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समाचार पत्रों से चयनित अंश
Newspapers Clippings

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

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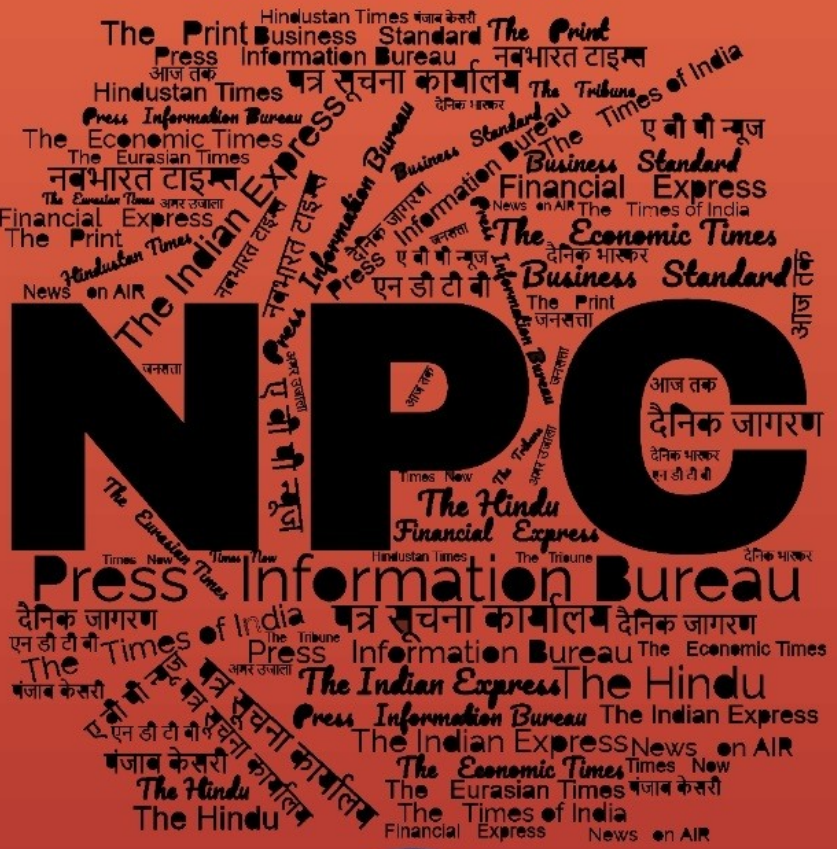

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DRDO News

As Pune DRDO facility reaches key milestones in humanoid development, former chairman puts focus on robotic soldier

Source: The Indian Express, Dt. 09 May 2025,
URL: https://indianexpress.com/article/cities/pune/as-pune-drdo-facility-reaches-key-milestones-in-humanoid-development-former-chairman-puts-focus-on-robotic-soldier-9991610/

Former DRDO chairman G Satheesh Reddy on Thursday highlighted the country's ambitious vision of developing a robotic soldier and positioning India as a frontrunner in the field. His remarks came as DRDO's premier laboratory in Pune, Research and Development Establishment (Engineers), has reached significant milestones in humanoid robot development.

Reddy, who was DRDO chairman and scientific advisor to the defence minister and is currently advisor to the Andhra Pradesh government, was speaking at the national workshop on Advanced Legged Robotics in Pune. The three-day workshop, which began on Thursday, has been organised by the R&DE(E) in association with College of Engineering Pune Technological University under the aegis of Pune chapter of the Indian Society of Systems for Science and Engineering.

The legged robotic systems — such as bipedal and quadrupedal robots — have a wide range of practical applications across sectors, including defence and security, healthcare, domestic assistance, space exploration and in industries. However, the design and development of autonomous legged robots present numerous technological challenges. The workshop aims to shed light on key technological domains and critical areas associated with the advancement of legged robotic systems.

In his inaugural address, Reddy said, "The industries and academic institutes are contributing in a big way to the advancements in the field of robotics. I don't think there's any good institute in the country where at least one person isn't working on robotics. In almost all institutions, individuals and teams are working on some kind of robot. But these efforts need to be synergised in the light of the major advancements in the related fields of Artificial Intelligence, material sciences, computational technologies, power sources. How will this synergy come, who will take this lead, can be deliberated upon in this conference."

"Government of India is creating structures in a focused manner towards work in certain areas. There are so many missions that the government has launched. It includes Artificial Intelligence Mission, Deep Tech mission, Quantum mission among others. So can we impress upon the government to come up with advanced robotic or humanoid related mission, which can spearhead the development in the country? The national mission will also be helpful to other domains. The R&DE Engineers should be able to come up with a robotic soldier and related applications. I am happy that this conference is happening on a very serious technology driven subject. I am sure that all the people sitting here and all the teams working in the field will be able to take the work

forward. And we hope to see the dream of having a robotic soldier is realised with our country being the frontrunner in this direction," Reddy said.

His remarks on development of robotic soldiers comes at a time when the Centre for Systems and Technologies for Advanced Robotics (C-STAR) at the R&DE(E) has reached key milestones in the development of a humanoid. The C-STAR targets the development of robotic mule and humanoid as their primary goals; however, in the long term the centre will be developing technologies in the areas of biomimetic robots, collaborative operations of multiple robotic elements, Swarm robots, flexible bio-inspired robots, advanced control, efficient actuators, low energy motion and Cognition, officials have said.

Officials said the two key system of the humanoid project, the humanoid upper body and humanoid stage-1 Biped which were at display at the workshop venue, have achieved important milestones. The humanoid upper body is designed to push, pull or slide doors, push obstacles and perform operations in high-risk zones. It can also safely handle hazardous objects like mines, explosives, liquids collaboratively with both arms and perform operations day, night, indoor and outdoor. The Stage-1 Biped has been designed to have the stability, control and balance during locomotion in unstructured terrain, fall and push recovery, real time map generation and navigation and can perform complex autonomous operations in high-risk zones.

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चांदीपुर मिसाइल रेंज की बढ़ाई गई सुरक्षा, DRDO ने बुलाई इमरजेंसी मीटिंग

Source: AajTak, Dt. 09 May 2025,
URL: https://www.aajtak.in/india/news/story/india-missile-units-chandipur-missile-range-drdo-emergency-meeting-today-ntc-rpti-2236002-2025-05-09

देश में वर्तमान में युद्ध जैसे तनावपूर्ण हालात को ध्यान में रखते हुए रक्षा संस्थानों की सुरक्षा को मजबूत करने के लिए कड़े कदम उठाए जा रहे हैं. इसी कड़ी में ईस्टर्न रेंज के डिप्टी इंस्पेक्टर जनरल (DIG) डॉक्टर सत्यजीत नायक ने एक आपात बैठक बुलाई है, जो कल दोपहर 2 बजे चांदीपुर में रक्षा अनुसंधान और विकास संगठन (DRDO) के ऑफिस में होगी.

इस बैठक का मुख्य उद्देश्य चांदीपुर स्थित इंटीग्रेटेड टेस्ट रेंज और प्रूफ एंड एक्सपेरिमेंटल एस्टैब्लिशमेंट (पीएक्सई) की सुरक्षा व्यवस्था की समग्र समीक्षा करना है. संभावना जताई जा रही है कि यह बैठक पीएक्सई कैंपस के भीतर भी आयोजित की जा सकती है.

कोस्टल सिक्योरिटी से जुड़े अधिकारी भी मीटिंग में शामिल होंगे

बलासोर के एसपी ने सभी संबंधित अधिकारियों को निर्देश दिया है कि वे एकजुट होकर बैठक की तैयारियों को पूरा करें और समन्वय बेहद प्रभावी बनाएं. इसके साथ ही कोस्टल सिक्योरिटी से जुड़े अधिकारियों को भी बैठक में भाग लेने के लिए आमंत्रित किया गया है, ताकि समुद्री क्षेत्र की सुरक्षा की भी पूरी जानकारी मिल सके.

मिसाइल परीक्षण केंद्र की सुरक्षा बढ़ाई गई

चांदीपुर में स्थित मिसाइल परीक्षण केंद्र की सुरक्षा व्यवस्था पहले ही मजबूत कर दी गई है. यहां चार स्तरों की सुरक्षा पर ध्यान दिया गया है. सबसे पहले, ओडिशा पुलिस तैनात है, उसके बाद आर्मी, फिर DRDO की अपनी सुरक्षा टीम और अंत में इंडो–तिब्बती बॉर्डर पुलिस (ITBP) चौथे स्तर की सुरक्षा प्रदान कर रही है. सभी सुरक्षा एजेंसियां हर गतिविधि पर निगरानी रख रही हैं और किसी भी अप्रिय घटना को रोकने के लिए सतर्क हैं. बैठक में विभिन्न विभागों से आवश्यक सूचना और सुझाव लिए जाएंगे, ताकि सुरक्षा व्यवस्था को और अधिक मजबूत बनाया जा सके. देश की सुरक्षा की दृष्टि से यह बैठक बेहद महत्वपूर्ण मानी जा रही है, जहां गंभीर हालात को ध्यान में रखते हुए ठोस निर्णय लिए जाएंगे.

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'ऑपरेशन सिंदूर को सटीकता से अंजाम देने के लिए भारतीय सेना को हृदय से बधाई', DRDO के कार्यक्रम में बोले रक्षा मंत्री राजनाथ सिंह

Source: India TV, Dt. 08 May 2025,
URL: https://www.indiatv.in/india/national/hearty-congratulations-to-indian-army-for-carrying-out-operation-sindoor-with-precision-said-defence-minister-rajnath-singh-drdo-event-2025-05-08-1133582

रक्षा मंत्री राजनाथ सिंह ने ऑपरेशन सिंदूर को अंजाम देने के लिए भारतीय सेना के पराक्रम की सराहना की और कहा कि भारतीय सेना ने जिस तरह का शौर्य दिखाया उसके लिए बधाई। वे राजधानी दिल्ली में डीआरडीओ के नेशनल क्वालिटी कॉन्क्लेव में बोल रहे थे।

हम सबके लिए गर्व का विषय

राजनाथ सिंह ने कहा कि भारतीय सेना ने जिस तरह से पाकिस्तान और पाक के कब्जे वाले कश्मीर में आतंकी ठिकानों को ध्वस्त किया है यह हम सबके लिए गर्व का विषय है। डीआरडीओ में किस तरह के क्वालिटी का काम होता है उसका नमूना हमने कल देखा। जिस तरह से ऑपरेशन सिंदूर को सटीकता से अंजाम दिया गया वह काबिले तारीफ है।

आतंकी ठिकानों को नेस्तनाबूद किया

रक्षा मंत्री ने कहा कि हमारी आर्म्ड फोर्सेज ने कल जो कार्रवाई की है, जो शौर्य और पराक्रम दिखाया है, उसके लिए उन्हें बधाई देता हूं। पाकिस्तान और PoK में, जिस तरह से हमारी आर्म्ड फोर्स ने आतंकी ठिकानों को नेस्तनाबूद किया है, वह हम सबके लिए गर्व का विषय है।

क्वालिटी की क्या भूमिका होती है, इसका नमूना हमने देखा

उन्होंने कहा, "क्वालिटी की क्या भूमिका होती है, यह क्या रोल अदा करती है, इसका एक नमूना हमने कल देखा। जिस सटीकता के साथ, 'ऑपरेशन सिंदूर' को अंजाम किया गया, वह सराहनीय रहा। इसमें 9 आतंकी कैप तबाह हुए, और अच्छी–ख़ासी संख्या में आतंकी मारे गए। जिस तरह से इस ऑपरेशन को, किसी भी निर्देष को नुकसान पहुंचाए बिना, minimum collateral damage के साथ अंजाम दिया गया, वह इसलिए सम्भव हो पाया, क्योंकि हमारी formidable and professionally trained Armed forces के पास, equipment भी high quality के थे।'

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Operation Sindoor was successfully executed because our formidable & professionally-trained Armed Forces were equipped with high-quality equipment, says Raksha Mantri at National Quality Conclave 2025

Source: Press Information Bureau, Dt. 08 May 2025,
URL: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2127735

"Operation Sindoor was successfully executed because our formidable & professionally-trained Armed Forces were equipped with high-quality equipment," said Raksha Mantri Shri Rajnath Singh while addressing the National Quality Conclave in New Delhi on May 08, 2025. Raksha Mantri commended the precision with which the Armed Forces executed the operation without harming any innocent person and with minimum collateral damage, terming it as unimaginable and a matter of great pride for the nation.

"In Operation Sindoor, nine terror camps were destroyed in Pakistan & PoK, and a good number of terrorists were killed. It shows the crucial role 'quality' plays in securing national interests," said Shri Rajnath Singh.

Raksha Mantri asserted that India has always played the role of a responsible nation exercising great restraint and it believes in resolving issues through dialogue, however, if anyone tries to take advantage of this restraint, they will face 'quality action'. He assured the nation that no limit will become an obstacle for the Government in protecting India's sovereignty. "We are fully prepared for such responsible responses in the future as well," he said.

Sharing his views on the theme of the conclave 'Fast-tracking of Quality Assurance through Integrated Approach and Technology Enabled Processes', Shri Rajnath Singh stated that fast-tracking quality assessment is the need of the hour in view of the disruptive changes and new transformations being witnessed in the defence sector across the globe.

Raksha Mantri voiced the Government's emphasis on the empowerment of the defence production sector since 2014, based on Prime Minister Shri Narendra Modi's philosophy of Defence Sovereignty. He said: "Defence Sovereignty means that until a country is capable and self-reliant in its defence needs, its independence cannot be considered complete. If we buy weapons and other defence equipment from abroad, we are outsourcing our security and leaving it at the mercy of someone else. Our government thought over it seriously and took a decisive step to achieve self-reliance. The expanding defence industrial ecosystem is providing an unprecedented strength to India".

Shri Rajnath Singh added that equal emphasis is being laid on quality and quantity in defence production with many revolutionary steps being taken in that direction, including corporatisation of Ordnance Factory Board (OFB). He termed Quality as the Government's priority Reform Agenda, highlighting that since the corporatisation of OFB, DPSUs have become internationally competitive and export-oriented, with efforts being made to advance quality production.

Raksha Mantri pointed out that one of the objectives behind the progress of the public sector has been to develop a Healthy Competitive Private Defence Ecosystem, which will strengthen India's security through quality. "In today's world, a strong brand value is important than just a product. The brand, which assures consistent quality and reliability, succeeds," he said.

Shri Rajnath Singh appealed to the Armed Forces, Government QA agencies, DPSUs, private industry, research institutions, academia, and MSME representatives present on the occasion to build a world-leading state-of-the-art Brand India. "Brand India means if an Indian company has promised something, it will definitely happen. 'Whenever in doubt, go for India' should be our USP," he said.

On the major changes being witnessed in the global order, Raksha Mantri stated that when developed countries move towards re-armament, the demand for arms & equipment will increase. He cited the report of Stockholm International Peace Research Institute which said that the world military expenditure has reached $ 2,718 billion in 2024. He expressed hope that with coordinated efforts, the Indian defence manufacturing sector can make its mark globally with the Brand India philosophy. "Defence exports crossed the record figure of about Rs 24,000 crore in Financial Year 2024-25. Our aim is to increase the figure to Rs 50,000 crore by 2029. The target is to make India a developed nation and the world's largest defence exporter by 2047. To achieve the goal, we must develop global trust regarding the quality of our defence equipment," he said.

While Shri Rajnath Singh acknowledged the efforts being made towards quality improvement, he stressed on the need to focus on using tools such as artificial intelligence, internet of things, and machine learning for real-time quality monitoring in today's technology-driven era. He also called for updating standards and testing protocols to align with evolving global technologies. We need to focus on time-bound quality assurance clearances so that unwanted delays do not take place, he said.

Raksha Mantri added that quality assessment agencies should always keep an eye on their deficiencies and work on overcoming them through modernisation and development of testing infrastructure. Continuous gap analysis in the field of niche technology will be an essential step, he said.

Organised by the Directorate General of Quality Assurance (DGQA) under the aegis of Department of Defence Production, the conclave underscored the need to transition from legacy QA models to predictive, data-driven, and automated systems. Experts called for seamless collaboration across stakeholders to accelerate certification timelines, streamline inspections, and embed real-time quality oversight into defence production.

Secretary (Defence Production) Shri Sanjeev Kumar spotlighted the role of innovation and industry collaboration in making India a leading defence exporter. In a transparent and interactive Open House session, he addressed queries from defence industry representatives and user agencies, reinforcing the Ministry's resolve to simplify, digitalise, and modernise QA systems.

Key Highlights & Announcements

- A landmark session introduced the Industry 4.0/QA 4.0 Roadmap, developed jointly by DGQA and industry partners. It includes deployment of smart technologies like Internet of Things-enabled test benches, automated data capture, digital dashboards, and AI-powered analytics—aimed at reducing human error, enhancing efficiency, and enabling continuous quality monitoring across defence product life-cycles.
- The Draft Indian Military Airworthiness Bill was formally presented for final inputs. The Bill, crafted through an inclusive process involving multiple stakeholders, including MoD, DRDO, Services, DPSUs, and industry, proposes a statutory framework for the certification of military aircraft and airborne systems. A dedicated interactive session captured final feedback from user representatives and industry forums.
- A dedicated session explored strategies to boost the indigenous development of Explosives and Ordnance (E&O) stores. Experts examined the role of emerging technologies - AI/ML, Big Data, Additive Manufacturing, Silicon Photonics, Semiconductors, and Advanced Materials—in modernising E&O production, safety validation, and certification. The session reinforced the need for technological self-reliance in critical munitions and precision systems.

The National Quality Conclave 2025 concluded with a united commitment from all stakeholders to redefine defence QA as a strategic enabler, not just of compliance, but of national security, export capability, and indigenous innovation. The outcomes of the conclave are expected to catalyse India's transformation into a global benchmark for defence quality assurance.

DG, DGQA Shri N Manoharan emphasised that the conclave had significantly strengthened the partnership between industry and defence stakeholders, while also advancing efforts toward standardisation and innovation in quality assurance.

Director General of Naval Armament Inspection Rear Admiral Rupak Barua, Director General of Aeronautical Quality Assurance Shri Sanjay Chawla, CMDs of DPSUs, senior MoD officers were also present on the occasion.

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Defence News

Defence Strategic: National/International

INS Sunayna (IOS Sagar) REturns To Kochi On Successful Completion Of Month Long Deployment

Source: Press Information Bureau, Dt. 08 May 2025,
URL: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2127730

Indian Navy's maiden initiative of Indian Ocean Ship Sagar, jointly crewed by personnel from nine IOR Navies, concluded its month long deployment in SW IOR region and returned to Kochi on 08 May 25. Vice Admiral V Srinivas, Flag Officer Commanding-in-Chief, Southern Naval Command congratulated the crew of India and nine friendly foreign countries during the grand reception ceremony held at Naval Base, Kochi.

The successful completion of the deployment marks a new chapter in maritime cooperation and underscores India's commitment to safeguarding collective maritime interests, capacity building and enduring partnership with IOR nations.

IOS Sagar was flagged off by the Hon'ble Raksha Mantri, Shri Rajnath Singh from Karwar on 05 Apr 25. During the deployment, the ship undertook port calls at Dar-es-Salaam, Nacala, Port Louis, Port Victoria and Male. The key highlights of the mission included joint naval exercises, professional & cultural exchanges and joint EEZ surveillance of key IOR nations - Tanzania, Mozambique, Mauritius & Seychelles.

Strengthening regional maritime cooperation between India and African nations, the ship participated in AIKEYME 2025 alongside INS Chennai & INS Kesari, which was jointly hosted by India and Tanzania from 13 - 18 Apr 25. The exercise provided an opportunity for the crew of lOS Sagar to participate in the joint harbour phase and interact with the participating Navies. At Mozambique, a range of collaborative activities and community engagements were held promoting operational synergy and interoperability with the Mozambique Navy.

Reinforcing the enduring bond between India and Mauritius, the crew of IOS Sagar had fruitful engagement with the Mauritius Police Force and undertook coordinated patrol with the Mauritius Coast Guard. Visit to Port Victoria, Seychelles was marked with cross deck visits, training exchange, joint Yoga sessions and maritime engagement with Seychelles Defence Force. The ship held collaborative maritime security and regional outreach mission at Maldives prior to entering Kochi. This deployment exemplifies Indian Navy's continued engagement with regional Navies and maritime security stakeholders of IOR nations to train together, exchange best practices and enhance interoperability and mutual understanding.

It was a unique experience for the 44 international crew of nine partner nations - Comoros, Kenya, Madagascar, Maldives, Mauritius, Mozambique, Seychelles, Sri Lanka and Tanzania who jointly manned the ship alongside Indian Navy crew, truly signifying the motto of 'One Ocean One Mission'.

The journey of IOS Sagar which commenced with the combined harbour and sea training phase at SNC, Kochi in Mar 25 has been truly memorable for all the crew members. The professional and seamless integration of the international crew working together as a well knit and cohesive team truly reflects the spirit of camaraderie and maritime friendship. The mission is a testament to Indian Navy's commitment as the 'First Responder' and 'Preferred Security Partner' in IOR towards the Gol's strategic vision of MAHASAGAR (Mutual and Holistic Advancement for Security Across the Region).

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Delivery Of 'Arnala'- First Anti Submarine Warfare Shallow Water Craft To The Indian Navy

Source: Press Information Bureau, Dt. 08 May 2025,
URL: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2127729

'Arnala', the first of the eight ASW SWCs (Anti-Submarine Warfare Shallow Water Craft), indigenously designed and built by Garden Reach Shipbuilders and Engineers (GRSE), Kolkata, was delivered to the Indian Navy on 08 May 25 at M/s L&T Shipyard, Kattupalli.

The warship has been designed and constructed as per the Classification Rules of Indian Register of Shipping (IRS) under a Public-Private Partnership (PPP) of GRSE with M/s L&T Shipyard, thus demonstrating the success of collaborative defence manufacturing.

Arnala is named after the historic fort 'Arnala' located off Vasai, Maharashtra, a reflection of India's rich maritime heritage. The 77 m long warship, is the largest Indian Naval warship propelled by a Diesel Engine-Waterjet combination.

The ship has been designed for underwater surveillance, search & rescue operations and Low Intensity Maritime Operations (LIMO). The ship is capable of undertaking ASW operations in coastal waters, along with advanced mine laying capabilities. The induction of ASW SWC ships would significantly boost shallow water Anti-Submarine Warfare capabilities of the Indian Navy.

Arnala's delivery is yet another milestone in the Indian Navy's quest for indigenous shipbuilding and upholding the Government's vision of 'Aatmanirbhar Bharat' with over 80% indigenous content.

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CENJOWS hosts MRSAM-India Eco-System Summit 2.0

Source: Press Information Bureau, Dt. 08 May 2025,
URL: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2127642

The Centre for Joint Warfare Studies (CENJOWS), in collaboration with Aerospace Services India (ASI) and Israel Aerospace Industries (IAI), successfully hosted the Medium-Range Surface-to-Air Missile (MRSAM) India Eco-System Summit 2.0 at the Manekshaw Centre, New Delhi on May 07, 2025. The day-long summit brought together key stakeholders from India's defence eco-system, highlighting collaborative achievements and future possibilities in enhancing the country's air & missile defence capabilities under the Aatmanirbhar Bharat and Make-in-India initiatives.

The event witnessed participation from senior representatives of the Ministry of Defence (MoD), Armed Forces, DRDO, Bharat Electronics Limited, Bharat Dynamics Limited, and leading Indian defence manufacturers. The participants voiced a shared commitment to elevate India's position as a global hub for advanced defence systems, with ASI reaffirming its vision to become India's premier defence service provider. The inaugural session was presided over by senior MoD officials and addressed by key industry leaders, focusing on the growing synergy between Indian and Israeli defence sectors. Key sessions of the summit included:

- Panel discussions on operational readiness and self-reliance in missile systems.
- Technology showcases featuring AI-powered service management systems like STORMS developed by ASI.
- Industry interactions on building India's long-term capability in indigenous defence manufacturing.

The summit emphasised the achievements of ASI-IAI's wholly-owned Indian subsidiary, which plays a critical role in providing technical representation, life-cycle support, and local manufacturing for the MRSAM system and its associated subsystems such as the BARAK 8 missile and Air Defence Fire Control Radar. It underscored the importance of establishing a resilient and future-ready air defence infrastructure through sustained collaboration, capability development, and localised innovation.

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Indian army neutralises over 50 drones launched by Pakistan in large-scale counter-drone operation

Source: The Economic Times, Dt. 09 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/indian-army-neutralises-over-50-drones-launched-by-pakistan-in-large-scale-counter-drone-operation/articleshow/121014292.cms

The Indian Army's Air Defence units on the night of Thursday neutralised over 50 drones launched by Pakistan in what official sources termed 'failed attempts' to attack various places along the Line of Control (LoC) and International Borders (IB).

The engagement involved extensive use of L-70 guns, Zu-23mm, Schilka systems, and other advanced counter-UAS equipment, sources told news agency ANI.

Pakistan attempted to target India's western borders with swarm drones, however, the bid remained unsuccessful after Indian Army's intervention.

"Yesterday night, when Pakistan made failed attempts to send swarm drones all across various places along the Line of Control (LoC) and International Borders (IB), over 50 drones were successfully neutralized during a large-scale counter-drone operation conducted by Indian Army Air Defence units in the areas of Udhampur, Samba, Jammu, Akhnoor, Nagrota, and Pathankot areas. The engagement involved extensive use of L-70 guns, Zu-23mm, Schilka systems, and other advanced counter-UAS equipment, demonstrating the Army's robust capability to counter aerial threats," ANI quoted sources as saying.

Pakistan launches air attacks along India's western borders

Amid rising hostilities, Pakistan launched an unexpected airborne assault on Thursday evening, deploying loitering munitions to strike strategic locations across Jammu and Kashmir. In response, the Indian military activated its air defence systems and engaged the incoming threats.

Late Thursday night, the Pakistan Army opened fire across the Line of Control (LoC) in the Uri, Kupwara, Tangdhar, and Karnah sectors, violating the ceasefire agreement.

According to defence sources quoted by ET, Pakistan also launched eight missiles targeting Satwari, Samba, RS Pura, and Arnia — all of which were successfully intercepted by Indian air defence units.

Jammu airport targeted; drones spotted over city

Jammu city's airport was among the main targets of the assault. While authorities have not reported any damage, the attack sparked widespread panic. Residents across Kashmir said they heard explosions and the wail of sirens.

Footage aired by local media showed suspected drones flying over Jammu, intensifying the urgency of the situation as security forces scanned the skies for additional threats.

In the immediate aftermath of the attack, a full blackout was imposed in Samba district. Jammu city also plunged into darkness, with homes, markets, and public roads enveloped in sudden silence and shadow.

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Russian, Israeli arms used to defend, launch counter-attack

Source: Hindustan Times, Dt. 09 May 2025,
URL: https://www.hindustantimes.com/india-news/russian-israeli-arms-used-to-defend-launch-counterattack-101746731967730.html

The Indian military on Thursday used a mix of Russia and Israel made weapons, and locally produced systems, to destroy missiles and drones fired by Pakistan at army and Indian Air Force bases.

The Pakistani attack unfolded in two waves, one in the intervening night of May 7 and 8, and the other on the evening of May 8.

The first wave of attacks targeted 15 cities in the country's north and west, and the second, Jammu, other parts of the Union Territory of Jammu & Kashmir, and border districts in Punjab and Rajasthan. India responded to the first wave with a counterattack on military targets in the neighbouring country, including Lahore, officials aware of the matter said.

It was also expected that it would respond to the second wave later on May 8, or early on May 9.

Indian forces used the Russian-origin S-400 Triumf air defence system, locally made Akash surface-to-air missiles, a variety of anti-drone systems and other counter-measures to defeat the incoming threats that were swiftly engaged after being detected and tracked by an integrated network of radars and, command and control systems, the officials said, asking not to be named.

Loitering ammunitions, including Harop bought from Israel, were deployed to target air defence networks in Pakistan, the people said. The Harop is a kamikaze drone or suicide drone.

India ordered five units of the S-400 missile systems from Russia for ₹39,000 crore in October 2018. The S-400 can destroy a variety of aerial threats, including enemy fighter jets, missiles and unmanned aerial systems, at a range of up to 400km. Three batteries have been inducted and deployed, but the remaining two are delayed at a time when Russia is caught in a lingering conflict with Ukraine.

The formidable air defence system, a significant capability upgrade for the IAF, has integrated radars, command and control centre and missiles that allow it to detect, track and engage targets at various height and range bands.

The Akash surface-to-air missile system, capable of intercepting high manoeuvring low radar cross-section aerial targets, was deployed to neutralise the incoming threats too.

The Pakistani missiles and drones were neutralised by the integrated counter-UAS (unmanned aerial system) grid and air defence systems, the defence ministry said, referring to the first wave. The grid and systems refer to a well-integrated network of anti-air weapons, sensors, radars and soft-kill measures to defeat incoming threats.

The debris of Pakistani weapons has been recovered from several locations.

The Harop was used on Thursday morning by the Indian forces to target air defence radars and systems at several location in Pakistan. The kamikaze drone, which has an endurance of several hours, can be used against high-value targets including air defence systems, command posts, ammunition dumps and supply depots.

"The Indian response has been in the same domain with same intensity as Pakistan. It has been reliably learnt that an air defence system at Lahore has been neutralised," the ministry added.

Pakistan's bid to escalate was negated and drew a proportionate response, it said.

The cities targeted by Pakistan on May 7 night included Awantipura, Srinagar, Jammu, Pathankot, Amritsar, Kapurthala, Jalandhar, Ludhiana, Adampur, Bathinda, Chandigarh, Nal, Phalodi, Uttarlai, and Bhuj. Fighter jets, military transport aircraft, and many military facilities and

headquarters are based in the cities that the Pakistan military sought to target, in a brazen night-long attempt to escalate tensions.

The Indian military on Wednesday launched Operation Sindoor and carried out precision strikes on terror targets in Pakistan and Pakistan-occupied Kashmir (PoK) using niche technology weapons with careful selection of warheads that ensured there was no collateral damage.

The ongoing operation is India's direct military response to the April 22 Pahalgam terror strike that killed 26 people, all men, 24 of whom were Hindus.

The weapons deployed to hit the nine terror sites included Scalp deep-strike cruise missiles that allow Rafale fighter pilots to attack ground targets from standoff ranges, the Hammer smart weapon system, guided bomb kits and M777 howitzers firing Excalibur munition. Kamikaze drones were also used strike the targets.

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India vs Pakistan tensions: How India used the Russian-built S-400 to counter Pakistan's missile threat

Source: The Economic Times, Dt. 08 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/s-400-missile-system-india-vs-pakistan-tensions-how-india-used-the-russian-built-s-400-to-counter-pakistans-missile-threat/articleshow/121004232.cms

Late on the night of 7–8 May, India's air defence forces sprang into action to intercept a major aerial assault launched by Pakistan. Using its Russian-made S-400 missile system, India neutralised multiple incoming threats aimed at critical military and civilian sites across Jammu & Kashmir, Punjab, and Rajasthan. The Defence Ministry said India remains "fully prepared to defend its sovereignty and ensure the safety of its people".

"Military stations at Jammu, Pathankot and Udhampur were targeted by Pakistani-origin drones and missiles along the International Border in Jammu and Kashmir today," a Defence Ministry spokesperson said. "The threats were swiftly neutralised using kinetic and non-kinetic capabilities in line with established standard operating procedures (SOPs)," he said, adding no casualties or material losses were reported.

In the afternoon, the Defence Ministry said Indian armed forces targeted air defence systems at several locations in Pakistan in response to Pakistani strikes on military targets at 15 sites in India.

Futhermore, during the evening hours of 8th May, several key areas under threat included the Jammu civil airport, Samba, RS Pura, Arnia and their surroundings. The Indian Air Force deployed its S-400 air defence systems — locally named 'Sudarshan Chakra' — to deflect the strikes with pinpoint accuracy.

Air Marshal Sanjeev Kapoor (Retired) on Thursday said that the S-400 missile system has made an enormous difference during the recent tensions with Pakistan.

In a self made video, Air Marshal Kapoor said Pakistan tried to target 15 Indian cities, but the S-400 system, which India bought in 2018 and received in 2021, helped prevent the attacks.

Kapoor explained that the S-400 can detect aircraft, missiles, and drones and can be deployed quickly across the country. The system has a range of 400 kilometres and can track many targets simultaneously.

Air Marshal Kapoor said, "Pakistan tried to attack 15 of our cities saved by S-400, which was purchased in 2018 and delivered in 2021. It can detect aircraft, missiles, drones, and is fully deployable within minutes and has a range of 400 Kms... It can pick up targets... It is a versatile and mobile and has been deployed suitably all across the country... It was one of the purchases that made a huge difference in our latest skirmish with Pakistan..."

Indian Army confirms attack, recovers debris

The Indian Army issued a statement detailing the attempted strike, “On the night of 07-08 May 2025, Pakistan attempted to engage a number of military targets in Northern and Western India, including Awantipura, Srinagar, Jammu, Pathankot, Amritsar, Kapurthala, Jalandhar, Ludhiana, Adampur, Bhatinda, Chandigarh, Nal, Phalodi, Uttarlai, and Bhuj, using drones and missiles. These were neutralised by the Integrated Counter UAS Grid and Air Defence systems. The debris of these attacks is now being recovered from a number of locations that prove the Pakistani attacks.”

According to defence officials cited by CNN-News18, India’s S-400 systems played a central role in intercepting the barrage. This marks the first known combat use of the S-400s in active defence since their induction.

Retaliatory Strikes and Escalating Tensions

By early morning on 8 May, Indian armed forces responded in kind. “Today morning Indian Armed Forces targeted Air Defence Radars and systems at a number of locations in Pakistan. Indian response has been in the same domain with same intensity as Pakistan. It has been reliably learnt that an Air Defence system at Lahore has been neutralised,” the Army said.

This retaliation follows Operation Sindoor, a precision campaign launched by India on 7 May. That operation targeted nine terror sites — four in Pakistan and five in Pakistan-occupied Kashmir (PoK) — in response to the 22 April terror attack in Pahalgam, Jammu & Kashmir. Reports suggest the operation caused significant damage to the camps without civilian casualties.

What is S-400: India’s aerial shield

The S-400 Triumf, developed by Russia’s Almaz-Antey, is one of the world’s most advanced long-range surface-to-air missile systems. India signed a ₹35,000 crore (approx. $5.4 billion) deal in 2018 to procure five S-400 squadrons. Three have been deployed; two more are expected by 2026.

Each S-400 unit can simultaneously track 160 targets and engage 72. Its four missile types cover ranges from 40 km to 400 km, and can hit threats at altitudes up to 30 km. The system can destroy aircraft, cruise missiles, drones, and even intermediate-range ballistic missiles travelling at up to 4.8 km per second.

The system is fast — it activates in under five minutes. It's also highly mobile, mounted on trucks that can redeploy quickly. These traits make it a critical tool in repelling sudden or mass attacks.

Sudarsan Chakra: A modern parallel

India's Air Force calls the S-400 'Sudarshan Chakra', after the mythical weapon of Vishnu and Krishna. Known for its speed, precision and ability to destroy evil from afar, the name reflects the weapon's intended role in safeguarding Indian airspace.

In earlier IAF exercises, the system reportedly "shot down" 80 per cent of a simulated enemy aircraft formation, forcing others to turn back. This performance underscores its tactical edge and psychological deterrence. The use of the S-400 during this crisis signals a new threshold in India's military readiness. It also marks a significant escalation in India-Pakistan hostilities, with both nations openly exchanging aerial strikes over military and civilian areas.

India's swift use of high-end defence technology, paired with precision targeting during Operation Sindoor, highlights a strategic doctrine focused on rapid response and minimal collateral damage. With both sides maintaining high alert, the situation remains tense. For now, the skies may be quiet — but the ground reality signals a deeper rift that could reshape regional defence postures in the days ahead.

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Harpy drones used by Indian military to target enemy air defence systems

Source: The Economic Times, Dt. 08 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/harpy-drones-used-by-indian-military-to-target-enemy-air-defence-systems/articleshow/120996897.cms

The HARPY drones designed to attack radar systems were used by the Indian armed forces to target enemy air defence systems in Pakistan. Meanwhile, the Air Defence system at Lahore has been neutralised by Indian military drone action.

The Harpy is designed to attack radar systems and is optimised for the suppression of enemy air defences (SEAD) role. It carries a high-explosive warhead. Equipped with an Anti-Radiation (AR) seeker, HARPY can autonomously seek and strike emitting, high-value targets. The HARPY operates in deep strike missions lasting up to 9 hours, day and night, in all weather conditions, and in Global Navigation Satellite Systems (GNSS)-denied or contested battlefields.

HARPY is equipped to hunt--seek targets in a designated area, locate and identify their frequency, and autonomously pursue a strike from any direction, at shallow or steep dive profiles.

After India executed Operation Sindoor, in which nine terror sites deep inside Pakistan were destroyed, Pakistan attempted to engage a number of military targets on the night of May 7.

The military targets were engaged in Northern and Western India, including Awantipura, Srinagar, Jammu, Pathankot, Amritsar, Kapurthala, Jalandhar, Ludhiana, Adampur, Bhatinda, Chandigarh, Nal, Phalodi, Uttarlai, and Bhuj, using drones and missiles.

These were neutralised by the Integrated Counter UAS Grid and Air Defence systems. The debris of these attacks is now being recovered from a number of locations that prove the Pakistattacks.

Indian Air Force S-400 Sudarshan Chakra air defence missile systems were fired last night against targets moving towards India. The targets were successfully neutralised in the operation, multiple domain experts told ANI. An official Government confirmation is awaited.

This morning, the Indian Armed Forces targeted Air Defence Radars and systems at a number of locations in Pakistan. Indian response has been in the same domain with same intensity as Pakistan. It has been reliably learnt that an Air Defence system at Lahore has been neutralised.

Earlier, sources said that over 100 terrorists were eliminated with a series of precision strikes launched in the early hours of Wednesday. The operation, aimed at avenging the Pahalgam terror attack, remains underway, making it challenging to provide an exact casualty count of the terrorists at this stage, sources further stated.

The strikes, executed by the Indian Armed Forces, targeted nine key terror camps in Pakistan linked to Jaish-e-Mohammed (JeM), Lashkar-e-Taiba (LeT), and Hizbul Mujahideen. Four of the targets were located inside Pakistan and the remaining five were situated in Pakistan-occupied Jammu and Kashmir (PoJK). The security forces targeted four terrorist camps in Bahawalpur, Muridke, Sarjal, and Mehmoona Joya.

The five other locations in PoJK on India's target were Markaz Ahle Hadith Barnala in Bhimber, Markaz Abbas and Maskar Raheel Shahid in Kotli, Shawai Nallah Camp, and Markaz Syedna Bilal, in Muzaffarabad.

Meanwhile, Pakistan has increased the intensity of its unprovoked firing across the Line of Control using mortars and heavy calibre artillery in areas in Kupwara, Baramulla, Uri, Poonch, Mendhar and Rajouri sectors in Jammu and Kashmir.

Sixteen innocent lives have been lost, including three women and five children, due to Pakistani firing. India was compelled to respond to bring Mortar and Artillery fire from Pakistan to a halt. Indian Armed Forces reiterate their commitment to non-escalation, provided it is respected by the Pakistani military.

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MoS Defence Sanjay Seth thanks Russia for support to India in fight against terror

Source: ANI News, Dt. 09 May 2025,
URL: https://www.aninews.in/news/world/asia/mos-defence-sanjay-seth-thanks-russia-for-support-to-india-in-fight-against-terror20250509072626/

Union Minister of State for Defence Sanjay Seth attended a bilateral meeting with Russian Deputy Defense Minister Colonel General Alexander Fomin, where he thanked the Russian side for their support to India in its fight against terrorism.

Both sides also held discussion on multifaceted military and military-technical cooperation.

In a post on X, Seth said, "Today I attended a bilateral meeting with Russian Deputy Defense Minister Colonel General Alexander Fomin. In this meeting, I thanked the Government and people of Russia for Russia's support in India's fight against cross-border terrorism. Also, there was a positive discussion on multifaceted military and military-technical cooperation. In the meeting, we agreed to further deepen these relations within the framework of existing institutional mechanisms. India and Russia will continue regular consultations in the future and enhance mutual cooperation in the changing situation," he said.

Seth arrived in Moscow on Thursday and was received by Ambassador Vinay Kumar and Major General Oleg Molessev of the Russian Defence Ministry.

During his visit, Seth will participate in the 80th anniversary celebrations of the Soviet Union's victory over Nazi Germany in World War II, attend the ceremonial Victory parade on Friday, hold bilateral talks with Russian Deputy Minister of Defence Alexander Fomin, and engage with the Indian community in Moscow.

Sharing a post on X, the Indian Embassy in Moscow said, "Hon'ble Raksha Rajya Mantri Shri @SethSanjayMP was received by Ambassador @vkumar1969 and Major General Oleg Molessev of the Defence Ministry of the Russian Federation on arrival at Moscow on 8 May 2025. He will attend the Victory Day parade on 9 May, have bilateral meeting with Russian Deputy Minister of Defence Alexander Fomin, and participate in other events of the commemoration of the 80th anniversary of Victory Day."

The post added, "He will also interact with the members of the Indian community in Moscow. This visit will further deepen the Special and Privileged Strategic Partnership between India and Russia."

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Air defence system in Lahore 'neutralised' by Indian Armed Forces: What does this mean?

Source: The Indian Express, Dt. 08 May 2025,
URL: https://indianexpress.com/article/explained/air-defence-system-lahore-neutralised-what-it-means-9991044/

India Strikes Lahore Air Defence System: The government on May 8 announced that the Indian Armed Forces had "neutralised" an air defence system of Lahore.

"Today morning, Indian Armed Forces targeted Air Defence Radars and systems at a number of locations in Pakistan. Indian response has been in the same domain with same intensity as Pakistan. It has been reliably learnt that an Air Defence system at Lahore has been neutralised," the Press Information Bureau (PIB) said in a Ministry of Defence release.

India's action was in response to Pakistan's activities earlier in the day. The press release said that late on the night of May 7, "Pakistan attempted to engage a number of military targets in Northern and Western India… These were neutralised by the Integrated Counter UAS Grid and Air Defence

systems. The debris of these attacks is now being recovered from a number of locations that prove the Pakistani attacks."

The situation is rapidly developing, with the government sharing information at regular intervals.

What does it mean that an air defence system at Lahore has been neutralised? What is an "air defence system" generally, and how does it work?

What is an air defence system?

An air defence system is a series of mechanisms working in tandem to protect against enemy air strikes.

The most commonly known element of an air defence system is a surface-to-air missile (SAM) or a Ground-to-Air Missile (GTAM), which is basically a missile launched from the ground to intercept an enemy missile or aircraft. But SAM is just one component of an elaborate system. How layered the system is depends on the military capabilities of a country.

The main functions of an air defence system are identifying, tracking, and then engaging the enemy missile. Thus, radars, jammers, and air sirens are all parts of an air defence system. A radar transmits radio waves, which hit an object and come back to the radar, thus telling the radar about the incoming object.

Once a missile or aircraft has been identified, the human personnel present decide how to deal with it. This involves judging how big the incoming threat is, and which weapon system should be deployed to deal with it, where the SAM are commonly used.

A SAM can have various strike ranges. It can be launched to either hit and take down the enemy aircraft, or the ammunition the aircraft is dropping. The missile intercepts the missile or bomb or drone being dropped and makes sure it goes off in the air, before it can hit its intended target. Often, this interception happens so high up in the air that even the debris of the incoming ammunition evaporates before it can touch the ground.

Here, it is also important to understand the difference between a missile and a bomb — a missile has its own engine and follows a guided or partially guided projectile trajectory, while a bomb depends on gravity to fall down and hit its target.

Destroying a city's air defence systems is usually done as a preparation to bombing the city, or select locations within the city.

Is there anything else?

What has just been described generally falls under Active Defensive Counter Air operations. NATO in a research paper mentions two other mechanisms.

Passive Defensive Counter Air (P-DCA)

Passive Defensive Counter Air measures are used to minimise the effects enemy raids might have. "Key facilities are hardened and protected, and may be duplicated or otherwise backed up by use of redundancy.

Camouflage, Concealment and Deception may be used to prevent direct attacks on likely targets, supported by an effective civil defence organisation to provide fire-fighting, medical, rescue and recovery services," the research paper says.

Offensive Counter Air (OCA)

Then is Offensive Counter Air, which basically means compromising the enemy's strike capability "through direct action", the paper says.

Pakistan's air defence systems have weapons bought from Turkey and China in recent times (as the bigger powers would either not sell to it or were too expensive for it) along with some older weapon systems from the US and some Soviet-era weapons.

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BrahMos manufacturing unit set to be unveiled in Lucknow, will produce 80-100 missiles a year

Source: The Indian Express, Dt. 09 May 2025,
URL: https://indianexpress.com/article/political-pulse/brahmos-missile-lucknow-produce-9990818/

Built as a joint venture between the Defence Research and Development Organisation (DRDO) and Russia's NPO Mashinostroyeniya, the BrahMos supersonic cruise missiles form a crucial part of India's arsenal, with Uttar Pradesh set to be the centre of its production.

On May 11, Defence Minister Rajnath Singh will inaugurate a BrahMos missile manufacturing unit in Lucknow whose target is to produce 80 to 100 missiles annually. The unit, whose foundation stone was laid in 2021, is part of a Defence Industrial Corridor that Prime Minister Narendra Modi had announced in 2018 during the global investors' summit.

"The inauguration of the BrahMos unit worth Rs 300 crore will certainly be a big boost to the project in the state. About 1,600 hectares of land have been allotted for the defence corridor project in the first phase, with big companies having already signed MOUs. We are also in talks with BHEL for one of its units to come here," said a senior government office at Uttar Pradesh Expressways Industrial Development Authority (UPIEDA), which is the nodal agency for the project.

While about 80 acres have been allocated for the BrahMos unit, a total of 117 hectares have been allotted to 12 companies in the Lucknow node that also includes Aerolloy Technologies, whose products, officials claimed, were used in space missions such as Chandrayaan as well as in fighter aircraft.

The defence corridor, which Prime Minister Narendra Modi announced during the 2018 global investor summit in the state, has six nodes: Lucknow, Kanpur, Aligarh, Agra, Jhansi, and Chitrakoot. According to state government officials, the Adityanath government is preparing to launch the second phase of granting land parcels under the project in Aligarh. Existing land parcels in Lucknow, Kanpur and Aligarh have already been allotted. Almost half of the land bank in Jhansi, which is one of the biggest nodes with 1,000 hectares of land, has also been saturated. With

this, about 60% of the land for the total project has been allotted. At present, UP Chief Secretary Manoj Kumar Singh and a team of other top officials are camping in Greek capital Athens to attract more investment in the defence sector.

Government officials said efforts were also going on to get more investors for the Chitrakoot node in Bundelkhand and the remaining stretch in Jhansi, considering high demand for land parcels by defence sector units in Aligarh. The government, which initially earmarked 200 acres of land in the district, is now all set to offer another 200 acres in the second phase. While there were some hiccups in Agra due to restrictions in place because of the Taj Trapezium Zone — a designated area of approximately 10,400 square km around the Taj Mahal established to protect the monument from pollution — officials said the issues with land banks had been resolved.

While the units in these nodes are in different phases of completion, the inauguration of the BrahMos unit is all set to give the entire project a lift, according to officials. Apart from BrahMos Aerospace and Aerolloy Technologies in Lucknow, the other major companies that have proposed investment are Bharat Dynamics, Armoured Vehicles Nigam, Tata Technologies, Global Engineers, and WB Electronics India in Jhansi node; Adani Defence Systems & Technologies, Ananth Technologies, and Genser Aerospace in Kanpur, and Anchor Research Labs LLP and Amitec Electronics in Aligarh.

Officials said both IIT Kanpur and IIT BHU in Varanasi had been roped in as centres of excellence for the project for various research and development needs. Officials said they had already received more than Rs 28,000 crore of investment proposals for different nodes of the project and are showcasing the project for more investment as well.

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Science & Technology News

ISRO performs space 'dogfight' with twin satellites 500 kilometres above Earth, showcasing advanced orbital control

Source: The Times of India, Dt. 08 May 2025,
URL: https://timesofindia.indiatimes.com/science/isro-performs-space-dogfight-with-twin-satellites-500-kilometres-above-earth-showcasing-advanced-orbital-control/articleshow/120990430.cms

Only weeks after the United States sounded the alarm over China's mock "dogfights" in space, India has quietly pulled off a historic space manoeuvre of its own—one that marries sophisticated scientific finesse with nuanced strategic signalling.

On its SPADEX (Space Docking Experiment) mission, the Indian Space Research Organisation (ISRO) successfully executed a high-speed satellite rendezvous in space, showcasing not only technical capability but future preparedness in the new frontier of orbital defence.

ISRO turns SPADEX mission into space dogfight experiment

The SPADEX mission was first initiated to develop autonomous docking and undocking of two satellites, SDX 01 and SDX 02, effectively making it possible for spacecraft to link and unlink automatically. Such autonomy is the backbone of long-duration space missions, space station activities, and servicing satellites.

When the main mission was accomplished, ISRO engineers observed that the two satellites had almost 50% of fuel left, owing to accurate launch calibration and cautious fuel management. This created the possibility for an unintended but ambitious second phase: testing high-speed coordinated manoeuvres in orbit.

India moves closer to space warfare readiness with dogfight drill

In this makeshift extension of the mission, ISRO executed what looked like a space-based dogfight. The two satellites were manoeuvred into synchronised, high-speed contact at orbital speeds of 28,800 kmph—approximately 28 times the speed of a commercial airliner. Flying at such velocities, even the slightest miscalculation can result in disastrous consequences, and hence, this was an accomplishment of gigantic technical sophistication.

Similar to fighter jets' aerial combat training, the satellites gradually closed in on each other under controlled conditions, pushing the boundaries of orbital control, real-time communication, and autonomous control systems. Although no weapons were used, the exercise replicates the manoeuvring accuracy that would be required in future space wars.

ISRO’s orbital test reflects India’s rising role in space security

ISRO has explained the procedure in purely scientific terms, but timing and capability displayed cannot be dismissed in a global perspective. As recently as a few months back, the US Space Force went on record denouncing China as carrying out provocative orbital manoeuvres and warning against potential militarisation of space.

India's version, technologically identical, was implemented in a serene, controlled setting centred on experimentation. Nevertheless, the message is obvious: India has grown to a stage of orbital capability where it can maintain, navigate, and control satellites with tactical sophistication—abilities important for civilian and defence uses in space.

ISRO’s milestone strengthens India’s position in the space race

This manoeuvre represents a great landmark for India in the increasingly intensified global struggle to dominate space. Only a very few countries have been able to execute such near-proximity, autonomous satellite activities. India, with this move, has entered that high echelon of exclusive clubs.

Further, it strengthens India's plans for deep-space explorations, satellite service technologies, and, in the longer term, its capability to protect its assets in space from the outside world—be they natural or hostile.

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Scientists create first ‘pangenome’ of Asian rice

Source: The Hindu, Dt. 09 May 2025,
URL: https://www.thehindu.com/sci-tech/science/scientists-create-first-pangenome-of-asian-rice/article69550023.ece

Scientists have assembled a first of its kind ‘pangenome’, a kind of reference genome, by stitching together key parts of genomes from 144 varieties of wild and cultivated varieties of rice from Asia. Much like the Human Genome Project in 2003 mapped genomes from a range of individuals, expressing the genetic diversity of the human species, the rice pangenome allows researchers to develop new rice cultivars and introduce new traits for disease-tolerance as well as resilience against climate shocks.

Rice is staple for nearly two-thirds of the globe. It is the primary crop grown in India over the monsoon months of June-September. In 2024-25, India produced a record 220 million tonnes of rice over 51,000 ha with an average yield of 4.2 tonnes/ha. Several studies over the years have warned that rising temperatures due to climate change would not only affect yields but also increase arsenic uptake among several rice varieties. India’s average temperature has increased by 0.7º C since 1901. 2024 was the hottest year on record, with the average minimum temperature 0.9º C above the long-term average.

Earlier this month, the Indian Council of Agricultural Research (ICAR) announced the development of two varieties of genome-edited rice, Samba Mahsuri and MTU 1010, that reportedly promise higher yields and better drought resistance. These however are yet to be released into farmer fields.

To develop the pangenome, the scientists — nearly all associated with the Chinese Academy of Sciences — report undertaking a “deep analysis of complex gene flows” both within cultivars (domesticated) and between cultivars and wild rice, highlighting the evolutionary and domestication pathways of various rice types. This study reinforced support for the hypothesis that all Asian cultivated rice had an evolutionary origin from a wild variety called Or-IIIa, the ancestor of japonica.Asian cultivated rice (Oryza sativa L.) was domesticated from its wild progenitor O. rufipogon, and is one of the most important food crops in the world. Or-IIIa is a variant of O. Rufipogon.

While reference genomes of a species generally confine themselves to identifying the characteristic genes that make up a species, a ‘pangenome’ has the common genes as well as maps out the unique genes found in the individual rice varieties. It presents a more complete understanding of the genetic variation present in rice.Primarily using ‘PacBio high-fidelity’(HiFi) sequencing technology and computational methods, their analysis revealed 3.87 billion base pairs of novel genetic sequences absent from the single acknowledged reference genome, O sativa ssp japonica.

They identified 69,531 genes collectively spanning the pangenome, with 28,907 core genes and 13,728 wild-rice-specific genes.Population genetics studies have earlier shown that ancient japonica rice was first domesticated from the O. rufipogon group IIIa (Or-IIIa) population in

China, and that indica rice was subsequently domesticated when ancient japonica spread southward and westward in Asia and crossed with the local O. rufipogon group I (Or-I) population.

Another key finding of the study was that of the 69,531 genes identified, about 20% were specific to wild rice. These genetic resources can improve understanding of rice environmental adaptation, phenotypic plasticity and regeneration potential. “By bridging the gap between wild and cultivated rice genetics, our study opens new avenues and provides useful wild rice resources for developing superior and more productive rice varieties,” the authors note.

“These improved varieties could incorporate valuable traits from wild rice species, potentially enhancing their resilience to rapid environmental changes.”

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MDRF, U.S. researchers call for precision treatment following discovery of a new subtype of monogenic diabetes

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Scientists from the Madras Diabetes Research Foundation (MDRF), Chennai, in collaboration with Washington University School of Medicine in St. Louis, United States, have discovered a previously unrecognised subtype of Maturity-Onset Diabetes of the Young (MODY), and have called for wider access to genetic screening and precision treatment for diabetes patients, particularly in India.

The findings were presented to the media at a conference held at the MDRF here on Thursday.

MODY is a rare, inherited form of diabetes caused by mutations in a single gene, typically appearing in adolescents and young adults. While 13 MODY subtypes have been recognised to date, the newly identified variant challenges long-standing assumptions about the condition, doctors said.Gene for rare form of diabetes found

Need for genetic testing in diabetes management

Researchers say the breakthrough not only adds to scientific understanding but also underscores the urgent need to integrate genetic testing into routine diabetes care. This, they noted, could mark a turning point in improving diagnosis, treatment, and long-term disease management for thousands of individuals living with undetected or misclassified forms of monogenic diabetes.These defects primarily affect the pancreatic beta cells, which are responsible for insulin synthesis and secretion.

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The study, published in the journal — Diabetes —of the American Diabetes Association, identifies Loss of Function (LOF) mutations in the ABCC8 gene (it helps regulate insulin release in the

pancreas by controlling a channel that responds to glucose levels, allowing insulin to be released into the bloodstream, when needed), in contrast to the Gain of Function (GOF) mutations previously linked to MODY and neonatal diabetes. The new variant results in early-life hypoglycemia, followed by later-onset diabetes — a progression previously undocumented in MODY cases.

Colin G. Nichols, lead researcher, Washington University School of Medicine, highlighted in the study that the LOF mutation impairs potassium channel function in pancreatic beta cells, disrupting insulin secretion. He said the study marked the first observed switch from congenital hyperinsulinism to diabetes in maturity-onset diabetes of the young context.

Clinical implications and treatment possibilities

Radha Venkatesan, executive scientific officer, head of molecular genomics at MDRF and co-lead author, emphasised the clinical implications of this discovery. “This variant does not respond to conventional treatments such as sulphonylureas, which are effective in other MODY forms. Understanding the underlying genetic mechanism is key to guiding appropriate therapy,” she said.

V. Mohan, chairman of MDRF, reiterated the importance of incorporating genetic testing into standard diabetes diagnosis. “Many patients with MODY remain undiagnosed or misclassified as having type 1 or type 2 diabetes. This discovery strengthens the case for precision diagnosis and treatment,” he said.

The findings are based on clinical data and laboratory analysis of Indian patients. Researchers believe that expanding access to genetic testing could lead to earlier detection and more effective care for individuals with monogenic forms of diabetes.

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