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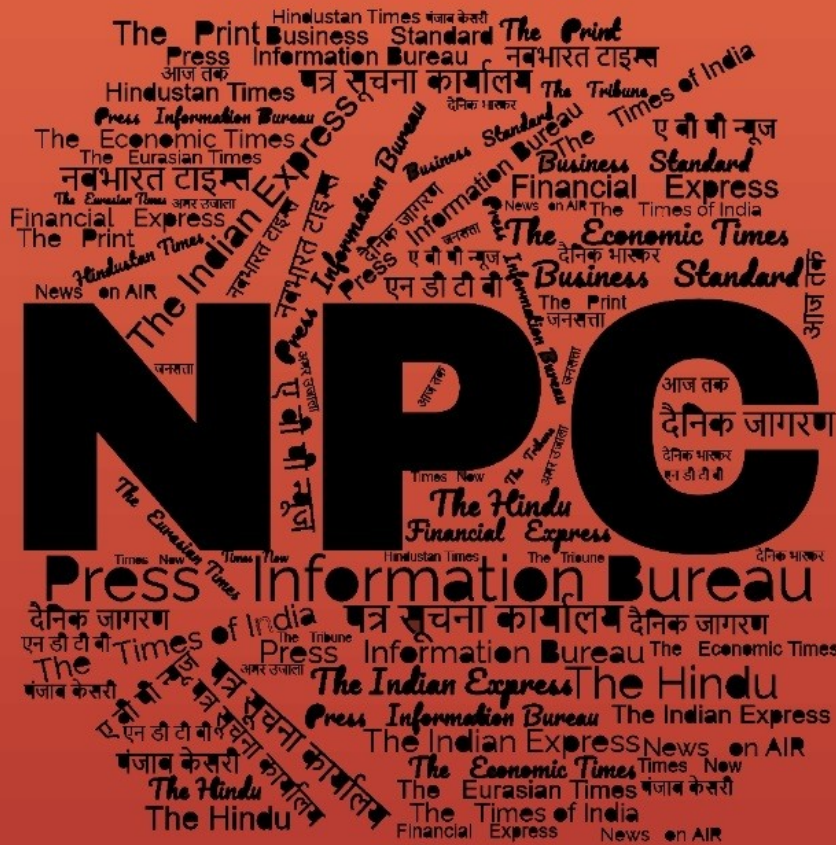
खंड/Vol. : 50 अंक/Issue : 81

06/05/2025

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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DRDO News

DRDO और नौसेना के हाथ लगी एक और सफलता, MIGM माइन्स का किया सफल परीक्षण

Source: IndiaTV Hindi, Dt. 06 May 2025,

URL: <https://www.indiatv.in/india/national/drdo-and-navy-got-another-success-successfully-tested-migm-mines-2025-05-06-1132775>

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) और भारतीय नौसेना ने स्वदेशी रूप से विकसित मल्टी-इन्फ्लुएंस ग्राउंड माइन (एमआईजीएम) का सफलतापूर्वक परीक्षण किया है, जो भारत की पानी के भीतर युद्ध क्षमताओं को मजबूत करने की दिशा में एक महत्वपूर्ण कदम है। कई सेंसरों का उपयोग करके दुश्मन के जहाजों का पता लगाने और उन्हें निशाना बनाने के लिए डिजाइन की गई एमआईजीएम प्रणाली को जल्द ही भारतीय नौसेना में शामिल किया जाएगा। एक बार तैनात होने के बाद, यह भारतीय समुद्री क्षेत्र में दुश्मन के जहाजों और पनडुब्बियों की घुसपैठ के खिलाफ एक शक्तिशाली निवारक के रूप में काम करेगी।

अंडर वॉटर माइन का सफल परीक्षण

यह परीक्षण महत्वपूर्ण रक्षा प्रौद्योगिकियों में आत्मनिर्भरता के लिए भारत के प्रयास में एक महत्वपूर्ण मील का पत्थर है। इसके अलावा पानी के भीतर मौजूद खतरों के खिलाफ समुद्री क्षेत्रों को सुरक्षित करने और नौसेना की क्षमता को बढ़ाने में कारगर साबित होगा। डीआरडीओ ने इस परीक्षण का एक वीडियो भी साझा किया है, जिसमें पानी के भीतर हो रहे विस्फोट को दिखाया गया है। इसे लेकर रक्षामंत्री राजनाथ सिंह ने एक्स पर बयान भी दिया है। रक्षा मंत्री राजनाथ सिंह ने इस सफल परीक्षण के लिए डीआरडीओ और नौसेना को बधाई दी है। राजनाथ सिंह ने कहा, "यह प्रणाली भारतीय नौसेना की पानी के भीतर युद्ध क्षमताओं को और बढ़ाएगी।"

सेंसर्स से लैस है MIGM

इसे लेकर भारत डायनेमिक्स लिमिटेड ने कहा, "MIGM कई सेंसरों से लैस है, जो समुद्री जहाजों द्वारा पैदा होने वाले ध्वनि, चुंबकीय फील्ड, दबाव, जैसी चीजों को मॉनिटर करता है। विशाखापत्तनम और अपोलो माइक्रोसिस्टम्स लिमिटेड और भारत डायनेमिक्स इसके उत्पादन में भागीदार हैं। बता दें कि अंडर वॉटर माइन्स कई शताब्दियों तक नौसैनिक युद्ध का केंद्र रही हैं। द्वितीय विश्वयुद्ध के दौरान ब्रिटिश, अमेरिकी, जापानी और जर्मन समुद्री मार्गों पर खदानें बिछाते थे।

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India carries out test of advanced underwater naval mine

Source: The Hindu, Dt. 06 May 2025,

URL: <https://www.thehindu.com/news/national/india-carries-out-test-of-advanced-underwater-naval-mine/article69542612.ece>

India has successfully test-fired an advanced underwater naval mine designed to enhance the Navy's capabilities against modern stealth ships and submarines. The development came amid increasing tensions between India and Pakistan over the Pahalgam terror attack.

Validation trials of Multi-Influence Ground Mine (MIGM) was successfully conducted by DRDO and @indiannavy . MIGM is designed to enhance the Indian Navy's capabilities against the modern stealth ships and submarines.



"The Defence Research and Development Organisation (DRDO) and Indian Navy have successfully undertaken combat firing (with reduced explosive) of the indigenously designed and developed Multi-Influence Ground Mine (MIGM)," the defence ministry said on Monday (May 5, 2025).

It said the the system is an advanced underwater naval mine developed by the Naval Science and Technological Laboratory, Visakhapatnam in collaboration with other DRDO laboratories.

The MIGM is designed to enhance the Indian Navy's capabilities against modern stealth ships and submarines. Bharat Dynamics Limited, Visakhapatnam and Apollo Microsystems Limited, Hyderabad are the production partners for the system.

Complimenting DRDO, Indian Navy and the Industry, Defence Minister Rajnath Singh said the system will further enhance undersea warfare capabilities of the Indian Navy.

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Parachutes for uncrewed spaceflight of Gaganyaan mission flagged off

Source: The Hindu, Dt. 06 May 2025,

URL: <https://www.thehindu.com/sci-tech/science/parachutes-for-uncrewed-spaceflight-of-gaganyaan-mission-flagged-off/article69542035.ece>

A set of parachutes developed for the first uncrewed mission of India's Gaganyaan human spaceflight programme was shipped from Agra on Monday (May 5, 2025). The parachutes were

developed by the **Aerial Delivery Research and Development Establishment (ADRDE)**, an Agra-based laboratory under the Defence Research and Development Organisation (DRDO).

“Indigenously developed parachutes for the safe return of the capsule that will carry astronauts under the proposed Gaganyaan Programme are set to undergo [testing in an] unmanned mission by the Indian Space Research Organisation (ISRO),” ADRDE stated. According to the statement, the parachute configuration consists of 10 parachutes designed for sequential deployment.

Under the Gaganyaan programme, ISRO aims to send a crew of two or three astronauts into Low Earth Orbit (LEO).

Explaining the recovery sequence during flight, the ADRDE statement detailed that it begins with the deployment of two Apex Cover Separation parachutes (which protect the main parachute compartment). This is followed by two Drogue parachutes to stabilise the module and reduce its velocity. Subsequently, upon release of the drogue chutes, three Pilot parachutes are deployed to extract the three Main parachutes individually. The Main parachutes are designed to reduce the crew module’s speed to safe levels for landing.

The flight unit parachutes were formally flagged off by Dr. Manoj Kumar, Director of ADRDE. They have been dispatched to the ISRO Satellite Integration and Testing Establishment (ISITE) in Bengaluru.

These parachutes are intended for the first uncrewed Gaganyaan mission, designated G-1. The ADRDE team will proceed to assemble the parachutes with the crew module at ISITE in preparation for this mission, which is planned for later this year.

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Defence News

Defence Strategic: National/International

Raksha Mantri holds bilateral meeting with his Japanese counterpart in New Delhi

Source: Press Information Bureau, **Dt.** 05 May 2025,

URL: <https://pib.gov.in/PressReleasePage.aspx?PRID=2127087>

Raksha Mantri Shri Rajnath Singh held a bilateral meeting with Minister of Defense of Japan Mr Gen Nakatani at Manekshaw Centre, New Delhi on May 05, 2025. During the meeting, both sides condemned terrorism in all its forms and emphasised the need for global cooperation in this regard.

Raksha Mantri condemned Pakistan’s state policy of cross-border terrorism against India, perpetrated through state and non-state actors. He stated that such attacks destabilise regional

peace and security. Shri Rajnath Singh called for a unified stand against terrorism and the state-sponsored actions that perpetuate it.



The Japanese Defense Minister expressed his condolences for the tragic terrorist attack which took place in Pahalgam, Jammu & Kashmir on April 22, 2025 and offered full support to India. Both the Ministers reviewed the defence and security pillars of the India-Japan Special Strategic and Global Partnership. They reaffirmed their commitment towards strengthening the bilateral relations and contributing towards regional peace. The Ministers welcomed the growing diversity and frequency of defence exercises & exchanges between the two countries, and concurred to enhance the scope & complexity of these engagements. Both leaders agreed to add new dimensions to the robust maritime cooperation between India and Japan.



Shri Rajnath Singh outlined the capability of Indian defence industry particularly its potential to collaborate with the Japanese side on new areas including Tank engines and Aero Engines. He highlighted the capabilities in the areas of Maintenance Repair and Overhaul operations. Both sides agreed to enhance industry cooperation, including exploring collaboration in niche domains such as automation and Artificial Intelligence. The two Ministers also decided to take forward the cooperation in emerging areas like Cyber and Space.

India and Japan share a long-term friendship, which has further gained qualitative momentum after the elevation of this collaboration to Special Strategic & Global Partnership in 2014. The Dialogue ended with strong commitment by both sides to enhance the bilateral defence cooperation.

Earlier, the Japanese Defense Minister laid a wreath at National War Memorial and paid homage to the fallen heroes. He was accorded a ceremonial welcome with a Tri-Services Guard of Honour prior to the dialogue at Manekshaw Centre.

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INS Sharda arrives Maafilaafushi, Maldives for HADR Exercise

Source: Press Information Bureau, Dt. 05 May 2025,

URL: <https://pib.gov.in/PressReleasePage.aspx?PRID=2126999>

In line with India's commitment towards regional cooperation, INS Sharda arrived at Maafilaafushi Atoll, Maldives, for a Humanitarian Assistance and Disaster Relief (HADR) exercise planned from 04 to 10 May 25. This deployment is a testament to the strong defence and maritime cooperation between India and the Maldives. It aligns with India's "MAHASAGAR" (Mutual and Holistic Advancement for Security and Growth Across Regions) vision, emphasising collaborative efforts to ensure peace, stability, and prosperity in the Indian Ocean Region.



This HADR exercise aims to enhance interoperability between the Indian Navy and the Maldives National Defence Force (MNDF). It will focus on actions like Disaster Response Coordination, Search and Rescue Operations, Medical Assistance, Logistical Support, Joint Drills, Training Sessions, and Community Engagement following a major natural disaster.

Through such collaborative efforts, India and the Maldives continue strengthening their partnership and ensuring readiness to respond effectively to natural disasters and other humanitarian challenges.

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Upgraded missiles, jets and revenge vows after Pahalgam attack raise stakes in India-Pakistan clash

Source: The Economic Times, Dt. 06 May 2025,

URL: <https://economictimes.indiatimes.com/news/defence/upgraded-missiles-jets-and-revenge-vows-after-pahalgam-attack-raise-stakes-in-india-pakistan-clash/articleshow/120889959.cms>

India and Pakistan have significantly upgraded their military capabilities since the nuclear-armed neighbours clashed in 2019, posing increased risks of escalation even in a limited conflict, former military officers and experts say.

Pakistan says India plans a military incursion after New Delhi blamed Islamabad for a deadly attack on domestic tourists in Indian Kashmir last month. India's Prime Minister Narendra Modi has vowed to punish the backers of the attack "beyond their imagination". Pakistan has denied involvement in the attack but has warned it will hit back if it is targeted.

In 2019, India carried out air strikes inside Pakistan after the bombing of an Indian military convoy in Kashmir and said it destroyed "terrorist camps". Pakistani jets conducted a retaliatory air strike and shot down an Indian aircraft during actions spread over two days.

The neighbours have fought three wars - in 1948, 1965 and 1971 - and clashed countless times since gaining independence, mostly over the Kashmir region. Both acquired nuclear weapons in the 1990s and Kashmir is considered one of the most dangerous flashpoints in the world. They say such a conflict is likely to involve aircraft, missiles or drones, where India and Pakistan are considered closely matched, although India's far greater resources would come into play over a longer period.

"Decision makers in both states now have a higher risk appetite for conflict initiation and escalation than prior to 2019," said Frank O'Donnell, a non-resident fellow at the South Asia Program at the Stimson Center, a think-tank in Washington, as they had managed then to clash without nuclear weapons being used. "But without a clear mutual sense of the precise actions, that could trigger inadvertent escalation," he added. Both sides have acquired new military hardware since 2019, opening up new conventional strike options.

"Each side will think they are in a better position than last time," said Muhammad Faisal, a South Asia security researcher based at the University of Technology, Sydney. "It is only when we see

actual combat that we will find out." In particular, India believes that it was at a disadvantage in 2019 because it had to rely mainly on ageing Russian jets. It has since inducted 36 French-made Rafale fighter jets, a top Western aircraft, with more on order for its navy.

To counter, Pakistan got one of China's most advanced war planes, the J-10, a rough equivalent of the Rafale, in batches since 2022. It has at least 20 of the aircraft, according to the London-based International Institute for Strategic Studies. The planes carry advanced capabilities, with the Rafale armed with Meteor air-to-air missiles that operate beyond visual range. The J-10 is armed with the comparable PL-15 missile, according to a Pakistani security official who declined to be identified because they were not authorised to brief the media.

To plug the gaps in air defences exposed on both sides in the 2019 conflict, India secured Russia's battle-tested S-400, a mobile anti-aircraft missile system. Pakistan obtained the HQ-9 from China, which is based on Russia's S-300, one notch down. "Most certainly in some respects we are better off (than 2019)," said Anil Golani, a former air vice marshal in the Indian Air Force, and the director general of the Delhi-based Centre for Air Power Studies think tank.

"There's a lot of clamour for action in the country but, in my personal assessment, both India and Pakistan are not looking for an all-out conflict," he added. Hanging over any conflict is China, India's rival and Pakistan's close ally and biggest supplier of military equipment. Although the U.S. has urged India and Pakistan to ease tensions, it will closely watch any conflict for insights on Beijing's aerial strength.

The Chinese plane and its PL-15 missile have not previously been tested in combat. "It could be a contest between Western and Chinese technology," said Faisal, adding "for India, there is the dilemma of how many air squadrons to commit to the Pakistan front, as it must also guard against China."

China and India fought a brief border war in 1962 and the two armies have clashed, most recently in 2022, along their tense Himalayan frontier. Pakistan has a fleet of F-16s, the U.S. aircraft acquired decades back when ties with Washington were stronger. These F-16s were deployed in the 2019 tussle, leading India to lodge protests with the U.S., although New Delhi now enjoys far closer ties with Washington.

This time, to avoid the political fallout with the F-16 and to take advantage of having a more advanced aircraft, Pakistan will likely spearhead with the Chinese J-10, experts said. But a drone or ground-launched missile strike is considered more likely since neither would risk a pilot being shot down.

India has turned to Israel for combat-capable drones, getting the Heron Mark 2, and it has U.S. Predator drones on order. Pakistan has acquired Turkey's Bayraktar TB2 - used by Ukraine in its war with Russia - and the Akinci, also from Turkey, according to the Pakistani security official.

Amid the standoff, Pakistan tested a surface-to-surface ballistic missile with a range of 450 km (280 miles) on Saturday, to show that the armed forces were ready to "safeguard national security against any aggression," according to a statement from the country's military. Pakistan also has a range of short-range and medium-range missiles, capable of being fired from ground, sea and air.

There was no immediate comment from India on the test. India's capabilities include the BrahMos supersonic cruise missile of about 300 km range as well the Agni series of intercontinental ballistic missiles. The 2019 skirmish almost spiralled out of control, with multiple missile strikes threatened before U.S. intervention calmed the situation down.

Kaiser Tufail, a former fighter pilot in the Pakistani air force, said that India did not manage to establish deterrence in 2019, so it would aim for a more incisive strike this time, bringing more risks in its wake. Modi said following the 2019 skirmishes that the country had felt the lack of Rafale fighters at the time, which were on order, and suggested that the results of the clash could have been different if it had the French fighter. "If you go beyond what we saw in 2019, it is very risky," said Tufail. "Nuclear-armed countries slugging it out is extremely dangerous."

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Indian Army tightens cybersecurity after defence-linked websites come under attack

Source: The Economic Times, Dt. 05 May 2025,

URL: <https://economictimes.indiatimes.com/news/defence/indian-army-tightens-cybersecurity-after-defence-linked-websites-come-under-attack/articleshow/120903126.cms>

The Indian Army is implementing stronger cybersecurity measures after multiple hacking attempts targeted defence-related websites, sources confirmed on Monday. These include attacks on Army Public Schools and the Army College of Nursing, as well as claims of data breaches involving defence think-tanks and a Public Sector Undertaking under the Ministry of Defence.

Defence think-tank denies breach

Amid swirling reports on social media, two senior officials from the Manohar Parrikar Institute for Defence Studies and Analyses (MP-IDSA) have categorically denied that their website was hacked, as reported by ANI. Their response comes after the Pakistan Cyber Force, a handle on social media platform X, claimed responsibility for breaching MP-IDSA systems.

The group alleged that it had accessed 10GB of sensitive data belonging to over 1,600 users on the MP-IDSA website. It also claimed access to data from the Military Engineer Services (MES). However, no official confirmation has been made, and the claims remain unverified. Pak diplomacy touches new low, Pakistani official makes 'throat slit' gesture at London protesters Pak diplomacy touches new low, Pakistani official makes 'throat slit' gesture at London protesters Pak diplomacy touches new low, Pakistani official makes 'throat slit' gesture at London protesters

Educational and welfare websites hit

A growing list of cyberattacks has alarmed defence authorities. Hackers recently targeted websites of several Army Public Schools (APS), including APS Nagrota and APS Sunjuwan in Jammu and Kashmir. Both websites were down as of Monday evening. On April 25, the Army College of Nursing in Jalandhar Cantonment was also attacked. The website was defaced with disturbing images and a banner that read: "YOU ARE HACKED!!! TEAM INSANE PK". The site remains

offline. These institutions fall under the Army Welfare Education Society, which manages a range of educational and welfare services for military personnel and their families.

Cyber experts monitoring situation

“Appropriate and necessary measures” are being taken to “bolster” digital defences and guard against further intrusions, sources told multiple media outlets. One insider added that the focus is on “enhancing the overall resilience” of military-linked digital infrastructure. Cybersecurity agencies are “actively monitoring cyberspace” for further attacks, especially those suspected to be cross-border operations.

PSU website taken down for audit

The website of Armoured Vehicle Nigam Limited (AVNL), a PSU under the Defence Ministry, was also reportedly taken offline. Sources quoted by NDTV said this was done for a thorough audit to assess any damage caused by an attempted cyber breach. A post from Pakistan Cyber Force allegedly showed an edited image of the AVNL homepage, where an Indian tank had been replaced with a Pakistani one. Another message read: “Hacked. Your security is illusion. MES data owned.”

Wave of attacks traced to Pakistan

On May 1, hacker groups such as “Cyber Group HOAX1337” and “National Cyber Crew” made failed attempts to breach several defence-linked websites. These were promptly detected and neutralised, according to ANI.

Earlier, in late April, a hacker group operating under the name “IOK Hacker” (Internet of Khilafah) launched a coordinated campaign against Indian defence platforms. Among the targets were websites of APS Srinagar, APS Ranikhet, and the Army Welfare Housing Organisation (AWHO). The website of the Indian Air Force Placement Organisation was also reportedly targeted. APS Srinagar, in particular, suffered a distributed denial-of-service (DDoS) attack in addition to being defaced with propaganda.

Larger tensions after Pahalgam attack

The cyber incidents come in the wake of heightened tensions between India and Pakistan following the Pahalgam terror attack on April 22, where 25 tourists and a local resident were killed. The Resistance Front, a proxy of the Lashkar-e-Taiba, claimed responsibility for the assault.

India has launched diplomatic actions, including the suspension of the Indus Waters Treaty and visa services to Pakistani nationals. Security meetings involving Prime Minister Narendra Modi, Home Minister Amit Shah, and senior defence officials suggest a broader response is being considered. In contrast, Pakistan has denied involvement and demanded evidence, a stance it has repeated in the aftermath of previous attacks.

Rajasthan education website also targeted

Adding to concerns, the website of the Rajasthan education department was hacked recently. The attackers mocked the Indian government over the 2019 capture of Indian Air Force officer Abhinandan Varthaman and posted inflammatory content related to the Pahalgam incident.

Authorities are on alert, and defence-linked institutions are revisiting their digital security protocols. With regional tensions simmering and cyber provocations increasing, officials say that India's cybersecurity infrastructure will be continuously upgraded to deal with evolving threats.

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Amid tensions with India, Pakistan tests FATAH surface-to-surface missile

Source: The Week, **Dt.** 05 May 2025,

URL: <https://www.theweek.in/news/defence/2025/05/05/another-war-cry-amid-tensions-with-india-pakistan-tests-fatah-surface-to-surface-missile.html>

A few days after conducting a test firing of the surface-to-surface missile—Abdali Weapon System—Pakistan, on Monday, claimed that it carried out a successful training launch of a FATAH Series surface-to-surface missile. The missile system has a range of 120 kilometers.



Pakistan's Inter-Services Public Relations (ISPR) said the launch was aimed at "ensuring the operational readiness of troops and validating key technical parameters, including the missile's advanced navigation system and enhanced accuracy."

Chairman Joint Chiefs of Staff Committee, and the Chief of Army Staff, who congratulated the troops, scientists, and engineers who participated in the test-launch of the missile, expressed complete confidence in the operational preparedness and technical proficiency of the Pakistan Army "to thwart any aggression against the territorial integrity of Pakistan."

The missile tests come in the wake of the ongoing tensions with India in the wake of the Pahalgam terror strike which left 26 tourists dead.

A few days ago, during a high-level meeting with the top defence leadership, including Defence Minister Rajnath Singh, Prime Minister Modi had given the armed forces "complete operational freedom" to decide on the mode, targets and timing of the response to the Pahalgam terror attack.

On Monday, Defence Secretary Rajesh Kumar Singh PM Modi against the backdrop of increasing tensions between the two countries.

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Pakistan shows JF-17 Block III fitted with PL-15 missiles for first time

Source: Janes, Dt. 05 May 2025,

URL: <https://www.janes.com/osint-insights/defence-news/air/update-pakistan-shows-jf-17-block-iii-fitted-with-pl-15-missiles-for-first-time>

The Pakistan Air Force (PAF) has published video imagery showing, for the first time, a JF-17 Block III fighter aircraft armed with the long-range PL-15 beyond-visual-range air-to-air missile (BVRAAM). Imagery of a Pakistan Aeronautical Complex/Chengdu JF-17 Block III, armed with four PL-15 BVR missiles, appeared in an official PAF video on air force readiness that was published on the service's YouTube channel on 29 April.

While Pakistan received its first batch of PL-15 missiles in 2021, according to Janes data, the new video provides official evidence that the missile has been integrated with the JF-17 Block III. Janes previously reported that the Block III variant entered the PAF service in 2023.



A rendering of a Pakistan Aeronautical Complex/Chengdu Aircraft Company JF-17 Block III recently seen equipped with PL-15 missiles. (Janes)

In the same video, the PAF also showed a J-10C in a camouflage colour scheme of green-grey, equipped with PL-15 missiles in dual-launch wing hardpoints. Earlier, Janes had reported that J-10C aircraft in this colour scheme are used in the maritime strike role.

Missile capabilities

Developed by the Aviation Industry Corporation of China (AVIC), the PL-15 has been in Chinese military service since 2016. Designed as an enhanced version of the earlier PL-12 BVRAAM, the

PL-15 is equipped with an active electronically scanned array (AESA) radar system and is capable of a speed of Mach 4. Janes estimates that the PL-15 has a maximum range of 300 km. In contrast, the earlier PL-12 (SD-10/10A) missile, which Pakistan also possesses, has an estimated maximum range of 70–100 km.

In the PAF video, the JF-17 Block III aircraft featured the serial number 22-311 and was also equipped with wingtip-mounted PL-10 short-range imaging infrared (IIR)-guided AAMs. The aircraft lacked a squadron insignia.

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Defence Secretary meets PM Modi as India mulls response to Pahalgam attack

Source: The Tribune, **Dt.** 05 May 2025,

URL: <https://www.tribuneindia.com/news/india/pahalgam-attack-after-navy-and-iaf-chiefs-now-defence-secretary-meets-pm-modi/>

In the ongoing one-on-one meetings at the PM's residence here, Defence Secretary Rajesh Kumar Singh is currently meeting Prime Minister Narendra Modi to discuss the current situation in the wake of the Pahalgam terror attack. It is the third high-profile private meeting the PM has had in two days -- after meeting the Navy and the Indian Air Force chiefs.

The discussion, sources say, ranges from India's options on the table following the attack besides India's preparedness vis a vis Pakistan's anticipated retaliation as and when India strikes. The meeting comes a day after Defence Minister Rajnath Singh said "you will get the response you are seeking". Singh on Sunday told a gathering that it was his duty to stand with the armed forces at this juncture. He also referred to PM Modi's risk-taking capacities.

The PM had earlier met the armed forces chiefs and given them full operational freedom to decide on India's military response and its timing. The Defence Secretary's meeting with the PM comes on a day when the United Nations Security Council will hold closed consultations on the Indo-Pakistan tensions. Pakistan, a non-permanent UNSC member, had sought the emergency meeting.

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Indian Army practises long-range Pinaka missile firing in Pokhran

Source: Firstpost, **Dt.** 05 May 2025,

URL: <https://www.firstpost.com/india/indian-army-practises-long-range-pinaka-missile-firing-in-pokhran-13885688.html>

The Indian Army conducted a practice firing of its indigenous Pinaka multi-barrel rocket launcher system at the Pokhran Field Firing Ranges in Rajasthan a few days ago, a source aware of the development told Firstpost. In consideration of the operational sensitivity of the matter, the date of the recent firing practice was not revealed.

The next round of Pinaka firing is scheduled to take place in a few weeks' times, the source said, requesting anonymity due to the sensitivity of the development. The information about firing practice, which has not been previously reported, comes amid rising tensions between India and Pakistan following the deadly terrorist attack in Pahalgam, Jammu and Kashmir, on April 22, where 26 people were killed.

How powerful are Pinaka long-range missiles?

Named after the mythical bow of the Hindu god Shiva, India's indigenously developed Pinaka Multi-Barrel Rocket Launcher (MBRL) system has emerged as a central pillar of the country's evolving artillery capabilities, combining high-volume firepower with precision targeting and domestic production.

Developed by the Defence Research and Development Organisation (DRDO) and manufactured by firms like Tata Advanced Systems and Larsen & Toubro, the Pinaka system can launch 72 rockets in just 44 seconds, delivering up to seven tonnes of explosives over ranges up to 60 kilometers.

The extended-range variant, Pinaka Mk-II ER, increases that reach to 90 kilometers, with advanced models under development aiming to push the range to 120, 150, and even 200 kilometers. It is equipped with GPS and inertial navigation systems for accurate targeting and minimal collateral damage.

The rocket system is a product of India's "Aatmanirbhar Bharat" or self-reliance initiative and has gained international traction with confirmed exports to Armenia and expressions of interest from France. India has the capacity to manufacture more than 5,000 rockets annually, allowing for sustained combat use. Designed for modern, network-centric warfare, Pinaka is integrated with real-time surveillance and reconnaissance platforms, enhancing the Indian Army's layered firepower and future readiness.

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China holds military drills in areas adjoining Ladakh

Source: The Tribune, Dt. 06 May 2025,

URL: <https://www.tribuneindia.com/news/india/china-holds-military-drills-in-areas-adjoining-ladakh/>

Amid mounting tensions between India and Pakistan following the Pahalgam terror attack, China has added a fresh twist by conducting a firing exercise with live ammunition in Tibet, facing eastern Ladakh.

Sources in India confirmed that China was conducting a military exercise that included firing by truck-mounted artillery guns and long-range rockets. Though the exercise is in China's own territory, its timing and the prevailing situation between India and Pakistan, has merited a hard look from security agencies about Beijing's intentions.

There was also unusual Chinese military movement on the G219 highway in Tibet. The two nations were locked in a military stand-off from April 2020 to October 2024 along several

locations along the Line of Actual Control — the de facto and un-demarcated boundary between the two countries.

In October last year, the two sides announced completed disengagement in the Depsang and Demchok regions of eastern Ladakh and said patrolling would begin soon. However, a large number of troops of both sides are deployed close to the LAC.

National Security Adviser Ajit Doval and China's Foreign Minister Wang Yi, who are special representatives on the boundary question, have been tasked with working out a solution.

After the Pahalgam terror attack, China has called for a "swift and fair investigation" and expressed support for its all-weather ally Pakistan in safeguarding its sovereignty and security interests amid Islamabad's rising tensions with India.

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Drone up

A message from Ukraine war for India's strategic & defence purchase plans

Source: The Times of India, Dt. 05 May 2025,

URL: <https://timesofindia.indiatimes.com/blogs/toi-editorials/drone-up-3/>

In a world's first, Ukraine has said that it has taken down a Russian fighter jet, an Su-30, with a naval drone, once again highlighting the changing dynamics of warfare. This comes after Ukraine had downed two Mi-8 helicopters last Dec in what was then considered the world's first drone strike on airborne targets from the sea. India would do well to take note of these developments. For, New Delhi operates a fleet of 259 Su-30MKIs – the Indian variant of Su-30. It now has to evaluate whether these fighters are susceptible to drones and what countermeasures can be incorporated to plug any vulnerabilities.

Beyond that, some fundamental changes need to be recognised to optimise the modernisation of the Indian armed forces. After Ukraine, it's widely accepted that drones need to be incorporated into defence strategy and reorganisation of the forces. But there are also bigger questions: How much of our future procurement should be focused on acquiring big, conventional platforms worth millions of dollars when we could be facing an enemy with drones worth a fraction of that price? Wouldn't it be better to invest that money in anti-drone systems or stealth technology? Consider this – the Ukrainian Magura marine drone that took down the Su-30 jet costs just over \$265,000 compared to the \$50mn price tag for the Russian fighter.

China, which is upgrading its armed forces at breakneck speed, recently unveiled what defence experts describe as the world's first purpose-built drone carrier. Such a platform can launch waves of drones in theatres far away from home base, greatly enhancing the force projection of the operating country. This also radically changes strategic defence calculations. Taiwan, which is constantly at the receiving end of Chinese military intimidation, can mitigate the huge gap in naval power with Chinese PLA if it can also successfully develop and deploy a stealth drone carrier that

can potentially inflict significant damage on PLA bases on the Chinese mainland. India too needs to be alert to the emerging threats and opportunities drones present. Investing in and developing drone systems, as well as developing a doctrine on drone warfare, are tasks that can no longer be delayed.

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How INS Vikramaditya and Vikrant Are Anchoring India's Naval Posture After Pahalgam Carnage

Source: Republic, **Dt.** 05 May 2025,

URL: <https://www.republicworld.com/defence/indian-armed-forces/how-ins-vikramaditya-and-vikrant-are-anchoring-indias-naval-posture-after-pahalgam-carnage>

India's strategic calculus has rapidly shifted since the April 22 Pahalgam massacre that left 26 civilians dead and dozens wounded. The attack traced back to Lashkar-e-Taiba's cross-border infrastructure. As retaliation options are weighed, India's naval doctrine is being brought into sharp focus, with its two aircraft carriers, INS Vikramaditya and INS Vikrant, assuming pivotal roles.

The deployment of these carriers in the Arabian Sea is not just symbolic. It underscores a calibrated build-up intended to project deterrence and readiness. Alongside diplomatic moves such as the suspension of the Indus Waters Treaty and the closure of land crossings, this maritime posture ensures India's options remain open without immediate escalation.

Naval Presence Shores Up India's Strategic Depth in The Arabian Sea and Beyond

Together, INS Vikrant and INS Vikramaditya represent the sharpest edge of India's sea-based military capability. Vikramaditya, a refitted Kiev-class carrier of Soviet lineage, carries up to 36 aircraft, including MiG-29Ks and Kamov helicopters. It can move at 30 knots and create a surveillance bubble of over 500 km.

Vikrant, commissioned in 2022, is India's first indigenously built carrier, with a complement of 30 aircraft and a displacement of 40,000 tons. Fully operational by late 2023, Vikrant's combat integration allows the Navy to field two carrier battle groups (CBGs) simultaneously, a first in India's maritime history.

Exercise Milan and Missile Tests Post-Pahalgam Point to Enhanced Readiness and Intent

This dual capability came into practical use during Exercise Milan 2024, where both carriers participated alongside multinational forces. In February-March 2024, they conducted joint operations along the Indian coastline with destroyer and submarine escorts.

Following the Pahalgam carnage, the Indian Navy conducted test missile strikes on April 27, 2025, in what officials described as a "signal of maritime readiness." While the carriers were not directly named, their operational footprint in recent months has placed them squarely in the strategic theatre, deterring hostile moves and allowing pressure without engagement.

India's Maritime Edge Offers Power Projection and Multi-Domain Flexibility

These deployments afford India key advantages. First is power projection—aircraft carriers act as floating bases, enabling air dominance far from home shores. Both Vikrant and Vikramaditya allow for rapid, sustained presence near chokepoints like Gwadar or the Strait of Hormuz, vital to Pakistan’s trade and oil lifelines.

Second, deterrence—Pakistan’s navy lacks comparable assets. While it fields submarines and missile boats, it does not possess a carrier, leaving it vulnerable to India’s sea-based airstrikes or blockades. The asymmetry ensures that Pakistan remains constrained in the maritime dimension. Third, strategic flexibility—India can now hold a carrier on Pakistan’s western seaboard while redeploying the other to the Bay of Bengal or the Andaman Sea, ensuring preparedness across both immediate and extended theatres.

As Land Tensions Simmer, Maritime Dominance Offers India Leverage Without Overt Escalation

In the post-Pahalgam scenario, the carriers serve not only a tactical but also a psychological purpose. Their visible presence signals to adversaries and allies alike that India is willing to escalate if provoked—yet not eager to act recklessly.

The use of naval dominance to project strength without triggering direct conflict demonstrates a measured response. It allows India to leverage economic chokepoints and surveillance capabilities while maintaining international credibility. As Pakistan’s economy reels under inflation and diplomatic isolation, India’s maritime assertiveness may prove decisive. With carrier groups now established in forward positions, India’s message is unambiguous: the seas will not remain neutral ground should Pakistan fail to rein in its proxies. The war may be undeclared, but the waters are already contested.

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US Navy conducts first hypersonic cold-gas launch

Source: Janes, **Dt.** 05 May 2025,

URL: <https://www.janes.com/osint-insights/defence-news/sea/us-navy-conducts-first-hypersonic-cold-gas-launch>

The US Navy (USN) conducted the first launch of the Conventional Prompt Strike (CPS) capability utilising the navy's cold-gas launch approach that will be used in the service's sea-based platform fielding, the Pentagon confirmed on 2 May.

The USN is now preparing guided-missile destroyer USS Zumwalt (DDG 1000) to be the first sea-based platform for the weapon.

“The cold-gas approach allows the navy to eject the missile from the platform and achieve a safe distance above the ship prior to first stage ignition,” said Vice Admiral Johnny Wolfe, director of Strategic Systems Programs (SSP), said in the 2 May Pentagon statement. USN SSP is the lead designer of the common hypersonic missile.

An end-to-end flight test of a conventional hypersonic missile from the Cape Canaveral Space Force Station, Florida, followed the launch, according to the Pentagon statement.

“This test informs the navy fielding approach for the Conventional Prompt Strike offensive hypersonic capability, as well as the continued development and production of the common hypersonic missile that is being developed in partnership with the US Army,” the Pentagon said.



Shown here before being modified for hypersonic missiles, USS Zumwalt is set to be the first US Navy sea-based platform for the weapons

The recent test was the next step in the navy's flight-testing programme of the common All-Up Round (AUR) that is being developed in partnership with the army's Rapid Capabilities and Critical Technologies Office, the Pentagon said, noting that in 2024 the programmes completed two additional end-to-end flight tests of the AUR that will be fielded to both the navy and army.

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Drone, Jet Or A Satellite? India Joins Elite League By Testing Stratospheric Airship; Here's Why It's A Big Deal

Source: The EurAsian Times, Dt. 05 May 2025,

URL: <https://www.eurasiantimes.com/drone-jet-or-a-satellite-india-joins-elite-league/>

Developed by the Aerial Delivery Research and Development Establishment (ADRDE) in Agra, the lighter-than-air platform reached an altitude of 17 km, carrying an instrumental payload during a 62-minute flight. The test validated critical systems, including envelope pressure control and emergency deflation mechanisms, with sensor data collected to refine high-fidelity simulation models for future missions. Defense Minister Rajnath Singh and DRDO Chairman Dr. Samir V. Kamat hailed the achievement, emphasising its potential to enhance India's earth observation, intelligence, surveillance, and reconnaissance (ISR) capabilities.

This positions India among a select few nations with indigenous stratospheric airship technology. The successful trial, conducted amid heightened India-Pakistan tensions, underscores DRDO's focus on advancing high-altitude, long-endurance platforms to bolster national security and surveillance, marking a pivotal step toward operationalising these pseudo-satellite systems.

Stratospheric Airships

In an era where connectivity, surveillance, and environmental monitoring are paramount, the innovative stratospheric airship platforms, high-altitude, lighter-than-air vehicles operating at 20–30 km, offer a transformative solution. These unmanned, long-endurance systems, often called High-Altitude Platform Systems (HAPS), combine satellites' endurance with terrestrial systems' flexibility. Positioned above commercial air traffic and weather systems, they promise to deliver telecommunications, intelligence, surveillance, reconnaissance (ISR), and scientific research at a fraction of the cost of traditional satellites.

Technology: Stratospheric airships are aerostatic vehicles that rely on helium-filled envelopes for buoyancy, allowing them to float in the low-density air of the stratosphere. Unlike fixed-wing HAPS or balloons, airships use propulsion systems, typically electric motors powered by solar panels or hydrogen-based regenerative fuel cells (RFCs), to maintain station-keeping or navigate over specific regions.

Their design incorporates lightweight, UV-resistant materials to withstand harsh stratospheric conditions, including temperatures as low as -60°C, intense ultraviolet radiation, and ozone corrosion.

Components: The primary technical challenges include developing lightweight materials, optimising energy efficiency, ensuring thermal management, and achieving reliable control in a near-vacuum environment. These hurdles have historically delayed operational deployment, but recent advancements are closing the gap. Key technological components include:-

- **Envelope and Materials:** The helium-filled envelope, often made of advanced composites like polyethylene or Mylar, must balance strength, weight, and durability. Innovations in nanotechnology and multi-layered fabrics enhance resistance to environmental degradation.
- **Power Systems:** Solar panels and energy storage (batteries or RFCs) enable continuous operation. RFCs, which generate electricity by combining hydrogen and oxygen, are particularly promising for long-endurance missions, as demonstrated in Japan's Stratospheric Platform (SPF) program.
- **Airships carry modular payloads** (20–1,500 kg) tailored to specific missions, such as phased-array antennas for 4G/5G connectivity, high-resolution cameras for ISR, or sensors for environmental monitoring.
- **Control Systems:** Autonomous navigation and station-keeping require sophisticated algorithms to counter stratospheric winds, which are milder than jet streams but still challenging. Machine learning and real-time data processing are increasingly integrated for precision.

Applications

Stratospheric airships are versatile platforms with applications across civilian, commercial, and military domains. These applications position stratospheric airships as a cost-effective alternative to satellites, with the added benefit of reusability and rapid deployment.

- **Telecommunications:** Airships can provide broadband connectivity to remote or underserved regions, acting as “pseudo-satellites (somewhat like Starlink).” For instance, Mira Aerospace’s ApusDuo HAPS delivered 5G connectivity in Rwanda in 2023, demonstrating the potential to bridge the digital divide. Unlike satellites, airships can be repositioned or serviced, offering flexibility for dynamic network demands.
- **Intelligence, Surveillance, Reconnaissance (ISR):** Airships’ ability to loiter over specific areas for extended periods makes them ideal for ISR.
- **Environmental Monitoring:** Airships with sensors can monitor greenhouse gases, climate patterns, or natural disasters. Sceye Inc., a New Mexico-based company, is developing airships to track environmental changes, supporting global sustainability efforts.
- **Scientific Research:** High-altitude platforms enable ground-breaking scientific research, such as atmospheric studies, astronomy, and other research requiring stable, high-altitude vantage points. NASA’s proposed Centennial Challenge aims to incentivise airship innovations for scientific missions, inspiring a new era of discovery.
- **Military Applications:** Beyond ISR, airships could support GPS jamming, missile defence, wartime communications, electronic warfare, and the potential for stealth detection.

Advantages & Limitations

Advantages: Stratospheric airships provide compelling advantages over traditional platforms like satellites. Their cost-effectiveness is a key benefit, with development, launch, and maintenance costs in the millions, far below the billions required for satellites. This affordability democratises access to high-altitude capabilities. Another strength is flexibility; unlike geostationary satellites, airships can be repositioned, serviced, or upgraded to meet evolving mission needs, enabling dynamic applications such as telecommunications or surveillance. Their long endurance—capable of missions lasting months or even years—reduces the need for frequent replacements, enhancing operational efficiency.

Additionally, operating below orbital altitudes improves accessibility, avoiding the complexities of space debris and stringent international space regulations. These attributes make stratospheric airships an attractive alternative for tasks like broadband delivery, environmental monitoring, and intelligence gathering, offering a versatile, cost-efficient bridge between terrestrial and space-based systems.

Limitations: Stratospheric airship platforms face significant limitations that hinder their widespread adoption. Technical complexity remains a primary challenge, as lightweight materials, efficient energy storage, and precise control systems require further development to ensure reliability in the harsh stratospheric environment. Limited operational systems exacerbate this issue, with most airships still in the prototype phase and scarce real-world flight data to validate performance.

Environmental challenges also pose risks, as stratospheric conditions—extreme cold, UV radiation, and ozone exposure—demand robust designs to prevent envelope degradation or thermal failures. Additionally, regulatory hurdles complicate deployment, as coordinating airspace usage and navigating international regulations, particularly for cross-border missions, remains a barrier. These challenges necessitate substantial investment in research, testing, and regulatory frameworks to transition stratospheric airships from experimental to operational systems, unlocking their potential for telecommunications, surveillance, and environmental monitoring.

Development Status

The concept of stratospheric airships, pioneered in the 1960s with Raven Aerostar's High Platform II reaching 70,000 ft in 1969, gained traction in the 1990s as materials and solar technology advanced. Despite high costs and complexity, recent global efforts signal a resurgence, driven by improved designs and commercial potential, as seen in Google's Loon (2013–2021).

United States: The U.S. pursued stratospheric airships through Lockheed Martin's High Altitude Airship (HAA) and DARPA's ISIS for ISR, but both were cancelled due to cost overruns. Aerostar's HiSentinel reached 74,000 ft in 2005, proving viability. Sceye Inc. now leads the scaling of solar-powered airships in New Mexico for broadband and environmental monitoring, with expansion planned for 2025.

Japan: Japan's JAXA launched the Stratospheric Platform (SPF) in the 1990s, focusing on solar-powered airships with regenerative fuel cells. Prototypes were tested, but the program shifted focus by 2009. Japan's early work on energy systems remains influential for long-endurance HAPS development. **South Korea & Europe:** South Korea explored HAPS in the 2000s with limited outcomes. In Europe, Thales Alenia Space's Stratobus targets ISR and telecom, aiming for five-year missions with a 2023 prototype. The TAO Group's SkyDragon introduces a segmented design for stability, enhancing European innovation.

China: China's Yuanmeng airship, tested in 2015, focuses on military surveillance and stealth detection. The Aviation Industry Corporation of China's ongoing programs emphasize long-endurance airships for communication and reconnaissance.

Future Prospects

The future of stratospheric airships is bright, driven by technological advancements. Innovations in nanotechnology and composite fabrics will produce lighter, more durable envelopes, extending mission durations. Next-generation regenerative fuel cells (RFCs) and high-efficiency solar cells will ensure reliable power, critical for continuous operation in the stratosphere. Enhanced by machine learning and real-time wind modelling, autonomous control systems will improve station-keeping precision, minimising energy use.

These developments will enable airships to loiter for months or years, offering cost-effective satellite alternatives. By addressing technical challenges, stratospheric airships are poised to revolutionise telecommunications, surveillance, and environmental monitoring by 2030. Commercialisation and global collaboration are accelerating progress. Companies like Sceye and Stratospheric Platforms are securing investments, reflecting market confidence in high-altitude platform systems (HAPS) for connectivity and monitoring.

NASA's proposed Centennial Challenge could spur international innovation, while public-private partnerships may streamline development. However, scaling production, reducing costs, and validating reliability through extended flight tests remain critical hurdles. If overcome, stratospheric airships could become mainstream solutions, particularly in regions lacking satellite or terrestrial infrastructure, transforming global access to data and security.

Conclusion

Stratospheric airship platforms represent a frontier in high-altitude technology, blending satellites' endurance with terrestrial systems' adaptability. From providing broadband in remote areas to enhancing military surveillance and monitoring climate change, their applications are vast and transformative.

While historical efforts faced setbacks, recent advancements, such as India's 2025 test, Sceye's commercial push, and Thales' Stratobus, signal a new era of viability. As materials, energy systems, and controls evolve, stratospheric airships are poised to redefine global connectivity, security, and scientific exploration, soaring to new heights in the decades ahead.

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Science & Technology News

New metal-free organic catalyst can produce hydrogen fuel by harvesting mechanical energy

Source: Press Information Bureau, Dt. 05 May 2025,

URL: <https://pib.gov.in/PressReleasePage.aspx?PRID=2127064>

Researchers have developed a novel, cost-effective, metal-free porous organic catalyst for efficient H₂ production by harvesting mechanical energy.

In order to reduce the global warming and related impact of fossil fuels, transition towards sustainable alternatives based on renewable energy becomes increasingly critical. Green hydrogen (H₂) fuel has emerged as a game-changing renewable and clean-burning energy source, which generates no direct carbon emissions and only water as a by-product when used in fuel cells. Recognizing the critical role of green H₂ in sustainable energy, the Government of India launched the National Green Hydrogen Mission to drive large-scale production, promote research and innovation, and position the country as a global leader in H₂ economy.

Among the environmentally benign methods of H₂ production, overall water splitting stands out as an effective and scalable technique that relies on a catalytic strategy since the reaction is energetically uphill. Piezocatalysis has emerged as a promising catalytic technology which harvests mechanical perturbations with a piezoelectric material to generate charge carriers that are utilized to catalyze water splitting.

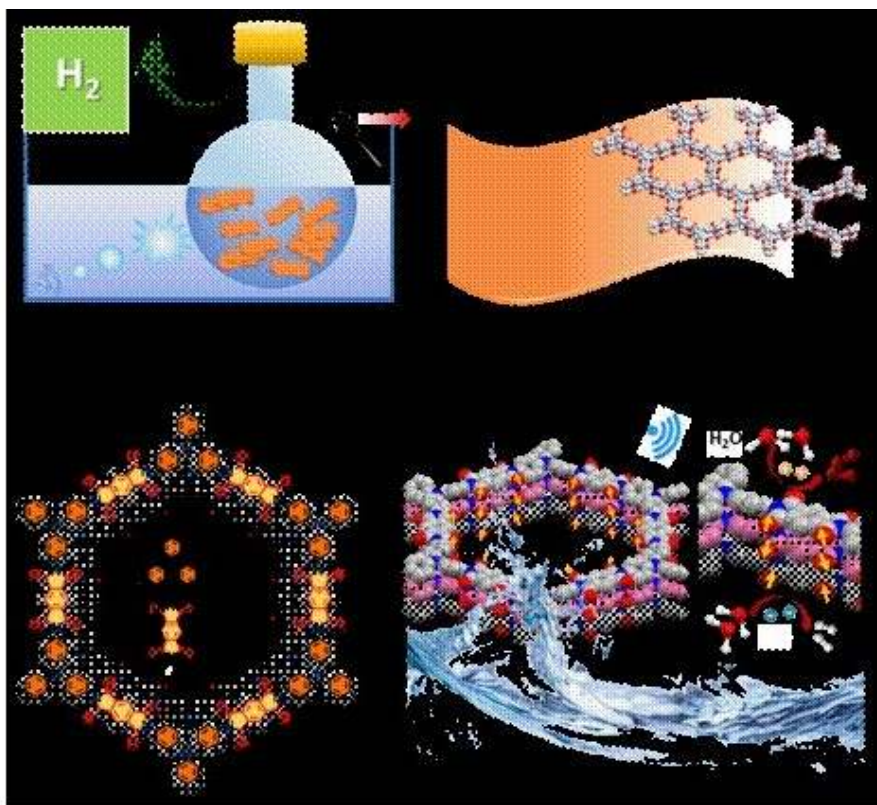


Figure: Schematic showing piezocatalytic water splitting by a metal-free donor-acceptor based covalent organic framework.

In recent groundbreaking research work, Professor Tapas K. Maji from Chemistry and Physics of Materials Unit at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) Bengaluru (an autonomous institution under the Department of Science & Technology, Govt. of India) and his research team have developed a metal-free donor-acceptor based covalent-organic framework (COF) for piezocatalytic water splitting. This study published in *Advanced Functional Materials* demonstrates a Covalent organic framework (COF) built from imide linkages between organic donor molecule tris(4-aminophenyl)amine (TAPA) and acceptor molecule pyromellitic dianhydride (PDA) acceptor exhibiting unique ferroelectric (FiE) ordering, which showed efficient piezocatalytic activity for water splitting to produce H_2 .

This discovery breaks the traditional notion of solely employing heavy or transition metal-based ferroelectric (FE) materials as piezocatalysts for catalyzing water splitting reaction. Conventional FE materials have limited charges confined at the surface only which usually lead to quick saturation of their piezocatalytic activity. In contrast, FiE ordering in a COF provides a multifold enhanced number of charges at the pore surfaces owing to the large local electric fields. The sponge-like porous structure of a COF allows the diffusion of water molecules to efficiently access and utilize these charge carriers for catalysis, giving ultra-high H_2 production yields and outperforming all oxide-based inorganic piezocatalysts.

Using a simple donor molecule like TAPA and an acceptor molecule like PDA, Prof. Maji and his research team have built a COF system that has strong charge transfer properties, which creates dipoles (separation between positive and negative charges).

The TAPA units have a unique propeller-like shape, where their benzene rings twist and tilt to break the flat symmetry of the structure, helping it reach a more stable, lower-energy state. Prof. Umesh V. Waghmare and his team from JNCASR, who are collaborators of the study, showed using theoretical analyses that this COF has an unusual electronic structure with energy bands that couple and resonate with each other by dipolar ordering. This causes instability in the lattice structure, leading to FiE ordering. These FiE dipoles interact with flexible twisting molecular motion in the material, making them responsive to mechanical pressure. As a result, the material can generate electron-hole pairs when mechanically stimulated, making it a highly efficient piezocatalyst for water splitting for H₂ production. The team comprises four other researchers from JNCASR: Ms. Adrija Ghosh, Ms. Surabhi Menon, Dr. Sandip Biswas and Dr. Anupam Dey.

Apart from JNCASR, Dr. Supriya Sahoo and Prof. Ramamoorthy Boomishankar from Indian Institute of Science Education and Research, Pune and Prof. Jan K. Zareba from Wrocław University of Science and Technology, Poland made important contributions to the present interdisciplinary study.

The utilization of a cost-effective, metal-free system with a high production rate of H₂ by harvesting mechanical energy opens up a new route to green H₂ based on porous heterogeneous catalysts.

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Department of Biotechnology (DBT) and Biotechnology Industry Research Assistance Council (BIRAC) announced a joint call for Proposals on Bio-AI for establishing मूलांकुर hubs under BioE3 Policy for Biomanufacturing

Source: Press Information Bureau, Dt. 05 May 2025,

URL: <https://pib.gov.in/PressReleasePage.aspx?PRID=2127063>

The Union Cabinet approved the BioE3 (Biotechnology for Economy, Environment, & Employment) Policy, in August 2024, for 'Fostering High-Performance Biomanufacturing' across the country. Subsequently, The Union Cabinet, chaired by the Prime Minister Shri Narendra Modi, approved continuation of the two umbrella schemes of Department of Biotechnology (DBT), merged as one scheme-'Biotechnology Research Innovation and Entrepreneurship Development (Bio- RIDE)' with a new component namely Biomanufacturing and Biofoundry. With in the ambit of "High -Performance Biomanufacturing", establishment of Bio-AI hubs for building of data driven and cutting edge paradigms in the areas of Health, Agriculture and Environment.

Department of Biotechnology (DBT) and Biotechnology Industry Research Assistance Council (BIRAC) have issued a Joint Call for Proposals on Bio-AI for establishing मूलांकुर hubs under BioE3 Policy for Biomanufacturing. Bio-AI hubs are proposed to be established across academia and industry to provide critical and novel research leads impacting Health, Agriculture and Environment through conglomeration of AI and Biology.

The Letter of Intent (LoI) for Bio-AI is uniquely designed to utilize AI in Biology for solving key biological challenges in Biomolecular Design, Sustainable Agriculture, Synthetic Biology, Ayurveda and Genome Diagnostics. Therefore, the problem statements in these domains as well as possible research solutions are invited from multi-disciplinary teams with research expertise across fields of synthetic biology, AI/ML and Computation to address complex biological research challenges. The problem statements are to be addressed by data-driven, cutting-edge, multi-disciplinary programmatic research initiatives for projected outcomes.

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CSIR-IIIM Jammu -Mentored Solar Mech Engine Wins Top Honor at HonorsGradU 2025 Scholarship Awards

Source: Press Information Bureau, Dt. 05 May 2025,

URL: <https://pib.gov.in/PressReleasePage.aspx?PRID=2126984>

Jammu, May 4, 2025 – In a landmark achievement for Indian student innovation, Japteg Singh Bamrah, a Class 12 student from Dalhousie Public School, has won the prestigious HonorsGradU 2025 Scholarship, securing the coveted “Build a Better Future” Award for his groundbreaking invention—the Solar Mech Engine.

Japteg Singh Bamrah and his Mentor, Dr. Nasir Ul Rasheed, demonstrating the Solar Mech Engine project executed under the Jigyasa Hackathon initiative. Mentored by Dr. Nasir Ul Rasheed, Senior Scientist at CSIR-Indian Institute of Integrative Medicine (IIIM), Jammu, under the Jigyasa Hackathon initiative, Japteg emerged as one of five global winners out of thousands of entries from around the world.



He has been awarded a \$10,000 scholarship for his undergraduate education in the United States, along with an additional \$5,000 grant for further development and scaling of his innovation. Notably, his project was recognized as the top technology among this year's winners.

Organized by Honors Graduation, a U.S.-based non-profit supporting student-led sustainability and innovation projects, the HonorsGradU Scholarship is highly competitive, offering only five awards annually across the globe. Japteg is the first and only student from India since the program's inception in 2012 to top the list, marking a moment of pride for the nation.

During the National Startup Festival held on February 22–23, 2025, at CSIR-IIIM, Jammu, Japteg presented his Solar Mech Engine to Dr. Jitendra Singh, Union Minister of Science and Technology and Vice President of CSIR, who graced the event as Chief Guest. The festival highlighted India's growing support for grassroots innovation under the "Start-Up India, Stand-Up India" campaign, originally launched by Prime Minister Shri Narendra Modi in 2015 and spearheaded by Dr. Singh.

The Solar Mech Engine, which earlier won the CSIR Jigyasa Hackathon 2024, is a standalone solar thermal system that operates on Concentrated Heat and Power (CHP) technology. It utilizes the principles of cyclic air expansion and contraction due to temperature differences to convert heat energy into mechanical energy.

A key feature is its low-resistance generator, which employs electromagnetic induction for direct mechanical-to-electrical energy conversion. Its unique selling proposition lies in its ability to function as a reversible heat pump, making it a highly efficient and sustainable energy solution.

CSIR-IIIM's incubation and mentoring of Japteg's project underscores its commitment to empowering young innovators and transforming their ideas into practical, scalable technologies.

In recognition of his innovation and academic excellence, Japteg has received offers from over ten top universities across the USA, Australia, and Canada, with additional scholarships amounting to \$16,000 annually for his undergraduate studies.

With a total grant of \$31,000, Japteg Singh Bamrah plans to refine his Solar Mech Engine further and pursue his higher education at a leading global university. His journey from a school innovator to a global sustainability advocate stands as a testament to the power of mentorship, vision, and grassroots innovation in building a better future.

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Seven High-Impact Projects (e-Nodes) Selected for Support under MAHA-EV Mission

Source: Press Information Bureau, Dt. 05 May 2025,

URL: <https://pib.gov.in/PressReleasePage.aspx?PRID=2126962>

The Anusandhan National Research Foundation (ANRF) announced the selection of seven e-Nodes for support under its "Mission for Advancement of High-impact Areas on Electric Vehicles" (MAHA-EV). The current program launched under the umbrella of ANRF's national mission, aims to address the critical challenges and drive innovation in India's electric vehicle ecosystem.

ANRF MAHA-EV call for proposal focussed on three strategically defined Technological Verticals (TV) are Tropical EV Battery and Battery Cells (TV-I), Power Electronics, Machines and Drives (PEMD)- (TV-II) and EV Charging Infrastructure (TV-III).

The each selected electric mobility nodes (e-nodes) will execute the project in consortia mode involving academic institutions/R&D laboratories with the mandatory industry participation, in order to contribute to and establish the R&D in the EV sector of the country.

The seven e-Nodes are selected under the ANRF's MAHA-EV mission are: Indian Institute of Technology Bombay, International Advanced Research Centre for Powder Metallurgy and New Materials Hyderabad, National Institute of Technology Surathkal, Indian Institute of Technology Kanpur, Indian Institute of Technology-BHU, CSIR- Central Electronics Engineering Research Institute, Pilani and Indian Institute of Technology Kharagpur, respectively.

The call noticed wide enthusiasm among all stakeholders and 227 proposals were received in consortia mode from academic institutions, R&D laboratories and the industrial section.

The selected seven e-Nodes, two of which will focus on Tropical EV batteries and Cell technologies (TV-I) three of which will work on Power electronics machines and drives (TV-II) and the remaining two e-Nodes will focus on Charging Infrastructure under TV-III.

The MAHA-EV Mission leads to catalyze India's leadership in next-generation electric mobility solutions, aligned with the goals of sustainability, innovation, and self-reliance.

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AI: is India falling behind?

Source: The Hindu, Dt. 05 May 2025,

URL: <https://www.thehindu.com/sci-tech/technology/ai-is-india-falling-behind/article69359080.ece>

The Government of India and a clutch of startups have set their sights on creating an indigenous foundational Artificial Intelligence large language model (LLM), along the lines of OpenAI's ChatGPT, Google's Gemini, and Meta's Llama. Foundational AI, or LLMs, are manually trained systems that can churn out responses to queries. Training them requires large amounts of data and enormous computing power, two resources that are abundant on the internet and in the cyberspaces of Western countries respectively.

In India, the crucial advance of creating a homegrown LLM is likely to be an uphill climb, albeit one that the government and startups are keen on achieving. Hopes have especially been heightened after the success of DeepSeek. The Chinese firm, at a far lower cost than Western tech companies, was able to train a so-called 'reasoning' model that arrives at a response after a series of logical reasoning steps that are displayed to users in an abstracted form and are generally able to give much better responses. Policymakers have cited India's low-cost advances in space exploration and telecommunications as a critical example of the potential to hit a similar breakthrough, and soon.

LLMs and small language models (SLMs) are generally compiled by condensing massive volumes of text data, typically scraped from the web, and ‘training’ the system through a neural network. A neural network is a machine learning model that roughly imitates the way a human brain works by linking several pieces of information and passing them through ‘layers’ of nodes until an output, based on multiple interactions in the hidden layers, results in an acceptable response.

Neural networks have been a tremendous breakthrough in machine learning and have for years been the backbone of services such as automated social media moderation, machine translation, recommendation systems on services such as YouTube and Netflix, and a host of business intelligence tools.

The AI rush

While deep learning and machine learning developments surged in the 2010s, the underlying research had several landmark developments, such as the ‘attention mechanism’, a natural language processing framework that effectively gave developers a way to break down a sentence into components, allowing computer systems to reach ever closer to ‘understanding’ an input that was not a piece of code. Even if this technology was not completely based on any sort of actual intelligence, it was still a massive leap in machine learning capabilities.

The approach to regulating AI in IndiaThe transformer, which built on these advances, was the key breakthrough that paved the way for LLMs such as ChatGPT. A 2017 paper by researchers at Google laid out the transformer architecture, laying out for the first time the theory of practically training LLMs on graphics processing units (GPUs), which have emerged as critical for the entire tech industry’s AI pivot.

It was quite some time before OpenAI started practically implementing the findings of the advancement in a way that the public could witness. ChatGPT’s first model was released more than five years after the Google researchers’ paper, for a reason that has emerged as both a commercial headache for firms looking to leverage AI and for countries looking to build their capabilities: cost.

Simply training the first major model, ChatGPT 3.5, cost millions of dollars, not accounting for the data centre infrastructure. With the lack of immediate commercialisation, this kind of expense was necessarily a long shot, the kind that only a large tech company, or well-endowed venture capitalists, could finance in the medium term.

The result, however, was extraordinary. The generative AI boom began in earnest after ChatGPT’s first public model, showcasing the accumulated technical advancements in machine learning until its release. The Turing test, a benchmark that can be passed by a machine that responds to a query sufficiently similar to a human, was no longer a useful way to look at new AI models.

A head-spinning rush followed to ship out similar foundational models from other companies that were already working on the technology. Firms such as Google were, in 2022, already running their models like LaMDA. This model was in the news as one prominent developer at the company made public (and unsubstantiated) claims that the chatbot was pretty much sentient. The company avoided releasing the model as it worked on safety and quality.

The generative AI rush had changed things, however, with each company best positioned to work on such models under tremendous investor and public pressure to compete. From going to keeping LaMDA restricted to internal testing, Google quickly deployed a public version, named Bard, later renamed Gemini, and swapped out its Google Assistant product on many Android phone users' handsets with this AI model instead. Today, Gemini offers half a dozen models for different needs and deployed the AI model into its search engine and productivity suite.

Microsoft was no different: the Windows maker deployed its own CoPilot chatbot, leveraging integrations with its own Office products and dedicating a button to summon the chatbot on new PCs. Firms such as Amazon and a host of other smaller startups also started putting out their products for public use, such as France's Mistral and PerplexityAI, the latter seeking to bring genAI capabilities to search. An image generation breakthrough based on similar technology also mushroomed against this context, with services like Dall-E paving the way to create realistic-looking pictures.

Indian industry players showed early enthusiasm in leveraging AI, as global firms have, to see how the technology could boost productivity and increase savings. Like in the rest of the world, text-generation tools have been able to increase employees' ability to do routine tasks and much of the corporate adoption of AI has revolved around such speed boosts in daily work. However, there have been questions about critical thinking as more and more tasks get automated, and many firms are yet to see a massive amount of value from this growth.

Yet, the fascination around AI models has yet to die down, as hundreds of billions of dollars are planned to be invested in setting up the computing infrastructure to train and run these models. In India, Microsoft is hiring real estate lawyers in every Union Territory and State to negotiate and obtain land parcels for building datacentres. The scale of the planned investments is a massive bet on the financial viability of AI models.

This is partly why the potential of advances such as DeepSeek have drawn attention. The Guangzhou-based firm was able to train the most cutting-edge models — capable of 'deep research' and reasoning — at a fraction of the investments being made by Western giants.

An Indian model

The cost reduction has led to an immense level of interest in whether India can replicate this success or, at least, build on it. Last year, before DeepSeek's achievements gained global repute, the Union government dedicated ₹10,372 crore to the IndiaAI Mission, in an attempt to drive more work by startups in the field. The mission is architected in a public-private partnership model and aims to provide computing capacity, foster AI skills among youth, and help researchers work on AI-related projects.

After DeepSeek's cost savings came into focus, the government rolled out the computing capacity component of the mission and invited proposals for creating a foundational AI model in India. Applications have been invited on a rolling basis each month, and Union IT Minister Ashwini Vaishnaw said he hoped India would have its foundational model by the end of the year.

Some policymakers have argued that there is an "element of pride" involved in the discourse around building a domestic foundational model, Tanuj Bhojwani, until recently the head of People

+ AI, said in a recent Parley podcast with The Hindu. “We are ambitious people, and want our own model,” Mr. Bhojwani said, pointing to India’s achievements in space exploration and telecommunications, shining examples of technical feats achieved at low costs.

There are of course monetary costs attached to training even a post-DeepSeek foundational model: Mr. Bhojwani referred to estimates that DeepSeek’s hardware purchases and prior training runs exceeded \$1.3 billion, a sum that is greater than the IndiaAI Mission’s whole allocation. “The Big Tech firms are investing \$80 billion a year on infrastructure,” Mr. Bhojwani pointed out, bringing the scale of Indian investment corpus into perspective. “The government is not taking that concentrated bet. We are taking very sparse resources that we have and we are further thinning it out.”

Pranesh Prakash, the founder of the Centre for Internet and Society, India, insisted that building a foundational AI model was important. “It is important to have people who are able to build foundation models and also to have people who can build on top of foundation models to deploy and build applications,” Mr. Prakash said. “We need to have people in India who are able to apply themselves to every part of building AI.”

There is also an argument that a domestic AI would enhance Indian cyber sovereignty. Mr. Prakash was dismissive of this notion, as many of the most cutting-edge LLMs — even the one published by DeepSeek — are open source, allowing researchers around the world to iterate from an existing model and build on the latest progress without having to duplicate breakthroughs themselves.

Beyond the investment hurdle, there is also the payoff ceiling: “Spending \$200 a month to replace a human worker may be possible in the U.S., but in India, that is what the human worker is being paid in the first place,” Mr. Bhojwani pointed out. It is unclear as yet if the automation breakthroughs that are possible will ever be worthwhile enough to replace a significant number of human workers.

Even for Indian firms seeking to make and sell AI models, our experience in the software era of the previous decades shows a key dynamic that could limit such aspirations: “If we believe we will make an Indian model with local language content, you are capping yourself on the knee because the overall Indian enterprise market that will purchase AI is much smaller,” Mr. Bhojwani said, pointing out that even Indian software giants sell much of their services in the United States, which remains the main market for much of the technology industry.

Financial imperatives are not everything, though. The Indian government’s focus on initiatives like Bhashini — which uses neural networks to power Indian language translation — reveals an appetite to leverage AI models at scale like Aadhaar or UPI. While it is unclear how much political will and investment will end up feeding those ambitions, however, as Microsoft CEO Satya Nadella pointed out in a recent interview, if AI’s potential across the board “is really as powerful as people make it out to be, the state is not going to sit around and wait for private companies.”

While India has a large pool of talent, it suffers from perennial migrations of its top research minds across all fields, a dynamic that could slow down breakthroughs in AI. Academic ecosystems have also been underfunded, something that severely limits resources even for those who are staying in the country to work on these problems.

The data divide

The most imposing barrier may not be the investment one, or even the potential for commercialising investments. The barrier could be data.

Most LLMs and SLMs rely on a massive amount of data, and if the data is not massive, then it has to at least be high-quality data that has been curated and labelled until it is usable to train a foundational model. For many well-funded tech giants, the data that is publicly available on the web is a rich source. This means that most models have skewed toward English since that is the language that is spoken most widely in the world, and thus is represented enormously in public content.

Even monolingual societies like China, South Korea, and Japan can get away with the amount of data they can obtain, as these are monolingual societies where internet users largely use the internet — and participate in discussions online — in their languages. This gives LLM makers a rich foundation for customising models for local sensibilities, styles, and ultimately needs.

India does not have enough of this data. Vivekanand Pani, a co-founder of Reverie Language Technologies, has worked with tech companies for decades to nudge users to use the web in their own languages. Most Indian users, even those who speak very little English, navigate their phones and the internet in English, adapting to the digital ecosystem. While machine translation can serve as a bridge between English and Indian languages, this is a “transformative” technology, Mr. Pani said, and not a generative one, like LLMs. “We haven’t solved that problem, and we are still not willing to solve it,” Mr. Pani told The Hindu in a recent interview, referring to getting more Indians to use the web in Indian languages.

Yet, some firms are still trying. Sarvam, a Bengaluru-based firm, announced last October that it had developed a 2 billion parameter LLM with support for 10 languages plus English: Bengali, Gujarati, Hindi, Marathi, Malayalam, Kannada, Odia, Tamil, Telugu and Punjabi. The firm said it was “already powering generative AI agents and other applications.” Sarvam did this on NVIDIA chips that are in high demand from big tech firms building massive data centres for AI across the world.

Then there’s Karya, the Bengaluru-based firm that has been paying users to contribute voice samples in their mother tongue, gradually providing data for future AI models that hope to work well with local languages. The firm has gained global attention — including a cover from TIME magazine — for its efforts to fill the data deficit. “India has 22 scheduled languages and countless dialects,” the IndiaAI Mission said in a post last July. “An India-specific LLM could better capture the nuances of Indian languages, culture, and context compared to globally focused models, which tend to capture more western sentiments and contexts.”

Krutrim AI, backed by the ridesharing platform Ola, is attempting a similar effort, by leveraging drivers on the Ola platform to be “data workers”. The IndiaAI Mission is itself planning on publishing a datasets platform, though details of where this data will come from and how it has been cleaned up and labelled have not yet been forthcoming.

“I think that we need to think much more about data not just as a resource and an input into AI, but as an ecosystem,” Astha Kapoor, co-founder of the Aapti Institute, told The Hindu in an interview.

“There are social infrastructures around data, like the people who collect it, label it, and so on.” Ms. Kapoor was one of the very few Indian speakers at the AI Action Summit in Paris in February. “Our work reveals a key question: why do you need all this data, and what do I get in return? Therefore, people who the data is about, and the people who are impacted by the data, must be involved in the process of governance.”

Is the effort worth it?

And then there are the sticky questions that arose during the mass-scraping of English-language content that has fed the very first models: even if job displacement can be ruled out (and it is far from clear that it can), there are questions about data ownership, compensation, rights of people whose data is being used, and the power of the firms that are amassing them, that will have to be contended with fully. This is a process that is far from settled even for the pioneer models.

Ultimately, one of the defining opinions on foundational models came from Nandan Nilekani last December, when the Infosys founder dismissed the idea altogether based on cost alone. “Foundation models are not the best use of your money,” Mr. Nilekani had said at an interaction with journalists. “If India has \$50 billion to spend, it should use that to build compute, infrastructure, and AI cloud. These are the raw materials and engines of this game.”

After DeepSeek dramatically cut those costs, Mr. Nilekani conceded that a foundational LLM breakthrough was indeed achievable for many firms: “so many” firms could spend \$50 million on the effort, he said. But he has continued to emphasise in subsequent public remarks that AI has to ultimately be inexpensive across the board, and useful to Indians everywhere. That is a standard that is still not on the horizon, unless costs come down much more dramatically, and India also sees a scale-up of domestic infrastructure and ecosystems that support this work.

“I think the real question to ask is not whether we should undertake the Herculean effort of building one foundational model,” Mr. Bhojwani said, “but to ask: what are the investments we should be making such that the research environment, the innovation, private market investors, etc., all come together and orchestrate in a way to produce — somewhere out of a lab or out of a private player — a foundational large language model?”

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