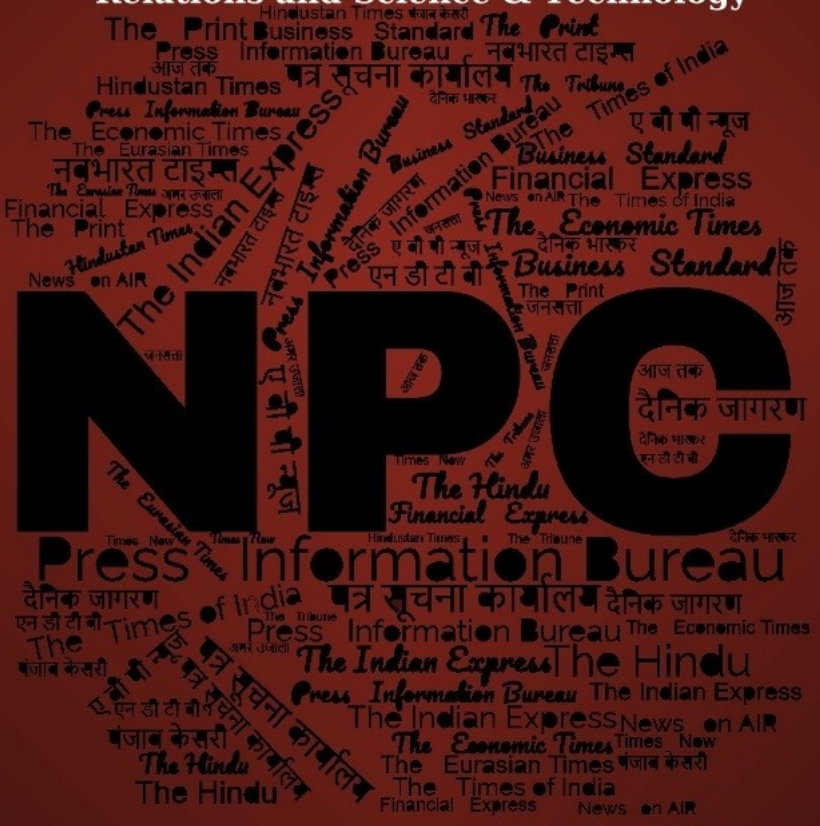
अगस्त
Aug
2024

खंड/Vol. :49 अंक/Issue :150
13/08/2024

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

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology



रक्षा विज्ञान पुस्तकालय
Defence Science Library
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र
Defence Scientific Information & Documentation Centre
मेटकॉफ हाउस, दिल्ली - 110 054
Metcalfe House, Delhi - 110 054

CONTENTS

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry of Defence

Mon, 12 Aug 2024

India- Sri Lanka Joint Military Exercise Mitra Shakti Commences In Maduru Oya, Sri Lanka

The 10th edition of India- Sri Lanka Joint Military Exercise MITRA SHAKTI commenced today, at Army Training School, Maduru Oya, Sri Lanka. The Exercise is scheduled to be conducted from 12th to 25th August 2024.

Indian contingent comprising of 106 personnel is being represented by a Battalion of Rajputana Rifles along with personnel from other arms and services. The Sri Lankan contingent is being represented by personnel from Gajaba Regiment of Sri Lankan Army. Joint Exercise MITRA SHAKTI is an annual training event conducted alternatively in India and Sri Lanka. Last edition was conducted in Pune in Nov 2023.

Aim of the Joint Exercise is to enhance joint military capability of both sides to undertake counter insurgency operations in a Sub Conventional scenario under Chapter VII of the United Nations Mandate. The exercise will focus on operations in the semi-urban environment.

Tactical drills to be rehearsed during the exercise include Response to a Terrorist Action, Establishment of a Joint Command Post, Establishment of an Intelligence & Surveillance Centre, Securing of a Helipad/ Landing Site, Small Team Insertion & Extraction, Special Heliborne Operations, Cordon & Search Operations besides employment of Drones and Counter Drone Systems, among others.

Exercise MITRA SHAKTI will enable both sides to share best practices in Tactics, Techniques and Procedures of conducting joint operations. It will facilitate developing inter-operability, bonhomie and camaraderie between the two armies. The Joint Exercise will also enhance defence cooperation, further augmenting bilateral relations between the two friendly nations.

https://pib.gov.in/PressReleasePage.aspx?PRID=2044570

Press Information Bureau
Government of India

Ministry of Defence

Mon, 12 Aug 2024

US Small Business Administration delegation visits iDEX-DIO in New Delhi

A U.S. delegation led by Ms. Isabel Casillas Guzman, Administrator of the U.S. Small Business Administration (SBA) visited Innovations for Defence Excellence-Defence Innovation Organisation, Department of Defence Production, and witnessed the techno-showcase organised by iDEX-DIO at IIT Delhi on August 12, 2024. The delegation interacted with the Indian side led by Shri Amit Satija, Joint Secretary (Defence Production).

An overview on iDEX was presented to the US delegation, highlighting how iDEX has been able to create a robust defence innovation ecosystem by fostering the development of deep-tech technologies by engaging with startups and MSMEs.

Ms. Isabel Casillas Guzman, the 27th Administrator of the U.S. SBA, commended the start-up showcase and the way the iDEX scheme has galvanised the defence innovation ecosystem in India. She said that SBA is looking forward to interact with iDEX and its startups during the forthcoming summit to explore collaborative avenues.

The U.S. SBA is an independent agency of the federal government, offering a range of financing options, from micro lending to debt and equity investment capital, to support small businesses.

Both sides also lauded the INDUS-X (India-US Defence Acceleration Ecosystem) initiative which is strengthening the technology partnership and defence industrial cooperation between the two countries. The key initiatives under INDUS-X include joint innovation projects in critical domains and the capacity building of startups.

iDEX has successfully fostered a burgeoning community of start-ups within the defence sector. It is currently engaged with over 450 start-ups and MSMEs. Till now, procurement worth over Rs 2,300 crore, has been cleared by the MoD for the successful iDEX projects. It has created avenues for young innovators and is playing a pivotal role under the umbrella of Make in India drive for a Viksit Bharat.

https://pib.gov.in/PressReleasePage.aspx?PRID=2044655

THE ECONOMIC TIMES

Mon, 12 Aug 2024

India’s defence exports skyrocket by 78% in Q1 FY 2024-25, sets new benchmarks

India's defence sector has witnessed remarkable growth in exports during the first quarter of FY 2024-25, with a significant 78% increase compared to the same period last year. Data released by the Ministry of Defence (MoD) reveals that exports reached Rs.6,915 crore between April and June 2024, up from Rs.3,885 crore in Q1 of FY 2023-24. The latest figures underscore India's growing presence in the global arms market, driven by robust domestic production and strategic policy reforms.

Economic Survey 2023-24 Highlights Record-Breaking Exports

The Economic Survey 2023-24, presented in the Lok Sabha on July 22, offers a detailed analysis of India's defence export achievements. According to the survey, India recorded its highest-ever defence exports, totaling $2.5 billion (Rs.20,915 crore) in FY 2023-24. This marks a 25% increase from $2 billion in FY 2022-23, reflecting a consistent upward trajectory over recent years

"India's defence exports have grown over 12 times since FY 2017, highlighting the country's commitment to becoming a significant player in the global defence market," the survey stated. This impressive growth is attributed to the increased number of export authorisations granted to defence manufacturers, which rose to 1,507 in FY 2024 from 1,414 in FY 2023.

Rise in Domestic Defence Production

In tandem with rising exports, India's domestic defence production also saw substantial growth. The MoD reported that domestic production reached nearly Rs.1.27 trillion in FY 2024, up from Rs.1.09 trillion in the previous fiscal year, marking a 16.7% increase. The surge in production has been fueled by the government's emphasis on boosting the indigenous defence manufacturing ecosystem, which has been instrumental in reducing reliance on imports.

Key Contributors to Export Growth

Around 100 domestic companies have played a crucial role in driving India's defence exports. These companies have been exporting a wide range of military products, including aircraft like the Dornier-228, artillery guns, BrahMos missiles, PINAKA rockets and launchers, radars, simulators, and armoured vehicles. The MoD noted, "These exports have significantly bolstered India's position among the top 25 arms-exporting nations, showcasing India's self-reliance and global competitiveness."

Government’s Commitmentto 'Viksit Bharat' and 'Atmanirbharta'

The Ministry of Defence, in a statement on X (formerly Twitter), highlighted the strategic importance of these achievements, stating, "This leap underscores our firm commitment to Viksit Bharat and Atmanirbharta in Defence, setting a new benchmark in self-reliance and innovation."

The statement reflects the government's ongoing efforts to enhance the country's defence capabilities through indigenous development and international collaboration.

Future Outlook: Targeting Rs.50,000 Crore in Defence Exports

India is well on its way to achieving its ambitious defence export target of Rs.50,000 crore within the next five years. The MoD has outlined a clear roadmap to sustain and accelerate this growth, with a focus on expanding the range of exported products and increasing collaboration with international partners.

The Defence Ministry had previously announced in April that India's defence exports grew by 32.5% during the FY 2023-24, surpassing the Rs.21,000-crore mark for the first time. This growth trajectory is expected to continue as India remains committed to enhancing its indigenous defence manufacturing capabilities and boosting military exports.

A Decade of Transformation

Over the last decade, India's defence exports have seen a dramatic rise, growing 31 times since FY 2013-14. The country is currently exporting military hardware to around 85 countries, with local firms involved in the production of a wide array of equipment, including missiles, artillery guns, rockets, armoured vehicles, offshore patrol vessels, radars, surveillance systems, and personal protective gear.

These developments are a direct result of policy initiatives and reforms aimed at strengthening the indigenous defence sector and reducing dependency on imports.

https://economictimes.indiatimes.com/news/defence/indias-defence-exports-skyrocket-by-78-in-q1-fy-2024-25-sets-new-benchmarks/articleshow/112469912.cms

Hindustan Times

Tue, 13 Aug 2024

Deal for 97 more LCA Mk-1As by year-end, say officials

The defence ministry could award Hindustan Aeronautics Limited (HAL) a contract for 97 more Tejas light combat aircraft (LCA Mk-1A) to strengthen the Indian Air Force's capabilities by end of the year, officials aware of the matter said on Monday.

The contract is estimated to be worth ₹67,000 crore. The upcoming deal will be the second order for the LCA Mk-1A after the ministry awarded HAL a ₹48,000-crore contract for 83 such aircraft in February 2021.

In April, the ministry issued a tender to State-run plane maker for the proposed acquisition of 97 more LCA Mk-1As. "The LCA Mk-1As are an integral part of the IAF's modernisation. The acquisition is on track, and it should go for CCS (cabinet committee of security) approval in December," said one of the officials cited above, who asked not to be named.

The development comes at a time when a question mark hangs over HAL's ability to meet the delivery timeline of the LCA Mk-1As already on order. IAF will have to wait longer for the first aircraft that was supposed to be delivered by March 31, 2024, as reported by HT on August 1.

The first aircraft is likely to be delivered to the air force only in November 2024. After missing the March 31 deadline, HAL hoped to deliver the first aircraft in July but again revised it to a later date in August.

IAF is unhappy with the current pace of the LCA Mk-1A programme because of the possible risks the delay in the induction of new fighter planes could pose to the air force's combat effectiveness, and has flagged the hot-button issue to HAL, calling for timely execution of the ₹48,000-crore contract, as first reported by HT on July 12.

HAL said at the time it will deliver 16 of these fighters to IAF in FY 2024-25 as per schedule. It also said it hoped to deliver all the 83 aircraft on order by 2028-29. The LCA Mk-1A made its maiden sortie from an HAL facility in Bengaluru on March 28.

Many in the air force are sceptical about the LCA Mk-1A deadlines being met, and one of the main reasons for that is the lingering delay in the supply of the F404 engines to HAL by US firm GE Aerospace.

The delivery of the engines is delayed by around 10 months. Also, the certification of new systems in the aircraft is still pending.

The single-engine Mk-1A will be a replacement for the IAF's Mikoyan-Gurevich MiG-21 fighter. LCA Mk-1A is an advanced variant of the LCA Mk-1, which has already been inducted by IAF.

US engine maker GE Aerospace earlier told HT that it is working with HAL to fix issues related to the delay in the supply of its F404 engines for the LCA Mk-1A programme, attributing it to supply chain bottlenecks in the aerospace industry.

HAL has set up a new production line in Nashik for LCA Mk-1As to meet IAF's growing needs. HAL says it can build 16 LCA Mk-1As every year in Bengaluru, and the Nashik line will help it ramp up production to 24 jets.

IAF has already inducted 35 of the 40 LCA Mk-1s ordered earlier. These are in the initial operational clearance (IOC) and the more advanced final operational clearance (FOC) configurations — the first variants of LCA.

The LCA Mk-1 is among the locally produced platforms being showcased at the ongoing Tarang Shakti 2024 exercise, the biggest multilateral air combat drills to be hosted by India.

Ten foreign air forces are taking part in the exercise, while 18 countries are participating as observers.

https://www.hindustantimes.com/india-news/explainer-what-is-a-breach-of-privilege-notice-101722494998416-amp.html

The Tribune

Mon, 12 Aug 2024

IAF seeks urgent upgradation of MiG-29 fighters to carry long-range, high-speed ground attack missiles

The Indian Air Force has projected an "urgent requirement" for upgrading its MiG-29 fighter aircraft with new stand-off ground attack weapons and associated avionics and control systems that would enhance their operational capability.

Initially, 24 MiG-29 aircraft would be modified to carry the High Speed Low Drag (HSLD) Mark-II stand-off weapon, having a strike range of over 180 kilometers, that would require retrofitting additional hardware as well as software on the aircraft. The MiG-29 is primarily an air defence fighter.

Stand-off weapons are missiles or bombs which are launched from a sufficient distance away from the target to allow the attacking aircraft to evade enemy retaliation. These are used against surface targets and in most cases are precision guided.

IAF officers said that a request for proposal was floated by the Ministry of Defence on August 7, inviting industrial partners to undertake the project that would be overseen by the IAF's No.11 Base Repair Depot.

According to a statement of case issued by the IAF for the indigenous production of HSLD Mk-II, these missiles are already deployed on the IAF's Su-30 and Jaguar fighters and there is a requirement to manufacture these weapons within the country.

Modifying the MiG-29 for the HSLD would involve designing and integration of suitable bomb racks to be carried on the aircraft's external hardpoints under the wings or fuselage and development of an avionics and software package along with cables and associated rigs.

Inducted into the IAF in 1986, about 66 of the Soviet/Russian origin fighters are in service in three squadrons. Two of them are based at Adampur and Jamnagar, while the third recently moved to Srinagar to replace a MiG-21 squadron that was phased out. In addition, the Navy also procured 35 MiG-29s for its fleet air arm. The modification of the IAF's MiG-29s for carrying HSLDs could also have spin-off benefits for the Navy.

The IAF's MiG-29s went in for extensive modification and upgradation during the second half of the last decade, which significantly enhanced their combat capability. Christened the MiG-29 UPG, this included modifications to the airframe along with new avionics, radar, missiles, weapon control systems and electronic warfare suite.

The IAF is also planning to undertake a second life extension programme on the fleet to enhance their service span from 40 years to 50 years. In the first life extension programme undertaken in the mid-2000s, the MiG-29s' technical life was being extended from 25 years to 40 years. According to

IAF sources, the enhanced technical life of the MiG-29 aircraft will begin expiring from 2025 onwards.

The IAF used its MiG-29s extensively during the 1999 Kargil War to provide fighter escort for Mirage 2000s attacking high altitude targets with laser-guided bombs as well as for carrying out combat air patrols. MiG-29s were also deployed in Ladakh to counter Chinese aircraft during the face-off along the Line of Actual Control in 2020.

According to reports, India is in the process of procuring 21 additional MiG-29s from Russia which would enable replacement of earlier losses and raise another squadron. These would be developed and upgraded from airframes built earlier but which never entered service.

https://www.tribuneindia.com/news/india/iaf-seeks-urgent-upgradation-of-mig-29-fighters-to-carry-long-range-high-speed-ground-attack-missiles/

FINANCIAL EXPRESS
Read to Lead

Mon, 12 Aug 2024

Boosting India's naval strength as China's expands presence: Submarine project nears Govt approval

India is on the brink of advancing its naval capabilities with the anticipated government approval for the construction of an indigenous nuclear-powered submarine, known as the Submersible Ship Nuclear (SSN). This project, expected to be approved later this year, underscores India's commitment to bolstering its maritime defence, particularly in response to the expanding naval presence of China in the Indian Ocean region.

The SSN project is poised to significantly enhance India's attack capabilities. Unlike conventional submarines, nuclear-powered submarines like the SSN have the advantage of staying submerged for extended periods, making them a formidable asset in deterrence strategies.

A key aspect of the upcoming SSN project is its emphasis on indigenous production, with 90 percent of the submarine's components expected to be locally sourced. This aligns with India's broader "Atmanirbhar Bharat" (self-reliant India) initiative, although some critical components may still be procured from international suppliers for viability.

The urgency of this project is underscored by China's rapid advancements in naval power. The Chinese People's Liberation Army Navy (PLA(N)) has been aggressively expanding its fleet, including the deployment of nuclear-powered submarines and aircraft carriers in the Indian Ocean. Since 2008, China's anti-piracy operations have provided a cover for deploying these assets, which also gather vital hydrological data in the region. This growing presence poses a strategic challenge for India, making the induction of SSNs crucial for maintaining a credible deterrent.

Comparatively, China's naval capabilities currently outpace those of India. The PLA(N) boasts a mix of both SSNs and nuclear-powered ballistic missile submarines (SSBNs), which give China a

robust second-strike capability. Their speed in developing and deploying these advanced submarines has been described as “unbelievably fast” by Indian defence sources, emphasizing the need for India to not only catch up but also to strategically position its forces in the region.

Pakistan, on the other hand, remains behind both India and China in submarine technology. Pakistan’s navy primarily relies on conventional submarines, with limited scope in nuclear-powered technology. While Pakistan’s submarine fleet is not negligible, it does not match the technological sophistication or the strategic reach of China’s or India’s developing capabilities.

Significance of SSN Project

India’s SSN project, once approved, will bridge the gap between itself and China, ensuring that India remains a formidable maritime power in the region. The SSN’s ability to remain undetected underwater for prolonged periods and its potential multi-mission utility, including anti-submarine warfare and intelligence gathering, will significantly enhance India’s naval strength. In a region where naval dominance is increasingly critical, the SSN project represents a pivotal step in securing India’s maritime interests.

https://www.financialexpress.com/business/defence-boosting-indias-naval-strength-as-chinas-expands-presence-submarine-project-nears-govt-approval-3580649/

FINANCIAL EXPRESS
Read to Lead

Mon, 12 Aug 2024

St. Martin’s Island: A strategic jewel in the Bay of Bengal – Explained

St. Martin’s Island, located at the southeastern tip of Bangladesh, is a small coral island that plays a significant role in the geopolitics of South Asia. Despite its modest size of about 8 square kilometers, the island’s strategic importance has made it a point of interest for regional and global powers, particularly in the context of the broader competition in the Indian Ocean.

Geographical and Strategic Significance

St. Martin’s Island is situated in the Bay of Bengal, close to the border between Bangladesh and Myanmar. The island’s location makes it a vital outpost for controlling maritime traffic and monitoring activities in the Bay of Bengal. This region is critical for several reasons: it lies near vital sea lanes that are essential for global trade, it is rich in natural resources, and it serves as a gateway to the Indian Ocean, making it a key area for naval operations and strategic dominance.

The Bay of Bengal is increasingly becoming a strategic hotspot due to the rising influence of China in the region. As China expands its naval presence in the Indian Ocean, other powers, including the United States and India, are keen to monitor and counterbalance this influence. Control over St. Martin’s Island would provide any nation with a significant advantage in maintaining surveillance over the Bay of Bengal and the broader Indian Ocean region.

Historical Context

St. Martin's Island has been a subject of geopolitical interest for decades. During the 1960s, when Bangladesh was still East Pakistan, the island was leased to the United States by the then-military dictator, General Ayub Khan, for the construction of a military base aimed at countering Indian influence in the region. This plan, however, was shelved after Bangladesh gained independence in 1971.

In the 1980s, the island again became a topic of contention when the Bangladeshi government firmly declared that no foreign military bases would be allowed on its territory, including St. Martin's Island. This stance reflected the island's perceived importance in maintaining national sovereignty and regional security.

Modern Geopolitical Dynamics

In recent years, St. Martin's Island has resurfaced as a strategic asset in the geopolitics of the region. The United States, keen on countering China's growing influence, sees the island as a potential site for establishing a military presence in the Bay of Bengal. Such a move would enable the US to monitor Chinese naval activities closely and assert its influence in one of the world's most strategically significant regions. This has led to increased tensions, with various stakeholders, including Bangladesh's political leadership, being drawn into the broader strategic competition between global powers. The island's strategic location means that it is likely to remain a focal point in the regional power dynamics for the foreseeable future.

Bottomline

St. Martin's Island, though small in size, holds immense strategic value in the Bay of Bengal. Its location at the intersection of key maritime routes and near resource-rich waters makes it a critical asset in the geopolitical landscape of South Asia. As global powers like the United States and China continue to vie for influence in the Indian Ocean, St. Martin's Island will likely remain a significant point

https://www.financialexpress.com/business/defence/st-martins-island-a-strategic-jewel-in-the-bay-of-bengal-explained/3580684/

The EurAsian Times

Tue, 13 Aug 2024

Pakistan Uses Russian UAVs To Spy On India; Developer Says Supercam Drones Witness Massive Demand

Russia has announced a surge in international interest in its Supercam series of drones, with the country already exporting these advanced unmanned aerial vehicles (UAVs) to several global clients, including Belarus and Pakistan.

This announcement came from the Unmanned Systems Group, the developer of the Supercam drones, during the ongoing Army-2024 International Military-Technical Forum. The event is being held from August 12 to 14, 2024, at the Patriot Convention and Exhibition Center in Moscow.

The Unmanned Systems group said that the Supercam drones were experiencing significant demand not only in Russia but also among former Soviet Union countries like Belarus, Kazakhstan, and Uzbekistan.

In particular, the Supercam S150 has been supplied to the Armed Forces of Belarus, where it plays a vital role in various operations. The drone is utilized in command and staff exercises, border security, and other military activities, showcasing its versatility and effectiveness.

The Supercam S150 is designed as a multipurpose platform equipped to handle a wide range of tasks. Its functionalities include mapping, patrolling, monitoring, search operations, and surveying large areas.

The drone features advanced optoelectronic systems, computer vision capabilities, and automatic tracking and targeting mechanisms. It is particularly noted for its high-precision aerial photography, facilitated by the option to install a geodetic-class GNSS receiver, making it suitable for detailed reconnaissance and surveillance at any time of day.

Beyond Russia and former Soviet Union nations, the Supercam family of drones has also extended its reach to several other countries. The company disclosed that Pakistan, Nigeria, and Angola were among the countries that have expressed interest in these drones.

The production capacity has increased significantly, enabling the company to boost serial deliveries both domestically and abroad.

The company said that production volumes have reportedly grown tenfold over the past three years and that it remains poised to expand its export operations further.

Although specific details about the variants supplied to these countries were not disclosed, it has been previously reported that Pakistan acquired an unspecified number of Supercam S-250 mini UAVs from Russia.

This variant of the drone has been used by Pakistan for Intelligence, Surveillance, and Reconnaissance (ISR) purposes near the Indian borders.

The Supercam S-250 is recognized for its tactical and technical superiority. It can fly for up to three hours in challenging weather conditions while providing high-quality video monitoring.

This enhances its performance for a range of applications, including facility security, mapping, and detecting unauthorized activities. The US government website has highlighted the Supercam S-250 as one of the top UAVs in its class, underscoring its reliability and effectiveness in various operational contexts.

Supercam Drones In Ukraine War

Russia has significantly increased its deployment of Supercam drones in the ongoing conflict with Ukraine. On July 30, Sergey Chemezov, CEO of Rostec, informed President Vladimir Putin about the advances in Supercam UAV technology.

Chemezov pointed out that the Supercam drone was now available in both reconnaissance and kamikaze versions. The production of these drones has been swift, with a new manufacturing facility spanning over 30,000 square meters established in just five months.

Supercam drones are proving their value on the battlefield, especially when used in tandem with howitzers. In the Ukraine war, Russian operators can effectively detect and neutralize Ukrainian firing positions and field depots.

Since early 2023, the Supercam S350 has been a key player in these operations. Distinguished by its larger size, the Supercam S350 features a wingspan of 3.5 meters (11.5 feet), significantly larger than the Orlan-10, which has a wingspan of just over a meter (3.3 feet).

Despite its larger dimensions, the Supercam S350 maintains comparable range and flight duration to that of smaller UAVs.

By the end of 2023, it was estimated that 15-20% of the drones employed by the Russian military in Ukraine were Supercam S350s. These drones are equipped with advanced cameras, video equipment, and thermal imagers that enable them to produce highly precise 3D terrain models and photomaps.

New Generation Supercam Complex Captures Images Faster Than Olympic Photographers

Meanwhile, at the Army-2024 International Military-Technical Forum, Russia unveiled the new generation Supercam S350M, an upgraded version designed to withstand the electronic warfare capabilities of the Ukrainian forces.

Russia claimed that the Supercam S350M can capture and transmit images faster than Olympic photographers. According to the developers, the advanced payload of the Supercam S350M enables it to capture high-definition photos and send them to the control room for automated processing, including the use of machine vision and artificial intelligence algorithms.

This process of transmitting high-resolution images, automatically processing them, and designating targets is completed significantly quicker than the time it takes for news agency photographers to send images from the Olympics, which typically takes 1 to 1.5 minutes, with a record time of 45 seconds.

The developer also emphasized that the new generation of Supercam unmanned aerial vehicles has enhanced convenience and safety for operators.

The forum also showcased the VTOL (Vertical Take-Off and Landing) modification of the Supercam S350, known as the Supercam SX350 tiltrotor. This variant’s automatic vertical take-off and landing capabilities make it suitable for deployment in challenging environments such as mountains and forests.

https://www.eurasiantimes.com/pakistan-uses-russian-uavs-to-spy-on-india/

Press Information Bureau
Government of India

Ministry of Science & Technology

Mon, 12 Aug 2024

2D electron gas creates possibilities for ultra-fast, low-power electronics

Researchers have created an innovative transparent layer that sits between two insulating materials. This material allows electrons to move in a two-dimensional plane at room temperature, with their spins (an inherent property of electrons called intrinsic angular momentum) all pointing in the same direction. This breakthrough could significantly speed up data transfer between different parts of electronic devices and increase the amount of data that can be stored in quantum devices. The need for attaining new functionalities in modern electronic devices has led to the manipulation of property of an electron called spin degree of freedom along with its charge. This has given rise to an altogether new field of spin-electronics or 'spintronics'. For decades, spintronics held theoretical promise, but its exotic behaviours seemed like science fiction. Concepts like spin currents and manipulation remained elusive. However, with the development of advanced materials and fabrication techniques, particularly at the nanoscale, scientists are now creating condensed matter systems that exhibit these very properties. This opens doors to a new era of spintronic devices with functionalities beyond traditional electronics. Scientists at Institute of Nano Science and Technology (INST) an autonomous research institution of Department of Science and Technology (DST) situated at Mohali India, have produced for the first time a transparent conducting interface between two insulating materials with room temperature spin polarized electron gas which allows for see-through devices with efficient spin currents. Prof. Suvankar Chakraverty and his group at INST have produced a 2D Electron Gas (2DEG) with room temperature spin polarization at the interface composed of chemicals LaFeO 3 and SrTiO 3. They grew super lattices and hetero structures of oxide materials to realize new and exotic two-dimensional electron gas at the interface of two insulating oxides that could be useful for next generation quantum devices.

The research supported by a grant from the DST-Nanomission and Board of Research in Nuclear Sciences (BRNS) in the form of a sophisticated, custom-made instrument called a combinatorial pulsed laser deposition setup, was published in the journal 'Physical Review B' in the Letters section. The interface of the two insulating materials LaFeO 3 -SrTiO 3 that could host two-dimensional electron gas is very different from the previously reported interfaces with SrTiO 3 . It for the first time exhibited unusual phenomena of room temperature. Due to the spin polarization the electrons, which are aligned in a particular direction (in a magnetic field) experienced less resistance (negative magnetoresistance) and deflected the current sideways (anomalous Hall

effect). This was due to structural transition of SrTiO 3 at interface with temperature. Such features have great significant in spintronics quantum-device applications. Spin carries additional information compared to just charge. By manipulating spin in transparent materials, Chakraverty and his group unlock new possibilities for light-controlled spintronics – functionalities impossible with traditional charge-based devices. Transparency allows for integration of spintronic devices within existing displays or solar cells. A transparent phone screen that processes information with spin currents, or a solar cell that generates electricity and manipulates spin for advanced functionalities opens a door to entirely new device architectures. Realization of conducting transparent oxide interface with spin polarization at high temperature, may open up a new field of quantum-device physics especially in the field of transparent spin-electronics quantum-devices, dissipation less electronics and quantum devices applicable for next generation data storage media and quantum computers. Publication details: https://doi.org/10.1103/PhysRevB.109.L201114

For more details Prof. Suvankar Chakraverty (suvankar.chakraverty[at]gmail[dot]com) can be contacted.

https://pib.gov.in/PressReleasePage.aspx?PRID=2044555

Press Information Bureau
Government of India

Ministry of Science & Technology

Mon, 12 Aug 2024

Highly porous Xerogel dressing can save lives by clotting blood faster

Researchers have developed a porous composite xerogel dressing incorporating Silica Nanoparticles and calcium that can help blood clot rapidly and provide relief for uncontrolled hemorrhage. The composite showed significant improvement in rate of blood clotting in comparison to commercial dressing. Uncontrolled hemorrhage is one of the leading causes of traumatic death resulting from accidents or injuries and during military or surgical operations. More than 40 % of trauma deaths are due to severe loss of blood. Gauze, a commonly used first aid material or the natural defenses of the human body operating through reduction in blood flow to the injury site, platelet plug formation by fibrin activation and activation of blood clotting pathways are inadequate to halt severe hemorrhage. Therefore, improved hemostatic materials are urgently required to reduce blood losses. Agharkar Research Institute (ARI) Pune, an autonomous institute of Department of Science and Technology (DST) has developed a highly porous spongy xerogel hemostatic dressing supplemented with substances that bind to a receptor inside a cell (agonists) like silica nanoparticles (SiNPs) and calcium. Scientists from the institute studied composite material and found that it increased the blood clotting index by 13-fold in comparison to commercial dressing clotting capacity. The well-characterized xerogel showed presence of multiple pores of around 30 µm size that contributed to the high absorbance capacity of the dressing. The

supplements improved the clotting capacity and resulted in quick absorbance of blood.Platelets are an important component of blood and contribute to the blood clotting process. Several factors like change in platelet shape, secretion of calcium, and activation of receptors on platelet surface play a role in the intricate pathway of blood clotting. The xerogel hemostatic dressing showed enhanced platelet aggregation due to the development of well-formed pseudopodia in the activated platelets resulting in agglutination which play a major role in the clotting process. In addition, the composite enhanced calcium release, and its extrusion. Furthermore, a significant increase of the active form of the protease activated receptor gene (PAR1 gene-- present in the platelet membranes facilitates thrombin signaling) was noted in human platelets. Platelet calcium release and upregulation of PAR1 on the platelet surface are critical for platelet shape change and aggregation. The study published in the Journal of Applied Polymer Science indicates that intracellular molecular mechanisms of platelet activation through PAR1 gene activation and calcium store release-- a significant event in the activation of platelets, are responsible for the hemostatic efficiency of xerogel composite. Such dressings can provide a potential hemostatic solution to reduce blood loss, disability, and mortality during surgery and trauma care.

Publication link: https://doi.org/10.1002/app.55194

https://pib.gov.in/PressReleasePage.aspx?PRID=2044556

THE TIMES OF INDIA

Tue, 13 Aug 2024

SSLV's final developmental flight pushed by a day; launch on August 16

Days after Isro had said the third and final developmental flight of its Small Satellite Launch Vehicle (SSLV) is scheduled for 9.17am on Aug 15, the space agency Monday said the launch will now happen on Aug 16. The lift-off time remains 9.17am. The rocket will launch Isro's latest Earth Observation Satellite (EOS-08). From environmental monitoring to disaster management and technological demonstrations, EOS-08, weighing approximately 175.5kg, is set to contribute valuable data and insights to various scientific and practical fields. Isro plans to handover SSLV to the private sector for production once it proves its capability through the demonstration flights. In July last year, the Indian National Space Promotion and Authorisation Centre (INSPACe) had even issued an expression of interest (EoI) for transfer of technology (ToT) of SSLV to Indian private players. The EOS-08, Isro said: "Boasts three state-of-the-art payloads: an Electro Optical Infrared Payload (EOIR), a Global Navigation Satellite SystemReflectometry payload (GNSS-R), and a SiC UV Dosimeter," Isro said.

The EOIR payload is designed to capture both day and night images in Mid-Wave IR and Long-Wave IR bands, enabling applications ranging from disaster monitoring to fire detection and volcanic activity observation. The GNSS-R payload demonstrates innovative remote sensing capabilities for ocean surface wind analysis, soil moisture assessment, and flood detection. The SiC

UV Dosimeter will play a crucial role in monitoring UV irradiance for the upcoming Gaganyaan mission, India's first crewed spaceflight programme. "Set to operate in a circular Low Earth Orbit (LEO) at an altitude of 475km, EOS-08 incorporates several technological advancements. These include an Integrated Avionics system known as the Communication, Baseband, Storage, and Positioning (CBSP) package, which combines multiple functions into a single, efficient unit capable of supporting up to 400Gb of data storage," Isro said. The satellite showcases miniaturised design elements, such as advanced antenna pointing mechanisms and a phased array antenna, enhancing its communication capabilities. "A flexible solar panel system and innovative thermal management solutions using materials like Germanium Black Kapton contribute to improved power generation and heat dissipation," Isro added. EOS-08 also features several indigenously developed components, including solar cell fabrication processes and a nano star-sensor for microsat applications. The mission's commitment to innovation, Isro said, extends to its X-band data transmission system for improved performance. With its planned one-year mission life, EOS-08 is poised to provide critical data that will enhance the understanding of Earth's systems and support a wide range of applications beneficial to society and scientific research.

https://timesofindia.indiatimes.com/india/sslvs-final-developmental-flight-pushed-by-a-day-launch-on-august-16/articleshow/112482633.cms

Hindustan Times

Tue, 13 Aug 2024

Liquid water in Mars: New hope of finding life after NASA's Insights Lander evidence

New seismic data from NASA's Insights Lander has discovered that a huge reservoir of liquid water may reside deep under the surface of Mars. Previous studies have established the presence of frozen water at Martian poles and the evidence that water vapour existed in its atmosphere. But this is the first time that liquid water has been found on the planet.

Prof Michael Manga, from the University of California, Berkeley told the *BBC* that water was "the most important molecule in shaping the evolution of a planet". This finding, he said, answers a big question of "where did all the Martian water go?".

Studies have found evidence of water channels and ripples which prove that rivers and lakes did exist on Mars in ancient times. But the planet has been a desert for three billion years as it lost all its water to sun after losing its atmosphere, a protective blanket to life or molecules on surface.

Prof Manga added that much of Earth's water exist underground and there was always a possibility that it could be similar in Mars, called the Earth's twin.

As life cannot exist without water, the finding indicates the possibility of discovering habitable environments deep underground.

Studying water's cycle on Mars is critical for the understanding the evolution of its climate, the outer surface and its interiors.

NASA's Insight completed its mission in December 2022, but the lander will continue to record seismic waves on the Mars surface for four years.

The lander has recorded almost 1,319 quakes and by measuring the speed of seismic waves, the scientists have figured out the kind of material likely to exist underground. The findings are published in the Proceedings of the National Academy of Sciences.

Similar techniques are used in Earth to prospect for water on Earth or scout for oil and gas.

https://www.hindustantimes.com/science/liquid-water-in-mars-new-hope-of-finding-life-after-nasas-insights-lander-evidence-101723508460622.html

THE ECONOMIC TIMES

Mon, 12 Aug 2024

Space tech revolutionising Indian fisheries, says govt ahead of National Space Day

In a bid to highlight the transformative impact of space technologies on the Indian marine fisheries sector, the Union Ministry of Fisheries, Animal Husbandry and Dairying is organising seminars and demonstrations across coastal states and Union territories. The initiative comes ahead of National Space Day, commemorated on August 23. Space technologies are already playing a crucial role in enhancing fisheries management and development, the ministry said in a statement. Space technologies like Satellite Remote Sensing utilise Oceansat and INSAT systems to identify potential fishing grounds and monitor ocean health.

Earth Observations technology employs INSAT, Oceansat, and SAR satellites to track ocean currents, waves, and extreme weather for optimised fishing operations. Satellite Communication enables real-time data exchange between vessels, shore stations and research institutions. Data analytics and artificial intelligence are helping predict fish distributions and optimising fisheries management. The ministry highlighted that these advanced systems enhance efficiency and safety at sea, detect illegal activities, support aqua mapping, and provide disaster warnings. To further bolster technological advancements, the government has approved a national rollout plan under the Pradhan Mantri Matsya Sampada Yojana (PMMSY). This ambitious project aims to install 1,00,000 transponders on marine fishing vessels across 9 coastal states and 4 union territories with an outlay of Rs 364 crore. India's extensive coastline of 8,118 km, a vast Exclusive Economic Zone covering 2.02 million sq km, and abundant inland water resources underscore the significance of these technological interventions in sustaining and developing the country's rich fisheries ecosystem.

https://economictimes.indiatimes.com/news/science/space-tech-revolutionising-indian-fisheries-says-govt-ahead-of-national-space-day/articleshow/112466340.cms