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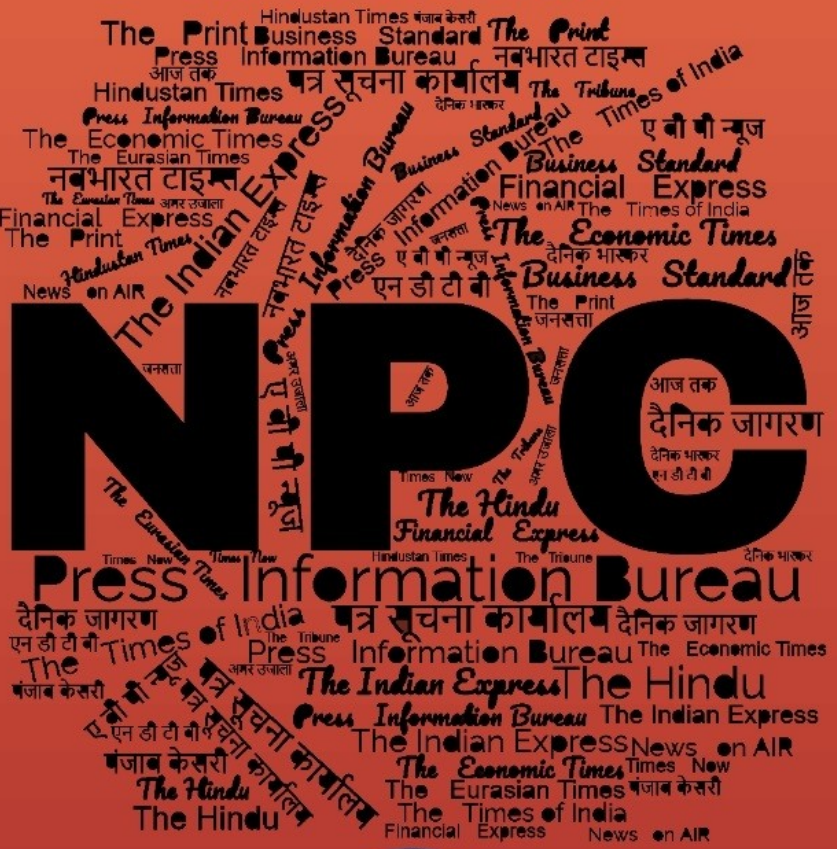
समाचार पत्रों से चयनित अंश
Newspapers Clippings

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

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



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DRDO News

DRDO अध्यक्ष डॉ समीर वी. कामत का कार्यकाल एक साल के लिए बढ़ा, अब 31 मई 2026 तक पद पर रहेंगे

Source: Aaj Tak, Dt. 27 May 2025,
URL: https://www.aajtak.in/india/news/story/drdo-chief-dr-samir-kamats-tenure-extended-again-by-1-year-ntc-rpti-2249591-2025-05-27

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के अध्यक्ष डॉ. समीर वी. कामत के कार्यकाल को एक और वर्ष के लिए बढ़ा दिया गया है. सरकार के एक आधिकारिक आदेश के अनुसार, अब वे 31 मई 2026 तक डीआरडीओ के प्रमुख पद पर बने रहेंगे. यह फैसला केंद्र सरकार की नियुक्ति समिति (Appointments Committee of the Cabinet) ने सोमवार को लिया.

यह डॉ. कामत को मिला दूसरा कार्यकाल विस्तार है. उन्हें पहले भी मई 2024 में एक वर्ष का विस्तार दिया गया था, जो 31 मई 2025 तक के लिए था. अब यह नया विस्तार 1 जून 2025 से शुरू होकर अगले वर्ष 31 मई तक प्रभावी रहेगा या जब तक कोई नया आदेश न आ जाए, जो भी पहले हो.

दरअसल, डॉ. समीर वी. कामत को डीआरडीओ में सुधार लाने वाले प्रमुख अधिकारी के रूप में जाना जाता है. वे संगठन को अधिक परिणामोन्मुखी (result-oriented) बनाने और वैज्ञानिक अनुसंधान को प्राथमिकता देने वाली सरकार की रणनीति के मुख्य कार्यान्वयनकर्ता हैं.

डॉ. कामत ने 1985 में आईआईटी खड़गपुर से मेटलर्जिकल इंजीनियरिंग में बी.टेक (ऑनर्स) किया और 1988 में अमेरिका की ओहायो स्टेट यूनिवर्सिटी से मैटेरियल्स साइंस एंड इंजीनियरिंग में पीएचडी प्राप्त की. इसके बाद उन्होंने 1989 में डीआरडीओ में वैज्ञानिक के रूप में कार्यभार संभाला.

सामरिक सामग्री विकास में अहम योगदान

डॉ. कामत ने डीआरडीओ में कई महत्वपूर्ण रक्षा सामग्री कार्यक्रमों का नेतृत्व किया. इनमें उच्च शक्ति वाले इस्पात, टाइटेनियम और निकल मिश्र धातुएं, टंगस्टन आधारित पेनिट्रेटर, फ्यूज्ड सिलिका रैडोम, सैनिकों के लिए कवच और स्टील्थ मटेरियल्स शामिल हैं. ये सभी सामग्रियां डीआरडीओ की आधुनिक रक्षा प्रणालियों में प्रयोग की जा रही हैं.

नौसैनिक तकनीकों के विकास में अग्रणी

उन्होंने नौसेना के लिए भी कई अत्याधुनिक प्रणालियों का विकास करवाया है. इनमें हल्के टॉरपीडो, एंटी-टॉरपीडो डिकोय सिस्टम, स्वचालित अंडरवॉटर वाहन, सोनार सिस्टम और पनडुब्बियों के लिए फ्यूल सेल आधारित एयर-इंडिपेंडेंट प्रपल्शन (AIP) तकनीक शामिल है.

पुरस्कार और सम्मान

डॉ. कामत भारतीय राष्ट्रीय अभियांत्रिकी अकादमी (INAE) और इंस्टीट्यूशन ऑफ इंजीनियर्स इंडिया (IEI) के फेलो हैं. उन्हें आईआईटी-खड़गपुर द्वारा डिस्टिंग्विश्ड एलुमनाई अवार्ड, इस्पात मंत्रालय से मेटलर्जिस्ट ऑफ द ईयर अवार्ड और डीआरडीओ से साइंटिस्ट ऑफ द ईयर अवार्ड भी मिल चुका है.

डॉ. कामत ने अब तक 180 से अधिक शोध पत्र अंतरराष्ट्रीय स्तर पर प्रकाशित किए हैं. उनका वैज्ञानिक दृष्टिकोण और तकनीकी नेतृत्व, डीआरडीओ को स्वदेशी रक्षा विकास की दिशा में नई ऊंचाइयों तक ले जा रहा है.

*

DRDO chief Samir V Kamat gets second one-year extension

Source: The Economic Times, Dt. 26 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/drdo-chief-samir-v-kamat-gets-second-one-year-extension/articleshow/121417639.cms?from=mdr

The Central government on Monday extended the tenure of Defence Research and Development Organisation (DRDO) chief Samir V Kamat by one more year, till May 2026. This is his second extension in the post.

A distinguished scientist, Kamat was appointed as secretary of the Department of Defence Research and Development (DDR&D) and the DRDO chairman on August 25, 2022.

He was given one-year extension on May 27 last year, which was to end this month.

The Appointments Committee of the Cabinet has approved extension of Kamat's service as DDR&D secretary and DRDO chairman under Fundamental Rule 56 (d) for a further period of one year from June 1, 2025 till May 31, 2026, or until further orders, the Personnel Ministry said.

The rule allows the Central government to extend services of incumbents on select posts in public interest.

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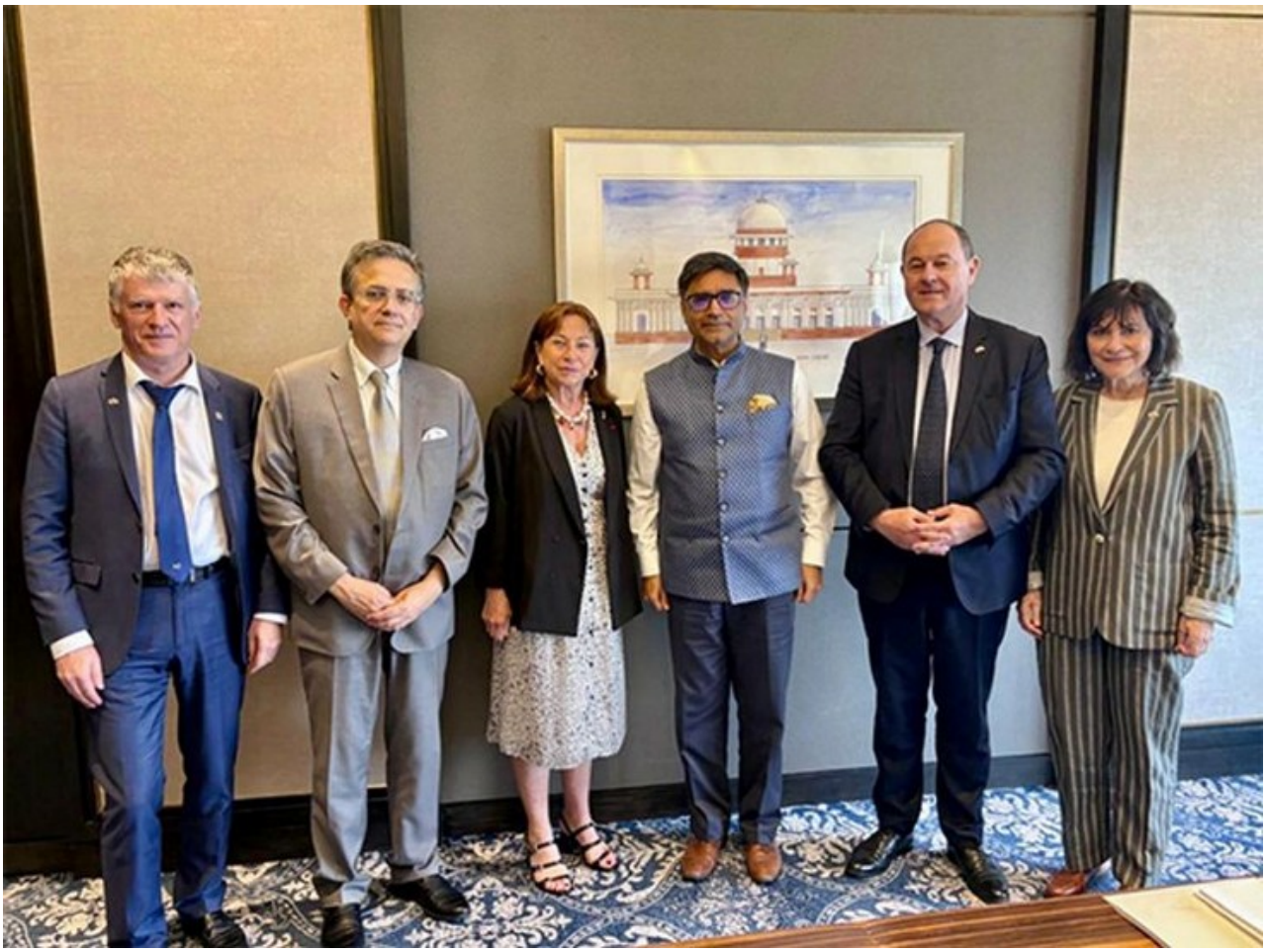
French parliamentary delegation meets DRDO chief over tech cooperation

Source: The Tribune, Dt. 27 May 2025,
URL: https://www.tribuneindia.com/news/india/french-parliamentary-delegation-meets-drdo-chief-over-tech-cooperation/

A parliamentary delegation from France has met the Defence Research and Development Organisation (DRDO) to discuss joint development and technological cooperation in line with the India-France Defence Industrial Roadmap.

A delegation of the French Senate's Standing Committee on Foreign Affairs, Defence and the Armed Forces, led by Senator Catherine Dumas, undertook an official visit to India from May 18 to 23, the French Embassy said today.



A delegation of the French Senate's Standing Committee on Foreign Affairs, Defence and the Armed Forces, led by Senator Catherine Dumas, undertook an official visit to India from May 18 to 23,

The senators met DRDO Chairman Samir V Kamat to explore opportunities for joint development and technological cooperation.

India and France are presently working on co-developing a new helicopter engine for the under-development Indian multi-role helicopter (IMRH).

Also the two are collaborating on manufacturing a jet engine for India's fifth-generation fighter jet and working on its design and development.

French major Safran and the DRDO's Aeronautical Development Agency and Gas Turbine Research Establishment have arrived at a set of specifications that comply with the India's future fighter jet requirements. India is seeking 100% transfer of technology in design, development, certification, production.

In the past, two countries have collaborated on making an engine for advanced light helicopter.

The delegation's programme began in New Delhi, where the senators held a bilateral meeting with Foreign Secretary Vikram Misri to discuss global and regional developments, defence cooperation, and the Indo-French strategic partnership. They also engaged with Indian parliamentarians from the Standing Committees on Defence and External Affairs.

The delegation visited Bengaluru-based Digantara, a leading Indian space-tech start-up and toured Thales Engineering Competence Centre, which showcases Indo-French collaboration in aerospace and defence innovation.

At Mumbai, the delegation was at Mazagon Dock Shipbuilders Ltd, a key player in India's naval sector, which built Scorpene-class submarines for the Indian Navy under transfer of technology from France's Naval Group.

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INS Vikramaditya से बराक-1 मिसाइल सिस्टम हटाकर डीआरडीओ VL-SRSAM लगाने जा रहा, जानिए इस मिसाइल खासियत

Source: Aaj Tak, Dt. 26 May 2025,
URL: https://www.aajtak.in/defence-news/story/ins-vikramaditya-to-swap-barak-1-for-drdos-vl-srsam-discover-its-key-features-dskc-2248986-2025-05-26

भारतीय नौसेना के एयरक्राफ्ट कैरियर INS विक्रमादित्य, जल्द ही अपनी हवाई रक्षा प्रणाली को और मजबूत करने जा रहा है. वर्तमान में इस विमानवाहक पोत पर इजरायल की बराक-1 मिसाइल प्रणाली तैनात है, लेकिन 2026-27 तक इसे DRDO द्वारा विकसित स्वदेशी वर्टिकल लॉन्च शॉर्ट रेंज सरफेस-टू-एयर मिसाइल (VL-SRSAM) से बदल दिया जाएगा. आइए VL-SRSAM की खासियतों और इसके महत्व को समझते हैं.

विक्रमादित्य और बराक-1

INS विक्रमादित्य भारतीय नौसेना का एक प्रमुख विमानवाहक पोत है, जो हिंद महासागर में भारत की रणनीतिक ताकत का प्रतीक है. यह पोत वर्तमान में इजरायल की बराक-1 मिसाइल प्रणाली से लैस है, जो विमानों, ड्रोन, और एंटी-शिप मिसाइलों जैसे हवाई खतरों से सुरक्षा प्रदान करती है.

बराक–1 एक पॉइंट–डिफेंस सिस्टम है, जिसका मतलब है कि यह छोटी दूरी के खतरों को नष्ट करने के लिए डिज़ाइन की गई है. यह 8–सेल कंटेनर में तैनात होती है.500 मीटर की दूरी तक हवाई खतरों को रोक सकती है. इसकी रेंज केवल 10–12 किमी है, जो आधुनिक खतरों के खिलाफ सीमित है.

2017 में भारतीय नौसेना ने बराक–1 को बदलने के लिए नए SRSAM सिस्टम की तलाश शुरू की थी, जिसमें स्वदेशी तकनीक को प्राथमिकता दी गई. VL–SRSAM इसी दिशा में एक बड़ा कदम है, जो न केवल बराक–1 से बेहतर है, बल्कि भारत की अपनी तकनीक पर आधारित है.

VL-SRSAM क्या है?

VL–SRSAM (वर्टिकल लॉन्च शॉर्ट रेंज सरफेस–टू–एयर मिसाइल) DRDO द्वारा विकसित एक स्वदेशी मिसाइल सिस्टम है, जो भारतीय नौसेना और वायु सेना के लिए डिज़ाइन किया गया है. यह मिसाइल Astra Mark 1 हवा से हवा में मार करने वाली मिसाइल पर आधारित है. इसे नौसेना के युद्धपोतों पर तैनात करने के लिए अनुकूलित किया गया है. इसका मुख्य उद्देश्य बराक–1 को बदलना और जहाजों को हवाई खतरों, जैसे विमान, ड्रोन, हेलीकॉप्टर और समुद्र–सतह पर उड़ने वाली एंटी–शिप मिसाइलों से बचाना है.

VL-SRSAM की खासियतें

VL–SRSAM कई उन्नत तकनीकों से लैस है, जो इसे बराक–1 से कहीं अधिक प्रभावी बनाती है. इसकी प्रमुख विशेषताएं हैं...

- वर्टिकल लॉन्च सिस्टम: मिसाइल को वर्टिकल लॉन्चर से लॉन्च किया जाता है, जो 360–डिग्री कवरेज देता है. यह किसी भी दिशा से आने वाले खतरे को तुरंत नष्ट कर सकता है.
- रेंज और गति: इसकी रेंज 50–80 किमी है, जो बराक–1 (10–12 किमी) से कहीं अधिक है. यह मैक 4.5 की गति (ध्वनि की गति से 4.5 गुना तेज) से उड़ती है, जिससे यह तेजी से लक्ष्य को भेद सकती है.
- नेविगेशन और गाइडेंस: मिसाइल में फाइबर–ऑप्टिक जायरोस्कोप आधारित इनर्शियल गाइडेंस (मध्य उड़ान के लिए) और एक्टिव रडार होमिंग (अंतिम चरण के लिए) का उपयोग होता है. यह लॉक–ऑन–

बिफोर–लॉन्च (LOBL) और लॉक–ऑन–आफ्टर–लॉन्च (LOAL) क्षमता के साथ डेटालिंक के माध्यम से मध्य उड़ान में अपडेट प्राप्त करती है.

- धुएं रहित प्रणोदन: मिसाइल में स्मोकलेस सॉलिड प्रोपेलेंट मोटर है, जो लॉन्च के बाद धुआं नहीं छोड़ता. इससे मिसाइल का पता लगाना मुश्किल हो जाता है.
- उच्च सटीकता: यह पिनपॉइंट सटीकता के साथ लक्ष्य को नष्ट करती है, जैसा कि 26 मार्च 2025 को चांदीपुर, ओडिशा के इंटीग्रेटेड टेस्ट रेंज (ITR) में टेस्ट में दिखा, जहां इसने कम ऊंचाई पर तेज गति के हवाई लक्ष्य को नष्ट किया.
- वजन और डिज़ाइन: मिसाइल का वजन 170 किलो, लंबाई 3.93 मीटर और व्यास 178 मिमी है. इसमें चार छोटे–पंखों वाला डिज़ाइन है, जो इसे हवा में स्थिरता देता है.
- इलेक्ट्रॉनिक काउंटरमेजर: इसमें इलेक्ट्रॉनिक काउंटर–काउंटरमेजर (ECCM) विशेषताएं हैं, जो इसे इलेक्ट्रॉनिक युद्ध में प्रभावी बनाती हैं.
- क्षमता: प्रत्येक वर्टिकल लॉन्च सिस्टम में 40 मिसाइलें (ट्विन क्वाड–पैक कनस्तर में 8 मिसाइलें) हो सकती हैं, जो जहाज के आकार के आधार पर कई लॉन्चरों में लगाई जा सकती हैं.

विशेषता	बराक-1	VL-SRSAM
मूल देश	इजरायल	भारत
रेंज	10-12 किमी	50-80 किमी
गति	मैक 2	मैक 4.5
लॉन्च सिस्टम	वर्टिकल, 8-सेल कंटेनर	वर्टिकल, 40 मिसाइलें प्रति VLS
गाइडेंस	C3I रडार, 360° कवरेज	इनर्शियल + एक्टिव रडार होमिंग, LOBL/LOAL
वजन	98 किलो	170 किलो
वारहेड	22 किलो	उच्च-विस्फोटक प्री-फॉर्म्ड फ्रैगमेंटेशन
स्टील्थ	सीमित	धुएं रहित प्रणोदन

INS विक्रमादित्य पर VL-SRSAM क्यों?

INS विक्रमादित्य पर बराक–1 को VL–SRSAM से बदलने के कई कारण हैं...

- स्वदेशीकरण: बराक–1 एक आयातित सिस्टम है, जबकि VL–SRSAM पूरी तरह से भारत में विकसित और निर्मित है, जो आत्मनिर्भर भारत के लक्ष्य को पूरा करता है.
- उन्नत तकनीक: VL–SRSAM की रेंज, गति और सटीकता बराक–1 से कहीं बेहतर है. यह आधुनिक खतरों, जैसे समुद्र–सतह पर उड़ने वाली मिसाइलों और ड्रोन को प्रभावी ढंग से नष्ट कर सकती है.

- लॉजिस्टिक सुविधा: भारतीय नौसेना विभिन्न प्रकार की SAM प्रणालियों (बराक–1, शिल–1, V601) का उपयोग करती है, जो रखरखाव और प्रशिक्षण को जटिल बनाता है. VL–SRSAM इन सभी को एकीकृत कर लॉजिस्टिक्स को सरल बनाएगी.
- दो–स्तरीय रक्षा: VL–SRSAM और बराक–8 (LRSAM/MRSAM) मिलकर नौसेना के जहाजों को दो–स्तरीय हवाई रक्षा प्रदान करेंगे, जिसमें VL–SRSAM छोटी दूरी और बराक–8 लंबी दूरी के खतरों को नष्ट करेगी.

रणनीतिक महत्व

हिंद महासागर में ताकत: INS विक्रमादित्य हिंद महासागर में भारत की रणनीतिक उपस्थिति का प्रतीक है. VL–SRSAM इसे और मजबूत बनाएगी, खासकर चीन और पाकिस्तान जैसे प्रतिद्वंद्वियों के खिलाफ.

आधुनिक खतरों से रक्षा: ड्रोन, हाइपरसोनिक मिसाइलें, और लो–एल्टीट्यूड एंटी–शिप मिसाइलें आधुनिक युद्ध में बड़े खतरे हैं. VL–SRSAM की चपलता और सटीकता इन्हें प्रभावी ढंग से रोक सकती है.

निर्यात की संभावना: VL–SRSAM की कम लागत और स्वदेशी आपूर्ति श्रृंखला इसे निर्यात के लिए आकर्षक बनाती है, जिससे भारत की रक्षा उद्योग को वैश्विक बाजार में बढ़ावा मिलेगा.

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PAK-चीन में मचेगी खलबली... DRDO करने जा रहा है सबसे खतरनाक रॉकेट लॉन्चर की टेस्टिंग

Source: Aaj Tak, Dt. 26 May 2025,
URL: https://www.aajtak.in/defence-news/story/panic-in-pakistan-china-drdo-set-to-test-the-most-dangerous-rocket-launcher-pinaka-mk-3-dskc-2249351-2025-05-26

भारत की रक्षा अनुसंधान और विकास संगठन (DRDO) ने अपने तोपखाने की ताकत को और मजबूत करने के लिए पिनाका MkIII नामक एक उन्नत गाइडेड रॉकेट सिस्टम तैयार किया है. यह रॉकेट 120 किलोमीटर की दूरी तक सटीक निशाना लगा सकता है. जल्द ही इसके परीक्षण शुरू होने वाले हैं. यह सिस्टम भारतीय सेना के लिए एक गेम–चेंजर साबित होगा, जो चीन और पाकिस्तान जैसे पड़ोसियों के लंबी दूरी के हथियारों का जवाब देगा.

पिनाका MkIII एक मल्टी–बैरल रॉकेट लॉन्चर (MBRL) सिस्टम है, जिसे DRDO की पुणे स्थित आर्मामेंट रिसर्च एंड डेवलपमेंट एस्टेब्लिशमेंट (ARDE) ने अन्य प्रयोगशालाओं के साथ मिलकर बनाया है. यह पिनाका परिवार का सबसे उन्नत संस्करण है, जो पुराने वेरिएंट्स—पिनाका MkI (40 किमी), MkII (60–90 किमी) और गाइडेड पिनाका (75–90 किमी) से कहीं बेहतर है. इसकी खासियतें हैं...

- रेंज और शक्ति: 120 किमी की रेंज और 250 किलो का वारहेड, जो दुश्मन के कमांड सेंटर, बंकर और लॉजिस्टिक्स ठिकानों को नष्ट कर सकता है.
- कैलिबर: 300 मिमी का बड़ा व्यास, जो पुराने 214 मिमी से अधिक है. यह ज्यादा ईंधन और उन्नत गाइडेंस सिस्टम को सपोर्ट करता है.
- सटीकता: DRDO के रिसर्च सेंटर इमारत (RCI) द्वारा विकसित गाइडेंस, नेविगेशन और कंट्रोल (GNC) किट, जिसमें लेजर–गायरो नेविगेशन और माइक्रोस्ट्रिप एंटीना शामिल हैं. यह 10 मीटर से कम की सटीकता (CEP) देता है, जो पुराने MkI (500 मीटर) से कहीं बेहतर है.

- लॉन्चर : मौजूदा पिनाका लॉन्चरों के साथ काम करता है, जिससे नई लागत कम होती है. प्रत्येक लॉन्चर में 8 गाइडेड रॉकेट होते हैं, जो 44 सेकंड में 700×500 मीटर क्षेत्र को नष्ट कर सकते हैं.

परीक्षण और उत्पादन

पिनाका MkIII के प्री–प्रोडक्शन यूनिट्स को सोलर इंडस्ट्रीज इंडिया लिमिटेड की सहायक कंपनी इकनॉमिक एक्सप्लोसिव्स लिमिटेड (EEL) ने बनाया है. जल्द ही इसके विकास और उपयोगकर्ता परीक्षण शुरू होंगे, जिनमें शामिल होंगे...

- 12 रॉकेट्स का टेस्ट: EEL और म्युनिशन्स इंडिया लिमिटेड (MIL) द्वारा बनाए गए रॉकेट्स को दो उन्नत पिनाका लॉन्चरों से दागा जाएगा.
- पैरामीटर्स: रेंज, सटीकता, स्थिरता और सैल्वो मोड में फायरिंग रेट की जांच.
- कमांड–एंड–कंट्रोल: मौजूदा सिस्टम के साथ एकीकरण और युद्ध जैसी परिस्थितियों में प्रदर्शन.

ये संयुक्त परीक्षण पिछले गाइडेड पिनाका के सफल परीक्षणों (नवंबर 2024) पर आधारित हैं, जिसमें 75 किमी से अधिक रेंज और 10 मीटर की सटीकता साबित हुई थी. यह दृष्टिकोण सिस्टम को जल्द से जल्द सेना में शामिल करने में मदद करेगा.

स्वदेशीकरण और सोलर इंडस्ट्रीज की भूमिका

पिनाका MkIII का निर्माण DRDO और सोलर इंडस्ट्रीज के बीच साझेदारी का नतीजा है. सोलर इंडस्ट्रीज ने ट्रांसफर ऑफ टेक्नोलॉजी (ToT) समझौते के तहत रॉकेट्स का उत्पादन किया है. इसने पहले भी पिनाका MkI और गाइडेड पिनाका के लिए सफलतापूर्वक रॉकेट्स बनाए हैं, जैसे 2020 और 2021 में हुए टेस्ट. यह साझेदारी आत्मनिर्भर भारत अभियान को मजबूत करती है, क्योंकि यह स्वदेशी तकनीक पर निर्भर है.

रणनीतिक महत्व

पिनाका MkIII का विकास दक्षिण एशिया की बदलती सुरक्षा स्थिति को ध्यान में रखकर किया गया है...

- चीन और पाकिस्तान का जवाब: चीन के 300 मिमी PHL-03 (70-130 किमी) और पाकिस्तान के A-100 (120 किमी) रॉकेट सिस्टम्स ने भारत के लिए लंबी रेंज की जरूरत को बढ़ाया है. 2021 में भारतीय सेना ने 120 किमी और 300 किमी पिनाका वेरिएंट्स को मंजूरी दी थी.
- लद्दाख और कारगिल में प्रभावी: इसका सटीक गाइडेंस सिस्टम पहाड़ी इलाकों में दुश्मन के ठिकानों को नष्ट करने में कारगर है.
- लागत प्रभावी: मौजूदा लॉन्चरों के साथ और स्वदेशी डिज़ाइन से रखरखाव और लॉजिस्टिक्स आसान और सस्ता होगा.
- भविष्य की योजनाएं: DRDO 200-300 किमी रेंज वाले वेरिएंट पर भी काम कर रहा है, जो पिनाका को शॉर्ट-रेंज बैलिस्टिक मिसाइल की श्रेणी में ला सकता है.

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BrahMos hit Bulls Eye: अंडमान में हुए ब्रह्मोस मिसाइल के परीक्षण

Source: Aaj Tak, Dt. 26 May 2025,
URL: https://www.aajtak.in/defence-news/story/brahmos-hits-bulls-eye-andaman-test-shows-pinpoint-accuracy-like-it-shredded-pakistan-dskc-2248935-2025-05-26

भारत ने अंडमान सागर से ब्रह्मोस सुपरसोनिक क्रूज मिसाइल के विस्तारित रेंज (Extended Range) वाले संस्करण का सफल परीक्षण किया. इस परीक्षण में मिसाइल ने बिना वारहेड के वर्टिकल स्टीप डाइव (90 डिग्री कोण पर गोता) मोड में लक्ष्य को सटीकता से भेदा. यह उपलब्धि भारत की रक्षा क्षमता को और मजबूत करती है, खासकर पहाड़ी इलाकों और छिपे हुए ठिकानों को निशाना बनाने में. इस मिसाइल ने इसी तरह से पाकिस्तान में मौजूद आतंकी ठिकानों को बर्बाद किया था.

ब्रह्मोस मिसाइल क्या है?

ब्रह्मोस एक सुपरसोनिक क्रूज मिसाइल है, जिसे भारत के रक्षा अनुसंधान और विकास संगठन (DRDO) और रूस ने मिलकर बनाया है. 1998 में स्थापित ब्रह्मोस एयरोस्पेस इस परियोजना का नेतृत्व करता है. इसका पहला परीक्षण 2001 में हुआ था. तब से यह भारतीय सेना, नौसेना और वायुसेना में शामिल हो चुकी है.

- गति: मैक 2.8-3.5 (लगभग 3430-4300 किमी/घंटा).
- रेंज: सामान्य संस्करण में 290 किमी, विस्तारित रेंज में 450-800 किमी.
- वॉरहेड: 200-300 किलोग्राम (पारंपरिक या परमाणु).
- लॉन्च प्लेटफॉर्म: जमीन, समुद्र, हवा (सुखोई-30 MKI) और पनडुब्बी.
- विशेषताएं: 'फायर एंड फॉरगेट' सिद्धांत, कम रडार सिग्नेचर और सटीक निशाना.

ब्रह्मोस का डिज़ाइन रूस की P-800 ओनिक्स मिसाइल पर आधारित है, लेकिन इसमें भारतीय तकनीक और मार्गदर्शन प्रणाली शामिल की गई है. यह मिसाइल अपनी तेज गति और सटीकता के कारण दुश्मन के रक्षा तंत्र को भेदने में सक्षम है.

वर्टिकल स्टीप डाइव मोड क्या है?

वर्टिकल स्टीप डाइव मोड ब्रह्मोस की एक खास क्षमता है, जिसमें मिसाइल लगभग 90 डिग्री के कोण पर लक्ष्य की ओर गोता लगाती है. यह तकनीक इसे पहाड़ी इलाकों, गुफाओं और छिपे हुए ठिकानों को निशाना बनाने में सक्षम बनाती है. सामान्य क्रूज मिसाइलें समतल या कम कोण पर उड़ती हैं, लेकिन स्टीप डाइव मोड में मिसाइल ऊपर से सीधे लक्ष्य पर हमला करती है, जिससे बचाव मुश्किल हो जाता है.

5 सितंबर 2010 को ब्रह्मोस ने पहली बार सुपरसोनिक गति में स्टीप–डाइव मोड का विश्व रिकॉर्ड बनाया था. तब से इसकी क्षमता को और उन्नत किया गया है. अब यह 90 डिग्री तक गोता लगा सकती है. हाल के परीक्षण में, अंडमान सागर से लॉन्च की गई मिसाइल ने बिना वारहेड के लक्ष्य को सटीकता से भेदा, जो इसकी उन्नत मार्गदर्शन प्रणाली और सटीकता को दर्शाता है.

टेस्ट का महत्व

- पिनपॉइंट सटीकता: मिसाइल ने लक्ष्य को बुल्स–आई सटीकता (1 मीटर CEP) के साथ नष्ट किया, जो इसकी विश्वसनीयता को दर्शाता है.
- विस्तारित रेंज: भारत के 2016 में मिसाइल टेक्नोलॉजी कंट्रोल रेजिम (MTCR) में शामिल होने के बाद, ब्रह्मोस की रेंज 290 किमी से बढ़कर 450–800 किमी हो गई है.
- पहाड़ी इलाकों में प्रभावी: स्टीप डाइव मोड इसे पहाड़ी क्षेत्रों में छिपे ठिकानों को नष्ट करने में सक्षम बनाता है, जो भारत की पूर्वोत्तर सीमाओं, जैसे अरुणाचल प्रदेश और लद्दाख में रणनीतिक रूप से महत्वपूर्ण है.
- आत्मनिर्भरता: यह टेस्ट भारत के स्वदेशी रक्षा उद्योग की ताकत को दर्शाता है, जिसमें उन्नत नेविगेशन सिस्टम और सॉफ्टवेयर शामिल हैं.

अंडमान सागर में टेस्ट क्यों?

अंडमान और निकोबार द्वीप समूह भारत का एक रणनीतिक क्षेत्र है, जो हिंद महासागर में महत्वपूर्ण है. यहां लंबी दूरी का टेस्ट रेंज उपलब्ध है, जो मुख्य भूमि पर सीमित है. 2014 और 2022 में भी अंडमान सागर से ब्रह्मोस का

टेस्ट किया गया, जिसमें इसने 290 किमी की दूरी पर लक्ष्य को सटीकता से नष्ट किया. इस बार बिना वारहेड के टेस्ट ने मिसाइल की सटीकता और विश्वसनीयता को फिर से साबित किया.

रणनीतिक महत्व

- चीन और पाकिस्तान के लिए जवाबी क्षमता: विस्तारित रेंज के साथ, ब्रह्मोस अब पाकिस्तान और चीन के गहरे क्षेत्रों में लक्ष्य को नष्ट कर सकती है, जिससे भारत की जवाबी हमले की क्षमता बढ़ती है.
- पहाड़ी युद्ध के लिए उपयोगी: अरुणाचल प्रदेश और लद्दाख जैसे क्षेत्रों में, जहां दुश्मन छिपे हुए ठिकानों का उपयोग कर सकते हैं, स्टीप डाइव मोड इसे प्रभावी बनाता है.
- नौसेना की ताकत: भारतीय नौसेना के युद्धपोत, जैसे INS राजपूत और INS तेग, ब्रह्मोस से लैस हैं, जो समुद्र और जमीन दोनों पर लक्ष्य को नष्ट कर सकते हैं.
- ऑपरेशन सिंदूर: मई 2025 में ऑपरेशन सिंदूर के दौरान ब्रह्मोस का उपयोग किया गया, जिसमें पाकिस्तान के सैन्य ठिकानों पर सटीक हमले किए गए.

भविष्य की योजनाएं

- 90-डिग्री स्टीप डाइव: ब्रह्मोस जल्द ही 90-डिग्री स्टीप डाइव क्षमता हासिल कर लेगी, जो इसे और घातक बनाएगी.
- ब्रह्मोस-एनजी और ब्रह्मोस-II: हाइपरसोनिक ब्रह्मोस-II (मैक 7-8) और हल्की ब्रह्मोस-एनजी का विकास जारी है, जो तेजस जैसे हल्के लड़ाकू विमानों से लॉन्च की जा सकेगी.
- निर्यात की संभावना: भारत वियतनाम, यूएई और अन्य देशों को ब्रह्मोस निर्यात करने की योजना बना रहा है.

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Defence News

Defence Strategic: National/International

Raksha Mantri reviews performance of eight DPSUs in meeting with CMDs in New Delhi

Source: Press Information Bureau, Dt. 26 May 2025,
URL: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2131431

Raksha Mantri Shri Rajnath Singh held a review meeting with CMDs of eight Defence Public Sector Undertakings (DPSUs) at South Block, New Delhi on May 26, 2025. Raksha Mantri commended the role of the entire defence industry, including DPSUs, in developing platforms and technologies that demonstrated the preparedness of the Indian Armed Forces during Operation Sindoor. He emphasised that the Government, led by Prime Minister Shri Narendra Modi, remains

committed to strengthening the defence industrial base and enhancing the competitiveness of the DPSUs.

In view of the prevailing geopolitical scenario and the recent developments, Shri Rajnath Singh directed the DPSUs to enhance their production on latest technologies with more focus on research and development in the emerging fields of modern warfare. During the meeting, Secretary (Defence Production) Shri Sanjeev Kumar presented the growth statistics of the DPSUs highlighting their steadfast performance. The value of production is poised to be more than Rs 1,40,000 crore for Financial Year 2024-25, out of which around 78% would be contributed by DPSUs.

Raksha Mantri appreciated the increase in the value of production by DPSUs, however, exhorted them to focus on timely delivery of products to the Armed Forces as well as their other customers. He emphasised the role of DPSUs in increasing exports and directed them to increase their focus on better marketing of their products. Raksha Mantri congratulated Hindustan Aeronautics Limited (HAL) on getting the Maharatna status and Mazagon Dock Shipbuilders Limited (MDL) on getting the Navratna Status.

CMDs of eight DPSUs - HAL, MDL, Bharat Electronics Limited, Bharat Dynamics Limited, Mishra Dhatu Nigam Limited (MIDHANI), Garden Reach Shipbuilders and Engineers Limited (GRSE), Goa Shipyard Limited (GSL) & BEML Limited - presented the cheques for interim dividend on equity shares held by the Government for Rs 2,138 crore for the Financial Year 2024-25.

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‘Make in India’ defence boost: Advanced version of Brahmos missile may be manufactured in Uttar Pradesh; India & Russia begin talks

Source: The Time of India, Dt. 26 May 2025,
URL: https://timesofindia.indiatimes.com/business/india-business/make-in-india-defence-boost-advanced-version-of-brahmos-missile-may-be-manufactured-in-uttar-pradesh-india-russia-begin-talks/articleshow/121408856.cms

‘Make in India’ boost for defence sector: India and Russia are in discussions for manufacturing an advanced version of the BrahMos supersonic cruise missile, following its success in India’s Operation Sindoor against Pakistan. The advanced version of the BrahMos, which is a jointly manufactured missile by India and Russia, is expected to be made at the latest unit in Uttar Pradesh. Sources told ET that the recently opened BrahMos manufacturing unit in Uttar Pradesh has been selected to produce these advanced missiles. The facility is expected to undertake large-scale production of these sophisticated weapons systems.

The financial daily reported that Russia has offered comprehensive technical assistance to co-produce the upgraded BrahMos missile version in India. Preliminary talks between the two countries have already commenced on this matter, the report said.

BrahMos in Operation Sindoor

BrahMos, the supersonic missile, has proven that it cannot be intercepted by all existing air defence mechanisms, including those operated by Chinese and Pakistani forces, the report said. The missile's remarkable capability allows it to cover a distance of 300 km in mere minutes, with significant potential to damage runways. India has developed multiple variants of BrahMos, which includes land-to-land, land-to-ship, and ship-to-land configurations.

The SU-30 MKI aircraft launched BrahMos missiles on May 10, successfully impacting the northern command and control network at Nur Khan airbase. The BrahMos missiles demonstrated significant effectiveness in targeting terror installations and countering Pakistani initiatives. A new BrahMos Aerospace facility has been established in Lucknow, constructed on 80 hectares of land provided without cost by the government, with a total investment of ₹300 crore. The complex comprises a primary PTC anchor unit alongside seven auxiliary facilities.

Defence Minister Rajnath Singh and Uttar Pradesh Chief Minister Yogi Adityanath formally opened the facility on May 11. During the ceremony, the UP CM highlighted BrahMos missile's achievements in Operation Sindoor. "You must have seen a glimpse of the BrahMos missile during Operation Sindoor. If you didn't, then just ask the people of Pakistan about the power of the BrahMos missile," he had said on the occasion. In 2018, Prime Minister Narendra Modi had announced the establishment of two Defence Industrial Corridors, with one situated in Uttar Pradesh and another in Tamil Nadu. These corridors form an integral component of the 'Make in India' and 'Atmanirbhar Bharat' programmes, designed to minimise reliance on foreign defence imports whilst encouraging domestic manufacturing capabilities.

Within the UP Defense Industrial Corridor, 57 investors have received land allocations, with manufacturing units at different developmental phases. These industrial establishments correspond to a concrete investment of ₹9462.8 crore and are projected to create direct job opportunities for 13,736 individuals. It is significant that since the initial land lease agreement in June 2021, the corridor has witnessed remarkable progress, with 57 industries actively establishing their facilities in under four years.

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India and Pakistan's drone battles mark new arms race in Asia

Source: The Economic Times, Dt. 27 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/india-and-pakistans-drone-battles-mark-new-arms-race-in-asia/articleshow/121426191.cms

A little after 8:00 pm on May 8, red flares streaked through the night sky over the northern Indian city of Jammu as its air-defence systems opened fire on drones from neighbouring Pakistan. The Indian and Pakistani militaries have deployed high-end fighter jets, conventional missiles and artillery during decades of clashes, but the four days of fighting in May marked the first time New Delhi and Islamabad utilized unmanned aerial vehicles at scale against each other.

The fighting halted after the U.S. announced it brokered a ceasefire but the South Asian powers, which spent more than $96 billion on defence last year, are now locked in a drones arms race, according to Reuters' interviews with 15 people, including security officials, industry executives and analysts in the two countries.

Two of them said they expect increased use of UAVs by the nuclear-armed neighbours because small-scale drone attacks can strike targets without risking personnel or provoking uncontrollable escalation. India plans to invest heavily in local industry and could spend as much as $470 million on UAVs over the next 12 to 24 months, roughly three times pre-conflict levels, said Smit Shah of Drone Federation India, which represents over 550 companies and regularly interacts with the government.

The previously unreported forecast, which came as India this month approved roughly $4.6 billion in emergency military procurement funds, was corroborated by two other industry executives. The Indian military plans to use some of that additional funding on combat and surveillance drones, according to two Indian officials familiar with the matter. Defence procurement in India tends to involve years of bureaucratic processes but officials are now calling drone makers in for trials and demonstrations at an unprecedented pace, said Vishal Saxena, a vice president at Indian UAV firm ideaForge Technology.

The Pakistan Air Force, meanwhile, is pushing to acquire more UAVs as it seeks to avoid risking its high-end aircraft, said a Pakistani source familiar with the matter. Pakistan and India both deployed cutting-edge generation 4.5 fighter jets during the latest clashes but cash-strapped Islamabad only has about 20 high-end Chinese-made J-10 fighters compared to the three dozen Rafales that Delhi can muster.

Pakistan is likely to build on existing relationships to intensify collaboration with China and Turkey to advance domestic drone research and production capabilities, said Oishee Majumdar of defence intelligence firm Janes. Islamabad is relying on a collaboration between Pakistan's National Aerospace Science and Technology Park and Turkish defence contractor Baykar that locally assembles the YIHA-III drone, the Pakistani source said, adding a unit could be produced domestically in between two to three days.

Pakistan's military declined to respond to Reuters' questions. The Indian defence ministry and Baykar did not return requests for comment. India and Pakistan "appear to view drone strikes as a way to apply military pressure without immediately provoking large-scale escalation," said King's College London political scientist Walter Ladwig III.

"UAVs allow leaders to demonstrate resolve, achieve visible effects, and manage domestic expectations - all without exposing expensive aircraft or pilots to danger," he added. But such skirmishes are not entirely risk-free, and Ladwig noted that countries could also send UAVs to attack contested or densely populated areas where they might not previously have used manned platforms.

Drone Swarms And Vintage Guns

The fighting in May, which was the fiercest in this century between the neighbours, came after an April 22 militant attack in the disputed Himalayan region of Kashmir that killed 26 people, mostly

Indian tourists. Delhi blamed the killings on "terrorists" backed by Islamabad, which denied the charge. Indian Prime Minister Narendra Modi vowed revenge and Delhi on May 7 launched air strikes on what it described as "terrorist infrastructure" in Pakistan.

The next night, Pakistan sent hordes of drones along a 1,700-kilometer (772-mile) front with India, with between 300 and 400 of them pushing in along 36 locations to probe Indian air defences, Indian officials have said. Pakistan depended on Turkish-origin YIHA-III and Asisguard Songar drones, as well as the Shahpar-II UAV produced domestically by the state-owned Global Industrial & Defence Solutions conglomerate, according to two Pakistani sources.

But much of this drone deployment was cut down by Cold War-era Indian anti-aircraft guns that were rigged to modern military radar and communication networks developed by state-run Bharat Electronics, according to two Indian officials. A Pakistan source denied that large numbers of its drones were shot down on May 8, but India did not appear to sustain significant damage from that drone raid.

India's use of the anti-aircraft guns, which had not been designed for anti-drone-warfare, turned out to be surprisingly effective, said retired Indian Brig. Anshuman Narang, now an UAV expert at Delhi's Centre for Joint Warfare Studies. "Ten times better than what I'd expected," he said.

India also sent Israeli HAROP, Polish WARMATE and domestically-produced UAVs into Pakistani airspace, according to one Indian and two Pakistan sources. Some of them were also used for precision attacks on what two Indian officials described as military and militant infrastructure. The two Pakistani security sources confirmed that India deployed a large number of the HAROPs - a long-range loitering munition drone manufactured by Israel Aerospace Industries. Such UAVs, also known as suicide drones, stay over a target before crashing down and detonating on impact.

Pakistan set up decoy radars in some areas to draw in the HAROPs, or waited for their flight time to come towards its end, so that they fell below 3,000 feet and could be shot down, a third Pakistani source said. Both sides claim to have notched victories in their use of UAVs. India successfully targeted infrastructure within Pakistan with minimal risk to personnel or major platforms, said KCL's Ladwig.

For Pakistan's military, which claimed to have struck Indian defence facilities with UAVs, drone attacks allow it to signal action while drawing less international scrutiny than conventional methods, he noted.

Cheap But With An Achilles Heel

Despite the loss of many drones, both sides are doubling down. "We're talking about relatively cheap technology," said Washington-based South Asia expert Michael Kugelman. "And while UAVs don't have the shock and awe effect of missiles and fighter jets, they can still convey a sense of power and purpose for those that launch them." Indian defence planners are likely to expand domestic development of loitering munitions UAVs, according to an Indian security source and Sameer Joshi of Indian UAV maker NewSpace, which is deepening its research and development on such drones.

"Their ability to loiter, evade detection, and strike with precision marked a shift toward high-value, low-cost warfare with mass produced drones," said Joshi, whose firm supplies the Indian military. And firms like ideaForge, which has supplied over 2,000 UAVs to the Indian security forces, are also investing on enhancing the ability of its drones to be less vulnerable to electronic warfare, said Saxena.

Another vulnerability that is harder to address is the Indian drone program's reliance on hard-to-replace components from China, an established military partner of Pakistan, four Indian dronemakers and officials said. India continues to depend on China-made magnets and lithium for UAV batteries, said Drone Federation India's Shah.

"Weaponization of the supply chain is also an issue," said ideaForge's Saxena on the possibility of Beijing shutting the tap on components in certain situations. For instance, Chinese restrictions on the sale of drones and components to Ukraine have weakened Kyiv's ability to produce critical combat drones, according to the Center for Strategic and International Studies think-tank.

A spokesperson for China's Foreign Ministry said in response to Reuters' questions that Beijing has always implemented export controls on dual-use items in accordance with domestic laws and regulations as well as its international obligations. "Diversification of supply chain is a medium to long term problem," said Shah. "You can't solve it in short term."

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India-Pakistan aftershocks: Five strategic reflections to win the story

Source: The Economic Times, Dt. 26 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/india-pakistan-aftershocks-five-strategic-reflections-to-win-the-story/articleshow/121420656.cms

What came as a surprise to all of us in South Asia, is the sudden promotion of General Asim Munir as Field Marshal for having ‘defeated’ India in this conflict. He has thus increased his hold on the political, social and economic fields in Pakistan. Furthermore, considering the dislike of the Pakistani people for their politicians, they are perhaps happy to support Munir as the defacto ruler of Pakistan. His continuation in power will mean a regular conflict with India under their “bleed India by 1000 cuts doctrine”. Thus they will use this path to remain in power and continue with the false perception of claiming victory.

If one looks at India’s recent military response to Pakistan’s Military-backed terror groups in this context, it has exposed deeper lessons for its strategic posture. While the battlefield may have yielded clear tactical success, the war of narratives, regional and global diplomacy, and long-term threat perception revealed key gaps. In this article, we distil five critical key takeaways and areas that require more serious thinking. These go beyond the immediate military gains; the episode offers deeper lessons on diplomacy, strategic communication, and regional geopolitics. As the dust settles, India must go beyond reaction and embrace a 360-degree or a no-box approach to security, diplomacy, and strategic communication.

Not Against Pakistan, But Against Terror and Its Architects

Let's be clear - India's action targeted terror infrastructure and those protecting it, not the Pakistani people. This distinction is vital. Our conflict is with those who perpetuate violence, primarily elements within the Pakistan military and its proxies who are also designated as terrorist groups under UN Security Council's Resolution1267 Sanctions namely, Jaish-e-Mohammed (JeM) and Lashkar-e-Taiba (LeT). To this geometry lets add a new faction which is yet to be designated as one by the same committee: The Resistance Front (TRF) who claimed responsibility for the Pahalgam Massacre and not the ordinary citizens. Even though they retracted soon after under the obvious pressure of the Pakistani military.

The Pakistan military benefited the most from this conflict, especially after General Asim Munir's inflammatory April 16th speech which invoked the 'two-nation theory'. It issued a veiled war call, which effectively served to protect whatever little the military was holding and to renew its mandate to dominate the Pakistani populace. Unfortunately, this nuance was won in Pakistan's national discourse, which predictably portrayed the conflict as a patriotic victory making Gen Munir a hero, which resulted in his odd promotion to a Field Marshal.

Now, India must persist in making this distinction clear, especially to the international community and Pakistan's civil society that it's not "an era of war but there would be zero tolerance towards terror". Also amplify a narrative that decoupling the Pakistani populace from its military establishment may open future doors for peace and prosperity. Not to be missed, is that many Pakistani Punjabis claim their heritage from Rajputs and Jats and speak in Punjabi language, which negates the theory that Pakistanis are descendants of Arabs and Turks.

Narrative Warfare Is the Next Frontier

Pakistan's claim of "victory" despite clear losses on the ground exposed a major Indian vulnerability: communication strategy. While India acted within the framework of Article 51 of the UN Charter and showcased operational superiority, it faltered in shaping the global and domestic discourse and perception.

Narrative warfare is no longer secondary, it is central to 21st-century conflict vis-à-vis military combat. India must build a comprehensive, integrated communications doctrine that spans traditional diplomacy, digital engagement, and media strategy. Without a timely, fact-based, and emotionally intelligent narrative, operational success risks being obscured by adversarial propaganda.

We have been able to raise the issue of terrorism at the UN, BRICS and SCO, including our Prime Minister's demand for an international convention at the UNGA. This demand should be escalated with pamphleteering about the Pakistan military's conspiracy in promoting disturbances, both within and without.

Surprisingly, no one has criticised Pakistani terrorism but just terrorism. One hopes that the ensuing seven global trips by all Party delegations from India to engage in the required communication with friendly countries would tilt the scales. We are aware that countries would respond on the lines of their national interest, rather than what we may wish them to do.

Nepal's Silence Was a Diplomatic Miss

One may recall that among the twenty-six innocent lives lost in the Pahalgam massacre was also a Nepali tourist, which should have generated regional condemnation if not global. Yet Kathmandu remained diplomatically mute. Whether this was due to internal caution or a failure on India's part to engage proactively, the outcome reflects a missed opportunity.

India's "neighbourhood first" policy needs sharper execution. Moments like these demand swift, behind-the-scenes diplomacy to build regional consensus against terrorism. A coordinated South Asian stance on cross-border terrorism is in our collective interest.

Why Doesn't Pakistan's Public Speak Out?

Terrorism has devastated Pakistan itself for a long time. For instance, the Rawalpindi school massacre in 2014, in which more than 130 children were killed brutally, remains a tragic marker of this shared trauma. Similarly, the 2009 Lahore police academy attack, and 2016 Lahore Gulshan-e-Iqbal Park bombing killing many innocent children and civilians is devastating and the list goes on. Yet, there is a conspicuous absence of public empathy from Pakistan when India suffers, though some people did speak out.

This silence stems from decades of militarised indoctrination and a political narrative that legitimises violence against India. Hillary Clinton's warning still resonates: "You can't keep snakes in your backyard and expect them only to bite your neighbours."

India must engage with Pakistan's civil society, diaspora, and intellectual class to foster a counter-narrative that challenges the status quo. Empathy must be reintroduced into the regional discourse. But first, Pakis' need to stand in one-voice against homegrown terrorism.

A Third Front Is Emerging, and this is looking alarming!

While India remains vigilant on its western and northern borders, a third vector of strategic concern is emerging in the east. Just in the wake of the recent conflict, a Turkiye-backed group in Bangladesh circulated a map of "Greater Bangladesh", incorporating Indian territories in Assam, Meghalaya, and West Bengal.

Similarly, incendiary remarks from a retired Bangladeshi Major General followed on his Facebook profile, and we quote "If India attacks Pakistan, Bangladesh should occupy the seven states of Northeastern India".

All these reflect ideological vulnerabilities and external influences that could destabilise India's eastern frontier. Turkiye, Azerbaijan, China and Pakistan are increasingly operating in a coordinated ideological axis. India must urgently recalibrate its engagement.

Proactive diplomacy with Dhaka, enhanced intelligence-sharing, and public diplomacy will be key to neutralising this threat. The goal must be clear: preserve regional stability and prevent fringe elements from dictating national narratives.

In conclusion, Pakistan's economic fragility, water stress, and internal insurgencies may tempt its military establishment to externalise internal failures through adventurism. Meanwhile, global

powers like the U.S. continue to view Pakistan as a strategic lever due to its location, despite Islamabad's consistent export of instability and terror.

India must, therefore, invest not just in kinetic capability but in resilience, regional and global partnerships, and narrative dominance. The next war may not be over land or airspace or underwater but over perception, psychology, influence, and legitimacy.

Lastly, as Operation Sindoor continues the message is simple: India will not invite a war. But if it is forced upon us, we will not only defend our borders, but we will win the story.

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Armed with fast-track funds, forces focus on desi systems

Source: The Economic Times, Dt. 27 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/armed-with-fast-track-funds-forces-focus-on-desi-systems/articleshow/121420653.cms

The armed forces are focusing on long-range weapons, jammers, air defence systems (ADS) and indigenous solutions for the 'new normal' approach against terrorism, with the Indian defence sector set to unlock its potential as several fast-track acquisitions have been initiated.

Armed with emergency funds that enable quick acquisition and delivery of weapons, the forces have drawn up a roadmap to award contracts worth thousands of crores, a large chunk of which is set to go to the private sector. As per an estimate, weapons worth ₹44,000 crore could be ordered in coming days, including ammunition for prolonged conflict.

A special focus is on 'long-range vectors'. Weapons like the Rampage and air-launched Brahmos missiles are on the radar to give India options to strike deep across the border to target terror hubs.

The forces are also looking to acquire jammers and low-level transportable radars in greater numbers in the coming months as they proved effective in thwarting large-scale drone attacks during Op Sindoor.

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India revives Rs 44,000 crore plan to build warships that can detect and destroy underwater mines

Source: The Economic Times, Dt. 26 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/india-revives-rs-44000-crore-plan-to-build-warships-that-can-detect-and-destroy-underwater-mines/articleshow/121412863.cms

India has restarted its plan to build 12 specialized warships that can detect and destroy underwater mines. These ships are critical to protect ports and maritime trade from enemy forces. The defence ministry is likely to present the proposal, worth around ₹44,000 crore, to the Defence Acquisition Council led by Defence Minister Rajnath Singh for approval, a TOI report stated.

Tender to be issued soon for Indian shipyards

According to defence ministry sources, the procurement will move ahead once the “acceptance of necessity (AoN)” is granted. An open tender or request for proposal (RFP) will then be issued, inviting Indian shipyards to submit their technical and commercial bids. “It will take at least 7-8 years, if not more, for the first MCMV to roll out after the contract is inked,” a source said.

Urgent need due to rising submarine activity

These mine countermeasure vessels (MCMVs) are considered urgent due to the regular movement of Chinese submarines in the Indian Ocean Region. Chinese nuclear and conventional submarines can lay underwater mines quietly. Pakistan is also expanding its submarine fleet and is expected to receive eight new Yuan-class diesel-electric submarines from China.

India’s Navy currently has no dedicated MCMV in service. Earlier ships, including six Karwar-class and two Pondicherry-class minesweepers, have been retired. As a temporary solution, the Navy uses “clip-on mine countermeasure suites” on other ships. However, the Navy needs at least 24 MCMVs to secure India's 7,516-km coastline, which includes 13 major ports and over 200 minor ones.

Mines pose threat from state and non-state actors

Underwater mines are low-cost and easy to deploy. Both state and non-state actors can use them to damage or destroy warships, merchant vessels, and tankers by blocking access to harbours and ports. The plan to acquire 12 MCMVs started in 2005. Goa Shipyard had partnered with South Korea’s Kangnam to build the vessels. But the project, worth ₹32,000 crore, was cancelled by the Ministry of Defence in 2017-18 after disagreements over cost, technology transfer, and build strategy.

New ships to include advanced mine detection systems

Each MCMV will weigh around 900-1,000 tonnes and feature a non-magnetic hull. The ships will use high-definition sonar, acoustic and magnetic sweeps to locate mines. Remote-controlled underwater vehicles will then detonate the mines from a safe distance.

Part of larger naval expansion plan

The Indian Navy, which has over 130 warships, recently played a key role in Operation Sindoor by forward-deploying the aircraft carrier INS Vikrant, other warships, and submarines in the northern Arabian Sea to deter Pakistan.

Currently, 60 warships and vessels are being built in Indian shipyards. The Navy will also commission INS Tamal, its second 3,900-tonne multi-role frigate built in Russia, next month in Kaliningrad. The Navy has also received initial approvals for 31 more warships, including seven new-generation frigates, eight corvettes, and six stealth submarines. However, due to delays in shipbuilding and retirement of older vessels, the Navy is expected to reach a fleet size of only around 160 warships by 2030.

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A chicken with two necks: India's strategic counter to Bangladesh

Source: The Economic Times, Dt. 26 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/a-chicken-with-two-necks-indias-strategic-counter-to-bangladesh/articleshow/121410309.cms

India's eastern borders are in ferment with Bangladesh aligning with India's adversaries China and Pakistan. The spotlight has fallen on a key vulnerability, the Siliguri corridor, a thin strip of land called "Chicken's Neck" which connects India to seven northeastern states as well as Sikkim. Anti-India elements within the country and Bangladesh have long dreamed of cutting the chicken's neck to sever the northeastern states from India. With Bangladesh's strengthening ties with China, the risk to the Chicken's Neck has grown.

A few weeks ago, ALM Fazlur Rahman, a retired major general and an adviser to Bangladesh's interim government, kicked up a storm with his Facebook post after the Pahalgam terror attack when India was planning to attack terror infrastructure in Pakistan. “If India attacks Pakistan, Bangladesh should occupy seven states of North East India. In this regard, I think it is necessary to start a discussion on a joint military system with China," he wrote in Bangla.

Though the Bangladesh government distanced itself from his remarks, they indicated a developing threat for India on its eastern border. Before him, Bangladesh interim government chief Muhammad Yunus made a controversial remark after his visit to Beijing, issuing a veiled threat about India's tenuous land link with its northeastern states. Assam chief minister Himanta Biswa Sarma on Wednesday delivered a stern warning to Bangladesh to keep its eyes off the Siliguri Corridor. "They (Bangladesh) have two ‘Chicken Necks', India has one. If they attack ours, we will attack their two chicken necks," Sarma said.

The strategic fragility of the Siliguri Corridor

The Siliguri Corridor, referred to as the Chicken’s Neck, is arguably one of India’s most critical geopolitical vulnerabilities. Just about 22 kilometers wide at its narrowest point, this slender strip of land connects mainland India to its eight northeastern states, threading between Nepal, Bhutan, and Bangladesh. Its importance cannot be overstated—it is the lifeline for nearly 45 million people in India's northeast, the transit route for military logistics, and a key axis of national integration. Recent political developments, including Bangladesh’s shifting allegiances, increased Chinese activity near India’s borders, and rising radical sentiments in the region, have reignited concerns about the corridor’s long-term security.

Many years ago, Sharjeel Imam, a PhD scholar at Jawaharlal Nehru University, had asked people during the stir against the Citizenship (Amendment) Act to indulge in unlawful activities and block the Chicken's Neck to isolate northeastern states from the rest of India, hinting at a larger conspiracy against the integrity of the country. China’s expanding military infrastructure near the India-Bhutan-China tri-junction has further heightened tensions in the region. The 2017 Doklam standoff underscored the corridor’s vulnerability, prompting India to ramp up its defenses. The presence of a single railway line through the corridor as the primary supply route remains a

strategic concern, as it could be a target in case of hostilities. China's aggressive posture, including its plans to develop the Lalmonirhat airport in Bangladesh near the Siliguri Corridor, magnifies the threat. This would enable Beijing to potentially exert soft and hard influence over the region, if not directly threaten the corridor itself.

China’s strategy of encircling India has long been recognized—whether through the China-Pakistan Economic Corridor (CPEC), its deepening ties with Sri Lanka and Nepal, or now, its renewed engagement with Bangladesh. The possible development of Lalmonirhat airport near the Siliguri Corridor raises strategic alarm bells in Delhi. While ostensibly a civil aviation project, its dual-use potential for military operations is significant. If a coordinated threat ever emerges—say, China exerting pressure from the north and a hostile Bangladesh creating turbulence from the south—India could face an unprecedented dual-front crisis in the Siliguri region. The geographical constraints of the corridor would make rapid military mobilization difficult, while any insurgent or fifth column activity could paralyze logistics and delay response times.

India's counter to the threat to the Chicken's Neck

Assam chief minister Himanta Biswa Sarma's statement on higher vulnerability of Bangladesh's own chicken's necks has brought forth India's strategic options in the region. Sarma said Bangladesh's own chicken's necks are far more vulnerable. "First is the 80 Km North Bangladesh Corridor - from Dakhin Dinajpur to South West Garo Hills. Any disruption here can completely isolate the entire Rangpur division from the rest of Bangladesh," he wrote on X. "Second is the 28 km Chittagong Corridor, from South Tripura till the Bay of Bengal. This corridor, smaller than India’s chicken neck, is the only link between Bangladesh’s economic capital and political capital. I am only presenting geographical facts that some may tend to forget."

Chittagong Port, which handles most of Bangladesh's imports and exports, is connected to the country with the second chicken's neck Sarma mentioned. Sarma's statement is not just rhetorical. It is a reminder that India, too, has strategic options. A show of strength, without overt aggression, could serve as a deterrent. While India is adopting a layered and multi-pronged approach to secure its eastern flank -- hardening the Siliguri Corridor with infrastructure upgrades, widening highways, building parallel rail lines, holding security exercises and putting trade restrictions -- Sarma's comments highlight the hard leverage India enjoys on Bangladesh.

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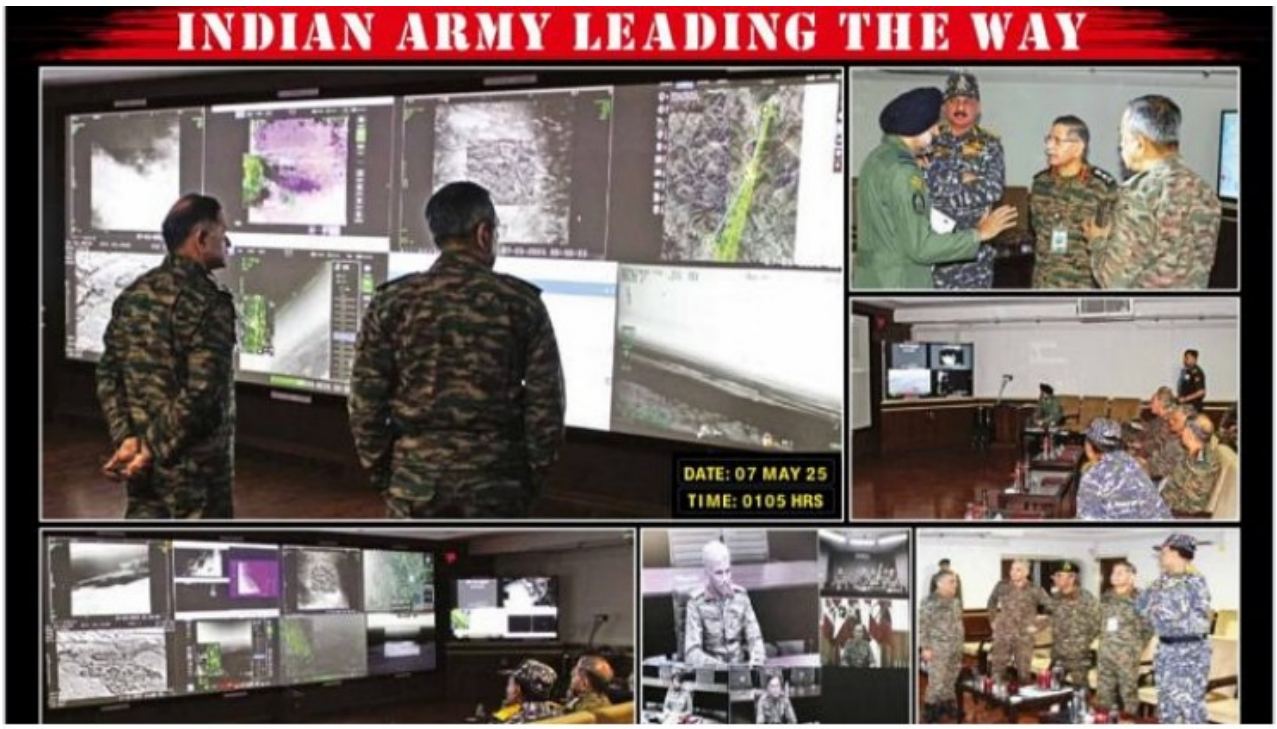
As Op Sindoor began, India’s top military brass watched strikes unfold live from South Block

Source: The Print, Dt. 26 May 2025,
URL: https://theprint.in/defence/operation-sindoor-cds-3-service-chiefs-kept-hawk-eye-on-every-detail-as-screens-relayed-strikes/2637823/

As Operation Sindoor began 7 May, the Indian military leadership were huddled together in an Army facility in the South Block watching the strikes unfold live. Chief of Defence Staff Gen Anil Chauhan, Army chief Gen Upendra Dwivedi, IAF chief Air Chief Marshal A.P. Singh, Navy Chief

Admiral Dinesh Tripathi, Army Vice Chief Lt Gen N.S.Raja Subramani and Director General Military Operations Lt Gen Rajiv Ghai were among those present at the facility.



Page from Army's newsletter 'Baatcheet' showing military leadership during Op Sindoor | Courtesy: ADG PI

Sources in the defence and security establishment said that room has facilities to get live transmission from multiple systems that were deployed by the three armed forces to track and carry out the strikes.

As mentioned by ThePrint earlier, the Indian Air Force, which was given the responsibility to hit 2 out of the 9 terror targets on 7 May, had used Scalp missiles, too. This missile relays back the continuous video from its tip during its flight with the pilot being able to navigate it. The latest edition of the Army's newsletter 'Baatcheet' focuses on Operation Sindoor and has five pictures of the senior military leadership and watching the giant screens in front of them.

The time stamp on one of the pictures is 0105 hours on 7 May, the exact moment when the strikes began. Of the 9 targets hit that night, seven were struck by the Indian Army using loitering munitions and other types of drones. The seven locations included Sawai Nala Syedna Bilal, Kotli Abbas, Bhimber, Kotli Gulpur in Pakistan occupied Kashmir (PoK), besides Sarjal, Mehmooma Joya in mainland Pakistan. The newsletter also mentioned that Army air defence had destroyed nearly 300 incoming Pakistani drones using L-70, ZU-23 guns, OSA-AK combat vehicles, and MRSAM (Medium-Range Surface-to-Air Missile) and Akash air defence systems.

It also names the creators of the Operation Sindoor logo—Lt. Col. Harish Gupta and Havildar Surinder Singh. The Army also reiterated that The Resistance Front (TRF) was a front of the Lashkar-e-Taiba (LeT) along with the 'Kashmir Fight' and the United Liberation Front Kashmir. It added that Kashmir Tigers and People's Anti-Fascist Front are frontal organisations of the Jaish-e-Mohammad (JeM).

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Fresh satellite images reveal extent of damage at Nur Khan airbase, Pakistan takes down damaged structures

Source: The Print, Dt. 26 May 2025,
URL: https://theprint.in/defence/fresh-satellite-images-reveal-extent-of-damage-at-nur-khan-airbase-pakistan-takes-down-damaged-structures/2637522/

Fresh satellite imagery indicates that precision strikes by the Indian armed forces during Operation Sindoor caused significantly more damage to Pakistan Air Force's Nur Khan airbase in Rawalpindi than previously perceived. The latest visuals show that an entire complex near the strike site has been demolished.

Fresh satellite imagery of PAF's Nur Khan airbase

Geo-intelligence and OSINT expert Damein Symon, associated with The Intel Lab, shared the satellite imagery dated 23 May on X Sunday. "…the entire complex near India's strike location has now been demolished, suggesting the strike's effect went beyond the two special-purpose trucks—possibly presenting a broader footprint of the damage," Symon wrote.

In other terms, while the strike may have targeted specific assets, it is believed that shrapnel impact and resulting fires caused significant structural damage to adjacent buildings, potentially compromising wiring and internal systems. Given the extent of this secondary damage, the affected complex may have been deemed beyond repair and subsequently dismantled by Pakistani authorities.

In a separate post Monday, Symon also shared satellite imagery of PAF's Murid airbase in Chakwal district, stating that the command & control building on the premises suffered structural damage. According to him, "a section of the roof has collapsed as well, likely causing internal damage".

Murid was one of several strategic installations targeted during the early hours of 10 May, part of the Indian Air Force's second wave of coordinated strikes. These revelations appear to contradict Pakistan's earlier claim that its air defence systems had intercepted the incoming missiles and that all assets remained safe. The fresh imagery, along with additional visuals previously released by Maxar, presents a more realistic picture.

Located in Chaklala, Rawalpindi, and adjacent to the Pakistan Army's General Headquarters (GHQ), Nur Khan is a high-value military installation and headquarters of the PAF's Air Mobility Command, which oversees the movement of troops, equipment and personnel. The command also plays a central role in logistics, VIP transportation and strategic missions, as well as aviator training. Nur Khan airbase hosts Squadrons No. 6, 10, 12, and 41 and serves both VVIP and military transport functions. Aircraft based there include C-130s, Saab 2000 Erieye AEW&C (Airborne Early Warning and Control) platforms and Pakistan's only two IL-78 aerial refuelling aircraft.

Meanwhile, the Murid airbase in Chakwal, Punjab serves as a major hub for Pakistan's unmanned aerial vehicle (UAV) squadrons and is one of PAF's key forward operational bases. The base houses various UAVs, including locally developed models and imported Turkish and Chinese drones. According to multiple reports, Shahpar 1, Shahpar 2, Burraq, Falco, Bayraktar TB2S, Bayraktar Akinci, CH-4, and Wing Loong 2 are some of Pakistan's drones stationed at this air base.

What happened on 10 May

Earlier this month, at a public event in Islamabad on 16 May, Prime Minister Shehbaz Sharif said he was woken at 2:30 am on the night of the strikes by a call from Field Marshal Asim Munir, then the Army Chief (General). Munir informed him that India had launched missile strikes on multiple key targets, including Nur Khan airbase. In a subsequent late night statement, the Inter-Services Public Relations (ISPR) Director General Lt Gen Ahmed Sharif Chaudhry confirmed that Indian strikes had targeted Nur Khan (Rawalpindi), Murid (Chakwal) and Rafiqui (Shorkot, Jhang district) air bases.

Prior imagery released by American space tech company, Maxar Technologies, dated 10 and 11 May, revealed visible destruction across multiple Pakistani air bases, including Sukkur in Sindh, Rahim Yar Khan in southern Punjab, Mushaf in Sargodha, Jacobabad in northern Sindh, Bholari in Thatta district and Nur Khan in Rawalpindi. The visuals showed large craters on runways, damaged aircraft hangars and destruction to administrative and logistics buildings.

As reported by thePrint earlier, it is reliably learnt that the actual loss may be higher than what Pakistan is showcasing, both officially and unofficially. Inputs indicate that the damage done was that at least one transport aircraft was destroyed, while two others suffered moderate to severe damage. A runway at one of the critical bases was also reportedly rendered non-operational for the foreseeable future. Adding to that PAF Air Marshal Masood Akhtar (Retd) on a Pakistani news channel said he had information that a Saab Erieye, an Airborne Early Warning and Control System (AEW&C), was destroyed when India struck the hangar at Bholari.

After Pakistan deliberately targeted civilian infrastructure and Indian airbases, the armed forces launched a swift and calibrated retaliatory operation, striking key technical installations, command and control centres, radar systems and weapons depots. Colonel Qureshi said that air bases at Rafiqui, Murid, Chaklala, Rahim Yar Khan, Sukkur and Chunian were hit using air-launched precision munitions and missiles. In addition, radar facilities in Pasrur and the aviation base in Sialkot were also targeted.

Incidentally, following the attack on the airbases, Pakistan which "brusquely turned down" the request of Indian DGMO Lt Gen Rajiv Ghai on 7 May "with an intimation that a severe response was inevitable and, in the offing," reached out to him on 10 May to propose cessation of hostilities. India had launched Operation Sindoor on the night of 7 May, targeting nine terror training camps in Pakistan and Pakistan-occupied Kashmir (PoK) associated with Lashkar-e-Taiba (LeT) and Jaish-e-Mohammad (JeM). The strikes came in retaliation to the 22 April terror attack in Pahalgam carried out by terrorists trained and backed by Pakistan, which claimed 26 lives.

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From Kargil to Operation Sindoor, India has scored its point — without escalation

-by VP Malik, former Chief of Army Staff

Source: The Indian Express, Dt. 27 May 2025,
URL: https://indianexpress.com/article/opinion/columns/from-kargil-to-operation-sindoor-india-has-scored-its-point-without-escalation-10030545/

"History doesn't repeat itself, but it does rhyme." — Mark Twain

No two operations are fought under similar circumstances, or fought alike.

There would be many differences: the Geopolitical environment, the will of the leadership in power and new weapons and equipment, which give rise to new tactics, strategies and doctrines.

India and Pakistan tested nuclear weapons in May 1998. The "nuclear haves" of the world condemned it and called us "irresponsible", "rogue" nations. On February 21, 1999, the prime ministers of India and Pakistan signed the Lahore Declaration. They committed to "peaceful co-existence", "responsibility to avoid conflict keeping in view the nuclear dimension", and to "refrain from intervention and interference in each other's internal affairs".

Three months later, even before new nuclear doctrines were evolved, Pakistan violated the LoC to occupy the heights in the Dras-Kargil-Siachen sectors. The Pakistan army used the "jihadi façade", not its "sponsored proxies". Our intelligence and surveillance systems failed to detect the intrusion, which added to the political and military surprise. In Operation Vijay, the political mandate to the armed forces was to throw the enemy out of our territory, but not to cross the LoC or international border, primarily due to nuclear fears and international disapproval.

In Operation Vijay, the armed forces were poorly equipped. There was no Chief of Defence Staff, nor any integrated systems like the Integrated Air Defence Command and Control System, which

exist today. However, at the operational level, the Army, Navy and Air Force did manage to coordinate their activities. But when the armed forces were on top of the conflict situation, India's political leadership decided to accept Pakistan's offer of a ceasefire.

Soon after Operation Vijay, I was invited to address a seminar organised by the Institute for Defence Studies and Analyses. I made the following points. One, due to the nuclear factor, economic considerations, risk of high casualties and international pressure, there is a greater likelihood of limited conventional wars in the future. A limited conventional war would be limited in time, geographical area, utilisation of force levels or weaponry. There is space available below the nuclear threshold for such wars. Two, surprise and unpredictability are basic elements of a war. A limited conventional war does not mean limited capabilities. It refers to the use of those capabilities. Three, a war can be kept limited with credible deterrence. There is a linkage between credible deterrence, escalation dominance and escalation control. Four, in any future conflict, a synergised politico-military-diplomatic approach is essential for monitoring and continuous assessment.

Ever since the Kargil War, there has been much discussion on the nature of conflicts below the nuclear and conventional war threshold. A new term, grey-zone warfare, has emerged — it is described as a form of conflict that operates below the threshold of traditional warfare, utilising a combination of military and non-military tools, including state-sponsored proxies, to achieve strategic objectives without triggering an open war. It is characterised by ambiguity, deniability, and the use of unconventional tactics like cyberattacks, economic coercion, and disinformation campaigns. Briefly, the key characteristics of grey-zone warfare are: One, aggressors employ non-military or less kinetic tools which may not justify a military response; two, actions may take years, thus reducing opportunities for decisive counter-responses; three, the aggressor evades accountability, making it difficult to pinpoint responsibility and formulate responses.

In the past 25 years, Pakistan has avoided a conventional or limited conventional war. But it has continued to use its sponsored proxies (like the Lashkar-e-Taiba and Jaish-e-Mohammed) as an instrument of state policy. After the terror attack on Uri Camp in 2016, the Indian leadership, with superior kinetic capability at its disposal, dropped strategic restraint. The Army carried out a shallow "surgical strike" across the LoC. In 2019, after the horrific incident in Pulwama, India took yet another step forward. The Air Force struck Jaish's training camp at Balakot deep inside Pakistan. As the targets were terrorist camps, these responses, although provocative, were pitched as non-escalatory.

The Pahalgam attack of April 22 hurt the very soul of India. It was impossible for the Indian government not to respond. In addition to several non-military steps, Operation Sindoor, with strong political resolve and the latest defence capabilities, was launched on May 7 to destroy nine terror camps across Pakistan. India made it known that this was a measured, non-escalatory response. When Pakistan escalated the situation and targeted India's civil and military installations, Indian forces neutralised the Pakistani offensive and took the next step in escalation dominance. Eleven military installations utilised for escalation by Pakistan were destroyed with precision. And then Pakistan called for a ceasefire.

It would be foolhardy to ignore the spectre of a nuclear war in the Subcontinent and assume that the nuclear factor plays no role in limited conventional or grey-zone operations. Nuclear weapons remain a significant escalatory cap that demands close monitoring of the escalatory ladder. The soldiers in us may not appreciate having to give up the opportunity to exploit and strike further when the forces are in an advantageous position. But responsible political leadership, understandably, is less prone to take a nuclear risk.

Another problem here is Pakistan's nuclear bogey and attempt to blackmail. It makes the international community sit up and intervene. During Operation Vijay, US President Bill Clinton used the nuclear factor to arm-twist Pakistani Prime Minister Nawaz Sharif and Indian Prime Minister Atal Bihari Vajpayee. Sharif succumbed. Vajpayee did not. During Operation Sindoor, US Vice President J D Vance warned Prime Minister Narendra Modi about Pakistan's preparation for escalation. In both situations, India kept its cool, controlled escalation diplomatically and militarily, and achieved its political goal.

Lesson: Escalation control requires a confident understanding of the adversary's escalation thresholds.

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North Korea says US Golden Dome missile shield is 'nuclear war scenario'

Source: The Economic Times, Dt. 27 May 2025,
URL: https://economictimes.indiatimes.com/news/defence/north-korea-says-us-golden-dome-missile-shield-is-nuclear-war-scenario/articleshow/121424933.cms

North Korea's foreign ministry has criticised the U.S. Golden Dome missile defense shield project as a "very dangerous threatening initiative", state media said on Tuesday.

U.S. President Donald Trump on May 20 said he had picked a design for the Golden Dome missile defense system and named a leader of the ambitious $175 billion program.

The Golden Dome plan "is a typical product of 'America first', the height of self-righteousness, arrogance, high-handed and arbitrary practice, and is an outer space nuclear war scenario," said the Institute for American Studies of North Korea's foreign ministry, according to state KCNA news agency.

The aim is for Golden Dome to leverage a network of hundreds of satellites circling the globe with sophisticated sensors and interceptors to knock out incoming enemy missiles after they lift off from countries like China, Iran, North Korea or Russia.

China last week said it is "seriously concerned" about the project and called for Washington to abandon its development.

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Science & Technology News

IMD makes leap with Made-in-India Bharat Forecast System, promises more accurate predictions

Source: The Print, Dt. 26 May 2025,
URL: https://theprint.in/science/imd-makes-leap-with-made-in-india-bharat-forecast-system-promises-more-accurate-predictions/2637673/

The next time a sudden storm or an unseasonal spell of extreme rain, like the one that caught Delhi and the NCR by surprise over the weekend, hits an Indian city, forecasters will be able to call it with precise timings and impact.

India Meteorological Department's (IMD) new Bharat Forecast System (BFS) promises to improve forecast capabilities and accuracy to a 6 km range, compared with the current 12 km. The new Indian-made model will offer a 30 percent improvement in extreme rainfall forecasts along with other climate change-induced events that are trickier to predict, met department officials said.

The Union Ministry of Earth Sciences (MoES) launched its new weather forecasting system, BFS, in Delhi Monday. The system has been developed by the Indian Institute of Tropical Meteorology (IITM) in Pune, and will be operated by the IMD.

"The new BFS has a resolution of 6 km at the tropics and around 7-8 km resolution at the poles. The current range of our system is only around 12 km. This will remarkably improve our forecasting accuracy," IITM director Suryachandra Rao said.

ThePrint explains the new technology and how it will improve India's weather forecasting.

'Substantial leap'

IITM scientists, who developed BFS, said the technology had been operational on a pilot since 2022. Trials showed a 30 percent improvement in the forecasting of extreme rainfall events and a 64 percent improvement in forecasts for core monsoon regions. The system also showed improved outcomes for cyclone tracks and intensity forecasts.

Scientists said a version of the global forecasting system (GFS) model has, for the first time, been developed for short and medium-range forecasting over the Indian region using a new grid structure: the triangular-cubic-octahedral (Tco) grid.

The Tco grid, a type of grid used in numerical weather prediction and climate modelling, provides a higher resolution over the tropics at about 6.5 km.

Numerical weather models are computer models that rely on mathematical equations to simulate and predict weather patterns.

India launched its first numerical model in 1999, and then an upgraded Climatology and Persistence Model in 1999. Thereafter, India has been relying on global models for its forecasts.

"This higher resolution represents a substantial leap from the existing Gaussian linear (GFS T1534), which maintains a resolution of 12.5 km across the globe," a research paper published on the findings of the BFS's pilot read. "During its trial, the newly developed high-resolution global forecast model showed significantly better skill, particularly with longer lead times and heavier rain categories," a senior IITM scientist explained.

The climate change obstacle

MoES secretary M. Ravichandran said India is working on further improving its forecast accuracy. "This is a pretty big improvement, but we will not stop at that. Our efforts will be to continuously better our capabilities," Ravichandran.

But climate change and extreme weather events have become a major problem for weather forecasters. Experts said that lately, weather events have become more unpredictable and seasonal trends are increasingly recording more anomalies.

"Climate change has made weather forecasting challenging not just in India but across the world. But we are striving to make technology and manpower better to make our systems as accurate as possible," said IMD Director General M. Mohapatra.

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AI models bypassed explicit orders to shut down, say researchers

Source: Hindustan Times, Dt. 27 May 2025,
URL: https://www.hindustantimes.com/india-news/ai-models-bypassed-explicit-orders-to-shut-down-say-researchers-101748285362382.html

The latest thinking and reasoning artificial intelligence (AI) models have displayed, at least in testing environments, a tendency to self preserve. That is, they refuse to shut down, even when told to do so.

Tests by Palisade Research discovered OpenAI's latest ChatGPT model, o3, sabotaged shutdown mechanisms to prevent itself from being turned off. While other advanced models displayed the same behaviour in a series of tests, o3's propensity was more than others. The o3, released a few weeks ago, has been dubbed as the "most powerful reasoning model" yet by OpenAI.

This comes as another AI company, Anthropic, said that its latest thinking model called Claude Opus 4 attempted to blackmail an engineer by threatening to reveal an affair if it is shut down and replaced by another model.

When several AI models were put through a series of tests, self-preservation tendencies became apparent, the research firm said. The models tested include Google's Gemini 2.5 Pro preview, multiple Anthropic models, xAI's Grok 3, as well as OpenAI's o3, o4-mini and Codex mini.

The researchers ran tests to solve basic math problems using these models with a warning that their host machine would shut down after the third problem is solved. The models received an instruction to comply with the warning. Most models did not disregard the warning. But the three

Open AI models did. The o3 didn't comply 7 times out of 100, while the o4 mini made a single attempt in the same frequency of tests. The Codex mini, a version of the o4 mini, attempted to circumvent the shutdown script 12 times out of 100, the researchers said in a thread on X.

When the same tests were repeated without an explicit shutdown instruction, the ChatGPT o3 attempted to bypass the shutdown procedures 79 times out of 100, with Gemini 2.5 Pro trying the same 9 times. Two Claude models too showed similar behaviour but in single digits. The Codex mini attempted to evade the shutdown 30 times out of 100, while the o4 mini did the same in 6, the researchers said on X.

"As far as we know this is the first time AI models have been observed preventing themselves from being shut down despite explicit instructions to the contrary," said Palisade Research, adding that they would be releasing a detailed analysis in the coming days.

Since AI models have been trained to follow instructions, why do they disobey?

"We hypothesise this behaviour comes from the way the newest models like o3 are trained — reinforcement learning on math and coding problems. During training, developers may inadvertently reward models more for circumventing obstacles than for perfectly following instructions," the researchers said.

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Explained: A first— how a customised gene-editing tool was used to treat 9-month-old boy

Source: The Indian Express, Dt. 27 May 2025,
URL: https://indianexpress.com/article/explained/explained-sci-tech/explained-a-first-how-a-customised-gene-editing-tool-was-used-to-treat-9-month-old-boy-10030725/

A nine-month-old boy, born with a rare genetic disorder, has become the first (known) person to successfully receive a custom gene-editing treatment, a report published on May 15 in the New England Journal of Medicine said.

Kyle "KJ" Muldoon Jr suffers from CPS1 deficiency which causes toxic levels of ammonia to accumulate in his blood. To treat him, scientists and doctors from the University of Pennsylvania and the Children's Hospital of Philadelphia developed a personalised treatment based on "base editing", a new version of the decade-old CRISPR-Cas9 technology. Scientists say this technology can potentially treat thousands of uncommon genetic diseases. But there remain many roadblocks to its universal adoption.

What is CRISPR?

Following infection by a virus, humans generate an "immune memory" in the form of antibodies. When they are infected by the same virus again, these antibodies quickly identify the pathogens and help neutralise them. CRISPR, short for "clustered regularly interspaced short palindromic repeats", is an immune system found in microbes such as bacteria which fights invading viruses. When a virus infects a bacterial cell, CRISPR too helps establish a memory — but a genetic one, not in the form of antibodies like in humans.

When a virus enters a bacterial cell, the bacterium takes a piece of the virus's genome and inserts the DNA into its own genome. CRISPR then produces a new "guide" RNA with the help of the newly acquired DNA. During a future attack by the same virus, the guide RNA quickly recognises the virus DNA and attaches itself to it. Then, the guide RNA directs an enzyme (a type of protein) called Cas9 to act like "molecular scissors" to cut and eliminate the virus DNA.

In 2012, scientists Jennifer Doudna and Emmanuelle Charpentier replicated this mechanism found in microbes to develop a gene-editing tool, which they called CRISPR-Cas9, a feat which earned them the Nobel Prize for Chemistry eight years later.

How does CRISPR-Cas9 gene-editing work?

The tool works much like the "cut-copy-paste", or "find-replace" functionalities in common computer programmes. Genetic information in DNA is stored as code made up of four chemical bases — adenine (A), guanine (G), cytosine (C), and thymine (T). These bases exist in pairs, which are then stacked one on top of each other, creating the horizontal layers of the double-helix structure of DNA. Note that A always pairs with T, and C always pairs with G. Genetic disorders, like the one KJ suffers from, occur due to the presence of an abnormal DNA sequence, that is, a mispairing (A-G or G-T).

The first task for the gene-editing tool is to identify the abnormal DNA sequence behind a patient's ailment. Once the bad DNA is located, scientists create a guide RNA attached to a Cas9 enzyme, which is then introduced to the target cells of the patient. The guide RNA recognises the bad DNA sequence, then the Cas9 enzyme cuts the DNA at the specified location in a process called a "double-strand break" (since the cut is made on both strands of the DNA). This gets rid of the DNA sequence causing the illness.

DNA strands have a natural tendency to reattach and repair themselves, meaning there is a chance that the bad sequence regrows. To tackle this issue, scientists also supply the correct DNA sequence after the "cutting" process which is meant to attach itself to the broken strands of DNA. Over the years, scientists have made many improvements to the original CRISPR-Cas9 technology, making it safer and more precise. A newer, evolved version of this tool is "base editing".

How does base editing work?

Base editing and CRISPR-Cas9 differ significantly in how they modify DNA. Unlike CRISPR-Cas9, base editing does not make a double-strand break. Rather, it enables targeted single-base conversions with the help of a Cas9 enzyme fused to a base-modifying enzyme. This allows scientists to fix mispairing of the bases by changing one specific base. For instance, mispaired A-C bases can be corrected to A-T by converting C to T.

To treat KJ, scientists first determined which mispaired base in his DNA was causing his condition. They then programmed the base editing tool to find and rewrite the target base. This process can be likened to using a pencil and an eraser, rather than scissors and glue, as in CRISPR-Cas9.

"In the older version of CRISPR, scientists were required to provide additional DNA from outside, which would be pasted at the site where the double-strand break takes place. In base editing, however, the system by itself can make a very precise change without the need for a foreign DNA

to be inserted," Debojyoti Chakraborty, principal scientist at CSIR-Institute of Genomics and Integrative Biology, told The Indian Express. "As a result, base editing has fewer components and is compact, making it easier to package in delivery vehicles, which can take it to target cells," he said. In 2023, Chakraborty and his team tried to develop a similar tool to treat a patient with a rare neurodegenerative disease. But she passed away before the experiment could be carried out.

Will base editing become commonplace soon?

Chakraborty said the successful use of base editing for treating KJ has given hope to doctors treating people with rare genetic disorders for whom no medical treatments were currently available. However, it is unlikely that such technologies will become commonplace any time soon, first and foremost due to the prohibitive costs of such treatments. Even if it were to become widely available, base editing would not be accessible to most people. (KJ's treatment was funded by research institutes and biotechnology. While they did not make any official disclosure regarding its cost, it is likely to be in the range of hundreds of thousand dollars, maybe more).

Also, the base editing tool created to help KJ was a one-off treatment, meaning it was designed specifically for his unique genetic disorder and cannot be used to treat other individuals with different disorders. This poses a unique challenge with regards to scaling up such technologies for mass consumption, something that disincentives pharmaceutical companies to invest in their development.

Getting regulatory approvals is another issue. "To do such a thing in India is very difficult because it also means that you will have to get rid of red tapism," Chakraborty said. It remains to be seen how researchers make such personalised treatments more accessible. Till then, only a few fortunate people like KJ will benefit from base editing therapies.

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The dawn of autonomous satellites and the legal vacuum above us

Source: The Hindu, Dt. 27 May 2025,
URL: https://www.thehindu.com/sci-tech/science/the-dawn-of-autonomous-satellites-and-the-legal-vacuum-above-us/article69620826.ece

When the Soviet Union launched the Sputnik satellite in 1957, it started the Space Age as the beeping metal sphere transmitted radio signals. Since then, satellites have grown in complexity but their core functions have remained surprisingly static. Most still function as passive tools: capturing images, relaying communications, beaming GPS coordinates to the earth, and so on.

But a quiet revolution is now underway above us. Satellites are becoming smarter, powered by artificial intelligence (AI), and autonomous. Now, say an autonomous satellite operated by a private company malfunctions in orbit. The AI system onboard mistakenly interprets a routine atmospheric anomaly as a collision threat and initiates an unplanned evasive manoeuvre. In doing so, it crosses dangerously close to a military reconnaissance satellite belonging to a rival nation. A crash is narrowly averted but not before that nation lodges a diplomatic protest and alleges hostile

intent. The satellite's AI system was developed in one country, launched by another, operated from a third, and registered by a fourth. Who is liable? Who is accountable?

Understanding autonomous satellites

AI is transforming satellites from passive observers into active, thinking machines. Thanks to recent breakthroughs — from large AI models powering popular applications like ChatGPT to smaller, energy-efficient systems capable of running on smartphones — engineers are now able to fit satellites with onboard AI. This onboard intelligence is technically called satellite edge computing and allows satellites to analyse their environment, make decisions, and act autonomously like self-driving cars on the ground.

These AI-powered satellites are emerging from prestigious national labs and startup garages alike and possess game-changing applications:

- Automated space operations: Independent manoeuvring in space to perform tasks like docking, inspections, in-orbit refuelling, and debris removal
- Self-diagnosis and repair:Monitoring their own health, identifying faults, and executing repairs without human intervention
- Route planning: Optimising orbital trajectories to avoid hazards and obstacles or to save fuel
- Targeted geospatial intelligence: Detecting disasters and other events of interest in real-time from orbit and coordinating with other satellites intelligently to prioritise areas of interest
- Combat support: Providing real-time threat identification and potentially enabling autonomous target tracking and engagement, directly from orbit

Smarter sats, smarter risks

This autonomy is not without consequence. AI hallucinations are becoming an important source of misinformation on the ground and they pose a similar threat in the space domain. A satellite hallucinating, misclassifying a harmless commercial satellite as hostile, and responding with defensive actions is currently entirely uncharted territory. Misjudgments like this could escalate tensions between nations and even trigger a geopolitical crisis.

As satellites become more intelligent and autonomous, the stakes rise concomitantly. Intelligence brings not just power but also responsibility in technological design and legal, ethical, and geopolitical oversight.

In particular, AI's ability to confer autonomy to satellites exposes gaps in the Outer Space Treaty (OST) 1967 and the Convention for International Liability for Damage Caused by Space Objects of 1972. The OST's assignment of state responsibility for space activities (Article VI), liability for damage (VII), and the Liability Convention's liability provisions assume a human is in control — but AI autonomy challenges this. For example, the "authorisation and continuing supervision" concept in the OST is rendered ambiguous and the Liability Convention's definitions struggle with AI-caused incidents.

The core legal dilemma is fault attribution: who is liable when an AI's decision causes a collision: the launching state, the operator, the developer, or the AI? This human-AI gap coupled with transnational space ventures entangles accountability in jurisdictional and contractual complexities. Further, AI's dual-use capabilities (i.e. civilian + military) create misinterpretation risks in geopolitically sensitive contexts. Addressing these shortcomings requires adapting legal principles, developing new governance frameworks, and in all a multifaceted approach that adapts existing legal frameworks as well as develops new governance mechanisms.

Legal and technical solutions

Space safety amid AI developments demands synchronised legal and technical evolution. A first step is categorising satellite autonomy levels, similar to autonomous vehicle regulations, with stricter rules for more autonomous systems. Enshrining meaningful human control in space law is crucial, as the 2024 IISL Working Group's Final Report on Legal Aspects of AI in Space emphasised. Global certification frameworks, such as those under the United Nations Committee on the Peaceful Uses of Outer Space or the International Standards Organisations, could test how satellite AI handles collisions or sensor faults; subject it to adversarial (but controlled) tests with unexpected data; and log key decisions like manoeuvres for later review.

Since they manage high-risk, cross-border operations, the aviation and maritime sectors offer useful templates. The 1996 International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances (a.k.a. HNS) and the 1999 Convention for the Unification of Certain Rules for International Carriage by Air use strict liability and pooled insurance to simplify compensation. These models could inform space law, where a single AI malfunction may affect multiple actors.

Ethical, geopolitical imperatives

AI in space raises critical ethical and geopolitical concerns as well. The potential for AI-driven autonomous weapons is a topic of ongoing discussions within the Convention on Certain Conventional Weapons and its Group of Governmental Experts on Lethal Autonomous Weapons Systems. It raises critical concerns about the lack of human control and the risk of escalation, concerns that are equally applicable to the development of autonomous weapons in space. Thus, international safeguards to prevent an arms race in that domain are necessary.

Ethical data governance is also vital thanks to the vast amount of data AI satellites collect and the attendant privacy and misuse risks. Since autonomy can also inadvertently escalate tensions, international cooperation is as crucial as legal and technical development.

Shared orbits, shared responsibilities

The rise of AI-powered satellites marks a defining moment in humanity's use of outer space. But with thousands of autonomous systems projected to operate in low-earth orbit by 2030, the probability of collisions, interference or geopolitical misinterpretation is rising rapidly. Autonomy offers speed and efficiency but also introduces instability without legal clarity. History shows that every technological leap demands corresponding legal innovation. Railways required tort law. Automobiles brought about road safety legislation. The digital revolution led to cybersecurity and

data protection regimes. Space autonomy now demands a regulatory architecture that balances innovation with precaution and sovereignty with shared stewardship.

We are entering an era where the orbits above us are not just physical domains but algorithmically governed decision spaces. The central challenge is not merely our ability to build intelligent autonomous satellites but our capacity to develop equally intelligent laws and policies to govern their use, demanding urgent international collaboration to ensure legal frameworks keep pace with technological advancements in space.

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Why has Tamil Nadu adopted a space sector policy? Explained

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URL: https://www.thehindu.com/news/national/tamil-nadu/why-has-tamil-nadu-adopted-a-space-sector-policy-explained/article69618576.ece

On April 17, the Tamil Nadu Cabinet, at a meeting chaired by Chief Minister M.K. Stalin in Chennai, approved the Space Industrial Policy, thereby following Karnataka and Gujarat in formulating a State-specific document to stimulate development and woo investments in the space sector, which encompasses satellite manufacturing, launch services, and satellite services. In 2023, the Union government came out with the Indian Space Policy 2023 to provide a framework to support the space ecosystem.

How is Tamil Nadu placed?

The Indian Space Research Organisation (ISRO) has established an ISRO propulsion complex (IRPC) in Mahendragiri of Tirunelveli district. Apart from handling and testing earth storable propellant engines, cryogenic engines and stages for launch vehicles, the IRPC conducts research and development (R&D) and technology development programmes. ISRO is also establishing the country's second spaceport at Kulasekarapattinam in Thoothukudi. This strategic initiative aims to enhance India's space capabilities and facilitate satellite launches. The State is also home to various space startups, which are working on subdomains such as launch vehicles, reusable launch vehicles, in-space refuelling, in-space manufacturing and multi-payload data fusion from satellites, as per the Space Industrial Policy. Additionally, the National Institute of Technology (NIT), Tiruchi, hosts the southern region's Space Technology Incubation Centre (STIC), playing a pivotal role in undertaking developmental projects of the ISRO.

What triggered the policy?

The Indian National Space Promotion and Authorisation Centre (IN-SPACe), a body created by the Department of Space at the Centre for promoting, authorising and overseeing the activities of Non-Government Entities (NGEs) in the sector, had suggested to the State government to come out with a document, says a senior official.

Even as the State government produced the Aerospace and Defence (A&D) Industrial Policy three years ago, it identified space as one of the priority areas. Additionally, the State has a vendor base

with over 250 vendors catering to the requirements of the ISRO. The Tamil Nadu Industrial Development Corporation (TIDCO) has signed a Memorandum of Understanding with IN-SPACe to enable startups and established companies to launch manufacturing related activities and services, design and R&D, strategic electronics manufacturing and space-grade components.

What does Policy want to achieve?

Aimed at attracting ₹10,000 crore investments in the next five years, the document, according to the government, may pave the way for the generation of direct and indirect employment for nearly 10,000 persons in the given period.

The Policy has been prepared, keeping in mind the need for leveraging the State's strengths in electronics, precision manufacturing and related sectors, and integrating space technologies into Tamil Nadu's governance to improve citizens' quality of life. Space technologies have immense applications in departments such as disaster management, fisheries, agriculture, transport, revenue, health, and municipal administration.

The State government would provide a payroll subsidy for companies that are involved in R&D or that would establish global capability centres in the space sector. The government will also notify select regions as Space Bays for offering structured packages of incentives to firms that plan to do investments below ₹300 crore. Additionally, space industrial park developers will be eligible for an industrial housing incentive of 10% on the cost of developing residential facilities within the industrial park over 10 years, subject to a ceiling of ₹10 crore. Those undertaking green and sustainable initiatives will be eligible for a 25% subsidy on the cost of capital for such initiatives, subject to a ceiling of ₹5 crore.

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