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# समाचार पत्रों से चयनित अंश

# Newspapers Clippings

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

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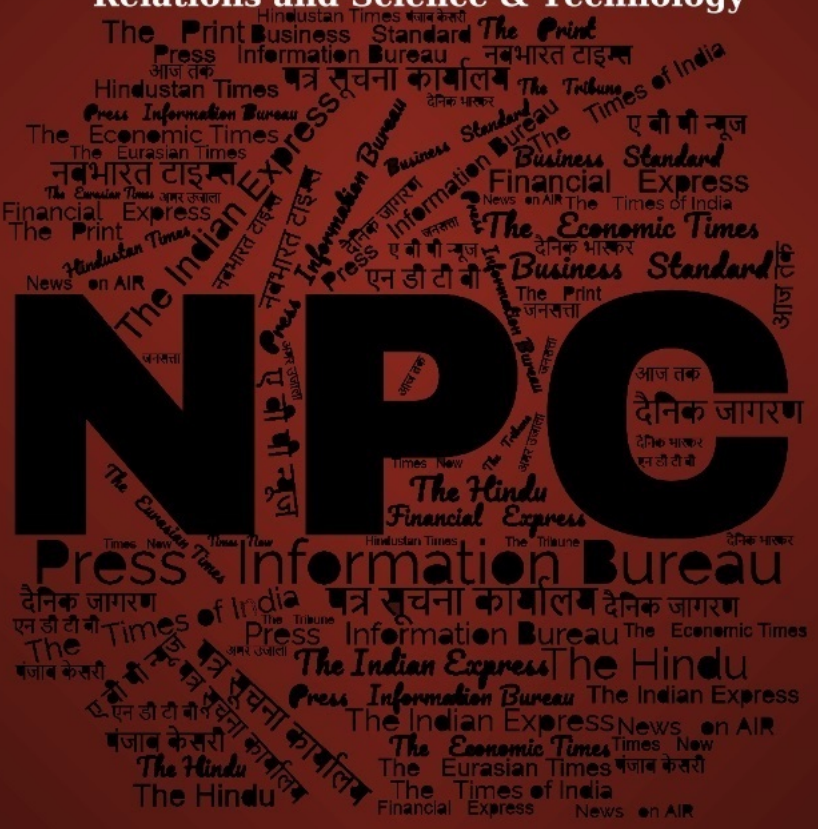


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# Defence News

## INS Tamal Makes Port Call at Souda Bay, Greece During Return Voyage to India

***Source: The Statesman, Dt. 22 Aug 2025***

INS Tamal, the latest stealth frigate, arrived at Souda Bay, Greece, during her return passage to India post commissioning in Russia.


The naval spokesperson stated that the engagements during the port call include a range of professional and cultural activities focused on fostering Indo-Greek bilateral relations, such as discussions with senior Hellenic Navy functionaries, familiarisation of operations and procedures at the NATO Maritime Interdiction Operational Training Centre in Souda Bay, and a walk around of NATO and Hellenic Navy facilities, culminating in a passage exercise on departure.

The ship's crew will also pay homage to the fallen citizens of Greece and uniformed personnel, including Indian soldiers who fought as part of the British Indian Army during World War II. They will also undertake cultural exchanges by way of visits to maritime museums of Crete and interaction with the local diaspora to further people-to-people bonds.

The Indian and Hellenic Navies have engaged with each other on multiple fronts, including training courses, passage exercises, port calls of warships, and delegation-level military visits. Recently, Hellenic Navy Ship Psara, a MEKO 200 class frigate, called at Mumbai from 11 to 13 July.

The visit is indicative of the importance India attaches to its relations with Greece and the endeavour to strengthen the growing defence cooperation and friendly ties between the nations. It will also provide an opportunity for both navies to share 'best practices' and explore new avenues of cooperation.

https://www.thestatesman.com/india/ins-tamal-makes-port-call-at-souda-bay-greece-during-return-voyage-to-india-1503474834.html

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# Conclusion of SLINEX-2025

***Source: Press Information Bureau, Dt. 21 Aug 2025***

The 12th edition of the India - Sri Lanka bilateral naval exercise SLINEX-25 successfully concluded at Colombo on 18 Aug 2025, reaffirming shared commitment and maritime security. The current edition saw the participation of Indian naval ships INS Jyoti and INS Rana from the Eastern Fleet and Sri Lankan Naval Ships SLNS Gajabahu and SLNS Vijayabahu (both Advance Offshore Patrol Vessels).

Upon arrival at the Port of Colombo, the Commanding Officers of INS Jyoti and INS Rana called on Commander of the Western Naval Area (WNA), Rear Admiral Chandima Silva RSP, USP, and discussed enhancing bilateral naval cooperation, and sharing Best Practices. They also paid solemn tribute at the Indian Peace Keeping Force (IPKF) Memorial, honouring the brave Indian soldiers who made the ultimate sacrifice during peacekeeping operations in Sri Lanka between 1987 and 1990.

The ships were opened to visitors, including personnel from the Sri Lankan Navy, government officials, students, and members of the Indian diaspora. The initiative offered a unique opportunity to showcase the operational capabilities, technological advancements, and rich naval traditions of the Indian Navy. Further, the initiative served to deepen mutual understanding, promote maritime diplomacy, and strengthen people-to-people connections between India and Sri Lanka.

The exercise was conducted in two phases, the harbour phase at Colombo from 14 to 16 Aug 25 and the sea phase from 17 to 18 Aug 25. The activities conducted during the harbour phase included professional interactions, exchange of Best Practices, reciprocal training on firefighting, damage control, aviation operations and Humanitarian Assistance and Disaster Relief (HADR), friendly sports competitions and a pre-sail conference.

The sea phase saw the successful execution of a wide range of advanced naval drills that included joint exercises, gunnery firing serials, communication protocols, navigation, as well as seamanship evolutions, Visit Board Search and Seizure (VBSS), and fueling. These meticulously planned operations significantly enhance interoperability, bolsters tactical capabilities and reaffirms the shared commitment to ensuring maritime security and stability.

The deployment of Indian naval ships to Sri Lanka served as another chapter in the growing India-Sri Lanka maritime partnership, contributing to stability and security in line with the vision of Security and Growth for All in the Region (SAGAR).

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2159316

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## Indian Army goes high-tech to enhance capabilities along China, Pakistan borders in Ladakh

***Source: The Statesman, Dt. 22 Aug 2025***

The Indian Army has gone high-tech in Ladakh, where India shares its borders with China and Pakistan. The Army has inducted Virtual Reality (VR) innovation to sharpen its observation at the borders.

In a post on X, Fire and Fury Corps of the Indian Army stated, “Simulation to Expertise-Mastering Precision through Innovation! Fire and Fury Corps Gunners adopt a tech-driven approach, developing cutting-edge immersive Virtual Reality innovation to sharpen Observation Post Officers’ tactical decision-making in dynamic combat scenarios. With real-time feedback, the training enhances their proficiency”.

The two borders are sensitive in Ladakh where India shares the LAC with China and the LOC with Pakistan. Meanwhile, technological advancements have also been introduced by the White Knight Corps along the LOC in the Poonch and Rajouri districts of Jammu.

Among these is the Smart Fence System that enhances border security and surveillance. Newly introduced equipment, including Quadcopters, Advanced Surveillance Tools, Bulletproof Vehicles, All Terrain Vehicles, Modern Weapons and Night Vision Sights, were also resonating the confidence of innovation and integration in the troops.

https://www.thestatesman.com/india/indian-army-goes-high-tech-to-enhance-capabilities-along-china-pakistan-borders-in-ladakh-1503474825.html

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# Rivalry with China need not mean conflict

## Better ties with China can help India build its own economic and military strength

*-by Kuldip Singh (retired Army officer, former principal director in the National Security Council Secretariat)*

***Source: The Indian Express, Dt. 22 Aug 2025***

Chinese Foreign Minister Wang Yi's visit to India this week comes against the backdrop of volatile geopolitical headwinds: The US tariff squeeze on India over oil purchases from Russia, but a temporary tariff reprieve for China. Wang also called on Prime Minister Narendra Modi, after which the latter announced that he will meet President Xi Jinping on the sidelines of the Shanghai Cooperation Organisation (SCO) summit, adding that "stable, predictable and constructive (New Delhi-Beijing) ties" will help "global peace and prosperity".

The US has long pursued Britain's age-old grand strategy of preserving "balance of power", with just one objective: Maintaining global preeminence. To this end, it has struck down, by forming a coalition, any rising power that became unmanageable. During World War II, the US allied with the USSR and the Chinese Kuomintang (KMT) nationalists. In the closing years of the war, while exploiting Soviet military predominance in Eastern Europe, it prevailed upon the Europeans to enter into the Bretton Woods Agreement (July 1944). As World War II ended, the US turned on its former ally, the USSR, and started to rebuild relationships with its former enemies, Japan and Germany, which it had firebombed and nuked into rubble.

After the People's Republic of China was established (1949), the US, worried about the emergence of a powerful USSR-China communist bloc, sided with the KMT (which fled to Taiwan) and supported Taiwan's recognition as the "real China" at the UN. It also trained Tibetan fighters against China. But its inability to break the Soviet Union finally led it to align with China through the 1972 Pakistan-led rapprochement, before which it ensured China replaced Taiwan (ROC) at the UN. The cases of Iran and Afghanistan, too, underline the risks of allying with the US.

India could have avoided turning its ties with the US into a loud, personalised affair. History tells us that such personalisation has never ended well, as leaders not only get replaced, but are always drawn back to primary strategic issues. The priority of both the Joe Biden and Donald Trump administrations has been to manage Russia and China.

The Russian economy is heavily dependent on energy exports, and its economic growth is contingent on high energy prices. From 2014, the US had tried, unsuccessfully, to push down oil prices to starve the Russian economy. Now, Trump wants to end the Russo-Ukrainian war, and as

part of this endeavour, he demands that India stop purchasing Russian oil. India's refusal to do so has miffed him, prompting tariffs.

On the other hand, the US wants to keep China's economic might, technological capabilities and geopolitical influence in check. But given the US's dependence on rare earths, certain supply chains, trade ties, and treasury holdings, there are limits to the risks Washington will expose itself to. If the US can arrive at a strategic understanding with China, it can de-emphasise its relationship with India. Further, the US's hope that India would emerge as an alternative economic-industrial destination and supply chain source vis-à-vis China didn't pan out.

Can India, then, turn towards China? The reality is that, barring isolated incidents (1967 Nathu La and Cho La clashes; 1987 Sumdorong Chu and the 2017 Doklam stand-offs; 2020 Galwan skirmish), the Line of Actual Control (the line since the 1962 war) has been quiet.

The Himalayas, stretching for about 2,400 km, are about 500 km wide in Kashmir and 200 km in Arunachal Pradesh. The Trans-Himalayas, the Great Himalayas and the Lesser Himalayas together constitute a very formidable obstacle and influence military operations, particularly logistics and land movement. While there's potential for skirmishes, limited land-grabs, and aerial and missile attacks, neither India nor China can conduct a full-scale, all-theatre war across the Himalayas, occupy large chunks of territory, and then sustain large forces over extended periods in occupied lands.

Since the Sino-Vietnamese War of 1979, China has studiously avoided war. It has focused on building its economy and infrastructure. War is no longer a lucrative venture. China gains nothing by going to war with a near-peer competitor like India. China stands to lose economically, politically and militarily even if it "wins" a war. A war with India will also upset China's focus on "great power" status vis-à-vis the US. The Communist Party is well aware that its legitimacy is linked to its ability to deliver continued prosperity to China's citizens.

The UPA I and II governments invested a lot of political capital in convincing China to de-hyphenate India from Pakistan in its foreign policy. Even PM Modi had cultivated good relations with China. It, therefore, does make sense for India to have a rapprochement with China and pursue a mutually beneficial economic relationship. This will also allow India to build its economic strength, and by corollary, military strength. While India and China are geopolitical rivals, that rivalry need not descend into bitter conflict. If the two can manage their differences, the outcome can be stability, gradual normalisation and prosperity.

https://indianexpress.com/article/opinion/columns/wang-yi-india-china-relations-pm-modi-sco-meeting-10202126/

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# Bangladesh deepens ties with China & Pak amid Dhaka's tension with Delhi

*Source: The Times of India, Dt. 22 Aug 2025*

**Dhaka:** Against the backdrop of occasional strains in Dhaka-Delhi relations, Bangladesh is witnessing intensified engagement with both Pakistan, which committed genocide in 1971, and China, with growing exchanges at multiple levels.

Bangladesh's chief of army staff General Waker-Uz-Zaman left Dhaka on Thursday for an official visit to China, where he is scheduled to hold courtesy meetings with senior civilian and military leaders. According to Inter-Services Public Relations (ISPR), discussions will focus on strengthening bilateral military cooperation.

Meanwhile, in a significant development, diplomatic and official passport holders of Bangladesh and Pakistan will now be able to travel to each other's countries without visas. The council of advisers, chaired by chief adviser Muhammad Yunus, approved a draft agreement to this effect on Thursday.

This even as Pakistan's federal minister for commerce, Jam Kamal Khan, began a four-day visit to Bangladesh on Thursday. His agenda includes boosting bilateral trade, exploring new investment opportunities, and strengthening economic ties. Bangladesh has said that unresolved historical issues with Pakistan remain central to bilateral discussions.

Foreign affairs adviser Md Touhid Hossain recently confirmed that Dhaka will raise all issues. "The interim govt is approaching the matter in a pragmatic way," Hossain told reporters. During foreign secretary-level talks on April 17, Bangladesh pressed Pakistan for settlement of pending financial claims.

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# आवश्यक रक्षा कवच है सुदर्शन चक्र

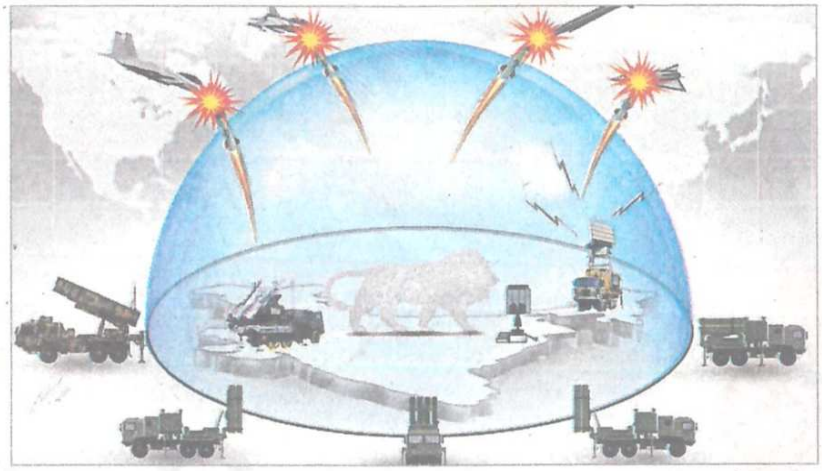
*Source: Dainik Jagran, Dt. 22 Aug 2025*

जगतबीर सिंह

**चूंकि वैश्विक सुरक्षा-सामरिक परिदृश्य बहुत तेजी से बदला है, इसलिए मिसाइल डिफेंस प्रणाली राष्ट्रीय सुरक्षा रणनीतियों का आधार स्तंभ बन गई है**

स्वतंत्रता दिवस पर लाल किले की प्राचीर से अपने संबोधन में प्रधानमंत्री नरेन्द्र मोदी ने कई महत्वाकांक्षी घोषणाएं कीं। ऐसी ही एक घोषणा राष्ट्रीय सुरक्षा के मोर्चे पर भी हुई। प्रधानमंत्री ने कहा कि प्रत्येक नागरिक को सुरक्षित महसूस होना चाहिए। इसे सुनिश्चित करने के लिए मिशन सुदर्शन चक्र को मूर्त रूप दिया जाएगा। इसके अंतर्गत अगले दस वर्षों के दौरान स्वदेशी तकनीकी विकास के माध्यम से भारत के महत्वपूर्ण प्रतिष्ठानों का सुरक्षा कवच मजबूत किया जाएगा। प्रधानमंत्री ने कहा कि भगवान श्रीकृष्ण से प्रेरणा लेते हुए हमने सुदर्शन चक्र की राह चुनी है। इस तंत्र से संबंधित समस्त शोध, विकास एवं विनिर्माण भारत में ही किया जाएगा। यह भी एक संयोग ही है कि भारत की प्रमुख स्ट्राइक कोर में से एक 21 कोर को भी सुदर्शन चक्र ही कहते हैं। अत्याधुनिक हथियारों से सुसज्जित यह आक्रामक इकाई दुश्मन को उसके इलाके में गहरी चोट पहुंचाने की क्षमताओं से लैस है। पिछले कुछ समय में वैश्विक सुरक्षा-सामरिक परिदृश्य बहुत तेजी से बदला है और निरंतर परिवर्तनों से गुजर रहा है। इस परिदृश्य में मिसाइल डिफेंस प्रणाली राष्ट्रीय सुरक्षा रणनीतियों का आधार स्तंभ बन गई है। इस क्रम में उन्नत तकनीकें मिसाइल खतरों का पता लगाने, उन्हें ट्रैक करने, इंटरसेप्ट करने और निष्क्रिय करने के लिए डिजाइन की गई हैं। इनके काम का दायरा छोटी रेंज की बैलिस्टिक मिसाइलों से लेकर अंतरमहाद्वीपीय बैलिस्टिक मिसाइलों यानी आइसीबीएम तक फैला हुआ है।

भू-राजनीतिक (जियो-पालिटिकल) तनाव बढ़ने की स्थिति में जब मिसाइलों का चलन बढ़ता है, तब सशक्त मिसाइल रक्षा प्रणालियों का महत्व अत्यधिक बढ़ जाता है। इस कड़ी में इजरायल की आयरन डोम प्रणाली का अक्सर उदाहरण दिया जाता है। अमेरिकी राष्ट्रपति डोनाल्ड ट्रंप ने भी इस साल एलान किया कि वे 175 अरब डालर की लागत से तैयार होने वाली गोल्डन डोम प्रणाली से अमेरिका के रक्षा आवरण को और अभेद्य बनाएंगे। गोल्डन डोम की संकल्पना स्थल, समुद्र और अंतरिक्ष आधारित मिसाइलों को निष्प्रभावी करने को ध्यान में रखकर की गई है। रूस ए-135 एंटी-बैलिस्टिक प्रणाली के जरिये मास्को और अन्य महत्वपूर्ण शहरों की रक्षा करता है। उसके पास एस-400 जैसी कारगर प्रणाली भी है जो तमाम मिसाइलों को नष्ट करने में सक्षम है। भारत के पास भी एस-400 की तीन स्क्वाड्रन हैं, जिसमें दो स्क्वाड्रन का और जुड़ाव होना है। चीन के पास एचक्यू-9 जैसी प्रणाली है। सतह से



अवधेश राजपूत

हवा में मार करने वाली लंबी दूरी की यह एंटी-बैलिस्टिक क्षमता प्रणाली एक तरह से रूसी एस-300 का ही चीनी संस्करण है। विमान, क्रूज मिसाइल और टैक्टिकल बैलिस्टिक जैसे हवाई खतरों को इंटरसेप्ट करने में सक्षम इस प्रणाली को चीन ने पाकिस्तान, मोरक्को, मिस्र, तुर्कमेनिस्तान और उज्बेकिस्तान जैसे देशों को बेचा भी है। ताइवान और जापान के पास भी ऐसी ही प्रणालियां हैं। ताइवान के पास जहां स्काई बो श्रेणी की सतह से हवा में मार करने वाली, एंटी-बैलिस्टिक मिसाइल और एंटी-एयरक्राफ्ट रक्षा प्रणाली है, वहीं जापान की योजना अमेरिका के पीएसी-3 वाले सतह से हवा में सक्रिय होने वाले इंटरसेप्टर्स को अपनाने की है।

अन्य प्रमुख देशों की तरह भारत भी मिसाइल संबंधी खतरों और साइबर हमलों के प्रति अपना रक्षा कवच मजबूत बनाने में लगा है। आपरेशन सिंदूर में इस रक्षा कवच का प्रभावी असर भी देखने को मिला। इंटीग्रेटेड एयर कमांड एवं कंट्रोल सिस्टम यानी आइएसीसीएस के जरिये भारत ने पाकिस्तान के मिसाइल हमलों को सफलतापूर्वक नाकाम किया। अनुमान है कि प्रस्तावित सुदर्शन चक्र को भारत के मौजूदा हवाई सुरक्षा ढांचे से भी जोड़ा जाएगा। इसे मूल रूप से आइएसीसीएस के आधार पर विकसित किया जाएगा, जिसमें सेना के स्वदेशी आकाशतीर नेटवर्क का भी समावेश होगा। सुदर्शन चक्र में अत्याधुनिक निगरानी, इंटरसेप्शन और प्रतिकार करने की क्षमताएं होंगी। यह हवा में, स्थल पर या समुद्र के साथ-साथ साइबरस्पेस से दस्तक देने वाले किसी भी खतरे को तत्काल निष्प्रभावी करने में सक्षम होगा। माना जा रहा है कि सुदर्शन चक्र की क्षमताएं पारंपरिक मिसाइल डिफेंस से भी कहीं अधिक होंगी।

वर्तमान में जिस तरह के नए-नए खतरे बढ़े हैं, उसे देखते हुए सैन्य एवं तकनीकी रक्षा कवच को और मजबूत बनाया जाना अपरिहार्य हो गया है। याद रहे कि आधुनिक समर नीति में केवल सैन्य प्रतिष्ठान ही नहीं, बल्कि बिजली ग्रिड, संचार नेटवर्क, खाद्य एवं जल आपूर्ति, स्वास्थ्य सुविधाएं और रक्षा प्रणालियां भी निशाने पर होती हैं। इसलिए सुदर्शन चक्र जैसे ढांचे की उपयोगिता बहुत बढ़ जाती है। इसमें सैन्य तकनीकों के साथ ही आर्टिफिशियल इंटेलिजेंस जैसी उभरती तकनीकों की भी अहम भूमिका होगी। वैसे तो मिशन सुदर्शन चक्र की रूपरेखा अभी पूरी तरह सामने नहीं आई, पर इसमें भारत की प्रतिष्ठित अनुसंधान इकाइयों, रक्षा प्रतिष्ठानों और निजी क्षेत्र की सहभागिता-सक्रियता देखने को मिलेगी। इसके अतिरिक्त, यह आकाश, एस-400 और क्यूआर-सैम जैसी मौजूदा प्रणालियों के साथ-साथ लेजर-आधारित इंटरसेप्टर जैसी भविष्य की ताकत से संचालित होकर एक संयुक्त रक्षा प्रणाली की भूमिका निभाएगा। इसे प्रभावी जवाबी हमलों की क्षमताओं के साथ ही हैकिंग और फिशिंग जैसे साइबर खतरों से निपटने की दृष्टि से भी तैयार किया जाएगा। आत्मनिर्भरता का भाव बढ़ाने के साथ ही यह सतह, हवा और समुद्र से भी संचालन-प्रक्षेपण में सक्षम होगा। इसका पुनःउपयोग भी किया जा सकेगा। इसका नियंत्रण भी चीफ आफ डिफेंस स्टाफ-सीडीएस के माध्यम से होगा।

इसमें कोई संदेह नहीं है कि जब सुदर्शन चक्र नाम वाली रक्षा प्रणाली प्रभाव में आएगी तो हमारे सामरिक ढांचे का प्रमुख स्तंभ बनेगी। एक निरंतर जटिल होते सुरक्षा परिदृश्य में अत्याधुनिक तकनीकों के जुड़ाव से उभरते हुए खतरों से निजात दिलाने में यह प्रणाली अहम भूमिका निभाकर भी अपनी उपयोगिता साबित करेगी।

(लेखक सेवानिवृत्त मेजर जनरल एवं यूनाइटेड सर्विस इंस्टीट्यूट आफ इंडिया में प्रतिष्ठित फेलो हैं)
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# Science & Technology News

## भारत बहुत जल्दी अपने रॉकेट, कैप्सूल से किसी भारतीय को अंतरिक्ष भेजेगा

***Source: NavBharat Times, Dt. 22 Aug 2025***

■ NBT रिपोर्ट, नई दिल्ली

केंद्रीय विज्ञान मंत्री डॉ. जितेंद्र सिंह की मौजूदगी में गुरुवार को भारत के अंतरिक्ष यात्री शुभांशु शुक्ला ने अपनी अंतरिक्ष यात्रा का अनुभव साझा किया। नैशनल मीडिया सेंटर में आयोजित प्रेस वार्ता में उन्होंने कहा कि ह्यूमन स्पेस मिशन का फायदा सिर्फ ट्रेनिंग तक सीमित नहीं है, बल्कि वहां रहकर जो अतिरिक्त ज्ञान मिलता है, वह अमूल्य है। पिछले एक साल में मैंने जो जानकारी जुटाई है, वह गगनयान और भारतीय अंतरिक्ष स्टेशन मिशन के लिए बेहद उपयोगी होगी। उन्होंने विश्वास जताया कि बहुत जल्द भारत अपने कैप्सूल, अपने रॉकेट और अपनी धरती से किसी भारतीय को अंतरिक्ष में भेजेगा।

**प्रेस कॉन्फ्रेंस** गुरुवार को केंद्रीय मंत्री जितेंद्र सिंह और ग्रुप कैप्टन प्रशांत बी. नायर की मौजूदगी में शुभांशु शुक्ला ने अपने अनुभव बताए।

उन्होंने कहा कि किताबें और ट्रेनिंग एक बात है, लेकिन असली मिशन की जिंदगी बिल्कुल अलग होती है और यह अनुभव गगनयान में बहुत काम आएगा। उन्होंने कहा, आज भी अंतरिक्ष से भारत सारे जहां से अच्छा दिखता है। भारतीय गगनयात्री ग्रुप कैप्टन प्रशांत बालकृष्णन नायर ने कहा कि भले मैं शुक्स (शुभांशु शुक्ला) से उम्र में बड़ा हूं, लेकिन इस राम का लक्ष्मण बनने को तैयार हूं।

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## 1st non-crew Gaganyaan mission to launch in December with robot Vyommitra

***Source: The Tribune, Dt. 22 Aug 2025***

Indian Space Research Organisation (ISRO) Chairman V Narayanan today said the Gaganyaan programme's first uncrewed mission G1 would be launched with humanoid robot Vyommitra in December.

Narayanan said Vyommitra would monitor module parameters, issue alerts and execute life support operations. The Gaganyaan mission is the country's ambitious human spaceflight programme, aimed at sending Indian astronauts to space.

Addressing a press conference here alongside Group Captain Shubhanshu Shukla, who recently returned from the International Space Station after a historic voyage, Narayanan said over 7,700 ground tests related to the Gaganyaan mission had been completed and over 2,300 more were to be done before March 2026.

"The motors for crew escape systems, which are integral for astronaut safety, have also been developed and tested. Orbital module preparation facility, Gaganyaan control centre,

environmental control and life system, crew training facility, second launch pad modification and parachute-based deceleration system have been established," he said.

The ISRO chief said the upcoming missions included an integrated air drop test that entailed dropping a crew capsule from an altitude of 3.5 to 4 km using a helicopter. "Trial sorties are underway. In the fourth quarter, the first uncrewed mission of Gaganyaan (G1) will be launched," he said.

Group Captain Shukla, in his first-ever media interaction, said the insights he gained from his visit to the ISS would help the country in the Gaganyaan mission.

Sharing an update about the seven experiments he conducted on the space station, Shukla said the results would be out in a few months. He said different countries came together for a common cause. "Space unites people. Witnessing a human space flight mission is a different experience. This mission has been extremely successful in achieving its objectives, but more importantly, it has given us insights that cannot be documented on paper. These will be critical as India prepares for Gaganyaan and beyond," he said.

Group Captain Prasanth B Nair, who trained alongside Shukla for the Axiom-4 mission, described the experience as a reminder of the country's growing stature in the global space community. Drawing from his interactions abroad, he said India's achievements were met with respect and admiration, often accompanied by surprise at the scale of progress made with humility.

He emphasised that India's approach to space was rooted in inclusivity and shared benefit, reflecting the nation's belief in the oneness of humanity. Stressing that the future lied in space and related technologies, he said the progress made was possible only because of the collective contributions of scientists, policymakers, and citizens.

Minister of State (Independent Charge) for Science and Technology and Department of Space Jitendra Singh said Shukla's space voyage vindicated the vision of Atmanirbhar Bharat.

Meanwhile, the Department of Space has constituted a high-level review committee to closely monitor the progress of activities leading to the launch of India's human spaceflight programme.

"Flight integration activities for various propulsion stages of the HLVM3 launch vehicle have been completed. Currently, crew and service modules' mechanical and electrical integration activities are underway. Further, integration of orbital module and thermovac tests, dynamic and acoustic tests and launch complex activities such as propellant filling and integrated checks are to be completed," Naryanan said, adding that five launches would take place this year and four in 2026.

https://www.tribuneindia.com/news/india/1st-non-crew-gaganyaan-mission-to-launch-in-dec-with-robot-vyommitra/

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## SpaceX took oxygen leak before Axiom-4 launch 'lightly': ISRO Chairman

***Source: The Hindu, Dt. 22 Aug 2025***

The Indian Space Research Organisation (ISRO) Chairman, V. Narayanan, on Thursday (August 21, 2025), said the Falcon 9 rocket team that launched Indian astronaut Group Captain Shubhanshu Shukla to the International Space Station (ISS) took the pre-launch leak in the

oxidiser line to one of the engines “lightly”. He said that had it not been for the ISRO’s insistence on a full-fledged test, the leak could have caused a “catastrophic failure” of the Axiom-4 mission that successfully ferried four astronauts to the ISS and brought them back.

The mission was aboard the SpaceX-owned Falcon 9 rocket, which has a track record of successful missions to the ISS. It was the first time in 40 years that an Indian made it to space. Costing India nearly ₹548 crore, the mission is believed to provide valuable information for ISRO’s upcoming manned flight missions such as Gaganyaan, scheduled for mid-2027.

The Axiom-4 mission was supposed to be launched on June 11, after the fourth rescheduling, but that was postponed when a liquid oxygen leak was discovered during an engine test in the lead-up to the lift-off. The decision to postpone, it emerges, was controversial as there appeared to be differences between the Falcon-9 team and ISRO on whether the leak was serious enough to postpone the mission.

Two months after the rocket lifted off on June 25, and which has successfully returned, Mr. Narayanan disclosed interactions between the Falcon team and ISRO that suggest that the Falcon team was not upfront with sharing data from the engine test results, nor could it satisfy the ISRO probing on details of the leak.

“I think they assumed that this was a minor leak because it wasn’t their ‘leak’ sensor but an oxygen sensor that had picked up (the leak). We learnt of this from the press (a press conference by SpaceX the previous day) and when we asked them the location of the leak, they said they couldn’t find it. This was shocking to us. Then we asked them for the rate at which oxygen was leaking out; they said this couldn’t be shared as it was “confidential” data. “We asked them nearly 14 questions; only two were answered,” said Mr. Narayanan.

“ISRO has 40 years of experience with liquid engines, and we know that if there is a block somewhere, it can be rectified, but if the source of a leak is due to a crack, it cannot be allowed. We insisted on a “complete correction” and they had to call off the launch on June 10, 5.15 p.m. Following this, the (Space-X) management directed the Falcon team to find the location of the leak. It turned out to be a crack in the fuel line. During the tests, it emerged that the crack was widening; we have the data. If the rocket were to lift off with such a crack, the ensuing vibrations will cause it to give way. That will only result in a catastrophic situation... They probably took this a little lightly,” he added.

The following day (June 12), the leak was repaired and tests were carried out to ISRO’s satisfaction. Subsequent leaks were detected in the Russian service module of the ISS, which led to further launch delays until June 25 when Mr. Shukla and his companions finally lifted off.

Captain Shukla, in response to queries at the press conference, on whether Mr. Narayanan “had saved his life” by insisting on fixing the leak said, “Everyone who does human space flight missions are very responsible. There were multiple postponements, and this wasn’t the only reason. It helped that we had technical expertise from the ISRO and these discussions happened. Ultimately this is what builds trust. ISRO, NASA and Space X have always been transparent and have had regular briefings on emerging issues.”

https://www.thehindu.com/sci-tech/science/spacex-took-oxygen-leak-before-axiom-4-launch-lightly-says-isro-chairman/article69961005.ece

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# Axiom-4 learnings will help train for Gaganyaan: ISRO chief

***Source: The Indian Expess, Dt. 22 Aug 2025***

The Indian Space Research Organisation (ISRO) has prepared a 4,000-page document detailing the experience of Group Captain Shubhanshu Shukla on the Axiom-4 mission, the training that he and fellow astronaut Prashant B Nair underwent, and the learnings of the ISRO team present in the US through the mission. ISRO chairman V Narayanan said these learnings would be applied for training astronauts for India's Gaganyaan programme.

They (the two astronauts) have gained a lot of confidence working with a very experienced team (SpaceX, NASA and Axiom). The entire training programme, going to space and coming back, the docking process, the microgravity environment that the bodies faced, everything has been documented. This will be very useful for our own astronauts, the current batch and subsequent ones," said Narayanan.

But the run-up to the mission was not all that smooth. Narayanan recounted the incident of a leakage in the rocket ahead of the launch, which the ISRO team insisted on being repaired. "… Probably, they thought that it was a minor leakage… When it came in the press, the first question asked was where the leak was. To our surprise, they could not find the location of the leak. We were shocked," Narayanan said.

He said that when the Axiom team was asked about the leak rate, they said it was confidential.

"We were not comfortable. If it is a case of just a small hole it is not a problem, but if it is a crack that cannot be allowed. So, we insisted on a complete correction and they had to call off the launch… When they located it, it was a crack in the fuel line. During the test, the leak was increasing, the data is with us. If it (the rocket) lifts-off with a crack, what will happen is that with vibrations, it will give way. Then it will be a catastrophic situation," he said.

Talking about his experience in space, Shukla said that despite all the training, when the rockets finally took off, it felt very different. He said everything was a surprise in space, the biggest of which was utilising space in 3D.

"You walk on the floor and sit on the seats. In space you can crawl on ceiling or the walls. This was a very unique experience. Initially, I gave things to people to hold, although I knew nothing would fall; it was a habit," he said.

He also spoke about sleeping in space through 16 sunrises and sunsets every day. He said GMT timing was followed on the space station and the windows were shuttered down when one had to sleep. "But it was so beautiful, I always wanted to sit by the window," said Shukla.

He said there was a craving for more Indian foods in space. "That's what you really miss. You don't really feel hungry… the food feels bland. I am very particular about my food, but when I came back I told my wife I will eat whatever you make. She said finally it took me going to space for it."

Shukla also spoke about his first view of the Earth. "It was a night pass… The darkness of the sea first and then the country completely lit up. There is no other place I would feel emotional about. I have seen India several times since, but that first view left its mark," he said.

Prashanth Nair, who was on the standby for the Axiom-4 mission, was asked whether he felt having missed out on this trip. He said the Air Force had taught him the importance of being a good wingman, and compared himself to being a "Laxman to Shukla's Ram". "It feels like Diwali today, and all our countrymen are here to receive us," Nair said.

He said the actual experience is very different from training. “Even if you write a PhD on the smell of roses, a person who has never smelled a rose will not know what it means after reading it entirely. Until you go to space you would not know what it means.”

https://indianexpress.com/article/india/axiom-4-learnings-will-help-train-for-gaganyaan-isro-chief-10203808/

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# Crafting smart materials: Tiny flakes and material design impact energy saving technologies

***Source: Press Information Bureau, Dt. 21 Aug 2025***

Smart windows devised by fine-tuning properties of "Polymer Network Liquid Crystals" (PNLCs) device by adding tiny flakes of a nanomaterial, hexagonal boron nitride (h-BN) can bring down the load on air conditioners by controlling infra-red light.

In the quest for more energy-efficient homes and devices, controlling how materials interact with light, especially invisible infrared (IR) radiation, is crucial. Infrared light, while essential for life on Earth, can also contribute to unwanted heat, increasing the need for air conditioning and the associated energy consumption. Scientists are constantly seeking innovative ways to manage this radiation.

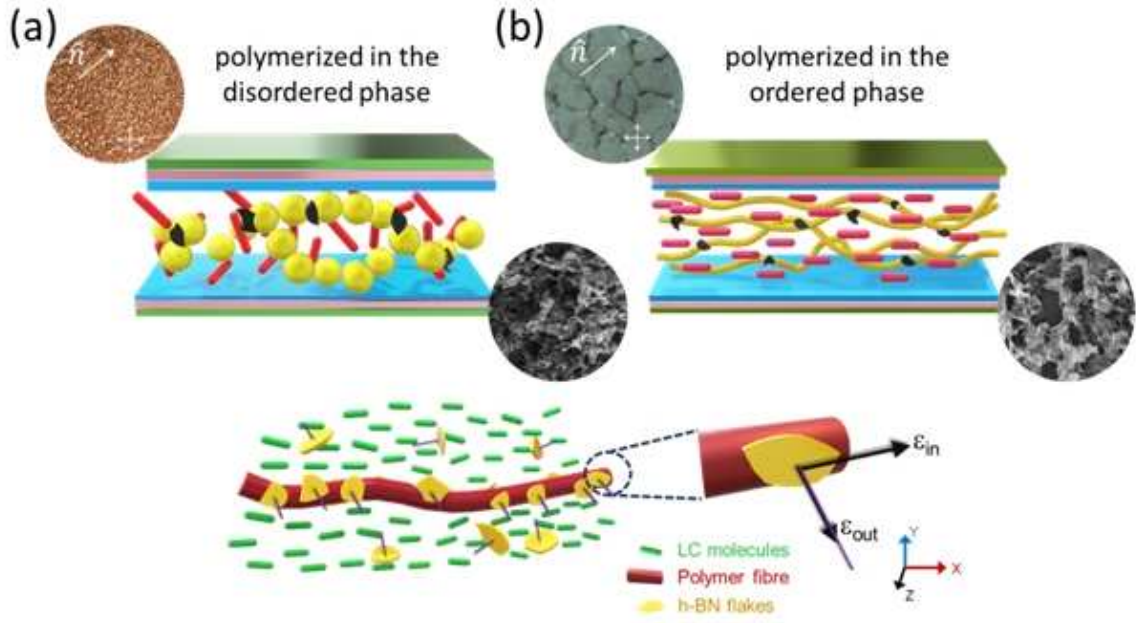


***Fig:*** *Top panel: Schematic diagram showing (a) the PNLC-BN system polymerized in the disordered phase along with its optical microscopy (left top) FESEM image (right bottom) and that of PNLC-BN system polymerized in the ordered phase with its FESEM image (right).*

***Bottom panel:*** *Schematic showing that the small sized h-BN flakes are better incorporated into the polymer as their lateral size is comparable to the size of polymer fibre.*

A research team at the Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru, an autonomous institute of Department of Science and Technology (DST) has brought fascinating new insights in this direction. Their recent work explores how to fine-tune the properties of

"Polymer Network Liquid Crystals" (PNLCs) device, using an optimized composite of polymers and liquid crystals, by adding tiny flakes of a nanomaterial, hexagonal boron nitride (h-BN).

Their research highlights two key ways to control the amount of IR light scattered by these materials through nano-level modification of the formed network. In the absence of h-BN, the system forms a course, bead-like network resulting in very little IR scattering and hence essentially no electrical control over. On the other hand, crafted incorporation of h-BN nanoflakes leads to a smooth and continuous network.

Consequently, the device with nanoflakes exhibits high-magnitude IR scattering permitting substantial electrical control over the amount of external heat entering the room. From the material design perspective, the “IR-control polymer-LC network” is primarily realized by polymerizing the composite in either the “ordered” or “disordered” state of the LC. Electron microscopy studies show that the accomplished nanoflake disposition creates a large number of local scattering sites, drastically enhancing the IR scattering.

Building on this, the team of the two researchers, Gayathri Pisharody and Priyabrata Sahoo working with faculty supervisors Dr. D.S. Shankar Rao, Dr. Ramakrishna Matte and Dr. S. Krishna Prasad, further explored ways and means of making the h-BN flakes blend seamlessly with the polymer network, a feature that depends on the physical dimension of the nanostructures, their concentration, process temperature and other control parameters.

Optimization of these parameters has led to smart windows driven by electric fields that exhibit a large IR contrast which can be switched between transparent (allowing heat radiation into or from the enclosure) and scattering (blocking IR radiation) states at high operating speeds.  Scaled-up versions of these smart windows could serve as excellent engineering devices, for instance, as specific light/heat management windows, and more importantly for bringing down the load on air conditioners.

The research was published recently as two papers in the Journal of Molecular Liquids.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2159344

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The Statesman
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The Times of India
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दैनिक जागरण
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