

सितम्बर

Sep

2024

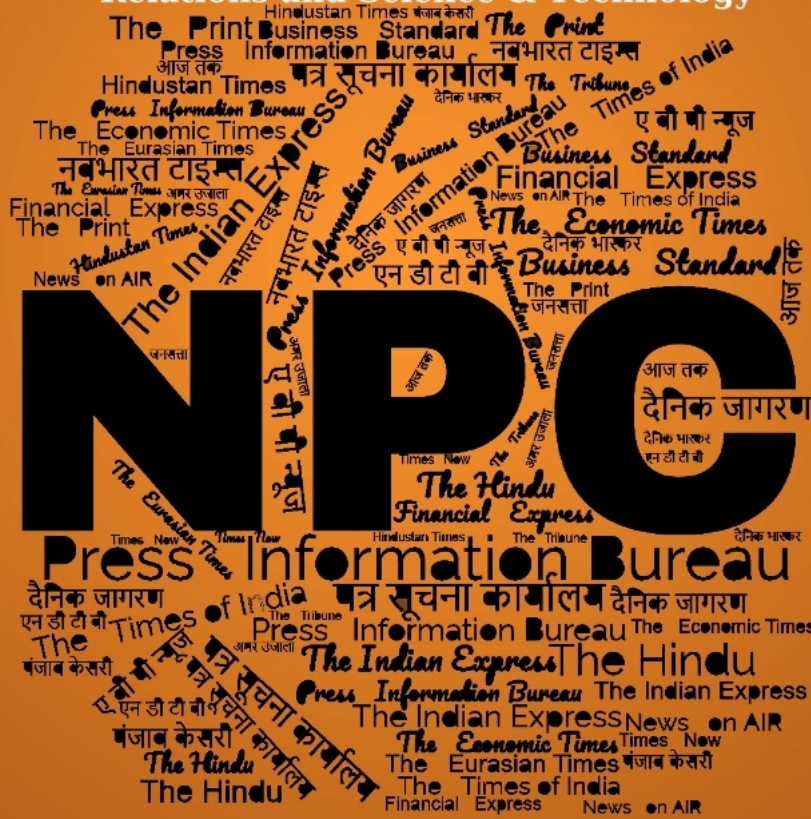
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समाचार पत्रों से चयनित अंश Newspapers Clippings

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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Press Information Bureau
Government of India

Ministry of Defence

Mon, 02 Sep 2024

Directorate General of Aeronautical Quality Assurance celebrates its 71st Raising Day

Directorate General of Aeronautical Quality Assurance (DGAQA) celebrated its 71st Raising Day at DRDO Bhawan, New Delhi on August 31, 2024. Secretary Defence Production (DP) Shri Sanjeev Kumar was the Chief Guest of the event. In his address, he lauded the journey of DGAQA and emphasised the importance of advanced QA techniques to keep pace with Global Aeronautical practices, terming it as the need of the hour to realise the vision of 'Aatmanirbhar Bharat'.

On the occasion, Secretary (DP), with other dignitaries, released the DGAQA basic governing documents i.e., Approval of a Firm and its Quality Management System Issue-III:2024 which provides autonomy to Indian industries in military aviation towards ease of doing business.

DG Shri Sanjay Chawla highlighted the Directorate's journey from 1954 to 2024 and its growth to 50 establishments across India. He explained about the steps taken for exponential indigenisation efforts to achieve the self-reliance in defence manufacturing.

The DGAQA is the regulatory authority for Quality Assurance of Military Aviation Stores for the Indian Air Force, Army Aviation, Naval Aviation and the Indian Coast Guard.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2050895>



**Press Information Bureau
Government of India**

Ministry of Defence

Mon, 02 Sep 2024

**Cabinet Committee on Security approves procurement of 240
aero-engines for IAF's Su-30 MKI aircraft from HAL worth
Rs 26,000 crore**

Cabinet Committee on Security, on September 02, 2024, approved the proposal for procurement of 240 aero-engines (AL-31FP) for Su-30 MKI aircraft of the Indian Air Force (IAF) under Buy (Indian) category from Hindustan Aeronautics Limited (HAL) at a cost of over Rs 26,000 crore inclusive of all taxes and duties. The delivery of these aero-engines would start after one year and complete over a period of eight years.

The engines will have indigenous content over 54%, enhanced due to indigenisation of some key components of aero-engines. These would be manufactured at Koraput division of HAL. Su-30 MKI is one of the most powerful and strategically-significant fleet of IAF. The supply of these aero-engines by HAL would meet the fleet sustenance requirement of IAF to continue their unhindered operations and strengthen the defence preparedness of the country.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2051039>

THE ECONOMIC TIMES

Mon, 02 Sep 2024

**Indian Navy's P8I on its first-ever deployment in Europe, to
take part in 'Exercise Varuna'**

A P8I aircraft of the Indian Navy has reached France to participate in 'Exercise Varuna' with the French Navy, an official said. The 2024 edition of Indo-French bilateral naval 'Exercise Varuna', scheduled from Sep 2 to 4 in the Mediterranean Sea, will include advanced tactical exercises underscoring the deepening synergy and interoperability between the two navies, a spokesperson of the Indian Navy said in a statement.

The Indian Navy's P8I aircraft touched down at Air Base 125 Istres-Le Tube, France, marking its first-ever deployment in Europe, it said. This deployment comes 63 years after the Indian Navy's Alize aircraft, operating from the erstwhile INS Vikrant, last flew at Hyeres Airbase, the spokesperson said. INS Tabar, which had earlier arrived in Toulon will also be participating in the exercise.

<https://economictimes.indiatimes.com/news/defence/indian-navys-p8i-aircraft-in-france-for-exercise-varuna/articleshow/112984490.cms>

Defence Ministry to take up mega warship, battle tank projects worth over Rs 1 lakh cr for approval

Amid the ongoing standoff with China, the Defence Ministry is set to undertake major projects, including the construction of seven advanced frigates for the Indian Navy and the Indian Army's proposal to replace its T-72 tanks with modern Future Ready Combat Vehicles (FRCVs).

The meeting, chaired by Defence Minister Rajnath Singh, is scheduled for Tuesday at South Block and will be attended by top officials, including the Chief of Defence Staff, the three service chiefs, the Defence Secretary, and other relevant officials.

The Indian Navy's plan involves acquiring seven new warships under Project 17 Bravo, which will be the most advanced stealth frigates ever built in India, following the Nilgiri-class frigates currently under construction, according to defence officials.

Defence sources indicated that the Defence Acquisition Council (DAC) is expected to approve issuing a tender worth approximately Rs 70,000 crore to Indian shipyards under the 'Make in India' initiative, including private sector shipyards.

The tender will likely involve Category A shipyards, such as Mazagon Dock Shipbuilders, Garden Reach Shipbuilders and Engineers Limited, Goa Shipyard Limited, and Larsen & Toubro, among others.

To expedite the project and prevent delays, the tender is expected to be split between two shipyards, though specific details will be available only after the project's approval. Currently, Mazagon Dock Shipbuilders and Garden Reach Shipbuilders are constructing frigates under Project 17A (Nilgiri-class), with four frigates being built by MDL and three by GRSE.

The Indian Army's proposal to replace its Russian-origin T-72 tanks with 1,700 FRCVs will also be discussed at the meeting. The Army plans to replace the T72s with indigenous FRCVs, which will be built under the Make-1 procedure of the Defence Acquisition Procedure.

Indian vendors will be required to manufacture the tanks with over 60 per cent indigenous content, and major companies like Bharat Forge and Larsen & Toubro are expected to participate in the tender.

The Indian Army aims to complete the FRCV project in phases, with approximately 600 tanks being built in each phase. Additionally, the Army is expected to propose acquiring around 100 BMP-2 infantry combat vehicles during the high-level meeting.

The overall FRCV project is likely to cost over Rs 50,000 crore, aimed at modernising the force's Armoured Regiments.

<https://economictimes.indiatimes.com/news/defence/defence-ministry-to-take-up-mega-warship-battle-tank-projects-worth-over-rs-1-lakh-cr-for-approval/articleshow/113001607.cms>

Rs 26,000 Cr Su30 MKI fighter engine deal for HAL okayed

The Defence Acquisition Council (DAC) chaired by Defence Minister Rajnath Singh is on Tuesday expected to pave the way for the acquisition of 26 Rafale-Maritime strike aircraft for aircraft carrier INS Vikrant with the cost negotiating committee to be convened soon after the final amendment is adopted, people familiar with the matter said.

While the government is tight-lipped over the DAC meeting, HT learns that Singh will also take a call on approving the construction of seven more Project 17 B stealth frigates at a cost of ₹70,000 crore. The new frigates will weigh around 8000 tonnes each and are expected to have significant strike capability.

HT also learns that DAC will drop the amendment for integrating the DRDO's experimental AESA radar on Rafale-M fighters as the cost of integration of a new radar is prohibitively expensive and will further delay the project. The Indian Navy requires Rafale-M fighters for its latest aircraft carrier INS Vikrant as the MiG-29K fighters onboard INS Vikramaditya are limited in numbers and need upgrades.

In the coming three months the capability of Indian armed forces, particularly the Indian Navy will get a big boost as the deal for the acquisition of 41 MQ 9B Predator armed drones will be signed before October 31, and the acquisition of Rafale-M fighters as well as indigenous construction of three additional Kalvari class submarines will be approved by the end of the year. The acquisition of the Predator drones was discussed during Singh's visit to the US this month with the manufacturer General Atomics making a presentation to him in the Pentagon.

The Biden administration has made it clear that it was ready to supply any hardware to India for its military requirement and the Emmanuel Macron government is ready to boost India's indigenous capability for manufacturing fighters, underwater drones and long range missile systems.

Even though the Indian Navy was expected to be a 200 warship force by 2027 as per long term prospective plans, there is a time lag on the count of resources and procedure. India has no options but to boost its maritime capability as the PLA Navy is expected to send long range patrols in the Indian Ocean in the next two years with turn around bases in Pakistan, Sri Lanka, Djibouti, Cambodia and an eye on Bangladesh. The PLA Navy is already showing belligerence against Japan and Philippines by sending ships and aircraft into Japan's EEZ and taking muscular action against the Philippines Navy.

Given the deteriorating strategic environment in the Indo-Pacific, the Indian Navy will have to approach DAC soon for building of 10-12000 ton destroyers of advanced Project 15 class equipped with anti-ballistic missile systems and drone launch capability.

<https://www.hindustantimes.com/india-news/rafalem-acquisition-to-clear-final-hurdle-at-dac-today-101725330692126.html>

Rajnath to be presented recommendations on theatre commands at first JCC

The detailed modalities prepared by the Services for the creation of Integrated Theatre Commands will be presented to Defence Minister Rajnath Singh at the first Joint Commanders Conference (JCC) scheduled to be held on September 4 and 5 in Lucknow. The meet is expected to see extensive deliberations on the issue, officials in the know said.

While those discussions continue, plans to set up four more Joint Logistics Nodes (JLNs) are in advanced stages, sources said. The new JLNs to come up at Leh, Siliguri, Sular and Prayagraj will add to the three existing nodes at Mumbai, Guwahati, and Port Blair, two sources independently confirmed.

“The detailed recommendations by the Services based on various studies conducted would be presented to the Defence Minister,” a source said.

The broad consensus among Services is for the creation of three theatre commands — two land commands focusing on western and northern borders, and a maritime command to oversee the country’s vast coastline. The other and a more pertinent recommendation, confirmed by multiple sources, is that all the three commanders of the theatre commands as well the Vice-Chief of Defence Staff should be four-star officers akin to the three Service chiefs and the Chief of the Defence Staff (CDS).

Lot of work has been done in the last two years on ironing out differences and fine-tuning the modalities of the structures to be reorganised and new ones to be created, another source said. Some “give and take” would be required by Services, the sources added. The reorganisation is expected to free up infrastructure and space from existing establishments, which would be used to quickly raise the new structures required.

The first JCC is set to take place at the Headquarters-Central Command in Lucknow with the theme “Sashakt aur Surakshit Bharat: Transforming the Armed Forces” and will serve as the pivotal platform for undertaking “internal process reforms” within the Services, the Defence Ministry said in a statement. General Anil Chauhan, the current CDS, will inaugurate the convocation on September 4, which brings together the apex-level hierarchy from the Ministry and the armed forces.

Joint logistics nodes

“The JLNs have proved to be successful in providing integrated logistics to all Services with optimal resource utilisation. The jointness in logistics is being enhanced further with new locations having been identified for establishment of JLN in future,” a defence source said.

Noting that cross-staffing and training between the three Services will enable full integration and jointness in approach, the source added, “Cross-posting of officers in the units of three Services

have already commenced. Posting them to headquarters and training establishments is also under way.” Officials said that cross-posting of a small number of officers at Headquarters and Command-levels has already commenced.

The government sanction letter for establishment of the first three JLN was signed on October 12, 2020. The JLN in Guwahati and the tri-services Andaman and Nicobar Command, Port Blair were operationalised on January 1, 2021. The JLN at Mumbai was operationalised on April 1, 2021.

The Ministry further stated that the two-day deliberations at JCC will focus on analysing the impact of regional and global geo-political disruptions and the commensurate demands likely to be placed upon the reforms being undertaken by the armed forces. “Preparing for future wars, jointness and integration among the constituent Services and technology absorption, riding on the government’s ‘Atmanirbharta’ initiative to achieve self-reliance in defence, will be areas receiving prime emphasis,” it added.

The Ministry had stated in the past that the JLN will provide integrated logistics cover to the armed forces for their small arms ammunition, rations, fuel, general stores, civil hired transport, aviation clothing, spares and also engineering support in an effort to synergise their operational efforts and would accrue advantages in terms of saving of “manpower, economise utilisation of resources, besides financial savings”. A JLN at each location is managed by the Service which has the larger presence in the location.

Among other measures towards jointness, the Ministry had said earlier that initiatives for the development of common digital maps and geo-reference system are under way and process of establishing joint communication structures has been initiated.

<https://www.thehindu.com/news/national/rajnath-to-be-presented-recommendations-on-theatre-commands-at-first-jcc/article68597674.ece>



Tue, 03 Sep 2024

PM Modi heads to Brunei, Singapore to boost strategic ties

Prime Minister Narendra Modi set out Tuesday on a three-day visit to Brunei Darussalam and Singapore in a bid to boost ties and celebrate diplomatic milestones.

This would mark the first-ever bilateral visit by an Indian Prime Minister to Brunei. PM Modi will remain in Brunei on September 3-4, and then travel to Singapore.

In his departure statement, Modi said he was looking forward to discussions with Brunei’s Sultan Hassanal Bolkiah and other key members of the Royal family. “As we celebrate 40 years of diplomatic ties, I am eager to advance our historical relationship with Brunei to new heights,” Modi said.

In Singapore, where he will be on September 4 and 5, he will hold meetings with President Tharman Shanmugaratnam, Prime Minister Lawrence Wong, Senior Minister Lee Hsien Loong, and Emeritus Senior Minister Goh Chok Tong.

PM Modi will also interact with Singapore's "vibrant" business community.

Modi's agenda in Singapore includes discussions to deepen the strategic partnership between India and Singapore. "I am looking forward to exploring new and emerging areas of collaboration, including advanced manufacturing, digitalization, and sustainable development," he noted.

Both Brunei and Singapore are key partners in India's Act East Policy and the Indo-Pacific vision. The Prime Minister's visit aims to strengthen these relationships and expand India's engagement with the broader ASEAN region.

Modi expressed confidence that these visits will contribute significantly to strengthening India's strategic ties with Brunei and Singapore, and bolster its engagement with the ASEAN bloc.

<https://indianexpress.com/article/india/pm-modi-brunei-singapore-visit-departure-statement-9547249/>



Mon, 02 Sep 2024

Mahindra Group Joins Forces with Sentrycs to Develop Advanced Anti-Drone Solutions in India

In a move to bolster India's defense and civilian security capabilities, the Mahindra Group has entered into a strategic partnership with Israeli company Sentrycs Ltd. The two companies have signed a Non-Binding Memorandum of Understanding (MoU) aimed at exploring opportunities for developing and providing cutting-edge anti-drone solutions within the country.

This collaboration aligns with the Indian government's 'Make in India' initiative, focusing on the transfer of technology and the domestic manufacturing of radio frequency-based counter-drone systems. These systems are designed to detect, track, identify, and neutralize unauthorized drones, offering enhanced protection for both civilian infrastructure and military assets.

The proposed anti-drone system is equipped with an autonomous command and control (C2) module that not only monitors drone flight paths but also identifies specific models, serial numbers, and IDs. This capability is crucial for distinguishing between friendly and hostile drones. When a threat is detected, the system can autonomously take control of the drone, guiding it to land safely in a designated area, thereby minimizing any potential damage.

Vinod Sahay, President of Mahindra's Aerospace & Defence Sector, emphasized the significance of the MoU, stating, "We are proud to contribute to the protection of our nation. This partnership with Sentrycs will enable us to explore new opportunities in the anti-drone space, enhancing our technological offerings and aligning with the 'Make in India' vision."

Echoing this sentiment, Yoav Zaltzman, CEO of Sentrycs, highlighted the importance of the Indian market and the growing threat posed by drones in modern conflicts. “Our collaboration with Mahindra will bring forth a multi-layered, adaptive counter-drone solution that is uniquely tailored to the Indian landscape,” he said.

This partnership marks a significant step forward in developing advanced, locally manufactured counter-drone technologies that can effectively safeguard India’s critical infrastructure and military assets.

<https://www.financialexpress.com/business/defence-mahindra-group-joins-forces-with-sentrycs-to-develop-advanced-anti-drone-solutions-in-india-3598734/>

ThePrint

Mon, 02 Sep 2024

Army to use heavy cargo drones in high altitude areas soon, optimisation of Pioneer Corps underway

Indian Army is considering technology infusion via the employment of heavy cargo drones in high altitude areas soon to ensure last-mile connectivity, sources in the establishment have said.

Pioneer Corps, the operational logistics arm of the Army, is also under optimisation, the sources confirmed. The process will take at least a decade for completion.

The Army has already optimised three units, which were with the Border Roads Organisation (BRO). The optimisation of Pioneer Corps is also likely to be extended to Territorial Army—reserve force comprising volunteers—sources said.

A source explained, “Last-mile connectivity in any battlefield is very crucial, whether we are on the battlefield or deployed on the borders. We would be able to construct roads and connect forward posts.”

The source added that as the Army builds infrastructure, it will be able to replace animal transport to some extent and that the process for this has already been underway. Owing to the nature of India’s terrain, the Army has employed all-terrain and rugged-terrain vehicles. In some cases, even mini-trucks ensure last-mile connectivity.

Moreover, the Army is carrying out research and development of robotic mules under the Army Service Corps (ASC), in partnership with the Indian Institute of Science (IISc).

According to sources, animal transport has served the purpose of ensuring connectivity well so far and the services of animals will continue alongside the improved infrastructure. But the requirement of animal transport will come down comparatively over the next decade.

The Army is also looking at faster construction for troops deployment in forward areas. It has introduced new technology, such as Light Gauge Steel Frame and 3D printing.

Moreover, 68 solar projects have been set up, including two at Siachen Base Camp.

Another step aimed at the enhancement of logistics operations is the introduction of Joint Logistics Nodes (JLN), which provide integrated logistics to the armed forces services with optimal resource utilisation. New locations are being identified for the establishment of the nodes in future. Cross staffing and training among the three services armed forces is essential for integration, and has already begun.

Logistics play an instrumental role for troops in forward areas, especially during winter, as access by road is cut off due to heavy snowfall. Indian and Chinese troops have been engaged in a standoff along the Line of Actual Control for four years now.

The Quarter Master General's (QMG) branch of the Indian Army is the one responsible for supply of ration and habitat, infusion and absorption of technology, optimal utilisation of units, personnel, animals and equipment, and ensuring combat readiness.

In addition, it is also responsible for land owned by the Army. With respect to certain Army land controversies and encroachments coming to light, the source said, "Over the years, we have instituted robust measures to ensure that military land is not encroached upon. We are being fairly successful at that. We have a number of measures, including watch and ward staff as well as a detailed survey of our land through digital means."

The government's decision last year to transfer Army cantonment land to civil municipal authorities will not have any impact on the Army's assets in the cantonment, sources said.

A source added that a gazette notification, seeking public suggestions and objections, had been issued by the Ministry of Defence on 5 March 2024 for ten cantonments—Ajmer, Babina, Clement Town, Deolali, Dehradun, Fatehgarh, Nasirabad, Mathura, Ramgarh and Shahjahanpur.

"The process of seeking suggestions and objections has begun, and deliberations are underway," they said.

<https://theprint.in/defence/army-to-use-heavy-cargo-drones-in-high-altitude-areas-soon-optimisation-of-pioneer-corps-underway/2248800/>

अमर उजाला

Mon, 02 Sep 2024

Exoskeletons Suits: जल्द ही 'आयरनमैन सूट' पहने दिखाई देंगे भारतीय सैनिक, आसानी से उठा सकेंगे भारी वजन!

भारतीय सेना के लिए यह साल बेहद अहम है, क्योंकि 2024 सेना की तकनीकी तरक्की का साल है, जिसे 'ईयर ऑफ द टेक्नोलॉजी अब्जॉर्प्शन' के तौर पर मनाया जा रहा है। भारतीय सेना के हर वर्टिकल में टेक्नोलॉजी को शामिल किया जा रहा है, लॉजिस्टिक्स से लेकर हथियार बनाने तक में टेक्नोलॉजी पर विशेष फोकस किया जा रहा है। वहीं, भारतीय सेना हाई एल्टीट्यूड इलाकों में तैनात जवानों तक रसद पहुंचाने के लिए एक्सोस्केलेटन सूट्स और रोबोटिक म्यूल्स यानी रोबोटिक खच्चरों की मदद लेने जा रही है। एक्सोस्केलेटन सूट पहन कर आसानी से पर्वतीय इलाकों में तैनात

जवानों तक रसद और भारी सामान पहुंचाया जा सकेगा। सेना ने इन खास सूट्स का ट्रायल भी पूरा कर लिया है और जल्द ही इन्हें सेना में शामिल किया जाएगा।

लॉजिस्टिक्स में बेहद कारगर होंगे एक्सोस्केलेटन सूट

भारतीय सैनिक जल्द ही 'आयरनमैन' जैसे सूट पहने दिखेंगे। इन सूट्स की खासियत यह होगी कि इन्हें पहनने के बाद सैनिकों की उत्पादकता और सहनशक्ति बढ़ाने में मदद मिलेगी, साथ ही मस्कुलोस्केलेटल चोटों का जोखिम भी कम होगा। वहीं लॉजिस्टिक्स में ये सूट बेहद कारगर साबित होंगे। क्योंकि इन्हें पहनने के बाद आसानी से भारी सामान जैसे रसद, हथियार और गोलाबारूद भी आसानी से हाई एल्टीट्यूड इलाकों में सेना की फॉरवर्ड पोस्ट तक पहुंचाए जा सकेंगे, जहां अभी तक खच्चरों की मदद ली जाती है।

सूट से चोट का खतरा भी कम होगा

सेना के वरिष्ठ सूत्रों ने बताया कि पहाड़ी इलाकों में अंतिम मील तक की कनेक्टिविटी बनाए रखने के लिए धीरे-धीरे एनिमल ट्रांसपोर्ट की जगह ट्रकों, ऑल टैरेन और रग्ड टैरेन व्हीकल्स ले रहे हैं। वहीं जहां तक इनकी पहुंच खत्म हो जाती है, वहां दिक्कत पैदा होती है। ऐसे में एक्सोस्केलेटन सूट पहन कर जवान ऊंचाई वाले पहाड़ी इलाकों में तेज रफ्तार के साथ अतिरिक्त भार भी उठा सकेंगे। इन सूटों को पहन कर चलने में न केवल आसानी होगी, बल्कि चोट का खतरा भी कम होगा। सूत्रों ने बताया कि इन विशेष प्रकार के सूट्स का ट्रायल पूरा हो चका है और सेना जल्द ही इनके ऑर्डर देने वाली है। वहीं इन्हें मेक इन इंडिया और आत्मनिर्भर भारत पहल के तहत स्वदेशी कंपनियों से ही खरीदा जाएगा।

उठा सकेंगे 5 से 35 किग्रा तक का अतिरिक्त बोझ

खास बात ये होगी इन एक्सोस्केलेटन सूट्स को वर्दी के ऊपर ही पहना जा सकेगा। इनमें दो तरह के एक्सोस्केलेटन सूट होंगे, एक जो बैटरी वाले होंगे, और दूसरे बिना बैटरी वाले होंगे। बिना बैटरी वाले एक्सोस्केलेटन सूटों का वजन लगभग 1.8 किग्रा है। इन सूटों को पहनने के बाद सैनिकों की बोझ उठाने की क्षमता लगभग 5 से 35 किलोग्राम तक बढ़ जाएगी। इनमें हाइड्रोलिक्स और स्प्रिंग्स लगे होंगे, जो जवानों की पीठ, रीढ़ और बाजुओं को सहारा देंगे। वहीं, इनकी शैल्फ लाइफ लगभग तीन से पांच साल तक होगी। इन एक्सोस्केलेटन सूट का इस्तेमाल भारी गोला-बारूद को पहुंचाने, सामान की लोडिंग-अनलोडिंग और लंबी दूरी तक वजन ढोने के अलावा अन्य कार्यों में भी किया जाएगा। वहीं, बैटरी वाले एक्सोस्केलेटन सूट्स की क्षमता 100 किलोग्राम तक अतिरिक्त वजन भार उठाने की होगी और यह 3 से 5 घंटे का बैटरी बैकअप देगा। भारत में भी निजी कंपनियों के अलावा डीआरडीओ (DRDO) भी एक्सोस्केलेटन सूट बनाने में जुटा है।

चीन और रूस पहले से कर रहे इस्तेमाल

इससे पहले चीन की पीएलए (पीपुल्स लिबरेशन आर्मी) भी एक्सोस्केलेटन सूट्स का इस्तेमाल कर रही है। 2020 में गलवान झड़प के बाद चीनी सैनिक गोला-बारूद ले जाने के लिए एक्सोस्केलेटन सूट पहने देखे गए थे। पीएलए सैनिक रसद सप्लाई और गश्त के लिए एक्सोस्केलेटन सूटों का इस्तेमाल करते हैं। पावर्ड एक्सोस्केलेटन सूट पहनने के बाद पीएलए के जवानों ने 80 किलोग्राम का वजन अपने कंधों पर लादा हुआ था। अमेरिका भी टैक्टिकल असॉल्ट लाइट ऑपरेंटर सूट (TALOS) एक्सोस्केलेटन का इस्तेमाल कर रहा है। ब्रिटिश फर्म 'इंटेलिजेंट टेक्सटाइल्स' ने भी 2015 में सैनिकों के लिए एक्सो-सूट तकनीक के लिए अमेरिका और ब्रिटेन के साथ कई मिलियन पाउंड का सौदा किया था। वहीं, रूसी सैनिक भी रशियन कॉम्बैट गियर 'सोतनिक' पहनते हैं। रूस सोतनिक में छोटे आकार के हमलावर स्वॉर्म्स ड्रोन को कंट्रोल करने की भी सुविधा जोड़ने जा रहा है।

<https://www.amarujala.com/india-news/exoskeletons-suits-indian-soldiers-will-soon-be-seen-wearing-ironman-suits-able-to-lift-heavy-weights-easily-2024-09-02>

India's Quest For Nuclear Subs 'Sink' 3rd Aircraft Carrier Plans? After Arihant & Arighat, INS Aridaman To Enter Service By 2025

India's second-strike nuclear capability will be fully operationalized by next year as it inducts its third nuclear submarine – INS Aridaman (Destroyer of Enemy), equipped with K-4 submarine-launched missiles with a range of 3,500 kilometers. This will bring a significant portion of China within India's strike envelope giving it a credible minimum nuclear deterrence.

In case of a nuclear conflict, the highest level of survivability lies with equipping nuclear-powered submarines with ballistic missiles with sufficient ranges. Since the submarine-launched ballistic missile first came into being, it has been considered the most survivable delivery system, as ocean depths remain opaque to a large extent.

In August 2024, India inducted INS Arighat (also meaning Destroyer of Enemy) into the Indian Navy. The induction ceremony took place in Vishakhapatnam, Andhra Pradesh. Before this, the Indian Navy already had INS Arihant in its flotilla. However, both these submarines are armed with K-15 missiles with a range of 750 kilometers, limiting their strike capability.

Even in a conflict with Pakistan, these missiles would only have targets within its range in the south of the country. These are the first indigenously developed short-range submarine-launched ballistic missiles (SLBMs). Hence, the developers have to overcome significant challenges like the underwater vertical launch system, which is among the most sophisticated and complex weapons since it demands stability, speed, and accuracy in two mediums—water and atmosphere.

INS Aridaman was recently photographed through satellite imagery. It is longer than the previous iteration of the Arihant class submarines. INS Aridaman is 'slightly larger,' with a load water line measurement of 125.4m compared with 111.6m of the 6,000-tonne INS Arihant, the lead boat in this class. The Launch tubes visible in the image indicate that the submarine will be able to carry twice the number of submarine-launched ballistic missiles than its predecessors.

The induction of S-4 will greatly boost India's nuclear deterrence. The lack of at least three operational submarines means that the submarines are primarily in and out of the harbor without maintaining constant atomic deterrence. A nuclear-powered attack submarine or SSBN guarantees survivability of nuclear retaliatory capability. With its long coastlines and peninsula, the SSBNs can remain hidden in ocean depths during the conflict to ensure the survival of second-strike capability.

“For nuclear deterrence, one submarine always needs to be on patrol. If Arihant is in and out of the harbor, it is not exactly a deterrent,” an Indian Navy officer told the EurAsian Times. “We need 3-4 SSBNs so we can keep one on patrol when one may be in port, one going for patrol, and one

coming back,” he explained. Buttressing his point, the officer referred to 52 years of Continuous Sea Deterrent (CASD), the UK’s longest-sustaining military operation. “If one cannot sustain it, it is hardly a deterrence,” he concluded.

SSN & SSBNs Put Aircraft Carriers On Backburner?

After INS Aridaman, the Indian Navy plans to construct another SSBN, code-named S-4*. In addition to the nuclear ballistic missile submarine, the Indian Navy has been seeking AoN from the government to build two nuclear-powered conventionally armed submarines (SSN). The force does not have a single SSN in its fleet so far. In comparison, China’s submarine fleet consists of more than 70 submarines, including seven nuclear ballistic missile submarines (SSBN), 12 nuclear attack submarines (SSN), and more than 50 diesel attack submarines (SSKs). In contrast, most of India’s conventional submarine fleet was acquired in the 1980s and is getting old.

Nuclear-powered submarines are so critical for the Indian Navy to match the growing power of the PLA Navy that the latter has reportedly shelved/put on hold its plans to build a 65,000-ton Indigenous Aircraft Carrier (IAC)-2 in favor of the SSN project. The Indian Navy has been contemplating the issue for a long time. Former Chief of Defense Staff General Bipin Rawat had asked the Indian Navy to prioritize its operational requirements in the face of a limited budget.

Talking about prioritization of operational requirements, General Rawat said in 2020, “Anything on the surface can be picked up by satellites and knocked off by missiles. I think the navy needs more submarines rather than aircraft carriers, which require their armadas for protection.”

SSNs are game changers. They are powerful platforms with stealth and unlimited endurance. They can remain underwater indefinitely and operate far away from the port for long periods and at high speeds. They can move along as part of the carrier battle group. Armed with long-range missiles, they can change the shape of maritime battle. The SSN has greater reach, endurance, and speed than the slow and short-legged diesel submarine. It can remain submerged for months, as compared to hours or days for the diesel engine-cum-battery propelled conventional boats, even one with Air-Independent Propulsion (AIP).

Once it dives into deep waters, the SSN is not only difficult to detect but also has enough speed (unlike the diesel sub) to overtake or outrun most other warships if necessary. The classic roles of an SSN are to protect carrier battle groups and to hunt enemy SSBNs, but it is also an ideal platform for the anti-ship, land-attack, and surveillance roles. There is an ongoing debate about which platform is better—an SSN or an aircraft carrier. Commodore Anil Jai Singh (retired), a former Indian Navy submariner, sees the two platforms as complementary.

“With AUKUS submarines at the approaches to the Indian Ocean and our SSNs in the Indian Ocean, the Chinese CBGs (Carrier Battle Groups) could find the going tough. But we could build them in stages. Comparing aircraft carriers with SSNs is not an apt comparison as each is a potent war-fighting platform in its own way. In fact, for a blue water Navy, aircraft carriers and SSNs complement each other,” he adds.

Nuclear Sharks – Expensive Yet Necessary

SSNs and SSBNs are expensive propositions. However, the Indian Navy has gained invaluable experience maintaining and operating nuclear-powered submarines through the leased Russian

Akula class submarines. The importance of SSNs in India's security calculus is evident from how the Navy deployed its only Russian Akula class submarine, rechristened INS Chakra, on the eastern side of the Indian Ocean during one of the many border standoffs with China in the past decade.

According to reports, INS Chakra slipped out of the Visakhapatnam harbor on India's eastern seaboard and disappeared for over a month after diving into the Bay of Bengal. Her deployment to the East was a well-kept secret. It demonstrated India's ability to carry out maritime strikes in response to land aggression. India presently has two nuclear-powered ballistic missile submarines (SSBNs). As an instrument of India's nuclear deterrence, they cannot be deployed for tactical missions. That is where the SSNs come into play to counter numerically superior navies. They can stalk and shadow targets at will, and their near invulnerability makes them the most potent weapon in a country's arsenal.

<https://www.eurasiantimes.com/indias-nuclear-trident-sinks-3rd-aircraft/>

Science & Technology News



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Mechanically gated transistor developed using single molecule for faster, greener electronics

A unique transistor developed using single molecules, controlled by mechanical forces could pave the way for advancements in areas like quantum information processing, ultra-compact electronics and sensing applications.

In a breakthrough in electronics, scientists at the S. N. Bose National Centre for Basic Sciences an autonomous institute, have developed a unique transistor using single molecules, controlled by mechanical forces rather than traditional electrical signals.

Using a piezoelectric stack, the researchers meticulously break a macroscopic metal wire to create a sub-nanometer gap precisely sized for a single molecule like ferrocene. The technique is known as mechanically controllable break junction (MCBJ). This molecule, structured with an iron atom sandwiched between two cyclopentadienyl (Cp) rings (See Figure 1, schematic of the molecule), exhibits altered electrical behaviour when mechanically manipulated, demonstrating the potential of mechanical gating in controlling electron transport at the molecular level.

Through experiments and calculations Dr. Atindra Nath Pal and Biswajit Pabi, in collaboration with their team, discovered that the orientation of ferrocene molecules between silver electrodes significantly affects the transistor's performance¹. Depending on the molecular orientation, the

device can either enhance or diminish electrical conductivity through the junction, underscoring the importance of molecular geometry in transistor design.

Further research explored gold electrodes with ferrocene at room temperature². This combination resulted in a surprisingly low resistance, nearly five times the quantum of resistance (around 12.9 k Ω), but significantly lower than the typical resistance of a molecular junction (around 1 M Ω). This suggests the possibility of creating low-power molecular devices. These devices could pave the way for advancements in areas like low-power molecular devices, quantum information processing and sensing applications.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2050883>

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In 1 yr, Aditya-L1 has found sweet spot with uninterrupted view of Sun, studied solar winds, space weather

After traversing the vacuum of space for 127 days, Aditya-L1 — India's first space-based solar observatory — arrived at its final destination on 6 January this year. The spacecraft is hovering around a rough region in space between the Sun and the Earth, called L1.

During its voyage as well as the subsequent eight months after reaching the imaginary point, Aditya-L1 achieved the unthinkable, setting countless precedents for future space missions.

“In terms of technological aspects, we learnt how to place a spacecraft around a Lagrange point. In terms of science aspects, Aditya-L1 is meant to observe the Sun in different wavelengths. Aditya-L1 is a multi-wavelength, multi-directional, multi-spatial and multi-instrument observatory,” Professor Anil Bhardwaj, director of Ahmedabad-based Physical Research Laboratory (PRL) told ThePrint. PRL has developed an instrument for the mission.

As India marks one year since the launch of Indian Space Research Organisation's (ISRO's) solar mission on 2 September, ThePrint explains Aditya-L1's milestones so far, its early promising scientific observations and which mysteries of the Sun it plans to unravel over the next few years.

First Indian spacecraft to reach L1

In January, Aditya-L1 became the first Indian spacecraft to reach the Sun-Earth Lagrange Point 1 (L1). Lagrange points are locations in space around which an object tends to stay in a stable orbital configuration because gravitational forces exerted by two large bodies balance the force required by the object to orbit the point.

Located 1.5 million kilometres from the Earth, L1 is a special and vantage location in space because not only does it provide Aditya-L1 with an uninterrupted view of the Sun's outer atmosphere or corona, but also enables the spacecraft to save fuel and conserve energy.

This is because at this point, the gravitational forces exerted by the Sun and the Earth on Aditya-L1 balance the centripetal force (which keeps a body moving along a curved path and is directed towards the centre of the path) required by the spacecraft to keep moving around the location. As a result, the spacecraft is in an equilibrium state and a stable position, and simply hovers in a halo orbit around L1, without spending much fuel.

A halo orbit is neither a perfect circle nor an oval, but a lopsided shape known as a lissajous figure — a pattern formed due to the complicated geometry of gravitational interactions there. Each halo orbit takes 178 Earth days.

The strategic point is imaginary and is located on the line joining the Sun and the Earth. The distance between Sun and Earth is 150 million kilometres and that between Aditya-L1 and Earth is 1.5 million kilometres, which implies that the spacecraft is 148.5 million kilometres away from the Sun. This allows it to study the Sun without experiencing the star's scorching heat.

“The distance between Aditya-L1 and the Earth is four times that between Earth and the Moon. In terms of distance between Sun and Earth, we are just one percent away from Aditya-L1 on the straight line joining Sun and Earth. On the same line, the spacecraft is 99 percent away from the Sun,” Professor Bhardwaj said. “A lot of technological challenges had to be overcome to send Aditya-L1 to the halo orbit around L1 because it is an imaginary point.”

On 19 September 2023, Aditya-L1 performed a manoeuvre called ‘Trans-Lagrangian Point 1 Insertion’, entering the trajectory towards L1.

On 30 September, it exited the Earth's gravitational sphere of influence, becoming India's second spacecraft to do so after Mangalyaan-1.

Scientific experiments during the journey

Aditya-L1's objectives are to study the dynamics of the corona, observe the plasma environment around the Sun, measure the temperature, velocity and density of different regions on the corona, identify sequences of solar activities, study space weather drivers, the physics and heating of the corona and chromosphere (layer immediately below the corona), heat differences between different layers, and the initiation and development of coronal mass ejections and flares.

It aims to conduct magnetic field measurements in the corona and understand the interaction of charged particles in solar winds with Earth's atmosphere and satellites, among other goals. It also intends to understand those processes inside the Sun, which lead to solar flares, coronal mass ejections and geomagnetic storms (major disturbances caused in Earth's magnetosphere due to exchange of energy between solar winds and space environment surrounding the planet).

The observatory is expected to function for at least five years, and as space records go, it will likely function for much longer than that.

To study the Sun, the spacecraft uses payloads that make simultaneous observations in different wavelengths. Some were switched on while Aditya-L1 was travelling towards L1 after launch.

While travelling towards its destination, Aditya-L1 conducted scientific experiments, such as measuring high-energy particles, capturing its first high-energy X-rays from solar flares, measuring

energy variations in protons and alpha particles (positively charged helium ions), and capturing full-disk images of the Sun in near-ultraviolet wavelengths.

It is equipped with seven payloads, four of which are remote sensing instruments (used to detect physical parameters of a particular area by measuring reflected and emitted radiation from a distance), while three are in-situ instruments (used to measure events in their original place).

“The spacecraft’s remote sensing payloads observe the Sun in hard and soft X-rays, ultraviolet and visible wavelengths. The in-situ instruments analyse the plasma coming from the Sun,” Professor Bhardwaj explained.

The remote sensing payloads are Visible Emission Line Coronagraph (VELC), Solar Low Energy X-ray Spectrometer (SoLEXS), Solar Ultraviolet Imaging Telescope (SUIT) and High Energy L1 Orbiting X-ray Spectrometer (HEL1OS). In-situ payloads include Aditya Solar wind Particle Experiment (ASPEX), Plasma Analyser Package for Aditya (PAPA) and Advanced Tri-axial High Resolution Digital Magnetometers.

The VELC, developed by the Indian Institute of Astrophysics (IIA) in Bengaluru, blocks Aditya-L1 from the entire Sun, except the corona. In other words, Aditya-L1 always views the Sun in total solar eclipse mode. This is known as occulting and helps other payloads study what goes on in the outer layers, without interference from the Sun’s bright light.

ASPEX, developed in PRL, is composed of low and high-energy spectrometers, which are used to obtain information about an object by understanding its light properties. Solar Wind Ion Spectrometer (SWIS) is the low-energy and Supra Thermal Energetic Particle Spectrometer (STEPS) is the high-energy spectrometer.

“The ASPEX spectrometers observe the Sun in the ecliptic plane, which refers to the plane in which the Earth goes around the Sun. We also look towards the north and south, and backwards towards the Earth,” Professor Bhardwaj said.

The payloads have been tuned in such a way that they can observe the solar atmosphere and conduct experiments to understand the local environment around L1.

Plasma from the Sun contains charged particles, like protons, and ions of different elements, such as nitrogen, carbon and oxygen. Professor Bhardwaj explained that they constitute a mere one percent of the solar wind.

STEPS, which measures high-energy ions present in solar winds, is Aditya-L1’s first payload to start scientific experiments. On 10 September 2023, it started measuring electrons and suprathermal ions, or highly energetic particles, at distances greater than 50,000 kilometres from the Earth.

ISRO measured the change in the behaviour of the energetic particles with time and with these observations, scientists can analyse how the behaviour of solar wind particles changes in the presence of Earth’s magnetic field.

HEL1OS, a hard X-ray spectrometer, captured its first high-energy X-ray glimpse of solar flares on 7 November 2023. It studies solar flares by measuring hard X-rays, which are high-energy X-rays emitted by the Sun. With data obtained from HEL1OS, researchers can study explosive energy

release and electron acceleration during impulsive phases of solar flares. These refer to phases during which electrons and other particles are accelerated after the stored energy in the Sun's magnetic field is released.

SWIS became operational on 1 December 2023 and began measuring energy variations in protons and alpha particles in solar winds.

On 8 December 2023, SUII, an ultraviolet telescope, captured full disk images of the Sun in near-ultraviolet wavelengths. It obtained several images of the Sun in wavelengths ranging from 200 to 400 nanometres, a first-of-its-kind feat. By studying these images, scientists can better understand the Sun's photosphere (visible outer disk) and chromosphere (layer between photosphere and corona).

While observational data has been released to the public, scientific papers are yet to be published.

Promising early results

On 11 January, ISRO deployed Aditya-L1's six-metre-long magnetometer boom (arm). It is equipped with two highly accurate magnetometer sensors, aimed at measuring low-intensity interplanetary magnetic fields in space and the magnetic fields at L1, in order to understand how solar activities affect magnetic fields in the interplanetary medium.

The PAPA payload, whose aim is to understand solar winds, solar wind ions and their composition, analyse particles and energies, and study electrons and heavier ions in solar winds in different directions, has decoded the Sun's wrath. It is working towards understanding mechanisms behind explosions of magnetic fields and plasma from the Sun's corona—known as coronal mass ejections — and how they affect solar winds and other phenomena.

Coronal mass ejections cause variations in total electron and ion counts in solar winds with time. PAPA measured these changes from 10 to 11 February.

ISRO then compared PAPA's data with those of NASA's Deep Space Climate Observatory (DSCOVR) and Advanced Composition Explorer (ACE) satellite, both of which are located at L1. PAPA's observations align with those made by the NASA satellites, indicating that Aditya-L1 is effective in monitoring space weather conditions, and can detect and analyse solar phenomena.

The payload studied total counts of solar wind electrons and ions before halo orbit insertion of Aditya-L1, during the insertion and after the process.

“Aditya-L1 can give us warnings of incoming plasma from the Sun about one hour before they reach the Earth. Instruments that are prone to damage from solar plasma can be protected in advance,” Professor Bhardwaj said.

In May, Aditya-L1 captured solar events, such as solar flares, subsequent geomagnetic storms, and images of sunspots and active regions a few days after the storms were over.

“During geomagnetic storms in May, highly charged particles were released from the Sun and analysed by ASPEX,” Professor Bhardwaj told ThePrint.

SUII's images of the solar disk in near-ultraviolet wavelengths captured in May showed solar flares and sunspots, which are areas where magnetic fields are 2,500 times stronger than the

magnetic field around the Earth. This information is beneficial for space weather predictions to determine how solar flares heat up the chromosphere, how energy is distributed in the layer, and what the overall impact of ultraviolet radiation is on the Sun's surroundings.

VELC, equipped with a multi-slit spectrograph (instrument dispersing electromagnetic radiation from the Sun into a spectrum), observed the solar corona on 14 May at 530.3 nanometres.

The yellow circle in the VELC image indicates the edge of the photosphere, and the black circle denotes the extent to which the VELC disk has blocked sunlight so that the solar corona can be visible with greater clarity.

During the geomagnetic storms in May, the highly charged particles released from the Sun were also analysed by ASPEX.

“ASPEX’s spectrometers observed huge changes in plasma flux during the May events. These solar storms and flares affected the Earth, especially the polar regions. After interacting with the Earth’s magnetic field lines, the charged particles reached the poles. Aircraft were asked to avoid flying above the poles because passengers would have experienced higher radiation, in addition to communication and navigation issues,” Professor Bhardwaj said. “We are in the solar maximum period, which is why we see so many flares.”

The period of greatest solar activity during the Sun’s 11-year-old cycle is known as solar maximum.

The Solar X-ray Monitor on Chandrayaan-2’s orbiter has observed that a significant number of micro solar flares occur even during the Sun’s quiet period or solar minimum, which is the period of least solar activity during the Sun’s 11-year-old cycle, the PRL director explained. “In one year, around 100 micro solar flares were observed,” he said.

What more can be learnt

On 2 July, Aditya-L1 completed its first halo orbit around L1, taking 178 days—equivalent to around six months.

Aditya-L1 is poised to provide significant information about the dynamics of space weather, solar flares, and propagation of particles and fields in the interplanetary medium, and is expected to help scientists better understand the phenomenon of coronal heating.

Aditya-L1’s findings may help scientists understand the nuclear fusion reactions, which occur inside the 4.5-billion-year-old star, and how they power it. The temperature of the central region of the Sun, or the core, is about 15 million degrees Celsius and that of the photosphere is about 5,500 degrees Celsius. Aditya-L1 will also study the reasons behind this difference in temperature.

“The surface of the Sun has a temperature of about 6,000 Kelvin. The corona’s temperature is one million Kelvin. We want to understand how the temperature rises from 6000 Kelvin to one million Kelvin in the corona,” Professor Bhardwaj said.

It is counterintuitive that the core (the heat source) is inside the Sun, but the temperature increases as one moves away from the surface towards the corona.

“Higher energy wavelengths, such as gamma rays, X-rays and ultraviolet rays get absorbed in the upper atmosphere, producing the ionosphere. But visible wavelengths, some infrared wavelengths and radio wavelengths are received by the Earth, and hence, we are able to probe these from the planet. Since higher energy photons cannot be probed from the surface of the Earth, we chose Aditya-L1 to study the Sun,” he added.

By studying the changing environmental conditions in space, Aditya-L1 has provided insights into how solar activities and charged particles in solar winds impact space weather in real time.

The charged particle environment and the nature of magnetic fields near the Earth change, when particles and magnetic fields from the Sun are directed towards the planet. Since these explosive phenomena can affect space assets, it is essential to send spacecraft that will perform experiments to understand the impact of solar activities on space weather in real time. Aditya-L1 is one such solar mission.

<https://theprint.in/science/in-1-yr-aditya-l1-has-found-sweet-spot-with-uninterrupted-view-of-sun-studied-solar-winds-space-weather/2249079/>

