

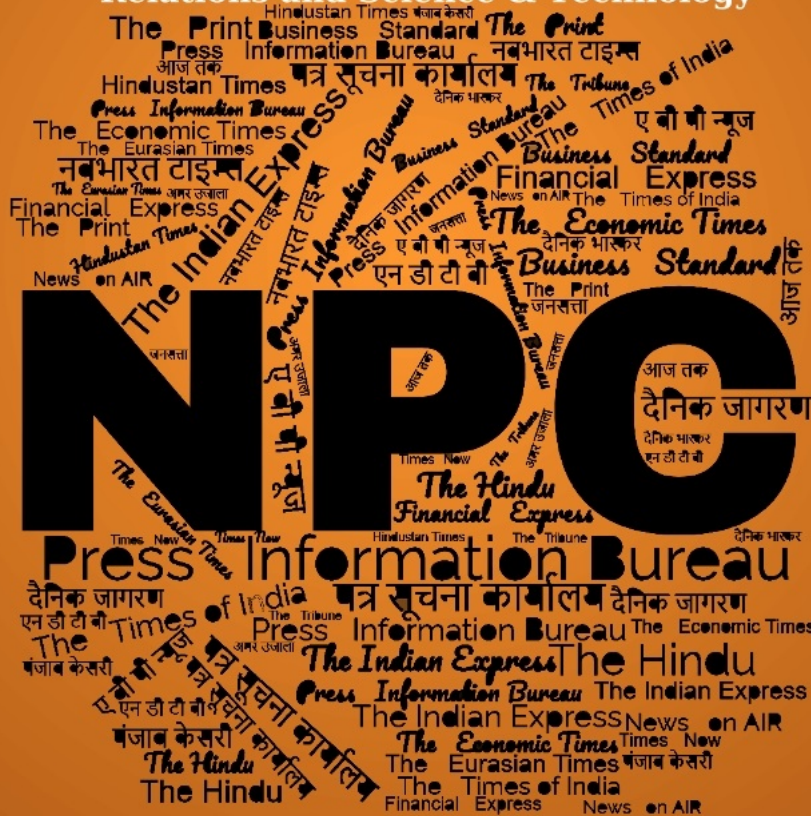
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# समाचार पत्रों से चयनित अंश Newspapers Clippings

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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Thu, 19 Sep 2024

## न गोला-बारूद, न कोई बम... डायरेक्टेड एनर्जी से हवा में तबाह होगा दुश्मन! DRDO बना रहा नया हथियार

रक्षा अनुसंधान एवं विकास संगठन (DRDO) इस साल भारतीय वायुसेना (IAF) की 'तीसरी आंख' विकसित कर लेना चाहता है. एक रिपोर्ट में, अधिकारियों ने बताया कि DRDO इसी साल IAF के लिए AEW&C-KI की फाइनल ऑपरेशनल क्लियरेंस भी चाहता है. इन प्लेटफॉर्म को 'नेत्र' नाम दिया गया है. इनका इस्तेमाल दुश्मन के विमानों या UAVs (ड्रोन) की पहचान और उन्हें ट्रैक करने में होता है. खतरे का अंदाजा लगाकर ऑपरेशन इंटरसेप्टर्स के जरिए दुश्मन को निपटा भी सकता है. इंडियन एक्सप्रेस में छपी रिपोर्ट के अनुसार, फिलहाल IAF दो AEW&C सिस्टमों का यूज कर रही है. DRDO दुश्मन के ड्रॉन्स को तबाह करने के लिए एंटी-ड्रॉन हाई पावर माइक्रोवेव सिस्टम पर भी काम कर रहा है. इसकी रेंज 1 किलोमीटर तक की होगी.

### डायरेक्टेड एनर्जी वेपन भी बना रहा DRDO

डीआरडीओ के वैज्ञानिक एक 30 किलोवॉट का डायरेक्टेड एनर्जी वेपन (DEW) सिस्टम तैयार करने में भी जुटे हैं. इसके जरिए हवाई वस्तुओं को निशाना बनाकर मार गिराया जा सकेगा. यह एक खास तकनीक है जिसकी टेस्टिंग और यूज दुनिया की कुछ एडवांस्ड सेनाएं ही कर रही हैं. रूस-यूक्रेन युद्ध और अन्य हालिया संघर्षों ने ड्रॉन्स को एक बड़े खतरे के रूप में उभारा है. DEW सिस्टम के जरिए दुश्मन को निशाना बनाने के लिए कंसंट्रेटेड इलेक्ट्रोमैग्नेटिक एनर्जी का यूज किया जाता है.

### क्या होते हैं डायरेक्टेड एनर्जी वेपंस?

डायरेक्टेड एनर्जी वेपंस (DEWs) में कोई ठोस प्रोजेक्टाइल (गोला-बारूद, मिसाइल आदि) इस्तेमाल नहीं होता. इसमें लक्ष्य को भेदने के लिए काइनेटिक एनर्जी की जगह, इलेक्ट्रोमैग्नेटिक या पार्टिकल तकनीक से कंसंट्रेटेड एनर्जी का यूज किया जाता है. ये हथियार बेहद सटीकता के साथ कई किलोमीटर दूर मौजूद टारगेट को निपटा सकते हैं. DEWs के उदाहरणों में हाई एनर्जी वाले लेजर, माइक्रोवेव, मिलीमीटर वेव्स, पार्टिकल बीम्स इत्यादि शामिल हैं.

### तकनीक के सहारे और घातक बन रही सेना

ऐसे अत्याधुनिक हथियारों के डेवलपमेंट और टेस्टिंग से भारत की सेनाएं और घातक बन रही हैं. पिछले साल, एयर चीफ मार्शल वीआर चौधरी ने कहा था कि भारत की डिफेंस इंडस्ट्री को ऐसे अत्याधुनिक हथियार बनाने में तेजी दिखानी चाहिए. जो रेंज और सटीकता हमें चाहिए, उसके लिए उन्हें हवाई प्लेटफॉर्म से इंटीग्रेट किया जाना चाहिए. चौधरी ने कहा था कि DEWs खासकर लेजर, परंपरागत हथियारों की तुलना में कहीं ज्यादा कारगर हैं.

<https://zeenews.india.com/hindi/india/drdo-netra-iaf-aewc-systems-new-directed-energy-weapon-being-developed/2437188>

# Business Standard

Thu, 19 Sep 2024

## Psychological test for Agniveers, anti-drone systems on DRDO's 2024 agenda

The Defence Research and Development Organisation (DRDO) has outlined several high-priority projects for this year, focusing on initiatives ranging from psychological assessments for the armed forces to advanced weapons systems.

According to a report by Indian Express, these efforts include developing a psychological evaluation for Agniveers, enhancing directed energy weapon systems, and providing statutory backing to key certification bodies.

### Psychological assessment for Agniveers

One significant project is the development of a psychological assessment test for the selection of Agniveers in the Indian Army, Indian Navy, and Indian Air Force. This test, aimed at evaluating the mental fitness of recruits, is expected to be adopted by the armed forces later this year. Currently, the recruitment process for Agniveers includes educational qualifications, physical tests, and medical assessments, but lacks psychological evaluation, the report said.

The Defence Institute of Psychological Research (DIPR), a part of DRDO, has been working on this initiative, and a psychometric test for Agniveers was trialled during a recruitment rally last year.

### Weapon systems

Another major focus for DRDO is the finalisation of advanced weapon systems. This includes the Final Operational Clearance for the Airborne Early Warning and Control (AEW&C) system for the Indian Air Force (IAF), known as "Netra". These platforms are designed to detect and track enemy aircraft and unmanned aerial vehicles (UAVs), aiding in threat assessment and interception. The IAF is currently operating two AEW&C systems that have already received Initial Operational Clearance, the report said.

Additionally, DRDO is working on a 30 kW Directed Energy Weapon (DEW) system to neutralise rogue aerial objects using concentrated electromagnetic energy. Such technology is crucial for countering the threat posed by UAVs, which have become a growing security concern, the report stated.

### Certification bodies

As part of its broader agenda, DRDO also aims to grant statutory status to key regulatory and certification entities like the Centre for Military Airworthiness and Certification and the Centre for Fire, Explosive, and Environment Safety.

In addition, DRDO is prioritising the development of an anti-drone High Power Microwave System with a range of 1 km, designed to neutralise enemy drones. Plans are also underway for the maiden

launch of a Long-Range Land Attack Cruise Missile, which will eventually be integrated into aerial, naval, and land-based platforms, the report further said.

[https://www.business-standard.com/external-affairs-defence-security/news/psychological-test-for-agniveers-anti-drone-systems-on-drdo-s-2024-agenda-124091900345\\_1.html](https://www.business-standard.com/external-affairs-defence-security/news/psychological-test-for-agniveers-anti-drone-systems-on-drdo-s-2024-agenda-124091900345_1.html)



*Thu, 19 Sep 2024*

## **Defence company Apollo Micro Systems shortlisted by DRDO for PRACHAND order**

Hyderabad-based Apollo Micro Systems, which caters primarily to the defence and aerospace sectors, has announced that it has been shortlisted by the Armament Research and Development Establishment (ARDE) under DRDO for the transfer of technology (ToT) related to the production of PRACHAND munition hardware. The company made the announcement about the same through an exchange filing.

"We are pleased to inform you that the Company has been shortlisted by the Armament Research and Development Establishment (ARDE), DRDO, for Transfer of Technology (ToT) related to the production of PRACHAND Munition Hardware," the company said in a statement.

PRACHAND is an Anti-Tank Munition with full width attack capability. The technology transfer will enable the company to manufacture and supply PRACHAND Munition Hardware to Indian Armed forces, it said.

Apollo Micro Systems further said that it is expecting huge market potential for the product and "our company is geared up to undertake production in large quantities".

Apart from this, the company said that it has received an order for supply of electronic modules worth Rs 5.72 crore from Reliable Technosystems India Pvt. Ltd.

Earlier month, the company had received orders from Economic Explosives Ltd and ARDE-Defence Research and Development Organisation (DRDO) worth Rs 4.70 crores. Besides, it was declared as the Lowest Bidder (L1) for GNC Kit by Munitions India Ltd, with a project worth of Rs 72.26 crores.

Apollo Micro Systems shares are available for trade on NSE and BSE. It is a constituent of BSE SmallCap index. The counter traded 3.32 per cent lower at Rs 106.32 around 1:30 PM.

As per BSE analytics, the defence counter has delivered a solid return of 90 per cent in the last one year and 530 per cent in two years. The counter has skyrocketed more than 800 per cent in the last three years.

The Hyderabad-based company is engaged in the aerospace and defence sector. It caters to the other sectors including infrastructure, transportation, railway and more. It commands a market cap of Rs 3,248.79 crore.

<https://www.etnownews.com/companies/defence-company-apollo-micro-systems-shortlisted-by-drdo-for-prachand-order-article-113484567>

## Defence News

## Defence Strategic: National/International



**Press Information Bureau**  
Government of India

**Ministry of Defence**

*Thu, 19 Sep 2024*

### **India is now seen as a preferred security partner in Indian Ocean Region; Navy playing a crucial role in promoting peace & prosperity: Raksha Mantri**

Shri Rajnath Singh exhorts Navy to be prepared for every situation in today's volatile global scenario

The 16th edition of India-Mongolia Joint Military Exercise NOMADIC ELEPHANT commenced today, at Foreign Training Node, Umroi (Meghalaya). The Exercise is scheduled to be conducted from 03rd to 16th July 2024.

Indian contingent comprising of 45 personnel is being represented by a Battalion of SIKKIM SCOUTS along with personnel from other arms and services. The Mongolian contingent is being represented by personnel from 150 Quick Reaction Force Battalion of the Mangolian Army. Exercise NOMADIC ELEPHANT is an annual training event conducted alternatively in India and Mongolia. Last edition was conducted in Mongolia in July 2023.

The Opening Ceremony of the Exercise NOMADIC ELEPHANT was attended by His Excellency Mr. Dambajavyn Ganbold, Ambassador of Mongolia to India and Major General Prasanna Joshi, General Officer Commanding 51 Sub Area of the Indian Army. The aim of the Exercise is to enhance joint military capability of both sides to undertake counter insurgency operations in a Sub

Conventional scenario under Chapter VII of the United Nations Mandate. The exercise will focus on operations in the semi-urban and mountainous terrain.

Tactical drills during the Exercise include Response to a Terrorist Action, Establishment of a Joint Command Post, Establishment of an Intelligence & Surveillance Centre, Securing of a Helipad/ Landing Site, Small Team Insertion & Extraction, Special Heliborne Operations, Cordon & Search Operations besides Employment of Drones and Counter Drone Systems amongst others. Major General Gyanbyamba Sunrev, Chief of General Staff of the Armed Forces of Mongolia is scheduled to attend the closing ceremony on 16th July 2024 along with Lieutenant General Zubin A Minwalla, General Officer Commanding 33 Corps of the Indian Army.

Raksha Mantri Shri Rajnath Singh addressed the second edition of Naval Commanders' Conference '24 in New Delhi on September 19, 2024. He commended the Indian Navy for playing a crucial role in promoting peace and prosperity in the Indian Ocean, terming the region as valuable & sensitive in view of the economic, geopolitical, trade and security aspects.

Pointing out that India was once a landlocked country with sea shores, but now it can be seen as an island country with land borders, the Raksha Mantri lauded the Indian Navy's readiness towards safeguarding the maritime interests of the country, which has resulted in establishing its credibility as the first responder in the region.

"A large part of the world's trade passes through the region, which makes it valuable. At the same time, incidents like piracy, hijacking, drone attacks, missile attacks and disruption of sea cable connections in the seas make it extremely sensitive. Our Navy has made a significant contribution in protecting the economic interests of all stakeholder nations of Indo-Pacific and in smooth movement of goods in the Indian Ocean region. Its anti-piracy operations are garnering appreciation not only in India but also globally. India is now seen as a preferred security partner in this entire region. Whenever need be, we will ensure security in the region," Shri Rajnath Singh said.

The Raksha Mantri asserted that the Indian Navy's growing strength in the Indo-Pacific region should not be taken for granted and called upon the Commanders to continue introspection from time to time, and be prepared for every situation in today's volatile global scenario. He emphasised on the need of a strong naval capability to protect the economic, trade, transport and overall national interests.

Shri Rajnath Singh reiterated Prime Minister Shri Narendra Modi-led Government's endeavour to make the Indian Navy more potent by inducting state-of-the-art ships, submarines etc. for its capability development, with focus on being Aatmanirbhar. He highlighted that 64 ships and submarines are currently under construction in Indian shipyards, and orders have been placed for 24 additional platforms.

The Raksha Mantri added that, in the last five years, more than two-third of the Navy's modernisation budget has been spent on indigenous procurement, resulting in accelerated development of the domestic defence ecosystem. While Shri Rajnath Singh praised the Navy's indigenisation efforts, he exhorted the Commanders to explore ways to further strengthen the resolve of achieving 'Aatmanirbharta'. He exuded confidence that the vision to transform the Navy from a 'Buyer' into a 'Builder' will be helpful in making it fully self-reliant by 2047.



The Raksha Mantri also spoke on the significance of jointness and optimum utilisation of resources. He stated that while Indian Navy and Indian Coast Guard have their own strengths, mandates & ways of working, there is need for more coordination to strengthen the maritime security of the country.

On the occasion, Shri Rajnath Singh also attended a Tech Demo, organised as part of the event. Various agencies, including Navy's premier R&D organisation Weapons & Electronics Systems Engineering Establishment showcased indigenous solutions, including Autonomous Systems, domain awareness, software defined radios and other niche tech initiatives. Chief of Defence Staff General Anil Chauhan, Chief of the Naval Staff Admiral Dinesh K Tripathi, Defence Secretary Shri Giridhar Aramane and other senior civil & military officials were present on the occasion.

The conference is the apex-level biannual event facilitating deliberations on significant strategic, operational and administrative issues among the Naval Commanders. Held against the backdrop of evolving geopolitical and geostrategic dynamics, regional challenges and complexity in maritime security situation in West Asia, the conference plays a crucial role in shaping future course of the Indian Navy.

The conference, as a pivotal platform, upholds the Navy's commitment to safeguard India's maritime interests and the Navy's status as a 'combat ready, credible, cohesive and future ready force'.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2056628>

# THE ECONOMIC TIMES

*Thu, 19 Sep 2024*

## **US firm expected to replace crashed MQ-9B Predator drone for meeting Indian Navy ops needs**

US firm General Atomics is expected to replace the MQ-9B Predator drone at the earliest to carry out surveillance missions for the Indian Navy as per the requirements projected in the contract between the two sides.

As per the lease agreement between the Indian Navy and the US firm, they are supposed to fly a certain number of hours every month to meet naval requirements and that can't be done by one bird only.

They will have to replace the crashed bird to meet the contractual obligations, defence officials told ANI. The Indian Navy has also briefed Defence Minister Rajnath Singh about the crash that took place off Chennai on Wednesday.

The Indian Navy had signed a lease contract with the American firm under the Contractor Owned Contractor Operated (COCO) model right after the Galwan clash in 2020. American drone pilots fly the drones for the Indian Navy missions sitting in an Indian Navy base near Chennai.

The Indian Navy has been using drones for surveillance missions in the Indian Ocean Region to keep an eye on Chinese military and intelligence-gathering vessels, along with operations against pirates and other elements in the area.

The Indian Navy had yesterday stated that a MQ-9B Predator High Altitude Long Endurance Remotely Piloted Aircraft (HALE RPA) encountered a technical failure on Wednesday, after which the aircraft was navigated to a safe area over the sea and carried out a controlled ditching at sea off Chennai.

"A detailed report has been sought from the Original Equipment Manufacturer (OEM)," it added.

"The MQ-9B Predator drones (HALE RPA) flying for the Indian Navy are operated by General Atomics under a lease agreement between the Indian Navy and the American firm. The Indian side pays only for the services provided by the vendor and the drones are flown by the pilots from the vendor side. The Indian side has asked for a detailed report from the vendors on the accident," Navy officials said.

<https://economictimes.indiatimes.com/news/defence/us-firm-expected-to-replace-crashed-mq-9b-predator-drone-for-meeting-indian-navy-ops-needs/articleshow/113499228.cms>

## THE ECONOMIC TIMES

*Thu, 19 Sep 2024*

### **BEL signs teaming agreement with Reliasat Inc. Canada to foray into space domain**

Navaratna Defence PSU Bharat Electronics Limited (BEL) on Thursday signed a teaming agreement with Reliasat Inc. Canada to collaborate in the area of space products, officials said.

The agreement aims at leveraging BEL and Reliasat's capabilities in the domain of space, they said.

"This is a significant step that will enable BEL to foray into the space segment in line with the Government of India's 'Atmanirbhar Bharat' and 'Make-in-India' initiatives and strengthen its existing portfolio," BEL said in a statement.

BEL, a Navaratna PSU under the Ministry of Defence, Government of India, enjoys a leadership position in the Defence/Strategic Electronics market in India and on the other hand, Reliasat develops space-based smart satellites and deep space solutions, enabling the internet from space with high capacity connectivity, it added.

<https://economictimes.indiatimes.com/news/defence/bel-signs-teaming-agreement-with-reliasat-inc-canada-to-foray-into-space-domain/articleshow/113500067.cms>

## **Need to accelerate our indigenous programme: IAF chief on India's self-reliance in defence**

IAF Chief Air Chief Marshal V R Chaudhari on Thursday said self-reliance is "not about isolation", but also about strengthening internal capabilities to face external challenges, as he asserted that for India to become self-reliant in defence, a comprehensive approach across multiple sectors is required.

In his address at the Bharat Shakti Defence Conclave here, he also said the countries today face a range of "new-age threats" that are different from the traditional military or economic risks of the past. "These threats are often complex, trans-national and multi-faceted.

Coupled with this is the emergence of hybrid warfare, blending traditional military aggression with cyber attacks, disinformation and economic coercion," the IAF chief said.

The air chief marshal underlined that a powerful and effective means for India to face these challenge is through collaboration.

"Collaboration with industry, academia, partner nations and emerging markets will be key to negotiating these turbulent times. As India faces these challenges, reliance on external sources for critical infrastructure, technologies and defence capabilities can create vulnerabilities," he said.

"In my opinion, self-reliance is not about isolation, but also about strengthening internal capabilities and capacities to face external challenges. It involves building robust domestic industries, investing in innovation, securing critical infrastructure and reducing vulnerabilities to external manipulation," the IAF chief added.

He cited the latest SIPRI report, according to which India remained the largest arms importer in the world between 2019-2023, with imports increasing by 4.7 per cent as compared to the previous period of 2014-2018.

"For India to become self-reliant in defence, a comprehensive approach across multiple sectors is required, combining technological innovation, structural reforms and strategic planning," he said. The IAF chief said the gathering at this conclave is to discuss how India can be a stabilising force in today's world "full of uncertainties".

"The 'VUCA' world represents a new paradigm, volatility, uncertainty, complexity and ambiguity would shape decision making at every level. Whether it is in geopolitics, modern warfighting or business, success in 'VUCA' world will require agility, resilience, collaboration and a readiness to embrace uncertainties," Air Chief Marshal Chaudhari said.

Chief of the Defence Staff General Anil Chauhan had in his address at an event here recently said that the vagaries of this VUCA -- 'volatility, uncertainty, complexity and ambiguity' -- world are impacting global defence supply chains, especially for ammunition.

The environment is challenging but also offers opportunities for those who can adapt, Air Chief Marshal Chaudhari said and cited the 'OODA loop', a decision-making model developed by Col John Boyd to explain how it can help in an uncertain world. The OODA stands for observe, orient, decide and act.

This loop's iterative nature encourages continuous reassessment which is crucial in a volatile and an uncertain environment. As the situation changes, the loop helps to quickly cycle back through the stages to adapt decisions accordingly, the IAF chief added. Similarly, complexity and ambiguity in an unstable world requires the decision makers to be open to new information and avoid being "locked into a single course of action," he said.

This OODA loop offers a structured yet a very flexible framework to address rapid change, uncertainties and complexities. It equips the leaders to observe real-time development, orient themselves in a complex environment, make decision on face of uncertainties and act swiftly, all the adapting to new information, the IAF chief said.

He added the combination of 'VUCA' analysis and the 'OODA loop' provides a "novel approach to navigate the modern and unpredictable world that we all live in". "In a world increasingly marked by disruptions and shifts, India's role as a stabilising force stems from its ability to leverage its strategic autonomy, geopolitical position, economic growth, technological expertise and of course cultural influence," the IAF chief said.

By navigating the complexities of the modern world with a balanced approach, India has a "potential to offer leadership" that promotes global peace, development and cooperation, he said. In his address, the IAF chief enumerated a few imperatives that is needed for a robust defence ecosystem.

"We must strengthen domestic research and development, encouraging public private partnership to enhance innovation to make up for the gap in expertise," he said and added that to foster such a culture, there is a need to encourage such research and development at the college level.

"Our education system, therefore, needs to be revamped completely to harness and nurture talent. The brain drain that we have seen in the past few decades, has not reduced and we need to offer better incentives to skill professionals to help retain the talent. That must become our topmost priority," he said. Secondly, there is a need to "expand and diversify our defence industrial base", the IAF chief added.

"While we have already signed many defence contract with private players, to foster competition and innovation, there is a need for us to build our local supply chain for critical components like electronics and advance material," he said.

Thirdly, there is need to "accelerate our indigenous programme" and this can only happen "if we adapt agile project management techniques to minimise time and cost overruns that have historically affected some of our defence programmes," the IAF chief added.

"There is a need to bring in accountability because we are dealing with national security," he said. He also pitched for "enhancing oversight by establishing bodies to monitor defence procurement processes" to ensure timely completion of projects and reduce inefficiencies.

Also, India should leverage its defence relationship with global powers to obtain technology transfers which can boost indigenous manufacturing. Forming joint ventures will develop domestic capabilities.

These partnerships can also be crucial in fostering innovations and transferring manufacturing expertise to the Indian companies, he said. The IAF chief said that without neglecting the established area of capabilities, "it is vital India prepares itself for what is going to come in future".

"We must develop innovative processes to cater for evolving defence needs in quick time. We must cross-pollinate between the industry and the air force to ensure that the India at 100 years possess an air force that is capable of addressing all challenges that are likely to be posed 25 years from now," he asserted.

The defence conclave was attended by various senior defence officials, industry representatives and defence attaches of many countries, among others.

The CDS and Army Chief General Upendra Dwivedi also took part in the conclave later.

<https://economictimes.indiatimes.com/news/defence/self-reliance-not-about-isolation-but-also-strengthening-internal-capabilities-iaf-chief/articleshow/113499137.cms>

# THE ECONOMIC TIMES

*Thu, 19 Sep 2024*

## **Indian defence industry optimistic about collaboration in Africa**

Eight public sector and two private defence sector companies of India participating in the Africa Aerospace and Defence expo are showcasing high quality of products and the level of after sales service offered to garner more business.

Harping on maintenance as a key factor in ensuring support, these top defence sector companies are confident that India's prowess in air, land and maritime products will find favour on the continent and globally, officials attending the Africa Aerospace and Defence (AAD) said.

Held biennially at the Waterkloof Airforce Base in the City of Tshwane - South Africa's administrative capital, the AAD Expo is one of the largest contributors to the country's GDP. This year's edition of AAD, which combines both a trade exhibition and an air show, is being held from September 18 till 22.

"Our products in combat situations have done well and therefore offer a good choice for the African countries. I'm sure, they will go back with good orders," said High Commissioner Prabhat Kumar after officially opening the India Pavilion at AAD on Wednesday. Sanjay Dwivedi, chairman and managing director of Armoured Vehicles Nigam Limited (AVNL), a government of India enterprise within the Ministry of Defence, said it the first time that they are participating as an exhibitor.

The AVNL has manufactured different types of tank variants, combat vehicles and their variants and different types of mine-protected vehicles and engines used in the tanks since 1962. "We know that there is a lot of potential in the African defence market where we can sell our products as well as support makeup and modernisation of their vehicles," Dwivedi said.

Stating that he did not see South Africa, also a strong tank developer, as a competitor, Dwivedi said, "Today's world is not only one of competition. Today's world is one of collaboration and partnership." Manoj Yadav, General Manager Marketing at Hindustan Aeronautics Limited, said his company is showcasing its latest product, an advanced light helicopter.

Girish Pradhan, executive director of Bharat Dynamics Limited, said there was a lot of potential for the combat weapons being supplied to the Indian armed

forces to be deployed in South Africa. "We (also) provide end-to-end solutions, not just the delivery of the weapons. We give product support, develop industries and collaborate with them," Pradhan said. Also showcasing their products and seeking business opportunities are Vinkal Bansal, Additional General Manager at India Optel; Kamesh Kasana, General Manager of Military Communication at Bharat Electronics, and Adikesh Vasudevan, General Manager at Goa Shipyard Limited.

<https://economictimes.indiatimes.com/news/defence/indian-defence-industry-optimistic-about-collaboration-in-africa/articleshow/113489719.cms>

## THE ECONOMIC TIMES

*Thu, 19 Sep 2024*

### **Indian artillery shells find their way to Ukraine, igniting Russian anger**

Artillery shells sold by Indian arms makers have been diverted by European customers to Ukraine and New Delhi has not intervened to stop the trade despite protests from Moscow, according to eleven Indian and European government and defence industry officials, as well as a Reuters analysis of commercially available customs data.

The transfer of munitions to support Ukraine's defence against Russia has occurred for more than a year, according to the sources and the customs data. Indian arms export regulations limit the use of weaponry to the declared purchaser, who risks future sales being terminated if unauthorised transfers occur.

The Kremlin has raised the issue on at least two occasions, including during a July meeting between Russian Foreign Minister Sergei Lavrov and his Indian counterpart, three Indian officials said.

Details of the ammunition transfers are reported by Reuters for the first time. The foreign and defence ministries of Russia and India did not respond to questions. In January, Indian foreign

ministry spokesperson Randhir Jaiswal told a news conference that India had not sent or sold artillery shells to Ukraine.

Two Indian government and two defence industry sources told Reuters that Delhi produced only a very small amount of the ammunition being used by Ukraine, with one official estimating that it was under 1% of the total arms imported by Kyiv since the war.

The news agency couldn't determine if the munitions were resold or donated to Kyiv by the European customers. Among the European countries sending Indian munitions to Ukraine are Italy and the Czech Republic, which is leading an initiative to supply Kyiv with artillery shells from outside the European Union, according to a Spanish and a senior Indian official, as well as a former top executive at Yantra India, a stateowned company whose munitions are being used by Ukraine.

The Indian official said that Delhi was monitoring the situation. But, along with a defence industry executive with direct knowledge of the transfers, he said India had not taken any action to throttle the supply to Europe. Like most of the 20 people interviewed by Reuters, they spoke on condition of anonymity due to the sensitivity of the matter.

The Ukrainian, Italian, Spanish and Czech defence ministries did not respond to requests for comment. Delhi and Washington, Ukraine's main security backer, have recently strengthened defence and diplomatic cooperation against the backdrop of a rising China, which both regard as their main rival. India also has warm ties with Russia, its primary arms supplier for decades, and Prime Minister Narendra Modi has refused to join the Western-led sanctions regime against Moscow.

But Delhi, long the world's largest weapons importer, also sees the lengthy war in Europe as an opportunity to develop its nascent arms export sector, according to six Indian sources familiar with official thinking. Ukraine, which is battling to contain a Russian offensive toward the eastern logistics hub of Pokrovsk, has a dire shortage of artillery ammunition.

The White House declined to comment and the U.S. State Department referred questions on Delhi's arms exports to the Indian government. India exported just over \$3 billion of arms between 2018 and 2023, according to data compiled by the Stockholm International Peace Research Institute think-tank.

Defence Minister Rajnath Singh said at an Aug. 30 conference that defence exports surpassed \$2.5 billion in the last fiscal year and that Delhi wanted to increase that to about \$6 billion by 2029. Commercially available customs records show that in the two years before the February 2022 invasion, three major Indian ammunition makers - Yantra, Munitions India and Kalyani Strategic Systems - exported just \$2.8 million in munitions components to Italy and the Czech Republic, as well as Spain and Slovenia, where defence contractors have invested heavily in supply chains for Ukraine. Between February 2022 and July 2024, the figure had increased to \$135.25 million, the data show, including completed munitions, which India began exporting to the four nations.

Arzan Tarapore, an India defence expert at Stanford University, said that Delhi's push to expand its arms exports was a major factor in the transfer of its arms to Ukraine. "Probably in the sudden recent expansion, some instances of end-user violations have occurred."

### **Discreet Deliveries**

Unlisted Italian defence contractor Meccanica per l'Elettronica e Servomeccanismi (MES) was among the companies sending Indian-made shells to Ukraine, said the former top Yantra official. MES is Yantra's biggest foreign client.

The executive said the Rome-based company buys empty shells from India and fills them with explosives. Several Western firms had explosive filling capabilities but lack the manufacturing capacity to mass produce artillery shells, the executive said.

Yantra said in its 2022-23 annual report that it had agreed a deal with an unnamed Italian client to set up a manufacturing line for L15A1 shells, which the former Yantra executive identified as MES. MES and Yantra India did not respond to emails seeking comment.

Customs data indicate that Yantra shipped \$35 million worth of empty 155mm L15A1 shells to MES between February 2022 and July 2024. Customs records also show that in February 2024, U.K.-based arms company Dince Hill - whose board includes a top MES executive - exported \$6.7 million in ammunition from Italy to Ukraine. Among the exports were 155mm L15A1 shells, which the customs declaration said were manufactured by MES for Ukraine's Defence Ministry and supplied for "promoting the defense capability and mobilization readiness of Ukraine."

Dince Hill did not respond to an email seeking comment. Its new owner, Rome-based Effequattro Consulting, could not be reached. In another instance, Spain's Transport Minister Oscar Puente shared on social media in May an end user agreement signed by a Czech defence official that authorised the transfer of 120mm and 125mm ammunition shells from Munitions India to arms dealer Czech Defence Systems.

Pro-Palestinian activists had alleged that the Borkum, a vessel carrying Indian-made arms which had stopped in a Spanish port, was carrying the weapons to Israel. Spanish newspaper El Mundo reported in May the final destination was actually Ukraine. A Spanish official and another source familiar with the matter confirmed to Reuters that Kyiv was the end user. Munitions India and CDS did not respond to questions. Customs records dated March 27 show Munitions India had shipped 10,000 rounds of 120mm and 125mm mortar shells, worth more than \$9 million, from Chennai to CDS.

### **Friendly Fire**

Russia, which supplies more than 60% of Delhi's arms imports, is a valued partner for India. In July, Modi chose Moscow for his first bilateral international trip since being elected to a third term. Subrahmanyam Jaishankar and Lavrov, the Russian minister pressed his counterpart about Indian munitions being used by Ukrainians and complained that some were made by state-owned Indian companies, according to an Indian official with direct knowledge of the encounter. The official did not share Jaishankar's response.

Walter Ladwig, a South Asia security expert at King's College London, said the diversion of a relatively small amount of ammunition was geopolitically useful for Delhi. "It allows India to show partners in the West that it is not 'on Russia's side' in the Russia-Ukraine conflict," he said, adding that Moscow held little leverage over Delhi's decisions.

<https://economictimes.indiatimes.com/news/defence/indian-artillery-shells-find-their-way-to-ukraine-igniting-russian-anger/articleshow/113478614.cms>



## **‘Misleading’: India rejects report on diversion of defence exports to Ukraine**

two leaders skipped the traditional annual summit meeting between the executive heads of the two countries in 2022 and India on Thursday dismissed a media report on diversion of defence exports to Ukraine as “speculative and misleading”.

A Reuters report had stated that artillery shells sold by Indian arms makers have been diverted by European customers to Ukraine and New Delhi has not intervened to stop the trade despite protests from Moscow.

Responding to the report, the Ministry of External Affairs in a statement, said such actions imply violations by India, where none exist, and hence, is “inaccurate and mischievous.”

The ministry further stated that India has an impeccable track record of compliance with international obligations on the export of military and dual-use items.

It asserted that India has been carrying out its defence exports taking into account its international obligations on non-proliferation and based on its own robust legal and regulatory framework, which includes a holistic assessment of relevant criteria, including end-user obligations and certifications.

According to the sources and the customs data quoted by Reuters, the transfer of munitions to support Ukraine’s defence against Russia has occurred for more than a year. Quoting three Indian officials, the report further stated that the Kremlin had raised the issue on at least two occasions, including during a July meeting between Russian Foreign Minister Sergei Lavrov and his Indian counterpart S Jaishankar.

The ministry’s clarification also comes weeks after Prime Minister Narendra Modi spoke to Russian President Vladimir Putin and “exchanged perspectives” on the Russia-Ukraine conflict and “his insights from the recent visit to Ukraine”.

Marking a historic milestone in India’s diplomacy in Europe which has been roiled by the Russia-Ukraine war, Modi met Ukrainian President Zelenskyy in Kyiv on August 23 and asked him to sit with Putin to “find a way out of the crisis”.

Delhi and Washington, Ukraine’s main security backer, have recently strengthened defence and diplomatic cooperation against the backdrop of a rising China, which both regard as their main rival. India also has warm ties with Russia, its primary arms supplier for decades, and Prime Minister Narendra Modi has refused to join the Western-led sanctions regime against Moscow.

<https://indianexpress.com/article/india/india-rejects-report-diversion-of-defence-exports-to-ukraine-9577070/>



*Fri, 20 Sep 2024*

## **Indian Army: Women Soldiers From India And US Are Playing Pivotal Roles In Yudh Abhyas 2024 Exercise**

The Indian Army today said that women soldiers from both India and the US are playing pivotal roles in every phase of the exercise in Yudh Abhyas 2024. Earlier yesterday, the Spokesperson of Defence said that over 1,200 Indian and US troops are currently pushing their limits in Rajasthan's rugged terrain, honing firepower and endurance in real-time counter-terrorism drills. India and US army personnel are training together to bolster interoperability and enhance synergy between forces of both nations in the 20th edition of the Joint Military Exercise 'Yudh Abhyas 2024.' Notably, army personnel have been training together at the Foreign Training Node, Mahajan Field Firing Ranges in Rajasthan, since September 9 and will continue till Sunday.

<https://www.newsonair.gov.in/indian-army-women-soldiers-from-india-and-us-are-playing-pivotal-roles-in-yudh-abhyas-2024-exercise/>



*Thu, 19 Sep 2024*

## **Army's Drone Revolution: Here are 5 cutting-edge drones to tackle Ladakh's extreme terrain**

The Indian Army is stepping up its efforts to enhance security along the Line of Actual Control (LAC) in eastern Ladakh through the use of advanced drone technologies. As part of this initiative, the Army recently hosted the 'Him-Drone' event in collaboration with the Federation of Indian Chambers of Commerce and Industry (FICCI) on September 17-18, 2024. The event took place at an altitude of 15,200 feet at Wari-La, a mountain pass southeast of Leh.

### **The Importance of Drones in Modern Warfare**

Drones have revolutionized military operations in recent years, proving their effectiveness in conflicts and their roles have expanded to include surveillance, logistics, precision strikes, and electronic warfare. As a result, the Indian Army is increasingly relying on drones to enhance its operational capabilities, especially in high-altitude areas like Ladakh, where the terrain is unforgiving, and weather conditions are extreme.

The Army's need for drones stems from the establishment of the Aviation Brigade in Leh in 2021. This brigade requires drones for tactical operations—quick response missions within a defined area—to enhance situational awareness and security along the LAC.

### **Five Types of Drones Under Evaluation**

During the 'Him-Drone' event, the Army evaluated five specific types of drones, each tailored to meet different military requirements:

**Surveillance Drones:** These drones are crucial for providing real-time intelligence and monitoring enemy movements along the LAC. Surveillance drones will help the Army maintain continuous oversight of critical areas in Ladakh.

**Loitering Munitions:** Also known as 'suicide drones,' these are designed to hover over a target area before striking, offering precision in targeting enemy installations and assets.

**Kamikaze Drones:** Similar to loitering munitions, kamikaze drones are pre-programmed to self-destruct by crashing into enemy targets, delivering a lethal payload.

**Logistics Drones:** These are designed to transport essential supplies, such as ammunition or medical equipment, across difficult and inaccessible terrains. Logistics drones will significantly enhance the Army's ability to supply troops in remote areas of Ladakh.

**Electronic Warfare Drones:** These drones play a crucial role in communication and electronic intelligence, capable of intercepting enemy communications and disrupting their electronic systems, providing a significant tactical advantage.

### **Challenges of High-Altitude Operations**

Operating drones in Ladakh presents unique challenges. The 'rarified atmosphere' at high altitudes reduces the lift generated by the drone's rotors and negatively impacts engine performance. Additionally, high winds, rapid ice formation, and freezing temperatures lead to faster battery depletion and operational inefficiencies. The 'Him-Drone' event tested these drones' ability to perform in such harsh conditions, as reliable high-altitude operation is essential for the Army's success in the region.

### **Ensuring Indigenous Development**

As part of India's broader vision of Atmanirbhar Bharat (Self-Reliant India), the Army is focused on procuring domestically developed drones to minimize dependence on foreign components. A key concern is the presence of Chinese parts in some domestically manufactured drones, which could pose security risks by potentially allowing data to be transferred to external devices. To address this, the Northern Command and the Army Design Bureau have set up a 'technical evaluation committee' to ensure that no critical components of Chinese origin are used in the drones selected for deployment.

### **The Future of Drone Warfare in Ladakh**

The 'Him-Drone' event is a pioneering step towards enhancing India's military capabilities in high-altitude areas. The Army plans to shortlist several drones for procurement based on their performance during the event, while recommending improvements for others. The event is part of a

broader effort, with the 'Him-Tech' event scheduled for September 20-21, 2024, aimed at harnessing military technologies specifically suited for high-altitude operations.

Drones are set to play an increasingly important role in India's military strategy, especially in the challenging terrain of Ladakh. By investing in indigenous drone technology and ensuring its suitability for extreme environments, India is positioning itself as a key player in the global drone industry, while also bolstering its defence capabilities against threats along the LAC.

<https://www.financialexpress.com/business/defence-armys-drone-revolution-here-are-5-cutting-edge-drones-to-tackle-ladakhs-extreme-terrain-3615268/>



*Fri, 20 Sep 2024*

## **India Mulls '3D Printing' Of Weapons During A Protracted War; Myanmar Rebels Already Ahead In The Game**

The battlefields are changing, and so is the duration of wars. Wars are getting protracted, putting pressure on weapon stockpiles. India, which faces the potential challenge of two fronts, is also aware of this development. In future conflicts, 3D printing, known as Additive Manufacturing, can help the Indian forces plug this critical gap in supply.

Technology is not futuristic, but it is already here. In the hands of rebels and non-state actors, it has provided an endless supply of weapons. In Myanmar, images of 3D-printed drones made by rebels have been catalyzing the civil war in the country.

The 3D printers are producing in-house weapons for the rebels, including drones, mortar stabilizers, and other munitions for the Karenni Nationalities Defence Force (KNDF), which was outgunned by the Myanmar Junta. Ukraine's cheap drones have revolutionized the way wars are fought, but the use of 3D printers in Myanmar has further shown that wars can be prolonged on a shoestring budget.

“Without 3D printing, someone can manufacture a very high-quality weapon,” Yannick Veilleux-Lepage, assistant professor of political science at the Royal Military College of Canada, has been quoted in the media. “But that does require a great deal of skill. You need to be a competent metal worker, and that takes a long time. With a 3D-printed firearm, it doesn't take very long to go from no skill to (creating) something lethal. That's how things are changing, the lethality and the ease of it.”

Additive manufacturing (AM), also known as three-dimensional (3D) printing, is a “process of joining materials to make parts from 3D model data, usually layer by layer.”

3D Printing creates the part and material simultaneously. This improves production speed and flexibility but requires careful control of the additive manufacturing process. It can be used to build parts that cannot be made any other way, uniquely combine materials, produce obsolete parts,

rapidly prototype, and create tools and specialized job aids. For India, the technology can help produce specific missile components, particularly rocket motors.

“Additive manufacturing (3D printing) can surely speed up missile key component manufacturing. For example, the inertial navigation system platform design and implementation, internal component design, and mounting assemblies can be expedited through additive manufacturing,” Indian Navy official Commander Milind Kulshrestha (retired) told the EurAsian Times.

The technique can be beneficial for missiles such as very short-range air defense systems (VSHORADS) and Man Portable Anti-Tank Guided Missiles. The Defence Research and Development Organisation (DRDO) is exploring 3D printing with private sector players. 3D printing a motor could take a mere 3-4 days, compared to the 3-4 weeks through precision manufacturing.

In 2024, Indian space startup Agnikul Cosmos successfully launched the nation’s first 3D-printed rocket engine, paving the way for reduced time and costs associated with building rockets and boosting the country’s spacefaring capabilities. This capability has numerous applications.

“Traditional Precision machining is an expensive and time-consuming activity, and redesign is a laborious procedure. Whereas in additive manufacturing, these things can be done on CAD (3D Modelling software) and directly implemented on a 3D printer, a device now within working reach and scope of most startups (whereas Precision machining is only limited to a few areas and PSUs),” Commander Kulshrestha added.

The 3D Printing process is essentially a factory-in-a-box, digitally controlled production line that can be easily turned on or off. Additive Manufacturing allows production to be distributed and scaled across multiple machines and locations. It also allows parts to be fabricated when needed. This can reduce equipment downtime, increase maintenance and repair efficiency, and reduce cost, supporting the need for “resilient and agile logistics.”

The US forces have already been using the technology. For instance, the US Marine Corps can use it to print a sensor housing to secure a gap in the perimeter of a base; Army field repair units print a low-cost cap to protect a million-dollar lens on a tank, and the US Air Force is using AM to replace obsolete parts for the C-5 at five percent of the cost. The Pentagon’s AM strategy, released in 2021, included experimenting with 3D-printed missile parts, re-engineering parts for its Black Hawk helicopters, and customizing personnel earplugs.

### **Taking Goliath Down With 3D Printers**

While world militaries explore 3D Printers to ease their supply chains, non-state actors are using them to reduce the gap between two sides in asymmetrical warfare. Earlier in 2024, videos surfaced of Myanmar’s rebels launching a barrage of 3D-printed drones into the jungle. Before graduating to drones, Myanmar’s rebels manufactured FGC-9s, 3D-printed semiautomatic rifles. In 2018, a gun designer using the moniker JStark1809 created the blueprint for the weapon.

Over several years, several iterations of the design were uploaded online, including on Odysee, an open-source blockchain-based media website. FGC stands for “f\*ck gun control,” as the gun can be manufactured without any regulated commercial gun components.

The gun is made of a mixture of custom 3D-printed parts, readily manufacturable metal components, and store-bought screws, springs, and bolts. JStark's motto, "live free or die," is engraved on a tag around 3D's neck. The FGC-9 was manufactured at the beginning of the coup and the rebels in the frontline were using it. However, the plastic firearms did not pass the muster of a battlefield weapon. The rebels started to use the 3D-printed guns for defensive action or for carrying out guerrilla attacks.

In December 2022, the rebels graduated to 3D-printing a drone. The first iteration was called the Liberator MK1. It was a small, fixed-wing reusable drone capable of carrying up to 1.5 kilograms of explosives. The frame of the drone was 3D-printed and then covered with fiberglass. The other components—its battery, motor, and control surfaces- were reported to have been smuggled across the border from Thailand.

The drone is compact and can be transported on a scooter. In February 2024, the Mk2 variant of the drone was launched. It costs around US \$5,000 to produce a drone and can be assembled in under two days. For the rebels in Myanmar, 3D printing has leveled the battlefield by giving them weapons bypassing the conventional supply chain.

<https://www.eurasiantimes.com/india-mulls-3d-printing-of-weapons-during/>



*Fri, 20 Sep 2024*

## **Abrams Tank: Kalashnikov Unveils UAV System That Helped Destroy US-Origin MBT In Ukraine War: Media**

Russian arms manufacturer JSC Kalashnikov Concern has presented an advanced UAV system that has reportedly made a major impact on the battlefield, including in a high-profile strike against an American-made M1A1 Abrams tank.

The unveiling occurred during the Gunsmith's Day celebration in Izhevsk, where the company showcased the Granat-4-E portable remote monitoring and relay complex. Developed by the Izhevsk Unmanned Systems Research and Production Association, part of the Kalashnikov Concern, the Granat-4-E system features an unmanned aerial vehicle (UAV) integrated with a mobile control point based on a Kamaz truck.

This setup is designed to provide comprehensive remote monitoring and real-time data transmission capabilities. The military variant of this complex, the Granat-4, has been actively deployed in the ongoing conflict in Ukraine. In May, the Granat-4 UAV made headlines when Russian troops used it to successfully strike a US-made M1A1 Abrams tank. According to Kalashnikov, the Granat-4 has proven instrumental in a variety of operations, including precise strikes against high-value targets such as the Abrams tank. The UAV's advanced features have

enabled it to effectively carry out round-the-clock aerial reconnaissance and deliver accurate target designation.

The Granat-4 system stands out for its ability to conduct remote monitoring using an array of photo, video, and thermal imaging equipment. It can transmit digital data in near real-time over distances of up to 70 kilometers, making it a valuable asset for combat operations. This capability has been crucial in identifying and engaging targets, from individual combat vehicles to fortified enemy positions and water crossings.

Kalashnikov began mass production of the Granat-4 in June 2024. According to the manufacturer, the UAV is noted for its maneuverability in confined spaces and its real-time visual reconnaissance capabilities. The Granat-4 is equipped with several other advanced features, including a dual-axis gyro-stabilized platform, cameras that operate in both visible and infrared ranges, and a laser rangefinder capable of measuring distances up to three kilometers. It boasts a flight time of six hours, a maximum flying distance of 70 kilometers, and a cruising speed of 100 km/h.

### **Abrams Face Drone Threats In Ukraine**

The Ukraine war has placed Western-origin military vehicles, including the M1 Abrams tanks, in an unforgiving environment where they face unconventional threats, including explosive-laden drones. Small drones equipped with explosives have become a potent tool for Russia and Ukraine, enabling cheap and precise strikes against enemy armor. This evolving method of warfare has significantly impacted the performance of the Abrams on the battlefield.

Despite its reputation as a reliable main battle tank, the Abrams has faced heavy losses since its deployment in Ukraine. Reports indicate that up to 20 out of the 31 Abrams tanks in Ukrainian service have been damaged and could be out of action. The first reported loss occurred in late February when Ukraine's 47th Brigade lost an M1 tank after a Russian first-person-view drone targeted its ammunition compartment, causing a catastrophic fire.

The Abrams continued to suffer heavy damage in the ensuing weeks, prompting Ukrainian forces to pull them back from the frontlines by April. However, keeping the Abrams permanently sidelined was not a viable option for Ukraine, whose armored fleet was already strained. Instead, Ukrainian forces resorted to a low-tech but effective solution to enhance the tanks' survivability: steel cages mounted on the tank's frame.

These makeshift screens, placed over the top of the Abrams where the armor is weakest, can absorb one drone strike before needing replacement. According to reports, this relatively simple fix has boosted crew survivability by up to 35%. While not a perfect solution, steel cages have proven to be remarkably effective in prolonging the operational life of the Abrams and other U.S. armored vehicles, such as the Bradley infantry fighting vehicle.

The Hill recently reported that the steel screens have "worked extraordinarily well at protecting not just the Abrams but also other US armored fighting vehicles like the Bradleys." For a tank that costs \$10 million apiece, this inexpensive modification has been crucial in keeping them in the fight. Nevertheless, the ongoing use of steel screens highlights the broader issue of resource scarcity in Ukraine. Each tank lost represents a significant blow to Ukraine's armored capabilities, as replacing these high-tech vehicles is a difficult and costly endeavor.

The reprieve offered by the cages will delay the depletion of Ukraine's tank fleet, but it is not a sustainable long-term solution. Meanwhile, the US Army is closely monitoring how its armored systems, including the Abrams and Bradleys, are performing in this new type of drone-heavy warfare. Observations from the conflict are being fed back into training programs for American soldiers, particularly at the Armor School at Fort Moore, Georgia.

Col. James Modlin, deputy commandant of the Armor School, emphasized the importance of understanding the evolving threat posed by small drones on future battlefields. "It's really just recognizing that it's a threat — that this is something that's out there," Modlin told Business Insider. "You have to look up; you have to look 360 degrees."

This evolving battlefield reality highlights the need for US forces to adapt and train new soldiers to recognize and respond to the dangers posed by small unmanned systems. As the conflict in Ukraine demonstrates, the fight is changing, and the ability to identify and mitigate drone threats is becoming a critical skill for armored crews.

<https://www.eurasiantimes.com/kalashnikov-unveils-uav-system-that/>

## Science & Technology News

# THE ECONOMIC TIMES

Thu, 19 Sep 2024

## ISRO satellite's key payload starts ops, offers excellent thermal imaging capabilities

ISRO on Thursday said the Electro Optical-Infrared (EOIR) payload on board its latest Earth Observation Satellite 'EOS-08' has commenced its operations, offering "excellent" thermal imaging capabilities.

Data from the EOIR payload, processed using algorithms and software developed by Space Applications Centre (SAC-ISRO), at the National Remote Sensing Centre (NRSC-ISRO), is being transformed into actionable insights, the space agency said.

These insights are expected to support a wide range of applications, from optimising agricultural practices to better managing wildfires and addressing urban heat challenges, it said.

EOS-08 was launched on August 16 on board the third developmental flight of small satellite launch vehicle SSLV-D3. EOIR is a state-of-the-art payload aboard EOS-08, along with the Global Navigation Satellite System-Reflectometry (GNSS-R) payload and the SiC UV Dosimeter.



Developed by SAC-ISRO, the EOIR payload is equipped with advanced midwave infrared (MIR) and long-wave infrared (LWIR) channels, marking a significant advancement in thermal imaging technology with its high performance, ISRO said.

One of the first images captured by the EOIR payload was on August 19, 2024, over Pune at 07:45 AM local time, it said, adding, the MIR image highlights the payload's ability to capture high-resolution thermal images. Images were taken over the Namibia Desert on August 21, 2024, at 11:15 AM local time, it further said, adding that the LWIR image further highlights the payload's ability to capture high-resolution thermal images with an exceptional level of detail.

Noting that the ongoing commissioning process will further validate the EOIR payload's capabilities, ultimately enhancing its role in environmental monitoring, ISRO said this includes precise applications such as improved agricultural management, more effective wildfire detection, and accurate urban heatisland (UHI) mapping. The payload's high-resolution thermal data promises to deliver actionable insights that help address pressing environmental and climate challenges, it said.

The EOIR payload's LWIR channel has been particularly effective in agricultural monitoring. By providing detailed data on soil moisture and vegetation health, the EOIR payload enables optimised water use, improved crop yields, and more efficient farm management, the space agency said. Its ability to differentiate between fire-affected areas and surrounding landscapes makes it a powerful tool in wildfire management as well, it said.

The MIR channel has shown impressive capability in detecting heat emissions from active fire, offering critical insights for early detection and continuous monitoring of wildfires. This is crucial for assessing fire intensity and behaviour, which supports more effective response efforts to mitigate damage, ISRO said.

In urban planning, the EOIR payload's thermal imagery has been instrumental in mapping Urban Heat Islands (UHI), it said, adding that the ability to capture detailed temperature variations within urban environments enhances efforts to design sustainable cities that mitigate heat-related challenges.

<https://economictimes.indiatimes.com/news/science/isro-satellites-key-payload-starts-ops-offers-excellent-thermal-imaging-capabilities/articleshow/113499657.cms>

## THE ECONOMIC TIMES

*Thu, 19 Sep 2024*

### **Australia-India space partnership takes flight: Start-up teams with two Indian firms for Optimus satellite launch**

Australian start-up Space Machines Company has partnered with Indian firms Ananth Technologies and Digantara to enhance its satellite services. This collaboration will enable the assembly and testing of their Optimus spacecraft at Ananth's facilities in Bengaluru. The spacecraft is scheduled

for launch aboard ISRO's Small Satellite Launch Vehicle (SSLV) in 2026. Optimus will use optical sensors from Digantara, a firm known for tracking space debris.

These sensors will help the satellite perform close approach manoeuvres safely. Space Machines Company's CEO, Rajat Kulshrestha, stated, "These partnerships represent a significant milestone for both the Space MAITRI mission and Australia's growing connection with India's space sector."

Ananth Technologies will assist in integrating the second Optimus spacecraft with the SSLV for a successful launch. Ananth Technologies' Chairman, Subba Rao Pavuluri, remarked, "This agreement is also an opportunity to showcase India's growing test and launch capabilities and how our space sector is working with international partners to address global opportunities and challenges."

Digantara will integrate their advanced optical payload on Optimus, tracking nearby space objects and aiding in safe manoeuvres.

Digantara CEO, Anirudh Sharma, said, "Our collaborative work with Space Machines Company will enable Optimus to track and engage short-range resident space objects, a vital capability when executing close approach manoeuvres during on-orbit operations."

The Australian government has invested \$8.5 million in the Space MAITRI mission, which aims to strengthen Australia-India cooperation in space technology and innovation.

<https://economictimes.indiatimes.com/news/science/australia-india-space-partnership-takes-flight-start-up-teams-with-two-indian-firms-for-optimus-satellite-launch/articleshow/113486414.cms>

# THE ECONOMIC TIMES

*Thu, 19 Sep 2024*

## **Scientists find new blood group called MAL**

Scientists from NHS Blood and Transplant (NHSBT) and the University of Bristol have made a groundbreaking discovery by identifying a new blood group system named MAL. This breakthrough addresses a mystery that has persisted for nearly 50 years concerning the AnWj blood group antigen, first noticed in 1972.

Senior research scientist Louise Tilley led the team that developed a genetic test to identify patients lacking the AnWj antigen. This test will improve care for patients with rare blood requirements and assist in finding compatible donors.

Tilley commented to BBC, "It's challenging to quantify the exact number of people who will benefit from this test. However, NHSBT is the last resort for around 400 patients each year worldwide."

The discovery's implications are extensive, providing benefits to patients worldwide. NHSBT's International Blood Group Reference Laboratory in Filton supports research by supplying antibodies and has created a test to integrate into current genotyping platforms.

### **New Blood Group: Key Findings of the Research:**

1. **AnWj Antigen:** Scientists determined the genetic basis of the AnWj antigen, enhancing understanding and treatment options for individuals lacking this blood group.
2. **MAL Blood Group System:** MAL is now recognized as the 47th blood group system, encompassing the AnWj antigen.
3. **Genetic Cause:** Researchers linked homozygous deletions in the MAL gene to the inherited AnWj-negative phenotype.
4. **Transfusion Safety:** The study aids the creation of new genotyping tests to identify rare AnWj-negative individuals, decreasing complications during transfusions.

Blood group antigens are proteins on red blood cells, and their absence can cause severe reactions in transfusions. Philip Brown, a laboratory technician and leukemia survivor, emphasized the discovery's significance.

“Having undergone multiple blood transfusions and a bone marrow transplant, I understand firsthand the critical need for safer blood matches,” Brown told BBC. Nicole Thornton, Head of the Laboratory, highlighted the global importance of this discovery.

“Unraveling the genetic basis of the AnWj antigen has been a major challenge. With this breakthrough, we can now design genotyping tests to identify patients and donors with this rare antigen,” Thornton explained.

<https://economictimes.indiatimes.com/news/science/scientists-find-new-blood-group-called-mal/articleshow/113487491.cms>



*Thu, 19 Sep 2024*

## **IISc researchers come up with solutions to reduce presence of heavy metals in groundwater**

Researchers from the Indian Institute of Science (IISc) have developed a nanomaterial-based solution that can effectively reduce the presence of heavy metals like chromium in groundwater.

According to IISc, chromium typically enters soil and groundwater through effluents from industries such as leather tanning, electroplating, and textile manufacturing.

### **Current methods**

Most current methods for removing heavy metal contamination rely on pumping out water from the ground, followed by purification using chemical precipitation, adsorption, ion exchange and reverse osmosis carried out at a different location. The IISc team instead proposes an on-site alternative which involves using iron nanoparticles that can remediate the heavy metals.

“Heavy metals enter the environment because of urbanisation and certain mismanagement by industries. If the groundwater is contaminated, we can inject these nanoparticles into the subsurface groundwater region where it will react with the chromium and immobilise it, resulting in clear water,” said Prathima Basavaraju, PhD student at Centre for Sustainable Technologies (CST) and lead author of the study.

The group first tried synthesising nanoparticles consisting of nano zero-valent iron (nZVI). This form of iron can react with the toxic and carcinogenic form of chromium (Cr<sup>6+</sup>) and reduce it to a less harmful form (Cr<sup>3+</sup>) which in turn results in co-precipitation. However, the team soon realised that the nZVI particles tend to clump together, limiting their application.

To prevent clumping, the team turned to carboxymethyl cellulose (CMC). “We modified nZVI by coating it with CMC. It forms a stabilising layer around nZVI separating individual particles,” Ms. Prathima added.

### **Preventing oxidation**

The CMC coating additionally prolonged the life of the material by preventing oxidation of the iron core. The team also boosted the reactivity of the CMC-nZVI by exposing it to sulphur-containing compounds in anoxic conditions.

This enabled the formation of a protective iron sulphide layer on the surface, a process called sulphidation. These modifications improved the stability of the S-CMC-nZVI and maintained its reactivity and efficiency.

S-CMC-nZVI showed nearly 99% efficiency at Cr<sup>6+</sup> removal under different conditions such as different pH levels and the presence of other competing ions that might be found in groundwater. The team tested this enhanced nanomaterial in conditions that mimic the natural environment of groundwater aquifers.

When they pumped contaminated water through sand columns containing the nanomaterial, they observed robust remediation activity. Experiments were also conducted on contaminated soil and sediments using nZVI to immobilise the heavy metals. Scaling up experiments are still in progress.

The authors suggest that S-CMC-nZVI is a promising material for on-site remediation of chromium-contaminated groundwater.

### **Lakes of Bengaluru**

“Places like Bellandur lake in Bengaluru have a lot of contaminated sediments. The technique developed can also prove quite useful in remediating contaminants such as cadmium, nickel, and chromium in contaminated sediments of Bellandur lake,” said G.L. Sivakumar Babu, Professor at CST, Department of Civil Engineering (CiE) who is also the co-author of the study which was published in the Journal of Water Process Engineering.

Apart from CST, CiE, members from Department of Instrumentation and Applied Physics (IAP) were also part of the study team.

<https://www.thehindu.com/news/national/karnataka/iisc-researchers-come-up-with-solutions-to-reduce-presence-of-heavy-metals-in-groundwater/article68659890.ece>

## Square Kilometer Array, world's largest radio telescope in making, becomes partially functional

Square Kilometer Array (SKA), the world's largest radio telescope in the making, has carried out its first observations, signalling that at least a part of the yet-to-be-completed facility has become functional.

SKA is a network of thousands of radio antennas, 197 of them located in South Africa and more than 1.3 lakh in Australia, designed to function as one single unit that will make it the world's largest radio telescope.

The array in South Africa is named SKA-Mid while the one in Australia is called SKA-Low, the names reflecting the frequency ranges they operate in. The facility is meant to observe the universe in a new way, and probe questions related to the origins of the universe, formation and evolution of galaxies and seeking the origins of life.

A few days ago, astronomers and engineers working at the Australian facility integrated data from the two stations of the SKA-Low to obtain co-ordinated observational results, thus confirming its capabilities to function as an interferometer.

Interferometers are instruments that use the principle of wave interference to make scientific measurements. It is a technique that allows scientists to gather a variety of information — from determination of distance to detecting gravitational waves — by splitting and recombining light beams or other electromagnetic waves. SKA-Low and SKA-Mid would also work as interferometers.

The first results have come just about six months after the first antennas in the SKA-Low array were installed in western Australia.

The SKA is an international science project with headquarters in the United Kingdom. In December last year, India, which has been collaborating on the project since its inception, became a full member country in the international consortium building this telescope across two continents.

o 1,31,072. Since the first antenna that was installed in March, the total installed antennas until August was 1,024 corresponding to four stations. The first image of the sky was obtained in early August. A similar first image was obtained in January this year from the prototype dish assembled for SKA-Mid in South Africa.

“The tests involve observing known radio sources or bright sources which are used to test the antenna's basic working, its fidelity and is used for calibration purposes,” Yashwant Gupta, centre-director, National Centre for Radio Astrophysics (NCRA) told *The Indian Express*.

India's current effort is focused around software development, that is, to integrate the appropriate software along with the antenna control structure required both for SKA-Mid and SKA-Low.

During the past four months, the Indian science team has been involved in the process of data analysis.

By early next year, the Indian team, inclusive of industries, will also go on to develop and produce digital hardware for signal processing at each of the 256 stations at SKA-Low. Teams from India and Italy will primarily be involved in this task.

Several tools developed will be deployed and kept ready for the time when larger volumes of data will be generated.

<https://indianexpress.com/article/technology/science/two-stations-for-ska-telescope-generate-first-observational-image-9576012/>



*Thu, 19 Sep 2024*

## **We are sharing state-of-the-art expertise with ISRO for Gaganyaan: French space agency chief**

Philippe Baptiste, President of the French Space Agency, Centre National d'Etudes Spatiales (CNES), who is in India to participate in the Bengaluru Space Expo 2024, spoke to The Hindu on the sidelines of the event on a wide range of topics from celebrating 60 years of French-India space cooperation to the Gaganyaan and the TRISHNA missions.

**Q.** India and France have had a partnership of over six decades in space. How do you see this collaboration evolving?

**A.** It (India-France collaboration) is not only a great success of the past but an ongoing one. It started with our launchers, where we had a strong cooperation many decades ago. Then we also had a partnership in engines and Earth Observation and so on. It is an ongoing cooperation. We have many projects coming very soon for launching satellites in the domain of space exploration, and there is a lot of discussion in the areas of defence and security, especially in Space Situational Awareness.

**Q.** Any update on the Indo-French Thermal Infrared Imaging Satellite for High-resolution Natural Resource Assessment (TRISHNA) mission? When will it be launched?

**A.** TRISHNA, which is our next project together, is a very highly visible project. It is an infrared satellite project. It will greatly help to get information on climate, agriculture, drought forecasting and urban heat island monitoring. The project is going very well. We expect to launch the satellite in 2026.

**Q.** India and France in 2021 had signed an agreement for cooperation for the Gaganyaan mission. Could you please elaborate on the areas in which CNES is helping ISRO and how is it progressing?

**A.** We do have a bit of expertise in this area (human spaceflight) as we have been sending astronauts to space for several decades. With regard to the Gaganyaan programme, we are sharing

knowledge, especially on space medicine, to understand the physiology of astronauts, to train them and so on. People from both India and France are going back and forth from Bengaluru and Toulouse sharing knowledge and expertise. We are sharing the latest state-of-the-art expertise with ISRO.

**Q.**India has lined up ambitious missions like the Chandrayaan-4 and Chandrayaan-5 which aim at bringing back samples from the moon. Is France keen to be part of this?

**A.** We are looking forward to these missions. We are very impressed by what you are doing in India, especially in lunar exploration. There is a lot of ambition and a lot of energy. We are looking forward to seeing close cooperation in these areas.

<https://www.thehindu.com/sci-tech/science/we-are-sharing-state-of-the-art-expertise-with-isro-for-gaganyaan-mission-french-space-agency-chief/article68655380.ece>

## ThePrint

*Thu, 19 Sep 2024*

### **A satellite bus, new green space propulsion system & tech collabs unveiled at Bengaluru Space Expo**

The Bengaluru Space Expo kick-started Wednesday with announcements of new partnerships and products by prominent start-ups in the space sector. Dhruva Space and Manastu Space have struck a deal, where Manastu's new green space propulsion technology will be tested on Dhruva's new satellite platform in space, while Bellatrix Aerospace unveiled a new satellite bus, called Project 200, which will operate from an ultra-low Earth orbit.

Hyderabad-based Dhruva Space's LEAP-3 platform, which looks like a huge box and is capable of hosting other payloads or instruments when in orbit, will fly to space by the end of 2025.

It will carry satellites from various customers and fly to low Earth orbit on a rocket. Once in orbit, it will use Mumbai-based Manastu Space's propulsion technology to move itself around to get to the right position and deploy the individual smaller satellites placed inside it.

Manastu's new green hydrogen peroxide-based fuel and a new type of combustion chamber will be used for the purpose. The fuel is 60 percent cheaper, 50 percent more efficient and 60 percent less emissive, compared to traditional fuels in use today.

“By incorporating green propulsion systems into satellite platforms, Manastu Space can significantly enhance their agility and expand their potential applications. This technology enables more precise orbital adjustments and manoeuvrability, opening doors to new mission possibilities that were previously constrained by limitations in propulsion capabilities. Moreover, in compliance with international regulations, we can safely deorbit the satellite at the end of its mission, minimising space debris and promoting sustainable space exploration,” Tushar Jadhav, Manastu's CEO & co-founder said in a statement.

The partnership highlights the growing number of collaborations among small but significant players in India's space industry.

Bellatrix Aerospace's pioneering Project 200 will fly to space and operate at an ultra-low Earth orbit (180 to 250 km from Earth). Access to this orbit around Earth is expected to provide newer vantage points for satellite technology, earth imaging and global connectivity. The test satellite bus platform has been developed and will be powered by Bellatrix's own propulsion systems at low orbit.

Low Earth satellites typically orbit well above 400-450 km, said co-founder Rohan Ganapathy. Owing to atmospheric interference, satellites fly much higher where the air is thinner, becoming dramatically more efficient.

He explained that the launch of tiny satellites to this region of space is expected to enhance high-resolution Earth observation, telecommunications and scientific research.

"Though it is known that a satellite's capabilities improve significantly at 200 km, limitations on propulsion technology have prevented satellites from operating at this orbit," Ganapathy said. "Over the last four years, Bellatrix has been working on solving this. We have a breakthrough in propulsion technology that would allow satellites to operate from this orbit for years instead of deorbiting within a few days due to drag. We are not just building a propulsion solution, but a first-of-a-kind satellite capable of operating from this altitude."

The Bengaluru Space Expo is a three-day event held by the Confederation of Indian Industry every two years, with exhibitions by various companies and space agencies, and discussions about the space sector among the players, experts and stakeholders.

<https://theprint.in/science/a-satellite-bus-new-green-space-propulsion-system-tech-collabs-unveiled-at-bengaluru-space-expo/2274240/>



*Thu, 19 Sep 2024*

## **Italy to build on Space Expo presence in Bengaluru for new partnerships with India**

Bengaluru: Two decades after ISRO and the Italian Space Agency formalised their partnership, Italy is pitching its presence at the ongoing Bengaluru Space Expo 2024 to drive collaborations with a new India that harbours ambitions of global sway in the sector.

between ISRO and Agancia Spaziale Italiana (ASI) started in 2005, with the two agencies signing a framework agreement. In 2022, the two countries initiated work on joint working groups on EO. Sergio Ledda, the Scientific Attache of the Italian Embassy in New Delhi, told DH that having



achieved “good levels” of results in the EO domain, Italy was pushing for formal agreements in two other core areas.

“There is potential in other areas including gravitational waves. Projects that involve the academia in the two countries are also ongoing,” Ledda said. Italy’s presence at the expo is led by the Italian Trade Agency, the country’s trade promotion body which has an office in the premises of the recently inaugurated Consulate General of Italy in Bengaluru. Four companies from Italy – including aerospace and defence group Leonardo – are showcasing their technologies at BSX 2024.

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<https://www.deccanherald.com/india/karnataka/bengaluru/italy-to-build-on-space-expo-presence-in-bengaluru-for-new-partnerships-with-india-3198266>

