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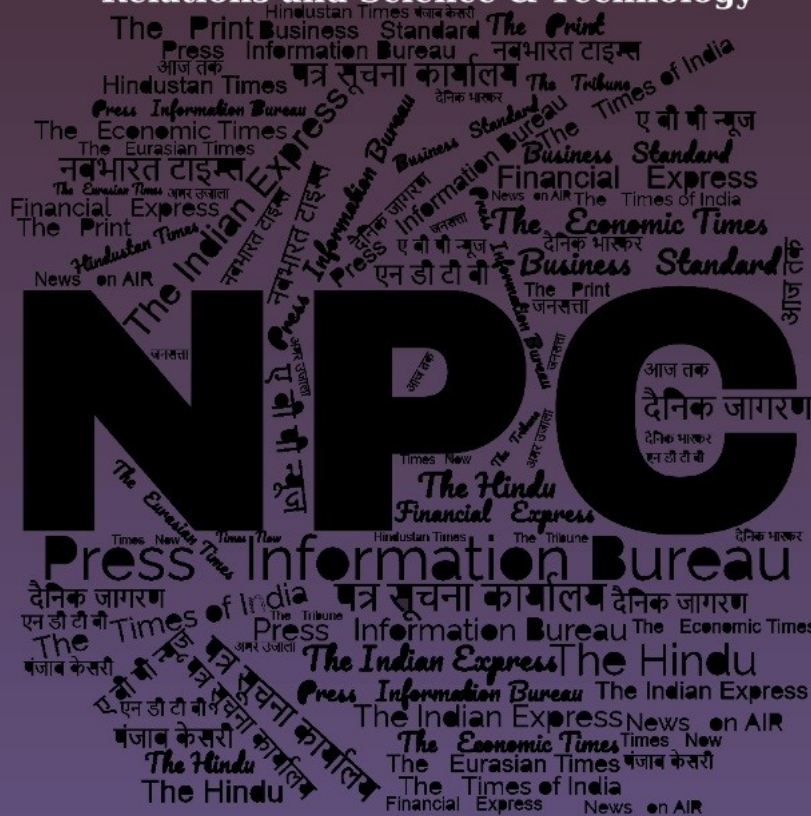
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समाचार पत्रों से चयनित अंश Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

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DRDO News

DRDO Technology News



Tue, 02 July 2024

बॉर्डर एरिया पर ड्रग्स गिरा रहे ड्रोन को रोकेंगे DRDO द्वारा बनाया जा रहा काउंटर ड्रोन सिस्टम

पाकिस्तान के तस्करों द्वारा आई.एस.आई. की सहायता से आए दिन ड्रोन के जरिए भारत में घुसपैठ कर ड्रग्स ड्रॉप की घटनाएं बढ़ती ही जा रही हैं। ऐसी बढ़ती हुई घटनाओं को लेकर सरकार इससे निपटने के लिए डी.आर.डी.ओ. की सहायता ले रही है। रक्षा मंत्रालय के सूत्रों के अनुसार, डीआरडीओ द्वारा काउंटर ड्रोन सिस्टम का 2020 में पंजाब क्षेत्र में परीक्षण किया गया था और तब से इस पर परीक्षण चल रहा है। काउंटर ड्रोन सिस्टम में लेजर हथियार है जो रेडियो फ्रीक्वेंसी जैमर और जीपीएस जैमर/स्पूफर सहित अन्य सुविधाओं के साथ 1,000 मीटर की दूरी तक काम करता है। इस एंटी-ड्रोन उपकरण के लिए पर्याप्त संख्या में ऑर्डर दिए गए हैं, जिसे भारत इलैक्ट्रॉनिक्स लि. (बीईएल) द्वारा बनाया जा रहा है। पूरे बॉर्डर को कवर नहीं किया जा सकता है इसलिए इंटेलीजेंस के आधार पर काउंटर ड्रोन सिस्टम का इस्तेमाल किया जाएगा। इसके अलावा ऐसे हॉटस्पॉट जहां पर ड्रोन की गतिविधियां ज्यादा हैं वहां पर भी काउंटर ड्रोन सिस्टम का इस्तेमाल किया जाएगा।

<https://dainiksaveratimes.com/punjab/the-counter-drone-system-being-developed-by-drdo-will-stop-drones-dropping-drugs-on-the-border-areas/>

Defence News

Defence Strategic: National/International



Mon, 01 July 2024

Field evaluation of submarine bids under P-75I complete

The Navy's mega-submarine deal under Project-75I, estimated at over ₹43,000 crore, has crossed a major milestone in the process with the Field Evaluation Trials (FET) — to check the compliance

of the bids received — now complete. There are two contenders in the fray: Germany's TKMS (Thyssenkrupp Marine Systems) and Navantia of Spain. While an Indian Navy team visited TKMS shipyard in March for FET, the evaluation of Navantia's offer was conducted last week, officials confirmed. The field evaluation report will now be compiled and presented to the Defence Ministry which will declare the bids that have cleared the FET; this is expected to take about two months, a defence official explained. Then, the bids would be opened and cost negotiations would commence with the qualified bidders.

Diplomatic sources said that Navantia would be demonstrating the Air Independent Propulsion (AIP) system fitted in a submarine operating on the surface and not submerged and that the submerged performance would be demonstrated in due course. The design offered by TKMS, which has partnered with Mazagon Dock Shipbuilders Limited (MDL), is based on its highly successful Class 214 submarine as well as Class 212CD.

Navantia, which has tied up with Larsen & Toubro, has offered a vessel based on its new S80 class of submarines, the first of which was launched in 2021 and was commissioned into the Spanish Navy as S-81 'Isaac Peral' in November 2023. The Request For Proposal (RFP) issued by the Navy, detailing the specifications required, states that the first submarine should have indigenous content (IC) of 45% which should go up to 60% for the sixth and last submarine.

The key determinant, however, to qualify for P-75I is the AIP system, which enhances the endurance of a submarine. In the backdrop of a decision on the deal, the top leaders of Germany and Spain are scheduled to visit India in the next few months during which they are expected to make a pitch for an inter-governmental agreement. German Chancellor Olaf Scholz is scheduled to visit India in the second half of October for inter-governmental consultations. Spain's President Pedro Sanchez is also expected to visit in the next few months.

In the past few months, Germany has simplified licensing requirements for the sale of military equipment to India as required under its BAFA (Federal Office for Economic Affairs and Export Control) and even granted small arms licence to India. Only Germany and Spain submitted bids for the deal, the deadline for which saw several extensions before finally culminating in July 2023.

The deal is being progressed under the Strategic Partnership model of the defence acquisition procedure and L&T and MDL are the two Indian shipyards shortlisted to partner with foreign submarine manufacturers to produce six advanced conventional submarines in India under technology transfer. TKMS has conveyed to the Indian Navy that the lithium-ion cell in its AIP module will be upgraded by the time the first submarine is delivered.

The AIP has a Polymer electrolyte membrane (PEM) based fuel cell and company officials said that it has both fuel cell and lithium-ion cell, giving it enhanced performance. Jayant D. Patil, whole-time Director, and senior executive Vice President of L&T's Defence Business had said in the past that Navantia's AIP is the only 3rd Generation AIP solution in the world and uses bioethanol as a source of hydrogen, which is known to be cost-efficient and easily available. As reported by The Hindu earlier, Germany has already presented a Government-to-government proposal to India for the sale of six conventional submarines under the P75I programme, and a senior German delegation was in Delhi in January for discussions.

<https://www.thehindu.com/news/national/field-evaluation-of-submarine-bids-under-p-75i-complete/article68355984.ece>

India's GRSE inks deal with Bangladesh Navy under \$500-mn line of credit

The Bangladesh Navy has inked a deal with India's State-run Garden Reach Shipbuilders and Engineers (GRSE) for an 800-tonne ocean-going tug – the first major contract under a \$500-million line of credit offered by New Delhi for defence purchases.

The agreement was signed in Dhaka on Sunday by representatives of the Bangladesh Navy's directorate general of defence purchases and GRSE to coincide with a four-day visit by the Indian Navy chief, Admiral Dinesh K Tripathi, aimed at bolstering bilateral defence ties and to explore new avenues for naval cooperation.

The \$500-million line of credit was operationalised last year and Bangladesh has used it to finalise a few minor deals with India for equipment such as bailey bridges and vehicles, people familiar with the matter said on condition of anonymity.

“This is the first major deal under the line of credit and will enable Indian shipyards to gain a foothold in Bangladesh,” one of the people cited above said.

The Bangladesh Navy operates vessels procured from different countries, though many of its frontline warships and two attack submarines are of Chinese origin.

During Bangladesh Prime Minister Sheikh Hasina's visit to India last month, the two sides agreed to strengthen defence cooperation with a long-term perspective.

India has been eyeing Bangladesh as a market for a range of military hardware, from specialist vehicles to helicopters, and maintenance of Russian-origin equipment, people familiar with the matter said. Among the items Bangladesh has shown an interest in are specialist vehicles from Tata and Mahindra, Tejas combat aircraft and Dhruv light helicopter, the people said.

The two sides have also explored the prospect of an Indian role in maintaining Bangladesh's Russian-origin equipment, especially aircraft such as Mi-17-1V helicopters, Antonov An-32 transport aircraft and MiG-29 jets. India operates these aircraft and has long-established maintenance facilities.

The deal will also be a fillip for Kolkata-based GRSE, which has stepped up its efforts to obtain export orders. Last month, it signed an agreement with Germany's Carsten Rehder Schiffsmakler and Reederei GmbH & Co for building four multi-purpose vessels of 7,500 DWT each.

The first warship exported by India – an offshore patrol vessel provided to Mauritius in 2014 – was built by GRSE. In 2021, a fast patrol vessel built by GRSE was exported to Seychelles. The shipyard is also working on six patrol boats and a dredger for the government of Bangladesh.

<https://www.hindustantimes.com/india-news/indias-grse-inks-deal-with-bangladesh-navy-under-500-mn-line-of-credit-101719835860896.html>

Rafale's Make-in-India plans get shot in the arm

French Aviation major Dassault Aviation SA is in the process of acquiring land near Jewar international airport for a maintenance, repair and overhaul (MRO) facility for India's Mirage 2000 and Rafale fighters, setting the stage for the local manufacturing of latest versions of Rafale fighters in the country to meet the Indian Air Force's long-pending requirement of around 100 twin-engine multi-role fighters that will be needed over the next two decades, according to two people familiar with the matter.

Notwithstanding the political ferment in France – the French far-right front National Rally won the first round of voting for the National Assembly, with 33% of the votes, ahead of the ruling coalition's 20% – the Emmanuel Macron government and Dassault have offered in writing to manufacture Rafale fighters in India under the "Make in India" rubric with locally sourced components to meet IAF's demand, the two people added, asking not to be named. This comes even as engine maker Safran SA is setting up a MRO facility to handle Rafale fighter engines (if numbers are enough) at Hyderabad adjacent to the company's LEAP engine facility for civilian aircraft, which will be ready by 2025. Safran, the people added, has conveyed that if there is a Rafale order for IAF, it is willing to manufacture the M-88 engines in India.

Given that HAL's LCA Mark II with GE-414 engines, which will replace the Mirage 2000, will not be ready before the middle of the next decade, the Rafale fighter will not only meet India's requirement but also allow India to export the same fighters to third countries. Dassault has already started sourcing titanium parts from companies in India for manufacture Rafale fighters and plans to add more local vendors to the supply chain list.

According to the two people, the manufacture of Rafale fighters in India is a win-win for both close allies as Dassault already has some 300 fighter orders in hand from Croatia, Greece, Serbia, Egypt, Qatar, UAE and Indonesia and has no capacity to manufacture extra planes for India. The company is also in talks with Saudi Arabia for supply of fighters and the French Air Force has asked it for 42 more Rafales.

IAF is already operating 36 Rafale fighters with Hammer and SCALP missiles with the Indian Navy currently involved in price negotiations for 26 Maritime Strike Rafales for the INS Vikrant aircraft carrier. India already has base maintenance depots, repairs, training and simulators for Rafales in its Ambala air base.

Given the gestation period for fighters and engines is over decades, the Modi government has also taken reassurance from France's stable licensing policy which will ensure there is no hiccup -- like Russia, France has been supplying aircraft to India since the Toofani fighter in 1953.

The people added that Safran is also ready for a joint venture with an Indian company for manufacture of engines for Indian Multi-Role Helicopters (IMRH) so that India does not have to look for a third country for urgent supplies.

With the Chinese PLA in an aggressive mood on the land and sea with India and equipped with its own fifth generation J-20 fighters, the Indian Air Force needs to be bolstered as its force levels are

below its projected requirement. China has developed the WS-15 engine, reverse engineering it from the Russian AL-31, and is rapidly expanding its force levels on land, air and sea. “India can ill afford to further delay the acquisition of advanced multi-role fighters as the Chinese challenge will increase by the day,” said a national security planner.

<https://www.hindustantimes.com/india-news/rafales-make-in-india-plans-get-shot-in-the-arm-101719896115568-amp.html>

The Tribune

Tue, 02 July 2024

Agnipath scheme has led to an acute shortfall in manpower

-By Maj Gen GG Dwivedi (retd)

ANY systemic transformation that relies on ‘after the fact’ mechanism to rectify errors is inherently flawed. The Agnipath scheme stands out as one such example. The scheme was ceremoniously rolled out two years ago. Touted to transform the recruitment process of ‘personnel below officer rank’ (PBOR), it has sought to cut down the burgeoning pension bill and ensure a youthful profile of other ranks in the armed forces.

The scheme has faced resistance from young aspirants passionate to join the armed forces. Periodically, it has been in the news and, of late, there is a strong demand across the spectrum for its holistic review.

The Agnipath idea draws from the ‘Tour of Duty’ (ToD) concept, which is widely prevalent in Western armies to overcome the shortage of optants for the military service. It was Gen Bipin Rawat, then Chief of Defence Staff (CDS), who conceived the idea of introducing ToD in our armed forces. The original plan was to test-bed the proposal by recruiting small numbers. However, the scheme was apparently pushed through unilaterally. It is evident from the reported disclosures in the book *Four Stars of Destiny* by a former Chief of Army Staff, Gen MM Naravane, wherein he describes the scheme as a ‘bolt from the blue’ for the three services.

Currently, under the scheme, Agniveers in the age group of 17.5 to 21 years and with Class X/XII qualification are recruited for a period of four years after six months of training. Only 25 per cent of them are to be retained and re-enrolled for a period of 15 years on fresh terms of service, with entitlement to pension and post-retirement benefits. Those released are to be given a severance package — *Seva Nidhi* — of Rs 10 lakh.

The total number of defence pensioners is about 24.62 lakh; of them, armed forces veterans constitute around 19 lakh and civilians 5.62 lakh.

Going by the figures of 2022, when the Agnipath scheme was introduced, the defence budget was Rs 5,25,166 crore, of which the pension outlay was Rs 2,07,132 crore. While the share of defence personnel stood at Rs 1,19,696 crore, the civilian component was Rs 87,436 crore, the latter accounting for a disproportionate 40 per cent share of the pensionary budget.

The adverse impact of the scheme is evident from the fact that individuals seeking an honourable career in the armed forces, many in keeping with family traditions, are now looking for alternative

avenues, with the Central Armed Police Forces (CAPF) being the top choice. I have witnessed this trend in my home state of Punjab. There is also a general feeling among the Agniveers that those released will bear the stigma of being discards and not be seen as proud veterans. Given the high rate of unemployment, particularly among the youth, the released Agniveers are unlikely to get a decent job; the idea of lateral placement into the CAPF is far-fetched.

Recently, there were two instances of Agniveers who made the supreme sacrifice while deployed in operational areas. Their kin were entitled to only a lump sum compensation as against those of the regular soldiers who are eligible for full pension. This discrimination stands out as a serious anomaly.

In the units today, there are two categories of soldiers: the regulars and the Agniveers. There is an unhealthy competition and obvious stress among the Agniveers in their quest to qualify for retention. It is indeed detrimental to the camaraderie and esprit de corps, the bedrock of unit culture and regimentation, the cutting edge of our armed forces as against the better-equipped adversaries. Incidentally, the performance of 'tourist soldiers' has been found wanting — be it Americans in Vietnam and Afghanistan, Israelis in Gaza and troops in the Russia-Ukraine war. Even the Chinese army conscripts have performed poorly in Ladakh during the ongoing standoff.

Agnipath has led to an acute shortfall in manpower; while the yearly retirement count is around 70,000, the Agniveer intake is just 42,000. With 25 per cent retention, the deficiency is set to grow further. The recruitment of Gorkhas has taken the maximum hit as 60 per cent of the manpower of 39 Gorkha battalions comes from 'Nepal Domicile Gorkha'. The Nepal Government's rejection of Agnipath has serious implications. Chinese overtures to recruit Gorkhas can't be ruled out. Indian youth joining foreign militaries is a worrying trend; the case in point is the recent reports of some persons lured to join the Russian army.

There are reports that the Agnipath scheme is under review and there is likelihood of an increase in the percentage of retentions and extension of the years of service for the Agniveers. Given that the scheme suffers from serious drawbacks, minor tweaking isn't going to serve a worthwhile purpose. It is prudent that the previous system be fine-tuned, making the recruitment process more scientific and stringent. The fallacy of bringing down the age profile from around 32 to 26 does not hold ground as fitness encompasses both physical and mental health. It takes six-seven years to produce an all-round soldier; besides individual ruggedness tends to peak towards the late 20s and early 30s. Incidentally, the fitness of the CAPF personnel who are manning the disputed borders with median age over 42 years has never been questioned.

The pension bill can be considerably reduced by resorting to rightsizing of the armed forces and defence civilian organisations. For example, the Defence Research and Development Organisation (DRDO) has a strength of around 30,000 alongside 10,000 contractual workers and 50-odd labs. The recent recommendations of the Vijay Raghavan Committee to restructure and downsize the DRDO is a step in the right direction. A similar exercise is required for the 41 ordnance factories, employing around 80,000 workers. The resilience of a system lies in its ability to undo a wrong. Hope the military hierarchy will scrap the Agnipath scheme in the larger organisational interest, setting aside all other considerations.

<https://www.tribuneindia.com/news/comment/agnipath-scheme-has-led-to-an-acute-shortfall-in-manpower-635809>

What is the military concept of ‘scholar warriors’, mentioned by the Air Chief Marshal recently?

Air Chief Marshal VR Chaudhari earlier this week highlighted the old military concept of “scholar warriors” in his speech at an event.

At the Air Force capstone seminar, which was organised to mark the end of the third Warfare & Aerospace Strategy Program (WASP) course, the Indian Air Force Chief said that the 15-week long strategic programme has refined the definition of scholar warriors.

Started in 2022 and conducted by the IAF with the College of Air Warfare and Centre for Air Power Studies, the WASP seeks to provide participants a deep understanding of geopolitics, grand strategy and comprehensive national power and to “nurture critical thinkers who can blend cross-domain knowledge to generate policy-driving ideas at the strategic level.”

What does the concept of scholar warrior mean?

In his address, the IAF Chief said a scholar warrior is a military professional who combines intellectual acumen with combat prowess in today’s increasingly complex and dynamic security environment.

The concept integral to most major militaries globally. It is aimed at creating well-rounded military practitioners who possess academic knowledge and statecraft alongside their core war-fighting skills.

Military professionals undergo military training and education at various levels and their courses are designed to meet this goal by incorporating tactical and strategic knowledge incrementally.

The concept is being increasingly thought to be critical for shaping the next generation of military leadership, who will be as academically and conceptually strong in warfare strategies as they would be in an actual battle.

Lt Gen Raj Shukla (retired), who led the Army Training Command (ARTRAC) and is a member of the UPSC, told The Indian Express that the concept looks at promoting heavy strategic thinking in the military, while creating the best thinking minds adept academically, in statecraft, and in tactical and strategic knowhows of warfare.

“The aim is to create a body of officers with a wide-angled view of National Security, officers who by education and instinct think strategically,” he said.

He added that this concept has always been there, even in ancient Indian epics like Mahabharata, which has fighters with intellectual depth.

“For instance, Arjun or Krishna were thought leaders and adept at warfighting and statecraft,” he said. However, he added that military education needs to constantly evolve for the all-round development of professionals. “There should be, for example, civil faculty for such courses, they need to inculcate knowledge on future technologies,” he said.

The need for scholar warriors

The concept aims at promoting innovative thinking to evolving unique warfare scenarios which could include both traditional battlefield methods, as well as new domains of warfare.

Trained in warfare strategies, latest technologies and strategic relations with other countries, scholar warriors are understood to be well-versed to decipher complex situations, think critically and act in anticipation of threats emerging from a situation, and formulate unique responses accordingly.

Their training, knowledge and strategic thinking also promotes adaptability in different operational scenarios.

Their skills

A critical attribute of scholar warriors is an interdisciplinary expertise — both in subjects of other services as well as deep military knowledge in artificial intelligence, cyber and space operations and international relations. Together, this can be leveraged well to strengthen the military's operational capabilities to have an edge over adversaries.

<https://indianexpress.com/article/explained/scholar-warrior-iaf-military-concept-9425725/>



Mon, 01 July 2024

Endeavour to ensure Indian army is always ready to operate in full spectrum of conflict: Army Chief

“It will be my endeavour to ensure that the Indian army is always ready to operate in the full spectrum of conflict, maintaining complete synergy with the Navy, Air Force and other stakeholders,” the new Army Chief Gen. Upendra Dwivedi said on July 1 after inspecting a Guard of Honour on South Block lawns.

This will ensure that India's interests are secured and we become a major pillar of nation-building to achieve the vision of ‘Viksit Bharat-2047’, he stated.

The geo-political landscape is changing rapidly and technology is evolving at a very fast pace, Gen. Dwivedi, who took over as the 30th Chief of Army Staff on June 30, said.

“Indian Army faces unique operational challenges and to remain prepared for such threats and distinctive requirements, it is crucial that we continuously equip our soldiers with state-of-the-art weapons and technology and continue to evolve our warfighting strategies.”

On the military modernisation underway, he said the Army is on the “Path to Transformation” and aspires to be ‘Atmanirbhar’. To achieve this, he said they will encourage indigenous initiatives and induct “maximum” war systems and equipment that are manufactured in our country.

It will be my priority to ensure that the interests and welfare of All Ranks and defence civilians of the Indian Army are looked after, he elongated about his priorities.

“My responsibility towards veterans, veer naris and their families is a sacred commitment and I assure this extended family, my full support,” he added. Gen. Dwivedi took over from Gen. Manoj

Pande who retired from service on superannuation and will have a tenure of two years in the top post

<https://www.thehindu.com/news/national/endeavour-to-ensure-indian-army-is-always-ready-to-operate-in-full-spectrum-of-conflict-army-chief/article68354386.ece>

अमर उजाला

Mon, 01 July 2024

Telangana: वायुसेना प्रमुख ने किया हथियार प्रणाली शाखा का उद्घाटन, कहा- अब एक छतरी के नीचे आ जाएंगे ऑपरेटर्स

तेलंगाना के बेगमपेट में सोमवार को एयर चीफ मार्शल वीआर चौधरी ने भारतीय वायुसेना की एक हथियार प्रणाली (डब्ल्यूएस) शाखा का उद्घाटन किया गया। वायुसेना के अधिकारियों के लिए नई हथियार प्रणाली शाखा की मंजूरी 2022 में दी गई थी। वायु सेना प्रमुख ने कहा कि इस शाखा के निर्माण के साथ ही जमीन आधारित और हथियार प्रणालियों के संचालक (ऑपरेटर) एक छतरी के नीचे आ जाएंगे।

भारतीय वायु सेना ने कहा, वायु सेना प्रमुख चौधरी ने आज कॉलेज ऑफ एयर वारफेयर (सीएडब्ल्यू) में उच्च कमान पाठ्यक्रम के 48 अधिकारियों को संबोधित किया। उनकी अगवानी सीडब्ल्यू के कमांडेंट एयर वाइस मार्शल पीएस वडोदकर ने की। इस दौरान वायुसेना प्रमुख ने वायु सेना के मध्य स्तर के नेतृत्व के बीच परिचालन तैयारियों और प्रभावी फैसले लेने की अनिवार्यता पर जोर दिया।

अपने संबोधन के दौरान विभिन्न वैश्विक और राष्ट्रीय मुद्दों पर बात की और भविष्य की सुरक्षा चुनौतियों का सामना करने के लिए तीनों सेनाओं के बीच एकीकरण को बढ़ाने की जरूरत पर जोर दिया।

<https://www.amarujala.com/india-news/weapon-system-school-of-the-indian-air-force-inaugurated-at-begumpet-telangana-2024-07-01>



Mon, 01 July 2024

Defence Ministry dials into Velmenni's Li-Fi technology to address Indian Navy's communication challenges

Velmenni, a trailblazer in light communication technology, has recently received a significant grant from the Ministry of Defence (MoD) under the iDEX initiative. This funding aims to bolster secure wireless communication for the Indian Defence sector, particularly focusing on the Navy and the unique communication challenges it faces in modern warfare.

The iDEX program is designed to stimulate innovation within India's defence sector by incorporating advanced technologies, such as Velmenni's Li-Fi. This initiative aligns with national strategies like Make in India, Startup India, and the Atal Innovation Mission (AIM). The grant underscores the potential of Li-Fi to address the communication hurdles encountered by the Navy in harsh environments.

Deepak Solanki, Founder and CEO of Velmenni, remarked on the significance of the grant, saying, “The iDEX Grant is a testament to the potential of our Li-Fi technology. With these resources, we are poised to revolutionize wireless communication, ensuring secure and efficient data transmission using light.

Our commitment to this groundbreaking technology reflects our dedication to innovation. We envision a future where light-based communication is the norm, transforming global data transmission and empowering industries worldwide, driving progress and fostering a connected and efficient future.”

Velmenni’s Li-Fi technology offers enhanced security and performance, making it ideally suited for the Indian Navy’s real-time communication needs. This breakthrough positions Velmenni as a leader in light communication technology, with the potential to usher in a new era of data transmission for the Navy and other defence applications. By leveraging this innovative technology, Velmenni is set to play a pivotal role in shaping the future of secure, efficient communication in the defence sector and beyond.

<https://www.financialexpress.com/business/defence-defence-ministry-dials-into-velmennis-li-fi-technology-to-address-indian-navys-communication-challenges-3540223/>

THE ECONOMIC TIMES

Sun, 01 July 2024

What is SEBEX 2, India's new explosive that is one of the most powerful bomb?

India has achieved a significant milestone in military technology with the development and certification of SEBEX 2, a cutting-edge explosive formulation. Certified by the Indian Navy, SEBEX 2 marks a leap forward in explosive power, boasting a TNT equivalence of 2.01. This places it among the most potent non-nuclear explosives globally, aimed at revolutionizing various munitions without compromising on weight.

How would it enhance India's military capabilities?

Developed by Economic Explosives Limited (EEL) under the Make in India initiative, SEBEX 2 utilizes a high-melting explosive (HMX) composition. This formulation significantly enhances the lethality of warheads, aerial bombs, artillery shells, and other munitions. SEBEX 2 has been evaluated, tested and certified by the Navy under its Defence Export Promotion Scheme. "The development of the explosive will enhance the potency and efficiency of weapons and ammunition in use," officials said, adding that final certifications were completed last week.

Developed by Economic Explosives Limited under the Make in India initiative, the composition based on high-melting explosive (HMX) will greatly improve the "lethality of warheads, aerial bombs, artillery shells and other munitions which utilise blast and fragmentation effects to inflict damage to targets", sources told Manu Pubby, in a ET report.

Certifications and Future Developments SEBEX 2 has undergone rigorous testing and certification under the Indian Navy's Defence Export Promotion Scheme, with final certifications recently completed. Economic Explosives Limited is also advancing towards developing another variant with a TNT equivalence of 2.3, slated for completion within six months.

EEL is also working on another variant that will have an explosive power graded at 2.3 times of TNT and is confident it will be ready within six months. Complementary Technologies In addition to SEBEX 2, the Indian Navy has certified SITBEX 1, a thermobaric explosive known for its extended blast duration and intense heat generation.

This makes it highly effective in demolishing enemy bunkers, tunnels, and fortified positions. SIMEX 4, an insensitive munition, has also received certification, emphasizing safety in storage, transport, and operation. Global Significance and Export Potential The performance of SEBEX 2, coupled with advancements in SITBEX 1 and SIMEX 4, underscores India's growing stature in military technology innovation.

These developments not only bolster national defense capabilities but also position India as a potential exporter of advanced explosive technologies. "These new formulations can be a game-changer for our armed forces," officials noted, highlighting their potential impact on global security efforts.

SEBEX 2 represents a pivotal advancement in India's military technology landscape, enhancing the country's defense capabilities and paving the way for strategic collaborations in global security. With ongoing developments and certifications, India is poised to play a crucial role in shaping the future of military explosives.

<https://economictimes.indiatimes.com/news/defence/what-is-sebex-2-indias-new-explosive-that-is-one-of-the-most-powerful-bomb/articleshow/111400988.cms>

THE ECONOMIC TIMES

Sun, 01 July 2024

Indian defence firms need to invest more in innovations and R&D to keep pace with global standards: Report

Indian defence firms are significantly trailing behind their global counterparts in research and development (R&D) intensity, despite substantial overall spending.

According to Foundation for Advancing Science and Technology (FAST India) in collaboration with IIFL Securities, these firms allocate only 1.2 per cent of their revenue to R&D, markedly lower than the global average of 3.4 per cent.

This gap highlights a need for increased investment in innovation to keep pace with global standards. Hindustan Aeronautics Limited (HAL) stands out as an exception among Indian firms, showcasing a robust commitment to R&D.

With an impressive R&D intensity of 9.3 per cent, HAL leads not only within India but also globally among the firms studied. In the fiscal year 2022-23, HAL invested USD 301

million in R&D, more than double the R&D spending of Bharat Electronics Limited (BEL), the second-highest R&D spender among Indian firms, which allocated USD 130 million.

This significant investment underscores HAL's dedication to advancing technology and innovation. Other Indian firms also show promising R&D performance.

Bharat Dynamics Limited ranks third in R&D intensity among all firms studied, boasting a commendable 6.1 per cent. This figure is 3.7 times higher than that of Sika Interplant, the second-highest R&D spender in the low-revenue cluster.

However, despite these individual successes, the broader trend reveals a concerning lag in R&D intensity across the Indian defence sector.

The Indian defence sector also lags in the proportion of PhD-qualified employees, with an average of only 0.1 per cent compared to the global average of 0.3 per cent. Despite this, firms like Sika Interplant and High Energy Batteries lead the low-revenue cluster with 2.2 per cent and 2.1 per cent PhD employees, respectively. These figures highlight the need for a greater focus on advanced qualifications within the industry to drive innovation and research.

In terms of academic and technical publications, Indian defence firms excel, producing 88.5 publications per USD billion revenue, more than double the global average of 37.9. High Energy Batteries leads this category with an impressive 6,692 publications per USD billion revenue, followed by BEL and Bharat Forge with 177 and 173 publications, respectively.

However, this strength in publications is not mirrored in patent output, a critical indicator of innovation and technological advancement. Indian defence firms produce just 7.3 patents per USD billion revenue, a stark contrast to the global average of 240.

Bharat Forge, despite leading among Indian firms in patent output, highlights the significant gap between India and global leaders like Safran SA, which boasts 5,336 patents per USD billion revenue. This disparity underscores the need for a stronger focus on intellectual property generation within the Indian defence sector. India, as the fourth-largest defence spender globally, contributes approximately 3.6 per cent to global defence expenditures.

The country's defence budget has seen a steady increase, projected to grow at an annual rate of 7 per cent to 8 per cent over the next five years. The fiscal allocation for the Defence Research and Development Organisation (DRDO) has also risen to Rs 23,855 crore for FY24-25, up from Rs 23,263.89 crore in the previous fiscal year.

This increased budget aims to bolster DRDO's capacity to develop new technologies, focusing on basic research and supporting private entities through initiatives like the Development-cum-Production Partner Program. Despite these initiatives, the median R&D intensity for Indian firms remains at 1.2 per cent, significantly below the global median of 3.4 per cent.

This disparity is further highlighted by the performance of high-revenue firms like Larsen & Toubro (L&T), which reported the highest revenue among the studied firms for FY23 but invested comparatively little in R&D, resulting in a low R&D intensity.

The Indian defence sector's lag in patenting efforts and the relatively low proportion of PhD employees indicate a need for increased focus on innovation and research. This is crucial

for India to maintain its competitive edge and leverage the growing opportunities in the global defence market.

<https://economictimes.indiatimes.com/news/defence/indian-defence-firms-need-to-invest-more-in-innovations-and-rd-to-keep-pace-with-global-standards-report/articleshow/111405034.cms>



Tue, 02 July 2024

Indian Tug Boat “Fights” Chinese Submarine In The Great Game; Delhi Works To Limit Beijing’s Presence In Bay Of Bengal

India has unleashed a charm offensive to pull Bangladesh from the Chinese embrace. After Prime Minister Narendra Modi hosted her Bangladeshi counterpart, Prime Minister Sheikh Hasina, twice within a month, the new Indian Navy chief, Admiral Dinesh Tripathi, chose Dhaka for his first official visit.

Amidst other maritime issues to be discussed by the Indian Navy Chief, Bangladesh has signed a contract for an 800-tonne ocean-going tug from an Indian shipyard. It remains to be seen if the tugboat from the Garden Reach Shipbuilders and Engineers (GRSE) Kolkata will match the Type 035G diesel-electric attack submarines, a Ming-class variant, given to Bangladesh by China. China is also building a submarine base in Bangladesh, and if the Chinese Navy gets access to the strategic base, it will be a matter of concern for India, considering its proximity to India’s Eastern Naval Command.

Prime Minister Sheikh Hasina was the first head of state invited by Prime Minister Modi after forming the new government in India. The Indian Government offered to manage the Teesta River Comprehensive Management and Restoration Project.

The project, estimated to cost \$1 billion, has attracted China’s interest. Beijing has submitted an official proposal to carry out this project along with India. New Delhi’s offer to finance the project stems from the need to keep China away from the river that flows into India. The river also has geopolitical and geostrategic importance. The area is closer to the vulnerable “Chicken Neck” corridor that connects India’s northeast with the rest of the country.

Dhaka is yet to make a call on the project. India and Bangladesh have also signed Dhaka-Delhi’s Memorandum of Understanding (MoU) on train movement between Bangladesh and India. An agreement will pave the way for train connectivity between India, Bangladesh, Nepal, and Bhutan. Prime Minister Hasina will visit China from July 8 to 11 in an effort to balance the two Asian giants.

It is against this backdrop that the Indian Navy Chief is visiting Bangladesh, and it is important to cement ties with Bangladesh. Bangladesh has decided to join the Indo-Pacific Oceans Initiative (IPOI), a forum promoted by India for countries to work together for collaborative solutions to the common challenges in the Indo-Pacific region.

During the five-day visit, Admiral Tripathi will discuss the passing-out parade at Bangladesh Naval Academy (BNA), Chittagong (now called Chattogram), with his counterpart in Bangladesh, Admiral M Nazmul Hassan. Admiral Tripathi will meet Bangladesh Army Chief General Waker-Uz-Zaman and Bangladesh Air Force Chief Air Marshal Hasan Mahmood Khan. Meanwhile, the Indian warship INS Ranvir will be at Chattogram for a week and conduct a maritime partnership exercise with the Bangladesh Navy.

China is helping the Bangladesh Navy build a dry dock in Chittagong. Named Sheikh Hasina submarine base and located at Cox's Bazar, the US \$1.2 billion facility is capable of hosting six submarines and eight warships at a time. Considering the Bangladesh Navy has only two Chinese submarines, it has been surmised that the facility will be opened to Chinese submarines in the future.

The base was inaugurated by Bangladesh's Prime Minister Hasina in March 2023 in a ceremony that saw Chinese officials and at least two senior PLA-N officers in attendance as well. The Dhaka Tribune reported last year, allowing for "safe and swift movement of the submarines in case of emergency."

The Great Game In the Bay of Bengal

The Bay of Bengal is the largest in the world, nestled between India on the East and Indonesia on the West. Bangladesh, Sri Lanka, and Myanmar are the coastal countries. The region's economic, diplomatic, and security importance attracts significant powers from the East and the West (China, Japan, India, the US, and even Russia). The Bay of Bengal lies on top of the sea lanes of communication that connect China, Japan, and Korea with the Middle East and Africa. Half of the world's trade passes through these lanes. The region is essential for the US policy of a 'Free, open and inclusive Indo-Pacific,' a euphemism for checking China's assertiveness.

China has long sought access to the Bay of Bengal, and Myanmar and Bangladesh have facilitated its entry into the region. Gaining a foothold in the Bay of Bengal would significantly increase the PLA's ability to operate farther from China's shores and create new challenges for India, the United States, and its allies. The Bay of Bengal's importance prompted the US Department of Defense to include Bangladesh and Myanmar on its list of locations where Beijing is likely striving to establish overseas military facilities.

India considers the Bay of Bengal as its immediate area of dominance and has been augmenting the military capability of the littoral countries. However, China has beaten India to the punch with its spending power. Bangladesh is one of the leading defense importers from China. India may not be overly concerned about China's support in building the submarine base in Bangladesh, but Chinese submarines in its backyard are a different ball game altogether. Considering China's increasing presence in the Bay of Bengal, India is bolstering its presence in the Andaman and Nicobar Islands, which sit on the Malacca Strait—a critical chokepoint for China.

Chinese submarines entering the Bay of Bengal have to surface while traversing the shallow water of Malacca Strait, giving India the advantage of geography. Hence the push towards having more military assets in the islands of Andaman and Nicobar.

<https://www.eurasiantimes.com/indian-tug-boat-fights-chinese-submarine/>

North Korea says its recent missile tests involved new ballistic missile with 'super-large warhead'

North Korea said Tuesday it had test-fired a new tactical ballistic missile capable of carrying a huge warhead, as the country is pushing to modernize its weapons arsenal to cope with what it calls U.S.-led threats.

The North's official Korean Central News Agency called the weapon Hwasongpho-11Da-4.5 which can carry 4.5 ton-class "super-large warhead." It said the test-fire on Monday was meant to verify flight stability and hit accuracy at the maximum range of 500 kilometers (310 miles) and the minimum range of 90 kilometers (55 miles).

South Korea's military earlier said that North Korea launched two ballistic missiles from one of its southwestern towns in a northeastern direction on Monday and that the first missile flew 600 kilometers (370 miles) and the second missile 120 kilometers (75 miles).

The second missile's flight distance was too short to reach the waters off the North's east coast, a typical landing site for North Korean test missiles. South Korea's Joint Chiefs of Staff said the second North Korean missile possibly travelled abnormally during the initial stage of its flight. It said if the missile exploded, its debris would likely have scattered on the ground though no damages was immediately reported.

The KCNA dispatch didn't say from where it launched the new missile and where it landed. But the fact that it tested both the missile's maximum and minimum ranges suggested North Korea performed two launches. KCNA, citing North Korea's Missile Administration, reported that North Korea will test-fire the missile again later in July to verify the performances of its simulated warhead at the medium range of 250 kilometers (155 miles).

Since 2022, North Korea has sharply accelerated weapons testing activities to enlarge its arsenal of nuclear-capable weapons designed to strike key sites in the mainland U.S., South Korea and Japan. The ranges of the newly tested missile suggest it targets South Korea.

Experts say North Korea would ultimately want to use an expanded nuclear arsenal to increase its leverage in future diplomacy with the U.S. Monday's missile's test were the North Korea's first weapons firing in five days.

Last Wednesday, North Korea launched what it called a multiwarhead missile in the first known test of a developmental weapon aimed at penetrating its rivals' missile defenses. North Korea said the launch was successful, but South Korea dismissed the North's claim as deception to cover up a failed launch.

The latest launches came a day after North Korea vowed "offensive and overwhelming" responses to a new U.S. military drill with South Korea and Japan.

<https://economictimes.indiatimes.com/news/defence/north-korea-says-its-recent-missile-tests-involved-new-ballistic-missile-with-super-large-warhead/articleshow/111418149.cms>

China deploys aircraft carrier off Philippine coast amid tensions over South China Sea

China has deployed its second aircraft carrier 'Shandong' which was spotted patrolling waters off the Philippine coast as Manila stepped up efforts to assert its claims over a shoal in the disputed South China Sea firmly opposing Beijing's counterclaims. Shandong, an aircraft carrier with a displacement of about 70,000 tonnes, was seen patrolling the waters off the Philippines which serves as a deterrence against "continuous Philippine provocations" on Chinese islands and reefs in the South China Sea, state-run Global Times media reported on Monday.

The aircraft carrier is likely on a scheduled exercise that could also prepare it for a potential far sea voyage into the West Pacific, it quoted Chinese experts as saying. Shandong's deployment comes after the People's Liberation Army (PLA) deployed major surface combat ships, including large and medium destroyers as well as the main amphibious landing ship in the South China Sea as the maritime territorial conflict with Manila escalated.

Ni Lexiong, a defence professor in the Department of Political Science at Shanghai University of Political Science and Law, was quoted by the Hong Kong-based South China Morning Post as saying that the Shandong's passage was meant to be a deterrent to Manila and Washington and underline "China's determination to protect territorial sea sovereignty" amid tensions over the Second Thomas Shoal.

Chester Cabalza, president and founder of International Development and Security Cooperation, a Manila-based think-tank, said the carrier's patrol was an example of "performative politics" by Beijing that could become a frequent event. If so, it "would mean that there is a red flag on their national security", he said, adding that "once we see massive military force, that means that Beijing is preparing for a war", the Post reported.

In the midst of tensions, a Chinese Coast Guard ship has rescued two Philippine fishermen after their fishing vessel suffered damage after an explosion on board near Huangyan Dao, widely known Scarborough Shoal in the South China Sea. After the incident, the Philippine side expressed gratitude for the humanitarian rescue by the China Coast Guard, Global Times reported.

The China-Philippines confrontation to assert their claims in the disputed South China Sea took a violent turn last month as their naval ships collided in the first such incident after Beijing issued new rules to act against foreign vessels and detain foreigners suspected of violating regulations in the Chinese waters.

A few weeks ago, a Philippines naval ship and a Chinese vessel collided near the Second Thomas Shoal of the South China Sea claimed by Manila. The navies and the coast guards of the two countries were having face-offs in the last few months as the Philippines, backed by the US, made a strong bid to assert its claims over the Second Thomas Shoal in the South China Sea (SCS) claimed by China. China claims most of the South China Sea (SCS) which the Philippines, Malaysia, Vietnam, Brunei and Taiwan hotly dispute.

China alleges that the Philippines deliberately ran a naval ship aground in 1999 at the Second Thomas Shoal, which it calls Renai Jiao, and converted the damaged ship into a permanent installation manned by naval personnel.

The Philippines, backed by the US, is trying to assert its claims over the SCS based on the 2016 ruling by a tribunal of the UN Convention of Law of Seas (UNCLOS) endorsing its rights. China, which boycotted the tribunal, however, rejected the tribunal findings and fiercely asserted its claims.

Last month, China promulgated a new law authorising its coast guard to seize foreign ships that illegally enter China's territorial waters and to detain foreign crews for up to 60 days. The law empowers China's coast guard to fire upon foreign ships if necessary. For its part, the US has deployed the mid-range Typhon missile systems in the Philippines as a show of strength for its backing for Manila's claims.

The Philippines has also imported India's Brahmos missiles. China currently has two aircraft carriers, Liaoning, which was a refit of the Soviet-era ship, and Shandong, which is an indigenously built 2nd aircraft carrier commissioned in 2019. China's third aircraft carrier Fujian, which is larger than the two carriers with a displacement of 80,000, is currently undergoing trials.

It is the "first fully domestically developed and constructed" aircraft carrier with an electromagnetic aircraft launch system (EMALS) similar to that of the American aircraft carrier, USS Gerald R. Ford, according to official media reports. China's other two aircraft carriers are equipped with ski-jump take-off ramps while the Fujian features a flat-top flight deck.

<https://economictimes.indiatimes.com/news/defence/china-deploys-aircraft-carrier-off-philippine-coast-amid-tensions-over-south-china-sea/articleshow/111412097.cms?from=mdr>

Science & Technology News



Press Information Bureau
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Ministry of Science & Technology

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New metal oxide nanocomposite can be used for sustainable photocatalytic degradation of organic pollutants

A new metal oxide nanocomposite has been developed that can help photocatalytic degradation of organic pollutants like dyes and pharmaceuticals and hence can be used as sustainable technologies for cleaning up the environment.

Metal oxide photocatalysis offers a sustainable solution for removing organic pollutants from water bodies. Titanium dioxide (TiO₂), zinc oxide (ZnO), and tungsten trioxide (WO₃) are notable catalysts due to their high surface area and stability. When exposed to light, they generate electron-hole pairs that degrade pollutants into harmless by-products. Factors affecting efficiency include

choice of metal oxide, crystal structure, light parameters, pollutant concentration, pH, and catalyst loading. Optimizing these factors is crucial for maximizing degradation rates.

Dr. Arundhuti Devi and her team at Institute of Advanced Study in Science and Technology (IASST), an autonomous institution of the Department of Science and Technology (DST) have developed an innovative metal oxide nanocomposite for photocatalytic degradation of organic pollutants.

Ni-doped TiO₂ on Fuller's earth (NiTF) was characterized and tested as a photocatalyst for methylene blue decolorization. It achieved 96.15% decolorization of dye solution at pH 9.0 under visible light for 90 minutes. Fuller's earth improved TiO₂ adsorption in the dark, suggesting cost-effective environmental photocatalysts. This work was recently published in the journal Elsevier (Inorganic Chemistry Communications).

The nanocomposite prepared can have potential applications in catalysis, energy storage, sensors, optoelectronics, biomedical fields, coatings, and renewable energy production through water splitting.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2030073>



Tue, 02 July 2024

Chandrayaan 3 traces impact event on Moon, characterises lunar soil for benefit of future missions

A number of research papers based on data gathered by the Chandrayaan 3 mission was presented at the International Conference on Planets, Exoplanets and Habitability, primarily by researchers from the Physical Research Laboratory (PRL), and other research institutions associated with ISRO.

On 23 August 2023, Chandrayaan 3's Vikram lander executed a soft, controlled landing on the lunar surface in the Nectarian plains between the Manzinus and Boguslavsky craters. The landing site is now officially designated as Statio Shiv Shakti.

The mission lasted for a lunar day, for as long as the solar panels could provide energy. Here is what the Chandrayaan 3 mission discovered.

Pragyan rover traces rock fragments to impact crater

The Pragyan rover moved 103 metres across the lunar surface over the course of the lunar day that it was operational for, and encountered numerous rock fragments.

These rock fragments ranged in size from one to 11 centimetres, and were found on the rim, slopes and floors of small craters measuring about two metres across.

The number and sizes of the rock fragments increased as Pragyan navigated towards the west of the landing site, with researchers identifying a possible source of the rock fragments as a crater roughly ten metres in diameter.

The researchers believe that the rock fragments were distributed by the formation of the ten metre wide crater, which was then buried and exposed several times within the lunar regolith.

The regolith, or lunar soil is made up of fine, coarse powder that is abrasive, like sandpaper, but flows easily, almost like a liquid. Two of the rock fragments had signs of degradation, suggesting that they had been exposed to space weathering.

The research supports previous findings that rock fragments within the lunar regolith get gradually coarser.

The development of the SHAPE payload

At the conference, researchers presented the development of the Spectro-polarimeter for HAbitable Planet Earth (SHAPE) payload on board the Chandrayaan-3 Propulsion Module. This was an example of ISRO maximising the science returns of the mission by packing in an additional scientific payload on the Propulsion Module. The payload consists of an EODS (Electro-Optical Detector System) and a RFS (Radio Frequency Source), that drives the Acousto-Optic Tunable Filter (AOTF), which is the heart of the device.

ISRO has not yet publicly released the data captured by the SHAPE payload, which was designed to observe the Earth as if it was an exoplanet. The observations provides scientists with a reference point to check how the Earth, and worlds similar to the Earth, would appear at astronomical distances. The Propulsion Module has itself returned to the Earth in a surprise, unplanned operation that demonstrates ISRO's capabilities for a future sample return mission. The Shukrayaan mission to Venus may carry a similar payload.

Estimation of regolith parameters

During the 103 metre trek of Pragyan, there was shearing observed of the lunar regolith, resulting in the sinkage of the wheels, both while the rover was stationary, as well as when the rover was moving.

The degree of slippage and sinkage depended on the bearing capacity of the regolith, as well as the pressure exerted by the rover wheels on the lunar surface.

Images captured by Vikram showed soil sticking to the wheels of the Pragyan, despite a lack of moisture in the regolith, which the scientists believe is because of triboelectric charging of the rover wheels, and electrostatic adhesion of the lunar regolith.

This phenomenon was also observed in previous Apollo, Chang'e, Luna and Surveyor missions. The data captured by the Chandrayaan 3 mission was used to calculate the attributes of the lunar regolith at Statio Shiv Shakti.

The studies will help better understand of the soil properties, and how they will interact with future rovers, landers and boots of astronauts. These studies provide valuable insights that can help better plan future missions.

<https://www.news9live.com/science/chandrayaan-3-traces-impact-event-on-moon-characterises-lunar-soil-for-benefit-of-future-missions-2600512>

SERA, Blue Origin announce India partner nation for human space flight programme

The Space Exploration and Research Agency and Blue Origin on Monday announced India as a partner nation in their human spaceflight programme for citizens from countries who have sent a few or no astronauts to space. SERA, a US-based agency, will offer citizens from across the world six seats on a future mission of New Shepard, Blue Origin's reusable suborbital rocket.

New Shepard will fly the selected astronauts on an 11-minute journey past the Kármán line (100 km), the internationally recognised boundary of space. Astronauts will experience several minutes of weightlessness before making a controlled descent back to the landing pad.

"We're excited to have India as part of our human spaceflight programme," said Joshua Skurla, Co-Founder, SERA. "We want to make space accessible for everyone and are happy to offer this unique opportunity to an Indian citizen who wants to experience the wonders of space travel," Skurla said.

Any Indian citizen can register for the programme by paying a fee of approximately USD 2.50 to cover the costs of verification checks that ensure safe and fair voting. The final candidates will be voted on by the public for an opportunity to fly to space onboard the New Shepard mission. The potential astronauts will be required to meet Blue Origin's physical requirements. They can garner votes by telling their story to the public using their mission profile pages, social media, and other resources. Voting will progress through candidate elimination across three phases. People will vote only for candidates from their nation or region, except for the sixth global seat.

"By giving communities the power to choose their astronauts, we ensure this mission is driven by people, for people," said Sam Hutchison, Co-Founder, SERA. "This approach will ignite national conversations on space and foster international collaboration in space exploration. The minimal physical requirements and training for New Shepard's flight lowers the barrier to entry by allowing more diverse and inclusive participation in space," Hutchison said.

<https://indianexpress.com/article/technology/science/sera-blue-origin-india-partner-human-space-flight-programme-9426330/>

ThePrint

Chinese rocket Tianlong-3 crashes after accidental launch during test run

Chinese rocket Tianlong-3, which is comparable to SpaceX's two-stage Falcon 9, was accidentally launched during formative tests in central China's Henan Province and crashed into a hillock seconds after take-off.

The incident was caused by a “structural failure at the connection between the rocket body and the test bench”, causing the rocket to be “detached from its launch pad”, said Space Pioneer, the developer and a private aerospace company based in China. “After liftoff, the computer on the rocket automatically shut down, and the rocket fell to the ground,” it said.

Tianlong-3, also known as ‘Heavenly or Sky Dragon 3’, is a large liquid-launch vehicle with a diameter of 3.8 meters and a take-off mass of 590 tonnes. Its low-earth orbit (LEO) transport capacity is 17 tons, with a sun-synchronous orbit (SSO) capacity of 14 tons. The two-stage rocket is partially reusable and customised for China’s satellite internet constellation. The test run at the Comprehensive Test Center in Gongyi City was part of the build-up to an orbital mission for the Tianlong-3.

Footage captured and uploaded by local residents on Chinese social media showed that the rocket was up in the air for over 30 seconds after which it flipped and fell downwards. Hitting the surface of a “safe area” in the mountainous region, it reportedly caused a small fire 1.5 kilometers southwest of the test platform. The Chinese media and Space Pioneer have maintained that no one was hurt due to the blast.

“The test site was far away from the urban area of Gongyi. Before the test, we worked with the local government to improve safety measures and organized the evacuation of surrounding people in advance. After investigation, there were no casualties,” Space Pioneer said in a statement.

The company assured it would complete a “fault reset” and thereafter organise the production and testing of new products.

The developer of this rocket, Beijing Tianbing Technology Ltd, is a private company founded in 2019, and known for its liquid propellant rockets. In April last year, the company launched the Tianlong-2 and became the “first commercial launch operator to send a liquid carrier rocket into space and successfully enter orbit”. The National Space Administration has called the rocket a record-setter in international and domestic aerospace, leapfrogging from solid to liquid launch vehicles.

Chinese aerospace was opened up to private players in 2014 after Xi Jinping took over as the new leader of China and treated civil space development as a key area of innovation, issuing a document 60 enabling private investment in the space industry. Following this, there has been a consistent rise in the number of space start-ups in the country.

<https://theprint.in/world/chinese-rocket-tianlong-3-crashes-after-accidental-launch-during-test-run/2155228/>



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Ahead of Ariane 6 launch, what are the other big rockets?

Europe's new Ariane 6 rocket is due to blast off for the first time next week, but it will launch into a quickly changing market for heavy space launchers increasingly dominated by SpaceX. Here are some of the other big rockets competing for the lucrative job of hauling satellites and other missions into space.

The first flight of the European Space Agency's biggest rocket launcher is scheduled from Europe's spaceport in Kourou, French Guiana, on July 9. It will replace the workhorse rocket Ariane 5, which in 2023 carried out the last of 117 launches over nearly three decades.

When Ariane 6 launches with two boosters, it will be able to haul 4.5 tonnes of payload such as satellites into geostationary orbit at 36,000 kilometres above Earth. Satellites in geostationary orbit follow Earth's rotation, so they appear fixed at a set spot. It will also be able to take more than 10 tonnes into low Earth orbit, just hundreds of kilometres up. Unlike geostationary orbits, objects in low Earth orbit, including the International Space Station, spin around the world much faster and do not appear fixed.

This lower region will be home to 85 percent of the satellites that will be launched by 2032, according to the firm Euroconsult. When Ariane 6 launches with four boosters, planned for next year, it will be able to deliver 11.5 tonnes into geostationary orbit and 21.6 tonnes into low Earth orbit.

It will also be able to deploy constellations of satellites across different orbits thanks to the reusable Vinci engine in its upper stage. However the rest of the rocket is not reusable, unlike its chief competition, the Falcon 9 of billionaire Elon Musk's SpaceX.

Falcon 9 is a reusable rocket that has come to dominate the market. Since 2010, it has launched 350 times, including 91 last year two-thirds of which were for SpaceX's own Starlink satellite internet constellation. Falcon 9 can take more than eight tonnes into geostationary orbit and nearly 23 tonnes into low Earth orbit.

Competitor Arianespace accuses SpaceX of charging the US government and NASA a premium price to use the Falcon 9, which lets the US firm offer low prices to its other commercial customers. Also in SpaceX's stable of rockets is the larger and more powerful Falcon Heavy.

And it is working on the massive Starship rocket, the most powerful ever built, which plans to carry up to 150 tonnes in its reusable form and 250 tonnes when not reusable. After three previous test flights ended with the Starship blowing up, last month the rocket held together and successfully splashed down for the first time. After years of delays, the first flight of Blue Origin's reusable New Glenn is scheduled for September, according to its first customer NASA.

The rocket is nearly 100 metres tall, compared to Ariane 6's height of 62 metres. It will be able to carry 13 tonnes into geostationary orbit and 45 tonnes into low Earth orbit. The US company founded by Amazon billionaire Jeff Bezos is keeping quiet about its order book, but the rocket is expected to help launch Amazon's Kuiper satellite internet constellation. The United Launch Alliance, a joint venture between Boeing and Lockheed Martin, launched its Vulcan Centaur rocket for the first time in January.

It is set to replace the company's workhorse Atlas V and Delta IV rockets, favourites of the United States for institutional launches. The rocket, which has reusable engines, will be able to have up to six boosters, delivering more than 15 tonnes into geostationary orbit and over 27 tonnes into low Earth orbit.

Japan's new flagship H3 rocket made its inaugural flight in February. It can have up to four boosters and launch 6.5 tonnes into geostationary orbit. Russia's replacement for its ageing Proton rockets made its maiden launch back in 2014 but a test flight in April was only its fourth since then.

It can deliver 5.4 tonnes into geostationary orbit and 24.5 tonnes into low Earth orbit. China's Long March 5 has launched 12 times since 2016. It can take 14 tonnes into geostationary orbit and 25 tonnes into low Earth orbit.

<https://www.hindustantimes.com/science/ahead-of-ariane-6-launch-what-are-the-other-big-rockets-101719888541444.html>

