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समाचार पत्रों से चयनित अंश
Newspapers Clippings

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

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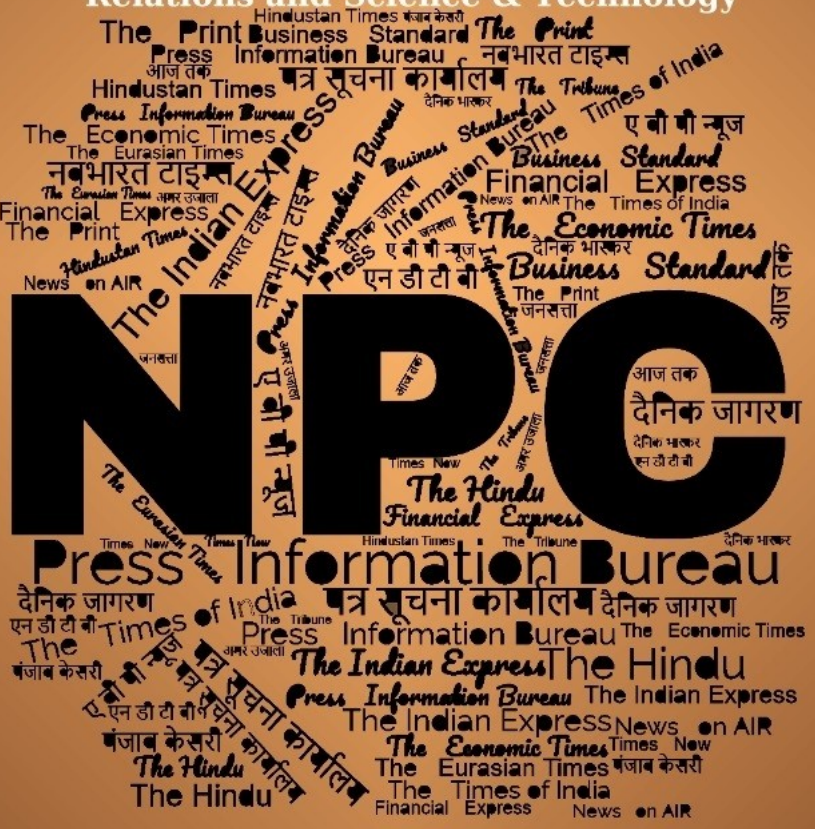

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Defence News

Defence Strategic: National/International

Strengthening Maritime Co-Operation: Chief Of Navy, Rnzn, Visits India

Source: Press Information Bureau, Dt. 18 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2112362

RAdm Garin Golding, Chief of Navy, Royal New Zealand Navy (RNZN), is in India on an official visit from 16 to 21 Mar 25, towards strengthening maritime cooperation and bilateral ties between the two Navies. His engagements include high-level discussions and operational interactions at New Delhi and Mumbai.

The visit began on 17 March with RAdm Golding attending the Raisina Dialogue. On 18 March, he laid a wreath at the National War Memorial, paying tribute to India's fallen heroes. This was followed by a ceremonial Guard of Honour and a bilateral meeting with Admiral Dinesh K Tripathi, CNS, where discussions focused on enhancing naval ties, joint training initiatives, and maritime cooperation. The New Zealand Navy Chief will also be interacting with senior defence leadership, including Chief of the Defence Staff, Chief of the Army Staff, Chief of the Air Staff and the Defence Secretary, reaffirming New Zealand's commitment to regional security

He will also be going to Mumbai where he will interact with the personnel of Western Naval Command, visit indigenous destroyer INS Surat, and explore avenues for future collaboration in ship maintenance and technology. On 20 March, a significant highlight will be the reception onboard HMNZS Te Kaha, hosted by the Prime Minister of New Zealand, further strengthening India-New Zealand maritime relations. RAdm Garin Golding's visit marks a significant step in the evolution of India-New Zealand defence relations, fostering deeper naval cooperation and reinforcing mutual interests in the Indo-Pacific.

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Indian And French Navies Set For The 23rd Edition Of Bilateral Naval Exercise - Varuna 2025

Source: Press Information Bureau, Dt. 18 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2112430

The 23rd edition of the bilateral naval exercise VARUNA, a testament to the enduring maritime partnership between India and France, is set to take place from 19 to 22 Mar 25. Since its inception in 2001, VARUNA has evolved into a cornerstone of cooperation, showcasing the two nations'

commitment to enhancing naval interoperability and operational synergy. This year's edition promises an exhilarating array of maritime exercises and complex manoeuvres across the sub-surface, surface, and air domains. The joint participation of the aircraft carriers Vikrant and Charles de Gaulle, alongside their fighter aircraft, destroyers, frigates, and an Indian Scorpene-class submarine, highlights the collaborative strength of both Navies.

VARUNA 2025 will feature advanced air defence drills and fighter exercises, including mock air-to-air combat between the French Rafale-M and Indian MiG-29K, designed to refine tactical and operational capabilities. Anti-submarine warfare exercises will provide rigorous training in underwater domain awareness, while surface warfare operations will demonstrate synchronised manoeuvres and engagements by the Indian and French fleets. Maritime patrol aircraft will enhance situational awareness, and replenishment-at-sea exercises will fortify logistical cooperation. This collaboration underscores the shared vision of safeguarding a free, open, and secure maritime environment.

By fostering the exchange of best practices and mutual understanding, the exercise reaffirms the ability of both nations to operate seamlessly in even the most complex maritime scenarios. VARUNA 2025 stands as a powerful reminder of the deep bonds uniting the Indian and French Navies in their pursuit of maritime peace and security.

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Director General Defence Intelligence Agency to embark on Australia Visit from March 19

Source: Press Information Bureau, Dt. 18 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2112082

Director General Defence Intelligence Agency (DG DIA) Lt General DS Rana is set to embark on an official visit to Australia from 19-21 March 2025. This visit aims to further strengthen bilateral defence intelligence cooperation and enhance strategic engagement between India and Australia. During the visit, DG DIA will hold discussions with senior Australian Defence officials, including the Deputy Secretary, Department of Defence, Director General of National Intelligence (DGNI), Chief of Defence Intelligence and the Chief of Joint Operations of the Australian Defence Forces (ADF). These high-level interactions will focus on intelligence-sharing mechanisms, regional security cooperation, and avenues for further collaboration in the Indo-Pacific region.

As part of the visit, DG DIA will also visit the Headquarters Joint Operations Command (HQ JOC) to gain insights into Australia’s operational framework and joint command structures. He is also scheduled to interact with the Director of the Australian Geospatial Organisation (AGO). Additionally, engagements at the Lowy Institute, a leading international policy think tank, will facilitate discussions on strategic defence and security dynamics.

Honouring the strong defence ties and shared military traditions between India and Australia, DG DIA will lay a wreath at the Australian War Memorial. The visit will also include attending the Last Post Ceremony, a solemn tribute to the fallen soldiers, symbolising mutual respect and

remembrance for the sacrifices made in service to the nation. This visit underscores the deepening intelligence and security cooperation between India and Australia, reinforcing both nations' commitment to maintaining peace, stability, and security in the region.

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Raksha Mantri meets Netherlands Defence Minister in New Delhi

Source: Press Information Bureau, Dt. 18 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2112311

Raksha Mantri Shri Rajnath Singh held a meeting with the Defence Minister of the Netherlands Mr Ruben Brekelmans in New Delhi on March 18, 2025. They discussed elevating the bilateral cooperation in areas like defence, security, information exchanges, Indo-Pacific and new & emerging technologies.

The two Ministers explored the possibilities of collaboration in shipbuilding, equipment and space sectors, optimising the complementariness in skills, technology & scale of the two countries. They also discussed working together in domains like Artificial Intelligence and related technologies, besides connecting the respective defence technology research institutes and organisations. In a post on X after the meeting, Raksha Mantri stated that India looks forward to further elevating its defence partnership with the Netherlands.

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"Equipping Pakistan with arms undermines stability": Defence Minister Rajnath Singh tells Dutch counterpart

Source: The Economic Times, Dt. 18 Mar 2025,
URL: https://economictimes.indiatimes.com/news/defence/equipping-pakistan-with-arms-undermines-stability-defence-minister-rajnath-singh-tells-dutch-counterpart/articleshow/119168676.cms

India has urged the Netherlands to refrain from supplying arms, weapon systems, platforms, and military technologies to Pakistan, citing concerns over the latter's long-standing support for cross-border terrorism. Defence Minister Rajnath Singh made this statement during a meeting with his Dutch counterpart, Ruben Brekelmans, on Tuesday. The two nations discussed various areas of bilateral cooperation, including defence, security, information sharing, maritime collaboration in the Indo-Pacific, and emerging technologies such as artificial intelligence (AI) and drones. However, the focal point of the conversation was Singh's firm stance on the issue of arms sales to Pakistan.

India's message to its allies

"Equipping Pakistan with defence equipment and technologies undermines regional security and stability," Singh told Brekelmans, according to sources familiar with the discussions. Singh

emphasised that India has been combating terrorism sponsored by Pakistan in Jammu and Kashmir and other parts of the country for decades. "India tells all friendly countries that they should not arm Pakistan in any way due to its state policy of fueling terrorism in other countries," he added.

The Netherlands has previously supplied two Alkmaar-class mine countermeasures vessels, also known as mine hunters, built at the Van der Giessen-de Noord shipyard in Alblasserdam. Additionally, the Netherlands is providing Pakistan with 1,900-tonne multi-role offshore patrol vessels from Damen Shipyards. Several Dutch companies are also engaged in military collaborations with Pakistan, particularly in the naval sector, sources said. In recent diplomatic discussions, India has taken a more assertive stance on combating terrorism, including raising concerns over Sikh separatism.

Modi govt's stance on extremism

On Monday, Prime Minister Narendra Modi discussed with New Zealand's Prime Minister Christopher Luxon the need for continued cooperation to tackle pro-Khalistani separatists operating in New Zealand. Similarly, Singh recently urged the US to designate Sikhs For Justice (SFJ), a group banned in India for promoting secessionist activities, as a foreign terrorist organization.

The India-Netherlands meeting also explored opportunities for collaboration in sectors like shipbuilding, equipment manufacturing, and space technologies. Both sides discussed leveraging their complementary strengths in technology and scale to enhance bilateral cooperation. "We also discussed working together in domains like AI and related technologies, connecting the defence technology research institutes and organizations of the two countries," a defence ministry official stated.

Singh highlighted India's growing "vibrant innovation and industrial ecosystem" and encouraged Dutch armament companies to integrate Indian vendors into their supply chains. "I am delighted to meet the young and dynamic defence minister of the Netherlands. The two of us reviewed the full range of bilateral defence cooperation, and we look forward to further deepening and elevating our defence partnership," Singh said in his closing remarks.

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Indian Army deploys Vehicle Mounted Infantry Mortar System near LAC

Source: Janes, Dt. 18 Mar 2025,
URL: https://www.janes.com/osint-insights/defence-news/land/indian-army-deploys-vehicle-mounted-infantry-mortar-system-near-lac

The Indian Army has deployed an unknown number of Mahindra Defence Systems Limited's (MDSL's) 4×4 Vehicle Mounted Infantry Mortar Systems (VMIMSs) near the Line of Actual Control (LAC). The Indian Army's Trishakti Corps announced the deployment on its official social media account on 14 March. According to the service, the VMIMS is deployed in the northeastern state of Sikkim, which shares a border with China, Bhutan, and Nepal.

The Indian Ministry of Defence (MoD) published a request for proposals (RFP) in January 2023, seeking to fast-track the acquisition of 50 automated infantry mortar systems mounted on 4×4 high-mobility light vehicles for the Indian Army. MDSL's VMIMS was selected by the MoD to fulfil this requirement.

The VMIMS consists of an MDSL ALSV 4×4 armoured vehicle fitted with a two-door cab and an Alakran-L deployable mortar system equipped with an 81 mm mortar.

Janes reported in 2024 that the deliveries of the VMIMS commenced in 2023 and were scheduled to conclude by the end of 2024. The VMIMS comprises Milanion NTGS' Alakran-L automated, deployable mortar system fitted with an 81 mm barrel mounted onto the rear of a 4×4 Armored Light Specialist Vehicle (ALSV) built by MDSL.

Milanion NTGS told Janes in 2024 that the VMIMS requires a crew of two to operate. It can accommodate 72 81 mm mortar bombs, with 36 mortar bombs stowed in compartments located on each side of the vehicle behind its armoured cab. The 81 mm mortar has a range of 7.2 km and a maximum rate of fire of 20 rds/min.

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India must act as a unifier in the Indian Ocean Region

- by Arun Prakash, former Chief of Naval Staff

Source: The Indian Express, Dt. 19 Mar 2025,

URL: https://indianexpress.com/article/opinion/columns/india-must-act-as-a-unifier-in-the-indian-ocean-region-9893485/

K M Panikkar, eminent Indian diplomat, historian, and strategic thinker, said in a 1945 essay: “While to other countries, the Indian Ocean is only one of the important oceanic areas, to India it is the vital sea…” In contemporary India, apart from the Navy, most others have paid scant attention to Panikkar’s writings, and to his emphasis on the creation of an Indian Ocean identity. We need to note that unlike most other parts of the world, the Indian Ocean Region (IOR) has historically

lacked forums and institutions that could facilitate dialogue or help create a cooperative response to developments affecting the whole region. There has never been a security architecture in the IOR, because diversity, combined with chauvinistic self-interest, has prevented the formation of functional, effective regional institutions.

Past attempts to give substance to the idea of the Indian Ocean as a unified geopolitical space have thrown up organisations whose acronyms constitute a veritable “alphabet soup” (IORA, SAARC, BIMSTEC, IPOI, CSC and IONS). For a number of reasons, including lassitude on the part of the Ministry of External Affairs of India, most of these endeavours, bar the Indian Ocean Naval Symposium (IONS) have failed to gather substantial momentum. The emergence of the US-origin “Indo-Pacific” paradigm, in the last decade, has also served to divert attention from such endeavours.

Against this backdrop, the Indian Ocean Conference (IOC), a “consultative forum for countries in the Indian Ocean Region” organised annually since 2016 by the Ministry of External Affairs in association with the BJP think-tank, India Foundation, appears to have attained considerable traction and participation. The forum focuses on the ways and means of implementing SAGAR, or “Security and Growth for All in the Region”, the watchword created by Prime Minister Narendra Modi in 2015 for IOR maritime cooperation/diplomacy.

Delivering the keynote address at the eighth edition of the IOC, held recently in Muscat, External Affairs Minister S Jaishankar referred, without naming names, to the “churn” being experienced at two geographic extremities of the IOR, that is, the ongoing Middle East conflict and the threat posed to international shipping by the Houthi rebels, as well as to tensions across the South China Sea arising from “stronger assertions of interests” and “unilateral changes to the status quo” (presumably) by China. From India’s own experience, he cited the importance of “adhering to agreements and understandings” as a central element for ensuring stability and predictability.

As far as the remainder of the IOR is concerned, Jaishankar pointed to certain economic, developmental, environmental and maritime security-related issues that impacted all nations alike. He then identified a list of 10 examples where, according to him, India continued to contribute by “shouldering responsibilities, stepping up in times of trouble and providing leadership where required”.

This is a list guaranteed to warm the cockles of a sailor’s heart, because almost all the examples cited are covered under the rubric of “maritime diplomacy”, actively and regularly practised by the Indian Navy (IN). Many will see this as validation of the IN’s 2007 Maritime Strategy, which declared: “The main business of major navies in the 21st century is to use warships to support foreign policy…”

There has been an enduring debate in India’s strategic circles about the inadequate use of military power to advance the nation’s foreign policy interests. There is a view that India’s external objectives could have been far better served if the military had been given a greater role in the formulation and implementation of foreign and security policies. India’s great-power ambitions and its quest for a place on the international high table, it is felt, cannot be achieved relying merely on “yoga and Bollywood”. We need to shed inhibitions about the display and deployment of military power.

India's maritime diplomacy had actually made its mark in December 2004, when the Great Asian Tsunami hit the region. Within hours, the IN reached out with alacrity, not just to India's stricken citizens but also to its Sri Lankan, Maldivian and Indonesian neighbours in dire need. The humanitarian assistance and disaster relief (HADR) rendered by India and the IN left a deep impression on our neighbourhood. This image was strongly reinforced by subsequent sea-lift operations mounted by the IN as a "first responder" to evacuate refugees fleeing from disaster-stricken or conflict zones. In order to realise its true potential as a "preferred security partner" and "first responder" in the IOR, New Delhi needs to develop a fully funded programme for security and HADR assistance, including amphibious heavy-lift capability and a hospital ship. To ensure timely delivery of assistance, the impediments and delays arising from lack of MoD-MEA coordination need to be eliminated.

An important component of India's evolving maritime diplomacy has been the creation of a strong Maritime Domain Awareness (MDA) capability. This enables the IN to share, in real time, a multidimensional maritime traffic picture with the neighbouring Seychelles, Mauritius, Maldives, and Sri Lanka. The IN has also been helping island nations safeguard their vast exclusive economic zones against poachers and smugglers by means of aerial and ship patrols

Maritime diplomacy is a flexible instrument that can be used to convey messages and influence events by offering a choice of naval actions, ranging from peaceful cooperation at one end to compellence and deterrence at the other. Even though they are not designed for this role, warships have many attributes that make them useful diplomatic instruments.In the emerging international environment, maritime diplomacy will have an increasingly important role to play, because, apart from its "soft power" and humanitarian aspects, it can help contain, resolve and prevent conflict.

For this to happen, navies, bureaucracies, diplomats and statesmen need to be on the same page and evolve a strategic approach to maritime diplomacy, within the overall ambit of a national security strategy. All this would require a "whole of government" approach, which is yet to emerge in our system.

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India's $74 Billion Defense Budget Fueling the Rise of a Military Superpower

Source: Republic World, Dt. 18 Mar 2025,
URL: https://www.republicworld.com/defence/indian-armed-forces/indias-74-billion-defense-budget-fueling-the-rise-of-a-military-superpower

India's aerospace and defence (A&D) sector is on an aggressive growth trajectory, shaking off its long-standing dependence on imports and stepping into the global spotlight. Once heavily reliant on foreign suppliers, the industry is now carving out a name for itself, with a market valuation of USD 26.78 billion in 2023, projected to nearly double to USD 48.41 billion by 2032. The driving forces? Cutting-edge technology, an expanding private sector, and a government laser-focused on self-reliance.

Building a Strong Foundation

India’s defence ecosystem isn’t just about policy; it’s about infrastructure and industry muscle. With 41 ordnance factories, nine defence public sector undertakings (DPSUs), and over 100 private companies, the sector is evolving into a formidable industrial base. The "Make in India" campaign has been instrumental in shifting gears, pushing local manufacturers to step up and reduce import dependency.

What’s changed? Indian defence firms are no longer just assembling parts—they’re designing, engineering, and exporting. Advanced manufacturing techniques, Industry 4.0 technologies like automation and data analytics, and a steady infusion of precision engineering have elevated India’s standing. The country isn’t just making weapons and aircraft—it’s making them to international standards.

Government-Backed Momentum

If there’s one thing India isn’t doing, it’s holding back on defence spending. With a whopping USD 74.7 billion defence budget for 2024, the country ranks among the world’s biggest spenders. And the focus? Keeping things local. The Defence Procurement Procedure (DPP) gives Indian manufacturers an edge, ensuring more military contracts land at home rather than overseas.

But it doesn’t stop there. The government has pumped resources into two defence industrial corridors in Uttar Pradesh and Tamil Nadu, designed to supercharge domestic production. The Defence Testing Infrastructure Scheme (DTIS), backed by INR 400 crore, is another game-changer, setting up state-of-the-art testing facilities in partnership with private firms.

Foreign Investors Take Notice

India’s rise in aerospace and defence isn’t just about domestic efforts—it’s about global collaboration. Major industry players are paying attention. In December 2022, Collins Aerospace doubled down on India by opening its Global Engineering and Technology Centre and India Operations Centre in Bengaluru.

Foreign Direct Investment (FDI) policies have been loosened to allow up to 74% FDI through the automatic route and 100% through government approval. The result? More joint ventures, more tech transfers, and deeper integration into the global defence supply chain.

Making in India, Selling to the World

India isn’t just producing for itself—it’s exporting. By 2025, the government is targeting INR 1.75 lakh crore in defence manufacturing revenue, with INR 35,000 crore expected from exports. The Technology Development Fund (TDF) has seen a significant boost, with per-project funding rising from INR 10 crore to INR 50 crore, fueling innovation among startups and MSMEs.

The Defence Research and Development Organisation (DRDO) is playing a crucial role in this shift. More than 5,000 companies have engaged with its TDF initiative, resulting in 163 indigenized technologies—including a successfully tested Power Takeoff (PTO) shaft for the Light Combat Aircraft (LCA) Tejas. The message is clear: India is no longer just assembling fighter jets; it’s developing the tech behind them.

The Tech Edge

Artificial Intelligence (AI), big data analytics, and next-gen manufacturing techniques are rapidly becoming the backbone of India's A&D sector. Thanks to international partnerships, technology transfers are bridging the expertise gap, helping Indian firms build the kind of sophisticated military hardware once dominated by Western manufacturers.

With local firms gaining expertise in high-tech solutions, India is no longer seen as a low-cost producer—it's becoming a serious contender in advanced defence technology. Beyond the numbers, the industry is creating real economic impact. The defence industrial corridors in Tamil Nadu and Uttar Pradesh are driving employment, skilling local talent, and expanding India's high-tech workforce. Global collaborations have sharpened expertise, while increased R&D investment has accelerated innovation across the sector.

The Road Ahead: India's Big Global Push

The 2024–25 Interim Union Budget has reinforced the government's commitment to defence, with higher allocations for infrastructure and modernization. India has also granted 606 industrial licenses to 369 defence companies, making it easier for firms to ramp up production.

Looking ahead, India is setting its sights on USD 6.02 billion in defence exports by 2028–29, a target that could firmly establish the country as a global defence supplier. With increased government backing, growing international credibility, and a strong shift toward self-reliance, India's A&D sector isn't just catching up—it's setting the pace for the future.

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As Army's officer cadre faces shortage of 17 per cent, intake of women up by 80 per cent

Source: The Tribune, Dt. 18 Mar 2025,
URL: https://www.tribuneindia.com/news/india/as-armys-officer-cadre-faces-shortage-of-17-per-cent-intake-of-women-up-by-80-per-cent/

Even as the Indian Army faces a shortage of officers, amounting to almost 17 per cent of its authorised strength, the allocation of vacancies for women officers has witnessed an increase by 80 per cent in the current fiscal year. "Vacancies have been increased from 80 per year to 144 per year in 2024-25," Parliament's Departmentally Related Standing Committee on Defence observed in its report tabled on March 17. The strength of women officers in the Army, excluding those in the medical cadre, is about 1,800.

Vacancies for women officers are allotted based on the organisation's requirements. Currently, they are permitted to join all arms and services except the Infantry and the Armoured Corps. Last year, Artillery, a combat arm, was also opened for women officers. They are being inducted into the Army through the National Defence Academy, Short Service Commission into technical and non-technical streams, the National Cadet Corps, and the Judge Advocate General's Department. Induction of women through departmental entries in the Remount and Veterinary Corps and the Territorial Army has also commenced.

The Committee noted that the authorised strength of officers in the Army, excluding the medical stream, is 50,538, whereas the posted strength is 42,095. This accounts for a shortfall of 8,443 officers or 16.71 per cent of the authorisation. Regarding the rank and file, the Army has a shortage of 7.72 per cent at the level of junior commissioned officers (JCOs) and other ranks. Their posted strength is 11.05 lakh against the authorised strength of 11.98 lakh.

According to the report, the central government has sanctioned the recruitment of 1,700 women into the rank and file of the Army in a phased manner. Currently, their number is 210, and training of an additional 100 women for the Corps of Military Police is underway. In the Indian Air Force, the shortage of officers (excluding medical) is 1,013 against the sanctioned strength of 12,929. A few years ago, the IAF had brought the shortage down to zero. Women officers comprise about 14 per cent of the IAF's officer cadre, which is the highest among the three services. The posted strength of airmen is 1,39,876 against an establishment of 1,46,030, leading to a deficiency of 6,154 in the ranks. This is expected to be mitigated to some extent by 2,317 recruits that are undergoing training at various IAF institutes.

The committee was appraised by service representatives that several proposals have recently been implemented to increase the intake of officers. These include setting up a Young Leaders Training Wing at Officers Training Academy, Chennai, for training serving soldiers, Approval of a Technical Entry Scheme, after 10+2 on 3+1-year model, which reduces training time by a one year and ensures early availability of officers, and reforming the selection procedures to increase the percentages of intake for pre-commissioning training.

The IAF has also revamped its induction plans so as to gradually bring the strength at par with the sanctioned establishment. It was also brought out that while adequate candidates register for joining the IAF as officers, the number of candidates who eventually get commissioned varies.

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Indian Army inks ₹197.35 Crore deal with Ashok Leyland for 500 Short Chassis Buses

Source: New Indian, Dt. 18 Mar 2025,
URL: https://www.newindian.in/indian-army-inks-%E2%82%B9197-35-crore-deal-with-ashok-leyland-for-500-short-chassis-buses/

The Indian Army has entered into a ₹197.35 crore contract with Ashok Leyland Defence Systems Ltd for the procurement of 500 pre-fabricated short chassis buses. These vehicles are designed to operate in rugged mountainous terrains, enhancing the Army's operational reach. The short chassis buses are built with reinforced structures and incorporate advanced technology and safety features. According to Ashok Leyland, these 4×2 configuration buses are powered by a 105 kW engine, achieving a top speed of 80 km/h, with a gross vehicle weight of 9,440 kg. Their robust design ensures reliable performance in challenging environments, aligning with the Army's logistical requirements.

This procurement falls under the 'Buy (Indian-IDDM)' category, emphasizing Indigenous Design, Development, and Manufacturing. Such initiatives are pivotal in boosting domestic defense

manufacturing capabilities and generating employment, resonating with the 'Aatmnirbhar Bharat' (Self-Reliant India) vision.

Ashok Leyland has been a consistent partner in strengthening India's defense logistics. In recent years, the company secured orders worth ₹800 crore to supply 4×4 and 6×6 logistics vehicles for the Army, intended for towing light and medium guns and transporting ammunition. The acquisition of these buses is part of a broader modernization strategy by the Indian Army. Recent initiatives include the integration of advanced technologies such as artificial intelligence, robotics, and drones, reflecting a commitment to transforming into a technologically adept force.

Additionally, the Army has been focusing on enhancing operational efficiency and adopting cutting-edge warfare technologies to align with its Vision 2047 objectives. The procurement of these 500 pre-fabricated short chassis buses from Ashok Leyland signifies a strategic enhancement of the Indian Army's logistical and operational capabilities. This move not only strengthens defense preparedness but also reinforces India's commitment to self-reliance and indigenous manufacturing in the defense sector.

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India-Made World's First Operational EV For Tactical Defence Undergoes Military Trials

Source: Times Now, Dt. 19 Mar 2025,
URL: https://www.timesnownews.com/auto/electric-vehicles/india-made-worlds-first-operational-ev-for-tactical-defence-undergoes-military-trials-article-119189514

Bengaluru-based EV startup Pravaig's all-terrain stealth vehicle, Veer -- the world's first operational EV designed for tactical defense use -- has undergone military trials and won the prestigious iDEX award from the Ministry of Defence.

"In a major step towards strategic autonomy, Pravaig has won the prestigious iDEX Award for its VEER Electric Tactical All-Terrain Vehicle (E-TATV) -- a cutting-edge, highly stealthy vehicle designed for forward patrolling, reconnaissance, and ISR operations," Pravaig Dynamics said in a post on X. Atima Corporation, a wholly-owned subsidiary of Pravaig, won the iDEX Award by the Defence Innovation Organisation (DIO), under the aegis of the Department of Defence Production in the Ministry of Defence, "for deepening India's sovereignty by building cutting-edge defence technologies and reinforcing the country's strategic autonomy."

The scheme for iDEX-Innovations for Defence Excellence was launched in May 2021 by DIO to foster innovation and technology development in the Defence sector. The mission is to build, own and operate India's defence technology. The award is considered the first step towards induction into Indian Defence Services.

Pravaig said technology dependency on foreign entities proved to be an Achilles' heel for not just Ukraine, but even for India, as evidenced by the GPS denial by the US during the Kargil War. The iDEX Award is conferred for deepening India's sovereignty by building cutting-edge defence technologies and reinforcing the country's strategic autonomy.

The mission is clear -- to ensure that India builds, owns, and operates its own advanced defence systems, free from external control. Pravaig VEER is "built in India, for India", the firm said. "With the Pravaig VEER, India is asserting its control over critical military technologies, ensuring full sovereignty over its national security infrastructure," it said.

VEER has class-leading stealth and is extremely powerful, military-grade and fully field-repairable. India will have complete data ownership with no foreign control. The vehicle has been field tested at difficult terrains and altitudes. "Pravaig builds products that leapfrog India's capabilities," it said. The startup also manufactures high-precision batteries for EVs.

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भारतीय वायुसेना को क्यों चाहिए अधिक ताकत, जानें चीन, पाकिस्तान से कितनी चुनौती

Source: NavBharat Times, Dt. 18 Mar 2025,
URL: https://navbharattimes.indiatimes.com/india/indian-air-force-need-more-power-to-counter-china-pakistan-advanced-fighter-plane/articleshow/119151422.cms

वायुसेना प्रमुख एयर चीफ मार्शल एपी सिंह ने हाल ही में एक टीवी इंटरव्यू में कहा कि भारत के पास भले छठी पीढ़ी के लड़ाकू विमान नहीं हैं, लेकिन ऐसे पायलट हैं, जो छठी पीढ़ी के लड़ाकू विमान उड़ा सकते हैं। भारतीय वायुसेना पर सभी को गर्व है, लेकिन यह बात दर्शाती है कि हमें आधुनिक लड़ाकू विमान चाहिए।

पड़ोसियों को बढ़त

चीन ने पहले ही छठी पीढ़ी के लड़ाकू विमान विकसित कर लिए हैं, जबकि भारत के पास अब भी 4.5 पीढ़ी के राफेल और सुखोई-30 जैसे विमान हैं। पाकिस्तान भी जल्द ही चीन में बने पांचवीं पीढ़ी के विमान अपने बेड़े में शामिल करने वाला है। यह भारत के लिए चिंता की बात है।

एयरफोर्स का बेड़ा घटा

भारत जिस स्वदेशी 5-जी विमान (AMCA) का विकास कर रहा है, वह एक दशक से पहले नहीं मिलने वाला। इसके अलावा, वायुसेना के लड़ाकू विमानों की संख्या घटकर 30 स्क्वाड्रन रह गई है, जबकि कम से कम 42 स्क्वाड्रन होने चाहिए। पाकिस्तान और चीन लड़ाकू विमानों को लंबी दूरी तक मार करने वाली मिसाइलों से लैस कर रहे हैं। भारत भी अपने विमानों पर मिसाइलें लगा रहा है।

आकाश में ताकत

तेजी से बदलती तकनीक के दौर में सैन्य हथियारों की ताकत और उनकी भूमिका में भी तेजी से परिवर्तन हो रहा है। किसी देश को दुश्मन पर बढ़त हासिल करनी है तो सिर्फ टैंक और तोपों से काम नहीं चलेगा, आसमान में भी प्रभुत्व बनाना होगा। इसी कारण बिना पायलट वाले ड्रोन भी विकसित किए जा रहे हैं। लड़ाकू विमानों की क्षमताओं को चौथी पीढ़ी से बढ़ाकर पांचवीं और छठी पीढ़ी तक अपग्रेड किया जा रहा है। हालांकि इतना ही काफी नहीं। जब तक इन विमानों पर लंबी दूरी तक मार करने वाली उन्नत मिसाइलें तैनात नहीं होंगी, तब तक ये दुश्मन के खिलाफ पूरी तरह प्रभावी साबित नहीं हो पाएंगे।

भारत का 'अस्त्र'

हवा से हवा में मार करने वाली मिसाइलों को लड़ाकू विमानों से दागा जाता है। ये मिसाइलें दुश्मन के विमानों को आसमान में ही नष्ट करने में सक्षम होती हैं। इन्हें 'बियॉन्ड विजुअल रेंज' (BVR) यानी नजरों से दूर स्थित लक्ष्य को मार गिराने वाली मिसाइल कहा जाता है। भारतीय वैज्ञानिकों ने इसी श्रेणी की 'अस्त्र' मिसाइल विकसित की है, जो 100 किलोमीटर तक दुश्मन विमान को निशाना बना सकती है।

बड़ी सफलता

'अस्त्र' का ताजा परीक्षण पिछले 12 मार्च को स्वदेशी तेजस लाइट कॉम्बैट एयरक्राफ्ट (LCA) पर किया गया। हालांकि, इसे करीब सात साल पहले ही सुखोई-30 MKI पर तैनात किया जा चुका था। लेकिन अब इसे स्वदेशी

तेजस विमान पर तैनात करने की सफलता से भारतीय वैज्ञानिकों ने LCA की मारक क्षमता को और मजबूत कर दिया है।

भारतीय वायुसेना की क्षमता

भारतीय वायुसेना ने इसके पहले राफेल पर 150 किलोमीटर तक मार करने वाली मेटियोर एयर-टू-एयर मिसाइलें तैनात की हैं, लेकिन इनकी संख्या सीमित है। मिराज-2000 लड़ाकू विमानों पर 80 किलोमीटर तक मार करने वाली माइका मिसाइलें भी तैनात हैं। रूस से आयातित आर-73 और आर-77 एयर-टू-एयर मिसाइलें भी भारतीय वायुसेना के बेड़े में शामिल हैं, लेकिन इनकी रेंज कम है।

चीन की चुनौती

भारतीय वायुसेना को आसमानी युद्ध में बढ़त बनाने के लिए अधिक दूरी तक मार करने वाली एयर-टू-एयर मिसाइलों की जरूरत है। दुश्मन वायुसेना ने 100-400 किलोमीटर तक मार करने वाली मिसाइलें तैनात कर दी हैं। चीन ने अपने देश में ही विकसित दुनिया की सबसे लंबी मारक दूरी वाली एयर-टू-एयर मिसाइलें तैनात कर भारतीय वायुसेना के सामने बड़ी चुनौती खड़ी कर दी है। उधर, चीन और तुर्किये की मदद से पाकिस्तान को भी सफलता मिल चुकी है।

भारत के लिए मुश्किल

अगर चीन या पाकिस्तान के लड़ाकू विमानों पर ऐसी मिसाइलें लगी हों जो भारतीय विमानों से ज्यादा दूर तक मार कर सकती हैं, तो हमारे लिए मुश्किल हो सकती है। इससे पहले कि भारतीय पायलट दुश्मन के विमान को देख कर उस पर निशाना लगा सकें, दुश्मन पहले ही हमला कर देगा। यही वजह है कि विभिन्न देशों के बीच अपने हथियारों के जखीरे में अधिक से अधिक दूरी वाली मिसाइलों को शामिल करने की होड़ मची हुई है।

सर्जिकल स्ट्राइक

2019 में पाकिस्तान के बालाकोट इलाके में सर्जिकल स्ट्राइक के अगले दिन, जब पाकिस्तान के F16 लड़ाकू विमानों ने धावा बोला, तब भारतीय वायुसेना को लंबी दूरी तक मार करने वाली एयर-टू-एयर मिसाइलों की जरूरत महसूस हुई। पाकिस्तानी हमले को रोकने के लिए भारतीय विमानों ने जवाबी कार्रवाई की। इसमें भारत ने पाकिस्तान का एक F16 लड़ाकू विमान मार गिराया, जबकि पाकिस्तान ने भी भारत के एक मिग-21 विमान को गिरा दिया।

आगे के लिए सबक

1971 के युद्ध के बाद भारत और पाकिस्तान के बीच यह आसमान में पहली आमने-सामने की लड़ाई) थी। इससे सबक लेते हुए भारतीय वायुसेना को न केवल आधुनिक लड़ाकू विमानों से अपनी ताकत बढ़ानी होगी, बल्कि चीन और पाकिस्तान की तुलना में अधिक दूरी तक मार करने वाली एयर-टू-एयर मिसाइलों की भी तैनाती करनी होगी। इससे भारतीय वायुसेना की ताकत बढ़ेगी।

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"Ship Wars": China Builds More Vessels By Tonnage Than U.S. Has Produced Since WW-II; Can U.S. Make A Comeback?

Source: The EurAsian Times, Dt. 19 Mar 2025,
URL: https://www.eurasiantimes.com/ship-wars-china-builds-more-vessels-by-tonnage/

China has implemented shipbuilding policies that have proved detrimental to the US and its allies' shipbuilding industry. Japan and South Korea, which once dominated the market, are now struggling to keep pace with China. The share of the US commercial shipbuilding sector has plummeted to just 0.11 percent of the global total in 2024. The Chinese Navy is undoubtedly the biggest naval force in the world, with a flotilla of over 370 ships and submarines. The US has the advantage in terms of guided-missile cruisers and destroyers. Also, its 11 aircraft carriers ensured that it has more tonnage than China.

However, the latest report by the Center for Strategic and International Studies (CSIS) has revised the estimated vessel numbers for the PLA-Navy in its latest report earlier this week. In its report "Ship Wars – Confronting China's Dual-Use Shipbuilding Empires," the CSIS says that China would have a 425-ship strong fleet by 2030, compared to the US Navy's 300 vessels. The 2024 report from CSIS indicated that the PLA Navy operated 234 warships against the US Navy's 219.

China's rising maritime force is indicative of the exponential rise that its shipbuilding sector has undergone. In a matter of two decades, China has been catapulted to the status of a major shipbuilding country from a peripheral player in the sector. The major force behind this meteoric rise has been the CSSC, the largest shipbuilder in the world today.

The shipbuilder constructed the country's first aircraft carrier, Shandong. Now, its Jiangnan Shipyard in Shanghai is building the country's second homebuilt aircraft carrier, Fujian, equipped with an Electromagnetic Aircraft Launch System (EMALS). More than the sophistication of the warships being constructed by the shipbuilder, the US has been alarmed by the rate at which they are built. The world is fast becoming dependent on Chinese shipyards to meet demand for its commercial trading vessels.

Such is the dominance of the Chinese shipbuilders that even the US military is dependent on the Chinese warships. According to the 2023 US Congress report: "Three of the ten commercial oil tankers selected to ship fuel for DOD (Department of Defense) as part of the newly enacted Tanker Security Fleet are Chinese-built. As for dry cargo supplies for DOD, 7 of the 12 most recently built ships in the Maritime Security Fleet are Chinese-built."

Civil-Military Fusion Paving The Way For A Global Maritime Force For China

China has been following the strategy of civil-military fusion as a national strategy, and its shipbuilding sector is no aberration. The division between the military and commercial shipbuilding has been blurred in China, pushing the country's maritime rise. The CSSC, the largest shipbuilder in the world, is the poster child of China's seamless fusion of civil and military

shipbuilding capabilities. The CSSC incorporates several shipyards, factories, and research institutes overseen by China's top political and military leadership. In 2024 alone, the CSSC produced more commercial vessels by tonnage than what the US has produced since World War II.

In addition, the company has been building warships for the Chinese Navy, which is ascending to become one of the largest navies in the world. Civil-military fusion means the CSSC can redirect its commercial revenue toward naval warship construction.

The CSSC has also benefited from the state-driven consolidation. In 2019, Beijing merged CSSC and its largest domestic rival, the China Shipbuilding Industry Corporation (CSIC). The merger brought together the two giants' dual-use shipyards and nearly 100 subsidiaries and research institutes under one corporate umbrella. This has streamlined financing, technology sharing, and personnel transfers across civilian and military lines.

China's astounding rise in commercial shipbuilding has also facilitated the country's access to dual-use technologies like specialized engines and propellers, navigation and control systems, integrated electronics, and radar modules. Many foreign companies, including those based in the US, have unwittingly helped the Chinese shipyards with these technologies, which can also be used for military development.

Speaking with the EurAsian Times, Vice Admiral Shekhar Sinha, a retired Indian Navy officer, said: "China has risen because, in 2015, they declared that seas are the future of prosperity and trade. Therefore, it was necessary for China to build a robust maritime infrastructure and a strong PLAN to protect its interests. These are two factors that made them realize that shipbuilding infrastructure should serve a twin purpose where the facility can be used to its full potential since these infrastructures are expensive to build.

"This has fructified and China has built large fleets of commercial ships as well as warships. In fact, there is a lesson to learn from this."

Shrinking US Shipbuilding Capability

A mapping by Newsweek has shown that the US has only four active shipyards. The decline has been stark, as the US Navy had over a dozen shipyards during World War II. The active shipyards include Pearl Harbor and Puget Sound on the US's Pacific coast and Norfolk and Portsmouth in the Atlantic. These sites are used for aircraft carrier and nuclear submarine maintenance.

The shrinking US shipbuilding capability means that the US builds around 5 ships or less every year compared to China's hundreds. In terms of gross tons, which measures a ship's volume, China, Korea, and Japan build over 90 percent of the world's tonnage; the United States builds about 0.2%.

If corrective measures are not taken, the decline of US commercial shipbuilding and shipping will soon be followed by the decline of military shipbuilding. US production of commercial vessels—at least the ones used in international trade—has been reduced to naught. Navy Secretary Carlos Del Toro told Congress in 2023 that a single Chinese shipyard had more construction capacity than the entire US industry. A leaked slide of the US Naval Intelligence presentation indicated that Chinese

shipbuilding capacity is over 232 times that of America. In a futuristic war with the US, China will have the upper hand in combat repair and replacement.

The US Navy has established a 2025 shipbuilding plant, which the Congressional Budget Office (CBO) estimates will cost an average of USD 40 billion per year beginning in 2024 for the next three decades. These budget estimates are in sync with the US Navy's plan to have a maritime force of 390 warships by 2054. The CBO said that the Navy's plan would strain the US industrial base, meaning that "over the next 30 years, the nation's shipyards would need to produce substantially more naval tonnage than they have produced over the past 10 years. In particular, the production rate of nuclear-powered submarines would need to increase significantly."

Trump's Revival Plan

US President Donald Trump has underscored the dire need for an overhaul of the US's shipyards. "We used to make so many ships. We don't make them anymore very much, but we're going to make them very fast, very soon," Trump said in March. Also, a group of veterans, cutting across party lines and led by Representative Mark Green, is set to introduce new legislation aimed at revitalizing US Shipyards and shipbuilders.

The Save Our Shipyards (SOS Act), endorsed by the American Shipbuilding Suppliers Association and Heritage Action, intends to address the decline of the shipbuilding industry. It proposes the creation of a National Commission on the Maritime Industrial Base to evaluate the current state of the US maritime industry. The commission will identify the impediments to its growth and give policy recommendations.

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Science & Technology News

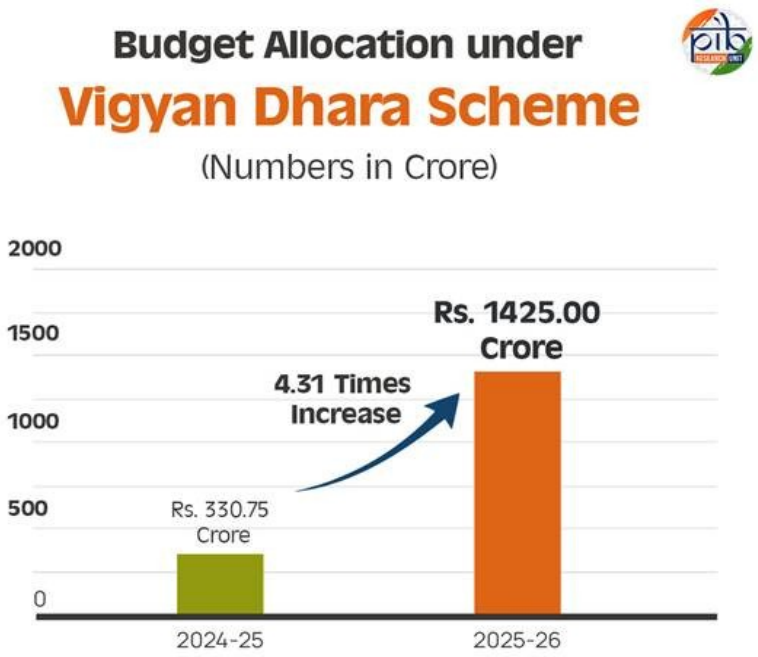
Vigyan Dhara: A Catalyst for India's Scientific Progress

Source: Press Information Bureau, Dt. 18 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2112121

Strengthening India's Scientific Future

The Government of India has significantly increased the allocation for the Vigyan Dhara scheme, reinforcing its commitment to enhancing the country's scientific research, innovation, and technological development ecosystem.

The budget has witnessed a substantial rise from Rs. 330.75 crore in 2024-25 to Rs. 1425.00 crore in 2025-26. The proposed outlay for the implementation of the unified scheme 'Vigyan Dhara' is Rs.10,579.84 crore for the period of 2021-22 to 2025-26, aligning with the 15th Finance Commission. This increased investment underscores the government's dedication to fostering science and technology as a foundation for national progress.



The Birth of Vigyan Dhara

The Vigyan Dhara scheme came into force with effect from 16.01.2025. It merges three key umbrella schemes into one, focusing on:

- Science and Technology (S&T) Institutional and Human Capacity Building: This component focuses on strengthening India's scientific infrastructure and human resource pool. It aims to build and enhance research and development (R&D) labs across academic institutions, creating a robust environment for scientific research.
- Research and Development (R&D): Vigyan Dhara emphasises research in various critical areas, including basic research, translational research in sustainable energy and water, and access to international mega facilities. This component also fosters collaborative research through international bilateral and multilateral cooperation.
- Innovation, Technology Development, and Deployment: This segment of the scheme aims to drive innovation at all levels, from schools to higher education and the industry. It seeks to promote technology development and deployment, with a particular focus on increasing collaboration between academia, government, and industry, as well as supporting startups.

This strategic integration enhances efficiency in fund utilization and establishes synchronization among the sub-schemes and programs, ensuring a more streamlined approach to achieving scientific progress in India.

Key Focus Areas of Vigyan Dhara

1. **Capacity Building**

- Establishing advanced research laboratories in academic institutions
- Supporting faculty development and student research

- Promoting international scientific collaborations**Civil-Military Fusion Paving The Way For A Global Maritime Force For China**

2. **Research and Development**

- Encouraging basic research with access to international mega facilities
- Supporting translational research in areas such as sustainable energy, water, etc.
- Fostering collaborative research through international bilateral and multilateral cooperation
- Contributing to building a critical human resource pool to expand the nation's R&D base and improve the Full-Time Equivalent (FTE) researcher count.

3. **Innovation and Technology Development**

- Supporting startups and entrepreneurs in science and technology
- Facilitating technology transfer and commercialization
- Promoting the development of indigenous technologies
- Reinforcing innovation efforts from school-level education to higher education, industries, and startups through targeted interventions

4. **Promoting Gender Parity in Science and Technology**

- Implementing focused programs to increase the participation of women in S&T fields
- Ensuring gender equality in Science, Technology, and Innovation (STI) through strategic interventions

5. **International Collaboration**

- Promoting joint research projects
- Facilitating knowledge exchange with international researchers
- Strengthening India's position as a global scientific leader.

Key Impacts:

- Enhanced collaboration between academia, government, and industry
- Increased participation of women in S&T fields.
- Strengthened R&D capabilities, aligned with global standards and national priorities.

All the programs under the Vigyan Dhara scheme are aligned with the 5-year goals of the Department of Science and Technology (DST), contributing towards the vision of Viksit Bharat 2047. Furthermore, the Research and Development (R&D) component of the scheme is structured to align with the Anusandhan National Research Foundation (ANRF), ensuring that India's scientific research follows globally prevailing standards while adhering to national priorities.

Fostering a Culture of Innovation

As of March 2025, 57,869 individual beneficiaries have availed the scheme. The beneficiaries include young students in the age group of 10-15 years and studying in class VI to X availing the benefits under INSPIRE-MANAK (Million Minds Augmenting National Aspiration and Knowledge) program. This initiative nurtures a scientific mindset, encourages research careers, and fosters innovation among students.

In Telangana alone, 4002 beneficiaries have availed of the scheme, with Rs. 3.3 crore utilized as of 10.03.2025. The increased budget allocation will further strengthen state-level scientific initiatives, enabling more individuals and institutions to benefit.

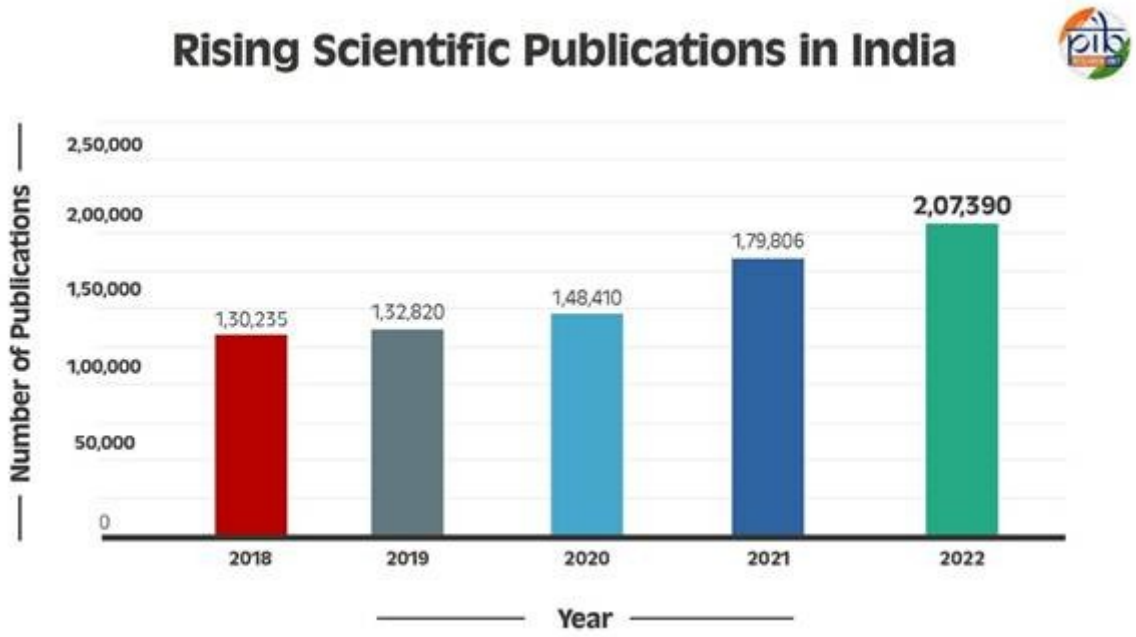
Nationwide Implementation: Spreading Scientific Awareness

Vigyan Dhara operates as a central sector scheme, implemented across the country. The Department of Science and Technology (DST) has taken proactive measures to raise awareness through:

- Extensive media coverage across print, social, and digital platforms
- A dedicated web portal providing comprehensive information on various programs
- Active engagement with stakeholders to disseminate knowledge about the scheme's benefits.

Rising Scientific Publications

As per the latest Science & Engineering Indicators report from the National Science Foundation, USA, India has shown a consistent rise in scientific publications. The details are as follows:



The government has taken several steps to strengthen the research ecosystem and encourage researchers for scientific publications, including:

- Successive increases in budget allocations for scientific research

- Establishment of Anusandhan National Research Foundation (ANRF) through the ANRF Act 2023
- Creation of Centres of Excellence
- Instituting research fellowships and research programs
- Encouraging industry participation in R&D
- Providing extramural project funding and fellowship schemes through DST, DBT, and CSIR

Research funding supports areas such as clean energy, water, nano and advanced materials, cyber-physical systems, quantum science, geospatial technology, biotechnology, and industrial technologies. The outcomes of these initiatives include scientific publications, intellectual property creation (patents), technology transfers, and industrial designs. Additionally, researchers are encouraged to conduct research publications and generate intellectual property, as these are key performance indicators for career progression.

A Transformative Vision for India's Future

Vigyan Dhara is set to revolutionize India's scientific landscape by fostering innovation, strengthening research capabilities, and promoting technological advancements. The government's increased budget allocation signifies a clear commitment to advancing India's position as a global leader in science and technology while ensuring inclusive participation and alignment with the nation's long-term development goals.

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Chandrayaan-5 mission approved by India: ISRO to launch advanced rover-for enhanced lunar exploration

Source: The Times of India, Dt. 18 Mar 2025,
URL: https://timesofindia.indiatimes.com/science/chandrayaan-5-mission-approved-by-india-isro-to-launch-advanced-rover-for-enhanced-lunar-exploration/articleshow/119149524.cms

ISRO Chief V. Narayanan unveiled some thrilling revelations about India's future space activities at a felicitation function in Chennai recently. He pointed out the clearance for the Chandrayaan-5 mission, with a 350 kg rover that has been co-developed with Japan, as part of the country's ambitious plan to land on the Moon by 2040. Narayanan also addressed the plans for the country to have its own space station by 2035 and the building of the Kulasekarapattinam spaceport to facilitate small satellite launches. Looking back on ISRO's previous achievements, Narayanan highlighted the determination and perseverance of the organisation towards pushing space research forward.

ISRO Chairman V. Narayanan discusses Chandrayaan-5 mission and future space ambitions

ISRO Chairman V. Narayanan has recently expressed his views on the Centre's approval for Chandrayaan-5 mission and future space missions during a felicitation function in Chennai. The

Chandrayaan-5 mission, with a 350 kg co-developed rover with Japan, is under the ambitious plan of India to launch a manned mission to the moon by 2040. Narayanan expressed his views regarding India's space station, Bharatiya Antriksh Station, to be achieved by 2035.

ISRO's success tale, like the success of Chandrayaan-3 mission and 131 satellite launches, was celebrated at the function. Narayanan talked about failure only after Chandrayaan-2, but narrated about the resilience of the ISRO. He spoke about the setting up of the Kulasekarapattinam spaceport, a launch pad for small satellite missions.

He thanked the Government of India, particularly Prime Minister Modi, and also endeavours made by former ISRO chairman K. Sivan. The event was attended by who's who of personalities like former Telangana Governor Tamilisai Soundararajan, and former Chennai Mayor Saidai Duraisamy.

During a felicitation function in Chennai, Narayanan announced some exciting things about the Chandrayaan-5 mission, which will be carrying a 350 kg rover jointly designed with Japan. The mission will extend the boundaries of India's achievement of landing on the Moon, with each step that will form the basis for future manned missions to the Moon. The Chandrayaan-5 mission, approved just a few days before, is one of ISRO's continued efforts to map the moon's surface with greater precision.

India’s ambitious space future Chandrayaan missions

Aside from the Chandrayaan series of missions, Narayanan also renewed India's aspirations to possess its own space station, the 'Bharatiya Antriksh Station,' by the year 2035. Narayanan further declared that the government has directed ISRO to make preparations on sending Indian cosmonauts to the Moon on a self-developed rocket and at the same time assigning utmost priority for their safe return. This bold target reflects the ambitions of India to go into space.

Narayanan also provided a background on ISRO's expanding international reach in space technology. He proudly stated that ISRO has launched 131 satellites belonging to other nations, including SAARC countries. India launched 433 satellites in the past decade with success. It has a 90% success rate. ISRO facilitated the launch of 393 foreign satellites and three Indian customer satellites between 2015 and 2024. India is being courted by many countries like the United States, United Kingdom, Singapore, Canada, and Israel to meet their requirement of launching satellites.

India’s space milestones

Aside from its moon mission, Narayanan highlighted India's commitment to Sun research. He mentioned that India has managed to launch a satellite committed to the study of the Sun, joining the elite list of countries conducting solar studies.

Besides this, he addressed the establishment of a new rocket launch complex in Kulasekarapattinam in Tamil Nadu. Prime Minister Narendra Modi laid the foundation stone of the new facility in February, and the work of building it is in progress. The facility will be instrumental in the provision of polar launches for India's Small Satellite Launch Vehicle (SSLV) and enhancing India's role in the global small satellite market.

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India would like to utilise your expertise in space exploration: ISRO chief to Sunita Williams

Source: The Tribune, Dt. 19 Mar 2025,
URL: https://www.tribuneindia.com/news/india/india-would-like-to-utilise-your-expertise-in-space-exploration-isro-chief-to-sunita-williams/

Welcoming Indian-origin US astronaut Sunita Williams back to earth, ISRO chief V Narayanan has said that India would like to utilise her expertise in space exploration.

In a message posted on X, Narayanan said, "Welcome back, Sunita Williams."

"Your safe return after an extended mission aboard the ISS is a remarkable achievement. A testament to NASA, SpaceX, and the USA's commitment to space exploration!" Narayanan said.

Stating that her resilience and dedication continue to inspire space enthusiasts around the world, Narayanan said as Secretary, Department of Space, and Chairman, ISRO, he on behalf of his colleagues was extending warm greetings to William and would wish her a great day ahead.

"When Bharat under the leadership of PM Modi is working towards making India a developed country, we wish to utilise your expertise in the space exploration," Narayanan said.

Williams, who was stuck in space for nine months, finally returned to earth on Tuesday.

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New finding forces search for ultra-rare decay process to continue

Source: The Hindu, Dt. 18 Mar 2025,
URL: https://www.thehindu.com/sci-tech/science/new-finding-forces-search-for-ultra-rare-decay-process-to-continue/article69281791.ece

Last month, Microsoft announced a new quantum computing chip called Majorana 1 that it expected would "realise quantum computers capable of solving meaningful, industrial-scale problems in years, not decades". Independent scientists soon raised doubts about this claim — grandiose as it is — but also acknowledged Microsoft had taken on a great challenge to build such a chip and that its efforts in this direction couldn't or shouldn't be written off altogether.

Microsoft named the chip "Majorana 1" because it consists of Majorana particles, which is a particular type of subatomic particle with unusual properties. One is that a Majorana particle is its own anti-particle. The particles that make up matter, called fermions, have anti-particles with distinct identities. For example, the electron's anti-particle is a positron, not another electron. The proton's anti-particle is the anti-proton, not another proton. But uniquely among fermions, a Majorana particle's anti-particle is yet another Majorana particle. If two of them meet, they will annihilate each other in a flash of energy.One of the major open questions in contemporary physics is whether neutrinos are Majorana particles.

Neutrinos, neutrinos everywhere

Neutrinos are the second-most abundant subatomic particle in the universe, after photons, the particles of light. They were produced in copious amounts during the Big Bang event. They are produced in radioactive decay, when massive stars explode, and when cosmic rays strike the earth's atmosphere. They are also made during nuclear fusion: the sun alone is responsible for flooding every square centimetre on the earth with 60 billion neutrinos each second. These particles are also extraordinarily hard to catch because they interact very weakly and very rarely with matter.

Yet it is crucial physicists study them: neutrinos may just be the key to answering many of the open questions about our universe. Their tremendous numbers are a sign that they're involved in many, many subatomic processes. Thus a clear view of their properties will also afford physicists a clear view of these processes, and the as-yet unresolved questions they can answer.

We don't know many things about neutrinos. Perhaps the biggest unknown is how much a neutrino weighs. We know neutrinos come in three flavours, or varieties, and we know the differences between the squares of their masses, but not the individual masses themselves. If neutrinos are found to be Majorana particles, the process that reveals them to be can be easily used to reveal their masses as well. This process is called neutrinoless double beta decay, or 0vßß for short.

Chilling with beta decay

Every atom has some energy, which it bears in its particles and the forces acting between them. Sometimes an atom's nucleus may have too much energy, rendering it unstable and looking for opportunities to shed the excess. This notion of stability comes from the fact that for every set of protons and neutrons in the nucleus, there is a number that allows the particles to arrange themselves in a way that leaves the nucleus with the bare minimum of energy.

For example, the nucleus of the actinium-227 atom contains 89 protons and 138 neutrons, forcing the nucleus to exist in a highly unstable configuration. To shed the 'excess energy', it undergoes a process called beta decay: it emits an electron and an anti-neutrino and changes to the thorium-227 nucleus. Th-227 also isn't stable and decays further, but since the beta decay process releases energy, the nucleus is better off than it was before.With neutrinos, scientists observe our galaxy in a whole new wayIn nature, beta decay is a common way for an unstable nucleus to decay. It can happen in one of two forms depending on whether a nucleus has too many neutrons or too many protons. In the first case, a neutron is converted to a proton and releases an electron and an anti-neutrino. In the second, a proton is converted to a neutron and releases a positron and a neutrino. A third form exists where two beta decays happen simultaneously, i.e. two neutrons are simultaneously converted to two protons, emitting two electrons and two anti-neutrinos.

The conversion ability stems from the weak interaction, which is one of the four ways in which subatomic particles can interact with each other. (The others are the strong, electromagnetic, and gravitational interactions.) The weak interaction is characterised by the appearance of particles called W or Z bosons. For example, during the Ac-227 beta decay, a neutron emits a W– boson and turns into a proton, and the W– boson decays to an electron and an anti-neutrino.A sign in the differenceAs common as beta decay is, scientists are currently on the hunt for an extremely rare

variant: 0vßß. It may not even exist, but just in case it does, it would prove neutrinos are Majorana particles.

In 0vßß, a nucleus emits two electrons instead of an electron and an anti-neutrino. This can happen only when the neutrino emitted by one neutron is absorbed as an anti-neutrino by the other neutron, which in turn can only happen if neutrinos and anti-neutrinos are the same thing. Each of the emitted electrons also has more energy because it 'includes' the energy of the missing anti-neutrino. Experiments looking for evidence of 0vßß can thus use this energy difference to tell whether a nucleus has undergone beta decay or 0vßß.

This is precisely what the AMoRE experiment in South Korea has been doing, with sensitive particle detectors pointed at a crystal containing 3 kg of molybdenum-100 nuclei, cooled to fractions above absolute zero. Mo-100 nuclei are known to undergo double beta decay.Antimatter idea offers scientists clue to cracking cosmic mysteryThe search continuesIn a paper published in Physical Review Letters on February 27, the AMoRE team reported it hadn't observed evidence of 0vßß. Because the process is already hypothesised to be rare, not observing it could just as easily mean we didn't look long enough. This is why the team reported in the paper that a population of Mo-100 nuclei would decay to half their number through 0vßß in no less than 1024 years. It could also mean 0vßß might show itself in a larger sample. In a future iteration of AMoRE, the physicists plan to look for it in 100 kg of Mo-100.

Meanwhile, they've also estimated the mass of each neutrino would have to be lower than 0.22-0.65 billionths of a proton. This is an extremely low mass ceiling, but it's not the same as saying the neutrinos have zero mass. The distinction is crucial. The current theory of all subatomic particles, called the Standard Model of particle physics, says neutrinos should be massless. The presence of even a small amount of mass thus vexes the theory and indicates it has a gap somewhere. The trouble is physicists don't yet know where. So AMoRE looks forward to its upgraded form and the search continues.

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What is FireSat, the Google-backed satellite put into orbit by Elon Musk's SpaceX?

Source: The Indian Express, Dt. 19 Mar 2025,
URL: https://indianexpress.com/article/technology/science/what-is-firesat-google-satellite-elon-musk-spacex-9892526/

A Google-backed initiative aimed at using satellites to detect and prevent wildfires before they escalate, has moved one step closer to its goal.

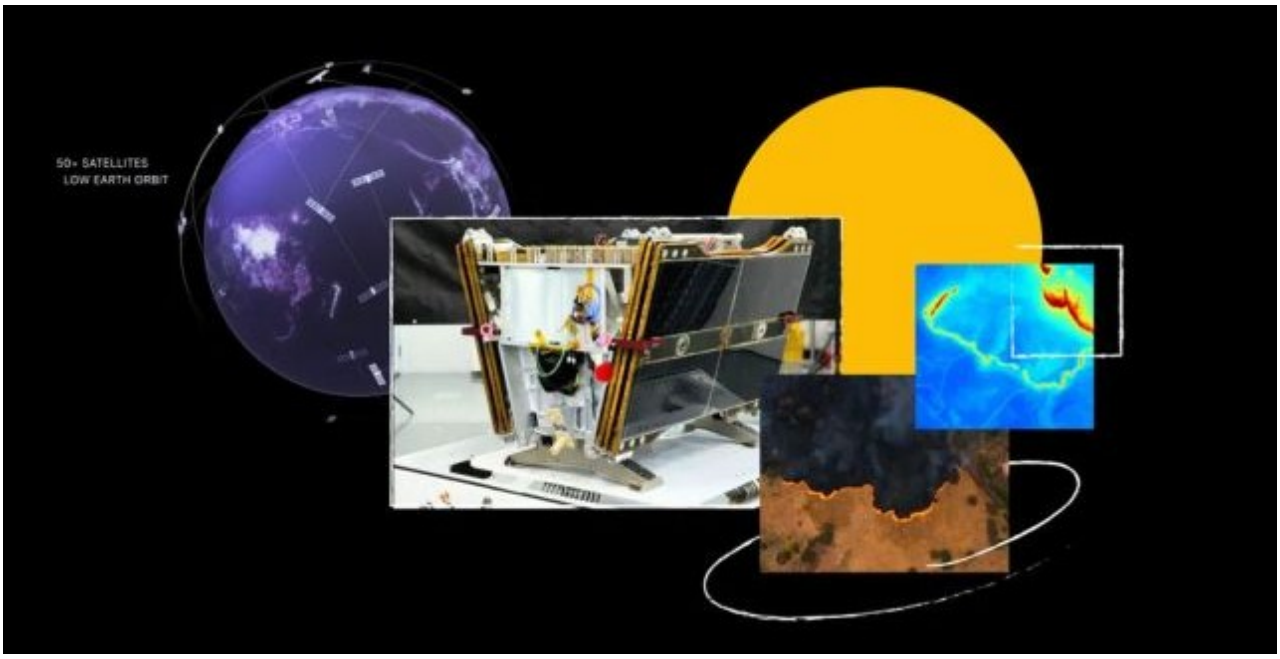
The FireSat project's first satellite was successfully placed into low Earth orbit (LEO) last week and has officially made contact with engineers back at base. "This satellite is the first of more than 50 in a first-of-its-kind constellation designed to use AI to detect and track wildfires as small as a classroom (roughly 5×5 meters)," read a blog post published by Google on Monday, March 17.

The FireSat satellite was launched on March 14 from Vandenberg Space Force Base in California, US, aboard Elon Musk-owned SpaceX's Transporter-13 mission. Taking to X, Google CEO Sundar Pichai thanked SpaceX "for the ride" and posted an image of the FireSat satellite on the launch pad prior to lift-off.

Rising temperatures due to climate change is expected to worsen droughts and spark potentially devastating wildfires in many parts of the world. Earlier this year, raging forest fires in southern California caused the deaths of at least 29 people and resulted in economic loss of an estimated $250 billion, according to a report by Los Angeles Times.

In the face of such intense blazes, disaster management authorities are increasingly looking to newer technology and tools for early detection and mitigation of wildfires.

Here's what we know about the FireSat satellite project supported by Google.



The FireSat constellation looks to produce five-metre resolution imagery.

What is FireSat?

The first FireSat satellite launched into space was reportedly built by Muon Space, a California-based aerospace startup that designs and operates satellites. The satellite carries six-band multispectral infrared cameras which are specially tuned to detect wildfires from a long distance.

The first phase of FireSat involves launching three satellites into space and making them operational by next year. With this three-satellite LEO constellation, FireSat is looking to initially revisit every point on the globe twice per day.

Eventually, FireSat aims to have an LEO constellation comprising 50 satellites that can provide high-resolution imagery of the Earth every 20 minutes. Google claimed that this will help emergency responders catch wildfires before they become destructive.

Who is behind the FireSat project?

FireSat is a collaborative initiative with several partners including Google Research, Muon Space, Earth Fire Alliance, Moore Foundation, wildfire authorities and others.

The project has been funded by Google.org, which has provided $13 million to launch the FireSat constellation of satellites, along with Moore Foundation. The tech giant's research team is also involved in developing the AI technology to spot wildfires and monitor their intensity from space.

Will FireSat be useful in preventing wildfires?

Several authorities already rely on images captured by satellites to track wildfires. However, the satellite imagery is likely to be low-resolution and only updated a few times per day.

Aerial photography via airplanes similarly faces a similar challenge of low-quality images. They also cannot be updated frequently as aerial photography services can be quite expensive.

The FireSat constellation looks to address both problems by producing five-metre resolution imagery and real-time updates on a wildfire's scope and intensity.

"There is a significant gap between the data we have available today and what we could have with better satellite coverage. So that's why Google Research, we teamed up with a bunch of folks, scientists, and leaders in the fire community to develop a new satellite constellation," Christopher Van Arsdale, lead researcher at Google Research's Climate and Energy group and a board member for Earth Fire Alliance, was quoted as saying by The Verge.

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