December
2022

समाचार पत्रों से चयित अंश
Newspapers Clippings

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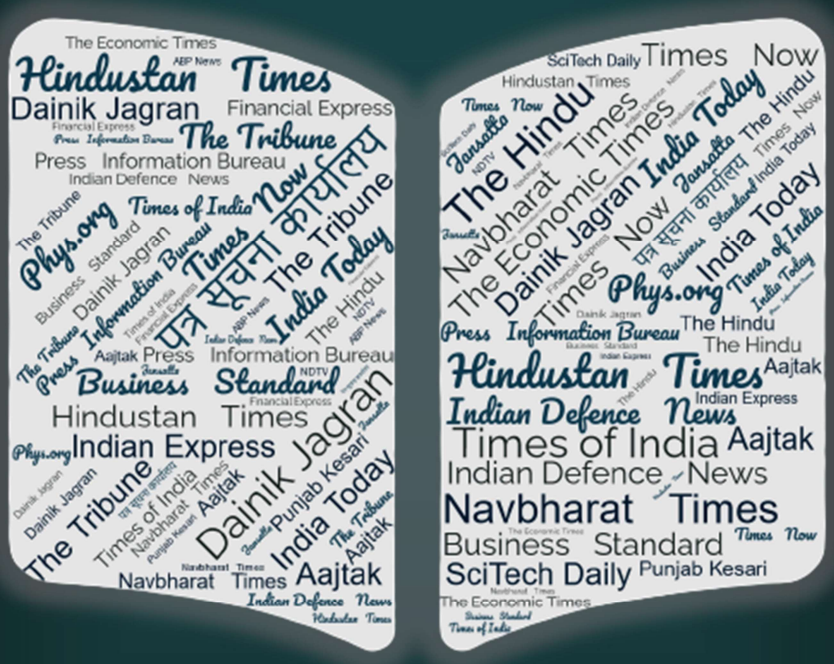
खंड : 47 अंक : 246 28 दिसंबर 2022

Vol.: 47 Issue: 246 28 December 2022



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DRDO News

DRDO Technology News

Tue, 27 Dec 2022

बिजली मंत्रालय व डीआरडीओ के बीच समझौता

ऊर्जा मंत्रालय और रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) संयुक्त रूप से हिमस्खलन, भूस्खलन, ग्लेशियर, हिमनदी झीलों और अन्य भू-खतरों के खिलाफ उपयुक्त शमन उपाय विकसित करने की दिशा में काम करेंगे। डीआरडीओ की विशेषज्ञता का उपयोग पहाड़ी क्षेत्रों में कमजोर पनबिजली परियोजनाओं और बिजली स्टेशनों के लिए एक व्यापक पूर्व चेतावनी प्रणाली (ईडब्ल्यूएस) विकसित करने में भी किया जाएगा।

इस उद्देश्य को प्राप्त करने के लिए मंत्रालय और डीआरडीओं ने मंगलवार को कमजोर जलविद्युत परियोजनाओं और बिजली स्टेशनों के लिए एक समझौते पर हस्ताक्षर किए। मंत्रालय ने पनबिजली परियोजनाओं, विशेष रूप से पहाड़ी क्षेत्रों के ऊपरी इलाकों में स्थित परियोजनाओं में ईडब्ल्यूएस के कार्यान्वयन की शुरुआत की है। ईडब्ल्यूएस खतरनाक घटनाओं से पहले आपदा जोखिम को कम करने के लिए समय पर कार्रवाई के लिए खतरों की निगरानी, पूर्वानुमान और भविष्यवाणी, आपदा जोखिम मूल्यांकन, संचार और तैयारी की एक एकीकृत प्रणाली है। समझौते पर ऊर्जा सचिव आलोक कुमार और डीआरडीओ प्रमुख और रक्षा विभाग (आरएंडडी) के सचिव समीर कामत ने हस्ताक्षर किए।

https://www.newsnationtv.com/business/economy/power-minitry-drdo-ink-pact-for-early-warning-ytem-for-vulnerable-hydro-project-331240.html

ThePrint

Tue, 27 Dec 2022

Ministry of Power and DRDO Sign MoU for Developing Mitigation Measures

Shi Alok Kumar, Secretary, Ministry of Power and Dr. Samir V Kamat, Secretary, Department of Defence (R&D) & Chairman, DRDO. (Photo/ANI)

Ministry of Power signed a Memorandum of Understanding with Defence Research and Development Organization (DRDO), Ministry of Defence today for the Implementation of Early Warning System for Vulnerable Hydro Projects/Power Stations.

Ministry of Power and DRDO will jointly work towards developing suitable mitigation measures against avalanches, landslides, glaciers, glacial lakes and other geo-hazards. The expertise of DRDO will also be utilized in developing a comprehensive Early Warning System for vulnerable hydro projects/ power stations in hilly regions. Separate and specific tasks will be formulated between DRDO & respective project developer(s) in agreement with the broad understanding developed through this MoU.

The MoU was signed by Alok Kumar, Secretary, Ministry of Power and Dr Samir V Kamat, Secretary, Department of Defence (R&D) & Chairman, DRDO. Union Minister of Power &

NRE, R K Singh, the Ministry of Power has taken the initiative of implementing Early Warning System (EWS) in the Hydro Power Projects especially those located in upper reaches of Hilly regions.

EWS is an integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness for timely action to reduce disaster risks in advance of hazardous events. Ministry of Power has already signed MoUs with CSIR-NGRI, IMD, WIHG and NRSC-ISRO for the implementation of EWS.

https://theprint.in/india/ministry-of-power-and-drdo-sign-mou-for-developing-mitigation-measures/1284594/

The Tribune

Tue, 27 Dec 2022

Power Ministry Inks Pact with DRDO to Develop Early Warning Systems for Vulnerable Power Projects in Hills

The Ministry of Power has signed a memorandum of understanding (MoU) with Defence Research and Development Organisation (DRDO) for the implementation of early warning systems for vulnerable hydropower projects and power stations located in disaster-prone mountainous regions.

Under the MoU, the Ministry of Power and DRDO will jointly work towards developing suitable mitigation measures against avalanches, landslides, glaciers, glacial lakes and other geo-hazards, according to an official statement issued on Tuesday.

DRDO's Defence Geo-informatics Research Establishment based here is mandated with carrying out research in these areas. The expertise of DRDO will also be utilised in developing a comprehensive early warning system for vulnerable hydro projects and power stations in hilly regions. Separate and specific tasks will be formulated between the DRDO and respective project developers in agreement with broad understanding developed through this MoU.

The Ministry of Power has taken the initiative of implementing early warning systems (EWS) at hydro power projects, especially those located in upper reaches of mountain regions. EWS is an integrated system of hazard monitoring, forecasting and prediction, disaster-risk assessment, communication and preparedness for timely action to reduce disaster risks in the event of hazardous occurrences. The ministry has already signed MoUs with the Council of Scientific and Industrial Research, India Meteorological Department, Wadia Institute of Himalayan Geology and National Remote Sensing Centre, ISRO for implementation of EWS.

https://www.tribuneindia.com/news/nation/power-ministry-inks-pact-with-drdo-to-develop-early-warning-systems-for-vulnerable-power-projects-in-hills-465011

Defence News

Defence Strategic : National/International

Business Standard

Tue, 27 Dec 2022

India-Nepal Armies Undertake 48-hr Gruelling Training Exercise: Army

The Indian Army said on Tuesday that troops of Idian Army and Nepali Army participated in a 48-hour long gruelling training, followed by successful validation of counter-terrorism drills on simulated settings, during the ongoing joint exercise in Nepal. The 16th edition of Indo-Nepal joint military exercise 'SURYA KIRAN', which started on December 16, will continue till December 29 at Nepal Army Battle School, Saljhandi. "Nepal Army soldiers of Shree Bhawani Baksh Battalion and Indian Army soldiers from the 5 GR will be participating in the exercise. The two armies, through these contingents, shall be sharing the experiences gained during the conduct of various counter-insurgency operations over the years in their respective countries," Defence Ministry said in a Press statement. "The joint exercise would focus on evolution of combined drills for planning and conduct of tactical operations at unit level in counter terrorism operations and disaster response mechanism in general and role of armed forces in management of disaster," it added.

During the exercise, participants will be training together to develop inter-operability and share their experience including Counter Insurgency and Counter Terrorist operations and also on Humanitarian Relief operations. "The joint military exercise will enhance the level of defence cooperation which will further foster the bilateral relations between the two nations," the Defence Ministry stated.

The exercise between the two Armies is part of 'Bharat Nepal Maitri'. Exercise 'SURYA KIRAN' is conducted annually between India and Nepal with the aim to enhance interoperability in jungle warfare & counter terrorism operations in mountainous terrain and Humanitarian Assistance and Disaster Relief operations.

https://www.business-standard.com/article/current-affairs/india-nepal-armies-undertake-48-hr-gruelling-training-exercise-army-122122700996_1.html

FINANCIAL EXPRESS
Read to Lead

Tue, 27 Dec 2022

India Boosts Coastal Security with High-Speed Interceptor Vessels

By Huma Siddiqui

By 2030, the Indian Navy is expected to be equipped with a total of 120 Fast Interceptor Craft (FIC-1), which will enable it to increase its patrols of vital coastlines along major metropolitan areas such as Mumbai and Chennai. Both of which were targeted by terrorists during the 26/11 attacks in 2008 when they arrived in the country via the sea route. India's coastline is around 7500 miles and the Indian Navy has deployed different grades of vessels to protect the coastline from the threat, including Offshore Patrol vessels and Fast Interceptor Vessels.

News

According to reports, Indian Coast Guard (ICG) in a joint operation with Anti-Terror Squad (ATS) of Gujarat has apprehended a Pakistani Boat Al Soheli in Indian waters on December 27, 2022 with 10 crew members. On the boat there were arms, ammunition & 40 kgs of Narcotics worth around Rs 300 crores.

Fast Interceptor Craft

The Fast Interceptor Craft line was developed especially to meet the stringent requirements of the military and coast guard. They are offered in several different variants, and thorough customisation ensures that they meet the specific needs of each operator.

The Ministry of Defence has initiated the process of purchasing 120 Fast Interceptor Crafts for the Indian Navy. Most of these vessels are high-speed interceptors intended specifically for patrol and rescue work. Between the years 2026 and 2030, which is four years, the FICs would be constructed in stages. The FICs will be able to undertake water-front patrols of coastal areas, including infrastructures such as command headquarters, naval bases, naval dockyards, breakwaters, naval jetties, and other such locations. "Inherent to this capability" would be to escort High-Value Units while entering/leaving the harbour. FICs will provide protection to the strategic assets located in the vicinity of naval bases and operate with Force Protection vessels and other craft deployed. In addition, FICs will carry out interception of high-speed craft and seaward anti-terrorist patrols for the security of coastal installations, naval harbours and their own coast," the official communication said.

FICs will operate in waters that are only a few feet deep and in extremely hot and humid situations. In addition, FICs will conduct independent deployments for at least one day at sea, during which they will conduct surveillance over a group of islands. According to the notification, the FICs will also give medical assistance and operate as water ambulances to evacuate casualties who require immediate medical attention.

Between 2026 and 2030, proposals for the FIC-1 will be made in batches of thirty ships per year. While high-value units like aircraft carriers, tankers, cruisers, destroyers, frigates, and submarines are approaching or exiting the harbour, the FICs will protect them with an escort. In

addition to that, they will conduct patrols along the water's edge in coastal locations. Kochi has recently welcomed the arrival of four Fast Interception Crafts.

These FICs are equipped with many weapons, including heavy machine guns, grenade launchers, and more. Canopies on the upper decks have been reinforced to resist bullets. The multipurpose vessels also come equipped with advanced navigational aids and communication technology, such as an AIS (Automatic Identification System) and an LRAD (Long Range Acoustic Device), designed to prevent piracy. The vessels comply with the regulations obligatory for those operating on the water. Two new fast interceptor crafts will be inducted in the Indian Navy's Bengal area, taking its total fleet strength at Kolkata to eight.

Indian Fast Interceptor Craft manufacturers

L&T and Goa Shipyard (GSL) manufacture FICs in India. Recently, high-speed interceptor boats built by L&T Shipyard were supplied to the Indian Coast Guard. As per the company, the Interceptor Boat is a "planning vessel" capable of topping 40 Knots. It is constructed with a lightweight aluminium-alloy hull and is driven by twin water-jet propulsion systems to enable the rapid response required for coastal surveillance. These vessels are anticipated to improve India's coastline security considerably.

GSL has built a 29-meter aluminium interceptor vessel. Two engines with a Waterjet propulsion system move the vessel at speeds in excess of 45 Knots. This vessel is designed for interdiction as well as conventional patrol activities in shallow water. Coastal surveillance, search and rescue operations, fisheries protection, and high-speed interception of small, maneuverable intruder vessels, anti-terrorist activities and Special Forces operations, are the anticipated roles. Its capabilities include shallow water operations with exceptional manoeuvrability and survivability, rapid acceleration and deceleration, high-speed stability and an excellent sea-keeping characteristic. It has a topside deck designed to maximize payload and/or armament carrying capacity. It is designed to carry cutting-edge electro-optical detection and surveillance systems and absorb the dynamic recoil loads of 20-30mm cannon.

https://www.financialexpress.com/defence/india-boosts-coastal-security-with-high-speed-interceptor-vessels/2928071/

FINANCIAL EXPRESS
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Tue, 27 Dec 2022

Budget FY2024: What to Expect in the Defence Sector?

By Amit Cowshish

One expectation every government entity has from the union budget is that of a handsome increase in its budget outlay, other than for defraying expenditure on salaries and sundry obligatory functions. The armed forces are no different; it's another matter that their expectation rarely, if ever, comes true. For as long as one can recall, the armed forces have knowingly made unrealistic budgetary pitches, only to be disappointed. Back in the 2000-01, they and other MoD departments had made a combined bid for allocation of Rs 72,724 crores. The projection was brought down to Rs 63586.95 crores by the MoD after due diligence. In the event, MoD ended up with an allocation of merely Rs 58,587crore -a good 20% lower than the initial projection.

This trend of ambitious budgetary projections and underwhelming allocations has persisted and the gap between the two widened over the past two decades. For the current fiscal the gap between projection and allocation was Rs 1,01,678 crore for the armed forces alone, as reported by the Standing Committee on Defence (SCoD). It is risky to predict but going by the past trend it will be reasonably safe to say that the allocation for the coming fiscal is unlikely to match the requirement projected by the armed forces. This is likely to be true of other less talked about branches of the MoD like the Defence Research and Development Organisation (DRDO), Coast Guard Border Roads Organisation (BRO)though they too are important constituents of India's overall defence capabilities.

There is a near unanimity among the defence analysts on the need for increasing the defence outlay. A section of the strategic community favours doubling the armed forces' outlay to 3% of the GDP. The fiscal reality, however, has prevented the successive governments from even toying with that idea. The more one gets into the numbers, the more intractable the problem appears to be. The Fifteenth Finance Commission projected that there will be a gap of Rs 15, 24,100 crore between 2021-22 and 2025-26 between the anticipated requirement of the armed forces and the annual allocations. This was based on the generous assumption that the revenue and capital outlay would grow at 7% and 16% per annum respectively during this period. These figures do not include defence pensions which have grown almost ten times from Rs 12,000 crore (BE) in 2000-01 to Rs 1,19,696 crore this year. The requirement is set to rise further in the next fiscal because of not just the normal annual increase in pensions, but also the second pension hike under the One Rank One Pension (OROP) Scheme retrospectively from July 2019, expected to cost Rs 8,450 crore in recurring expenditure and Rs 23,638 crore in arrears till June 2022. In the circumstances, it will be something worth celebrating if the finance minister maintains the past momentum and increases the defence outlay by 9-10% for the next fiscal; anything above that would be a bonus. For sure, the final allocation will be much below the expectation, or the formal demand projected by the armed forces, but it will be unrealistic to expect a dramatic turnaround.

There is a tendency to consider the government's inability to meet the armed forces' expectations as an indication of the political and bureaucratic apathy, if not failure to grasp the imperatives of increasing the defence outlay in the face of threats posed individually and collectively by China and Pakistan. Consequently, much energy is expended in making out a case for substantially higher allocations. This is both unfair and unnecessary.

The problem lies in the government's inability to raise enough revenue through taxation and borrowings, both of which have political and economic implications. Higher revenues are a sine qua non for making higher allocations for defence and other sectors like health, education, infrastructure, and poverty alleviation which too deserve as much attention as defence.

As a matter of fact, the union budget is more about the government's economic policies and schemes rather than matters related to defence and security which almost exclusively fall in the MoD's domain and, to some extent, the National Security Council. The MoD needs to pull its socks up to evolve policies and plans in sync with the fiscal reality rather than making financially unviable plans and bemoaning inadequacy of budgetary allocations. It is not for the finance minister to advise the MoD how to do this. While the finance minister is unlikely to arrogate to herself the responsibility of expounding the defence plan and strategies, it is possible that some reference will be made to Atmanirbharta, or self-reliance, which has become the trope for local

manufacture, indigenisation, research and innovation, private sector participation, embargo on imports, defence exports, and the like.

The finance minister had announced in her speech while presenting the budget for 2022-23 that a total of 68% of the capital budget -up from 58% in 2021-22- was earmarked for procurement from the domestic industry. Although the impact of this announcement, and other measures like embargo on import of 411 items, is debatable, one cannot begrudge her, or any other finance minister, a little window dressing in the budget speech. Be that as it may, it would be a sign of political maturity and fairness if, alongside this window dressing, the finance minister also gives an update on some announcements made, and steps taken, in the recent past. This would include creation of the Non-lapsable Defence Modernisation Fund, recommended by the Fifteenth Finance Commission, scaling down the Public Sector Enterprises in the strategic sector to a bare minimum number, corporatisation of the Ordnance Factory Board, and earmarking 25% of the R&D budget for the private industry, startups and the academia.

https://www.financialexpress.com/defence/budget-fy2024-what-to-expect-in-the-defence-sector/2928093/

FINANCIAL EXPRESS
Read to Lead

Tue, 27 Dec 2022

Missile Marvels: India Makes a Mark with its Growing Capabilities

By Girish Linganna

India's missile capabilities have been on the rise in recent years, making it a force to be reckoned with in the world of defense technology. From anti-ballistic missile systems to hypersonic technology missiles, the country has made significant strides in expanding its missile arsenal.

India is one of only four countries to have both anti-ballistic missile and anti-satellite systems. According to a report in the New York Times, India has successfully tested hypersonic technology missiles, joining the US, Russia, and China as countries with operational hypersonic missiles. This achievement has propelled India to the seventh rank in the world's most powerful missiles for 2022, with the AGNI-5 system. However, India still lags behind China in overall global rankings for missile technologies.

Breaking barriers

Hypersonic missiles are a game-changer in the world of defence technology, with the ability to travel at speeds of over 5,000 miles per hour. This is faster than the speed of sound, making them difficult to detect and intercept. These missiles have the potential to revolutionise the way wars are fought, with their ability to strike targets quickly and with precision.

Hypersonic weapons come in two types: hypersonic cruise missiles and hypersonic boost-glide vehicles. The former type is powered by rockets or jets throughout their flight and are a much faster version of existing cruise missiles. The latter type is launched into the upper atmosphere on top of existing ballistic missiles and then releases hypersonic glide vehicles (HGVs) that fly lower, faster, and in an unpredictable manner to enemies. China has two hypersonic missiles.

The first, the Dong Feng-17 (DF-17), is a medium-range missile or MRBM system equipped with an HGV. It can carry conventional or nuclear weapons and has a reported speed of Mach 5-10. With a range of 1,800-2,500km and a launch weight of 15,000 kg, the DF-17 is a formidable threat to any adversary. The second is the DF-ZF HGV, which can also travel at speeds between Mach 5-10 and is capable of performing "extreme manoeuvres" to evade enemy defences. The DF-17 has been designed to work specifically with the DF-ZF, greatly increasing the power of both weapons. Russia has three major hypersonic weapons: the Avangard, the Kinzhal, and the Zircon. In comparison, the US is lagging behind in hypersonic technology. A test of the AGM-183A ARRW, a hypersonic missile, failed when the rocket engine did not ignite after the missile successfully separated from the B-52H bomber carrying it.

India's defence industry soars with self-sufficient strategies

In 2021-2022, the budget for defence research was Rs 11,375.50 crore. In 2010, the Defense Research and Development Organisation (DRDO) was directed to restructure and give a "major boost" to defence research and to increase the private sector's involvement in defence technology. The Defense Technology Commission was established with the defence minister as its chair to improve the effectiveness of the DRDO. However, a Comptroller and Auditor General report on projects undertaken by the Aeronautical Development Establishment (ADE) from 2007-2017 found that the lab had undertaken projects without focus or priority, spent money on research that was abandoned without completion, and lacked the involvement of user representatives in pre-project work or during project execution.

India's defense sector has made strides in recent years, particularly in the realm of missile technologies. The country has successfully tested hypersonic technology missiles, and with the AGNI-5, it now ranks seventh in the world for the most powerful missiles. However, compared to China, India remains a laggard in global rankings for missile technologies.

There are two main types of hypersonic weapons: hypersonic cruise missiles and hypersonic boost-glide vehicles. The former are powered by rockets or jets throughout their flight, while the latter are launched into the upper atmosphere on top of existing ballistic missiles and then release hypersonic glide vehicles. China, in particular, has two highly advanced hypersonic missiles: the Dong Feng-17 and the DF-ZF HGV. Russia also has several hypersonic weapons, but the US has lagged behind in developing this technology.

To boost defence research in the country, India's DRDO has undergone restructuring to increase private sector involvement and establish a Defense Technology Commission. However, the Comptroller and Auditor General has criticised the ADE, a division of the DRDO, for undertaking projects without focus or priority and abandoning research without completion. India currently only produces 45-50% of the defence products it uses, with the rest imported.

Despite financial constraints, import restrictions, and a lack of clarity in decision making, India's DRDO has made significant progress in research and development of missile technologies in recent years. This article outlines some of the major achievements of DRDO in the field of missile technology. The organisation's achievements include the development of various advanced missile systems, including the New Shaurya Missile, a nuclear-capable two-stage cruise surface-to-surface medium range missile; the BrahMos series, a medium-range stealth ramjet supersonic cruise missile; the Nirbhay Subsonic Cruise Missile, capable of carrying conventional and nuclear warheads; and the Akash Missile, a surface-to-air missile with three variants at various stages of development. Additionally, DRDO is working on the Barak 8, a

long-range Indo-Israeli surface-to-air missile; the Prithvi Air Defense, a two-stage liquid and solid-fueled ballistic missile defence high altitude interceptor; and the ASAT Missile, a missile designed to hit targets in space. Despite these achievements, India remains a laggard in global rankings in missile technologies, particularly compared to China.

Skyfall: The Pralay Surface-to-Surface Missile

One of the standout missiles in India's arsenal is the Pralay, a surface-to-surface guided short-range ballistic missile that was recently tested off the coast of Odisha in Balasore. Developed by the DRDO, the Pralay follows a Quasi Ballistic Trajectory, meaning it takes a low curved path after being launched and is capable of changing direction and range. It hit its target with high accuracy, demonstrating the efficacy of its control guidance and mission algorithms.

But what sets the Pralay apart from other tactical missiles on the market? For one, it is canisterized, meaning it can be carried in a strong metal container that holds chemicals or gases. This allows for greater mobility and the ability to deploy the missile quickly in the event of a conflict. The Pralay is also capable of carrying a variety of warheads, including high explosive preformed fragmentation, penetration come blast, and runway denial penetration submunition, making it a versatile weapon for a range of targets.

As India continues to develop and test new missiles, it will be interesting to see how it positions itself on the global stage. With its diverse range of weapons and cost-effective approach, it is well-positioned to make a name for itself as a major player in the global arms race.

https://www.financialexpress.com/defence/missile-marvels-india-makes-a-mark-with-its-growing-capabilities/2928282/

news nine

Tue, 27 Dec 2022

Innovations for Defence Excellence: All You Need to Know about iDEX Framework

With the latest signing of its 150th contract, Innovations for Defence Excellence (iDEX), the flagship initiative of the Department of Defence Production, has reached a milestone. The achievement comes within five months of the signing of its 100th contract on July 26, 2022. This contract is related to a Defence India Start-up Challenge (DISC 7) SPRINT edition initiative for the Indian Navy. The competition titled "Expendable Mobile Anti-Submarine Warfare (ASW) Training Target (EMATT) capable of imitating the sound and movement of a submarine", was secured by Altair Infrasec Pvt Ltd, Pune. The iDEX initiative has been taken by the Government of India to modernise the nation's Defence industry in a move to become a 'self-reliant India'.

About the challenge

The challenge called for the development of a training target that could be launched from P8I aircraft, MH60R helicopters, ships sailing at a speed of up to ten knots, and other remotely piloted aircraft without undertaking any modification on the platform from which the MK 39 Expendable Mobile Anti-Submarine Training Target is required to be launched.

All about Innovations for Defence Excellence (iDEX) initiative

Launched in 2018, by the Prime Minister of India, the iDEX framework has been designed to provide a platform for co-creation and co-development in the defence sector, engage start-ups and develop defence and aerospace set-ups in the nation. The iDEX is being implemented by Defence Innovation Organisation (DIO), established under the Department of Defence Production and aimed at providing financial support to nearly 300 start-ups, Micro, Small and Medium Enterprises (MSME), individual innovators and 20 partner incubators under the DIO framework. Through its flagship programmes like DISC, Prime, and Open Challenges, iDEX has quickly become a game changer in the defence ecosystem (OC). The iDEX also bagged the coveted Prime Minister Award for Public Policy in the Innovation Category for the year 2021. In the year, 2021 the Defence Ministry has approved a budget of Rs 498.8 crore for the next five years to support over 300 startups and foster innovation in the defence and aerospace sectors.

Objectives of the iDEX

The Defence Ministry created this one-of-a-kind initiative to facilitate the rapid development of new, indigenous, and innovative technologies for the Indian Defence and aerospace sectors, allowing these sectors' needs to be met in shorter time frames. It also helps in creating a culture of engagement with innovative startups, to encourage co-creation in the defence and aerospace sectors. To encourage the development of a culture of technological co-creation and co-innovation within the aerospace and defence industries. To deliver armaments by inventing or utilising advanced technologies to solve the critical needs of the sector.

Functioning of iDEX

iDEX-DIO established the Defence India Startup Challenge (DISC) to tackle problems faced by the Armed Forces, DPSUs and OFB. Startups or individual applications are invited to resolve the challenges and after rigorous evaluation of the applications, winners receive innovation grants in technological areas through the prototype funding guidelines known as Support for Prototype and Research Kickstart (SPARK). This comprises allocating grants to the start-ups for prototype development in successive tranches based on milestones up to a maximum of Rs 1.5 crore.

https://www.news9live.com/knowledge/innovations-for-defence-excellence-all-you-need-to-know-about-idex-framework-216582

The EurAsian Times

Wed, 28 Dec 2022

Costing as much as J-20 Stealth Fighter, MQ-9 Drones Deployed by India along LAC 'Ineffective' Against China – Media

By Ashish Dangwal

Following the recent skirmish between Indian and Chinese soldiers in Arunachal Pradesh, India deployed its leased General Atomics MQ-9A unmanned aerial vehicles (UAVs) to observe the PLA along the Line of Control (LAC). The drones were deployed along the LAC, according to

publicly accessible mission flight data that open-source intelligence expert Damien Symon released. General Atomics leased two MQ-9B Sea Guardian drones to the Indian Navy in 2020 for a year for surveillance in the Indian Ocean. After that, the lease's term was extended.

Pointing out the deployment of US-made drones along LAC, the Chinese media has claimed that these drones are not particularly effective against the Chinese military. Chinese media noted that the MQ-9 utilized by India is still a revised model that is only capable of surveillance and lacks strike capacity. The Chinese media noted that India and the US are in the advanced stages of discussions to purchase 30 MQ-9B Predator armed drones for more than $3 billion; each of these drones would cost India over $100 million. The article claims that the amount is nearly equal to the cost of the PLA Air Force's J-20 stealth fighter jets. Furthermore, the report also boasted that the Wing Loong family of drones used by the PLA have comparable capabilities. Additionally, the report highlighted the Chinese military's extensive array of anti-drone capabilities. It is also claimed that China's Type 625 AA Gun Missile Integrated Weapon System can neutralize India's drones.

The EurAsian Times had previously reported that Beijing unveiled a new air defense system armed with missiles and a Gatling-style cannon at this year's Zhuhai Air Show. The air defense system is jointly developed by China South Industries Group Corporation (CSGC) and China North Industries Group Corporation, or Norinco, and is known as the Type 625E AA Gun Missile Integrated Weapon System. The Type 625E short-range air defense system (SHORAD) is believed to be an 8×8 vehicle-mounted self-propelled anti-aircraft gun and surface-to-air missile system. According to Chinese media accounts, the turret is equipped with a sizable, distinctive-looking Gatling-style cannon that is a six-barreled 25mm self-propelled anti-aircraft gun. Each turret of the vehicle is equipped with four canisterized anti-aircraft missiles.

The precise type of missile employed on the system is unknown. However, based on the 4-unit missile launcher's overall design, reports indicate that the FB-10 short-range types may have been used. These missiles were developed by the China Aerospace Long-March International (ALIT) company.

US-Made MQ-9B Drones For India

It was reported that the US-made MQ9B Sea/Sky Guardian Remotely Piloted Aircraft would be assembled locally in India (RPA). These UAVs are considered the world's most advanced High Altitude Long Endurance (HALE) combat and surveillance drones. Chief of Naval Staff Admiral R Hari Kumar told Businessworld, "through assertive negotiations, instant acquisition proposals have been leveraged for assembly of at least 60% of the quantity of aircraft proposed for procurement in India."

The MQ-9B drone is a derivative of the MQ-9 "Reaper," which in August 2022 was deployed to launch a modified Hellfire missile that killed al-Qaeda leader Ayman al-Zawahiri in the center of Kabul. Admiral Hari Kumar also noted that the $3 billion deal would include collaboration with DRDO to transfer specialized technology required for indigenous D&D of HALE RPAS in India.

The Indian Navy has been enhancing its surveillance capabilities to keep an eye on expanding Chinese activities, such as the frequent forays of PLA warships into the Indian Ocean region. The MQ9B has nine hardpoints and can support up to 2155 kilograms of external cargo. According to General Atomics, this enables armed services and governments to quickly incorporate sovereign payloads and mission systems for their own specifically tailored solutions.

Admiral Hari Kumar earlier also stated that the Indian Navy had found the experience of leasing two MQ9As from the US to be of "great value," and he expressed confidence that these RPAs would "bring enormous value to all three services." Furthermore, these leased drones also completed 10,000 hours of flight time supporting Indian security missions in two years. That being said, the MQ9B deal, once completed, will be one of the leading symbols of India-US defense cooperation. It will also be the first time this combat and surveillance drone has been assembled outside the United States.

https://eurasiantimes.com/chinese-media-claims-mq-9-drones-ineffective-against-china/

The EurAsian Times

Wed, 28 Dec 2022

US, Israel Ground F-35 Stealth Fighters after F-35B Crash in Texas; A Rocky 2022 for 'World's Best' Warplanes

By Sakshi Tiwari

The year 2022 saw the F-35 sales going up several notches, with many Western countries expressing interest in the aircraft. However, this fifth-generation aircraft manufactured by US-based Lockheed Martin also ran into controversies in 2022 and had to be grounded on more occasions than one. In a recent blow to the reputation of the F-35 Lightning II, Israel grounded 11 of its F-35A stealth fighters on December 25. The decision was taken after an F-35B crashed in Texas, United States, earlier this month, The Jerusalem Post reported. According to a statement from the Israel Defense Forces (IDF), the decision to ground the Israeli F-35 aircraft was made after an initial examination revealed potential similarities between the Israeli fighter's malfunctions and those that may have contributed to the crash of the US fighter. However, both IDF and Lockheed Martin have added a caveat that they weren't sure at this point that the F-35A in the IDF fleet had the same technical problems as the F-35B aircraft involved in the Texas accident. They further stated that 11 aircraft were grounded only as a precautionary measure.

Shortly after the IDF decision was made public, the F-35 Joint Program Office also grounded a few of its new F-35 Joint Strike Fighters in response to the Dec. 15 incident.

The F-35 Joint Program Office reportedly confirmed on December 27 that it has provided guidelines due to the incident and that some higher-risk F-35s are grounded, at least until January. The F-35 is unquestionably the cornerstone of the Israeli Air Force due to its stealth component and the capability to attack targets in hostile countries without being tracked down by enemy radars and defense systems. However, the incident earlier this month has rattled the Jewish nation.

On December 15, about ten days before the Israeli decision, the F-35B jet of the US Air Force (USAF) made an initial touchdown, then bounced back into the air before making a hard nose-first down landing on the runway. The nose gear completely collapsed before the pilot ejected, and the jet rolled onto the ground. At the time of the incident, a USAF pilot was flying the aircraft, but the aircraft had not yet been passed to the military by the manufacturer. Even though

the Israeli decision to ground the F-35 ten days after the mishap is worth examining, it is not the first time in the year that IDF has made such a move. In July, after a faulty component was discovered inside the ejection seat of the F-35 fighters, both the US and Israel temporarily stood down their F-35 fleets. Back then, the IDF's decision was based on the USAF's decision to halt operations. Maj.-Gen. Tomer Bar, the head of the IAF, suspended operations in July after evaluating the whole fleet and having two planes examined daily by IAF teams using Lockheed Martin-provided technology. Every aircraft with functional ejection seats was immediately put back into the air.

Controversies Gripped F-35 In 2022

The USAF grounded its F-35 fighter jets in July because of a malfunctioning cartridge-actuated device inside the ejection seat, which would have prevented the pilot from safely ejecting from the aircraft in an emergency.

The ejection seats inside aircraft have cartridge-actuated devices, essentially explosive cartridges used to help propel the seat out of a plane in an emergency. The manufacturer reportedly identified specific production lots of CADs used in Martin-Baker ejection seats as problematic and needing repair, which caused panic among aircraft operators worldwide. Another big controversy surrounding the F-35 Lightning II unraveled in September, leading to the US State Department abruptly halting deliveries of the stealth aircraft upon discovering a Chinese component in the aircraft. According to a statement released by Lockheed Martin on September 7, a magnet in the F-35's Honeywell-manufactured turbo machine, an engine part that powers the starter/generator placed on the engine, was found to have been made using a cobalt and samarium alloy that is produced in China. However, the alloy was magnetized in the United States. When the revelation was made, it caused widespread concerns about the security of the aircraft being compromised. Not just that, it exposed the loopholes in the supply chains and rattled the Pentagon and the higher echelons in the Joe Biden administration.

The spokesman for the F-35 Joint Program Office (JPO), Russell Goemaere, stated categorically that the component which is a magnet used in F-35 turbo machine pumps, "does not transmit information or harm the integrity of the aircraft and there is no performance, quality, safety, or security risks associated with this issue." However, the deliveries were suspended nonetheless.

Later, on October 4, a South Korean lawmaker stated that the nation's F-35A fighters were labeled as operationally unready 234 times over 18 months ending in June because of malfunctions. The Air Force, on its part, acknowledged having trouble obtaining parts for defects in the aircraft. It added stated that it would strive to get them from the manufacturer.

Further, the aircraft has been under the scanner this month for cost overruns and the expenses that maintaining the aircraft can entail for the state exchequer. The costs of developing a new cockpit computer for the F-35 Joint Strike Fighter, set initially at $712 million four years ago, have soared by another $239 million, generating extra expenses of $680 million.

Not just that, a senior Australian journalist, Brian Toohey, criticized the 'Defense Strategy Review' of the Australian government that has recommended buying the fourth squadron of F-35 fighter jets. He argued the long history of costly problems of the F-35s already acquired while arguing that Australia "should be asking for a refund" and that "the biggest mistake was to buy the plane in the first place." The effective combat radius of the F-35A, as previously reported by EurAsian Times, is only approximately 1,000 kilometers, and with a tanker aircraft, it might be

increased to roughly 1,500 kilometers. The F-35A cannot travel to the South China Sea without aerial refueling. Even so, the availability of airborne tankers over contested airspace is questionable during a battle. In addition, the F-35 unfortunately ran into many troubles this year. Before the hard nose landing of the aircraft in the US earlier this month, an F-35B Lightning II fighter jet was photographed parked in Okinawa, Japan, with its nose down on the road on December 1. At the time of the Japan incident, EurAsian Times had reported that F-35B attached to the US Marine Corp (USMC) had suffered a nose landing gear collapse at Kadena Air Base in Okinawa while being towed following an emergency/precautionary landing. An F-35A fifth-generation fighter plane crashed in the US state of Utah, close to Salt Lake City, in October 2022. Although the pilot is said to have successfully ejected and received treatment for minor injuries, the crash reportedly started bushfires that burned around 8 to 10 acres of land. Before the October event, two F-35 jet crashes were reported in January of this year. On January 4, the South Korean F-35's pilot performed an emergency "belly landing" at an airfield when the landing gear malfunctioned owing to mechanical issues.

A few days after the South Korean accident, on January 25, a US Navy F-35C had a "landing incident" on the deck of the Carl Vinson aircraft carrier in the South China Sea, the first-ever crash involving the carrier form of the fifth-generation fighter. However, despite all the controversies and accidents that the aircraft had to brave this year, it has also garnered widespread global popularity. Faced with security threats posed by the Russian invasion of Ukraine, several European countries and the Global North have signed agreements to purchase this fifth-generation stealth jet. It may have been a controversial year for the aircraft, but it has undoubtedly been very profitable for Lockheed Martin, which has been inundated with orders.

https://eurasiantimes.com/us-israel-grounds-f-35-stealth-fighters-after-f-35b-crash-in-texas/

news nine

Wed, 28 Dec 2022

Carl Gustaf M4 to be Manufactured in India: All You Need to Know about the Multipurpose Weapon

The Swedish defence company Saab is all set to manufacture the Carl-Gustaf M4 weapon system in India. Through a partnership with a defence PSU, Saab, which has been present in the country for more than 40 years, is already manufacturing the Carl-Gustaf M3 here. The launchers have been placed with Army formations in the eastern and western sectors near LAC. The manufacture of the shoulder-fired Carl-Gustaf M4 will begin in 2024, according to Gorgen Johannson, senior vice president of Saab. The company claimed in a statement that the new facility will support both its production and parts for system users all around the world. Additionally, Saab will collaborate with Indian subcontractors to produce systems that completely adhere to the 'Make in India' programme's specifications.

This weapon system is special because it gives soldiers the tactical edge in every combat situation, whether they are taking on opponents in buildings, neutralising armoured tanks, or clearing obstacles. Every circumstance can be handled by the single-weapon system. It reduces the number of weapons to carry while increasing tactical flexibility.

Carl-Gustaf M4

The Indian Army has been using the Carl-Gustaf M4 recoilless rifle since the initial collaboration agreement for production in India was inked in 1976. The Carl-Gustaf has become a crucial shoulder-launched weapon in the Indian Armed Forces due to its extensive ammo selection. Nearly all of the Indian Army's advanced positions along the Line of Actual Control (LAC) with China are outfitted with previous versions of the weapon system. According to the official website's description of the weapon system, "The Carl-Gustaf recoilless rifle is a man-portable, multi-role weapon system that allows dismounted soldiers to effectively deal with multiple challenges on the modern battlefield. Adaptable and flexible, the system is constantly evolving to satisfy future user and market needs." A Carl-Gustaf M4 measures less than one metre in length and weighs less than seven kilograms. Moreover, its fully programmable nature and wide range of ammunition makes it an anti-armour, anti-structure, and anti-personnel weapon system.

Special features

The system comes with a conventional clip-on telescopic sight, but it also offers an open sight, a red-dot, and advanced firing control as additional choices. It also has upgraded air pressure and temperature sensors, as well as optical and night vision capabilities, giving ground forces an advantage in any situation. The Carl-Gustaf M4 is only compatible with 84-mm calibre ammunition. They do, however, cover all possible adversary targets. Furthermore, it includes rapid smoke shots to blind attackers and illuminating rounds for nighttime engagements. Moreover, the system delivers cutting-edge technology right at your fingertips and guarantees improved accuracy and quicker reactions. The system's ability to work with modern fire control tools and programmable ammunition enables soldiers to complete their missions quickly and safely.

https://www.news9live.com/knowledge/carl-gustaf-m4-to-be-manufactured-in-india-all-you-need-to-know-about-the-multipurpose-weapon-216727

Science & Technology News

Press Information Bureau
Government of India

Ministry of Science & Technology

Tue, 27 Dec 2022

Year-End Review -2022: DST (Ministry of Science & Technology)

Major Achievements during 2022

INDIA'S RANKING IN GLOBAL S&T INDICES CONTINUES TO RISE

India is now placed at 40th position among the top innovative economies globally as per Global Innovation Index (GII) 2022. The country remains among the top 3 countries in scientific publication as per NSF database and also in terms of no of PhDs, in size of Higher Education System; as well as in terms of number of Start-ups.

CREATING A ROBUST START-UP AND INNOVATION ECOSYSTEM

DST has been pioneer in establishing a network of Technology Business Incubators (TBI) and Science & Technology Entrepreneur's Parks (STEP) across the country under the National Initiative for Developing and Harnessing Innovations (NIDHI) program. This had a major impact through all aspects of innovation ecosystem for scouting and mentoring of start-ups for commercialization including significant widening the base of innovation pyramid, enhanced support to frugal and grassroots innovations. NIDHI has the entire innovation value chain and built largely around Technology Business Incubators with several components like Institutional mechanisms with capital/equipment support through NIDHI-Technology Business Incubator (TBI), NIDHI-Centres of Excellence (NIDHI-CoE) NIDHI-Promotion and Acceleration of Young and Aspiring technology.

With the aim to establish NIDHI – CoEs to act as a reservoir of knowledge in venture promotion and help in aligning the linkages with both national as well as international partners, a new Centre of Excellence at T-Hub, Hyderabad, Telangana has been established during 2022, making it a total of 8 CoEs under active support. Thirteen new PRAYAS centres have been supported during 2022 along with support to 30 ongoing PRAYAS centres across the country that are supporting young innovators to turn their ideas into prototype. Ten new Entrepreneurs-in-Residence (EIR) centres have been supported during the year along with support to 18 ongoing EIR centres that supports aspiring or budding entrepreneur of considerable potential for pursuing a promising technology business idea over a period up to 18 months.

INDIA ACHIEVING NEW HEIGHTS IN SUPERCOMPUTING CAPACITY

New installations of high-performance computers at five institutes (IIT Kharagpur, NIT Trichy, IIT Gandhinagar, IIT Guwahati, IIT Mandi). The figures of human resource trained under the mission reached 17,500.

BOOSTING TECHNOLOGY DEVELOPMENT IN CYBERPHYSICAL DOMAINS LIKE AI, ROBOTICS, IOT THROUGH RESEARCH AND INNOVATION HUBS

The Union Cabinet approved the National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS) in December, 2018 at a total outlay of Rs.3660 Crores for a period of five years, to be implemented by the Department of Science and Technology (DST). The Mission is being implemented through 25 Technology Innovation Hubs (TIHs) created at reputed academic institutes across the country. TIHs are working towards achieving the Mission objectives. The ARTPARK at IISc Bangalore developed an AI-driven platform called XraySetu that helped Chest X-ray interpretation of images sent over WhatsApp and brought early intervention through rapid screening of COVID 19, aiding doctors who have no access to X-ray machines. A team of scientists from IIT Bombay have developed a tapestry method for screening COVID-19 under Remedial Action, Knowledge Skimming, and Holistic Analysis of COVID-19 (RAKSHAK), an effort supported by the Technology Innovation Hub (TIH) at IIT Jodhpur. It has also led to the development of a New Chest X-ray based COVID diagnosis System, Open Data for Indian and

International COVID Cases - COVBASE (Imaging, clinical parameters, longitudinal data, and annotations), Campus RAKSHAK - A decision framework for Campus Safety.

STRENGTHENING INDIA'S POSITION ON INTERNATIONAL S&T ENGAGEMENT

India assumes the G20 Presidency on the 1st of December 2022 and will convene the G20 Leaders' Summit for the first time in the country in 2023. As part of the same DST takes the responsibility of coordinating the activities of Science-20 (S20) and Research Innovation Initiative Gathering (RIIG) Engagement Groups during India's G20 Presidency in 2023.

India joins hand with Finland to establish Virtual Network Centre in Quantum Computing to jointly develop 20 qubits superconducting based Quantum Computer in 1st phase and further scale it up to 54 qubits in second phase.

GEOSPATIAL DATA, INFRASTRUCTURE AND TECHNOLOGY LEADING TO IMPROVED CITIZEN SERVICES

- The Second United Nations World Geospatial Information Congress (UNWGIC) on the theme "Geo-Enabling the Global Village: No one should be left behind" was held successfully in Hyderabad from 10-14 October 2022. A Special Event on "Geo-enabling the Global Village with Generations Z and Alpha" was organized where school children from around the country participated and showcased the localizing of SDGs through spatial thinking.
- India was awarded to chair the new working group constituted for the Integrated Geospatial Information Framework (IGIF) during the Eleventh Plenary Meeting at Hyderabad organized by the Regional Committee of UN-GGIM for Asia and the Pacific (UN-GGIM-AP).
- Six Regional Centres for Geodesy have been established under the National Geospatial Programme at IIT Bombay, IIST Trivandrum, IRS Anna University, IIT (ISM) Dhanbad, MNNIT Allahabad and MANIT Bhopal with the aim to assist in spreading Geodesy Education and R&D in the country towards strengthening the Geodetic Infrastructure.
- Survey of India (SoI) the National Survey and Mapping Organization of the country has successfully carried out drone survey of rural abadi areas of 2,00,000+ villages as part of the SVAMITVA (Survey of villages and mapping with improvised technology in village areas) for distribution of Property Cards in Abadi Areas and providing 'Record of Rights' to village household owners. A Large Scale Mapping on 1:500 scale of States and UTs has been completed for several states and is being carried out for Haryana, Karnataka, Maharashtra, Andhra Pradesh, Andaman & Nicobar Islands.
- Continuously Operating Reference Stations (CORS) is one of its kind geodetic infrastructure (consisting of network of geodetic quality GNSS receivers and antennas that are permanently installed throughout the country. Total 815 Nos. of CORS stations have been established covering about 80% of the country. As on date a total of 1795 No. of users have registered on the stated portal till date.
- Onlinemaps portal launched on 17th August, 2021 provides various digital geospatial products (free as well as at fair & transparent price) to the users. From its inception till date, total 275 govt. users & 41182 private users have registered on this portal and 13957 paid products & 381345 free map products have been downloaded. Link - www.onlinemaps.surveyofindia.gov.in
- High resolution mapping for major river basins is also being carried out to provide the high resolution GIS and Digital Elevation Model (DEM) for improved flood hazard mapping and other planning purposes.

- Standardised Geographical Place Names (Toponymy): SOI has prepared National toponymic database in 23 languages.

NEW FEATHERS TO TECHNOLOGY COMMERCIALIZATION

This year took well by witnessing the swarming of 1000 indigenized drones in the sky at the eve of beating the Retreat ceremony on January 29, 2022- a drone show by women led M/s Botlab Dynamics, proudly positioning India at fourth place on the globe and received appreciation from the Hon'ble Prime Minister. M/s Swajal Water Private Limited, Gurugram, a tech startup company proposed not only reduction in the use of plastic bottles but also showed potential to reduce cost of purified water to as low as 25 paise per litre. M/s Skyshade Daylights Private Limited, Hyderabad, proposes India's first integrated, centralized day lighting system to reduce the carbon footprint and can also reduce AC load to which in turn protects our environment and climate. This daylight can reach to basements even. M/s Sapigen Biologix Pvt Ltd., Hyderabad has prepared a Covid-19 intra nasal vaccine that can generate mucosal immune response thereby protecting both the upper and lower respiratory system of a vaccinated individual and break the cycle of infection and transmission.

M/s Orange Koi Private Limited, Visakhapatnam aims at implementing the Metal Injection Molding (MIM) process for the manufacturing of medical surgical instruments and device components. The potential of MIM lies in its ability to combine the design flexibility of plastic injection molding and the versatility of unlimited choice of material offered by powder metallurgy. Women led startup M/s Astrome Technologies Private Limited, Bengaluru has proposed an Innovative Wireless Product to solve Internet connectivity issues of the Rural India. Their work is so eccentric that it gathered attention of Hon'ble PM and were named in 90th Mann ki Baat.

In tune with Honb'le Prime Minister's vision of National Hydrogen Mission (NHM), M/s Multi Nano Sense Technologies Private Limited, Maharashtra has come up with plan to manufacturing of Hydrogen sensors indigenously. For actual benefit of Prime Minister's Atal Bhujal Yojana (Atal Jal), a Jharkhand based startup, M/s Kritsnam Technologies Private Limited are developing 'Dhaara Smart Flowmeter' - an integrated system for online monitoring that is designed to track the water distribution in real-time.

M/s Panacea Medical Technologies Pvt. Ltd., Bangalore Panacea with TDB's financial assistance has developed a Linear Accelerator – "Siddharth II with advanced features of stereotactic imaging & advanced delivery techniques viz. IMRT, IGRT, VMAT and SBRT", a "Make in India" product which has played an important role in making India 'self-reliant'. With the development of India's first ring gantry based Linear Accelerator, Panacea aims to make cancer treatment affordable in India and in rest of the countries. The ring gantry based Siddharth II contain a beam stopper, minimizing shielding requirements and in turn reducing the cost of the bunker construction.

ACCESSIBLE SCIENTIFIC INFRASTRUCTURE FOR ALL STAKEHOLDERS

Four new Universities under 'Promotion of University Research and Scientific Excellence (PURSE)' and 65 Departments in various academic organizations and universities under 'Fund for Improvement of S&T Infrastructure (FIST)' were supported under FIST for strengthening the research infrastructure. A special call under PURSE for few unserved states in the Country was made to provide basic infrastructure and enabling the facilities for promoting R&D activities in

new and emerging areas of Science & Technology in Universities of North Eastern Region, Jammu & Kashmir, Chhattisgarh, Madhya Pradesh, Jharkhand, Bihar, Haryana, Telangana, Himachal Pradesh and Rajasthan and 11 new universities have been selected for support. An important milestone like the installation of the 300 keV Cryo-Transmission Electron Microscope, one of the state-of-art infrastructures for the northern part of the country has been established at IIT Delhi through Sophisticated Analytical & Technical Help Institute (SATHI) facility and it is ready for the usage through I-STEM portal. Organised 191 training programs under Synergistic Training program Utilizing the Scientific and Technological Infrastructure (STUTI) benefitting 6395 researchers in the country.

TECHNOLOGY-LED SOLUTIONS FOR ENERGY AND ENVIRONMENT CHALLENGES

The Department has been supporting mission mode technology development programmes in different areas of clean energy, water and environment areas. A first-of-its-kind Distributor System Operator (DSO) report has been prepared that can help in transforming the operational and financial state of the Indian power sector and boost private sector's confidence attracting much-needed investment and innovation in the industry. A real time pollution monitoring photonic system, Air Unique Quality Monitoring System (AUM) has been developed which is capable of real time remote monitoring of all air quality parameters, with high sensitivity and accuracy simultaneously, at a very high frequency of sampling. A coal to methanol pilot plant (0.25 TPD) to demonstrated the generation of methanol from high ash coal has been installed at BHEL-Hyderabad. Methanol with purity of more than 99% has been generated from syngas. An innovative interfacial engineering approach to enable fast charge-discharge rates in solid-state lithium metal batteries have been developed by researchers at IISc through a DST support under programme on Material for Energy conservation and Storage Platform.

CLIMATE CHANGE RESEARCH EXPANDING TO NEWER AREAS

The Department has been implementing two National missions on Climate Change. Four new State Climate Change Cells (SCCCs) have been established in the States of Goa, UT of Chandigarh and Jharkhand and Uttar Pradesh. One Centre of Excellence (CoE) has been supported in the Vidarbha Region of Maharashtra State to study the Impact Assessment of Thermal Power Plants on Microclimate.

PROMOTING CAREER OPPORTUNITIES FOR WOMEN SCIENTISTS

DST is encouraging meritorious girls to pursue higher education and career in underrepresented STEM areas, through its major initiative ‘Vigyan Jyoti’. During the year, 30000 girls of Class IX-XII from 200 districts were enrolled under Vigyan Jyoti to get benefits of various interventions like parent-student counselling, subject oriented classes, curriculum-based STEM activities, exposure visits, etc. Research Support to Women Scientists was extended to around 370 women scientists under Women Scientists Scheme-A (WOS-A) to pursue research after break in career in 5 subject areas of Basic and Applied Sciences. Training in Intellectual Property Rights (IPRs) was provided to 99 women scientists. Research Infrastructure Support, CURIE (Consolidation of University Research for Innovation and Excellence) Programme extended to 25 Women PG Colleges. The ‘SERB-POWER mobility grant’ was introduced to provide opportunity to women scientists to visit leading institutions/universities across the globe for a period of 01-03 months

ATTRACTING THE BEST TALENT POOLS TO PURSUE THEIR CAREER IN SCIENCE

The Scholarship for Higher Education (SHE) was supported to 10833 students, selected on competitive basis, for pursuing under-graduation and post-graduation in basic and natural sciences. Sixteen INSPIRE SHE Scholars identified on competitive mode were provided the opportunity to participate in Asian Science Camp held in South Korea during August 2022 and one of the Indian participants could win third prize in poster making competition. INSPIRE fellowship was offered to 845 Fellows for pursuing Doctoral Degree program in science & technology domain. The SERB-National Post-doctoral fellowship was extended to 300 fellows during the year.

CONSERVING THE HERITAGES THROUGH DIGITAL TECHNOLOGIES

Under the Science and Heritage Research Initiative (SHRI) programme of DST, the sound proofing qualities of Pattamadai mat, a mat made by weaving or interlacing korai grass with the cotton threads, has been explored for use in noise guarding classrooms as well as recording studios against external noise disturbances. This can increase the demand for this traditional art of Tirunelveli, Tamil Nadu. With SHRI support, SASTRA Deemed to be University traced, collected, redeemed, and restored around 20 heritage rice varieties of Tamil Nadu, through 10 community seed banks benefiting more than 500 farmers in the state.

AUGMENTING RESEARCH CAPABILITIES IN STATE UNIVERSITIES AND COLLEGES

The growth of existing research capabilities in state universities and colleges is imperative to ensure horizontal diffusion of research excellence reaching all research students hoping to contribute to the national R&D ecosystem and promoting the enhancement of quality. A dedicated scheme, State University Research Excellence (SERB-SURE) has been launched by Science and Engineering Research Board (SERB) to create a robust R&D ecosystem in state universities and colleges including the private ones.

KEY ACHIEVEMENTS FROM AUTONOMOUS INSTITUTIONS

Quantum Science and Technology

- Physicists from the Raman Research Institute (RRI) and TIFR with International Centre for Theoretical Sciences (ICTS), probed the role of noise in quantum technology and the evolving area called quantum Brownian motion threw fresh light on how a charged particle in contact with an environment in the presence of a magnetic field behaves when it is subjected to ultra-cold temperatures. The study could help explore ways to control noise in the domain of quantum technology.
- Scientists from RRI and Institute for Quantum Computing, Canada, have found a simpler way to quantify the amount of entanglement in higher dimensional systems. They have formulated analytical relations between statistical correlation measures and known entanglement measures for any arbitrary dimension. The study could help potentially enable a better assessment of the efficacy of an entangled state for technological applications like quantum teleportation
- Scientists from S. N. Bose National Centre for Basic Sciences have formulated a new theoretical concept by Indian scientists exploring connections between the laws of thermodynamics and Quantum Information Theory (QIT).

Astronomy

- Using 3.6-m Devasthal optical telescope (DOT) (India's largest optical telescope) and 1.3-m Devasthal Fast Optical Telescope (DFOT) telescopes located at Devasthal, Nainital under ARIES, a team of scientists, including Indian and International collaborators, have derived the accurate value of Pluto's atmospheric pressure at its surface. It is more than 80,000 times less than the atmospheric pressure at mean sea level on Earth.
- Utilising the indigenously invented and built SARAS 3 radio telescope, researchers from Raman Research Institute, have conclusively refuted a recent claim of the discovery of a radio wave signal from cosmic dawn, the time in the infancy of our Universe when the first stars and galaxies came into existence.
- Astronomers from ARIES & IIA have developed a simple technique of separating the constant background of the Solar Colona and revealing the dynamic corona. The new method is capable of separating the background revealing the dynamic corona. This research has been accepted for publication in the Solar Physics journal.
- A team of astronomers from IIA along with their collaborators have found that interactions between two different Coronal Mass Ejections (CMEs) in the interplanetary medium as they travel towards the Earth play a key role in their evolution.
- Researchers from the Raman Research Institute (RRI) have determined properties of radio luminous galaxies formed just 200 million years post the Big Bang, a period known as the Cosmic Dawn thus providing an insight to the properties of the earliest radio loud galaxies that are usually powered by supermassive black holes.

Nano Science

- INST scientists for the 1st time, have proposed an efficient way to induce a property called piezoelectric delta phase in polymer (PVDF) nanoparticles making it useful for applications in touch sensors, acoustic sensor, and piezoelectric nanogenerators. They have made a device with PVDF nanoparticles which exhibits much superior piezoelectric response in comparison to the film counterpart
- Scientists from the Institute of Advanced Study in Science and Technology (IASST) have developed biodegradable, biopolymer nanocomposite which can detect relative humidity can find application as smart packaging materials, especially for the food industry. The fabricated nanocomposite film was an excellent smart sensor based on the fluorescence 'on-off' mechanisms against humidity.
- Researchers at the S N Bose Centre for Basic Sciences have used Machine learning to develop a design map of alloys at the nanoscale which can help predict the match of pairs of metals that can form bimetallic nanoalloys. They have calculated the Surface-to-core relative energy on a variety of possible binary combinations of alkali metals, alkaline earth, basic metals, transition metals and p-block metals to create a large data-set of 903 binary combinations.
- Scientists from INST have computationally predicted two fascinating 2D monolayers having great potential for applications in next-generation self-powered materials which develop spin currents in response to strain. They have proposed a new class of stable, hexagonal, buckled ZnX (X: S, Se, or Te) monolayers in the journal 'ACS Appl. Mater

Climate & Environment

- A study by Wadia Institute of Himalayan Geology (WIHG) has found that glaciers in Suru Basin, Ladakh, and western Himalaya, have fluctuated greatly throughout the Marine Isotope

Stages (MIS) to the Little Ice Age (LIA). The glacial chronologies from such semi-arid regions can help understand the past climate changes and in assessing the impacts of future climate change in the region.

- Scientists of the Wadia Institute of Himalayan Geology, an autonomous institute of the Department of Science and Technology has reported first time the oldest glacial advance during 52 Kilo years from the Central Himalaya, as the evidence of glacial advance during the Last Glacial Maxima and subsequently younger time periods have already been reported from many parts of the Central Himalaya.
- Wadia Institute of Himalayan Geology (WIHG) has spotted fossils of a small mammal resembling squirrels called treeshrew belonging to a new genus and species from Ramnagar in Jammu and Kashmir.
- A study by the Indian Institute of Geomagnetism, Mumbai, an autonomous institute of the Department of Science & Technology, Govt. of India, has chalked the possible geological cross-sections along the Greater Maldive Ridge (GMR) for the first time with the help of satellite-derived high-resolution gravity data. The researchers postulated that the GMR may be underlain by an oceanic crust. The results from their study can provide additional constraints in understanding the plate-tectonic evolution of the Indian Ocean, better.
- Research by Birbal Sahni Institute of Paleobotaby (BSIP) revealed that certain mangrove species in Chilika and Sundarbans along the east coast and Dwarka and Porbandar along the west coast of India is likely to reduce and shift landward by 2070 due to decline in suitable habitats in response to precipitation and sea level changes, said a study based on a prediction model. The study can help identify highly suitable areas for conservation and management and develop conservation strategies for the future.

Health

- Scientists from Jawaharlal Nehru Center for Advanced Scientific Research (JNCASR) studied the glassy dynamics of an artificial active-matter system and found that patterns can form in systems consisting of active elongated particles that help it elude turning glassy. Their research published in Physical Review Letters showed that the patterns were triggered by the defects in the orientation of the particles, and this helped keep the particles moving, preventing the system from behaving like a typical glass.
- Scientists at JNCASR have found a new ingredient that can weakly perturb bacterial membrane, thus countering bacterial resistance to multiple classes of antibiotics, can help revive the efficacy of obsolete antibiotics. They have come up with the approach of revitalising the efficacy of existing antibiotics by using them in combination with antibiotic adjuvants -- ingredients that can help counter resistance to existing antibiotics. This novel idea can help strengthen the activity of obsolete antibiotics and bring them back into use for treating complicated infections.
- A newly identified gene can hold the key to prevent fungal infection Candidiasis that often affects intensive-care unit (ICU) patients, cancer patients and patients receiving immunosuppressive therapy. The researchers have carried out a large-scale screen to identify regulators of chromosome stability in C. albicans, a clinically relevant fungal model system.

Energy

- JNCASR scientists have discovered a novel material called single-crystalline scandium nitride (ScN) that can emit, detect, and modulate infrared light with high efficiency making it useful for solar and thermal energy harvesting and for optical communication devices.

- ARCI has developed a new method to produce hydrogen with high purity (99.99%) from methanol-water mixture at ambient pressure and temperature that uses only one-third of the electrical energy required in water electrolysis. The method combines both the processes of electrolysis and reformation to produce hydrogen from methanol-water mixture by electrochemical methanol reformation (ECMR) at ambient pressure and temperature. The main advantage of this process is that the electrical energy needed to produce hydrogen is 1/3rd of water electrolysis.
- A platinum-based electrocatalyst has been developed by ARCI for use in fuel cells through an efficient procedure. This electrocatalyst showed comparable properties to the commercially available electrocatalyst and could enhance the lifetime of the fuel cell stack performance.

NURTURING SCIENCE AND TECHNOLOGY THROUGH THE S&T SUPPORTED IN STATES AND UTs

Many of the S&T councils supported by the Department of Science and Technology has taken up a proactive role in promoting science and technology in the states through new methods and new initiatives. The Gujarat Council of Science and Technology (GUJCOST) has come up with a unique project of establishing innovation clubs in 483 arts, commerce, and science colleges in the state. The Punjab State Council for Science & Technology has conceptualized and catalysed setting up of world class S&T infrastructure in the form of 'Knowledge City' housing state-of-the-art institutional cluster spread across 400 acres in Mohali.

GOOD LABORATORY PRACTICE:

Department of Science & Technology (DST) is implementing the National GLP Compliance Monitoring Programme for certification of Indian Test Facilities/laboratories, conducting non-clinical health and environment safety studies in accordance with the OECD Principles. Four new Test facilities/ laboratories have been certified as GLP Compliant. Similarly, 16 existing Test facilities/laboratories have been Re-certified as GLP Compliant.

POLICY FORMULATION IN SOME KEY AREAS

Brought out two guidelines during the year and two major policies are in the process of finalization.`

Scientific Research Infrastructure Sharing maintenance and Networks (SRIMAN) guidelines

Scientific Social Responsibility (SSR) Guidelines

Science, Technology and Innovation (STI) Policy

National Geospatial Policy

https://pib.gov.in/PressReleasePage.aspx?PRID=1886841

THE HINDU

Tue, 27 Dec 2022

President Inaugurates ₹500 Crore MIDHANI Plate Mill

President Droupadi Murmu inaugurated the Mishra Dhatu Nigam (MIDHANI) ₹500 crore Wide Plate Mill set up at its existing plant in the presence of Governor Tamilisai Soundararajan here on Tuesday. The plant will be for rolling of slabs of various alloys., plates and sheets of special steel, superalloy, stainless steel, titanium and titanium alloy, armour grade catering to the strategic sectors of defence, space, energy and export market. The high capacity '6,000T' roll separating force can help roll ultra high strength steel in very low thickness.

The new facility will meet the requirements of steel plates for the Agni missile program of Advanced Systems Lab (ASL), DRDO and plates for ordnance factories. MIDHANI is expecting a business of around US$10 million in export market for the products rolled from this mill from Eastern Europe, Middle East and South Asian countries, informed a press release. The President praised the state-of-the-art facility and said that the initiative will bring the country a step closer to fulfilling Prime Minister Narendra Modi's vision of self-reliant, self-sustaining India as it will play a major role in catering to the internal requirements of the country, in turn cutting down huge imports over the years.

Ms. Murmu expressed confidence that MIDHANI will successfully meet all the expectations and fulfil the purpose for which it was established and will continue its journey of excellence in the coming years. The public sector enterprise under Ministry of Defence, manufactures a wide range of superalloys, titanium alloys, special steels and stainless steels, controlled expansion alloys, heat resistance alloys, special purpose alloys, refractory metals and alloys, magnetic alloys, bio-grade materials in various mill forms using state-of-the-art production facilities for use in the strategic sectors.

Minister for Scheduled Tribes, Women and Child Welfare Satyavati Rathod, Defence Joint Secretary Anurag Vajpayee, MIDHANI Chairman and Managing Director Sanjay Kumar Jha, directors Gowri Sankara Rao (Finance), T. Muthu Kumar (Production & Marketing) and other senior officers were present, added the press release.

https://www.thehindu.com/news/national/telangana/president-inaugurates-500-crore-midhani-plate-mill/article66311290.ece

NDTV

Tue, 27 Dec 2022

India, Israel, US Aim to Develop Drug to Treat this Rare Disease: Report

Researchers at the Indian Institute of Technology (IIT), Madras, Tel Aviv University and Columbia University are studying a rare genetic brain disease called "GNB1 Encephalopathy" and trying to develop a drug to treat it effectively. With less than 100 documented cases

worldwide, GNB1 Encephalopathy is a kind of neurological disorder which affects individuals in the foetus stage.

Scientists say delayed physical and mental development, intellectual disabilities, frequent epileptic seizures, are among the early symptoms of the disease and since genome-sequencing is an expensive procedure, not many parents opt for it early on. According to Haritha Reddy, a former PhD scholar at IIT Madras, a single nucleotide mutation in the GNB1 gene that makes one of the G-proteins, the "Gβ1 protein," causes this disease. "This mutation affects the patient since they are a foetus. Children born with GNB1 mutation experience mental and physical developmental delay, epilepsy (abnormal brain activity), movement problems. To date, less than a hundred cases have been documented worldwide. "However, the actual number of affected children is probably much greater as diagnosis is not widely available since it requires a sophisticated and expensive procedure," Reddy told PTI from Israel, where she is conducting the research. "Every cell in the human body has a wide variety of signalling molecules and pathways that help in communicating with other cells and within itself. The major signalling mechanism used by cells is 'G-Protein Coupled Receptor' (GPCR) signalling," she added.

The GPCR is a receptor that receives a signal (e.g. a hormone, light, neurotransmitter) from the outside of the cell and transduces it to the inside of the cell. "GPCR is present in the cell membrane and has a G-protein (αβγ) attached to it from inside the cell. G-proteins are the immediate downstream molecules that relay the signal received by the GPCR. These G-proteins are present in every cell, and any malfunction will cause disease," she explained.

Mutations in GNB1 gene cause the neurological disorder (GNB1 Encephalopathy) characterised by general develop- mental delay, epileptiform activity in the electroencephalogram (EEG) and seizures of several types, muscle hypotonia or hypertonia, and additional variable symptoms, are seen in the patients. According to Amal Kanti Bera, Professor, Department of Biotechnology, IIT Madras, as GNB1 encephalopathy is a rare and less-known disease, not much research has been done on this. "We don't know the mechanisms that underlie the disease. We don't know how to treat this disease. Therefore, it is import to do research on GNB1 encephalopathy.We have a long way to go. It is not easy to develop a drug for treating this disease effectively," he told PTI. "We are in the process of developing preclinical animal models of this disease. Hopefully, in three years we will be able to develop personalised disease models which will be useful in research and drug screening," he told PTI.

The strong neurological impact of GNB1 mutations indicates that Gβ1 is involved in specific aspects of neuronal signaling. A recent proteomic study identified strong link between human epilepsies and Gβ1 protein levels in different brain regions. Nathan Dascal, Professor, Tel Aviv University, explained that as the developmental issues start at the fetal stage, gene therapy is the most plausible option to alleviate the effects of the mutation. However, the development of this complicated procedure will take many years and great investment of funds. "On the other hand, epilepsy can be treated using specific drugs to increase the patient's quality of life. To treat epilepsy, specific targets have to be identified. Most epilepsies are caused due to altered ion channel function. Ion channels are proteins that underlie the electrical activity of neurons and heart cells. "It is also possible that a combination of already existing drugs helps in a customised treatment line for the rare disease. Like in case of Covid, no new drug was found but already available drugs became part of treatment protocol," he said. The research was supported by Indo-Israel Binational grant offered by Israel Science Foundation (ISF) and India's University Grants Commission (UGC). Professor Dascal pointed out that whole genome sequencing, the

elucidation of the full genetic analysis of the baby, can be very helpful in early diagnosis of the disease. "We have found that a potassium channel called G-protein gated Inwardly Rectifying K (GIRK) channel (present in brain, heart and endocrine glands) function is affected significantly. Then we used specific drugs to correct the channel activity. "As I80T mutation is the most prevalent variant in GNB1 encephalopathy patients, we are currently focusing prioritising on this mutation alone. We have a mouse models with I80T, K78R and D76G mutations. We have generated induced pluripotent stem cells (iPSCs) from the patient's fibroblasts with I80T mutation. "We will differentiate patient-derived iPSCs to differentiate into neurons. Our study paves the way for testing in animal models or patient-derived neurons to develop concrete therapeutic approaches," he said.

https://www.ndtv.com/science/india-israel-us-trying-to-develop-drug-to-treat-rare-disease-gnb1-encephalopathy-report-3642262

THE TIMES OF INDIA

Wed, 28 Dec 2022

Watch out for these deeptech STARTUPS IN 2023

With a new year fast approaching, we thought it would be a good time to showcase a few deeptech startups based out of India that have made waves during the last year. Experts at Nasscom and Deloitte (the latter through their annual technology fast 50 ranking list) were kind enough to help us whittle down the plethora of startups in India to these handful. This list is in no way exhaustive or definitive, but should give you a starting point to gauge the deeptech startup landscape in India in the coming year.

BRIDGE THE SKILL GAP FOR MORE INNOVATION

RAMKUMAR NARAYANAN | CHAIRPERSON, NASSCOM PRODUCT COUNCIL, AND VP TECHNOLOGY & MD, VMWARE INDIA

India is a growing hub of innovative deep-tech startups with tremendous opportunities to develop world-class products and solutions, not just for India, but for the world. As India sees a surge in product-based companies built on deep tech foundations, there is an acute skill shortage in areas such as product management, design, analytics, product marketing, and product sales along with cross-domain skills in line with the need for a deep tech ecosystem. These are the skill sets that we need to focus on and develop on an urgent basis. In 2023, I hope organisations will invest in training their employees on emerging technologies and build industry-academia partnerships to help bridge the skill gap.

Staqu

Founded in 2015, Staqu is a Gurugram-headquartered AI startup. It delivers solutions for image recognition, audio-video analytics, and text processing. The company works closely with several private and public organisations, including police forces of multiple states, and was responsible for the first facial recognition system used by a police force in India when its platform, Jarvis, was used to build the Punjab Artificial Intelligence System in 2020. The Uttar Pradesh and Bihar Police have also been using Staqu's proprietary technology since then. Staqu says their vision is to integrate JARVIS technology into all cameras in order to make cameras as intelligent as humans. With their product offerings, they have already solved numerous problem statements in the security, retail, and manufacturing industries. In the coming years, they plan to expand their customer base, refine their product offerings, and establish themselves in new geographies, particularly the United States and the United Kingdom.

Founders: ATUL RAI, ANURAG SAINI, AND PANKAJ SHARMA
HQ: Gurugram

SecurelyShare

SecurelyShare was founded by Prakash Baskaran in 2017, as his sixth start-up, with a vision to be the global norm for communicating sensitive data in a secure, trusted and intelligent manner. His previous company Pawaa Software was acquired by Cisco in 2015. Baskaran later discovered the potential white spaces in secure exchange of sensitive data. And so, with an objective to protect sensitive data from rampant data breaches without hampering user experience and productivity, Baskaran started SecurelyShare with a team of seasoned technical professionals. The company says it is an R&D-based, innovation driven company with a focus on providing unique tools and technologies for varied data security and privacy needs. Their technology is backed by seven US-granted patents and provides security, privacy, and confidentiality in storing and communicating an organisation's structured and unstructured datasets internally or externally.

Founder: PRAKASH BASKARAN
HQ: Bengaluru

QNu Labs

Founded in 2016 and incubated in IIT-Madras, Qnu Labs is the first Indian company in the Quantum safe-cryptography space. Their primary product range deals with Quantum Key Distribution (QKD). QKD solves the problem of secure key distribution by allowing the exchange of a cryptographic key between two remote parties through an exchange of encoded quantum bits (qubits), which are unhackable. The company says it has built powerful solutions that leverages the unbreakable laws of quantum physics to prevent data thefts caused by cyberattacks like phishing or malwares and empowers organizations to become future-ready against more advanced attacks from advanced quantum computers. The company's technology and products have been extensively validated and are being used by the Indian army and navy, as well as by clients in India and the Middle East.

Founders: SUNIL GUPTA, SRINIVASA RAO ALURI, MARK MATHIAS & ANIL PRABHAKAR
HQ: Bengaluru

AgniKul Cosmos

Agnikul is a groundbreaking company that is based out of the National Center for Combustion R&D at IIT-Madras. Started by Srinath Ravichandran and Moin SPM in 2017, the startup provides a dedicated launch vehicle for smaller satellites at a lower cost. Agnikul is also using 3D printing to build most of its launch vehicles, thereby cutting down on costs. In November this year, Agnikul successfully completed the test firing of Agnilet—the company's 3D-printed rocket engine— at the Vikram Sarabhai Space Center in Thiruvananthapuram. According to the company, Agnilet is the world's first single-piece 3D-printed rocket engine. It is designed to carry Agnibaan (which is the company's planned small satellite launch vehicle currently under development) and payloads of up to 300 kilograms to a low-Earth orbit. The company also recently opened India's first-ever launchpad, designed and operated by a private player, at Sriharikota.

Founders: SRINATH RAVICHANDRAN, MOIN SPM, SATYANARAYANAN C HAKRAVARTHY & JANARDHANA RAJU
HQ: Chennai

Skyroot Aerospace

Skyroot Aerospace is a spacetech startup that aims to address a rising concern in the global space industry – how to provide low-cost launch solutions to reach space in a smaller time frame. The startup's three launch vehicles – Vikram I, II, and III – can carry payloads ranging from 200 kg to 700 kg to low Earth orbit. The firm was founded by former Isro scientists. In 2021, it successfully tested India's first privately developed fully cryogenic rocket engine – called the 'Dhawan 1' – running on two high-performance rocket propellants, Liquid Natural Gas and Liquid Oxygen. In November of this year, Skyroot became the first private space startup to launch a rocket from India. The startup says it plans to make its first orbital launch in 2023. By 2025, the startup plans to achieve a frequency of two satellite launches every month. The company also raised over $50 million in September, in a funding round led by Singapore's sovereign wealth fund, GIC.

Founders: PAWAN CHANDANA & BHARATH DAKA
HQ: Hyderabad