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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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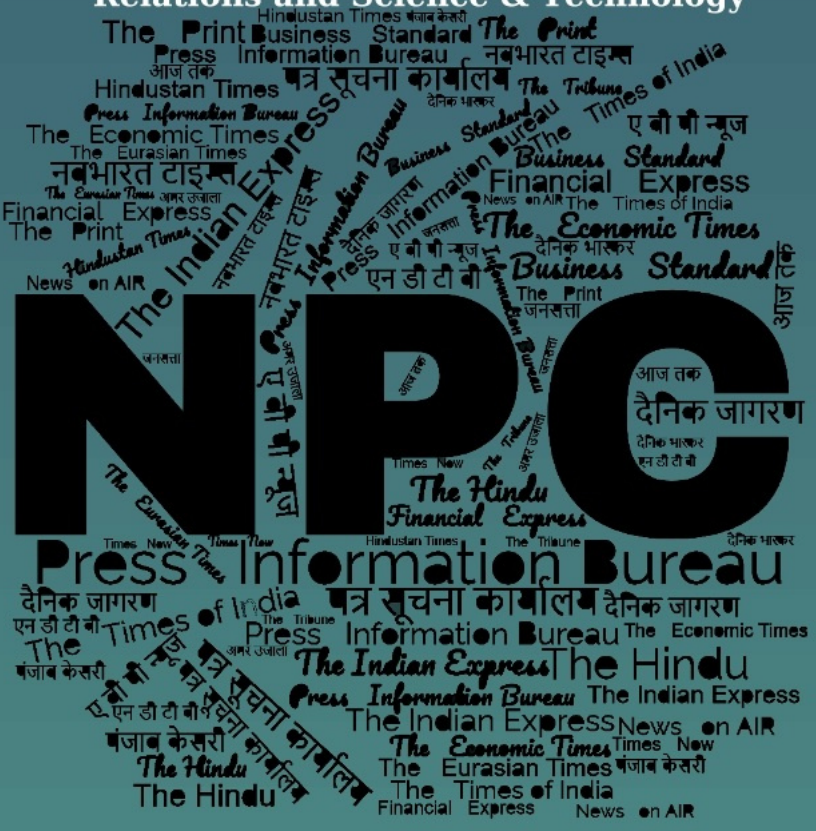

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Fri, 20 Dec 2024

Yard 12707 (Surat) And Yard 12651 (Nilgiri) Delivered To Indian Navy

In a historic milestone for the country's Aatmanirbharta, journey, two warships, a destroyer (Surat) and a frigate (Nilgiri) were delivered to the Indian Navy on 20 Dec 24. The ships have been designed and constructed indigenously by the Warship Design Bureau of Indian Navy and M/s MDL, respectively. This is in keeping with the thrust, given by Government of India and the Indian Navy, on nation building through self-reliance. Simultaneous induction of two state-of-the-art men of war will significantly enhance the operational capabilities and combat readiness of the Indian Navy.

Yard 12707 (Surat), the fourth and final Project 15B stealth guided missile destroyer, follows in the wake of her predecessors IN Ships Visakhapatnam, Mormugao and Imphal commissioned in the past three years. The delivery of Surat culminates the iconic indigenous destroyer building project of the Indian Navy, which began with the Project 15 (three Delhi class, 1997-2001), followed by Project 15A (three Kolkata class, 2014-2016) and Project 15B (four Visakhapatnam class, 2021-2024).

Being a guided missile destroyer with a displacement of 7,400 tons and an overall length of 164 meters, Surat is a potent and versatile platform equipped with state-of-the-art weapons and sensors, including surface-to-air missiles, anti-ship missiles and torpedoes. Powered by a Combined Gas and Gas (COGAG) propulsion set, comprising four gas turbines, she has achieved speeds in excess of 30 knots (56 km/h) during her sea trials. It is also poised to be IN's first AI enabled warship utilising indigenously developed AI solutions which would enhance its operational efficiency manifolds.

Yard 12651 (Nilgiri), the first Project 17A stealth frigate is a follow-on of the Shivalik class (Project 17) frigates active in service. Nilgiri is first among the seven P17A frigates under construction and MDL, Mumbai and GRSE, Kolkata. These multi-mission frigates are capable of

operating in a ‘blue water’ environment dealing with both conventional and non-conventional threats in the area of India’s Maritime Interests. The newly designed ships are also being built using ‘Integrated Construction’ philosophy, which involves extensive pre-outfitting at the Block stages to reduce the overall build periods. The ships are powered by two Combined Diesel or Gas (CODOG) main propulsion plants, each comprising a Diesel Engine and Gas Turbine, driving a Controllable Pitch Propeller (CPP). The ships also have state- of-the-art Integrated Platform Management System (IPMS). The ships are fitted with supersonic surface-to-surface missile system, Medium Range Surface-to-Air Missiles system, 76 mm Upgraded Gun, and a combination of rapid-fire close-in weapon systems.

The delivery of the vessels showcases the nation's design, ship construction, engineering prowess and industrial know-how. The delivery also reinforces IN’s unrelenting focus on Aatmanirbharta in both ship design and shipbuilding. In keeping with the current thrust on nation building through self-reliance the vessels have 75% indigenisation content with orders on a myriad of indigenous firms including MSMEs (more than 200 in each shipyard). The projects have boosted self-reliance, economic development, employment generation, growth of MSMEs and ancillary ecosystem in the country.

The warships are fitted with major weapons and sensors sourced from indigenous OEMs, viz M/s BAPL, L&T, MTPF, M/s BEL, BHEL, Mahindra etc.

Surat's keel was laid on 07 Nov 19 and was launched on 17 May 22. The ship has been delivered to the Indian Navy in 31 months from launch to delivery, making her the fastest indigenous destroyer ever built. The ship had commenced her Contractor Sea Trials on 15 Jun 24 and completed her Final Machinery Trials on 25 Nov 24, within an unprecedented record time of just six months.

Nilgiri’s keel was laid on 28 Dec 17 and the ship was launched into water on 28 Sep 19. The ship had sailed out for her maiden sea trials in Aug 24 and ever since, has undergone a comprehensive schedule of trials in harbour and at sea, leading up to its delivery now.

The balance six ships of the class are at various stages of construction at MDL, Mumbai and GRSE, Kolkata. These ships are expected to be delivered to IN in 2025 and 2026.

https://pib.gov.in/PressReleasePage.aspx?PRID=2086668

Press Information Bureau
Government of India

Ministry of Defence

Fri, 20 Dec 2024

Aatmanirbhar Bharat: MoD inks Rs 7,629 crore contract with L&T for K9 VAJRA-T Self-Propelled Tracked Artillery Guns for Indian Army

Ministry of Defence has signed a contract with Larsen & Toubro Limited for procurement of 155 mm/52 calibre K9 VAJRA-T Self-Propelled Tracked Artillery Guns for the Indian Army under Buy (Indian) category at a total cost of Rs 7,628.70 crore. The contract was signed by senior officials of the Ministry and representatives of L&T in the presence of Defence Secretary Shri Rajesh Kumar Singh in South Block, New Delhi on December 20, 2024.

The procurement of K9 VAJRA-T will catalyse the artillery modernisation and enhance overall operational readiness of the Indian Army. This versatile artillery gun, with its cross-country mobility, will play a pivotal role in enhancing the firepower of the Indian Army, enabling deeper

strike with precision and its lethal firepower will bolster the capability of artillery in all terrains. The gun being equipped with cutting-edge technology is capable of delivering long-range lethal fires with high accuracy & higher rate of fire and will be able to operate in sub-zero temperature in high-altitude areas to its full potential.

The project will generate an employment of more than nine lakh man-days over a period of four years and encourage active participation of various Indian industries including MSMEs. The project will be a proud flag-bearer of 'Aatmanirbhar Bharat' in consonance with the 'Make-in-India' initiative.

https://pib.gov.in/PressReleasePage.aspx?PRID=2086514

The Indian EXPRESS

Mon, 23 Dec 2024

India, Kuwait boost ties: Strategic partnership, key pact on defence

AS PRIME Minister Narendra Modi and Kuwait's Amir Sheikh Meshal Al-Ahmad Al-Jaber Al-Sabah held their first bilateral meeting on Sunday, the two countries elevated their relationship to a "strategic partnership" and signalled that trade and defence cooperation would form the key pillars of their ties.

This came on the day that Kuwait conferred its highest honour — 'The Order of Mubarak Al-Kabeer' — on Modi for his role in strengthening the relations between the two countries.

Modi arrived in Kuwait on Saturday for a two-day visit — the first by an Indian PM in 43 years. The last Indian PM to visit Kuwait was Indira Gandhi in 1981. Modi was accompanied by External Affairs Minister S Jaishankar and National Security Advisor (NSA) Ajit Doval.

Besides the Amir, Modi also met Crown Prince Sheikh Sabah Al-Khaled Al-Hamad Al-Mubarak Al-Sabah, who hosted a banquet in his honour, and held delegation-level talks with Kuwaiti Prime Minister Sheikh Ahmad Abdullah Al-Ahmad Al-Sabah.

The two sides institutionalised defence cooperation through an overarching agreement that includes training, exchange of personnel and experts, joint exercises, supply of defence equipment, and collaboration in research and development, among others.

Besides defence, three other MoUs (Memoranda of Understanding) were inked to facilitate cooperation in the areas of sports, culture and solar energy.

Modi invited a delegation comprising the Kuwaiti Investment Authority and other stakeholders to visit India to look at new opportunities, including in the fields of energy, defence, medical devices, pharma, food parks, the Ministry of External Affairs (MEA) said.

During his meeting with Kuwait's Amir, Modi also invited him to visit India. "Excellent meeting with His Highness the Amir of Kuwait, Sheikh Meshal Al-Ahmad Al-Jaber Al Sabah. We discussed cooperation in key sectors like pharmaceuticals, IT, FinTech, infrastructure and security," Modi said in a post on X after the meeting.

"In line with the close ties between our nations, we have elevated our partnership to a strategic one and I am optimistic that our friendship will flourish even more in the times to come," he added.

While a strategic partnership entails greater cooperation in the areas already identified — pharmaceuticals, IT, fintech, infrastructure and security in this case — several new areas of cooperation will also be sought. In this regard, regular bilateral consultations, exchanges and visits pertaining to issues of mutual concern will be held.

Modi also thanked the Amir for ensuring the well-being of over one million Indians in Kuwait while the Kuwaiti leader expressed appreciation for the contribution of the community in the development journey of the Gulf nation.

At their delegation-level talks, the two Prime Ministers discussed a roadmap to strengthen the strategic partnership in diverse areas including trade, investment, energy, defence, security, health, education, technology and people-to-people ties, according to the MEA.

At his meeting with the Crown Prince, Modi conveyed that India attaches utmost importance to its bilateral relations with Kuwait. "They emphasised on close coordination between both sides in the UN and other multilateral fora," the MEA said.

In the meetings, the Indian side also showed keen interest in intensifying its cooperation with the Gulf Cooperation Council (GCC) through Kuwait's presidency of the influential grouping which includes the United Arab Emirates, Bahrain, Saudi Arabia, Oman and Qatar. The total volume of India's trade with GCC countries stood at US$ 184.46 billion in the financial year 2022-23. Both sides also stressed the importance of early conclusion of the India-GCC Free Trade Agreement.

The MEA said Modi appreciated the new initiatives being undertaken by Kuwait to fulfill its 'Vision 2035' and congratulated the Amir for the successful holding of the GCC summit earlier this month.

The Amir reciprocated Modi's sentiments and expressed appreciation for India's role as a valued partner in Kuwait and the Gulf region, the MEA said. It said the Kuwaiti leader looked forward to a greater role and contribution of India towards the realisation of Kuwait's 'Vision 2035'.

The Amir also conferred 'The Order of Mubarak Al-Kabeer' to Modi at the Bayan Palace. The award was given to Modi for strengthening the good relations between the two nations, Kuwait's state-run news agency KUNA reported.

"I am honoured to be conferred the Mubarak Al-Kabeer Order by His Highness the Amir of Kuwait, Sheikh Meshal Al-Ahmad Al-Jaber Al Sabah. I dedicate this honour to the people of India and to the strong friendship between India and Kuwait," Modi said in a post on X.

Modi's visit comes at a time when West Asia is still simmering — the two sides are expected to have discussed the situation during their talks. In his departure statement on Saturday morning, Modi had said the two sides "have shared interest in peace, security, stability and prosperity in the West Asia region".

A joint statement issued at the end of the visit said: "The two sides unequivocally condemned terrorism in all its forms and manifestations, including cross-border terrorism, and called for disrupting of terrorism financing networks and safe havens, and dismantling of terror infrastructure."

"The leaders expressed optimism that this renewed partnership would continue to grow, benefiting the people of both countries and contributing to regional and global stability," it said.

https://indianexpress.com/article/india/india-kuwait-boost-ties-strategic-partnership-key-pact-on-defence-9739540/

THE ECONOMIC TIMES

Fri, 20 Dec 2024

Ukraine unveils new laser weapon 'Tryzub', that can shoot down aircraft from a mile away

As the war between Ukraine and Russia enters its 1,000th day, Ukraine has reportedly gained a technological edge with the development of a cutting-edge laser weapon named the Tryzub. The weapon, named after Ukraine's national trident symbol, is said to be capable of targeting and downing aircraft at distances exceeding two kilometres.

Vadym Sukharevskyi, Commander of Ukraine's Armed Forces Unmanned Systems, confirmed the weapon's existence during a defence summit in Kyiv earlier this week. Sukharevskyi stated, "It

really works; it really exists. We can state that today Ukraine is, if I’m not mistaken, the fifth country that can say it has a laser weapon," as quoted by the Kyiv Post.

What is the Tryzub Laser Weapon?

While specific details about the Tryzub are scarce, the weapon is believed to operate as a laser-directed energy weapon (LDEW), a technology capable of emitting intense beams of light to destroy targets. Sukharevskyi confirmed that the Tryzub is "real" and "currently operational," although the exact location of its deployment remains undisclosed.

According to experts, the Tryzub’s capabilities are similar to those of the UK’s DragonFire laser weapon, which is designed to target drones, missiles, and aircraft using concentrated light beams. The DragonFire system has been tested and is expected to be fully operational by 2027.

How Tryzub Could Benefit Ukraine

If Ukraine's claims about the Tryzub are accurate, the laser weapon could provide significant advantages in countering a range of threats. Military experts suggest that it could offer a cost-effective alternative to traditional missile systems, especially for targeting inexpensive drones that have become a major threat in modern warfare. The cost of firing a shot from the Tryzub is expected to be minimal, possibly under £10 per shot, compared to the much higher costs associated with missiles.

The Tryzub could also be a crucial tool in countering Russian hypersonic missiles, which travel at speeds of over 6,000 km/h and are difficult to intercept using conventional missile defence systems.

"The big deal with lasers is that they provide a way of downing cheap weapons such as drones without using something costing vastly more," explained Martin J Dougherty, a weapons expert and author of Aircraft, Tanks and Artillery of the Ukraine War, speaking to The Telegraph.

Additionally, the Tryzub offers the potential for an “infinite magazine,” meaning that, unlike traditional weapons with limited ammunition, a laser system can continue firing as long as there is available electrical power. This would make it an invaluable resource in prolonged engagements where traditional ammunition might be exhausted.

Challenges with Laser Weapon Technology

Despite the advantages, laser weapons have their limitations. While they are effective against slow-moving or fragile targets such as drones, they face challenges when dealing with faster, heat-resistant threats like artillery shells or ballistic missiles.

Patrick Senft, a specialist from Armament Research Services, noted, “Faster-moving or heat-resistant targets — such as artillery shells, and ballistic missiles — are much harder to neutralise and demand a more advanced system.”

Other technical obstacles include the ability to maintain the strength of the laser over long distances, atmospheric factors like rain or clouds that can absorb or scatter the laser, and the potential for "thermal blooming," a phenomenon where the surrounding air heats up and diminishes the power of the laser.

Fabien Hoffmann from the Oslo Nuclear Project added, “To assess how effective it is in a missile defence role, we’ll need to see how it performs in practice.”

Global Context: Nations with Laser Weapon Systems

With the Tryzub, Ukraine joins a small group of countries possessing operational laser weapons. The United States is one of the leading nations in laser technology, with its truck-mounted high-energy lasers designed to target drones, helicopters, and rockets. Similarly, countries such as China, Israel, Turkey, and Germany have also developed their own laser systems.

In July, South Korea announced that it would begin deploying laser systems designed to intercept drones, particularly North Korean drones, which have raised security concerns in the region. South Korea’s “Block-I” anti-air laser system, developed by Hanwha Aerospace, can engage small, low-cost drones at a fraction of the price of traditional munitions, with each shot costing approximately $1.50.

India is also in the process of developing laser weapons, including systems like DURGA (Directionally Unrestricted Ray Gun Array) and KALI (Kilo Ampere Linear Injector), which have been in research since the 1980s. According to reports, DURGA is designed for space-based applications, while KALI is expected to target powerful pulses of electron beams to disable satellites.

Even Russia, Ukraine’s primary adversary, is working on a high-energy laser system with the goal of neutralising enemy satellites.The development of the Tryzub marks a pivotal moment in Ukraine's military strategy.

Laser weapons are gaining recognition worldwide as effective tools for countering the growing threat posed by low-cost drones. As the technology matures, experts believe that more nations will

adopt directed-energy weapons, not just for military use but also for public safety, such as preventing terrorist attacks.

Ukraine's Tryzub offers a cost-effective and sustainable solution to modern warfare's challenges, but its true potential will only be realised once it is deployed and tested in real combat scenarios. As laser technology continues to evolve, it could revolutionise how wars are fought, making expensive missiles and ammunition less critical in future conflicts.

https://economictimes.indiatimes.com/news/defence/ukraine-unveils-new-laser-weapon-tryzub-that-can-shoot-down-aircraft-from-a-mile-away/articleshow/116499682.cms

THE ECONOMIC TIMES

Sun, 22 Dec 2024

Govt panel to plan IAF's capability enhancement

The government has set up a committee that will work on a plan for capability enhancement for the air force.

To be headed by Defence Secretary RK Singh, the committee will look at current trends, requirements projected over the years and ongoing procurement cases for modernisation of the force. Sources said that the committee has been tasked to come out with a comprehensive report and suggestions for capability enhancement. It is likely to complete the study within the next four months. The air force has publicly stated that it is lagging behind China when it comes to technology and has been requesting for more combat jets to bridge the gap.

Earlier this year, Air Chief Marshal AP Singh said that when it comes to the human element and the people behind the machine, India is way ahead but lags on technology and production. Records show that the current strength of 31 fighter jet squadrons is the lowest that India has had since 1965, when a war was fought with Pakistan.

This number steadily increased after the 1965 war and peaked at 41 squadrons in 1996. As the aircraft profile changed, the strength dipped to 35 in 2013 and since then has gone steadily down. Besides combat jets, several major capability enhancement programmes are in the works, including procurement of Medium Transport Aircraft (MTA) that are to be Made in India. The MTA plan has been moving ahead and is also likely to fall under the purview of the committee.

Besides, it is expected to deliberate on training capability and equipment needed to counter new age threats like swarm drones, Man-Unmanned Teaming and Hypersonic weapons.

https://economictimes.indiatimes.com/news/defence/govt-panel-to-plan-iafs-capability-enhancement/articleshow/116574160.cms

THE ECONOMIC TIMES

Sun, 22 Dec 2024

Centre forms committee under Defence Secretary to look into Air Force's overall capability development

Amid the growing air power of China and Pakistan and the shortage of fighter aircraft faced by the Indian Air Force, the Defence Ministry has formed a high-level committee under Defence Secretary Rajesh Kumar Singh to look into the overall capability development of the service through indigenous design, development and acquisition projects.

Government officials told that the committee was formed after the Indian Air Force made detailed presentations to Defence Minister Rajnath Singh during the Air Force Commanders' Conference last month in the national capital.

During the conference, the top Defence Ministry functionaries were briefed about the futuristic combat aircraft requirements along with the gaps required to be filled in the capability that the force wants to have in the coming times to tackle the threat perception faced on both the fronts.

The officials said the committee has other senior members of the Defence Ministry, including the Secretary (Defence Production), Sanjeev Kumar; Defence Research and Development Organisation chief Dr Samir V Kamat; and Deputy Chief of Air Staff Air Marshal T Singh, who is the committee's member secretary.

The Secretary of Defence Finance also attended the first meeting of the committee that took place last week.The committee is expected to submit its report to the Defence Minister in the next two to three months with a detailed assessment of the requirements of the force.

The Indian Air Force has been able to induct only 36 new Rafale aircraft under the 4.5-plus generation of fighter aircraft that it wants in significant numbers to tackle the threat mainly posed by China, which is also supplying arms and equipment to the Pakistan Air Force.

The Chinese are now also likely to provide fighter aircraft to the Bangladesh Air Force, where the new government is not seen as friendly to India.

The Indian Air Force's plans of acquiring over 110 fighter aircraft of the 4.5-plus generation capability have been pending for some time with the government, and the committee may suggest a way to address the requirement through the indigenous route.

The gap in weaponry on the aircraft in terms of all types of air-to-air and air-to-ground missiles has also been widening vis-a-vis the northern adversary.

The long-range surface-to-surface missile systems with the Chinese forces are also believed to have longer ranges and are in much higher numbers than what is possessed by the Indian forces.

The Indian Air Force has been relying mainly on the indigenous projects for its future capability development, but the LCA Mark 1A project has been hit by delays due to supply chain issues faced by the supplier GE of the US.

The Indian Air Force's plans to have 114 fighter aircraft made in India by Indian manufacturers in collaboration with foreign original equipment manufacturers to fulfil the capability gap.

The IAF has already stated that it favours all its major future acquisitions to be built through indigenous routes only.

https://economictimes.indiatimes.com/news/defence/centre-forms-committee-under-defence-secretary-to-look-into-air-forces-overall-capability-development/articleshow/116569677.cms

THE ECONOMIC TIMES

Sun, 22 Dec 2024

How Pakistan used blackmail to pressure the US on India, leading to the creation of the killer Washington missile

Tensions between the United States and Pakistan have escalated recently following revelations that Pakistan is developing long-range nuclear missiles capable of reaching major US locations. This includes efforts to build intercontinental ballistic missiles (ICBMs), a move that has raised alarms in Washington.

US Deputy National Security Advisor Jon Finer disclosed that Pakistan had falsely presented its space programme as a cover for its missile development, a strategy that was eventually uncovered by the US. In response, Washington imposed strict sanctions on companies linked to Pakistan's missile programme.

Pakistan’s Failed Attempt to Leverage the US

Before pursuing this ambitious missile development, Pakistan had attempted to influence the Biden administration’s stance on India’s missile capabilities. Pakistani officials repeatedly sought to pressure the US into halting India’s long-range missile development, as reported by Pakistani media Dawn's sources.

According to the Pakistani newspaper Dawn, the Biden administration rejected these demands, and the Pakistani government’s efforts were firmly dismissed. This rejection from Washington led to growing frustration in Islamabad, which shifted its focus towards advancing its own missile programme targeting the US.

The Shaheen-III Missile: A Key Player in Pakistan’s Strategy

Pakistan already possesses the Shaheen-III missile, which has a range of 2,750 kilometres and is capable of striking any location in India. However, as part of its strategic push, Pakistan is now focused on developing missiles with the range to target the US. This shift in focus has significantly heightened concerns in Washington, particularly as Pakistan’s missile programme could also include potential threats to Israel.

While Pakistan continues to bolster its missile development, India has also ramped up its own capabilities, driven in part by the growing security concerns stemming from China’s missile advancements. This escalating missile arms race in the region has drawn attention from the US, which has voiced concerns about both Pakistan’s and India’s long-range missile developments. However, Pakistan's recent emphasis on expanding its missile programme to target the US has become a new point of contention.

US Response: Sanctions and Increased Scrutiny

In response to Pakistan’s missile development activities, the United States has taken significant measures to curb the programme. In 2023, the Biden administration intensified sanctions, targeting three Chinese companies that were suspected of assisting Pakistan in advancing its missile technology. This move added to the growing strain between the two nations, which has been marked by increasing wariness of Pakistan's missile ambitions.

The US government had already raised concerns about Pakistan’s missile programme as early as 2015, after the successful test of the Shaheen-III missile. However, with recent developments, the US has taken a more aggressive stance, viewing Pakistan’s missile capabilities as a potential threat to global security. The imposition of sanctions and heightened scrutiny reflects a growing sense of caution in Washington regarding Islamabad’s military advancements.

Pakistan Responds to US Allegations

Pakistan's Foreign Ministry has vehemently rejected the US claims, labelling them as "unfounded" and "devoid of rationality." The ministry responded to US Deputy National Security Advisor Jon Finer’s remarks, which labelled Pakistan’s missile programme as an "emerging threat," by asserting that the country’s strategic capabilities are purely defensive.

According to Pakistan’s Foreign Ministry, these capabilities are aimed at safeguarding its sovereignty and maintaining regional stability, not at threatening any other nation.In a statement, the ministry described the US allegations as "unfortunate," adding that Pakistan’s missile programme should not be perceived as a threat.

It further highlighted the historical cooperation between the US and Pakistan, especially in counter-terrorism efforts, and reiterated Pakistan’s commitment to engaging constructively with the US on issues related to regional security and stability.

A History of Turbulent US-Pakistan Relations

The bilateral relationship between the United States and Pakistan has always been complex, marked by moments of cooperation and periods of tension. During the Cold War, both nations worked together on various fronts, including in the fight against al-Qaeda after the 9/11 attacks.

However, Pakistan’s military coups, its support for the Taliban's rule in Afghanistan, and its controversial nuclear weapons programme have been major points of contention between the two countries.

The relationship began to show signs of strain after the US withdrawal from Afghanistan in 2021, with both nations increasingly at odds over regional security issues. The current missile development dispute is the latest chapter in this long-standing, multifaceted geopolitical rivalry.

As tensions grow, the future of US-Pakistan relations remains uncertain, with the missile programme continuing to fuel diplomatic friction.With the US imposing sanctions and Pakistan rejecting allegations of a threat, the situation between the two countries is poised to remain contentious.

How the two sides resolve their differences will have significant implications not just for their bilateral ties, but also for regional and global security dynamics.

https://economictimes.indiatimes.com/news/international/global-trends/how-pakistan-used-blackmail-to-pressure-the-us-on-india-leading-to-the-creation-of-the-killer-washington-missile/articleshow/116562497.cms

THE ECONOMIC TIMES

Sun, 22 Dec 2024

Fencing the border with Myanmar: Why the government is treading cautiously

Ten months after India announced its plans to fence the 1,643-km-long border with Myanmar, the government is treading cautiously.

While New Delhi wants to curb the influx of drugs and weapons, it is facing opposition from local communities that have ethnic ties across the border.

It's a struggle between security imperatives and ethnic bonds and pits national priorities against age old ties.

Fencing Update

10 km completed near Moreh, Manipur

21 km nearing completion, along the border in Manipur

300 km may be the length of electric fencing

COST ESTIMATES

Fence construction: ₹21,000 crore

Allied border roads: ₹10,000 crore

Total Project Cost: ₹31,000 cr

GoI Proposes, But...

GOVERNMENT INITIATIVE:

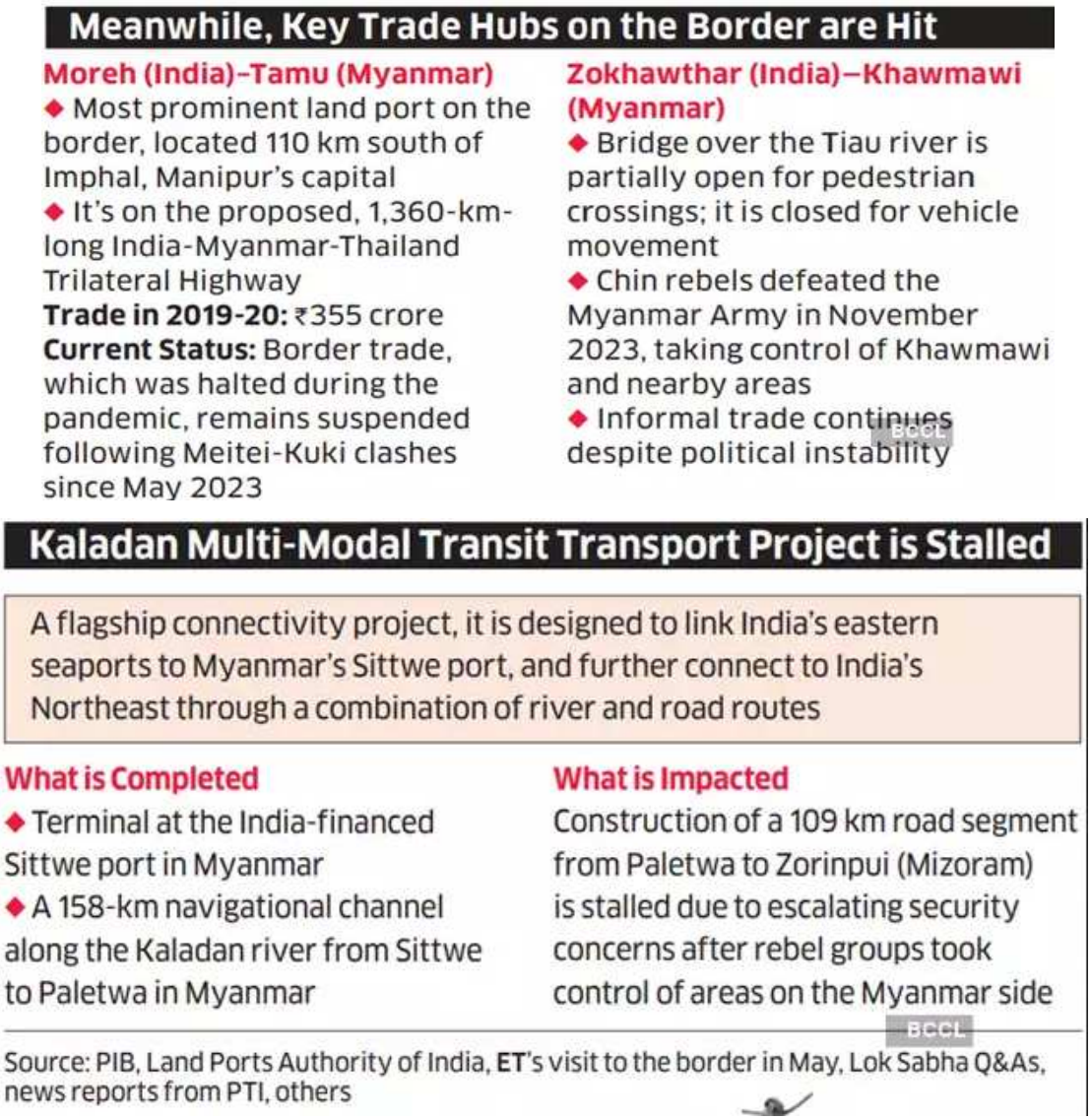
- The project was announced in February 2024, mainly **to curb the smuggling of drugs, weapons**, exotic animals, etc
- Priority is now given to segments in **Manipur and Arunachal Pradesh as there is less on-ground opposition** compared with Nagaland and Mizoram where the same tribes often live on both sides of the border

WHO IS OPPOSING AND WHY:

- Civil society groups and political parties in Mizoram and Nagaland oppose:

i) The **scrapping of the Free Movement Regime,** which allows cross-border movement of up to 16 km without documents

ii) The fencing itself, citing **ethnic and cultural ties across the border**. For instance, the Rih Dil lake in Myanmar holds spiritual significance for Mizos as a passage to afterlife



https://economictimes.indiatimes.com/news/defence/fencing-the-border-with-myanmar-why-the-government-is-treading-cautiously/articleshow/116546752.cms

THE ECONOMIC TIMES

Sat, 21 Dec 2024

Space warfare, AI solutions to defence highlight of DefSat 2025 next month

Strategists and business leaders from the defence and space sectors will converge here next month to share experiences and deliberate on new opportunities in the area that has emerged as a critical link in securing the country's borders. The third DefSat Conference and Expo, scheduled to be held

at the Manekshaw Centre here from January 8-10, is expected to provide a platform to explore the synergies between defence modernisation and India's expanding space ambitions.

The theme of the three-day national conference is 'Integrated Space Capabilities for Multi-Domain Operations' and will highlight the strategic role of disruptive space technologies in modern warfare across land, maritime, aerospace, cyberspace and homeland security domains."

DefSat 2025 will spotlight next-gen military technologies, from quantum key distribution and non-kinetic space warfare to AI/ML-powered solutions, all designed to keep us at the forefront of future-ready defence operations," Lt Gen PJS Pannu (retd), senior advisor, SIA-India, said.

With highlights like IndSpace Wargame 3.0, the conference will unite defence practitioners, industry leaders and international experts to simulate real-world space security challenges, showcasing the complexities of space operations and underscoring India's readiness to navigate the evolving space domain, Pannu said.

Hosted by Satcom Industry Association-India (SIA-India), the event is supported by the Department of Defence Production, Ministry of Defence, Defence Research and Development Organisation, NewSpace India Ltd, Astronautical Society of India, and Aeronautical Society of India and the Centre for Land Warfare Studies (CLAWS) as a knowledge partner.

"The integration of space technology into defence strategies has become indispensable in today's geopolitical landscape." Dr Subba Rao Pavuluri, president of SIA-India and CMD of Ananth Technologies, said.

The conference will feature a dedicated session on Harnessing Space Technologies for Comprehensive Homeland Security with senior officers from the Central Armed Police Forces, state police forces and paramilitary forces as participants.

https://economictimes.indiatimes.com/news/defence/space-warfare-ai-solutions-to-defence-highlight-of-defsat-2025-next-month/articleshow/116530589.cms

THE ECONOMIC TIMES

Fri, 20 Dec 2024

Indian, Vietnam Coast Guards conduct joint sea exercise off Kochi

The Vietnam Coast Guard Ship CSB 8005 departed Kochi on Friday, after a successful visit strengthening the partnership between the Vietnam Coast Guard (VCG) and Indian Coast Guard (ICG), according to ICG officials. The four-day visit was aimed to enhance maritime cooperation and interoperability between the two maritime forces, they added.

The centerpiece of the visit was a comprehensive sea exercise code named Sahayog Hop Tac off Kochi, a press release issued by Coast Guard said.

This exercise was focused on critical maritime security issues and included a variety of scenarios, including Pollution Response Demonstration, in which Indian Coast Guard ships and aircraft showcased their expertise in responding to oil spills and other environmental hazards at sea, it stated.

The exercise also simulated Visit Board Search and Seizure (VBSS) Operations for inspecting vessels suspected of illegal activity and for counter drugs interdiction, it added.

During this exercise, Indian Coast Guard helicopter and Dornier aircraft conducted Search and Rescue drills, Pollution Response demonstrations, External Fire Fighting simulation and Medical Evacuation by helicopter, showcasing ICG ability to undertake various missions, the release said.

The exercise also included joint training to neutralise asymmetric threats.During the exercise, members from both the maritime agencies, embarked other country ship as observers. This provided the crews with the opportunity to observe operations from a varied perspective and imbibe best practice, the release said.

The joint exercises proved valuable for both the Coast Guards allowing them to hone their skills and enhance their professional outlook, it added.

The visit of the VCG CSB 8005 to Kochi serves as a powerful symbol of the growing partnership between the VCG and Indian Coast Guard through collaborative efforts, both nations are working towards a safer and secure maritime environment, the release said."

On 19 Dec 24, @IndiaCoastGuard warmly welcomed the crew of #VietnamCoastGuard Ship #CSB 8005 onboard #ICG Ship Saksham at #Kochi," Coast Guard PRO posted on 'X'.

"Inspector General Bhisham Sharma, PTM, TM, #COMCG (West) hosted #VCG Senior Colonel Nguyen Minh Khanh, Chief of Staff, Coast Guard Region 3. Further, #ICG & #VCG conducted the joint exercise SAHYOG HOP TAC off #Kochi today, strengthening professional exchanges in MPR, MSAR & Law Enforcement," the post added.

The VCG Ship CSB 8005 arrived Kochi on December 16 as a part of its ongoing overseas deployment to India. The four-day visit was marked by a series of engaging harbour activities to foster collaboration, the release said.

The activities included cross-visits, where crew members from both the VCG and ICG had the opportunity to embark ships, gaining valuable insights into their capabilities and procedures, the release said.

A beach cleanship drive at Fort Kochi and friendly volleyball match were also organised, which provided a lighthearted opportunity for crews to interact and build camaraderie, outside the professional setting, it added.

On completion of the sea exercise, the Indian Coast Guard bid ceremonial farewell as per the Maritime Customs and traditions to the visiting VCG ship and escorted the vessel till territorial waters, the release added.

https://economictimes.indiatimes.com/news/defence/indian-vietnam-coast-guards-conduct-joint-sea-exercise-off-kochi/articleshow/116512643.cms

THE WEEK

Sat, 21 Dec 2024

Inside China's expanding underground bunkers, nuclear arsenal

There is a robust and highly technologically advanced underground facility programme in China to conceal and protect the country's military forces, including weapons of mass destruction, logistics, and modernised missile, ground, air, and naval forces. There are thousands of such facilities in the country, and China is building more each year, a report by the US Department of Defence titled '2024 Report on Military and Security Developments Involving the People's Republic of China' revealed.

These bunkers enable China to protect its valuable assets from the effects of missile strikes and conceal military operations from enemies in the event of conflicts. China's emphasis on strategic deterrence has contributed to the construction of such facilities for the country’s nuclear forces, which aims to survive an initial nuclear first-strike by an enemy, the report said.

China will likely continue to develop and expand its underground facility programme to support its expanding forces and military modernisation, the report added.

Meanwhile, the report suggests that over the next decade, China is expected to continue to rapidly modernise, diversify, and expand its nuclear forces.

China "seeks a larger and more diverse nuclear force, comprised of systems ranging from low-yield precision strike missiles to ICBMs with multi-megaton yields to provide it options at every rung of the escalation ladder." the report said.

China's land-based nuclear force primarily consists of intercontinental ballistic missiles with different basing modes, complemented by theater-range road-mobile systems.

The PLARF (People's Liberation Army Rocket Force) uses a set of operational procedures to keep part of its force at heightened readiness during peacetime, the report stated and added that "This readiness posture allows the PLARF to maintain a portion of its units on a heightened state of readiness while leaving the other portion in peacetime status with separated launchers, missiles, and warheads."

PLA’s nuclear expansion and modernisation very likely are tied to its overall military strategy—seeking to close capability gaps and become a competitive global power.

https://www.theweek.in/news/defence/2024/12/21/inside-chinas-expanding-underground-bunkers-nuclear-arsenal.html

Fri, 21 Dec 2024

How capable are China's spies? US report highlights sophisticated espionage capabilities of Beijing

China appears to have a sophisticated, persistent cyber-enabled espionage system in place, seeking to procure and export controlled military items from the USA to Beijing.

The '2024 Report on Military and Security Developments Involving the People's Republic of China' released by the US Defence Department, listed a few instances of arrests that happened in the past one year to highlight China's efforts to acquire sensitive, dual-use, or military-grade equipment from the US.

These included aviation technologies, radiation-hardened power amplifiers and supervisory circuits, radiation-hardened integrated circuits, monolithic microwave integrated circuits, accelerometers, gyroscopes, naval and marine technologies, signals decoders, syntactic foam trade secrets, space communications, military communication jamming equipment, and dynamic random access memory.

In October 2023, a former identified US service member was arrested for trying to deliver national defense information to China's security services, including a device that would enable access to US secure military computer networks, the report said.

In August 2023, two US service members were arrested for transmitting sensitive military information to China. This included information on sensitive weapons, propulsion, and desalination systems of naval warships.

In another instance, a US Army intelligence analyst allegedly transmitted sensitive documents pertaining to the tactics, techniques, and procedures manuals for the HH-60W helicopter, the all-weather, supersonic stealth fighter aircraft F-22-A Raptor, intercontinental ballistic missiles, and the HIMARS mobile artillery system. The analyst was arrested. According to the report, "the analyst provided information on US military exercises, studies on major countries including China, hypersonic equipment, and the United States' potential plans during a Taiwan contingency."

In another case, a Chinese national, working for Google, was arrested for the theft and transition of artificial intelligence-related trade secrets and offering them to China-based companies.

China presents a sophisticated, persistent cyber-enabled espionage and attack threat to military and critical infrastructure systems through its efforts to develop, acquire, or gain access to information and advanced technologies, according to the report.

Telecommunications firms, service providers, and software developers too were the target of Chinese spies. "Key US targets include proprietary commercial and military technology companies and research institutions associated with defense, energy, and other sectors," the report said.

The report revealed that China seeks to create create disruptive and destructive effects to shape decision-making and disrupt military operations at the initial stages and throughout a conflict and said China's activities in cyberspace constitute "a fundamentally different, more complex, and more urgent challenge to the US national security today than they did a decade ago."

https://www.theweek.in/news/defence/2024/12/21/how-capable-are-chinas-spies-us-report-highlights-sophisticated-espionage-capabilities-of-beijing.html

THE WEEK

Sat, 21 Dec 2024

Why India is 'closely following' ballistic missile programme of Pakistan

A day after a top White House official claimed that Pakistan developing sophisticated missile technology would give it the ability to strike targets well beyond South Asia and added that the country's actions were an emerging threat to the US, India said it is closely following the ballistic missile programme of Pakistan.

MEA spokesperson Randhir Jaiswal, when asked about the country's stance on Pakistan's ballistic missile programme, said India is following all developments that have a bearing on its security "very closely" and New Delhi "takes action, as appropriate".

There have been reports of Pakistan developing increasingly sophisticated missile technology, from long-range ballistic missile systems to equipment that would enable the testing of significantly larger rocket motors.

"As you know, we follow all developments that have a bearing on our security and our interest very closely, and we take these things very seriously, and take action as appropriate," he said.

A few days ago, the US slapped sanctions on four Pakistani entities, including state-owned flagship aerospace and defence agency—National Development Complex (NDC)—on charges of contributing to Pakistan's ballistic-missile programme. The others are Akhtar and Sons Private Limited, Affiliates International and Rockside Enterprise, all based in Karachi.

The US assesses that the NDC is responsible for Pakistan's development of ballistic missiles, including the SHAHEEN-series ballistic missiles, the US State Department had said.

While Akhtar and Sons Private Limited has worked for the NDC to supply a range of equipment to Pakistan's long-range ballistic missile programme, Affiliates International has facilitated procurement of missile-applicable items for the NDC and others. Rockside Enterprise has worked for the NDC to supply a range of equipment to Pakistan's long-range ballistic missile programme, the State Department said.

All these entities "having engaged, or attempted to engage, in activities or transactions that have materially contributed to, or pose a risk of materially contributing to, the proliferation of weapons of mass destruction or their means of delivery (including missiles capable of delivering such weapons), including any efforts to manufacture, acquire, possess, develop, transport, transfer or use such items, by Pakistan," State Department Spokesperson Matthew Miller had said.

https://www.theweek.in/news/defence/2024/12/21/why-india-is-closely-following-ballistic-missile-programme-of-pakistan.html

THE WEEK

Sat, 21 Dec 2024

Plans of China's Western Theater Command for India revealed: US report details PLA's focus on '3 evil forces'

The list of core interests of China has grown over the last decade with President Xi increasingly using the terms of a national security law passed in 2015 to extend the formal status of “core interest” to territorial disputes in the South China Sea (SCS), the Senkaku Islands, and India's Arunachal Pradesh, a report by the US Department of Defence revealed.

The congressionally mandated report, titled '2024 Report on Military and Security Developments Involving the People's Republic of China' charts the current course of the country's national,

economic and military strategy, and offers insights into the strategy, current capabilities and activities, as well as its future modernisation goals of the People's Liberation Army (PLA).

The report said the Western Theater Command (WTC)— geographically the largest theater command—of China is oriented toward India and counterterrorism missions along the Central Asia borders of China. It is responsible for responding to conflict with India, border interactions with Central Asian states, and what the country refers to as the "three evil forces"—terrorism, separatism, and extremism in Tibet and Xinjiang, an autonomous territory in northwest China.

The primary focus of the WTC is on securing China's border with India. The report highlighted the 2020 clashes between soldiers of India and China in Galwan Valley—the most violent clash between the two countries in 45 years—and detailed how the theatre focuses on building infrastructure and support facilities to maintain multiple BDE deployments along the Line of Actual Control (LAC).

Detailing the readiness of PLA, the report said, the Army "continued to improve its methods and standards of training combined arms units. Training encompassed individual to collective soldier events integrating reconnaissance, infantry, artillery, armor, engineers, and signal units. In addition to continued PLAA (People's Liberation Army Army) deployments to the Indian border and Burma, the PLAA conducted multiple large-scale exercises in training areas throughout the country."

In recent cases involving land border disputes, China has sometimes been willing to compromise with and offer concessions to its neighbors, the US report said, adding, however, in the last decade, China has employed a more coercive approach to deal with disputes over maritime features, rights to potentially rich offshore oil and gas deposits, and border areas.

https://www.theweek.in/news/defence/2024/12/21/plans-of-chinas-western-theater-command-for-india-revealed-us-report-details-plas-focus-on-3-evil-forces.html

THE WEEK

Fri, 20 Dec 2024

Capabilities of LCA Tejas Mk2: Parliamentary panel explains what makes this fighter jet deadly

A parliamentary panel report, tabled in Parliament recently, stated that the Light Combat Aircraft (LCA) Tejas Mk2, which is under design and development, will be a day and night capable, all-weather multi-role combat aircraft with adequate self-defence capability to operate in a dense and hostile AD environment.

"The aircraft would be a potent platform designed around a higher thrust engine, better performance metrics featuring an integral Unified Electronic Warfare Suite (UEWS) for survivability, new Digital Flight Control Computer (DFCC) and improved maintainability

compared to the LCA Mk1/1A. LCA Mk2 is intended to replace Mirage-2000, MiG-29 and Jaguar aircraft of the IAF," the panel said.

On its predecessor, the report said IAF has received and operationalised two squadrons of Tejas Mk1 ac and these are being employed for operational roles and participated in the recently concluded international exercise Tarang Shakti.

The IAF contracted for procurement of 83 LCA Mk1A and deliveries were planned to commence from February 2024. However, the programme faced delays due to design and development issues.

"The IAF has also progressed as case for procurement of additional 97 LCA Mk1A aircraft for which AoN was accorded and RFP was issued," the report said, quoting the defence ministry. With these acquisitions, IAF will have 220 LCA Mk1 & Mk1A ac, it added.

The report also said the number of IAF fighter squadrons has reduced in recent years due to the phasing out of ageing variants of the MiG-21, the MiG-23 and the MiG-27 aircraft. According to the panel, the shortage is being addressed through "multi-pronged" approaches to minimise the impact.

https://www.theweek.in/news/defence/2024/12/20/capabilities-of-lca-tejas-mk2-parliamentary-panel-explains-what-makes-this-fighter-jet-deadly.html

ThePrint

Fri, 20 Dec 2024

From new recruits to serving soldiers, Indian Army steps up measures to assess & treat mental health

The Indian Army has introduced psychometric assessment of recruits at all training centres in order to measure a person’s personality traits, intelligence, abilities, behavioural style and aptitude.

In response to a question in the Lok Sabha, Minister of State for Defence Sanjay Seth said this evaluation at recruitment stage began from the training year 2024-25.

Highlighting other measures taken by the defence ministry for the wellness of troops, Seth spoke of counselling facilities and the training of officers in basic psychological therapy.

Mental health helplines at psychiatry centres in service hospitals have been made available, he said, adding that a tele-MANAS node has been established at Armed Force Medical College, Pune from 1 December, 2023.

This has been done in association with the health ministry. MANAS is a 24/7 mental health helpline for the armed forces.

Army personnel have also been directed to use the Ministry of Social Justice & Empowerment helpline ‘KIRAN’ for online counselling.

Seth added the defence ministry had hired psychological counsellors in stations outside military hospitals in order to maintain confidentiality. “Over 100 facilities are being established at identified locations, for which funds have already been allocated.”

Among other steps taken, the force conducts yoga and meditation as part of a unit’s routine, and ensures better manpower management and prompt redressal of grievances, the minister said. Counselling by religious teachers have also been made available where required, he added.

Also being encouraged are group sports and recreational activities, along with a liberalised leave policy to attend to domestic problems.

The authorisation of additional railway warrants—or a voucher that can be exchanged for a ticket to travel at a subsidised rate or for free—to personnel deployed in counter insurgency and counter-terrorism areas was being undertaken, the minister told the House. Reading material in vernacular languages on how to manage stress have also been made available to troops.

Seth said there has been “improved accessibility” and frequent interaction of soldiers with their leaders or commanding officers. The “buddy system”—or the pairing of two soldiers to work as one unit—has also been expanded to a group to be more effective, he added.

https://theprint.in/defence/from-new-recruits-to-serving-soldiers-indian-army-steps-up-measures-to-assess-treat-mental-health/2413487/

ANI
South Asia's Leading Multimedia News Agency

Sun, 22 Dec 2024

India to create comprehensive anti-drone unit for border security: Amit Shah

Under the patronage of President Sheikh Mohamed bin Zayed Al Nahyan, Supreme Commander of the Armed Forces, the Ministry of Defence, in strategic partnership with ADNEC Group, will be organising the International Defence Exhibition (IDEX) and the Naval Defence Exhibition (NAVDEX) 2025 on February 17-21. The globally renowned and highly anticipated events in the defence sector will also include the International Defence Conference.

The IDEX and NAVDEX 2025 serve as significant global platforms, bringing together leading government officials, executives, and experts from the defence and security sectors worldwide.

The two events provide a significant opportunity to network with investors, build new partnerships, and engage with industry leaders.

The Ministry of Defence and ADNEC Group are committed to supporting the defence and security industries as a national priority, contributing to the development of a vital sector that strengthens and enhances the UAE's national economy.

Staff Major General Pilot Faris Khalaf Al Mazrouei, Chairman of the Higher Organising Committee for IDEX and NAVDEX, and the accompanying International Defence Conference, stated: "Hosting and organising major exhibitions such as IDEX & NAVDEX has reinforced Abu Dhabi's position as a leading global destination for the defence and military industries. We are confident that these events will continue to achieve remarkable success, reflecting our commitment to building a more prosperous and secure future for the world by advancing a shared vision of maintaining global stability and security."

Staff Major General Mubarak Saeed Ghafan Al Jabri, Deputy Chairman of the Higher Organising Committee for the exhibitions, stated: "The national defence and security industries sector enjoys unlimited support from the UAE leadership who seeks to enhance the capabilities of national defence industries as a vital field aligned with the UAE's aspirations for leadership and excellence."

He added that organising IDEX & NAVDEX 2025 reflects the country's position as a leading global hub that brings together the largest specialised companies in this sector.

"These exhibitions serve as a platform to strengthen cooperation and strategic partnerships with major global companies, contributing to attracting more investments that form a key pillar in supporting the national economy, achieving sustainable development, and building competitive industrial capabilities in accordance with the highest international standards."

Humaid Matar Al Dhaheri, the Managing Director & Group CEO of ADNEC Group, said: "We anticipate that the upcoming editions of IDEX and NAVDEX will be the largest and most significant in the history of the two events. They will contribute to promoting innovation, building new business partnerships, and shaping a vision for a more secure and stable future, thanks to the distinguished global presence of defence and security sector leaders."

"ADNEC Group is committed to organising the largest and most successful editions of the exhibitions to date. And we look forward to providing an exceptional, high-value experience for all international and local exhibitors, as well as visitors from around the world," he added.

IDEX returns as a global platform to showcase the latest defence technologies and enhance cooperation between international defence entities, with the participation of leading figures in the defense and security sectors.

NAVDEX continues its role as the largest maritime defence and security exhibition in the Middle East and North Africa, focusing on maritime security and advancing efforts toward a safer future. The event will take place on the waterfront at ADNEC Marina, hosting the latest technologies, equipment, and vessels related to coastal and maritime security.

The 16th edition of IDEX 2023 and the 7th edition of NAVDEX 2023 achieved significant success, attracting 132,507 participants at ADNEC Abu Dhabi. The exhibitions featured 41 international pavilions and included 1,353 exhibitors from 65 countries.

Notable new initiatives included the IDEX NEXT_GEN a dedicated space that brought together over 100 startups from around the world, and the IDEX Think_Tank which organised a series of

sessions under the supervision of private partners and resulted in the publication of impactful strategic reports.

https://www.aninews.in/news/world/middle-east/idex-and-navdex-2025-launch-on-february-17-under-uae-presidents-patronage20241222231715/

THE HINDU

Mon, 23 Dec 2024

Pointing the beacon at India's undersea warfare capabilities

The year 2024 started on a high note for the Indian Navy, with Operation Sankalp expanding from the Strait of Hormuz to the Red Sea to ensure the safety and the security of shipping from piracy and providing assistance to ships targeted by the Houthis.

The Navy's continued response in addressing piracy, hijacking, and drone attacks on international merchant shipping has reinforced its status as a preferred security partner and first responder. In 2024, while several salient episodes marked the Navy's operational preparedness, an area that witnessed several critical developments was undersea warfare.

Pivotal developmentsOne key development was the commissioning of India's second indigenous nuclear-powered ballistic missile capable submarine (SSBN), INS Arighaat, in August 2024. Adding value to the third leg of India's nuclear triad — and hence nuclear deterrent value — the SSBN mirrors its predecessor, INS Arihant, in size and propulsion.

The boat, as submarines are known colloquially, has a higher indigenous content than INS Arihant. The advanced sonar and propulsion systems and upgraded acoustic dampening are a distinctive addition to India's underwater warfare capabilities. These capabilities were emblematically enhanced by the recent testing of the K-4 submarine-launched ballistic missile (SLBM) from INS Arighaat, with a range of 3,500 kilometres.

While the firing was successful, the results of the test parameters are awaited. Successful tests and the induction of the missile as a composite weapon package of SSBNs would place most of China under striking range.

Anti-piracy Act has been a great enabler: Navy chiefAbout a month after the commissioning of INS Arighaat, the Cabinet Committee on Security cleared the long-pending Project-77 (P-77), giving its final approval to construct two nuclear-powered attack submarines (SSNs) at a cost of ₹40,000 crore.

Delivery of the first SSN is scheduled for 2036-37 and the platform is expected to include over 90% indigenous content. The addition of the SSNs would enhance the Navy's underwater warfare capabilities, which essentially includes providing protection to deployed SSBNs. With the induction of the SSNs, India would become the only non-P5 nation operating SSBNs and SSNs.

On conventional submarines

While nuclear boats open up new vistas of capabilities, conventional boats will always be relevant. In the past, there has been discussion in the U.S. about the re-induction of non-nuclear boats, as not all undersea missions require nuclear power. In India's case, Project-75, in collaboration with France, will see the commissioning of the sixth Scorpene boat, INS Vaghsheer soon.

The Navy is looking to order three more such boats, which will add the required punch and help fill the void with the decommissioning of older boats. The efficacy of non-nuclear boats has increased with the advent of air independent propulsion (AIP).

Therefore, Project 75(I), which seeks to induct AIP-enabled boats, involves Spain and Germany as contenders to build such boats, and is expected to reach its logical conclusion when the technical and financial evaluations are completed. In all cases, indigenous content is expected to increase.

For example, the follow-on three Scorpene boats are expected to feature 60% indigenous content. In the case of Project 75(I), with the bidders, Germany's Thyssenkrupp Marine Systems (TKMS) and Spain's Navantia, accepting India's transfer of technology and indigenous content requirements, the first boat is likely to include a minimum of 45% indigenous content, rising to 60% in the sixth boat.

Another domestic development in niche undersea naval technologies is the approval of building 100-tonne Unmanned Underwater Vehicles (UUVs) at a cost of ₹2,500 crore. UUVs would add to India's undersea capabilities as a low-cost option with a high return on investment. This project is symbolic of India's positioning of niche technologies as strategic enablers to address increasingly complex and evolving threats in the maritime space.

Some of the hurdles

The approach to enhance the Navy's undersea capabilities in tandem with surface and aviation elements underscores the importance placed at various levels of the Indian government on ensuring maritime stability and security. This approach would create a balanced blue water force. However, this calls for addressing long-drawn budgetary issues to manage the mismatch between planned acquisitions and modernisation allocations and excessive time delays. Sustained funding for projects with long gestation periods, streamlined processes on specifying requirements, shortlisting original equipment manufacturers, and issuance and evaluation of tenders would require focus.

A balanced force would ensure fulfilling the Navy's strategic and operational requirements, which are indispensable for addressing the threats, challenges, and risks emanating from the maritime domain while also taking advantage of the opportunities that arise.

India aims to achieve 100% indigenous Naval platforms: ENC chief

These opportunities, especially cooperation and collaboration with strategic partners and other friendly maritime nations, would augur well not only for India's growth as a maritime nation but also support India's maritime visions of Security and Growth for All in the Region (SAGAR) and a free, open, and inclusive Indo-Pacific.

https://www.thehindu.com/opinion/op-ed/pointing-the-beacon-at-indias-undersea-warfare-capabilities/article69016503.ece

The EurAsian Times

Mon, 23 Dec 2024

India, U.S.China “Shrinks Gap” With U.S. Navy In Vertical Launch System Capability; Here’s Why VLS Is Vital For A Navy

China is rapidly narrowing the gap with the United States in vertical launch system (VLS) missile capacity, a key indicator of naval strength, according to a new analysis by the International Institute for Strategic Studies (IISS), a UK-based think tank. The report, published on December 20, disclosed that China’s Navy, known as the People’s Liberation Army Navy (PLAN), has surpassed 50% of the US Navy’s firepower in VLS-equipped surface ships as of 2024, with the disparity expected to shrink further.

The VLS is a crucial component of modern warships, which allows them to carry a range of missiles for air defense, anti-ship operations, and land attacks. The report revealed that by the end of 2024, the US Navy operated 85 VLS-equipped surface warships, just one more than China’s 84. Johannes Fischbach, a maritime research analyst at IISS who authored the report, pointed out that the PLAN has made good progress in the past two decades.

“A 20-year comparison highlights the increase in the PLAN’s capacity. While it had less than 1.5% of US Navy capacity in 2005, this grew to over 13% by 2015. As 2024 ended, this had reached more than 51%,” Fischbach noted. Between 2021 and 2022 alone, China added more than 1,260 new VLS cells to its fleet.

However, the shift is not solely due to China’s advancements. The US Navy has seen a decline in its VLS capacity, mainly due to the retirement of its aging Ticonderoga-class cruisers, which have long been the most heavily armed U.S. surface platforms in terms of VLS cells, with each ship carrying 122 cells. Moreover, the construction of new US warships has not kept pace with the diminishing number of aging vessels nor with China’s rapid production of new warships.

The report further predicted, “The gap between the capacity of the US Navy and that of the PLAN is set to continue to close for the foreseeable future.”

The Role Of VLS In Modern Naval Warfare

According to the Pentagon’s annual report on Beijing’s military, China currently commands the world’s largest navy, with more than 370 ships and submarines, including over 140 major surface combatants.This force is set to expand, with projections indicating it could grow to nearly 400 vessels by next year and reach 435 by the decade’s end.

However, the US Navy still holds several advantages. Its VLS-equipped platforms, such as the Arleigh Burke-class destroyers, are integrated with the advanced Aegis combat system, a key edge in operational experience and missile defense capabilities.

Despite the aging of some platforms, the US Navy has opted to extend the service life of its oldest Arleigh Burkes and three Ticonderoga class cruisers, postponing their retirement beyond initial plans. Meanwhile, China's modern ships, such as the Renhai-class destroyers with 112 VLS cells, are entering service at a rapid pace.

The ability to carry many vertical-launch system (VLS) cells offers several tactical advantages. It allows a warship to launch many missiles before needing to reload, a task that's difficult to accomplish at sea and typically requires a return to port.

VLS technology also provides greater flexibility and faster salvos than traditional arm launchers. For example, the US-made Mark 41 VLS can fire various missiles to target land, surface, air, and space-based threats. It can even launch anti-submarine rockets (ASROC) that deploy torpedoes into the ocean from precise locations chosen by the ship's captain.

The US has already faced high munitions expenditure rates during its conflict with Houthi rebels in Yemen. However, a potential conflict with China would demand far greater munitions use. While the number of VLS cells serves as an important metric of a navy's firepower, it does not encapsulate the full complexity of naval warfare.

Other critical elements, such as the dimensions and operational capabilities of launch tubes and the variety of munitions employed, play a vital role in shaping combat effectiveness. In a potential US-China conflict, the efficacy of air defenses and countermeasures would be equally pivotal. Moreover, naval warfare extends beyond surface ships. Anti-ship missiles can be launched from land-based platforms or aircraft, and submarines with missile tubes are also critical. The US Navy maintains a considerable underwater advantage over China in this area.

The US Navy retains an edge in its VLS-equipped submarine force, a critical component that China is only now beginning to develop. The US's fleet of Ohio-class nuclear-powered guided-missile submarines, each carrying 154 VLS cells, remains unmatched. However, with the impending retirement of the Ohio-class submarines, this advantage may diminish in the coming years.

https://www.eurasiantimes.com/china-shrinks-gap-with-u-s-navy-in-vertica/

The EurAsian Times

Sun, 22 Dec 2024

India's Third Aircraft Carrier Absolutely On Cards! Navy Chief Says "Has Clearly Emerged A Necessity"

Though China has been expanding its influence in the Indo-Pacific, India's Chief of Naval Staff, Admiral Dinesh Kumar Tripathi, says that "The Indian Navy remains combat ready, credible, cohesive, and future-ready force committed to ensuring safe seas and secure maritime environment

in consonance with Prime Minister Narendra Modi's vision of Security And Growth for All in the Region(SAGAR)."

In an exclusive interview, Admiral Tripathi added that "The Indian Navy, along with other stakeholders, is fully prepared to safeguard the maritime interests of the nation. We have credible capability and are continuously evolving to meet the new challenges."

"We are constantly fine-tuning our concept of operations and formulating our capability perspective plans to cater to developing threats. Our efforts are not aimed at any specific nation but rather at ensuring the security of India's maritime interests and contributing to a stable and prosperous Indo-Pacific.

"In the last 10 years, China has modernized its Navy at an intense pace and has inducted more warships than the size of the IN (Indian Navy). Consequently, China has maintained a permanent presence in the IOR (Indian Ocean Region) under the pretext of an Anti-Piracy Escort Force (APEF) since 2008.

"In addition, Chinese Research Vessels, Satellite Tracking Ships and Deep-Sea Fishing Boats are also being increasingly deployed in the IOR. The Chinese are also investing in port and maritime infrastructure development projects worldwide, with about 20 of them being undertaken in the IOR itself, reflecting their desire to stay in the region.

"Pertinently, augmentation of existing Naval facilities and construction of a new naval base, besides existing full-fledged naval facilities and submarine bases in our immediate neighborhood, could facilitate the enhanced presence and sustenance of Chinese warships in the Region.

"Our focus is on building credible deterrence by modernizing our fleet with capable multi-dimensional platforms while also integrating emerging technologies, including long-range surveillance and space-based sensors as well as autonomous vessels, to monitor and secure critical sea lanes of communication and choke points.

"We are also enhancing our operational reach and MDA through increased deployments, joint exercises, and collaborations with like-minded navies across the world. Partnerships through bilateral and multilateral exercises like RIMPAC, MALABAR, MILAN, and initiatives like IONS (Indian Ocean Naval Symposium) help strengthen collective maritime security and ensure an enabling environment for maritime trade and commerce."

When asked about the state of balance between the Indian Navy's 'capacity' and 'capabilities' with reference to dimensions such as surface, subsurface, aerospace, and cyber on the one hand and spheres such as 'brown water' and 'blue water' on the other, Admiral Tripathi said: "The Indian Navy envisions the creation of a well-balanced multi-dimensional networked force that is capable of delivering ordnance on target and effects across the spectrum of conflict.

This involves augmentation of existing capacities and induction of novel capabilities, including in the space and cyber domains. Force structuring and capability development initiatives are continually calibrated based on threat assessment, technological advancements, and the evolution of warfare. It also caters for platforms/equipment envisaged to be deployed across our Area of Interest, encompassing both 'brown' as well as 'blue waters'."

In this regard, Admiral Tripathi identified the following thrust areas:

(a) Blue water platforms for deterrence, power projection, sea control, SLOC (Sea lines of communication) security, and other roles.

(b) Adequate sea denial capability through submarines, heavily armed surface combatants, MMCBs (Mobile Missile Coastal Battery), and autonomous systems.

(c) Shore-based and integral naval aviation assets (crewed and autonomous) for maritime surveillance, Fleet Air Defence, maritime and shore strike, ASW, Special Operations, SAR, intelligence gathering, and Fleet logistics/communications.

(d) Platforms for Low-Intensity Maritime Operations (LIMO), Offshore Security, Coastal Security, and Local Naval Defence, with a mix of manned and unmanned solutions, including UAVs/USVs/UUVs.

(e) Adequate expeditionary capability to achieve desired power projection, influence events ashore in crises, support land campaigns during the conflict, address 'Out of Area Contingencies' (OOAC), undertake Military Operations Other Than War (MOOTW), and render succor/assistance through HADR/ NEO.

(f) Platforms for Special Forces to enhance niche capabilities to conduct direct action missions, Maritime Interdiction Operations (MIO), and other envisaged roles.

On the question of the Indian Navy's future role in the proposed theatre commands, the Navy Chief pointed out that "India is a maritime nation with increasing maritime interests across the vast expanse of IOR and beyond.

Addressing vital threats and challenges in the maritime domain necessitates an integrated approach and high levels of synergy in terms of strategy, planning, and application of force.

"The Indian Navy is committed to synergizing our command, control, communication, and combat maneuvers with our counterparts from the Army and Air Force. We are also working towards the optimization of assets and resources between the Services. The release of Joint Doctrine for Amphibious Operations and Joint Doctrine for Cyberspace Operations is aimed at achieving uniformity of thought at the doctrinal level.

"At the organizational level, we are undertaking cross-staffing of personnel at various levels to build institutional synergy. The recent contract conclusion for 31 MQ-9B HALE RPAs steered by the Indian Navy is a classic case of integrated capability development to jointly optimize national resources.

"Further, Joint Logistics Nodes for integration of logistics support, Joint Service Study Groups for achieving commonality in aviation assets, and Integrated Maintenance Working Groups for maintenance of common systems across three services are some of the initiatives towards increased interoperability and maximization of resources between the Services.

"Notwithstanding the formal announcement of theaterisation, the Indian Armed Forces and the Navy, in particular, are far more 'Joint' and 'Integrated' than most of us believe… this was amply

showcased by the synergy displayed in the daring operation undertaken by Indian Naval Ships to rescue MV Ruen from Somali pirates, through a well-coordinated deployment of IN Marine Commandos from an Indian Airforce C-17, about 1400 nautical miles from our shore."

At a time when the narrative of India needing more submarines rather than going for a third aircraft carrier is gaining currency, Admiral Tripathi was emphatic that "Aircraft Carrier has clearly emerged as a necessity for the nation, as was also highlighted by the Standing Committee on Defence (SCOD) in its 36th Report of the 17th Lok Sabha.

"Aircraft Carriers are central to the Indian Navy's concept of operations. A Carrier Battle Group centered on an Aircraft Carrier is a means of projecting maritime power at sea. It is a self-contained and composite force capable of undertaking a wide range of operational tasks that no other platform can undertake. The ship and its airwing – fighters and helicopters – constitute a war-fighting system that has inherent flexibility as well as mobility and can be rapidly re-deployed based on emerging scenarios.

"Considering the vast expanse of the area of operations and emerging threats/challenges in our areas of interest, it is envisaged that IN would need to conduct concurrent Sea Control operations in geographically distant locations. This can be achieved only through Carrier Battle Groups centered on aircraft carriers, fortified by multi-role destroyers, frigates, and corvettes, which, through three-dimensional offensive capability, can wield power to affect, impact, and influence the behavior of regional/extra-regional players in support of national maritime interests.

"The indigenous construction of Vikrant has generated significant employment opportunities, not just in shipyards, but also in related ancillary industries, resulting in visible plow back into the economy. The Economic Survey 2022-23 tabled in the Parliament recognized this plow-back and highlighted that every rupee spent on shipbuilding triggers circulation of 1.82 rupees.

"The Indigenous Aircraft Carrier, INS Vikrant alone engaged about 500 MSMEs and created employment for 12,000 people from ancillary industries, in addition to 2000 shipyard employees with an employment multiplier effect of 6.4.

"Additionally, IN has gained considerable expertise through the design and construction of Vikrant. Therefore, the construction of not just aircraft carriers but any naval platform comes with a host of accompanying economic benefits for industry and contributes in great measure to the vision of *Aatmanirbharta*.

"We must remember that an aircraft carrier is not just a floating sovereign airfield that could be deployed hundreds of miles away from our coast, but also a symbol of national pride, naval might, and a decisive military capability that only a select few in the world possess and operate."

On the question of what lessons the Indian Navy has learned from the ongoing war in Ukraine, Admiral Tripathi replied, "We have witnessed the continuation of the Russia-Ukraine conflict for more than 1000 days without much pullback from either side. Whilst the conflict has been largely terrestrial, it also expanded into the maritime domain incurring significant losses to both sides.

“The employment of asymmetric tactics by both sides has been noteworthy, with drones and uncrewed systems emerging as force multipliers, providing real-time intelligence, surveillance and targeting capabilities. It is important that we don’t learn wrong naval lessons from this conflict – be it the sinking of the Russian Cruiser Moskva by a shore-based Anti-Ship Missile or many images of unmanned systems delivering a knockout punch – since all these have happened in the confined brown waters of a rather large lake called the Black Sea, and not in the blue waters of oceanic space where classic Naval Battle happens.

“Sustained war-waging capability by strengthening and reinvigorating indigenous military-industrial complex has been a critical operational imperative. The conflict has also reinforced the need for flexibility in naval strategies and the ability to adapt to emerging threats.

“The Indian Navy’s focus on modernizing its fleet, adopting cutting-edge technologies as well as the continuous evolution of warfighting concepts, is aimed at ensuring that we remain prepared for the changing character of warfare.

“Along with the Russia-Ukraine conflict, we have also imbibed lessons from the ongoing conflict in West Asia, as well as the conflict between Armenia and Azerbaijan. These conflicts have brought out:

- The ubiquity of conventional warfare, such as the use of brute force, attrition, collateral damage, and destruction.
- Busted the myth of short and swift wars.
- Usage of the maritime domain to influence events ashore. This has reiterated the traditional role of Navies in protecting maritime trade and commerce through ISLs and SLOCs.
- Effectiveness of low-cost lethal kinetic solutions in creating disproportionate impacts.
- Development of indigenous defense industry capabilities with the ability to surge capacity when required through a steadfast commitment to *Aatmanirbharta*.
- Need for constant innovation to achieve superiority.
- Requirement of integration across domains, including space, cyber, and cognitive, for military operations.“

https://www.eurasiantimes.com/india-navy-fully-prepared-to-face-the-chinese-challenges/

Press Information Bureau
Government of India

Ministry of Science & Technology

Fri, 20 Dec 2024

Foldscope Microscopy empowering farmers in Chhattisgarh to detect plant diseases, take S&T aided agricultural decisions

Farmers spanning across 20 districts of Chhattisgarh now have a magic wand to aid pest and disease detection, soil quality assessment, and water analysis in their agricultural fields, fostering informed decision-making and sustainable practices at minimal cost in their farm lands.

Foldscope, a portable and affordable microscope, is the new tool that is empowering communities in the state to take agricultural decisions with the help of frugal science and hence helping agricultural livelihoods. It is helping in in-situ diagnosis and digital cataloging of plant-pathogenic fungi through Foldscope Microscopy.

The initiative spread across the districts of Raigarh, Janjgir-Champa, Balodabazar-Bhatapara, Raipur, Dhamtari, Durg, Rajnandgaon, Mohla-Manpur-Ambagarh Chowki, Koriya, Surguja, Jashpur, Korba, Sakti, Mahasamund, Bilaspur, Mungeli, Kabirdham, Bemetara, Kanker, and Bastar spanning over 30 villages is being implemented by ICAR - National Institute of Biotic Stress Management. It is supported under SYST programme of SEED Division of the Department of Science and Technology (DST).

Capacity building and sampling activities are being undertaken to identify the plant pathogenic fungal diseases -- Powdery mildew, Leaf blight, Leaf spot and post-harvest diseases and so on at In-situ condition with the help of the foldscope.

A total 16 fungal diseases and their causal organisms were identified based on morphological structure of pathogen and host species such as Golovinomyces cichoracearum, Erysiphe polygoni, Erysiphe cichoracearum, Leveillula aurica, Penicillium digitatum, Ustilago tritici, Albugo bliti, Fusarium oxysporum, Alterneria sp and Rhizophus sp.

In addition, five biopesticides have been tested and two bioagents --. Trichoderma viride and Pacelomyces spp have been successfully observed under Foldscope and with Fruiting bodies of mushroom and Pleurotus spp (oyster mushroom).

Foldscope microscopy was also used for assessing semen quality in straws for cattle artificial insemination (AI). This could be a pioneering application with significant potential to enhance conception rates and improve the grading of indigenous cattle breeds.

Rural youth and students received hands-on training to independently demonstrate foldscope microscopy to local communities to expand the reach of the initiative. Training sessions, demonstrations, workshops, and awareness campaigns were organized to promote the use of Foldscope for in-situ diagnosis of plant pathogenic fungi and zoonotic diseases. This helped reach out to diverse audience, including farmers, rural youth, college students, agriculture and horticulture extension officers, veterinary officers, and faculty members.

The Foldscope's frugal science approach is transforming livelihoods in Chhattisgarh by bringing advanced microscopy within the reach of rural communities. Farmers use it to detect crop pests, diagnose plant diseases, and assess soil and water quality, enabling timely and informed actions for sustainably enhancing the livelihoods of farmers.

Documented posts on observations and events were shared on the MICROCOSMOS Foldscope Community platform (URL: https://microcosmos.foldscope.com/author/2294), fostering engagement and knowledge exchange within the broader scientific community.

https://pib.gov.in/PressReleasePage.aspx?PRID=2086502

THE ECONOMIC TIMES

Sat, 21 Dec 2024

ISRO to study how crops grow in space on PSLV-C60 mission

Demonstration of seed germination in outer space, a robotic arm to catch a tethered debris there, and testing of green propulsion systems are some of the experiments planned on the POEM-4 -- the fourth stage of ISRO's PSLV rocket that remains in orbit after launching a satellite.

The PSLV-C60 mission, slated for an yearend launch, is scheduled to place the twin satellites 'Chaser and Target' to demonstrate the space docking technologies that are crucial for building India's space station.

The PSLV Orbital Experiment Module (POEM) will carry 24 experiments -- 14 from various ISRO labs and 10 from private universities and start-ups -- to demonstrate various technologies in space.

ISRO plans to grow eight cowpea seeds from seed germination and plant sustenance until the two-leaf stage in a closed-box environment with active thermal control as part of the Compact Research Module for Orbital Plant Studies (CROPS) developed by the Vikram Sarabhai Space Centre.

The Amity Plant Experimental Module in Space (APEMS), developed by Amity University, Mumbai, plans to study the growth of spinach in a microgravity environment.Two parallel experiments will be carried out simultaneously -- one on POEM-4 in space and one on the ground at the university.

The experiment's outcome will provide insights into how higher plants sense the direction of gravity and light.

The Debris Capture Robotic Manipulator, developed by VSSC, will demonstrate the capturing of tethered debris by a robotic manipulator using visual servoing and object motion prediction in the space environment.

The robotic manipulator will be capable of capturing free-floating debris and refuelling tethered and free-floating spacecraft in future POEM missions.

Mumbai-based start-up Manastu Space will test Vyom-2U, the green propulsion thruster, that uses a blend of hydrogen peroxide and in-house additives as fuel, with the goal of providing a safer and higher-performing alternative to hydrazine for space applications.

The Varuna payload, developed by Piersight Space-Ahmedabad, is an in-orbit demonstration of a Synthetic Aperture Radar (SAR) in a CubeSat form factor.

This mission marks the initial step towards establishing a constellation of SAR and Automatic Identification System (AIS) satellites, aiming to provide persistent, near real-time monitoring of all human and industrial activity at sea.

https://economictimes.indiatimes.com/news/science/isro-to-study-how-crops-grow-in-space-on-pslv-c60-mission/articleshow/116569045.cms

THE ECONOMIC TIMES

Sat, 21 Dec 2024

ISRO & ESA agree to cooperate on astronaut training, mission implementation

ISRO on Saturday said it has entered into an agreement with European Space Agency (ESA) for cooperation on activities related to astronaut training, mission implementation, and research experiments. The agreement was signed by ISRO Chairman and Secretary, Department of Space (DOS) Dr S Somanath and ESA Director General Dr Josef Aschbacher.

The agreement provides a framework for cooperative activities in human space exploration and research, especially in areas such as astronaut training, support for experiment development and integration, using ESA facilities on the International Space Station (ISS), human and biomedical research experiment implementation as well as joint education and outreach activities, ISRO said in a statement.

For the upcoming Axiom-4 mission in which ISRO's Gaganyatri and ESA's astronaut are crew members, both agencies are collaborating to implement shortlisted experiments by Indian Principal Investigators on ISS, it said.

Further, participation in ESA's human physiological studies, technology demonstration experiments as well as joint educational outreach activities are also being pursued, it added.

Somanath in his remarks highlighted that ISRO has defined a roadmap for human space flight activities and the recent approval of Bharatiya Antariksh Station (BAS) (India's proposed indigenous space station) presents an opportunity to develop interoperability between human spaceflight platforms.

Dr. Aschbacher thanked Dr Somanath for speaking at the ESA Council and remarked that the agreement provides a strong basis for cooperation between the two agencies.

The leadership of both agencies expressed satisfaction with the progress of joint activities for the upcoming Axiom-4 mission and underlined the need for continuing cooperative activities in the area of human spaceflight in the future, ISRO added.

https://economictimes.indiatimes.com/news/science/isro-esa-agree-to-cooperate-on-astronaut-training-mission-implementation/articleshow/116533645.cms

THE TIMES OF INDIA

Fri, 20 Dec 2024

ISRO starts assembly of HLMV3 for Gaganyaan mission at SDSC for first uncrewed flight

Indian Space Research Organisation continues to make significant milestones in space exploration with its continuous efforts to launch India's first crewed spaceflight under the Gaganyaan mission.

The Indian astronaut called Gagannauts into space aboard Human - Rated Launch Vehicle Mark-3 (HLVM3). On Wednesday, ISRO initiated the assembly of Human - Rated Vehicle Mark-3 (HLVM3) as a critical component of India's Gaganyaan mission which aims to achieve the country's first crewed spaceflight. This coincides with the 10th anniversary of the Launch Vehicle Mark-3 (LVM3-X/CARE) mission as a foundational role in the Gaganyaan program mission.

ISRO HLVM3 successfully launched on December 18

On December 18 2024 at 8:45am, ISRO began the launch campaign for the HLVM3-G1/0M-1 featuring the full-flex seal nozzle of the S200 motor at the Satish Dhawan Space Center (SDSC) in Sriharikota. This step acts as a major step towards the launch vehicle for the future space missions. Some of the additional components following the launch vehicle include S200 motors, control systems, and avionics to be integrated.

LVM3’s human-rating enhances safety for future missions

HLVM3 assembly as the crucial development is the successful human rating of the LVM3 launch vehicle. The human-rating involves the rigorous testing to ensure the vehicle's systems meet the

safety standards being required for the human spaceflight. All the systems have undergone extensive ground and flight tests even in off-nominal conditions to verify their performance and reliability under the human safety requirement, confirmed ISRO.

LVM3, a human rating process, ensures to handle the human-space travel complexities. The inclusion of the Crew Escape System (CES), a safety feature designed to protect astronauts during every phase of ascent, adds a layer of redundancy to the vehicle's safety mechanisms. The CES system, which is operational from the launch pad until its separation after the atmospheric flight regime, significantly boosts the confidence in the upcoming manned missions.

Specifications of HLVM3

- HLVM3 is a massive, three stage vehicle standing 53m tall and 640 tonnes in weight.
- Capable of carrying payloads up to 10 tonnes into Low Earth Orbit
- This crew module will be a part of the Gaganyaan mission designed with multiple redundancies and enhanced safety features to protect the astronauts.
- It can operate under the most extreme conditions of human spaceflight.

The Gaganyaan program is not only an important aspect of India's space exploration goals, but it is also a necessary precursor to the Bharatiya Antariksh Station (BAS). The Gaganyaan mission's experience will be valuable in the construction and operation of India's prospective space station. ISRO's long-term strategy includes applying Gaganyaan's lessons to the development of more advanced space technology and a sustainable space infrastructure.

Development in India's Gaganyaan human spaceflight program

The LVM3-X mission, which launched on December 18, 2014, was critical in the development of India's human spaceflight program. The mission successfully transported a 3,775 kg crew module to a suborbital altitude of 126 km, where it was manoeuvred with thrusters to guarantee a successful reentry.

The module was designed as part of Gaganyaan's pre-project operations and data from this flight will have a direct impact on the design and the testing of the crew module for the subsequent mission.

Crew module to ensure safe human spaceflight for Gaganyaan

The crew module from the Bay of Bengal on December 18 2024 was a watershed moment that confirmed the ability of the vehicle to safely return from space highlighting the importance of the mission. Information collected during the mission has been an integral part in refining the crew module and its associated systems to ensure that they are capable of supporting human spaceflight in future.

Leveraging LVM3 data to enhance the Gaganyaan mission and future of manned missions

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mission. Information collected during the mission has been an integral part in refining the crew module and its associated systems to ensure that they are capable of supporting human spaceflight in future.

Leveraging LVM3 data to enhance the Gaganyaan mission and future of manned missions

As ISRO prepares for the uncrewed Gaganyaan mission, the insights gained will be pivotal for the future of human spaceflight in India. With the human-rating of the LVM3 vehicle and the successful integration of key systems, the nation is now closer than ever to achieving its goal of sending astronauts to space.

The upcoming uncrewed flight will serve as a critical testing ground for the various systems and technologies involved, paving the way for a successful manned mission.

ISRO's successful assembly of the HLVM3 vehicle and the completion of key tests mark significant progress in India’s space exploration journey. The Gaganyaan mission not only aims to send humans to space but also plays a key role in laying the foundation for more ambitious future projects, including the Bharatiya Antariksh Station. The lessons learned from this program will help shape India’s space exploration goals for the coming decades.

https://timesofindia.indiatimes.com/science/isro-starts-assembly-of-hlvm3-for-gaganyaan-mission-at-sdsc-for-first-uncrewed-flight/articleshow/116480273.cms

Hindustan Times

Sun, 22 Dec 2024

NASA's Parker Solar probe to make historic closest approach to the Sun

The Parker Solar Probe was launched in 2018 to get a close-up look at the sun. Since then, it has flown straight through the sun's corona: the outer atmosphere visible during a total solar eclipse.

The next milestone: closest approach to the sun. Plans call for Parker on Tuesday to hurtle through the sizzling solar atmosphere and pass within a record-breaking 3.8 million miles (6 million kilometers) of the sun's surface.

At that moment, if the sun and Earth were at opposite ends of a football field, Parker "would be on the 4-yard line,” said NASA's Joe Westlake.

Mission managers won't know how Parker fared until days after the flyby since the spacecraft will be out of communication range.

Parker planned to get more than seven times closer to the sun than previous spacecraft, hitting 430,000 mph (690,000 kph) at closest approach. It's the fastest spacecraft ever built and is outfitted

with a heat shield that can withstand scorching temperatures up to 2,500 degrees Fahrenheit (1,371 degrees Celsius).

It'll continue circling the sun at this distance until at least September. Scientists hope to better understand why the corona is hundreds of times hotter than the sun's surface and what drives the solar wind, the supersonic stream of charged particles constantly blasting away from the sun.

The sun's warming rays make life possible on Earth. But severe solar storms can temporarily scramble radio communications and disrupt power.

The sun is currently at the maximum phase of its 11-year cycle, triggering colorful auroras in unexpected places.

"It both is our closest, friendliest neighbor," Westlake said, "but also at times is a little angry."

https://www.hindustantimes.com/science/nasas-parker-solar-probe-to-make-historic-closest-approach-to-the-sun-101734886988468.html

THE HINDU

Fri, 20 Dec 2024

Gaganyaan-G1 mission to validate critical technologies in the run-up to manned flight: VSSC Director S. Unnikrishnan Nair

Gaganyaan-G1, the first of three un-crewed test missions that will lead up to India's maiden human spaceflight, is designed to mimic - end to end - the actual flight and validate critical technologies and capabilities including the Human-rated Launch Vehicle Mark-3 (HLVM3), S. Unnikrishnan Nair, Director, Vikram Sarabhai Space Centre (VSSC), has said.

The Indian Space Research Organisation (ISRO) began the 'stacking,' or assembly, of HLVM3 at the Satish Dhawan Space Centre, Sriharikota, on December 18, coinciding with the tenth anniversary of the sub-orbital Crew Module Atmospheric Re-entry Experiment (CARE) mission of 2014.

Speaking to The Hindu about the upcoming HLVM3-G1 mission, Dr. Unnikrishnan Nair said the integration of the crew module, which will fly aboard the mission, is progressing at the VSSC, which is ISRO's lead facility for launch vehicles at Thumba here. Once the crew module is ready, it will be transferred to the U.R. Rao Satellite Centre (URSC), Bengaluru, for integration with the service module.

Orbital module

The service module and the crew module together make up the orbital module. "After a series of tests including thermo-vacuum tests at the URSC, the orbital module will be transported to

Sriharikota to be placed aboard the launch vehicle," said Dr. Unnikrishnan Nair, who was the first Director of the Human Space Flight Centre (HSFC), Bengaluru.

The HLVM3-G1 mission will place the orbital module in an 170 km x 43 km elliptical orbit around the earth. It will subsequently be manoeuvred into a circular orbit. Once the orbital module de-orbits, the crew module, which has enhanced safety margins and multiple redundancies, will separate for controlled re-entry into the earth's atmosphere and splashdown in the Bay of Bengal.

The HLVM3-G1 mission is designed to validate technologies and abilities needed for a manned mission. "It is designed as an end-to-end mission covering lift-off, injection into orbit, 'circularisation' of orbit, re-entry and splashdown," Dr. Unnikrishnan Nair said. The G1 mission will also flight-test the humanoid robot Vyommitra developed by the ISRO Inertial Systems Unit (IISU).

The ISRO recently announced that the human-rating of the LVM3 vehicle has been completed and all systems have been "tested for enhanced reliability." The related tests had taken close to three years, according to Dr. Unnikrishnan Nair.

The launch vehicle components - the S200 solid rocket boosters, the L110 liquid stage and the C32 cryogenic stage - have arrived at Sriharikota after clearing the human-rating process.Compared to the conventional LVM3 (formerly known as Geosynchronous Satellite Launch Vehicle Mk-III), the HLVM3 has distinct features.

"The aerodynamic configuration is different. Normally, you have a bulbous payload fairing atop the vehicle protecting the satellite. Here, we have the crew escape system at the very top. Inside it will be the orbital module. The crew module is connected to the crew escape system. The overall height of the vehicle has increased by around 10 metres to 53 metres," Dr. Unnikrishnan Nair said.

The ISRO is planning two more uncrewed missions - G2 and G3 - before the actual manned flight. These two test missions will be identical in their parameters, Dr. Unnikrishnan Nair said.

https://www.thehindu.com/sci-tech/science/gaganyaan-g1-mission-to-validate-critical-technologies-in-the-run-up-to-manned-flight-vssc-director-s-unnikrishnan-nair/article69009281.ece

THE HINDU

Sun, 22 Dec 2024

Prof. Neena Gupta: 'Not every problem will give you a eureka moment' National Mathematics Day

On the way to a conference dinner in Bengaluru in 2014, Neena Gupta, then a postdoctoral student, was discussing a fundamental problem in algebraic geometry with a field expert, another student, and her grand supervisor, S.M. Bhatwadekar.

The expert said the problem had already been solved by an Indian. Bhatwadekar pointed at Gupta and said, “You are sitting beside that Indian.”

“That kind of recognition is rare,” Gupta, currently a professor in the Theoretical Statistics and Mathematics Unit at the Indian Statistical Institute, Kolkata, and the recipient of the 2024 Infosys Prize 2024 in mathematics.

She won the prize for her groundbreaking work on a fundamental problem in algebraic geometry called the Zariski cancellation problem, posed in 1949 by Oscar Zarsiki.

Remembering the forgotten women of science in India

Gupta also won the Shanti Swarup Bhatnagar Prize in Mathematical Sciences in 2019, the Nari Shakti Puraskar in 2021, and the DST-ICTP-IMU Ramanujan Prize in 2021.

“It was a long journey to arrive at the solution. When I first encountered the problem, I thought I could solve it. My supervisor, Dr Amartya Kumar, very kindly told me that it is a very difficult problem. I spent a lot of time reading research papers and took some time to solve it. It was the first time I tried an innovative approach,” she told The Hindu.

That wasn’t the end. As questions poured in regarding the solution, she dived deeper into the problem. With the help of her then PhD students Parnashree Ghosh and Ananya Pal, she developed a theory around the solution that could then be used to find a solution in a higher dimension.“In this field there is no end to learning,” Gupta said.

“One of the best ways to enhance your knowledge is to collaborate with people. You can learn from papers and books but when you collaborate your learning multiplies.”

She said her mentor played an important part in her success. “I came to know of this area of my research from Dr Kumar’s lecture series that he was giving in the department. After I started working with him, he suggested papers and relevant research to further my knowledge. Mathematics is not a subject you can pursue alone. You need to talk to people, even to know what to read and how to proceed in research. He has been patient and kind with my questions and always encouraged me to pursue my interests.”

“You have to really like what you are doing. Academia can get quite depressing. Not every problem will give you a eureka moment, but you have to persevere and work hard to stay on in this field,” she added.

Gupta supports the same mantra when speaking to young female researchers who want to pursue a career in mathematics.

“Every person is different, they think in their own unique way. Their background and thought process often bring a different perspective which may actually help solve problems,” she said.

“This is not just in the case for women but for men, too: you need to have perseverance and put in hard work.”

She also acknowledged women in mathematics face unique difficulties. “Thirty years back you would find almost nobody’s studying beyond class 10 or 12 but now things have changed and there

are is a lot of participation of women, at least until graduation, but really few of them continue for PhD and continue, decide to do research."

"Very often, women will leave in between because [they have] the dual responsibility of taking care of the family as well as excelling in their careers. That makes it very difficult. So having a supportive family is very important."

"Things are changing now. We have professors (Raman) Parimala and Sujatha (Ramdorai) showing us the way. The government has several scholarships and fellowships for women who want to get back into research," she added.

She also said institutions such as the Infosys Science Foundation are playing a role. According to her, the recognition they confer through their awards recognises the hard work of researchers as well as popularises their work, which fosters more interest and collaboration.

https://www.thehindu.com/sci-tech/science/national-mathematics-day-neena-gupta-women-in-mathematics/article69013899.ece

The Indian EXPRESS

Sun, 22 Dec 2024

OpenAI unveils new o3 model: What is it and how is it different from o1?

OpenAI has announced o3, the improved version of its most advanced AI model to date. With reasoning, the o1 model, launched in September, takes its time to think over responses to prompts from users. The new model is capable of delivering responses in a more step-by-step, logical manner. OpenAI CEO Sam Altman, during the launch, said that the company is viewing o3 as the beginning of the next phase of AI. He said that these models can be used to do more complex tasks that require "a lot of reasoning".

When it comes to performance, the new o3 model surpasses several benchmarks when compared to o1. These include complex coding-related skills, competency in solving scientific problems, and even advanced mathematical problems. Reportedly, the model is claimed to be three times better at answering questions from ARC-AGI tests. In simple words, ARC-AGI is a test designed to assess an AI model's ability to comprehend and perform tasks without relying on its pre-trained knowledge. In essence, o3 models are capable of solving some extremely difficult math and logic problems that they are being exposed to for the first time.

As of now, OpenAI is starting with public safety testing, indicating the company's cautious approach. If early results and benchmark performances are to be believed, o3 models could mark a significant step forward in the advancement of AI models.

What is o3 and how is it different from o1?

o3 is a frontier AI model that has been developed to offer advanced reasoning and intelligence across a range of complex tasks. It has been announced alongside a smaller version, o3 Mini. The o3 model has been designed to solve some challenging problems in coding, general intelligence, and math. OpenAI has highlighted some notable benchmarks that show how o3 is capable of tackling reasoning of more complex problems, something that has never been done before by older models.

While o1 scored a 48.9 per cent in SWE-bench verified, the o3 model achieved 71.7 per cent accuracy. The SWE-bench verified is a set of tests to assess the coding ability of a model. Similarly, when it comes to programming (Codeforces), o1 scored 1891, while o3 scored 2727, much beyond the predecessor. Also, o3 surpassed o1 in mathematical reasoning by securing 96.7 per cent on the AIME 2024, compared to 83.3 per cent scored by 01. Similarly, o3 showcased unparalleled performance in science benchmarks. Especially on GPQA Diamond, a test that has PhD-level questions, o3 scored 87.7 per cent accuracy, in contrast to o1's 78 per cent.

On the other hand, the EpochAI Frontier Math benchmark is among the toughest mathematical benchmarks with problems that have never been published before. The o3 model scored 25.2 per cent in this test, while older AI models from across the industry have only managed to cross 2 per cent.

Is this the best reasoning model?

Perhaps the most significant aspect of the o3 model is its scores in the ARC-AGI benchmark. ARC-AGI stands for Abstraction and Reasoning Corpus for Artificial Intelligence, and it was developed by French software engineer and AI researcher Francois Chollet. The test showcases an AI model's ability to learn new skills from limited examples. While traditional benchmarks test pre-trained knowledge or pattern recognition skills, the ARC-AGI has tasks that challenge models to learn from rules and transformations that it has never done before. This is usually a task that humans can manage naturally, something that AI has always struggled with.

ARC-AGI is particularly tough as its tasks require direct reasoning skills, and models cannot rely on solutions previously memorised or templates. This pushes the model to adapt to entirely new challenges with each test. Each task as part of ARC-AGI is unique, as one may require the model to trace patterns, while others may require them to reason about numerical patterns. With its expansive tasks and diversity, ARC AGI is a reliable barometer to see if an AI model can think and learn like humans.

On the other hand, the o3 Mini is an affordable alternative to the o3 model. According to OpenAI, the mini version is ideal for tasks that need higher accuracy amid resource constraints. The o3 mini brings adaptive thinking, allowing users to adjust reasoning efforts based on the complexity of a task. The model's low-effort reasoning offers speed and efficiency needed for simple tasks, and for complex tasks, it uses higher effort for accuracy. The high-effort mode matches the larger o3 model but at a significantly lower cost. According to OpenAI, the flexibility of the o3 Mini model makes it best suited for developers and researchers.

When will o3 be available?

Both o3 and o3 mini are currently limited to researchers through OpenAI's safety testing program. Reportedly, the 03-mini model will be available towards the end of January 2025. The full o3 model will be available after the safety testing.

https://indianexpress.com/article/explained/explained-sci-tech/openai-new-o3-model-9737712/