BOSS. An all-weather electronic surveillance system successfully designed and developed by Instruments Research & Development Establishment (IRDE), Dehradun. The system has been deployed at Ladakh border area for day and night surveillance. The system facilitates monitoring and surveillance by automatically detecting the intrusions in harsh high-altitude sub-zero temperature areas with remote operation capability. The system is being produced by Bharat Electronics Limited (BEL), Machlipatnam.The IMSAS is state-of-the-art, fully indigenous, high performance intelligent software system that provide Global Maritime Situational Picture, Marine planning tools and Analytical capabilities to Indian Navy. The system provides Maritime Operational Picture from Naval HQ to each individual ship in sea to enable Naval Command and control (C2). Centre for Artificial Intelligence & Robotics (CAIR), Bengaluru and Indian Navy has jointly conceptualised and developed the product and the BEL, Bengaluru has implemented it.The ASTRA Mk-I is the indigenously developed first Beyond Visual Range (BVR) Missile, which can be launched from Sukhoi-30, Light Combat Aircraft (LCA), Mig-29 and Mig-29K. Globally, very few countries have expertise and capabilities to design and produce this class of weapon system. Successful development of ASTRA weapon system by Defence Research & Development Laboratory (DRDL) Hyderabad & production by Bharat Dynamics Limited (BDL), Hyderabad is a major contribution towards 'Atmanirbhar Bharat'.Secretary, DDR&D & Chairman DRDO Dr G Satheesh Reddy stated that DRDO is committed to the development of advanced systems and technologies for Defence. He added that DRDO strives to create robust ecosystem of Defense design, development and production along with academia, industry and armed forces.Several senior functionaries from Ministry of Defence and Government of India were present at the function.

Source: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1681732

Successful Maiden Launch of MRSAM

Defence Research and Development Organisation (DRDO) achieved a major milestone today with the maiden launch of Medium Range Surface to Air Missile (MRSAM), Army Version from Integrated Test Range, Chandipur, off the Coast of Odisha around 1600 hrs. The missile completely destroyed a high speed unmanned aerial target which was mimicking an aircraft with a direct hit. Army version of MRSAM is a surface to Air Missile developed jointly by DRDO, India and IAI, Israel for use of the Indian Army. MRSAM Army weapon system comprises of Command post, Multi-Function

Radar and Mobile Launcher system. The complete Fire Unit has been used during the launch in the deliverable configuration. The team from the users i.e. Indian Army also witnessed the launch. Number of range instruments such as Radar, Telemetry and Electro-Optical Tracking System were deployed and captured the complete mission data, validating the weapon system performance including the destruction of the target. Raksha Mantri Shri Rajnath Singh lauded the efforts of DRDO and associated team members involved in the mission and said that India has attained a high level of capability in the indigenous design and development of advanced weapon systems. Secretary Dept. of Defence R&D and Chairman, DRDO Dr G Satheesh Reddy congratulated the DRDO community for successfully demonstrating the performance of the MRSAM Army weapon system registering direct target hit in its maiden launch. He also lauded the efforts of the entire team in realizing the system within record time and meeting the committed schedule.

Source: https://pib.gov.in/PressReleasePage.aspx?PRID=1683136

Maiden Flight Trial of SAHAYAK-NG, Air Droppable Container

Defence Research and Development Organisation (DRDO) along with Indian Navy conducted the successful maiden test trial of 'SAHAYAK-NG' India's first indigenously designed and developed Air Dropped Container from IL 38SD aircraft (Indian Navy) off the coast of Goa.The trial was conducted by Indian Navy to enhance its operational logistics capabilities and provide critical engineering stores to ships which are deployed more than 2000 km from the coast. It reduces the requirement of ships to come close to the coast to collect spares and stores. Two DRDO laboratories i.e. NSTL, Visakhapatnam and ADRDE, Agra were involved in the development of SAHAYAK-NG container along the industry partner M/s Avantel for GPS integration. SAHAYAK-NG is an advanced version of SAHAYAK Mk I. The newly developed GPS aided air dropped container is having the capability to carry a payload that weighs upto 50 kg and can be dropped from heavy aircraft. Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy congratulated DRDO scientists, Indian Navy and the associated industry partners involved in the successful maiden trial.

Source: https://pib.gov.in/PressReleasePage.aspx?PRID=1684799

Rolls-Royce partners Infosys for Aerospace Engineering in India

Rolls-Royce, a global aerospace and defence technology company, and Infosys, India's second largest IT services firm, have signed a strategic partnership for sourcing engineering and R&D services for Rolls-Royce's Civil Aerospace business.As part of the partnership, Rolls-Royce will transit a significant part of its engineering centre capabilities for Civil Aerospace in Bengaluru to Infosys. Leveraging its expertise in core engineering services, digital transformation capabilities, and Rolls-Royce product knowledge acquired through the partnership, Infosys will provide a full range of high-end engineering and R&D services integrated with advanced digital service to Rolls-Royce, according to a press statement. Speaking about the partnership, Kishore Jayaraman, President, Rolls-Royce India & South Asia, said, "India has grown to become a key contributor to the Rolls-Royce global engineering ecosystem, delivering high technical capability to support a broad range of complex business demands. Our vision is to continue this high capability engineering work in India, in partnership with Infosys."The engineering centre for Civil Aerospace will strengthen Infosys' existing capabilities in Turbomachinery and Propulsion that are currently delivered through a network of engineering centres in Mysuru, Baden, and Karlovac, the statement added.Jasmeet Singh, Executive Vice President and Global Head of Manufacturing, Infosys, said, "We have had a long and fruitful association with Rolls-Royce and are looking forward to supporting the company in addressing Civil Aerospace industry challenges."Over the past decade, Rolls-Royce has established a multi-disciplinary engineering centre in Bengaluru, and this has been an integral part of Rolls-Royce Engineering and R&D services.The Centre covers a mix of engineering capabilities spanning the full range of sub-functions and specialisms in R&D. Going forward, Rolls-Royce will continue these complex engineering activities in India in partnership with Infosys, the release said.

Source: https://www.deccanherald.com/

Indian Navy wants to join IAF in fighter jet shopping

The Navy is looking to combine its multi-role carrier-based fighter jet procurement tender along with the IAF tender for 114 fighters that is under way. The development comes following a decision to cut down the numbers to be procured following the indigenous development proposal by the Defence Research and Development Organisation (DRDO).”We have the MiG-29K operating from the Vikramaditya and will operate from the Indigenous Aircraft Carrier (IAC)-I. To replace them, we have taken up a case for the Multi-Role Carrier Borne Fighters (MRCBF) which we are trying to do along with the IAF,” Navy Chief Admiral Karambir Singh said last week without elaborating. “The Navy has approached the IAF and we are awaiting their response,” another Navy official said on condition of anonymity.On the Navy’s fighter procurement plans, Adm. Singh said the new development has been the Twin Engine Carrier Based Deck Fighter (TEBDF) which the DRDO and the Aeronautical Development Agency (ADA) have offered. He said they are working together to make sure that happens. It then “will have an indigenous deck based fighter for the Navy”.Adm. Singh said many lessons have been learn from the Naval LAC-MK1 programme like the arrestor hook and under carriage and so on and more lessons are being learnt through the Shore-Based Test Facility (SBTF) in Goa. “My hope is that the TBDRF would be able to enter service sometime in the early 2030s.”Cutting down numbersIn 2017, the Navy has floated a Request For Information (RFI) to global fighter manufacturers and the response is being evaluated. However, with the new jet under development and also factoring in budgetary constraints, the Navy is in the process of cutting down the number of fighters from 57 to around 36. The final decision is awaited.To further optimise the process, it is now looking to combine it with the IAF. However, it has to be seen how this is taken forward as the IAF RFI was open to both single and twin-engine fighters while the Navy has a stated requirement for a twin-engine jet to operate off its carriers.The Navy has 45 Russian MiG-29K and it had said earlier there will not be enough aircraft to operate from both carriers. The response to the RFI from Boeing with its F-18 Super Hornet and Dassault Aviation with its Rafale jets are being evaluated. Both companies had said their jets can operate off the ski-jump of the Vikramaditya and in future the IAC-I Vikrant.In fact, a Navy team was to visit the US Naval Air Station in Maryland early this year to witness a demonstration from Boeing on the compatibility of its F-18 Super Hornet to take off and land from the decks of Indian carriers. However, the visit was deferred due to the pandemic.

Source: https://www.thehindu.com/

Union Cabinet approves export of Akash missile system

The Union Cabinet approved the export of indigenous Aakash surface-to-air missiles to friendly countries with the aim of boosting India’s defence export that remained at a minuscule level for years.The move comes four decades after defence scientists led by then DRDO chief APJ Abdul Kalam proposed developing five indigenous ballistic missile systems including Aakash to make India self-reliant in missile technology.With a range of 25 km, the Akash air defence missile was inducted by the Indian Air Force in 2014 and by the Indian Army a year later.The export version of Akash will be different from the system currently deployed with Indian armed forces.”After its induction, interest has been shown in Akash missile by many friendly countries during international exhibitions Def-Expo and Aero India shows. The Cabinet approval will facilitate Indian manufactures to participate in the RFI/RFP (tendering process) issued by various countries,” a defence ministry spokesperson said in a statement.So far, Indian defence exports were limited to the supply of parts and components as export of big platforms was minimal. The Cabinet decision, according to an official, would help the country improve its defence products and make them globally competitive.Though India remains the world’s second-largest importer of arms, its position as an exporter comes at the 23rd spot out of the world’s top 25 arms exporters, according to the Stockholm International Peace Research Institute that tracks arms trade around the world. Myanmar, Sri Lanka and Mauritius are the three biggest recipients of Indian arms.A panel comprising the Ministers of Defence and External Affairs and the National Security Advisor has also been set up to approve high-value platforms like missile, aircraft and radars on a case-by-case basis.Besides Akash, interest has been shown for coastal surveillance systems, radars and air platforms. After successfully exporting Dhruv advanced lightweight helicopters to a handful of nations, the Hindustan Aeronautics Limited now plans to woo other countries to buy the home-made Tejas light combat aircraft, Dhruv ALH and its armed version, Rudra.The Cabinet decision comes ten months after Prime Minister Narendra Modi set up a target of $5 billion worth of defence export in the next five years.

Source: https://www.deccanherald.com/

TECHNOLOGY

DRDO Young Scientists Laboratory Develops Quantum based technology for Random Number Generation

Random numbers have essential roles in many fields, such as Quantum Communication, cryptography (key generation, key wrapping, authentication etc.), scientific simulations, lotteries and fundamental physics experiments. The generation of genuine randomness is generally considered impossible with classical means. Quantum Mechanics has the inherent potential of providing true random numbers and thus has become the preferred option for the scientific applications requiring randomness. DRDO Young Scientist Laboratory for Quantum Technologies (DYSL-QT) has developed a Quantum Random Number Generator (QRNG) which detects random quantum events and converts those into a stream of binary digits. The Laboratory has developed a fiber-optic branch path based QRNG. Branch path based QRNG is based on the principle that if a single photon is incident on a balanced beam splitter, it will take either of the beam-splitter output paths randomly. As the path chosen by photon is random, the randomness is translated to sequence of bits.QRNG system developed by the laboratory has passed the global randomness testing standards viz. NIST and Die-harder Statistical Test Suites at the speed of ~150 kbps after post-processing. The generated random numbers are also evaluated and verified using DRDO's indigenously developed Randomness Testing Statistical Test Suite of SAG. With this development India enters the club of countries who have the technology to achieve the generation of random numbers based on the Quantum Phenomenon.

Source: https://www.pib.gov.in/PressReleasePage.aspx?PRID=1684381

DRDO successfully demonstrates quantum communication between two labs

The Defence Research and Development Organisation (DRDO) successfully demonstrated communication between its two labs using Quantum Key Distribution (QKD) technology."Secure communications are vital for defence and strategic agencies world over and distribution of encryption keys from time to time is an important requirement in this context... Quantum based communication offers a robust solution to sharing the keys securely," said an official statement.Defence Minister Rajnath Singh congratulated the DRDO for successful demonstration of QKD-based communication between its two labs in Hyderabad, said the statement.The Defence Research and Development Laboratory (DRDL) and The Research Centre Imarat (RCI) were the two labs that participated in this demonstration.

Source: Times of India

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Article

China in Space: The Long, SteadyMarch

During the cold war, the USA and USSR fiercely competed with each other in the arena of space like Olympic sprinters. After the end of the cold war, an enfeebled Russia that emerged from the ashes of the Soviet Union could not muster enough resources to undertakemajor space ventures as itssoviet predecessor did earlier.

But in this post-cold war era, the People's Republic of China has emerged as a serious competitorto the US signifying a new 'space race'. Despite the ravages of COVID-19 this year, high rate of space launches maintained by the US and China signifies this new competition.

Today, space is *yet anotherdomain* in which People's Republic of China is intent on prominently demonstrating its prowess to impress the outside world. China's aim of becoming a global space power became more evident in recent years when in 2018 and 2019 it surpassed United States in the number of space launches. And the conspicuous success of China's *Chang'e 5* robotic spacecraft which triumphantly brought 2 kg of lunar rock and soil samples to earth on December 17 further underscores this.

Formidable challenge

China now poses a formidable challenge to the US in many areas of space that includes satellite launch vehicles, planetary exploration, human spaceflight and satellite navigation.

In recent years, China has been launching progressively sophisticated satellites for various purposes ranging from communications (including the world's first quantum communication satellite in 2016) to earth observation to navigation.

And earlier this year, the launch of *Tianwen-1* spacecraft carrying an orbiter, lander and a rover to Mars on July 23 surprised many analysts since China had taken up such a complex mission in its very maiden attempt itself to explore Mars completely on its own.

All thissuggests China's mounting confidence about its space capability, which worries many countries including India because of its military connotation and the firm control exercised by the People's Liberation Army over the Chinese space programme.

Modest beginning

Contrary to the current Chinese buoyant attempts to explore and exploit space in a conspicuous way, the genesis of Chinese space programme was quite modest and an offshoot of its ballistic missile development effort. It beganin the late 1950s under the leadership of Dr Qian Xuesen, who had been deported from the US inthe McCarthy era of witch hunt during the heydays of the cold war.

Though Chinese were initially benefitted by significant Soviet assistance in developing ballistic missiles,subsequent to the Sino-Soviet split and the consequent cooling down of relations between the two communist giants, Chinese had to really struggle to develop their first intermediate range ballistic missile *DF3*.By suitably modifying *DF4* missile subsequently, China successfully launched its *Dong Fang Hong-1* ('The East is Red' in Mandarin, which was the favourite revolutionary song of Mao) in its *Long March-1* rocket on April 24, 1970.

During the Deng era, many space technologies were quietly developed by China as American export control laws were relaxed.

Space Power Status

With the dawn of the new Millennium, China began flexing its muscle in the domain of space. First, it successfully launched its maiden space traveller (Taikonaut, as labelled by Western media) Yang Li Wei on October 15,

2003 in *Shenzhou-5 (Divine Vessel-5)*. Next came the success of *Chang'e 1* spacecraft which China placed in an orbit around the Moon in 2007.

In the succeeding decade, China launched its first two space stations*Tiangong-1 and 2*(Heavenly Palace), which resembled the early Soviet *Salyut* space stations.

This was also the decade of triumph for China in lunar exploration. In 2013, China successfully soft landed*Chang'e-3*carrying *Yutu* (Jade Rabbit) rover on the Moon.

Pioneering mission

More importantly in January 2019, China became the first country to land a spacecrafton the far side of the moon, which is invisible to the earth. Like its predecessor, *Chang'e4* lander smoothly touched down and yetanother rover *Yutu-2* began roaming in that pristine area. Now China has scored another prominent success through *Chang'e 5*.

For the future, China has more ambitious space ventures including a beginning the construction of a modular space station in low earth orbit around 2021 and manned lunar landing mission at a later date.

Implications

Analysts say that such keen and perseverant pursuit of space ambitions by China has enabled it to develop not only space capability but counter space capability as well. This they say can be used to deny its enemies the advantages offered by their space assets.

But China has skilfully succeeded in not making it much apparent, while making its civilian space programme glaringly visible to catch the attention and appreciation of the outside world, as it successfully did recently in the case of *Chang'e 5*.

Source: Deccan Hearld

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