

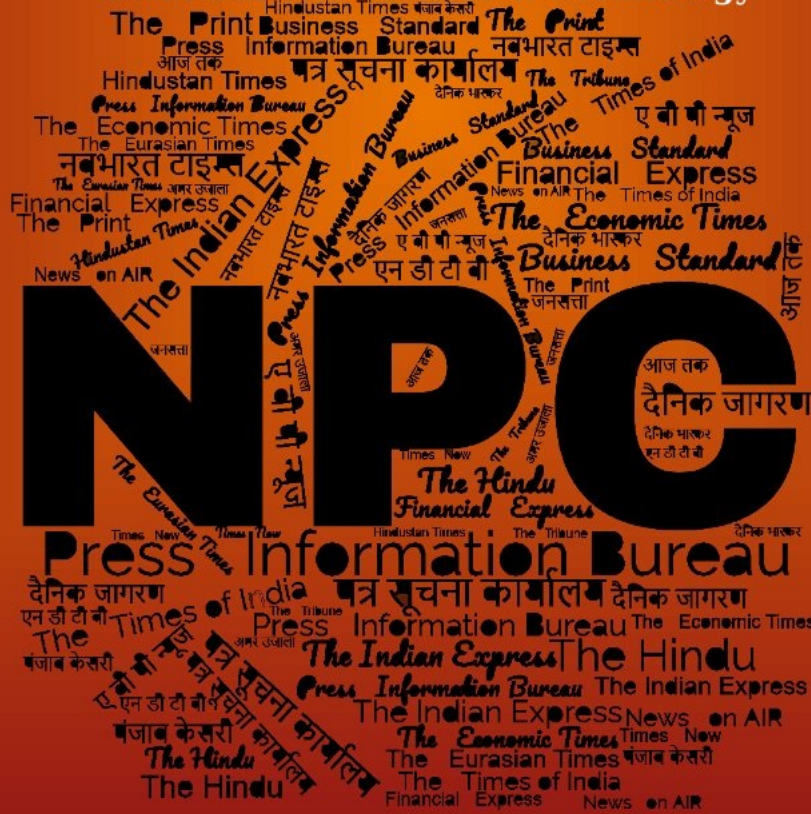
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# समाचार पत्रों से चयित अंश Newspapers Clippings

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

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




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# CONTENTS

S. No.	TITLE	Page No.
<b>DRDO News</b>		<b>1-6</b>
<b>DRDO Technology News</b>		
1.	वैज्ञानिक सुनीता जेना की नेतृत्व ने निकली DRDO की झांकी, महिला सशक्तिकरण का हुआ प्रदर्शन	1
2.	DRDO Tableau led by Scientist Sunita Jena showcases Women Empowerment	2
3.	Indigenous Weapon Locating Radar, Drone Jammer feature in R-Day Parade	3
4.	India to export BrahMos supersonic missile systems to Philippines in next 10 days: DRDO chief	3
5.	307 ATAGS: चीन और पाकिस्तान बॉर्डर पर दहाड़ेंगे 307 ATAGS हॉवित्जर तोप, 31 मार्च से पहले सेना को मिलेगी पहली खेप	4
<b>Defence News</b>		<b>6-17</b>
<b>Defence Strategic: National/International</b>		
6.	India shows off its top Defence Tech as Swathi radar, Sarvatra, Prachand, Nag march through Kartavya Path	6
7.	Air and space to AI and sea: India, France adopt new roadmap of defence production	9
8.	Jet Engine Deal with France will give 100% access to Technology, says Indian envoy	10
9.	U.S. approves F-16 sale to Turkiye, F-35 to Greece after Turkiye ratifies Sweden's entry to NATO	11
10.	Indian Navy Helps douse fire on UK oil tanker attacked by Houthis in Gulf of Aden	12
11.	Indian Navy to showcase twin carrier operations with Rajnath Singh on board	13
12.	Iran launches 3 Satellites into Space amid Ballistic Missile concerns	14
13.	North Korea fires Cruise Missiles off East	15
14.	JSW Group announces entry into Defence Sector; to focus on domestic, overseas markets	16
<b>Science &amp; Technology News</b>		<b>18-25</b>
15.	ISRO adds another feather to its cap with POEM-3 success	18
16.	Aditya L1 update: ISRO successfully deploys Magnetometer Boom in Halo Orbit	19

17.	Tuning Optical Properties of Liquid Crystals with a type of Photoactive Organic Molecule can give Novel Optical Devices	<i>Press Bureau</i>	<i>Information</i>	20
18.	A New Alloy Developed can act as Alternative Magnetic Refrigerant for Minimizing Greenhouse Gas Emissions	<i>Press Bureau</i>	<i>Information</i>	21
19.	So-Apt! Girl from Delhi bags PM award for innovation	<i>The Times of India</i>		23
20.	Mars Rover Data confirms Ancient Lake Sediments on Red Planet	<i>Reuters</i>		24



## दैनिक जागरण

Fri, 26 Jan 2024

### वैज्ञानिक सुनीता जेना की नेतृत्व ने निकली DRDO की झांकी, महिला सशक्तिकरण का हुआ प्रदर्शन

गणतंत्र दिवस पर नारी शक्ति का प्रदर्शन करते हुए रक्षा अनुसंधान और विकास संगठन (DRDO) की झांकी का नेतृत्व उत्कृष्ट वैज्ञानिक और निर्देशित मिसाइलों की विशेषज्ञ सुनीता जेना ने किया। उन्होंने STAR श्रृंखला की मिसाइलों के लिए प्रौद्योगिकी का उपयोग करके स्वदेशी तरल रैमजेट प्रौद्योगिकी विकसित की थी। मालूम हो कि DRDO की झांकी का विषय "रक्षा प्रौद्योगिकी में आत्मनिर्भरता" था।

#### महिला वैज्ञानिकों ने किया नेतृत्व

महिला वैज्ञानिक पी. लक्ष्मी माधवी, आई सुजाना चौधरी और ए. भुवनेश्वरी भी इस झांकी में मौजूद रहीं। ऑयल 30 विकसित सिस्टम और सब सिस्टम को झांकी में MPATGM, ASAT, AGNI, VSHORADS, NASM-SR, HELINA, QRSAM और अस्त्र; LCA तेजस एयरक्राफ्ट; AESA रडार, इलेक्ट्रॉनिक युद्ध प्रणाली-शक्ति; साइबर सुरक्षा प्रणालियां; कमांड नियंत्रण प्रणाली; और अर्धचालक निर्माण सुविधाएं प्रदर्शित किया जा रहा है। झांकी में तीन प्रमुख प्रणालियों को दर्शाया गया है; MPATGM जो 2.5 किलोमीटर की दूरी में सुरक्षा प्रदान करने में कारगर है।

#### स्वदेशी उच्च-प्रौद्योगिकी प्रणालियां का प्रदर्शन

रक्षा अनुसंधान और विकास संगठन ने, रक्षा में आत्मनिर्भरता की खोज में, कई स्वदेशी उच्च-प्रौद्योगिकी प्रणालियां विकसित की हैं। आत्मनिर्भरता की दिशा में प्रगति के लिए एक प्रवर्तक के रूप में, रक्षा अनुसंधान के प्रमुख क्षेत्रों में डीआरडीओ में महिला वैज्ञानिकों का बहुमूल्य योगदान महत्वपूर्ण रहा है।

समाचार एजेंसी एनआई के मुताबिक, इन उत्पादों के अनुसंधान और विकास में महिलाओं की भागीदारी को 2024 डीआरडीओ की झांकी में प्रदर्शित किया गया है। कमान और नियंत्रण प्रणालियों के विकास में महिलाओं का योगदान रहा है। झांकी में सेमीकंडक्टर निर्माण सुविधा और साइबर खतरों से देश की सुरक्षा को भी दर्शाया गया है।

## फ्रांसीसी राष्ट्रपति इमैनुएल मैक्रों रहे मुख्य अतिथि

इस बीच, राष्ट्रपति द्रौपदी मुर्मू ने शुक्रवार को कर्तव्य पथ पर राष्ट्रीय ध्वज फहराकर 75वें गणतंत्र दिवस समारोह की शुरुआत की। कर्तव्य पथ पर पहुंचने पर राष्ट्रपति मुर्मू का प्रधानमंत्री नरेंद्र मोदी ने स्वागत किया। परंपरा के अनुसार, राष्ट्रीय ध्वज फहराया गया, इसके बाद राष्ट्रगान गाया गया और स्वदेशी बंदूक प्रणाली 105-एमएम इंडियन फील्ड गन के साथ 21 तोपों की सलामी दी गई। राष्ट्रपति मुर्मू और उनके फ्रांसीसी समकक्ष इमैनुएल मैक्रों, जो इस वर्ष के गणतंत्र दिवस समारोह के मुख्य अतिथि हैं।

<https://www.jagran.com/news/national-republic-day-2024-drdo-tableau-showcases-liquid-ramjet-technology-23638638.html>

# ThePrint

*Fri, 26 Jan 2024*

## **DRDO Tableau led by Scientist Sunita Jena showcases Women Empowerment**

The Defence Research and Development Organisation's tableau in the Republic Day parade on Friday depicted women empowerment and was led by renowned scientist Sunita Jena.

Women's involvement in the areas of research and development was showcased in the tableau themed on "Women Power in protecting the nation by providing the defence technologies in all five dimensions." The Defence Research and Development Organisation (DRDO), in the pursuit of self-reliance to defence, has developed many high tech systems. The tableau was led by Sunita Jena, an outstanding scientist and specialist in guided missiles.

She was involved in the development of the Indigenous Liquid Ramjet Technology. Scientists P Laxmi Madhavi, J Sujana Choudhary and A Bhuvaneswari were also part of DRDO's tableau. Models of systems developed by the DRDO were displayed on the tableau including the key MPATGM, AGNI-5 and ASAT missiles.

President Droupadi Murmu led India in celebrating the 75th Republic Day with an imposing display of its rising military might and rich cultural heritage during a 90-minute parade at the majestic Kartavya Path.

The grand celebrations, with an overarching theme of projecting the nation's women power and democratic values, were graced by French President Emmanuel Macron as the chief guest.

<https://theprint.in/india/r-day-drdo-tableau-led-by-scientist-sunita-jena-showcases-women-empowerment/1940135/>

# Business Standard

*Fri, 26 Jan 2024*

## **Indigenous Weapon Locating Radar, Drone Jammer feature in R-Day Parade**

The indigenously developed weapon locating radar system "Swathi", the "Sarvatra" mobile bridging system, the drone jammer system and the advanced radio frequency monitoring system featured in the Republic Day parade here on Friday.

The weapon locating radar system has been developed by the DRDO and the Bharat Electronics Ltd. It was followed by the mechanically-launched mobile bridge "Sarvatra Mobile Bridging System" of the Corps of Engineers.

The contingent was followed by the mobile drone jammer system and the advanced radio frequency monitoring system of the Corps of Signals.

These were followed by the medium-range surface-to-air missile that can carry out surveillance of airspace up to a range of 300 km and effectively engage hostile aerial platforms up to a range of 70 km.

The multi-function radar system, which can carry out surveillance of airspace up to a range of 300 km, was also displayed in the parade.

[https://www.business-standard.com/india-news/indigenous-weapon-locating-radar-drone-jammer-feature-in-r-day-parade-124012600212\\_1.html](https://www.business-standard.com/india-news/indigenous-weapon-locating-radar-drone-jammer-feature-in-r-day-parade-124012600212_1.html)

# THE ECONOMIC TIMES

*Thu, 25 Jan 2024*

## **India to export BrahMos supersonic missile systems to Philippines in next 10 days: DRDO chief**

India is gearing up to export ground systems for the BrahMos supersonic cruise missile, with the missiles expected to be dispatched to the Philippines by March this year. This marks a crucial milestone in India's defence export efforts, as highlighted by DRDO chairman Dr Samir V Kamat in a recent interview with ANI. According to Dr Kamat, the export process is set to commence within the next 10 days, with the ground systems taking the lead. The first set of BrahMos missile systems is anticipated to reach the Philippines by the end of March.

This venture is part of a monumental defence export contract valued at USD 375 million, making it the largest such agreement India has ever entered into with a foreign nation. Expressing optimism

about the future of defence exports, Dr Kamat stated, "I am sure over the coming years exports are going to become a very important part of our portfolio."

He emphasized the growing role of exports in the defence sector, citing examples such as hull-mounted sonars, lightweight torpedoes, and radar systems that India has successfully exported to various countries. Philippines Deal Details The deal with the Philippines, signed in January 2022, focuses on the supply of the shore-based anti-ship variant of the BrahMos supersonic cruise missile. This underscores the global demand for India's advanced defence capabilities and establishes the country as a reliable partner in the international arms market.

DRDO's Export Achievements Dr Kamat highlighted DRDO's success in exports, noting that products developed by the organization have either been inducted into the defence system or received Acceptance of Necessity (AoN) from the Defence Acquisition Council (DAC).

The total worth of these DRDO-developed products stands at approximately Rs 4.94 lakh crores. Furthermore, he emphasized the accelerated pace of product development, with 60-70% of inducted products accomplished in the last 5-7 years.

BRAHMOS Supersonic Cruise Missile The BRAHMOS supersonic cruise missile system, a joint venture between India and Russia under BrahMos Aerospace, stands as one of the world's most successful missile programs. Recognized as the best and fastest precision-guided weapon globally, BRAHMOS has significantly bolstered India's deterrence capabilities in the 21st century.

The next-generation variant of the missile, characterized by smaller, lighter, and smarter dimensions, is designed for deployment on a broader range of modern military platforms.

This landmark deal not only strengthens diplomatic ties but also positions India as a key player in the global defence arena. The successful export of cutting-edge defence technology marks a significant milestone in India's TOP TRENDING NEWS journey towards becoming a leading contributor to international security and stability.

<https://economictimes.indiatimes.com/news/defence/india-to-export-brahmos-supersonic-missile-systems-to-philippines-in-next-10-days-drdo-chief/articleshow/107139068.cms?from=mdr>



*Thu, 25 Jan 2024*

## **307 ATAGS: चीन और पाकिस्तान बॉर्डर पर दहाड़ेंगे 307 ATAGS हॉवित्जर तोप, 31 मार्च से पहले सेना को मिलेगी पहली खेप**

रक्षा अनुसंधान और विकास संगठन (DRDO) के अध्यक्ष डॉ. समीर वी कामत ने गुरुवार को कहा कि चीन और पाकिस्तान के साथ लगती सीमाओं पर तैनाती के लिए 307 एडवांस्ड टोड आर्टिलरी गन सिस्टम

(ATAGS) का पहला ऑर्डर चालू वित्तीय वर्ष 2023-24 के खत्म होने से पहले दिया जाएगा. डीआरडीओ के प्रमुख ने एक इंटरव्यू में कहा कि एटीएजीएस ने पहले ही सभी टेस्ट पूरे कर लिए गए हैं.

### **एटीएजीएस ने पहले ही सभी परीक्षण पूरे कर लिए**

समीर वी कामत ने कहा, "एटीएजीएस ने पहले ही सभी परीक्षण पूरे कर लिए हैं. मेरा अनुमान है कि 307 एटीएजीएस हॉवित्जर तोपों के लिए ऑर्डर इस वित्तीय वर्ष में 31 मार्च से पहले दिया जाना चाहिए." उन्होंने कहा कि स्वदेशी 155 मिमी x 52 कैलिबर हॉवित्जर तोप को डीआरडीओ ने दो निजी भागीदारों टाटा एडवांस्ड सिस्टम्स लिमिटेड और भारत फोर्ज लिमिटेड के साथ विकसित किया था.

### **DCPP कॉन्सेप्ट के तहत बनाए जा रहे DRDO प्रोडक्ट्स**

अपने डेवपलमेंट कम प्रोडक्शन पार्टर (DCPP) पहल के तहत डीआरडीओ उत्पादों को विकसित करने में दिलचस्पी रखने वाली प्राइवेट फर्मों के कदमों पर बोलते हुए कामत ने कहा, "डीआरडीओ हमेशा इंडस्ट्री का समर्थन करता रहा है. हमारे विकास चरण के दौरान हमने एमएसएमई और छोटे उद्योगों के साथ काम किया और अब पिछले सात से आठ वर्षों में जब हमने इस डीसीपीपी अवधारणा को शुरू किया है, हम डिज़ाइन और विकास चरण से ही सिस्टम इंटीग्रेटर्स के रूप में भी उनके साथ काम कर रहे हैं. प्राइवेट और पब्लिक सेक्टरों में डीसीपीपी के रूप में चुने जाने की समान संभावना है."

डीआरडीओ के शीर्ष अधिकारी ने कहा, "हमने अब प्रौद्योगिकी विकास निधि नामक एक योजना शुरू की है. इसके जरिए हम इंडस्ट्री का समर्थन कर सकते हैं. यह ज्यादातर प्राइवेट के लिए है. हम इस योजना में पीएसयू को फंड नहीं देते हैं. हम 50 करोड़ रुपये तक की फंडिंग देते हैं. प्राइवेट सेक्टर अपने दम पर विकास करना चाहता है."

### **चीन और पाकिस्तान सीमाओं पर तैनाती के लिए सेना ने रक्षा मंत्रालय को भेजा था प्रस्ताव**

इससे पहले, पिछले साल मार्च में रक्षा मंत्रालय को चीन और पाकिस्तान के साथ लगती सीमाओं पर तैनाती के लिए 307 एडवांस्ड टोड आर्टिलरी गन सिस्टम (एटीएजीएस) खरीदने के लिए भारतीय सेना से एक प्रस्ताव मिला था. ATAGS का परीक्षण 26 अप्रैल से 2 मई, 2023 के बीच पोखरण फील्ड फायरिंग रेंज (PFFR) में पूरा किया गया था.

आधिकारिक बयान में कहा गया है कि एटीएजीएस भारतीय सेना के तोपखाने आधुनिकीकरण कार्यक्रम के एक हिस्से के रूप में डीआरडीओ द्वारा मिशन मोड में शुरू की गई एक स्वदेशी टोड आर्टिलरी गन सिस्टम परियोजना है. आयुध अनुसंधान और विकास प्रतिष्ठान (ARDE) पुणे बाकी डीआरडीओ प्रयोगशालाओं के साथ-साथ एटीएजीएस के डिज़ाइन और विकास के लिए डीआरडीओ की नोडल प्रयोगशाला है.

### **एक दिन पहले तटरक्षकों के FPV लिए रक्षा मंत्रालय ने साइन किए 1070.47 करोड़ के कॉन्ट्रैक्ट**

इससे पहले रक्षा मंत्रालय ने बुधवार को भारतीय तटरक्षक के लिए 14 तेज गश्ती जहाज (एफपीवी) के अधिग्रहण के मकसद से मुंबई के मझगांव डॉक शिपबिल्डर्स लिमिटेड (MDL) के साथ 1070.47 करोड़ रुपये के कॉन्ट्रैक्ट साइन किए हैं. इन मल्टीपरपज तेज गश्ती जहाजों को एमडीएल द्वारा स्वदेशी रूप से तैयार, विकसित और निर्मित किया जाएगा. साथ ही रिकॉर्ड 63 महीनों में इसे मंत्रालय को सौंप दिया जाएगा.

रक्षा मंत्रालय ने इस बारे में कहा कि उच्च तकनीकी और उन्नत सुविधाओं एवं उपकरणों के साथ ही ये मल्टीपरपज हाई स्पीड गश्ती जहाज कई भूमिकाओं में सक्षम ड्रोन, वायरलेस से कंट्रोल रिमोट वॉटर रेस्क्यू



क्राफ्ट लाइफबॉय और आर्टिफिशियल इंटेलिजेंस क्षमता से लैस होंगे. इससे तटरक्षक बल (Cost Gaurds) को आधुनिक युग की बहुआयामी चुनौतियों का सामना करने के लिए अधिक लचीलापन और साथ ही बेहतर संचालन क्षमता मिल सकेगी. मंत्रालय ने कहा कि इन गश्ती जहाजों की खरीद का मकसद तटरक्षक बल की क्षमताओं को बढ़ावा देना और समुद्री सुरक्षा की ओर सरकार के बढ़ते प्रयास को विस्तार देना है.

<https://zeenews.india.com/hindi/explainer/drdo-chief-samir-kamat-says-orders-for-307-atags-howitzers-for-army-placed-before-31-march/2078060>

## Defence News

## Defence Strategic: National/International

# THE ECONOMIC TIMES

*Fri, 26 Jan 2024*

## **India shows off its top Defence Tech as Swathi radar, Sarvatra, Prachand, Nag march through Kartavya Path**

The Republic Day parade in India this year highlighted the nation's prowess in indigenous defense technologies, with a focus on the "Swathi" weapon locating radar system, "Sarvatra" mobile bridging system, drone jammer system, and advanced radio frequency monitoring system. Developed by the Defense Research and Development Organization (DRDO) and Bharat Electronics Ltd., these cutting-edge systems were featured prominently during the parade, showcasing India's commitment to technological advancements in defense.

### **Indigenous Defense Technologies Steal the Show:**

#### **Swathi Weapon Locating Radar System:**

The indigenously developed "Swathi" weapon locating radar system took center stage at the Republic Day parade. A joint effort by DRDO and Bharat Electronics Ltd., this advanced radar system exemplifies India's capability in developing state-of-the-art defense technologies. The system is designed to accurately locate enemy weaponry, enhancing the nation's strategic defense capabilities.

### **Sarvatra Mobile Bridging System:**

Following the Swathi radar system, the Corps of Engineers showcased the "Sarvatra" mobile bridging system. This mechanically-launched mobile bridge plays a crucial role in providing strategic mobility to the armed forces, showcasing India's commitment to robust infrastructure for military operations.

### **Drone Jammer and Radio Frequency Monitoring System:**

The Corps of Signals presented the mobile drone jammer system and advanced radio frequency monitoring system. These technologies address modern threats, reflecting India's proactive approach in countering unmanned aerial vehicles and monitoring radio frequencies for enhanced security.

### **Historic Cavalry Display and Mechanized Columns:**

#### **61st Cavalry's Horsed Cavalry Regiment:**

In a unique spectacle, the 61st Cavalry, the world's sole serving horsed cavalry regiment, led the Indian Army contingent. Major Yashdeep Ahlawat led the cavalry, showcasing a historic amalgamation of all "State Horsed Cavalry Units."

#### **Mechanized Columns and Armored Vehicles:**

Following the mounted cavalry, the parade featured main battle tanks T-90 'Bhishma,' the NAG missile system, a tank destroyer designed by DRDO, and various infantry combat and all-terrain vehicles. The mechanized columns showcased India's military strength and technological advancements.

The indigenously designed and manufactured Pinaka Multiple Rocket Launcher System added to the display of India's defense capabilities. This emphasizes the nation's commitment to self-reliance in defense technology.

#### **Medium-Range Surface-to-Air Missile:**

The parade also featured a medium-range surface-to-air missile with a surveillance range of 300 km and the ability to engage hostile aerial platforms within a range of 70 km. This missile system underlines India's focus on air defense capabilities, ensuring protection across various threat scenarios.

#### **Multi-Function Radar System:**

Further demonstrating India's capabilities, a multi-function radar system with a surveillance range of 300 km was displayed. This versatile radar system adds another layer to the country's airspace monitoring capabilities.

### **Tightened Security Measures for Republic Day Celebrations:**

**Elaborate Security Arrangements:** With the Republic Day celebrations underway, elaborate security arrangements have been implemented across the country. In the national capital alone, over 8,000 security personnel are deployed to ensure a safe and secure environment for the festivities. **Traffic Restrictions and Border Sealing:** Special Commissioner of Police (Special Cell) HS Dhaliwal announced stringent measures, including the sealing of borders on the night of January 25. Heavy

transport and light goods vehicles will be barred from entering the capital. Elaborate security checks have been put in place due to the sensitivity of the occasion.

Deputy Commissioner of Police (DCP) Devesh Kumar Mahla highlighted the deployment of 8,000 security forces, emphasizing the use of technology and human intelligence for enhanced surveillance. Security measures have been intensified, with a focus on communication redundancy.

Public Advisory: DCP Mahla urged the public to refrain from carrying small backpacks and bringing children under five years old to the Republic Day event. Additionally, Central Industrial Security Force has intensified security checks at Metro stations.

### **Nationwide Vigilance and Preparedness:**

Security Measures Beyond Delhi: Security has been tightened not only in Delhi but also in Jammu and Kashmir and naxal-affected areas in Odisha. The Indian Army, employing snipers and advanced technology, is ensuring heightened vigilance along the Line of Control in Bandipora, Jammu and Kashmir.

Specific Aerial Threat Measures: Delhi Police, addressing specific aerial threats, outlined precautions against hand gliders, paragliders, para motors, aero models, drones, and short-range aerial vehicles.

This vigilance is especially heightened after the recent Pran Pratishtha ceremony of Lord Ram in Ayodhya. Women-Centric Republic Day Parade and Other Highlights: Women Participation: Major General Sumit Mehta announced a significant milestone – an allwomen tri-services contingent participating in the Republic Day Parade. This contingent includes women troops from the Army's military police and the other two services.

### **French Contingent and Flypast:**

The French President, Emmanuel Macron, graced the occasion as the chief guest, marking the sixth time a French president has been the chief guest at the Republic Day parade. A special highlight was the French contingent's participation and a flypast featuring 15 women on the planes.

As India celebrates its 75th Republic Day, the parade not only showcased the nation's indigenous defense capabilities but also underscored the importance of heightened security measures. The inclusion of women-centric contingents and the participation of international allies added a unique dimension to the festivities.

The nation stands united in its commitment to technological advancements and security preparedness, reflecting the spirit of Jan Bhagidari – people's participation in the national festival.

<https://economictimes.indiatimes.com/news/defence/republic-day-2024-india-shows-off-its-top-defence-tech-as-swathi-radar-sarvatra-prachand-nag-march-through-kartavya-path/articleshow/107162360.cms?from=mdr>

*Fri, 26 Jan 2024*

## **Air and space to AI and sea: India, France adopt new roadmap of defence production**

India and France Friday adopted a Roadmap on Defence Industrial Cooperation as Prime Minister Narendra Modi held talks with visiting French President and Republic Day chief guest Emmanuel Macron Thursday and Friday.

The roadmap, said Foreign Secretary Vinay Kwatra, underlined that the will identify opportunities in co-design, co-development and co-production in the defence industrial sector and it will cover a range of domains: air and space technology, maritime tech, underwater domain awareness, land warfare, robotics, artificial intelligence, autonomous vehicles and cyber defence.

Defence and security has been one of the key pillars of the strategic partnership between India and France established on Jan 26, 1998. This year's Republic Day celebrations also cap the 25th anniversary celebrations of the Indo-French strategic partnership forged during then French President Jacques Chirac's visit, also as Chief Guest for the Republic Day celebrations.

"The whole idea... building the defence supply chains between two countries so that they can not only fulfil the defence needs in India but also can be a useful contributor for the security partnership with other countries," said Kwatra. "The focus of conversation is on defence production."

He added that the two sides also agreed on a roadmap on space and a pact between Tata and Airbus on making H-125 single-engine helicopters.

Both also agreed on cooperation in healthcare, which would include education, training and research, and the use of AI in healthcare.

The year, 2026, was declared as the year of India-France innovation with the two sides announcing a Young Professionals scheme for people between 18 to 35 years of age.

Kwatra said an MoU was sealed between New Space India Ltd and France's Arianespace for cooperation in satellite launches.

He said that cooperation in space will involve space situational awareness, collision avoidance, earth monitoring, communications and broadcasting, and satellite launching services.

Modi and Macron also discussed the conflict in Gaza and its various dimensions including that terrorism and humanitarian aid, Kwatra said.

The two leaders also exchanged perspectives on the evolving security situation in the Red Sea including potential disruptions, he said.

Macron began his two-day trip to India with a visit to Jaipur Thursday, where he visited the Amer Fort, Jantar Mantar and Hawa Mahal. Modi accompanied Macron during the roadshow between Jantar Mantar and Hawa Mahal.

The French president is the sixth French leader to be the chief guest at the Republic Day celebrations at Kartavya Path Friday, the most by any country, a testament to the breadth and depth of bilateral ties that encompass key strategic areas.

Launched on January 26, 1998, this strategic partnership was the first-ever for India with a country in the West and a first for France outside EU.

“The partnership draws strength, trust and consistency from a shared sense of strategic autonomy and sovereignty, a quest for the multi-polar world, and a natural affinity for democratic values and rule of law,” an official said.

The partnership now includes a strong Indo-Pacific component. “The salience of the partnership is growing in the changing world, complex geo-political environment and in pursuit of respective national ambitions,” the official said.

Macron also attended the At Home reception hosted by President Droupadi Murmu and will be hosted for a state banquet at Rashtrapati Bhawan, officials said.

<https://indianexpress.com/article/india/india-france-roadmap-on-defence-industrial-ties-9129221/>



*Sat, 27 Jan 2024*

## **Jet Engine Deal with France will give 100% access to Technology, says Indian envoy**

Collaborating with France on manufacturing an engine for India’s fifth-generation fighter jet and working on its design and development is the subject of ongoing discussions between the two countries, Indian envoy to France Jawed Ashraf has said.

The new engine is meant to power the Advanced Medium Combat Aircraft (AMCA), which is being developed. Discussions are in progress between Safran and the Defence Research and Development Organisation’s Aeronautical Development Agency and Gas Turbine Research Establishment on arriving at a set of specifications that complies with the country’s future fighter jet requirements, the envoy said at a press conference.

The subject always features in conversations between French President Emmanuel Macron and Prime Minister Narendra Modi, he added. The decision to jointly develop the aero engine was announced during Mr. Modi’s visit to France in July 2023.

“What we are looking for is not just a transfer of manufacturing technology, which essentially keeps you going with the same crutches that you have been on for the last six decades, but to work

in the actual design phase, metallurgical aspects, etc. So, Safran [French multinational firm that works in the aerospace and defence sectors] is fully willing to do it with 100% transfer of technology in design, development, certification, production, so on and so forth,” Mr. Ashraf said.

“But it’s obviously a very complex subject, and it has to fit in with the overall future requirements. So, these discussions will continue to take place.

And that’s also part of the defence industry.” Meanwhile, the deal with General Electric (GE) is for the manufacturing licence of the already-operational F-414 engine, which is set to be manufactured in India by Hindustan Aeronautics Limited.

The U.S. government has given all approvals for the deal and it is now for the two companies to finalise the commercial agreements, officials said. The deal will give India access to several technologies and industrial processes involved in the manufacture of jet engines and increase the capabilities of both public and private industries in India.

The F-414 engines are meant to power the indigenous Light Combat Aircraft (LCA)-MK2, a larger and more capable variant of the LCA currently in service, and the initial version of the AMCA. The development of the AMCA is planned in two phases: MK1 with the F-414 engine, and Mk2 with a more powerful engine in collaboration with France.

Very few countries have a proprietary right to jet engine technology and it is a closely guarded secret due to its extreme criticality in modern warfare. India made unsuccessful attempts in the past to develop an engine locally under the now-shelved Kaveri project, which was sanctioned by the Cabinet Committee on Security (CCS) in 1989.

Over the course of 30 years before it was shut down, the project saw an expenditure of ₹2.035.56 crore and the development of nine full prototype engines and four core engines.

<https://www.thehindu.com/news/national/jet-engine-deal-with-france-will-give-100-access-to-technology-says-indian-envoy/article67780629.ece>



*Sat, 27 Jan 2024*

## **U.S. approves F-16 sale to Turkiye, F-35 to Greece after Turkiye ratifies Sweden's entry to NATO**

The Biden administration has approved the sale of F-16 fighter jets to Turkiye following the Turkish government's ratification this week of Sweden's membership in NATO.

The move is a significant development in the expansion of the alliance, which has taken on additional importance since Russia's invasion of Ukraine.

The State Department notified Congress of its approval of the \$23 billion F-16 sale to Turkiye, along with a companion \$8.6 billion sale of advanced F-35 fighter jets to Greece, late Friday. The

move came just hours after Turkiye deposited its “instrument of ratification” for Sweden's accession to NATO with Washington, which is the repository for alliance documents and after several key members of Congress lifted their objections.

The sale to Turkiye includes 40 new F-16s and equipment to modernise 79 of its existing F-16 fleet. The sale to Greece includes 40 F-35 Lightning II Joint Strike Fighters and related equipment.

NATO ally Turkiye has long sought to upgrade its F-16 fleet and had made its ratification of Sweden's membership contingent on the approval of the sale of the new planes.

The Biden administration had supported the sale, but several lawmakers had expressed objections due to human rights concerns.

Those objections, including from the chairman and ranking member of the Senate Foreign Relations Committee, Sens. Ben Cardin, D-Md., and Jim Risch, R-Idaho, have now been overcome, officials said. Cardin said in statement Friday that he had still had concerns about Turkiye's rights record, but had agreed to the sale based on commitments Turkiye has made to improve it.

“I look forward to beginning this new chapter in our relationship with Turkiye, expanding the NATO alliance, and working with our global allies in standing up to ongoing Russian aggression against its peaceful neighbours,” he said. Turkiye had delayed its approval of Sweden's NATO membership for more than a year, ostensibly because it believed Sweden did not take Turkiye's national security concerns seriously enough, including its fight against Kurdish militants and other groups that Ankara considers to be security threats.

The delays had frustrated the US, and other NATO allies, almost all of whom had been swift to accept both Sweden and Finland into the alliance after the Nordic states dropped their longstanding military neutrality following Russia's invasion of Ukraine in February 2022. Sweden's formal accession to NATO now depends on Hungary, which is the last remaining NATO ally not to have approved its membership. US and NATO officials have said they expect Hungary to act quickly, especially after Turkiye's decision.

<https://www.thehindu.com/news/international/us-approves-f-16-sale-to-turkiye-f-35-to-greece-after-turkiye-ratifies-swedens-entry-to-nato/article67782245.ece>



*Sun, 28 Jan 2024*

## **Indian Navy Helps douse fire on UK oil tanker attacked by Houthis in Gulf of Aden**

Fire on British oil tanker Marlin Luanda in the Gulf of Aden has been doused by the combined efforts of Indian, US, and French Navy personnel. Twenty-two Indians were onboard the oil tanker, which was attacked by Yemen's Houthi on January 26.

“Ten Indian Naval personnel with specialist fire fighting equipment embarked MV Marlin Luanda in the early hours of January 27. After six hours of battling the fire along with the crew of MV Marlin Luanda, the Indian Naval fire fighting team has successfully brought the fire under control,” the Navy said.

The Indian Navy’s guided missile destroyer, INS Visakhapatnam, had responded to the distress call from the oil tanker.

In a video, Captain Abhilash Rawat, Master of MV Marlin Luanda, thanked the Indian Navy for helping the British oil tanker during a tough time.

“Half of the world knows that yesterday, we were struck by a missile in the Gulf of Aden. Due to the attack, our vessel was on massive fire. I would really like to thank Indian warship INS Visakhapatnam; we had lost hopes, but these (Indian Navy) guys have done a tremendous (firefighting) job. They really went out of the book to help us out,” Captain Abhilash Rawat told news agency PTI.

Responding to the distress call from MV Marlin Luanda PM 26 Jan, INS Visakhapatnam proceeded to provide assistance. A US and French warship also responded to the distress call.

The fuel tanker was operated on behalf of the trading firm Trafigura, and the company confirmed that a missile struck the Marlin Luanda as it transited the Red Sea.

Along with the British oil tanker, a US warship, the destroyer USS Carney, was also attacked by the Houthi group.

<https://www.indiatoday.in/india/story/british-oil-tanker-marlin-luanda-ins-visakhapatnam-fire-under-control-gulf-of-aden-2494416-2024-01-28>



*Sun, 28 Jan 2024*

## **Indian Navy to showcase twin carrier operations with Rajnath Singh on board**

Defence minister Rajnath Singh will witness twin carrier operations of the Indian Navy during the top Naval Commanders Conference in March on board INS Vikrant between Kochi and Goa. India’s second aircraft carrier INS Vikrant came out of maintenance refit at Cochin Shipyard on January 26 and is slated to participate in 50 nation Milan exercise in February off the coast of Visakhapatnam.

While the Naval Commanders Conference will be held between March 4 and 8 with the second stage in New Delhi, Defence Minister Rajnath Singh will inaugurate the first MH 60R squadron of multi-role helicopters in Cochin. As many as 24 Sikorsky MH 60 R helicopters were acquired by India from the US on a government-to-government basis.



It is during his sea trip from Kochi to Goa, Singh will witness the full power of the Indian Navy with aircraft carriers INS Vikramaditya and INS Vikrant showcasing their prowess at sea with fighter operations using MiG-29 K aircraft. INS Vikrant is currently on sea trials and will move to Visakhapatnam after docking at Cochin port for final review.

As many as 24 nations are sending their warships for participation in Milan Exercises on the Indian eastern seaboard. The multi-nation exercises come at a time when the Houthi militia and Somali pirates are playing havoc with commercial shipping in the Red Sea and off the Gulf of Aden. The Iranian-backed Shia Houthis are targeting commercial shipping in the Red Sea to force Israel to suspend its military operations against the Hamas terrorist group in Gaza.

The Somali pirates are active in the region in lieu of the multi-million dollar ransom they extract from owners of hijacked ships. While the Indian Navy is playing a yeoman role in defending commercial shipping from pirates and missile attacks in the Arabian Sea, the maritime security in the Indo-Pacific is currently under threat with China and the rapidly expanding PLA Navy playing the hegemon in the South China Sea.

<https://www.hindustantimes.com/india-news/indian-navy-to-showcase-twin-carrier-operations-with-rajnath-singh-on-board-101706415814576.html>



*Sun, 28 Jan 2024*

## **Iran launches 3 Satellites into Space amid Ballistic Missile concerns**

Iran on Sunday claimed it has successfully launched three satellites into space. The state-run IRNA news agency said the launch involved the successful use of Iran's Simorgh rocket. It is the latest development in its program about which the West feels improves its ballistic missiles.

Iran's state TV named the launched satellites Mahda, Kayhan-2 and Hatef-1. As per its description, the Mahda is a research satellite, while the Kayhan and the Hatef are nanosatellites focused on global positioning and communication respectively.

Iranian state television released footage of the nighttime launch for the Simorgh rocket. Expert analysis of the footage showed that it took place at the Imam Khomeini Spaceport in Iran's rural Semnan province.

"The roar of the Simorgh (rocket) resonated in our country's sky and infinite space," said Abbas Rasooli, a state TV reporter, in the footage.

### **About Iran's Simorgh program**

The Simorgh is a part of Iran's civilian space program. It is a two-stage, liquid-fueled rocket designed to place satellites into a low Earth orbit. In recent years, the Simorgh, or "Phoenix," rocket had suffered failures.

## **US' apprehension about Simorgh**

The United States has been apprehensive of Iran's Simorgh program. The US intelligence community's 2023 worldwide threat assessment report cites the Simorgh as a possible dual-use rocket. The report says that the development of satellite launch vehicles "shortens the timeline" for Iran to develop an intercontinental ballistic missile because it uses similar technology.

The United States has previously said Iran's satellite launches defy a UN Security Council resolution. US suspects Iran is involved in the development of ballistic missiles capable of delivering nuclear weapons. Though US intelligence agencies and others assess Iran has not begun actively seeking a nuclear weapon.

Meanwhile, UN sanctions related to Iran's ballistic missile program expired last October.

## **Tension in the Middle East**

The launch of satellites has happened amid simmering tension in the Middle East due to the ongoing Israel-Hamas war. Amid the war, Israel has also been involved in border escalations with Iran-backed Hezbollah militants in Lebanon.

In the Red Sea region, Iran-backed Houthi militants have caused problems by launching attacks on ships and vessels. Houthis say they are supporting Hamas in Gaza and want to disrupt any shipping linked to Israel.

<https://www.hindustantimes.com/world-news/iran-launches-3-satellites-into-space-amid-ballistic-missile-concerns-101706430054020.html>



*Sun, 28 Jan 2024*

## **North Korea fires Cruise Missiles off East Coast**

North Korea fired multiple cruise missiles off its east coast on Sunday, its second such launch in less than a week, South Korea's Joint Chiefs of Staff (JCS) said.

The missiles were launched at around 8 a.m. (2300 GMT on Saturday) and were being analysed by South Korean and U.S. intelligence authorities, the JCS said, without specifying how many missiles were fired or how far they travelled.

"While strengthening surveillance and vigilance, our military is cooperating closely with the United States and monitoring additional signs and activities from North Korea," it said in a statement.

The latest launches came days after North Korea fired what it called a new strategic cruise missile called "Pulhwasal-3-31", suggesting it is nuclear capable.

North Korea is stepping up confrontation with the United States and its allies, but officials in Washington and Seoul say they have spotted no signs Pyongyang intends to take imminent military action.

Pyongyang is likely to continue or even increase provocative steps, officials and analysts say, after it made strides in ballistic missile development, bolstered cooperation with Russia and China, and scrapped its decades-long goal of peacefully reuniting with South Korea.

Earlier on Sunday, North Korea's state media KCNA denounced a series of military drills conducted in recent weeks by U.S. and South Korean troops, warning of "merciless" consequences.

"The reality that nuclear war exercises against our republic have been going on like crazy since the beginning of the New Year demands that we be fully prepared for a deadly war," the dispatch said.

North Korea carried out its first test of a cruise missile with possible nuclear strike capabilities in September 2021.

While U.N. Security Council sanctions do not bar the isolated country from testing conventional cruise missiles, South Korea's defence minister Shin Won-sik condemned the recent launches as a serious threat to his country and beyond.

The latest launch came a day after a Chinese delegation led by Vice Foreign Minister Sun Weidong returned home following a three-day visit to Pyongyang, during which both sides vowed to boost tactical cooperation and defend common interests.

In a separate dispatch on Sunday, KCNA said a North Korean delegation headed by sports minister Kim Il Guk left on Saturday for China.

<https://www.reuters.com/world/asia-pacific/north-korea-fired-multiple-cruise-missiles-south-korea-military-2024-01-28/>

## THE ECONOMIC TIMES

*Thu, 25 Jan 2024*

### **JSW Group announces entry into Defence Sector; to focus on domestic, overseas markets**

Indian conglomerate JSW Group on Thursday announced its strategic entry into the defence sector with the establishment of a new business vertical that would focus both on the domestic and overseas markets.

The JSW Defence and Aerospace (JSW Defence) would not only supply state-of-the-art equipment to the Indian Armed Forces but also intends to establish itself as a key player at the global stage and contribute to India's ambition to become a USD 5 billion defence export economy, the company said.

It said JSW Defence, in its very first venture, has acquired a majority stake in an extreme off-road vehicle company, Gecko Motors Private Ltd, now renamed as JSW Gecko Motors Pvt Ltd (JSW Gecko). The company promoted by its founders led by Jaskirat Singh Nagra has secured an order

worth Rs 250 crore from the defence ministry for supply of 96 specialist mobility vehicles (SMVs), branded as ATOR N1200, it said.

The ATOR N1200 is an indigenised version of the SHERP N1200 amphibious extreme mobility vehicle, designed by UK-based Copato Ltd. Copato has entered into a joint venture agreement with JSW Defence and JSW Gecko along with technology supply licence agreement for the manufacture of specialist mobility vehicles in India with a vision to make the country a global production hub for this product, the JSW Group said in a statement."

At USD 73.8 billion, India as a country has an extremely large defence budget. By 2030, the Indian defence budget is likely to grow to USD 200 billion. Capital outlay forms a very large part of the defence budget and it is here, we at JSW see a big opportunity," said Parth Jindal of JSW Group. JSW Group is known for bringing world class products and services to India and "we would like to extend this very ethos to the defence vertical as well", he said.

"Moreover, JSW Group's entry into the defence business reciprocates the Indian government's confidence of providing impetus through the private sector's participation in building indigenous defence capabilities," Jindal said. "In line with our strategy, our first product, ATOR N1200 specialist mobility vehicles being manufactured for the Indian Army, is an Indian adaptation of the amphibious all-terrain SHERP N1200," he added.

This vehicle, Jindal said, is designed to navigate all types of terrains in extreme weather conditions and that it has proven its capability from the arid deserts of Rajasthan to the tortuous creeks and mudflats of Bhuj and Rann of Kutch to the rugged mountainous terrain in sub-zero temperatures. "The ATOR shall provide significant advantages to the Indian Army in its operations," he said. Jindal said JSW Defence's endeavour will be to bring in niche technologies to fill in the "capability gaps" of Indian Armed Forces and partner with the soldiers in the line of combat. Jaskirat Singh Nagra said, "We saw a great opportunity for extreme mobility vehicles in the Indian market."

"We were very keen to have a strategic partner who could help us grow our business and at the same time support our R&D efforts to design and develop new extreme mobility products for India and the world," he said.

JSW Defence has appointed Commodore Madhu Gentela (retd), who is former naval officer with over 30 years' experience in military technology, to lead the Group's defence business.

<https://economictimes.indiatimes.com/news/defence/jsw-group-announces-entry-into-defence-sector-to-focus-on-domestic-overseas-markets/articleshow/107151992.cms?from=mdr>

### **ISRO adds another feather to its cap with POEM-3 success**

The Indian Space Research Organisation has successfully achieved all its experiments to be performed on its orbital platform launched recently by PSLV-C58 mission. The space agency is now preparing for a controlled re-entry into Earth's atmosphere within the next 75 days, ensuring the mission leaves no space debris behind.

"ISRO's innovative space platform, POEM-3, successfully achieves all payload objectives. With the likely re-entry of POEM-3 in the next 75 days, the PSLV-C58 XPoSat mission will be leaving zero debris in space," ISRO said in an X post on Saturday.

After placing X-Ray Polarimeter Satellite into an orbit of 650km with 6-degree inclination, ISRO lowered the launch vehicle's fourth spent stage. It was used as a platform for onboard experiments.

#### **Which experiments were performed on POEM-3?**

1. Bellatrix Aerospace, based in Bengaluru, tested Rudra 0.3 HPGP, a green monopropellant thruster, and ARKA-200, a heater-less hollow cathode for Hall thrusters.
2. InspeCity Space Labs, located in Mumbai and incubated by IIT Bombay, tested the Green Impulse TrAnsmmitter (GITA), a green bipropellant CubeSat propulsion unit.
3. TakeMe2Space from Hyderabad tested its Radiation Shielding Experimental Module (RSEM) designed to evaluate the effectiveness of Tantalum coating, enhancing CubeSat lifespan.
4. Thiruvananthapuram-based LBS Institute of Technology for Women contributed to the Women Engineered Satellite (WESAT), measuring solar irradiance and UV Index.
5. KJ Somaiya Institute of Technology in Mumbai featured BeliefSat-0, an amateur radio satellite, onboard POEM.
6. ISRO's Vikram Sarabhai Space Centre (VSSC) had two payloads, the Fuel Cell Power System (FCPS) and Silicon-based High Energy Cell, onboard POEM.
7. The Ahmedabad-based Physical Research Laboratory has sent the Dust Experiment (DEX) on POEM, designed to measure interplanetary dust count.

The space agency confirmed the successful completion of all payload objectives. "After achieving all objectives, more experiments with POEM-3 are planned for generating data for future missions including upcoming POEM configurations," it added.

Across POEM-1 to POEM-3 missions, ISRO has incorporated a total of 21 payloads from diverse institutes and industries.

## **ISRO committed to leave no space debris**

During the PSLV-C58 mission, the vehicle was intentionally lowered to a 350 km circular orbit to expedite orbit decay after the experiment's completion.

On the 25th day in orbit, POEM-3 accomplished 400 orbits, currently residing in an orbit measuring approximately 322 km by 352 km. It is anticipated that POEM-3 will remain in orbit for about 73 more days before re-entering the Earth's atmosphere.

“With POEM we leave no debris and with a mission planned for tethered debris capture ISRO will solve the debris problem once and for all,” said Manish Purohit, a former ISRO scientist and founder of NIMBUS Education.

“Not only that, ISRO's ambitious future in-orbit services initiative is developing technologies for Satellite Refuelling, ISRO Satellite re-Servicer module (ISM), in Orbit rendezvous, capture, docking and maintenance,” he added.

<https://www.hindustantimes.com/technology/isro-writes-poem-in-space-objectives-achieved-pslv-c58-to-leave-zero-debris-101706350234092.html>



*Thu, 25 Jan 2024*

## **Aditya L1 update: ISRO successfully deploys Magnetometer Boom in Halo Orbit**

The Aditya-L1 spacecraft has successfully deployed its 6-meter long magnetometer boom in space at Lagrange Point-1.

The deployment took place on January 11, 2024, while the satellite was stationed in a halo orbit at the Lagrange point L-1, marking 132 days since the spacecraft's launch.

The magnetometer boom is a critical component of the Aditya-L1 mission, which aims to study the Sun's chromosphere and corona, as well as the interplanetary magnetic field.

The boom carries two advanced fluxgate magnetometer sensors that are essential for measuring the low-intensity magnetic fields in space. These sensors are strategically placed at distances of 3 and 6 meters from the main body of the spacecraft to minimise interference from the spacecraft's own magnetic field.

The use of dual sensors allows for a more accurate estimation of this influence and helps cancel out any magnetic effects originating from the spacecraft itself. Constructed from carbon fiber reinforced polymer, the boom segments act as interfaces for sensor mounting and contain the mechanism elements necessary for deployment.

The boom's design includes an articulated mechanism with five segments connected by spring-driven hinge mechanisms. This allows the boom to fold and deploy in an accordion-like fashion, a

process controlled by a patented Kevlar closed control loop mechanism. Once deployed, the hinges lock the segments into their operational configuration.

During the launch phase, the boom was held securely in place by two hold-downs, which transferred the launch loads to the spacecraft body. To initiate deployment, a thermal cutter-based release system was activated upon command.

Telemetry data confirmed the successful release of the hold-downs, the initial motion of the boom, and the locking of all hinges. Impressively, the in-orbit deployment time was recorded at approximately 9 seconds, falling within the predicted range of 8 to 12 seconds. All telemetry indications for hinge locking and hold-down release were reported to be within nominal parameters, indicating a flawless deployment operation.

This achievement marks a significant step forward for the Aditya-L1 mission, as the fully deployed magnetometer boom will now enable scientists to gather precise measurements of the interplanetary magnetic field, furthering our understanding of solar phenomena and their impact on space weather.

The success of this deployment demonstrates the advanced capabilities of India's space technology and its contributions to solar physics research.

<https://www.indiatoday.in/science/story/aditya-l1-update-isro-successfully-deploys-magnetometer-boom-in-halo-orbit-2493610-2024-01-25>



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*Thu, 25 Jan 2024*

## **Tuning Optical Properties of Liquid Crystals with a type of Photoactive Organic Molecule can give Novel Optical Devices**

Scientists have tuned the disallowed bands of wavelength in liquid crystals by it doping it with a type of organic molecule which are photoactive dimers, introducing properties that can be useful for new generational optical devices.

Owing to their ability to modulate light, there has been growing interest in photonic crystals (PCs) for developing new-generation optical devices. The periodic dielectric structure of PCs gives rise to disallowed bands of wavelength or photonic bandgap (PBG).

The bandgap corresponds to the frequencies/wavelengths of electromagnetic radiation that are not transmitted through the material. Among various PBG structures, liquid crystals (LCs), where molecules self-organize into a periodic structure, are gaining attention due to their capability to self-assemble. Liquid systems exhibit PBG structures in two phases—namely the cholesteric (Ch) phase

and the twist grain boundary smectic C\* (TGBC\*) phase, displaying periodic structures in one and three dimensions, respectively. The PBG properties of these systems can be easily altered by external stimuli like temperature, doping with nanoparticles, etc.

Scientists from the Centre for Nano and Soft Matter Sciences (CeNS), an autonomous institute under the Department of Science & Technology (DST), have demonstrated the impact of ultraviolet light on the one-dimensional and three-dimensional PBG features of the LC systems.

By incorporating small amounts of guest photoactive organic compounds with a structure containing two identical or similar units (dimers), the wavelength and the width of the PBG in 1 or 3-dimensions could be tuned in the presence of UV light.

The observed feature can find application as a selective wavelength mirror whose wavelength can be optically tuned. Another interesting fact is the memory effect observed in two-dimensional PBG dictated by UV or actinic light, a feature holding promise for memory devices. This research work published in *Journal of Molecular Liquids* was performed by Rajalaxmi Sahoo, Reshma C., D.S. Shankar Rao, C.V. Yelamaggad, and S. Krishna Prasad.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1999499>



**Press Information Bureau**  
**Government of India**

**Ministry of Science & Technology**

*Thu, 25 Jan 2024*

## **A New Alloy Developed can act as Alternative Magnetic Refrigerant for Minimizing Greenhouse Gas Emissions**

Researchers have found a new alloy that can act as an effective magnetic refrigerant that can be an alternative cooling agent for minimizing greenhouse gas emissions and meet the global demand for higher energy efficiency for tackling global warming.

Magnetic refrigeration offers an energy-efficient and environment-friendly cooling technology as an alternative to the vapor-cycle refrigeration technology in use today. Hence efforts are on to fabricate magnetic refrigerators for household, industrial, and technological applications.

Magnetic cooling effect (MCE) is defined as the reversible temperature change of a magnetic material when it is subjected to an external applied magnetic field. In the magnetic refrigeration cycle, a magnetic field is applied on the magnetic material under an adiabatic process (no exchange of heat with the surrounding). Initially randomly oriented magnetic moments get aligned along the external magnetic field, resulting in the heating of the magnetic material. This heat is transferred from the material to the ambience. When the magnetic field is removed during adiabatic demagnetization, the magnetic moments of the material become randomized, resulting in a decrease in temperature



below the ambient temperature. This process causes the material to absorb heat from the surrounding heat-transfer medium.

Current research is focused on developing new magnetic materials such as refrigerants. Three critical criteria need to be fulfilled. First, the material must be capable of operating for millions of cycles without any fatigue and failure, the material must have high thermal conductivity and the material should respond to external magnetic field of about 2 T (Tesla) which can be generated by permanent magnets.

Since most of the materials developed so far show giant magneto caloric effect (GMCE) only at fields as high as 5 T, there is an urgent need to look for materials in which GMCE is achieved in lower fields.

A team S.N. Bose National Centre for Basic Sciences, an autonomous institute of the department of science and Technology (DST) experimented with a certain type of alloys called all-transition metal based Heusler alloys (magnetic intermetallics with face-centered cubic crystal structure) in their search for material exhibiting giant reversible MCE.

The team at S.N. Bose Centre has chosen Ni (Co)-Mn-Ti Heusler system because such systems often exhibit multifunctional properties with ultrahigh mechanical stability because of their intrinsic *d-d* hybridization.

In their study published in the journal Physical Review Materials they have found giant reversible MCE and magneto resistance (MR) in bulk  $\text{Ni}_{35}\text{Co}_{15}\text{Mn}_{34.5-x}\text{Cu}_x\text{Ti}_{15.5}$  ( $x = 1, 2, \text{ and } 3$ ) under an applied magnetic field of 5 T and 7 T. Scientists have shown that Cu doping in the Mn site pulls the magnetic transition towards structural transitions and therefore the distance between them decreases. This is because Cu strengthens the metallic character of the Ni–Ti bond and at the same time weakens the magnetic Mn–Mn exchange interaction.

Polycrystalline samples of  $\text{Ni}_{35}\text{Co}_{15}\text{Mn}_{34.5-x}\text{Cu}_x\text{Ti}_{15.5}$  ( $x = 1, 2, \text{ and } 3$ ) were prepared by arc melting technique. To ensure compositional homogenization, the samples were re-melted five to six times on each side. The melted ingots were wrapped with tantalum foil and sealed in an evacuated quartz tube. The samples were annealed at 1323 K for four days and quenched in ice water. The actual compositions of the samples were verified by energy dispersive x-ray.

Authors claimed from the temperature and field-dependent magnetization measurements that this investigated alloy yields giant reversible MCE parameters.

Change of fundamental ordering of spins and consequently the crystal and magnetic structure resulted in a significant change in the electrical resistance.

The researchers claim that the obtained magnitude of reversible MCE and MR is the highest reported value so far in the all-*d*-metal Heusler family. The concurrent observation of refrigerant capacity and MR is also very rare in Heusler alloys. The search for the right kind of magnetic material has yielded positive results at the S.N. Bose Centre Lab. The synergistic combinations of giant MCE and MR by proper tailoring of Cu-doped Heusler alloys may lead to a diverse range of solid state-based technological applications.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1999496>

## **So-Apt! Girl from Delhi bags PM award for innovation**

“If only 1% of the tractors used in India would use my technology, there would be an annual saving of Rs 1,800 crore of diesel,” Suhani Chauhan, a student of Class XI at Amity International School Pushp Vihar, said. She was awarded with Pradhan Mantri Rashtriya Bal Puraskar for innovation by President Droupadi Murmu at Vigyan Bhavan in New Delhi on Thursday.

Suhani has innovated So-Apt, a unique solar-operated agri-vehicle for small farmers. This has made her the only recipient for innovation and the only one from Delhi to get this national award for children. Suhani will be in the Republic Day parade too. So-Apt is a multifunctional vehicle with zero carbon emissions. The vehicle can be used for sowing seeds, spraying, irrigation, hole digging and various other agricultural needs, making it score high on utility.

The award given to Suhani is given to children in the age group 5 – 18 years for their excellence in seven categories for bravery, art and culture, environment, innovation, science and technology, social service and sports that deserve national recognition. Suhani said:

“The reduction of carbon emissions per year would be about 272,000 metric tonnes of CO<sub>2</sub> which in carbon credits would add up to \$10 million (about Rs 84 crore) per year. The farmers can use the solar panels to power other appliances or even sell any surplus.

She added that she felt “extremely honoured and humbled” to receive the award from the President. “It was a dream come true for me. I have been working on this idea ever since I was in Class 8, when I visited a farm on a school trip. On seeing the plight of small farmers, I realised that a low-cost, eco-friendly and multi-tool agrivehicle could be transformative,” she said.

Prime Minister Narendra Modi, while meeting the awardees, discussed various initiatives, including Suhani’s query about the Pradhanmantri Suryodaya Yojana.

“The Prime Minister also wants the homeowners to be able to sell any surplus energy from their roof-top solar panels to earn money, just the way I want farmers using my agrivehicle,” Suhani said. “We were told that we belong to the country, not only to our families. We have a responsibility to work harder to help our country,” she said.

“I will always cherish the signed watch, book and tablet that Modiji gifted to each of us,” she added. Suhani is in discussions with manufacturing companies to develop her innovation further and produce vehicles

<https://timesofindia.indiatimes.com/city/delhi/girl-from-delhi-wins-pm-award-for-innovation-with-solaroperated-agrivehicle/articleshow/107158824.cms>

*Sat, 27 Jan 2024*

## **Mars Rover Data confirms Ancient Lake Sediments on Red Planet**

NASA's rover Perseverance has gathered data confirming the existence of ancient lake sediments deposited by water that once filled a giant basin on Mars called Jerezo Crater, according to a study published on Friday.

The findings from ground-penetrating radar observations conducted by the robotic rover substantiate previous orbital imagery and other data leading scientists to theorize that portions of Mars were once covered in water and may have harbored microbial life.

The research, led by teams from the University of California at Los Angeles (UCLA) and the University of Oslo, was published in the journal *Science Advances*, opens new tab.

It was based on subsurface scans taken by the car-sized, six-wheeled rover over several months of 2022 as it made its way across the Martian surface from the crater floor onto an adjacent expanse of braided, sedimentary-like features resembling, from orbit, the river deltas found on Earth.

Soundings from the rover's RIMFAX radar instrument allowed scientists to peer underground to get a cross-sectional view of rock layers 65 feet (20 meters) deep, "almost like looking at a road cut," said UCLA planetary scientist David Paige, the first author of the paper.

Those layers provide unmistakable evidence that soil sediments carried by water were deposited at Jerezo Crater and its delta from a river that fed it, just as they are in lakes on Earth. The findings reinforced what previous studies have long suggested - that cold, arid, lifeless Mars was once warm, wet and perhaps habitable.

Scientists look forward to an up-close examination of Jerezo's sediments - thought to have formed some 3 billion years ago - in samples collected by Perseverance for future transport to Earth.

In the meantime, the latest study is welcome validation that scientists undertook their geo-biological Mars endeavor at the right place on the planet after all.

Remote analysis of early core samples drilled by Perseverance at four sites close to where it landed in February 2021 surprised researchers by revealing rock that was volcanic in nature, rather than sedimentary as had been expected.

The two studies are not contradictory. Even the volcanic rocks bore signs of alteration through exposure to water, and scientists who published those findings in August 2022 reasoned then that sedimentary deposits may have eroded away.

Indeed, the RIMFAX radar readings reported on Friday found signs of erosion before and after the formation of sedimentary layers identified at the crater's western edge, evidence of a complex geological history there, Paige said.

"There were volcanic rocks that we the landed on," Paige said. "The real news here is that now we've driven onto the delta and now we're seeing evidence of these lake sediments, which is one of the main reasons we came to this location. So that's a happy story in that respect."

<https://www.reuters.com/science/mars-rover-data-confirms-ancient-lake-sediments-mars-2024-01-27/>

