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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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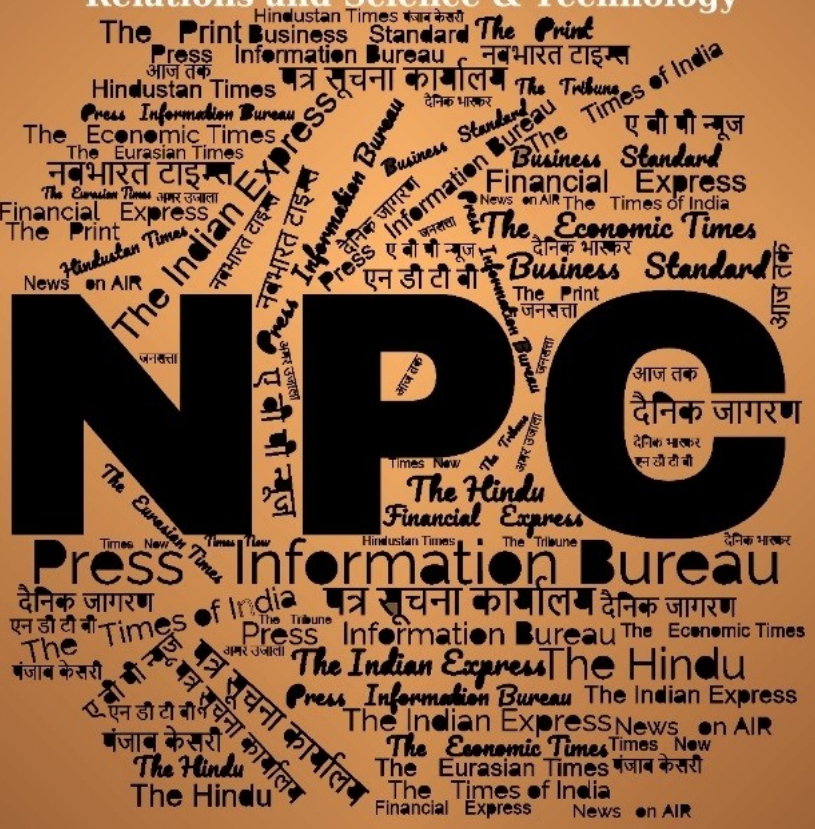

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DRDO News

DRDO initiates new policies to help private sector develop futuristic military technologies

Source: The Tribune, Dt. 21 Mar 2025,
URL: https://www.tribuneindia.com/news/india/drdo-initiates-new-policies-with-private-sector-to-develop-futuristic-military-technologies/

The Defence Research and Development Organisation (DRDO) has initiated new deep tech and cutting-edge policies under the Technology Development Fund (TDF) scheme to identify and involve private sector entities in the collaborative development of emerging technologies.

The TDF scheme extends financial support and expertise to upgrade existing products, systems, processes, and their applications by reducing production costs, improving functionality and quality. It also promotes the indigenous development of futuristic technologies with defence applications.

The Ministry of Defence had sanctioned 80 projects worth about Rs 335 crore through the TDF scheme until December 2024. Under this scheme, the government offers up to Rs 50 crore per project as a grant.

According to available information, a total of 18 technologies developed by Indian industries under the TDF have been successfully transferred to the users. A new scheme to fund cutting edge research like what the Defense Advanced Research Projects Agency (DARPA) does in the US has been added to the TDF scheme in 2025. DARPA is a research and development agency of the US Department of Defence responsible for the development of emerging technologies for use by the military.

Additionally, private entities are funded through grants to develop specific technologies, Minister of State for Defence Sanjay Seth said in the Lok Sabha on Friday in response to a question by MP Sanjna Jatav.

According to available information, 264 projects, amounting to approximately Rs 930 crore, have been approved under the DRDO's policy for grants-in-aid to the industry, including MMSEs and start-ups.

The minister said that the DRDO laboratories have structured research roadmaps designed to keep pace with global advancements in defence technologies and products. Furthermore, the DRDO prepares a bi-monthly document that provides a global review of new technologies and systems developed worldwide.

A global scan is conducted using authoritative frameworks and technological developments are actively monitored in the public domain, including social media platforms. The DRDO also provides its scientists with online access to various international databases in the field of defence science and technology.

Further, the DRDO has established a network of Industry Academia Centres of Excellence (DIA-CoEs) to foster synergy among academia, industry and its own research bodies to ensure the effective transition of academic research into industrial applications for the indigenisation of technologies.

A total of 15 DIA-CoEs have been set up across the country at premier institutions such as the Indian Institutes of Technologies, Indian Institute of Science and central universities, which promote directed research, facilitating the development of critical and futuristic technologies for defence and security applications.

Each DIA-CoE focuses on technology development in designated futuristic areas across 84 identified research verticals. A standard operating procedure for the industry's engagement with academia has been activated to streamline projects through DIA-CoEs.

In 2024, 73 projects were sanctioned with a total cost of Rs 275 crore, in which 266 researchers and 10 new academic institutes have been engaged. This makes it a total of 274 sanctioned projects at a total cost of Rs 984 crore, engaging 900 researchers and 46 academic institutes, so far.

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AI-driven surveillance at international borders: IIT Guwahati-incubated start-up's new tech grabs DRDO's attention

Source: Deccan Herald, Dt. 23 Mar 2025,
URL: https://www.deccanherald.com/science/ai-driven-surveillance-at-international-borders-iit-guwahati-incubated-start-ups-new-tech-grabs-drdos-attention-3458743

Researchers at Indian Institute of Technology (IIT), Guwahati have developed advanced robots to man international borders which will offer AI-powered surveillance and uninterrupted, real-time monitoring across challenging terrains, according to officials. The robots developed by Da Spatio Rhobotique Laboratory Pvt. Ltd (DSRL), a start up incubated at IIT Guwahati, have also received acknowledgement from the Defence Research and Development Organisation for their potential for integration into India's defence infrastructure. The Indian Army is already conducting field trials for the surveillance system.

According to Arnab Kumar Barman, CEO, DSRL, unlike conventional security measures that rely on drones, stationary cameras, and manual patrolling, this autonomous robotic system overcomes the limitations of terrain, weather and endurance.

"Equipped with seamless pole traversal capabilities, adaptive obstacle navigation, and AI-driven reconnaissance, the system is a game-changer for border protection, critical infrastructure surveillance, and strategic defence applications. Our mission is to develop cutting-edge, AI-driven surveillance solutions that address the evolving challenges of national security," Barman told PTI.

"This robotic system is designed to operate seamlessly in difficult terrains, ensuring 24/7 vigilance. We are proud to contribute to India's vision of self-reliance in defence technology and are committed to further innovations that strengthen our national security," he added. The system features multi-sensor intelligence gathering, significantly enhancing its ability to detect and deter potential threats.

Keyur Sorathia, Head - Technology Incubation Centre, IIT Guwahati, said, this ground breaking innovation represents a strategic advancement in India's commitment to strengthening national security through indigenous, high-tech solutions.

"The AI-driven robotic surveillance system exemplifies the transformative potential of deep-tech startups in strengthening India's defence capabilities. With the Indian Army actively conducting field trials, the surveillance system is advancing toward large-scale deployment in sensitive areas and military stations," Sorathia told PTI.

“This cutting-edge, indigenous technology is set to fortify national security by countering modern threats such as rogue drones and infiltration attempts. This breakthrough marks a crucial step in strengthening the nation's frontiers with homegrown innovation,” he added.

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WhAP: This TATA-DRDO amphibious armoured vehicle ensures Naxal mines, IEDs can no longer hurt CRPF jawans in Chhattisgarh

Source: The Week, Dt. 23 Mar 2025,
URL: https://www.theweek.in/news/defence/2025/03/21/wh-ap-kestrel-this-tata-drdo-amphibious-armoured-vehicle-ensures-naxal-mines-ie-ds-can-no-longer-hurt-crpf-jawans-in-bastar-chhattisgarh.html

A deep-jungle tactical meeting of the Naxals was intercepted by security forces in the Bijapur district of Chhattisgarh on Thursday, neutralising 30 militants. The development has brought the country's focus back to anti-Naxal operations.

Landmines and Improvised Explosive Devices (IEDs) used to be the go-to weapons of Left Wing Extremist Naxals in Chhattigarh for long. Security forces took significant casualties over the years as the militants used mines to ambush patrolling troops. However, India has significantly turned

the tide in recent times, liberating many parts of the "red corridor" that used to be impenetrable for uniformed men. The use of advanced technology and weaponry played a crucial role in bringing the Naxals to their knees across the jungles of Chhattisgarh. Night vision goggles, drones, and rocket launchers have all helped the security forces to counter the guerilla militants effectively. However, the Wheeled Armoured Platform or WhAP 8X8, an indigenously developed armoured troop carrier, requires special mention.

WhAP arrives to counter LWE

According to reports, the Naxals learnt that WhAP is not to be messed with. Their first encounter with this state-of-art machines happened in 2024 when they launched a surprise attack on a CRPF camp in Telangana's Tekulagudem. The officer in command of the camp quickly ordered his men to mount the Medium Machine Guns (MMGs) on WhAPs. The Naxals, who thought they had the element of surprise, had no choice but to beat a retreat as they had no chance against the heavy fire.

The deployment of WhAP 8X8 in Bastar and other Naxal-hit areas has provided the CRPF personnel with protection from explosives. Neither landmines nor IEDs can "wipe out" the jawans any longer as they are moving in these unbreachable giants. If one forward operating base (FOB) comes under attack, troops from nearby FOBs rush to help in these vehicles that can travel at a speed of 40km/h in off-road conditions.

What are WhAP 8x8?

The Defence Research and Development Organisation (DRDO) developed WhAP 8x8 in collaboration with Tata Advanced SystemsTata Advanced Systems. The nomenclature "8x8" refers to a vehicle with eight wheels, all of which are powered. It is India’s first amphibious Infantry Combat Vehicle (Wheeled) that can travel in water at a speed of 10km/h using a water jet. It can carry 10 fully equipped soldiers apart from the two crew members.

WhAP can negotiate muddy terrain with ease and can reach 100 km/h on regular roads. It can be equipped with anti-tank guided missiles (ATGMs), 30mm cannons or 7.62mm coaxial machine guns depending on the variant. They have been inducted into the Indian Army and Paramilitary forces.

Why Naxal mines are useless against Wheeled Armoured Platform?

Its hull is designed with a V-shaped bottom to absorb impact and provide better protection to the riders and provide stability to the vehicle. The bottom panel, meanwhile, can deflect blast energy and absorb the force. This too, reduces the impact of the explosion on the vehicle and safeguards the soldiers.

The vehicle can withstand mine blasts as it has STANAG Level III-IV ballistic protection. Additional armour can be fitted to them depending on requirements, various missions and operating conditions. Tata claims they were "designed for optimised survivability, all-terrain performance and increased lethality."

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Defence News

Defence Strategic: National/International

14th meeting of ADMM-Plus Experts Working Group on Counter-Terrorism concludes in New Delhi

Source: Press Information Bureau, Dt. 21 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2113546

The 14th meeting of ASEAN Defence Ministers' Meeting-Plus (ADMM-Plus) Experts Working Group on Counter-Terrorism (EWG on CT) was held in New Delhi from March 19 to 20, 2025. Delegations from ASEAN Secretariat, ASEAN countries (Lao PDR, Malaysia, Indonesia, Myanmar, Singapore, Thailand, Malaysia, Philippines and Vietnam), ADMM-Plus member states (China, USA, Russia, Australia, Japan and Republic of Korea) participated in the meeting. During 14th ADMM-Plus EWG on CT, the co-chairs, India and Malaysia conveyed work plan for the activities planned for the cycle 2024-2027. It announced the conduct of Table-Top Exercise for EWG on CT in Malaysia in 2026 and Field Training Exercise in India in 2027.

During the two-day meet, discussions were held to focus on evolving a robust and comprehensive strategy to tackle the evolving threat of terrorism and extremism. The meeting was aimed to share the on-ground experience of the Defence Forces of ASEAN countries and its dialogue partners. The meeting laid a foundation for the activities/exercises/meetings/ workshops planned for the current cycle. Earlier, Myanmar and Russia, co-chairs for EWG on CT during the previous cycle for 2021-2024, handed over the co-chairmanship to India and Malaysia for the present cycle (2024-2027). India is hosting the maiden EWG meeting for the current cycle.

In the Inaugural session, Defence Secretary Shri Rajesh Kumar Singh delivered the keynote address and interacted with participating head of delegations during the opening ceremony. He stated that terrorism remains a dynamic and evolving challenge with threats increasingly transcending borders. He highlighted India's efforts towards countering terrorism in the region, including adoption of Delhi Declaration during India's chairmanship of Counter-Terrorism committee of the UNSC in 2022.

Joint Secretary [International Cooperation (IC)], Ministry of Defence Shri Amitabh Prasad, Additional Director General (IC), Indian Army, senior officials from the Ministry of External Affairs and Indian Army's Counter-Terrorism division participated in the event. The Heads of Delegations of participating countries and ASEAN Secretariat also presented their views on adopting best practices for countering terrorism in the region. The delegates also visited Agra as part of the cultural tour.

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Indian Navy And Coast Guard Carry Out Daring MEDEVAC Operation Out At Sea

Source: Press Information Bureau, Dt. 21 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2113906

In the early hours of 21 Mar 25, the Indian Navy successfully carried out a critical Medical Evacuation (MEDEVAC) operation from MV Heilan Star, a Panama-flagged bulk carrier, located about 230 nautical miles West of Goa.

On the night of 20/21 Mar 25, the Indian Coast Guard's Maritime Rescue Coordination Centre(MRCC) at Mumbai informed the Indian Navy of four crew members of MV Heilan Star having sustained severe burn injuries and requiring immediate advanced medical care. Responding swiftly, the Navy diverted two ships, INS Vikrant and Deepak, from their ongoing deployment to render aid.

At first light on 21 Mar 25, a Seaking helicopter from Vikrant carried out a challenging winching operation, to evacuate three injured crew - two Chinese and one Indonesian nationals, from MV Heilan Star. The fourth crew had, sadly, already succumbed to injuries.

The rescued crew were immediately flown to INS Hansa, Goa, from where they transferred to a civil hospital for further medical care. This operation underscores the Indian Navy's and the Indian Coast Guard’s unwavering commitment to life-saving efforts and swift response to humanitarian assistance, despite challenging circumstances, even beyond national maritime boundaries.

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Headquarters Integrated Defence Staff & Department of Science and Technology ink MoU in Defence R&D to enhance Technological Innovation for Armed Forces

Source: Press Information Bureau, Dt. 21 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2113750

Headquarters Integrated Defence Staff (HQ IDS) and the Department of Science and Technology (DST) have inked a Memorandum of Understanding (MOU) on 21 March, 2025 at New Delhi. This agreement marks a significant step towards strengthening collaboration in defence research and development, aimed at enhancing technological innovation for the Indian Armed Forces.

The MoU was signed by Deputy Chief of Integrated Defence Staff, HQ IDS, Vice Admiral Sanjay Vatsayan and Additional Secretary, DST Shri Sunil Kumar in the presence of Chief of Integrated Defence Staff Lieutenant General JP Mathew and Secretary DST, Shri Abhay Karandikar.

The partnership seeks to leverage DST's extensive R&D capabilities to address the evolving needs of the Armed Forces by aligning defence technology research with national science initiatives, thereby enhancing the defence sector's self-reliance in critical technology domains.

Under this MoU, DST will facilitate access to its research infrastructure, expertise and academic institutions to meet the defence sector's requirements. The collaboration will focus on developing advanced military technologies and fostering innovation, contributing to the overall goal of building self-reliance in critical defence capabilities.

This partnership underscores the joint commitment to promoting cutting-edge research, aligning with the national vision of ‘Atmanirbhar Bharat’, and emphasises a whole-of-nation approach towards enhancing the country’s defence preparedness.

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Second Frigate of Project 1135.6 built by GSL launched

Source: Press Information Bureau, Dt. 22 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2114025

The second frigate of Project 1135.6 Additional Follow-on Ships, named 'Tavasya', built by Goa Shipyard Limited (GSL), was launched by Mrs. Neeta Seth in the presence of Raksha Rajya Mantri Shri Sanjay Seth, and FOC-in-C West Vice Admiral Sanjay J Singh today on 22 Mar 25 at GSL, Goa. These Frigates are Follow-on of P1135.6 ships, which are now being constructed indigenously by Indian Shipyard.

Addressing the gathering on the occasion, Raksha Rajya Mantri highligted the Indian Navy's growing self-reliance. He underlined, "This launch is a defining moment in India's Naval history, showcasing our technological capabilities and unwavering commitment to self-reliance."

Raksha Rajya Mantri further stressed that the successful localization of critical components such as BrahMos missile system, torpedo launchers, sonar, and auxiliary control systems demonstrates the growing resilience of India's shipbuilding ecosystem. "The launch of Tavasya is not just a step forward for the Indian Navy but a giant leap for India's strategic defence ambitions," he added.

The ship has been named 'Tavasya', after the mace of legendary warrior 'Bhima' from the 'Mahabharata', representing the indomitable spirit and growing strength of the Indian Navy.

The contract for building two Project 1135.6 Follow-on frigates was signed between the Ministry of Defence and Goa Shipyard Limited on 25 Jan 19. The first ship 'Triput', was launched on 23 Jul 24. These ships are designed for surface, sub-surface and air combat operations. 'Triput' and 'Tavasya' are 124.8 m long and 15.2 m wide, with a draught of 4.5 m. The displacement is approximately 3600 tons with a maximum speed of 28 knots.

'Triput' and 'Tavasya' have a large percentage of indigenous origin equipment, weapons and sensors, ensuring large scale defence production by Indian manufacturing units generating employment and capability enhancement within the country. These ships are also equipped with stealth features, advanced weapon & sensors and platform management systems.

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13th Edition of India-Italy Military Cooperation Group Meeting concludes in Rome

Source: Press Information Bureau, Dt. 22 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2113982

The 13th edition of the India-Italy Military Cooperation Group (MCG) meeting was successfully conducted from 20-21 March 2025 in Rome, Italy. The meeting was co-chaired by the Deputy Assistant Chief of Integrated Defence Staff IDC (A) from Headquarters Integrated Defence Staff (HQ IDS), representing India, and the Deputy Head of the Strategic Direction and Military Cooperation Division of the Italian Defence General Staff, representing Italy.

The discussions were focusing on identifying new avenues to expand the scope of bilateral military focused cooperation. Key agenda points included enhanced exchange programs, capability development efforts and strengthening collaboration between the Indian and Italian armed forces. The meeting also reviewed ongoing defence engagements, assessing their progress and exploring ways to optimize future interactions.

The MCG serves as a key institutional mechanism to enhance defence cooperation between the armed forces of both nations, fostering stronger military-to-military engagements and strategic collaboration.

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Goa Shipyard launches second P1135.6 frigate, a monumental leap in India's indigenous warship building

Source: Press Information Bureau, Dt. 22 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2113980

Goa Shipyard Limited (GSL), one of India's premier defence shipyards, achieved yet another historic milestone with the successful launch of 'Tavasya', the second frigate of Project 1135.6 (Yard 1259) today, March 22, 2025. The launch marks a significant advancement in India's self-reliance in warship construction, reinforcing the country's vision of Atmanirbhar Bharat in defence manufacturing.

The ship was ceremonially launched by Smt Neeta Seth, in the esteemed presence of Shri. Sanjay Seth, Hon'ble Raksha Rajya Mantri, who graced the occasion as the Chief Guest. Addressing the gathering, Hon'ble Raksha Rajya Mantri commended the GSL's extraordinary achievement in launching two complex, weapon-intensive frigates within just eight months, despite geopolitical challenges affecting global supply chains. Highlighting the Navy's growing self-reliance, he remarked:

"This launch is a defining moment in India's Naval history, showcasing our technological capabilities and unwavering commitment to self-reliance. The successful localization of critical components such as the BrahMos missile system, torpedo launchers, sonar, and auxiliary control systems demonstrates the growing resilience of India's shipbuilding ecosystem. The launch of Tavasya is not just a step forward for the Indian Navy but a giant leap for India's strategic defence ambitions," the minister said.

With a displacement exceeding 3800 tons, 'Tavasya' is engineered to execute a diverse range of offensive and defensive operations, ensuring strategic dominance in the Indian Ocean Region. Equipped with advanced stealth features, high-endurance capabilities, and next-generation combat systems, the ship represents a significant boost to the operational might of the Indian Navy, the minister said. He reaffirmed India's ambition to emerge as a global leader in warship exports, citing GSL's pioneering role in defence exports and the Ministry of Defence's vision to achieve ₹50,000 crore in defence exports by 2029.

Speaking on the occasion, Shri Brajesh Kumar Upadhyay, Chairman and Managing Director, GSL, highlighted the shipyard's remarkable evolution into a strategic defence asset for the nation. "The launch of 'Tavasya' is the culmination of our relentless pursuit of excellence in indigenous warship building. From being a mid-sized shipbuilder, GSL has evolved into a leading defence yard, now delivering some of the most complex naval platforms. This project reaffirms our capability to execute high-end warship programs with precision, efficiency, and unmatched commitment to national security," he said.

The event was attended by Shri. Sadanand Tanawade, MP-Rajya Sabha, Cap. Viriato Fernandes, MP-Lok Sabha, senior dignitaries, including Vice Admiral SJ Singh, PVSM, AVSM, NM, FOC-in-C (WNC); Vice Admiral Rajaram Swaminathan, AVSM, NM, CWP&A; Shri Brajesh Kumar Upadhyay, Chairman and Managing Director, GSL, as well as officials from the Ministry of Defence, Senior Indian Navy officers, and GSL personnel.

It is a maiden attempt by an Indian Shipyard to construct these complex platforms, which were previously imported in a fully built condition. With an indigenous content exceeding 56%, far

surpassing the 25% in similar ships constructed abroad, the frigate is a shining example of India's engineering prowess, bolstering national security and strengthening India's position in the global defence ecosystem. The formidable multi-role stealth frigate is designed to operate across the full spectrum of Naval Warfare - Air, Surface, and Sub-Surface - ensuring unmatched operational capability.

GSL's impressive execution record has positioned it at the forefront of India's defence shipbuilding industry. The shipyard has successfully launched seven ships within a year, a feat that underscores its capabilities in delivering multi-domain, next-generation vessels.

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Keel Laying Of Second And Third Next Generation Offshore Patrol Vessels (Yard 1281 and 1282)

Source: Press Information Bureau, Dt. 23 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2114196

Keel Laying ceremony of the second and third Next Generation Offshore Patrol Vessels (NGOPV), to be constructed by Goa Shipyard Ltd (GSL), was held at M/s Yeoman Marine Services Private Ltd (YMSPL), Ratnagiri on 23 Mar 25. The contracts for indigenous design and construction of 11 NGOPV were concluded on 30 Mar 23 between Ministry of Defence and GSL, Goa and M/s Garden Reach Shipbuilders and Engineers (GRSE), Kolkata, with seven ships to be constructed by Lead Shipyard M/s GSL and four ships by Follow Shipyard M/s GRSE.

Main hull blocks of Yard 1281 and Yard 1282 are being fabricated at the premises of YMSPL, Ratnagiri as part of GSL's build strategy. Keel Laying ceremony of both the vessels was held at Ratnagiri with V Adm R Swaminathan, Controller Warship Production & Acquisition as the Chief Guest, in the presence of senior officials from Indian Navy, M/s GSL and M/s YMSPL.

The NGOPVs with an approximate tonnage of 3000T, are designed for Coastal Defence & Surveillance, Search & Rescue operations, Protection of Offshore Assets and Anti-Piracy missions. Keel Laying of these vessels marks a significant milestone in the overall project timeline. The 11 NGOPVs are being built in consonance with the nation's vision of 'Aatmanirbhar Bharat' and 'Make in India' and are poised to augment the Indian Naval maritime prowess.

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GE to deliver first of 99 F-404 engines for Tejas MK 1A by March-end

Source: Hindustan Times, Dt. 22 Mar 2025,
URL: https://www.hindustantimes.com/india-news/ge-to-deliver-first-of-99-f-404-engines-for-tejas-mk-1a-by-marchend-101742615337284.html

Amidst anxiety over India-US trade tariffs, there is forward movement on the security front, with US aircraft engine major GE expected to deliver the first of the 99 GE-404 engines to HAL this

month after a contractual delay of two years. The much awaited GE-404 engines powers Tejas Mark 1-A fighters, delays in deliveries of which has caused much concern in the Indian Air Force (IAF).

According to at least two officials in knowledge of the matter, the first of the contracted engines is already on the test-bed and is expected to be delivered by end of this month. A total of 12 engines are expected in 2025 with 20 engines each expected to be delivered by GE every year to fulfill the 2021 99-engine contract worth USD 716 million.

Parallelly, the HAL, despite its Indian PSU mindset, is working with GE for manufacturing the more powerful GE-414 engine in India under transfer of technology regime worked out by iCET (initiative on Critical and Emerging Technologies) between India and US National Security Advisors. The GE-414 engine will power the advanced multi-role combat aircraft (AMCA) being developed by the DRDO.

Faced with delays in the supply of 83 LCA MK 1 A aircraft by HAL and frustration voiced by none other than the IAF Chief over the same, the Defence Ministry under the Chairmanship of Defence Secretary R. K. Singh has set up a committee to work out a business model for the proposed fifth generation fighter.

This committee will not go into any technical aspects of the proposed AMCA but will work out a model which involves private sector participation in the fifth-generation program. The whole idea is that India should have other options than HAL to manufacture fighter jets to fulfill the country's national security requirements for the future.

While US President Donald Trump has made an offer to supply India with a proven fifth-generation F-35 fighter, the Indian focus is simultaneously looking at the French option, which envisages the manufacture of Rafale fighters along with the M-88 engine in India under the 'Aatmanirbhar Bharat' route.

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Rafale-M operations, anti-submarine warfare in focus during Indo-France naval exercise

Source: The Hindu, Dt. 23 Mar 2025,
URL: https://www.thehindu.com/news/national/rafale-m-operations-anti-submarine-warfare-in-focus-during-indo-france-naval-exercise/article69362719.ece

India and France deployed aircraft carriers INS Vikrant and Charles de Gaulle for the bilateral exercise named 'Varuna', allowing the Indian Navy getting to closely observe, and operate with the Rafale-M fighter jets, which it is set to contract soon. The manoeuvres also focused on Anti-Submarine Warfare (ASW) operations.

The exercise was held from March 19-22 off the coast of Goa."For four days we have been working on every naval warfare domain either below the surface, on the surface, or above the surface, interacting with the Indian submarine, with MiGs and Rafales of course working all together," said Rear Admiral Jacques Mallard, Chief of the French Carrier Strike Group, speaking

to two Indian media outlets onboard the carrier about 90-100 miles off Goa. “I am just coming back from the debriefing on the exercise on INSVikrant, and we have been through all the detailed exercises that we just carried out, working all together to improve interoperability, in order to know and trust each other better and to be able to operate [with] each other,” he stated.

On the way forward for the exercise, which has grown in scope and complexity, he said exercise Varuna is building up every time, reaching further in operations between the French and Indian Navies. “This year, we have been working on an Anti-Submarine exercise,” he elaborated. “One Indian submarine was playing aggressor and all frigates, either French or Indian, were protecting the high-value units played by the French oiler Jacques Chevallier. We learned a lot working together and comparing tactics, arranging the different ways of doing things, and building the knowledge to work together,” he added.

ASW exercises provide rigorous training in underwater domain awareness, while surface warfare operations demonstrate synchronised manoeuvres and engagements by the Indian and French fleets, the Navy stated. Maritime patrol aircraft enhance situational awareness, and replenishment-at-sea exercises fortify logistical cooperation, it added, highlighting that this collaboration underscores the “shared vision of safeguarding a free, open, and secure maritime environment.”

The French Carrier Strike Group has been on deployment in the Indian Ocean Region since November 2024 as part of the Clémenceau 25 mission to strengthen ties with its partners in the Indo-Pacific and has engaged in a series of exercises during this period. “After conducting air and naval exercises with Indian forces following the stopovers of French ships in Goa and Kochi in January, cooperation between the two countries continues with the return of the French CSG in the Indian Ocean,” the French Embassy noted in a statement on Thursday.

As a resident nation of the Indian Ocean, France is committed to working alongside its partners in the region to ensure a free, open, and stable Indo-Pacific, notably through the presence of French forces in the United Arab Emirates and the French Armed Forces in the Southern Indian Ocean, it added. By fostering the exchange of best practices and mutual understanding, the exercise reaffirms the ability of these two nations to operate seamlessly in even the most complex maritime scenarios, the Indian Navy added.

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India aims to become exporter of military equipment: MoS Defence

Source: The Times of India, Dt. 23 Mar 2025,
URL: https://timesofindia.indiatimes.com/city/goa/india-aims-to-become-exporter-of-military-equipment-mos-defence/articleshow/119354182.cms

India, one of the world’s largest importers of weapons, wants to become a net exporter of military equipment, said minister of state for defence Sanjay Seth on Saturday. He said the defence ministry wants to end dependence on foreign suppliers and wants local defence firms to scale up and get into exports.

“Our aim, in the coming years, is not to import weapons but to export them,” Seth said. “Earlier we were known for being importers...but today, this country is not a country that begs, it is a country that looks another country in the eye and talks,” Seth said.

He was speaking at the launch of the last of four follow-on Triput-class stealth frigates contracted from Russia and the second one under construction at Goa Shipyard Ltd (GSL).

He said, “We supply military equipment to 100 countries. Our goal is to reach Rs 50,000 crore in defence exports by 2029.” As for the frigates, they are part of the inter-governmental agreement inked in Goa in Oct 2016 on the sidelines of the Brics summit.

Though the frigates are built using Russian technology and design, they are powered by gas turbine engines from Zorya-Mashproekt of Ukraine. The frigates, officially called the Project 1135.6, have 56% indigenous equipment. Local construction of the frigates has infused Rs 7,000 crore into the economy and involved 400-450 MSMEs.

“I have been informed that the steel used in this warship has been indigenously made. It has indigenous weapons, weapon systems, combat suite, steering gears, fin stabilisers, and communication equipment,” Seth said. “It is a proud moment for the nation that the auxiliary control system, Brahmos missile systems, torpedoes, sonar systems, and rocket launchers are made in India.”

GSL chairman and MD Brajesh Kumar Upadhyay said the shipyard aims to attain Navratna PSU status by 2027-28 and hopes to become a Schedule A shipyard by 2025-26, thus joining the ranks of Cochin Shipyard Ltd, Mazagon Dock Shipbuilders Ltd, and Hindustan Shipyard Ltd.

“With the successful launch of both frigates of this project, GSL’s capability has been established in constructing weapon-intensive projects,” Upadhyay said. GSL will deliver the first frigate to the Navy in 2026 and the second six months later.

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Army Subjected Indigenous Howitzer To 'Absurd Tests' While Still Keeping Door Open For Israel's ATHOS: Military Brass Still After 'Imported Toys'?

Source: Swarajya, Dt. 22 Mar 2025,
URL: https://swarajyamag.com/defence/army-subjected-indigenous-howitzer-to-absurd-tests-while-still-keeping-door-open-for-israels-athos-military-brass-still-after-imported-toys

The Army's insistence on purchasing 400 ATHOS guns was "repeatedly rebuffed" by the government though, which saw it as a move that could undermine the growing indigenous artillery design and development ecosystem.

As journalist Chitra Subramaniam brings the Bofors saga to a definitive close with her new book — an authoritative account of what happened and how, the Indian military, too, is finally turning the page on its decades-long artillery curse, called the Bofors jinx.

For years, the spectre of Bofors loomed large over every attempt at modernisation, turning procurement into an exercise in paralysis.

Even when the Indian Army inducted the US-made M777 howitzers, many rushed to declare that the so-called Bofors jinx had been broken. But it hadn’t—not really. That moment has arrived only now. Not with another foreign purchase, but with an artillery system forged in India, for India's needs.

On 20 March, the Cabinet Committee on Security, chaired by Prime Minister Narendra Modi, cleared a landmark Rs 7,000 crore deal for the procurement of the Advanced Towed Artillery Gun System (ATAGS), the first fully indigenous 155mm howitzer. The deal will bring 307 ATAGS guns into the Army’s arsenal, along with 327 gun-towing vehicles.

And it couldn't have come a day sooner.

In 1999, the Indian Army introduced the Field Artillery Rationalisation Plan (FARP), an ambitious blueprint aiming to acquire 2,800 155mm artillery guns by 2027. The plan envisioned the procurement of 1,580 155mm x 52 calibre towed artillery guns, with the remaining guns to come from self-propelled (tracked and wheeled) artillery, mounted gun systems, and ultra-light howitzers. The goal was clear: modernise the artillery corps and bring India’s artillery capabilities up to speed with global standards.

Yet, over two decades later, the programme had barely moved forward.

The Comptroller and Auditor General report recently exposed the glacial pace at which the programme has progressed, highlighting the near complete stagnation in the artillery modernisation effort.

Since the induction of the Bofors FH-77B howitzers in 1986-87 — a procurement that was completed over 35 years ago — there had been no meaningful addition to the artillery inventory till the induction of the ultra-light M777s bought from the United States in 2017. As of now, only eight per cent of the total 2,800 guns have been acquired, and only 17 percent of the proposed guns have been delivered under the six proposals for the acquisition of new artillery systems.

The ATAGS

The development of the ATAGS began in 2013 as part of the Indian Army’s artillery modernisation programme. It was designed and developed by the Defence Research and Development Organisation (DRDO) in collaboration with Bharat Forge (Kalyani Strategic Systems Limited, or KSSL) and Tata Advanced Systems Limited (TASL).

The objective was clear: build an artillery system with a fit for India's unique needs.

Automation became a key defining feature of the ATAGS, setting it apart from most conventional artillery systems. Unlike traditional systems that rely on hydraulic mechanisms, the ATAGS was designed with an all-electric drive, which not only improved reliability but also reduced maintenance needs. The gun-laying process was fully automated, minimising crew workload and enhancing response times during combat.

Equipped with an integrated fire control system, the ATAGS boasts an inertial navigation system, a muzzle velocity radar, and a ballistic computer, all of which contribute to its exceptional precision. Additionally, the system includes an optronic sight with a thermal imager and laser rangefinder, enabling effective night firing.

Mobility was another focus. The gun was built to be highly transportable, with both towed and self-propelled configurations. This was needed given the diverse terrain from the western border with Pakistan to the northern boundary with China.

The ATAGS recoil system uses a double-baffle muzzle brake and hydro-pneumatic technology to manage the force of the gun's recoil. The muzzle brake redirects gases from the shot, reducing recoil and keeping the gun stable. The hydro-pneumatic system absorbs the recoil energy, ensuring sustained firing without destabilising the weapon. These technologies enable rapid and stable firing, even in challenging terrains.

A key engineering challenge was extending the gun’s range without compromising accuracy or reliability. To achieve this, the designers decided to increase the chamber pressure beyond conventional limits. This required an advanced gun barrel capable of withstanding extreme stress, along with a reinforced breech mechanism.

Engineers employed autofrettaged steel and specialised manufacturing techniques to ensure durability. The result was a gun capable of achieving a range of 38.5 km with a boat-tail round, which features a streamlined shape for improved aerodynamics; and, a 48 km range with a base bleed round, which reduces drag by releasing gas from the base to enhance the round's range, outperforming many existing systems around the world.

ATAGS was first publicly showcased during the Republic Day Parade in 2017. By 2022, it became the first indigenous gun to participate in the 21-gun salute at the Red Fort.

In March 2023, the Ministry of Defence (MoD) approved the procurement of 307 ATAGS units for the Indian Army. The proposal had been under review for several years. Meanwhile, multiple other artillery procurement proposals, including those for self-propelled guns, were either dropped or not pursued further.

The ATAGS has also received foreign orders. In August 2023, the Armenian Ground Forces placed an order for six ATAGS units from KSSL. The guns were manufactured at KSSL’s Pune facility and delivered to Armenia by the end of 2023. As of October 2024, Armenia has expressed interest in procuring an additional 84 units following successful trials.

A trial by fire—literally and figuratively

If there's one thing the Indian Army seems to do with conviction, it's testing indigenous weapons systems to the brink of absurdity. And the ATAGS was no different.

Over five years, the ATAGS underwent a series of rigorous trials, from the scorching heat of Pokhran's desert to the sub-zero temperatures of northern Sikkim. Each phase pushed the limits of the gun, as the Army and its engineers worked relentlessly to address issues, all while facing constant scrutiny and doubts from critics.

The journey started with high hopes in 2016, when the DRDO successfully conducted the first proof firing of the 155mm howitzer. But the road ahead was far from smooth.

In December of the same year, the gun fired its first live ammunition, but it wasn't until 2017, after an intense series of summer trials in the desert of Pokhran, that the ATAGS truly began to interest the Indian Army.

The gun not only met expectations but exceeded them by setting a new world record for range, hitting 47.2 kilometres and later 48.074 kilometres with high explosive-base bleed rounds—surpassing the capabilities of any artillery gun in its class at the time.

However, the journey of testing was far from just glory. The ATAGS faced its first serious setback in 2020, during user trials, when one of the guns suffered a barrel burst, injuring four personnel. But an investigation revealed that the real cause was faulty ammunition supplied by the Ordnance Factory Board, not an inherent flaw in the ATAGS itself.

This incident momentarily halted the trials but didn't deter the development team. In fact, after a thorough investigation and modifications, the gun was cleared for further testing.

Despite this, the Army wasn't fully convinced.

The gun, built for versatility across terrains from the Himalayas to the Thar Desert, was criticised for being too heavy, especially for deployment along the Line of Actual Control with China in the Himalayas, where mobility is a challenge.

For the winter trials, the gun was taken to Lukrep, in the plateau regions of North Sikkim, not far from the boundary with China.

This location is of strategic importance, as it offers India access to the Tibetan Plateau and allows for the potential to cut off Chinese access to the Chumbi Valley. The trials in such a sensitive area added a level of geopolitical significance to the testing, beyond mere technical performance.

The journey to Lukrep involved covering a distance of 341 kilometres, testing the ATAGS in one of the harshest environments imaginable. North Sikkim's terrain is notoriously difficult, with steep gradients and narrow hairpin bends that make mobility challenging.

Yet, the ATAGS was able to traverse this otherwise inaccessible landscape with ease. Unlike other artillery systems that would need to be unhooked and moved in a self-propelled mode on such rugged terrain—leading to longer travel times—the ATAGS could remain in its towed configuration and continue to move smoothly, reducing the time spent on this critical operation.

In total, the ATAGS covered 526 kilometres through the mountainous and high-altitude terrain of North Sikkim, a stark contrast to the 23 km mobility test conducted for foreign artillery systems as part of the Army's search for a towed gun system. But the Army remained unconvinced, and complaints about the ATAGS' weight persisted.

Another concern raised by the Army regarding the ATAGS, besides its weight, was its perceived inability to meet performance benchmarks, particularly in terms of firing rates.

However, when examining its actual performance, the ATAGS has demonstrated impressive capabilities. It can fire five rounds in one minute in burst mode, 10 rounds in 2.5 minutes during intense firing, and sustain 60 rounds per hour.

In contrast, the competition—Elbit's ATHOS—while meeting the Army's 15-tonne weight limit, can fire only three rounds in 30 seconds in burst mode, 12 rounds in three minutes during intense firing, and maintain 42 rounds per hour in sustained mode.

An opening for imports?

Although the Army came around and an order for ATAGS has finally come through, the number—307—is only a fraction of the Army's requirement in this category.

This, coupled with the Indian Army Request for Information (RFI) to acquire a 155mm/52 calibre Towed Gun System, issued in late 2022, has sparked speculation about the possibility of opening the door for imports of Elbit's ATHOS gun, which, at least one report says, "the Army was keen on." The Israeli gun had been in the race for a contract from the Indian Army for over a decade.

The RFI issued in December 2022 emphasised that the weight of the gun system "be preferably less than 15 tons," a specification that aligns with the ATHOS gun's weight. While the ATAGS weighs more than 18 tons, the ATHOS is lighter and meets the Army's preferred weight limit. This has led many to believe that the new RFI could pave the way for the import of the Israeli-made ATHOS gun.

The process to acquire towed guns began in 2001, as part of the Indian Army's Field Artillery Rationalisation Plan. Over the decades, several Requests for Proposals (RFPs) have been floated. During the UPA government's tenure, one such RFP attracted bids from Israel's Elbit Systems and France's Nexter. The plan at the time was to acquire 400 guns directly, with an additional 1,180 to be manufactured locally by the Ordnance Factory Board (OFB) through a technology transfer deal.

However, the 155mm x 52 caliber towed artillery gun was included in the first negative list of defence imports, initially set to be embargoed from December 2020. But the cut-off date for this specific category was later extended to December 2021.

Despite the embargo, a provision was introduced allowing the armed forces to procure defence equipment from foreign sources under exceptional circumstances, even if the system was listed in the negative import list.

In 2019, Elbit Systems emerged as the most competitive bidder. However, the DRDO pushed back against importing foreign systems, asserting that the indigenous ATAGS outperformed the ATHOS. Despite this, the Army favoured acquiring 400 ATHOS guns to bolster its capabilities in high-altitude regions along the northern borders.

The Army's insistence on purchasing 400 ATHOS guns was "repeatedly rebuffed" by the government, which saw it as a move that could undermine the growing indigenous artillery design and development ecosystem that had taken shape in recent years.

But the opening for ATHOS remains only in the realm speculation for now.

A new towed gun

The limited order for ATAGS can also be interpreted as a rare instance of the Army embracing iterative development—an approach that has often been overlooked in India's defence procurement unless driven top-down by the government.

The DRDO has engineered a 155 mm/52 calibre gun barrel featuring a 23-litre chamber, a more compact design compared to the 25-litre chamber found in the ATAGS. This smaller barrel, originally crafted for the DRDO's Mounted Gun System (MGS), results in a lighter weight. The technology is now being extended to private industry through a Transfer of Technology (ToT) arrangement.

This is interesting, given the Army is seeking a lighter Towed Gun System (TGS) to serve as its primary artillery platform moving forward, targeting a weight of approximately 15 tonnes—significantly less than the ATAGS—while retaining comparable firepower.

DRDO's 23-litre chamber design could be used in a new domestically developed TGS, given its procurement has been approved under the 'Buy (Indian-IDDM)' category, which requires sourcing from an Indian vendor for products that are indigenously designed, developed, and manufactured, with at least 50 per cent indigenous content based on the total contract value.

The TGS, as outlined in the Acceptance of Necessity granted in 2023, must achieve a firing range beyond 40 kilometres across various terrains. In high-altitude and mountainous regions, the gun should be capable of engaging targets at a minimum distance of 5 kilometres when firing at high angles. Additionally, it should be compatible with all 155mm ammunition currently used by the Indian Army.

Dead in the tracks no more

The induction of the ATAGS gun would finally and decisively kickstart the long-stalled artillery modernisation plan. Companies like Kalyani Strategic Systems and Tata Advanced Systems have established a robust indigenous ecosystem for designing, developing, and manufacturing artillery systems, providing the Indian Army for the first time with viable alternatives to foreign artillery guns.

Beyond its battlefield capabilities, ATAGS signals something even more consequential: a shift in how India builds its weapons.

It stands as proof that state-owned institutions, with their technological reserves, and private industry, with its agility and drive for innovation, can come together to create capable weapons systems tailored to India's needs.

Such collaboration, long elusive in India's case, now establishes a precedent that could serve as a model for future defence manufacturing.

There can't be a clearer sign of progress for India's "Make in India" defence initiative than an indigenous system, developed through collaboration between state-owned and private sectors, making its way into the armed forces to fulfil a critical shortfall.

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China's J-36 sixth-generation stealth fighter spotted again. Is Beijing outpacing US in air superiority?

Source: The Week, Dt. 22 Mar 2025,
URL: https://www.theweek.in/news/defence/2025/03/22/chinas-j-36-sixth-generation-stealth-fighter-spotted-again-is-beijing-outpacing-us-in-air-superiority.html

Amid reports of announcement of the US plans to build its sixth-generation aircraft, known as Next Generation Air Dominance (NGAD) the mysterious sixth-generation fighter jet of China, J-36, made a second public appearance. A few months ago, the Chinese sixth-generation fighter jet reportedly made its first public appearance, fling along with a J-20S fifth-generation fighter. Now, military observers claim that massive fighter aircraft flew solo although there is no official confirmation on the public appearance of J-36.

Some reports suggest that the latest flight of the sixth-gen fighter without a chase plane could mean that the landing gear and the aerodynamic capabilities of J-36 are being tested. Although the details about the sixth-gen fighter of China continue to remain mostly speculative, Chinese military commentator Song Zhongping has been quoted as saying that the new aircraft is making "smooth progress with test flights in short intervals."

The first flight test of the tailless stealth fighter, built by Chengdu Aircraft Corporation, was conducted by the end of December. A bulgarianmilitary report suggests that the jet appears to have features that are associated with the sixth-generation fighters, including stealth, enhanced sensors and the capability to seamlessly integrated with unmanned systems. The wingless design also makes it tough to detect, giving it yet another edge in the stealth game.

The unusual three-engine setup and the substantial size—about 22.5 meters in length and wingspan of 24 meters—of the aircraft indicates that the it can carry a huge amount of payload for extended missions. Although it is not yet clear if J-36 is a fighter or bomber, some analysts believe that it could be a designed for multi-role missions. Meanwhile, President Donald Trump announced that Boeing will build the Air Force's future fighter jet—F-47—which will serve as quarterback to a fleet of future drone aircraft designed to be able to penetrate the air defences of China and any other potential adversaries. They will replace Lockheed Martin's aging twin-engine, all-weather, supersonic stealth fighter aircraft F-22 Raptor, a major component of the Global Strike Task Force.

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China's PLA deploys AI tool 'DeepSeek' in military hospitals, non-combat functions

Source: The Economic Times, Dt. 23 Mar 2025,
URL: https://economictimes.indiatimes.com/news/defence/chinas-pla-deploys-ai-tool-deepseek-in-military-hospitals-non-combat-functions/articleshow/119376280.cms

China's People's Liberation Army (PLA) has started using the recently released Chinese AI tool 'DeepSeek' for non-combat support functions, especially in military hospitals, to assist the doctors in devising treatment plans besides other civilian areas, media reports said. DeepSeek's open-

source large language models (LLMs) are being used in PLA hospitals, People's Armed Police (PAP), and national defence mobilisation organs, the Hong Kong-based South China Morning Post reported on Sunday.

Earlier this month, the general hospital of the PLA Central Theatre Command announced that it had authorised "embedded deployment" of DeepSeek's R1-70B LLM, saying it could provide treatment plan suggestions to support doctors, according to the Post. The hospital also emphasised patient privacy and data security, noting that all data was stored and processed on local servers.

Similar deployments have been seen in other PLA hospitals nationwide, including the elite PLA General Hospital in Beijing, also known as "301 Hospital", where senior Chinese officials and military officers receive treatment and highly sensitive personal data is believed to be stored.

Earlier, the PLA, which is investing heavily in modernisation, cautioned its armed forces against banking heavily on artificial intelligence, saying that AI should be a tool to guide but not a replacement for human decision-making on the battlefield because it lacks self-awareness capability.

"As AI evolves, it must remain a tool guided by human judgment, ensuring accountability, creativity, and strategic adaptability remain at the forefront of military decision-making," an article published in the People's Liberation Army Daily, the official media of the Chinese military, said in January. "AI must work in tandem with human decision-makers to optimise command effectiveness, enhancing rather than replacing human agency," it said.

China is abuzz with DeepSeek's latest AI offering which has drawn global attention for its low-cost model. Further, DeepSeek's R1 used a fraction of compute power as compared to established AI models like ChatGPT.

Also, DeepSeek overtook ChatGPT as the top-ranked free app on Apple's Appstore, as the US tech industry - that has long justified injecting billions of dollars into AI investments - watched in sheer disbelief. In the longer run analysts expect the AI models to find imminent application in battlefield intelligence surveillance and decision-making by the Chinese military.

Besides treatment plans in military hospitals, China is promoting AI integration across industries, including healthcare, manufacturing, and urban development, and some Chinese government agencies are increasingly utilising DeepSeek models, including for anti-corruption efforts. Some units of PAP (People's Armed Police), a paramilitary police force under the Central Military Commission (CMC), the overall high command of the Chinese military, started the AI app for daily physical training and psychological counselling.

The political work department of the Hainan paramilitary force shared an example of soldiers using DeepSeek to address anxiety and create an exercise plan on its official media account.

Sam Bresnick, a research fellow at Georgetown University's Centre for Security and Emerging Technology who focuses on military AI applications, said that the use of DeepSeek's models in settings like hospitals and soldier training programmes offers the PLA a controlled environment for experimentation. By initially deploying LLMs in non-combat scenarios, the PLA could try to

address technical and operational challenges before expanding into more sensitive, high-risk areas, Bresnick told the Post.

The PLA had long highlighted the potential utility of AI for military decision-making, he said, adding that "the emergence of an advanced model like DeepSeek's R1 might help in that area".

The PLA has called for the incorporation of high-end technology, particularly AI, to strengthen its combat capabilities in previous years. This would include boosting the effectiveness of drone swarm tactics, improving the efficiency and realism of pilot training, and battlefield decision-making support. The Chinese state-run Guangming Daily said last month that DeepSeek "is playing an increasingly crucial role in the military intelligentization process, ushering in a new chapter in the evolution of military intelligentization".

It said DeepSeek was capable of processing massive amounts of battlefield data in real-time, enabling precise situational awareness during combat. Fu Qianshao, a Chinese military analyst, said DeepSeek's applications in routine physical training and logistical support "demonstrate the PLA's commitment to 'staying up-to-date and fully utilising AI technology to enhance comprehensive combat capabilities'."

"It cannot be ruled out that DeepSeek has been used for other combat functions," Fu said, adding that "the integration of AI into command systems has been underway for a considerable time".

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India Unveils ‘Powerful’ D4 Anti-Drone System; IAF Expert Explains How It Will Be A Game Changer For Military

Source: The EurAsian Times, Dt. 23 Mar 2025,
URL: https://www.eurasiantimes.com/india-unveils-powerful-d4-anti-drone-system-iaf-expert-explains-how-it-will-be-a-game-changer-for-military/

The changing nature of warfare is no longer a future prediction; it’s a present reality. From asymmetric threats to state-sponsored terrorism, the use of commercial off-the-shelf drones in surveillance, smuggling, and targeted attacks has exploded. India, with its expansive land borders, porous coastline, and hostile neighbors, has been particularly vulnerable.

But that vulnerability is now being met with resilience. In a quiet but powerful move, India’s Defence Research and Development Organisation (DRDO) has unveiled the D4 (Drone Detect, Deter, Destroy) anti-drone system, which is now being deployed along key border areas.

This homegrown, integrated counter-drone solution is designed to detect and neutralize rogue unmanned aerial vehicles (UAVs) with precision. Having personally contributed to this system as part of the interception drone component, I’ve seen the complexities, the vision, and the urgency that built this shield.

This article offers an insider’s view of the D4 system, why it matters, how it works, and where it stands in India’s larger strategy against unmanned threats.

The New Threat Landscape

The low cost, ease of availability, and increasing autonomy of drones have made them the weapon of choice for non-state actors and insurgent groups. From the smuggling of narcotics across the Punjab border to the airdropping of arms in Jammu & Kashmir, drones have proven to be effective tools for asymmetric warfare.

The 2021 Jammu Air Force Station drone attack was a wake-up call. In under five minutes, two small drones dropped explosives on the station premises—no fighter pilot, no warning radar signature, no traditional engagement possible. It wasn't just a breach of physical space; it was a breach of perception. The enemy didn't need a missile—they just needed a drone with GPS and intent.

Genesis Of The D4 System

In response to this evolving threat, DRDO initiated the development of an indigenous counter-drone solution. The D4 system was built under the stewardship of India's finest minds in collaboration with private and public-sector partners.

I was privileged to be part of this effort—not as a spectator but as a designer and integrator of interceptor drones that could autonomously engage rogue UAVs mid-flight. Our design mandate was speed, precision, and non-collateral impact.

The project was multi-layered. It required seamless integration of various technologies:

- Radio-frequency (RF) detection
- Radar and electro-optical tracking
- AI-powered threat classification
- Electronic jamming and spoofing
- Hard-kill and soft-kill neutralization

The D4 is not just a product—it's a system of systems designed to adapt to terrains, threat levels, and operational environments.

What Makes The D4 Unique?

At its core, the D4 system is a multi-sensor, multi-kill solution that can detect, track, and neutralize small drones flying at low altitudes, especially in cluttered environments.

Let's break it down:

1. **Detection Layer**

The D4 system uses a combination of radars, RF sensors, and EO/IR (electro-optical/infrared) cameras. This multi-modal detection helps overcome the limitations of any single sensor.

- RF Scanners detect the command-and-control (C2) signals of most commercial drones.
- X-band radar provides precise bearing and range data even for low RCS (Radar Cross Section) drones.

- EO/IR cameras provide visual confirmation, especially useful in day/night ops and to avoid false positives.

This layered detection ensures the system sees what human eyes and legacy radars can't.

2. **Threat Analysis**

An embedded AI engine processes signals, differentiates between birds, kites, and drones, and classifies the type—quadcopter, fixed-wing, or hybrid. This AI-based target classification is critical, especially in crowded or civilian areas. No room for error here. A wrong kill could mean civilian casualties or diplomatic blowback.

3. **Soft-Kill Options**

Once a drone is confirmed hostile, the D4 activates its electronic warfare (EW) suite:

- GPS spoofing to misguide the drone.
- RF jamming to sever the command link between pilot and drone.
- Wi-Fi de-authentication for certain models using off-the-shelf chips.

These measures are non-lethal and are typically the first response.

4. **Hard-Kill Options**

When soft kills fail, kinetic action is initiated. The D4 offers:

- Laser-directed energy weapons (DEWs) that melt key components.
- Interceptor drones—the component we worked on—chase and collide or deploy net-based entrapments.
- Projectile launchers (in some deployments) to physically down the drone.

In some trials, we tested hybrid interceptors with AI-swarming capability—imagine a flock of drones coordinating to bring down a rogue intruder. These are no longer ideas on a PowerPoint; they are functional, field-tested, and calibrated for border ops.

My Role In Building The Aerial Interceptor

Designing the interceptor drone for the D4 system was a deeply technical and philosophical challenge. We weren't building a racing drone or a long-endurance surveyor. We were building a hunter.

Key Considerations:

- High thrust-to-weight ratio for vertical climbs and rapid acceleration.
- AI-based vision system to track the rogue UAV even if RF signals are jammed.
- Onboard decision-making—in case of lost link with the ground controller.
- Payload options like deployable nets, blade attachments, or even self-destruct for one-time missions.

We tested them across altitudes and demonstrated them to the Governor of Telangana. Our goal was to intercept within 20 seconds of detection. Every gram and millisecond of latency mattered. This wasn't just engineering; it was a battlefield ballet of hardware, software, and instincts. The D4 system also has a similar hunter drone.

From Trial Grounds To Frontlines

In 2024, after multiple test cycles, the D4 system was declared operational. The Ministry of Home Affairs and the Indian Army began trials at select locations—particularly in Punjab, Jammu, and the Northeast, where drone intrusions had surged.

Today, D4 is being deployed in layers:

- Forward bases to monitor infiltration and drone drops.
- Strategic installations like ammunition dumps, airbases, and communication hubs.
- Border Outposts (BOPs) to detect cross-border smuggling and recon drones.

And it's not just the Army—BSF, CRPF, and NSG are also undergoing training to use it.

Gamechanger In Anti-Drug & Anti-Terror Ops

Drones have become the new mules for drug cartels. In Punjab, heroin drops via quadcopters with GPS-guided coordinates became common by 2022. The D4 system is now actively being used to:

- Detect incoming drops.
- Jam them before payload release.
- Capture and retrieve drones for forensic analysis.

Terror outfits across the border also experimented with dropping hand grenades and IEDs. The D4, integrated with secure command systems, alerts local quick-reaction teams, ensuring response in seconds—not minutes.

In at least three reported incidents, the D4's interceptor drone brought down a rogue UAV before it could cross the border—making this not just a defensive system but a proactive countermeasure.

Why Indigenous Matters

Could we have bought a similar system from abroad? Yes.

But like many of us who've served, I believe Indian problems need Indian solutions. The terrain, the fog, the power conditions, the enemy playbook—it's unique. Off-the-shelf Israeli or Western systems simply can't be hardcoded to understand Punjab's winter haze or Assam's jungle clutter.

The D4 is Made in India, Made for India, and now, Made for the World. DRDO's success here signals that India can be a global hub for counter-UAS systems. From export-ready components to full-stack platforms, our moment is here.

The Road Ahead

The battlefield is evolving faster than protocols. The enemy will adapt. They will switch frequencies, deploy stealthier drones, and perhaps even use AI-generated swarm attacks.

This is why the D4 is being constantly upgraded:

- Integration with facial and payload recognition.
- 5G jamming modules.
- Portable D4 Lite versions for VIP protection and convoys.
- Naval variants with maritime radar integration.

AMOS Aerospace, AutoMicroUAS, and others are working parallelly to make this ecosystem modular, mobile, and interoperable.

A Personal Note

As someone who has flown supersonic fighters and chased bogeys on radar, building an anti-drone system might seem like a step-down. But in truth, it's a step forward. Because today, the enemy doesn't always come with wings and missiles. Sometimes, it comes as a buzzing quadcopter with a grenade, flying under the radar but aimed at our sovereignty.

Building the interception drone for D4 wasn't just an engineering challenge. It was personal. Each successful test, each drop recovered, each attack foiled—that's a soldier saved. That's a village protected. That's India defended.

Conclusion: Our Skies, Our Watch

The D4 anti-drone system is not just hardware. It's a doctrine shift. It marks the transition from traditional perimeter defense to 360-degree, layered airspace awareness. India is no longer waiting to react. It is preparing to anticipate, intercept, and neutralize in real-time.

And for me, being part of this journey—from cockpit to code, from radar to rotor—has been nothing short of poetic. The future of war is silent. But so is the drone that guards our skies.

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Science & Technology News

Scientists develop 'air-chargeable' battery

Source: The Tribune, Dt. 24 Mar 2025,
URL: https://www.tribuneindia.com/news/india/scientists-develop-air-chargeable-battery/

Marking a sustainable and eco-friendly power solution, Indian scientists have developed a novel "air-chargeable" battery that traps oxygen from the environment to drive the charging process for energy storage.

Researchers from the Centre for Nano and Soft Matter Sciences (CNSMS) explored the "air-assisted self-charging" concept of aqueous zinc-ion batteries, aiming to utilise oxygen from the air to replenish the charge of the battery.

They have developed a photo-assisted self-chargeable energy storage device that enhances the charge storage capacity in the presence of light. It can charge by its own in the presence of oxygen from the atmosphere, according to information shared by the Ministry of Science and Technology.

In a world racing towards renewable energy solutions, a photo-assisted battery offers great promise as it combines the best of two worlds – the light-capturing capability of solar cells and the robust energy storage of conventional batteries.

Generally, solar panels convert sunlight into electricity, but they rely on separate battery systems to store the energy for later use. In contrast, photo-assisted batteries merge these functions into a single device, creating a seamless synergy between solar energy conversion and storage.

Photo-assisted batteries enhance the capacity of the batteries in the presence of light. However, it needs an external power supply to charge the battery. To overcome this limitation, energy storage devices with self-rechargeability are required.

“The ever-growing demand for portable electronic devices in various applications emphasises the necessity for continuous power sources, particularly in situations where recharging is not readily available. These discoveries pave the way for the advancement of self-rechargeable photo-assisted energy storage devices for real-world usage,” the researchers have stated in their study, which has been brought out in the Chemical Engineering Journal, an international peer-reviewed publication tracking developments in chemical engineering.

The researchers used Vanadium and Tungsten compounds to design a photoelectrode for air-photo-assisted self-charged energy storage. “Notably, this study marks the first instance of employing Tungsten trioxide as an active material,” the researchers said.

The device showed a significant increment in the charge storage capacity by about 170 per cent, demonstrating the superiority of photo-assisted self-charged energy storage performance.

The findings by the CNSMS pave the way for integrating these devices into self-reliable electronics, potentially powered by renewable energy sources, marking a major step forward in the pursuit of sustainable energy solutions and demonstrating the practical utility of energy storage devices in modern technology, the ministry said.

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The Quantum Spin Breakthrough That Could Supercharge Computing

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UC Riverside and its partners are exploring antiferromagnetic spintronics, a tech that could unlock lightning-fast, ultra-dense memory and smarter computing through quantum mechanics.

The University of California, Riverside has been awarded nearly $4 million through the UC National Laboratory Fees Research Program to lead a major research initiative in antiferromagnetic spintronics, a promising new approach for advanced memory and computing technologies.

Over the next three years, the project will explore how antiferromagnetic materials – known for their ultrafast, spin-based properties – can be used to push the boundaries of modern microelectronics.

Advancing Microelectronics with Antiferromagnets

“The semiconductor microelectronics industry is looking for new materials, new phenomena, and new mechanisms to sustain technological advances,” said Jing Shi, a distinguished professor of physics and astronomy at UCR and the award’s principal investigator. “With co-principal investigators at UC San Diego, UC Davis, UCLA, and Lawrence Livermore National Laboratory, we aim to cement the University of California’s leadership in this area and obtain extramural center and group funding in the near future.”

Spintronics, short for spin-based electronics, uses the quantum property of electron spin, in addition to electric charge, for information processing. Antiferromagnetic spintronics offers a faster, more compact alternative to today’s ferromagnetic-based technologies used in memory chips and hard drives.

What Is Spintronics? A Quick Primer

“With UCR leading this project, we are well positioned to compete nationally for new funding provided by the CHIPS Act,” Shi said. The CHIPS Act provides funding for the Creating Helpful Incentives to Produce Semiconductors (CHIPS) for America Fund to support the domestic production of semiconductors.

Shi explained that in ferromagnetic materials, all electron spins align in the same direction, creating a net magnetic moment. In contrast, antiferromagnets have alternating spin directions, resulting in no net magnetic moment. Despite this, the oppositely aligned spin directions can be flipped to represent two distinct states, which can be used for memory storage.

“The advantage of antiferromagnetic memory is higher density, as the lack of a net magnetic moment means neighboring bits don’t interfere with each other,” Shi said. “Additionally, memory writing in antiferromagnets is faster due to quicker spin dynamics, driven by a quantum interaction called exchange interaction.”

Faster, Denser, Smarter Memory Systems

Beyond memory, antiferromagnets also have potential in computing, particularly in “magnetic neural networks.” Special antiferromagnets, called easy-plane antiferromagnets, can carry spin pulses over long distances with minimal energy loss, Shi explained.

“These pulses can propagate information through multiple neural layers, similar to how signals are processed in biological neural networks,” he said. “This is possible because of a quantum state called spin superfluidity, where spin pulses move efficiently through the material without much dissipation.”

Spin Superfluidity and Energy-Efficient Processing

Titled “Antiferromagnetic spintronics for advanced memory and computing,” the project will study these special antiferromagnets and investigate their potential. Researchers will use several lab

facilities at UCR as well as those at Lawrence Berkeley National Laboratory and Oak Ridge National Lab. The project will also involve the participation of several postdoctoral researchers and graduate students.

Shi said the proposal's reviewers assessed the research as high risk and high reward.

"There are many challenges ahead, including innovative approaches for designing and synthesizing materials, but our team has strong expertise in antiferromagnetic material synthesis," he said. "We are confident we can overcome the challenges."

The UCR team includes Igor Barsukov, an associate professor of physics and astronomy, and others.

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