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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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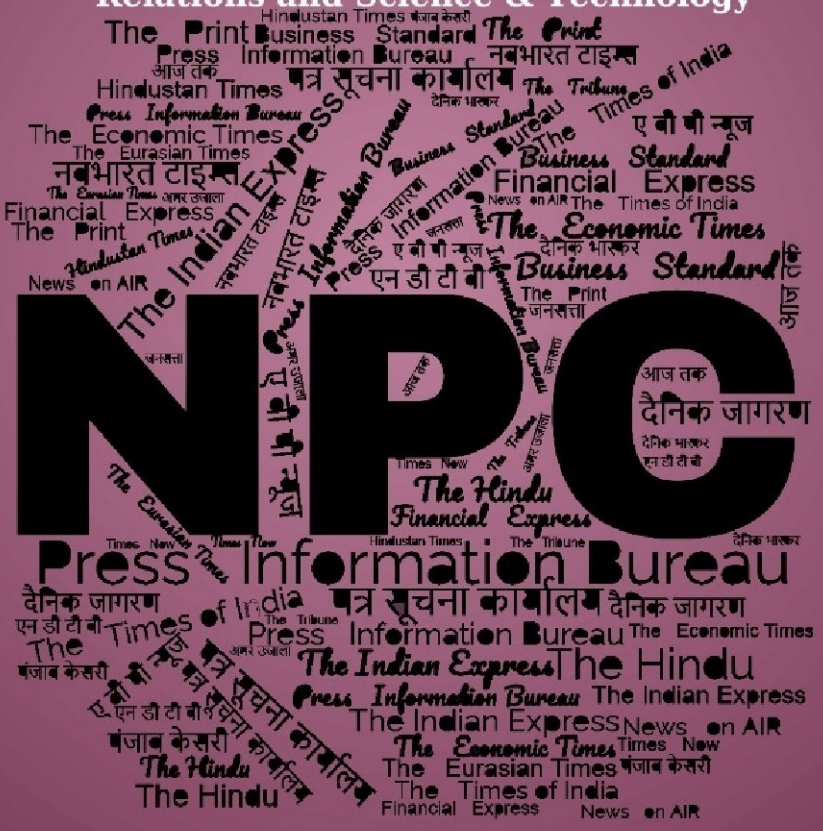

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Defence News

Combat squadron strength dwindles, Govt looks at plan to upgrade Su-30MKIs

Source: The Indian Express, Dt. 26 Oct 2025

With the final exit of the MiG-21s last month bringing down the IAF fighter squadron strength to 29 as against the sanctioned 42, there's a push within the government to go ahead with the programme to upgrade the Sukhoi Su-30MKI fleet, the backbone of the IAF, officials aware of the latest discussions have told The Sunday Express. The Su-30MKI upgrade programme, also referred to as the Super Sukhoi programme, is a major midlife upgrade programme which can increase the service life of the multirole fighter by another 20 years.

According to officials, the upgradation proposal is currently being examined by the Ministry of Defence and efforts are underway to fast-track its movement to the Cabinet Committee of Security (CCS) for its approval. "It is currently being examined by the Ministry of Defence. Efforts are on to send it soon to the CCS for its sanction for the design and development phase," a senior official said, adding that around 80 aircraft will be upgraded under this programme.

The upgrade, the official said, will include a new cockpit, avionics, radars and IR sensors, a new electronic warfare suite including jammer pods. Officials said the upgrade programme is nearly finalised and once it gets the CCS sanction, state-owned Hindustan Aeronautics Limited (HAL) has set a timeline to deliver the aircraft's initial operational clearance (IOC) version in five years and the final operational clearance (FOC) version in seven years of the CCS nod.

While an IOC aircraft typically achieves a certain milestone before full-scale production can begin, which can include integration of a few basic key features, the FOC version refers to the version which is more combat-ready with all planned weapon integration and other upgrades. The development also assumes significance in the context of the IAF's dwindling fighter squadron strength, which went down to 29 after the last of the MiG-21s retired in September. The IAF currently has a sanctioned fighter squadron strength of 42. The IAF is yet to receive delivery of any of the 83 Light Combat Aircraft Tejas Mk1A from the HAL. In November 2023, the Defence Acquisition Council (DAC), headed by Defence Minister Rajnath Singh, had accorded an Acceptance of Necessity for upgradation of Su-30MKI aircraft indigenously from HAL.

The worry, the need

The dwindling combat strength is a concern given that the IAF has to patrol the skies over the borders with Pakistan and China. Down to 29 squadrons from the sanctioned strength of 42, the IAF is in urgent need of aircraft. The Jaguar and Mirage 2000 fleets will be retired in a phased manner sometime after 2030 and the IAF is still to receive delivery of the Tejas MK1A to fill existing gaps.

In December 2024, the DAC accorded an Acceptance of Necessity for procurement of Electronic Warfare Suite (EWS) comprising External Airborne Self Protection Jammer pods, Next Generation Radar Warning Receiver and associated equipment for the Su-30MKI.

According to the Ministry of Defence, this system will enhance the operational capabilities of the Su-30MKI and protect it from enemy radars and related weapon systems during missions against enemy targets protected by air defence systems.

Last year, the DAC also gave its nod for the overhaul of engines of the Su-30MKI which will enhance service life. Earlier this month, IAF chief Air Chief Marshal A P Singh said the processes related to the Su-30MKI upgrade are currently underway. He said systems are being developed and the process of contracting for integration of those systems is going on, and will likely involve the Russians at certain stages. “That discussion is on,” he said. Without mentioning the exact number of aircraft being considered for upgradation, he said that in such programmes, 70%-75% of the fleet is catered for.

https://indianexpress.com/article/india/combat-squadron-strength-dwindles-govt-looks-at-plan-to-upgrade-su-30mkis-10327147/

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सेना के शीर्ष कमांडरों से राजनाथ बोले, दुश्मन को काम ना आँके

Source: NavBharat Times, Dt. 25 Oct 2025

जैसलमेर में रक्षा मंत्री भैरव बटैलियन के कमांडो से भी मिले।

■ पीटीआई, नई दिल्ली: रक्षा मंत्री राजनाथ सिंह ने जैसलमेर में शीर्ष सैन्य कमांडरों को संबोधित करते हुए कहा कि ऑपरेशन सिंदूर भारत के साहस और संयम का प्रतीक बनेगा। राजनाथ ने सेना को चेताया कि दुश्मनों को कभी कम न आंकें और हर परिस्थिति के लिए सतर्क रहें। रक्षा मंत्री नई लाइट कमांडो बटैलियन भैरव से भी मिले। भैरव बटैलियन को क्रॉस बॉर्डर ऑपरेशन के लिए खासतौर पर तैयार किया गया है।

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India to hold major tri-service exercise on western frontier

Source: The Times of India, Dt. 27 Oct 2025

India is now conducting a major tri-Service combat exercise called “Trishul” on the western front with Pakistan, with a NOTAM (notice to airmen) issued for all aircraft to avoid a vast swathe of airspace along the border in Rajasthan and Gujarat from Oct 30 to Nov 10. Pakistan, too, has issued a notification restricting multiple air traffic routes along its central and southern airspace, though somewhat away from the border, possibly for an exercise or weapons test on Oct 28-29.

This muscle-flexing is reminiscent of the multiple NOTAMs issued by both countries in the aftermath of Operation Sindoor during which India conducted deep precision strikes against nine terror hubs as well as 11 airbases and radar sites from May 7 to 10. A senior military officer told TOI that the ongoing wargames are “routine”, in accordance with the practice to conduct a major tri-Service exercise at least once a year. The sheer scale, complexity and area of operations, however, is quite huge. “Multiple joint combat drills, both offensive and defensive in nature, will be executed during Trishul,” an officer said.

Moreover, the exercise comes soon after defence minister Rajnath Singh warned Pakistan about its recent military infrastructure build-up near the sensitive Sir Creek region, the 96-km-long tidal estuary between the Rann of Kutch in Gujarat and the Sindh province of Pakistan, which is a major bilateral dispute. “If Pakistan dares to act in the Sir Creek Sector, the reply will be so strong that it will change both history and geography,” he had said.

Under the overall Trishul exercise, the armed forces will conduct joint operations across diverse and challenging terrains, including offensive manoeuvres in the creek and desert sectors, amphibious operations off the Saurashtra coast, and joint multi-domain operational drills. The Army has deployed well over 20,000 soldiers with main-battle tanks, howitzers, armed helicopters and different kinds of missile systems. Drills like `Trinetra’ with a focus on “full-cycle electromagnetic spectrum operations and counter-unmanned aerial system kill-chains” are already being conducted by the 21 `Sudarshan Chakra’ strike corps in the desert sector. The IAF, in turn, will soon swing into action with `Mahagujraj” high-tempo operations, with frontline fighters like Rafales and Sukhoi-30MKIs, special aircraft, helicopters, remotely-piloted aircraft and force-enablers like IL-78 mid-air refuellers and airborne early-warning and control (AEW&C) aircraft being deployed from several air bases.

The Navy, too, has deployed some frigates and destroyers off the Gujarat coast for the intensive combat manoeuvres. “Remember, the Jamnagar refinery in Gujarat will be a target for Pakistan in any full-scale war,” said the officer. “Different indigenous weapon systems and innovations will be fully tested during the Trishul exercise. In the non-kinetic domains, ISR (intelligence, surveillance and reconnaissance), EW (electronic warfare and cyber capabilities will also be a focus area,” the officer said.

https://timesofindia.indiatimes.com/india/india-to-hold-major-tri-service-exercise-on-western-frontier/articleshow/124820830.cms

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Operation Sindoor embodies India’s military prowess, national character, says Rajnath Singh

Source: The Pioneer, Dt. 26 Oct 2025

Defence Minister Rajnath Singh on Friday described Operation Sindoor as an embodiment of India’s military prowess and national character, and a demonstration by the soldiers that their strength lies not only in weapons, but also in their ethical discipline and strategic clarity. Underlining this point while addressing the Army Commanders’ Conference in Jaisalmer, Rajasthan, he also said, “Operation Sindoor will go down in history as not just a military operation but also a symbol of the nation’s courage and restraint. The action taken by our forces against

terrorists was in keeping with both policy precision and human dignity. The operation isn't over. Our mission for peace will continue as long as even a single terrorist mindset remains alive."

Rajnath Singh took stock of the security situation and the operational preparedness of the Indian Army during the Conference, and the visit to the forward areas of Tanot and Laungewala in Rajasthan on October 24, 2025. During the conference, detailed deliberations were held with the senior leadership of the Indian Army on key aspects including Grey Zone Warfare and the roadmap for Jointness, Aatmanirbharta and Innovation. Chief of Defence Staff (CDS) General Anil Chauhan, Chief of the Army Staff General Upendra Dwivedi, Defence Secretary Rajesh Kumar Singh, Vice Chief of the Army Staff Lieutenant General Pushpendra Singh and all Army Commanders were in attendance.

The defence minister said Operation Sindoor has given rise to a new strategic thinking that India responds to any terrorist activity on its own terms. "This is New India's Defence Doctrine, which embodies both resolve and courage," he said. Rajnath Singh urged the Commanders to continue focusing on defence diplomacy, Aatmanirbharta, information warfare, defence infrastructure, and force modernisation to ensure a future-ready army.

On the situation along the Northern border facing China, the defence minister stated that the ongoing talks and de-escalation steps have demonstrated a balanced and firm foreign policy of India. "Our policy is clear that there will be dialogue and our readiness on the border will remain intact," he said. Rajnath Singh emphasised that while present-day warfare is technology-driven, the soldiers remain the greatest assets of the country. He stated that machines multiply strength, but it's the human spirit that possesses the power to deliver results. He asserted that modern-day warfare is fought in invisible domains such as cyberspace, information, electronic disruption, and space control, and what matters, along with adapting to the latest technological advancements, is quick decision-making and willpower of the soldiers.

At Laungewala, the defence minister laid a wreath at the iconic Laungewala Yudh Sthal and paid homage to the brave hearts of the Indian Army. Rajnath Singh inaugurated 'Chandpuri Hall', an Audio-Visual Room, dedicated to the memory of Major (later Brigadier) Kuldip Singh Chandpuri who led the gallant defence during the Battle of Laungewala in 1971. He also felicitated the veterans who had participated in the battle.

https://www.dailypioneer.com/2025/india/operation-sindoor-embodies-indias-military-prowess-national-character-says-rajnath-singh.html

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Satellite for armed forces to be launched next week

Source: The Hindu, Dt. 27 Oct 2025

The Indian Space Research Organisation (ISRO) will launch military communications satellite CMS-03 on November 2 from the Satish Dhawan Space Centre in Sriharikota. The CMS-03 communication satellite, also known as GSAT-7R, will be launched by the Launch Vehicle Mark 3 (LVM3).

"CMS-03 is a multi-band communication satellite that will provide services over a wide oceanic region including the Indian landmass. CMS-03, weighing about 4400kg, will be the heaviest communication satellite to be launched to Geosynchronous Transfer Orbit (GTO) from Indian soil," ISRO said on Sunday (October 26, 2025). The launch vehicle has been fully assembled and

integrated with the spacecraft, and has been moved to the launch pad on Sunday (October 26) for further pre-launch operations, ISRO added.

The launch of the CMS-03 will be the first by the LVM3 rocket in over two years. The last time the rocket was deployed was in July 2023 to launch the historic Chandrayaan-3 mission from Sriharikota. “The previous mission of LVM3 launched the Chandrayaan-3 mission, where India became the first country to land successfully near the lunar south pole,” ISRO said.

https://www.thehindu.com/sci-tech/science/isro-to-launch-military-communications-satellite-cms-03-on-november-2/article70205060.ece

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Conclusion of second edition of Naval Commanders' Conference 2025 (CC 2025/2)

Source: Press Information Bureau, Dt. 25 Oct 2025

The second edition of the biannual Naval Commanders' Conference 2025 was conducted from 22 to 24 Oct 2025 at the Nausena Bhawan, New Delhi. The three-day, apex-level conference served as a vital forum for the Naval Commanders to deliberate on issues of operational preparedness, maritime security, capability development, and Tri-Service integration.

The conference commenced with the inaugural address by the Chief of the Naval Staff. Emphasising the evolving geostrategic environment, the CNS highlighted the Navy's role in safeguarding national maritime interests through preparedness, adaptability, and regional engagement. Reaffirming the Navy's status as a ‘Combat Ready, Credible, Cohesive and Future-Ready Force’, the CNS lauded recent operational deployments, capability augmentations, and joint missions. He also underscored progress towards a fully Aatmanirbhar Navy by 2047, driven by innovation, technology induction, and iDEX initiatives.

The Hon'ble Raksha Mantri, Shri Rajnath Singh, addressed and interacted with the Naval Commanders on 23 Oct 2025. He acknowledged the Indian Navy's vital role in safeguarding national interests and commended its high level of operational readiness and robust deterrent posture. He affirmed that the Indian Navy's presence in the Indian Ocean Region is a matter of

comfort for the friendly nations, while it is a source of discomfort for those who seek to destabilise the region. He also reiterated that a self-reliant Navy is the foundation of a confident and powerful nation, and Indian Navy's efforts towards enhancing its capabilities through indigenous equipment has made it the flag bearer of Aatmanirbharta. He outlined the need to harness technology and tactics urgently to out-manoeuvre our adversaries. He also highlighted the importance of uncrewed and autonomous systems in modern warfare.

The Chief of the Defence Staff, Chief of the Air Staff, and the Cabinet Secretary also interacted with the Naval Commanders. CDS during his address outlined the importance of integration, jointness, and resource optimisation.

During the conference, five naval publications, such as the Regulations for Naval Armament Service, GeM Handbook, and the Foreign Cooperation Roadmap, were released. Additionally, a one-stop-solution portal 'NIPUN' (Naval Intellectual Portal for Unified Knowledge) was launched as an online aggregator of intellectual work of the naval fraternity in various domains. On the sidelines of the conference, the Sagar Manthan event held on 22 October, brought Naval Commanders, subject matter experts, and thought leaders together to deliberate on contemporary issues.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2182461

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आतंकी मनसिकता ख़तम होने तक जारी रहेगा ऑपरेशन सिन्दूर

Source: Dainik Jagran, Dt. 25 Oct 2025

जागरण ब्यूरो, नई दिल्ली : रक्षा मंत्री राजनाथ सिंह ने कहा कि आपरेशन सिंदूर इतिहास में भारत के साहस और संयम के प्रतीक के रूप में दर्ज होगा। उन्होंने सेना से कहा कि वह दुश्मनों को कभी कम न आंकें और किसी भी स्थिति से निपटने के लिए हमेशा सतर्क रहे। उन्होंने कहा कि आपरेशन सिंदूर अभी खत्म नहीं हुआ है। शांति के लिए हमारा मिशन तब तक जारी रहेगा, जब तक एक भी आतंकी मानसिकता जीवित है। राजस्थान के जैसलमेर में आपरेशन सिंदूर के बाद सेना के कमांडरों के पहले सम्मेलन में अपने संबोधन के दौरान रक्षामंत्री ने यह बात कही। उन्होंने कमांडर सम्मेलन में हिस्सा लेने के बाद शुक्रवार को राजस्थान के तनोट और लोंगेवाला सीमा के अग्रिम क्षेत्रों का दौरा कर सेना की सुरक्षा स्थिति और सैन्य आपरेशन तैयारियों का जायजा लिया। उन्होंने कहा कि आपरेशन सिंदूर से जन्मी नई रणनीतिक सोच यह है कि भारत किसी भी आतंकी गतिविधि का अपनी शर्तों पर जवाब देता है। यह नए भारत का रक्षा सिद्धांत है, जो संकल्प और साहस दोनों का प्रतीक है। कमांडरों से रूबरू होते हुए उन्होंने आपरेशन सिंदूर को भारत के सैन्य कौशल और राष्ट्रीय चरित्र का प्रतीक बताते हुए कहा कि सैनिकों ने यह दिखा दिया कि उनकी ताकत केवल हथियारों में ही नहीं, बल्कि उनके नैतिक अनुशासन और रणनीतिक स्पष्टता में भी निहित है। कमांडर सम्मेलन के दौरान सेना के वरिष्ठ नेतृत्व के साथ ग्रे जोन युद्ध और संयुक्तता, आत्मनिर्भरता और नवाचार के रोडमैप सहित प्रमुख पहलुओं पर विस्तृत विचार-विमर्श किया गया। इसमें चीफ आफ डिफेंस स्टाफ जनरल अनिल चौहान, सेना प्रमुख जनरल उपेंद्र द्विवेदी, रक्षा सचिव राजेश कुमार सिंह, उप सेना प्रमुख लेफ्टिनेंट जनरल पुष्पेंद्र सिंह के साथ सेना के कमांडर मौजूद थे। रक्षा मंत्री ने उत्तरी सीमा की स्थिति के बारे में चीन से चल रही बातचीत और तनाव कम करने के कदमों के संदर्भ में कहा कि यह भारत की संतुलित और दृढ़ विदेश नीति को प्रदर्शित करता है। कहा कि हमारी नीति स्पष्ट है कि बातचीत जारी रहेगी व सीमा पर हमारी तत्परता बरकरार रहेगी। कहा कि भारतीय सेना को दुनिया की सबसे अनुकूलनशील सेनाओं में से एक माना जाता है।

जैसलमेर में सेना कमांडरों के सम्मेलन में रक्षा मंत्री राजनाथ सिंह ने आपरेशन सिंदूर को बताया राष्ट्रीय चरित्र का प्रतीक

<< राजस्थान में शुक्रवार को लोंगेवाला सीमा पर अत्याधुनिक शस्त्रों के साथ तैनात सैनिकों के साथ रक्षा मंत्री राजनाथ सिंह (मध्य) ● प्रेट्र

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Delivery of 'Mahe' - first anti-submarine warfare shallow water craft built by CSL, Kochi

Source: Press Information Bureau, Dt. 24 Oct 2025

'Mahe', the first of eight Anti-Submarine Warfare Shallow Water Crafts (ASW SWC) being built by Cochin Shipyard Limited (CSL), Kochi, was delivered to Indian Navy on 23 Oct 2025. 'Mahe', named after the historic port town in the Union Territory of Puducherry, symbolises India's rich maritime heritage.

The vessel has been indigenously designed and constructed by CSL, reflecting India's growing self-reliance in Naval Shipbuilding. It is equipped for underwater surveillance, Low Intensity Maritime Operations (LIMO), Anti-Submarine Warfare (ASW) operations in coastal waters and has advanced Mine Laying capability. At approximately 78 metres, with a displacement of around 1,100 tons, the ship packs a punch in underwater warfare, with torpedoes, Multifunctional Anti-Submarine Rockets, and advanced radars and sonars.

Induction of ASW SWCs will significantly augment the Indian Navy's ASW capability, enhancing maritime security in the littorals. The delivery of 'Mahe', with over 80% indigenous content, marks yet another milestone and reaffirms the Government of India's vision of 'Aatmanirbhar Bharat'.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2182188

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Is the QUAD dead or on the backburner?

-by Bhopinder Singh (military veteran, former Lieutenant Governor of the Andaman and Nicobar Islands and Puducherry)

Source: The Pioneer, Dt. 27 Oct 2025

The late Prime Minister of Japan, Shinzo Abe, can claim to be the original proponent of the QUAD (Quadrilateral Security Dialogue) in 2007. QUAD, or the "Democratic Security Diamond", was

envisaged as a strategic coalition of maritime democracies (the United States of America, Japan, India, and Australia), or like-minded nations, to work towards a “free and open Indo-Pacific” region.

What remained unsaid was the “elephant in the room” — the commonality of Sino-wariness that beset the four QUAD nations as they awoke to the realities of a belligerent, hegemonic, and expansionist China. Initial fanfare with the 2007 Malabar Exercise (Joint Naval Exercises) notwithstanding, the ideation went into dormancy for a decade, only to be revived in 2017 when China started stamping its footprint in the neighbourhood (South and East China Seas) and beyond (Belt and Road Initiative).

By 2017, specific factors such as the return of Shinzo Abe as Prime Minister, India’s Doklam face-off, worsening public sentiment against China in Australia, and an assertive US under a China-baiting Donald Trump contributed to the circumstantial momentum for QUAD. Ambiguous language like “desisting unilateral attempts to change the status quo by force in the Indo-Pacific” barely hid the fact that the real target was China.

Later, Joe Biden continued the commitment with intermittent dialogues and occasional posturing through naval exercises. QUAD was expected to get sharper claws with the return of Donald Trump to the Oval Office in his second term. Oddly, this time, Trump’s angst and ire are fuelled by tariffs not only targeted at China but also at its QUAD partners — most notably against India, with some of the most punitive rates. As the scope for QUAD was overarchingly wholesome, encompassing military, economic, infrastructural, and technological spheres, Trump’s inexplicable and singular fixation with tariffs has not spared allies, putting the notion of preferential treatment afforded by concepts like QUAD in jeopardy.

As QUAD has not yet translated into a formal “treaty” and relies on positive consensus among member states, the popular mood against an uncouth Trump in India, Australia, and Japan has made intra-member engagement unnatural. This recent unease created by the US has led India to declare the October 2025 summit to be “on hold”, alluding to prevailing bilateral tensions with the US. It is not just India — Trump has also threatened Japan unless it makes more trade concessions, citing Tokyo’s unwillingness to buy US-grown rice and its large trade deficit. Australia has had it even worse, with Trump forsaking all diplomatic balance and publicly telling the Australian Ambassador to the US to his face, “I don’t like you either, and probably never will”, besides pressurising Canberra on multiple fronts. It is as if India, Japan, and Australia have suddenly morphed into “enemy” states warranting punishment, thereby diminishing the chances for a conceptualisation like QUAD, which is predicated on mutual understanding and alignment among member states, especially the US.

On the contrary, other blocs like BRICS (Brazil, Russia, India, China, and South Africa) have gathered momentum, memberships, and materiality. The fact that BRICS has two known nemeses of the US, Russia and China, within it, makes it even more leverageable for countries like India, which rightfully feel let down by the US in recent times. In its own subtle way, Delhi is refusing to kowtow or bend to Trump’s pressure tactics (for instance, cosying up to Pakistan) or persistent diatribes by refusing to renege on its historical equation and arrangement with Russia. So, does this signal the end of QUAD and all the great counter-possibilities that it promised? The short answer is no.

While concepts like QUAD will undergo topical pressures and even be put on the backburner, it would be premature to write off QUAD and all that it offers, especially to the US in the long term. It is important to recognise that an unstatesmanlike leader like Trump rarely panders to the “larger picture” and tends to have very reactive, unfiltered, and limited thoughts whilst pronouncing on

other countries, even if they were to be “natural allies” (a term once used for India). This infuses awkwardness on many bilateral and multilateral fronts.

As an unhinged businessman, Trump’s worldview is driven by very transactional, zero-sum bargaining for “business deals” rather than long-term strategic partnerships. Such a rationale in the Oval Office can end up overlooking the systemic context of interdependencies that cut across the realms of economics, geopolitics, geostrategy, and even security. Trump’s language and conduct ironically personify the exact sentiment that QUAD expressly sought to negate, as per a joint statement issued on 20 May 2023, envisioning a world “where no country dominates and no country is dominated — one where all countries are free from coercion and can exercise their agency to determine their futures”.

But by his own nature and incorrigibility, Trump will be made to feel enfeebled and isolated when China does flex its invariable muscle, and Washington DC will then suddenly find a miffed Delhi, Tokyo, and Canberra in an “I told you so” mode. Sadly, by the time Trump receives the rude wake-up call, much avoidable damage — to the detriment of all Sino-wary nations — would already have been done. So, QUAD is sadly relegated to the backburner — but only temporarily so.

https://www.dailypioneer.com/2025/columnists/is-the-quad-dead-or-on-the-backburner-.html

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Bhairav — 1st specialised commando battalion to take charge by Oct-end

Source: The Tribune, Dt. 27 Oct 2025

The newly raised ‘Bhairav’ specialised commando battalion will be deployed along the border by the end of October. Sources said five of these battalions would be deployed in critical areas in the Northern Command, including Ladakh, and Srinagar. The western sector and the eastern hilly regions facing China would also get a battalion each.

The army has set a target to raise an additional 20 such battalions in the next six months. On October 24, the army released first pictures of the troops of the Bhairav battalion during their interaction with Defence Minister Rajnath Singh along the forward area in Rajasthan. The Defence

Minister had witnessed a dynamic “capability demonstration exercise”, showcasing integrated employment of the new organisation.

Each battalion would comprise 250 specialised commandos equipped with weapons and technology to bring down anything and strike deep inside the enemy territory. These battalions would integrate fighting components and have weapons, equipment and vehicles used by infantry, artillery, Special Forces, Signals and Unmanned Aerial Systems (UAS).

The tasking of each such unit would be done at the level of Corps Commander. Each Bhairav battalion would be standalone and not part of any infantry unit. These units would be “lean, lethal and highly mobile” and would operate as a force between conventional infantry and the elite Para (Special Forces).

These batallions would be tasked to conduct rapid, high-impact tactical operations, especially along the border with China and Pakistan. Thus, freeing up the Special Forces for more strategic and high-risk missions. Unlike traditional infantry battalions, troops have been drawn from several arms of the army, including infantry, artillery, air defence and Signals. Creation of Bhairav battalions is part of a wider modernisation drive in the army, which also includes the formation of “Rudra” all-arms brigades and “Ashni” drone platoons for enhanced technological warfare capabilities.

https://www.tribuneindia.com/news/india/bhairav-1st-specialised-commando-battalion-to-take-charge-by-oct-end/

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Restraint as Statecraft : The Next Chapter

-by Lt Gen SS Mehta (retd) (Western Army Commander and Founder Trustee, Pune International Centre)

Source: The Tribune, Dt. 27 Oct 2025

‘The wise commander ends the war within victory, not beyond it.’ - Arthashastra tradition

WARS seldom end where they stop; they pause where proportion begins. From Versailles to Gaza, Baghdad to Kyiv, every unfinished war repeats the same lesson: victory without restraint plants the seeds of its own undoing. When triumph turns to humiliation, peace collapses. India has long known this truth. From Dhaka to Kargil to Op Sindoor, the Republic’s victories have carried an unmistakable civility, the ability to stop not from fatigue but from foresight. Restraint is not withdrawal; it is judgment, courage with conscience, power with proportion. To end well is the hardest act of command.

The Trap of Unmeasured Victory

As the world bleeds across continents and creeds, restraint stands almost orphaned. Wars now outlast reason, and peace has no constituency. In this moral vacuum, India’s inheritance of proportion becomes more than a virtue, it becomes a counter-narrative to the age of excess. Unmeasured victory is the oldest trap of power. Versailles birthed Hitler; Iraq’s dismemberment birthed ISIS. Retaliation without reflection changes only the uniform, not the animus. The pursuit of total victory often ensures total loss in the next generation. India’s discipline lies in ending wars on principle, not applause.

A Challenge to the Architects of Fracture

The architects of the current world order, those who equate alliance with obedience, have created the very fracture they now lament. For those who criticise autonomy as isolation or neutrality, the response is simple: bloc loyalty has failed. India's discipline is not just a domestic virtue; it challenges the failing model of power, offering a non-coercive paradigm where autonomy and restraint become the highest forms of strategic choice.

The Grammar of Modern Power

Restraint cannot remain an heirloom. Power today is exercised not only through arms but through algorithms, finance and influence. The grammar of statecraft has changed. Supply chains are siege lines, data the new territory, and narrative the most contested frontier. The next battles are curated, not declared, fought through perception, precision and patience. The state that ends well is the state that endures. For India, the challenge is dual: to preserve its civilisational temperament while adapting to the speed of the century. Principle must pair with preparedness, ethics with agility, patience with precision. The art of restraint must now be woven into technology, diplomacy and communication.

Strategic Autonomy: The Balm That Heals

When the UN stands emasculated, the P5 crippled by the veto, a bleeding world simply bleeds on. Trade becomes a weapon and peace prizes seek sponsors before causes; who then steers the ship? No one. It is in such drift that India's civilisational ethic steps in, not to command, but to exemplify. To show that power need not dominate to define; that restraint, walked open-chested, can still steady the storm. This is strategic autonomy in a fractured world, the principled third way that eschews bloc politics, a balm that heals without applause.

Restraint Reimagined

Restraint, having mastered consequence, must now master context. It begins where power ends, and responsibility begins. It is foresight expressed through proportion and conviction through composure. Beyond power and purpose lies the governance of impulse, the discipline to act with precision even when provoked, to uphold order without imitation, to preserve identity without isolation.

The Armed Forces have long practised this discipline, from the ceasefire at Dhaka to the Sindoor principle: silent preparation, precision without publicity, and power without excess. Diplomacy has mirrored it, preferring calibration to confrontation. The next frontier is artificial intelligence, where technology must serve transparency, not tyranny. The Republic that can humanise its algorithms will not only command power but trust. India's instinct to balance velocity with veracity in the digital realm may be its greatest strategic gift.

The Test of Calm

Such balance demands vigilance. The world stands fractured, the region is in upheaval; old alignments shift, and China's quiet entry is masked by a manufactured thaw. In this engineered calm, subterfuge travels beneath diplomacy. This is where restraint must think, not just wait, where composure pairs with clarity. We reclaim our region not by outshouting others, nor by joining rigid blocs, but by outlasting them, through the steadfast choice of partnership and the quiet authority of example. The age of outrage demands subtler courage: the ability to think slowly in a fast world, to stand still when the algorithm insists on motion. When the volume rises, restraint must speak in frequency, not fury.

Commanding Trust: The New Frontier of Statecraft

The true measure of modern statecraft is not the speed of its reaction but the mastery of its own impulse. The Republic that trades wisdom for velocity will stumble; strength lies in calm purpose, in the discipline that governs outrage. The psychological frontier has become the real domain of power. India's resilience flows from a vast and vocal society where dissent refines conviction and the rumble of democracy steadies the Republic's course: unity in diversity. Sindoor demonstrated: restraint with readiness, civility with resolve. That is the strategic message, and the moral one.

The Next Chapter

It will not be a treaty or a truce; it will be a tempering of power itself. It will belong to those who can innovate without intimidation, defend without domination, and lead without spectacle. In that balance lies the design of tomorrow's peace. It will be India's contribution to the grammar of deterrence.

Closing Reflection: The Unflinching Flame

When the world is quiet, restraint is mistaken for hesitation and autonomy for aloofness. But when the world burns, as it does now, and a civilisational requiem is revealed in moments like Sindoor, the true nature of power stands bare. In the scramble for peace prizes, when the vanquished rush to underwrite what is not theirs, India stands apart. Its civilisational restraint and strategic autonomy are not mere legacy; they are the two defining strengths of its enduring character, the only hands steady enough to hold the flame without feeding the inferno.

https://www.tribuneindia.com/news/comment/restraint-as-statecraft-the-next-chapter/

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Japan's new PM commits to higher defence spend, ties with India, Quad

Source: The Hindu, Dt. 25 Oct 2025

In a dramatic announcement three days after she was sworn in, Japanese Prime Minister Sanae Takaichi said her government will ensure that Japan's defence spending would increase to 2% of its GDP by March 2026, two years ahead of schedule, even as she pledged support for "security partnerships" like the Quad, which includes India. Ms. Takaichi, who said the government's first priority is to tackle inflation and boost fiscal spending, was addressing the Japanese Parliament, or Diet, in an inaugural speech about her agenda in office.

Ms. Takaichi, the country's first woman Prime Minister, also responded on Friday to Prime Minister Narendra Modi's congratulatory message on her appointment, saying she "looks forward" to promoting the Japan-India Special Strategic and Global Partnership.

"The free, open, and stable international order with which we have become familiar is being significantly shaken by historical shifts in the balance of power and intensifying geopolitical competition," Ms. Takaichi said, citing Russia, China and North Korea as "serious concerns" and promising to deepen Japan's "multilateral security consultations" involving the U.S., South Korea, the Philippines, Australia, and the Quad. In an interview to The Hindu, Assistant Minister and Spokesperson at the Ministry of Foreign Affairs Toshihiro Kitamura said India was a "unique"

country for its leadership of the Global South, and that Ms. Takaichi was committed to following former PM Shinzo Abe's lead on the Indo-Pacific.

Crucial partner

"In order to promote the main pillar of the Japanese diplomacy, a Free and Open Indo-Pacific, India is a crucial partner. Prime Minister Takaichi is fully committed to promote further cooperation with India," Mr. Kitamura said. In the parliament speech, Ms. Takaichi also ordered a review of Japan's National Security, Strategic and Defence plans that included the commitment on raising defence expenditure.

Japan's GDP last year was about $4 trillion (591 trillion Yen), and according to the National Security Strategy documents issued in 2022, defence spending was due to reach 11 trillion Yen, or 2%, only by the end of the financial year in 2027. The announcement on defence spending and the Indo-Pacific is significant as it comes a day before Ms. Takaichi leaves for Malaysia where she will meet with counterparts from ASEAN countries on October 26, and then will return to prepare for U.S. President Donald Trump's three-day visit to Japan beginning October 27.

Ms. Takaichi promised to elevate the Japan-U.S. relationship to "even greater heights". It remains to be seen whether Ms. Takaichi will also raise the Quad and scheduling the Summit due to be held in India later this year, which has been stalled due to India-U.S. tensions on trade issues.

Ms. Takaichi called Japan's population decline its "biggest problem", and struck a sharp note on immigration, suggesting controls on foreign nationals working in the country, including restrictions on land acquisition by them.

"First, to clarify, PM Takaichi is not anti-immigrant or anti-migration," said Mr. Kitamura, responding to question about the concerns. "The Japanese population is declining, and we need foreign workforce to support, maintain and revitalise our economy," he said. PM Takaichi has appointed US-born Minister for Economic Security Kimi Onoda also as the "Minister in charge of a Society of Well-Ordered and Harmonious Coexistence with Foreign Nationals" to reflect the priority.

"As regards to cooperation on skilling and workforce exchanges with India, the truth is that Japan does not have sufficient talent, particularly in IT and Science related industries, as India does," Mr. Kitamura added, referring to an "Action Plan" launched by PM Modi and former PM Shigeru Ishiba to promote 500,000 workforce exchanges over the next 5 years, including 50,000 skilled personnel and potential talents from India to Japan. "Prime Minister Takaichi will promote the agreement [India and Japan] have made," he said.

Ms. Takaichi gave the parliament address after appointing her Cabinet, which includes several faces familiar to New Delhi. Foreign Minister Toshimitsu Motegi was a minister in the Shinzo Abe cabinet (2017-19), while Internal Minister Yoshimasa Hayashi was the Foreign Minister (2021-23), under former PM Fumio Kishida, and travelled to Delhi for the G20 and Quad Foreign Minister's meeting. Meanwhile, 44-year-old Defence Minister Shinjiro Koizumi is the son of former Japanese PM Junichiro Koizumi, who travelled to India in 2005 to reset ties, set off strategic talks and launched the practice of annual summits with PM Manmohan Singh.

https://www.thehindu.com/news/international/japans-new-pm-commits-to-higher-defence-spend-ties-with-india-quad/article70198094.ece

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Russia tests unique cruise missile with nuclear engine

Source: The Pioneer, Dt. 27 Oct 2025

Russian President Vladimir Putin on Sunday announced the successful test of a unique nuclear powered 'Burevestnik' cruise missile with unlimited range and ordered the armed forces to prepare infrastructure for its deployment. Putin, in his televised meeting with the chief of defence staff and other military commanders, mentioned that during recent drills of nuclear forces, the 'Burevestnik' cruise was in the air for 15 hours and covered 14,000 kilometres during successful trials.

As the Supreme Commander of Russia's Armed Forces, Putin visited the joint staff of military operations in Ukraine earlier in the morning and interacted with force commanders led by Chief General Staff Gen Valery Gerasimov. Gerasimov briefed Putin about the encirclement of more than 10,000 Ukrainian troops in two vital directions. "A large group of the Ukrainian Armed Forces, comprising 31 battalions, has been blocked," Gerasimov said.

https://www.dailypioneer.com/2025/world/russia-tests-unique-cruise-missile-with-nuclear-engine.html

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अजय मिसाइल दाग पुतिन ने ट्रंप को दिखाई ताकत

Source: Dainik Jagran, Dt. 27 Oct 2025

जागरण न्यूज नेटवर्क, नई दिल्ली: अमेरिका से गहराती तनातनी के बीच रूस ने असीमित दूरी तक मार करनेवाली क्रूज मिसाइल दागकर अमेरिका सहित पूरी दुनिया को चौंका दिया है। रूस के राष्ट्रपति व्लादिमीर पुतिन ने रविवार को घोषणा की कि रूस ने असीमित दूरी तक मार कर सकनेवाली क्रूज मिसाइल बुरेवेस्तनिक का सफल परीक्षण किया है। अब इसे तैनाती की दिशा में आगे बढ़ाया जाएगा। पुतिन ने कहा कि ये ऐसा हथियार है, जो दुनिया में किसी और देश के पास नहीं है। अमेरिका का हर कोना इस मिसाइल की जद में है। इसकी विशेषताओं की वजह से इसे अजेय माना जा रहा है।

परमाणु हथियारों को ले जा सकने में सक्षम यह मिसाइल अपने पहले परीक्षण में सभी मानकों पर खरी उतरी। परीक्षण के दौरान यह 15 घंटे तक हवा में रही और 14 हजार किमी दूर लक्ष्य का संधान किया। समाचार एजेंसी रायटर के मुताबिक, ये मिसाइल असीमित दूरी तय करने की क्षमता रखती है। इसके लिए ये हफ्तों और महीनों तक हवा में रह सकती है। ये दुनिया की पहली ऐसी मिसाइल है, जिसमें परमाणु ऊर्जा इस्तेमाल होती है। इसके लिए इसमें एक न्यूक्लियर रिएक्टर स्थापित है।

दावा किया गया है कि ये मिसाइल किसी भी डिफेंस सिस्टम या रडार की पकड़ में नहीं आती और साथ ही इसके मार्ग का भी अंदाजा नहीं लगाया जा सकता है। पुतिन ने बताया कि इस मिसाइल का परीक्षण पिछले हफ्ते (21 अक्टूबर) किया गया है, लेकिन हर तरह के विश्लेषण के बाद रविवार को इसका खुलासा किया गया।

पुतिन ने इस मिसाइल को 'उड़न चेर्नोबिल' नाम दिया है। चेर्नोबिल रूस का परमाणु ऊर्जा रिएक्टर था, जिसमें 1986 में धमाका हो गया था। इसके बाद कई वर्षों तक क्षेत्र में रेडियोएक्टिव विकिरण फैला रहा। ये मिसाइल भी उड़ान के दौरान रेडियोएक्टिव विकिरण छोड़ती है। इसमें लगा छोटा रिएक्टर आंशिक तौर पर ढका होता है, जिससे विकिरण होते रहते हैं। विशेषज्ञों के मुताबिक इससे इकोसिस्टम और सुरक्षा चिंताएं बढ़ सकती हैं।

यूक्रेन युद्ध में रूस पश्चिमी देश के दबाव में नहीं आएगा >> पेज 18

- 20,000 किमी मानी जा रही है मिसाइल की अधिकतम रेंज
- 5459 परमाणु मिसाइलें हैं रूस के पास
- 5177 एटमी मिसाइलों से लैस है अमेरिका
- 87 प्रतिशत परमाणु हथियार हैं रूस और अमेरिका के पास

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'Both countries will support each other': Top Pak military-official meets- Yunus; discusses defence ties

Source: The Times of India, Dt. 27 Oct 2025

Visiting Pakistan Joint Chiefs of Staff Committee chairman General Sahir Shamshad Mirza called on Bangladesh chief adviser Muhammad Yunus and discussed ways to enhance bilateral cooperation, including in areas of "trade, connectivity and defence".

Emphasising "shared historical, cultural and people-to-people ties" between the two countries, Mirza expressed Pakistan's desire to strengthen cooperation in multiple sectors, said Yunus' press wing on Sunday. The two sides expressed satisfaction over the positive trajectory of bilateral relations, and Mirza noted the vast potential for expanding trade, connectivity and investment between the two nations.

"Our two countries will support each other," he said, adding that a two-way shipping route between Karachi and Chittagong has begun operations, while a Dhaka-Karachi air route is likely to open within a few months. The press wing said both sides also underscored the need to de-escalate tensions in West Asia and Europe.

https://timesofindia.indiatimes.com/world/pakistan/both-countries-will-support-each-other-top-pak-military-official-meets-yunus-discusses-defence-ties/articleshow/124838481.cms

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Indian Coast Guard launches advanced Fast Patrol Vessels ICGS Ajit & Aparajit

Source: The Statesman, Dt. 25 Oct 2025

Marking a significant milestone in strengthening India's maritime security, the Indian Coast Guard (ICG) launched two advanced Fast Patrol Vessels (FPVs) — ICGS Ajit and ICGS Aparajit — at Goa Shipyard Limited (GSL) here on Friday. These vessels are the seventh and eighth in a series of eight indigenously built FPVs being constructed by GSL for enhancing the ICG coastal surveillance and response capabilities.

Designed and built entirely by GSL, the FPVs reflect the growing strength of India's indigenous shipbuilding capabilities. Measuring 52 metres in length and displacing 320 tonnes, these vessels are equipped with Controllable Pitch Propellers (CPP), the first-of-its-kind in this class in India,

offering superior manoeuvrability and propulsion efficiency. They are capable of multi-mission roles, including fisheries protection, coastal patrol, anti-smuggling, anti-piracy and search and rescue operations, particularly around India's island territories and Exclusive Economic Zone.

A statement from the Ministry of Defence stated that the vessels were launched by Manju Sharma, in the presence of Financial Advisor (Defence Services) Dr. Mayank Sharma. Commending the ICG and GSL for their achievement, Dr. Mayank lauded the project's contribution to domestic industry, employment generation and the MSME ecosystem, emphasising how such initiatives are bolstering the nation's self-reliance in maritime capability.

With the induction of two FPVs, the ICG continues to expand its fleet of modern, high-speed platforms, ensuring enhanced operational readiness and maritime safety across India's vast coastline. The launch further cements GSL's position as a key player in building next-generation indigenous defence vessels for the nation.

https://www.thestatesman.com/india/indian-coast-guard-launches-advanced-fast-patrol-vessels-icgs-ajit-aparajit-1503502821.html

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INS Sutlej concludes 18th joint survey with Mauritius

Source: The Pioneer, Dt. 27 Oct 2025

INS Sutlej has successfully completed a joint hydrographic survey with the Mauritius Hydrographic Service, covering an area of nearly 35,000 square nautical miles, the Indian Navy said on Sunday. The initiative will significantly contribute to marine charting, coastal regulation, resource management, and long-term environmental planning, thereby supporting Mauritius' Blue Economy goals, a Navy spokesperson said.

The survey was conducted in close coordination with national agencies under the existing MoU between India and Mauritius. As part of the mission's capacity-building efforts, six personnel from various Mauritian ministries embarked on board INS Sutlej for hands-on training in modern hydrographic techniques, the Navy said.

In addition, INS Sutlej carried out joint Exclusive Economic Zone (EEZ) surveillance and anti-piracy patrols with the Mauritius National Coast Guard, strengthening regional maritime security, the spokesperson said. At a ceremony held on board INS Sutlej, the fair sheet of the completed survey was formally handed over to Mauritian authorities in the presence of Shakeel Ahmed Yousuf Abdul Razack Mohamed, Minister of Housing and Lands, Mauritius, and Anurag Srivastava, High Commissioner of India to Mauritius, the statement said.

The deployment marks the 18th joint hydrographic mission between India and Mauritius—"a testament to the enduring maritime partnership and shared commitment to safe navigation, sustainable ocean management, and regional cooperation," the Navy said. The successful completion of the mission reaffirms the deep-rooted bonds of friendship between the two nations, aligned with the vision of 'MAHASAGAR,' or Mutual and Holistic Advancement for Security and Growth Across Region, it said.

https://www.dailypioneer.com/2025/india/ins-sutlej-concludes-18th-joint-survey-with-mauritius.html

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Science & Technology News

IIT-Bhubaneswar, ISRO ink pact for collaborative research

Source: The Pioneer, Dt. 26 Oct 2025

The Indian Space Research Organisation (ISRO) and Indian Institute of Technology (IIT) Bhubaneswar have signed an MoU to foster collaborative research and development, an official said. The National Remote Sensing Centre (NRSC) of ISRO and IIT-Bhubaneswar signed the agreement here on October 17, and the official statement was issued on Friday, he said. The partnership focuses on assessing physical and biogeochemical oceanic processes and shoreline change dynamics along the western Bay of Bengal, the release said.

"The pilot phase will involve mapping and analysing nearshore dynamics from the Sundarbans delta to northern Andhra Pradesh, with potential extension to other Indian coastal regions..." it said.

https://www.dailypioneer.com/2025/india/iit-bhubaneswar-isro-ink-pact-for-collaborative-research.html

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NIT Rourkela develops intelligent hybrid microgrid to manage renewable energy flow

Source: The Pioneer, Dt. 25 Oct 2025

Researchers at the National Institute of Technology (NIT), Rourkela have developed an intelligent control system that can automatically regulate electricity flow from solar, wind and battery sources, officials said. The innovative "hybrid microgrid" can provide clean and continuous power to rural areas lacking access to the main electricity grid, they said. The findings of the research have been published in the journal IEEE Transactions on Industry Applications.

Arnab Ghosh, assistant professor at NIT Rourkela said the primary objective of the research is to reduce reliance on fossil fuel reserves and supply power to remote regions not covered by the main grid. “Hybrid microgrids are being researched globally, where renewable energy sources such as solar and wind power are combined with battery storage. However, the integration remains complex and prone to fluctuations, leading to unstable supply and even interruption,” he said.

He said a dynamic Power Management Scheme (PMS) that enables all energy producers and storage units to coordinate seamlessly has been developed to address this issue. This technique allows batteries to store energy safely and efficiently, enhancing capacity and lifespan, while reducing overall costs, he added. Ghosh explained that automatically switching converters according to the most readily available resources – solar in the morning and wind, Biomass Gasifier (BMG) and Pico Hydropower (PH) during the rest of the day – ensures active power flow is balanced across different loads.

“This multi-source converter-based hybrid setup, which is hardly ever present in current markets, can provide an effective solution for the needs of remote communities and can be a source of approximately 10 kWh of dependable energy, sufficient for four households,” he said. Krishna Roy, Assistant Professors, Department of Electrical Engineering, NIT Rourkela said, “the research focuses on power management among different sources, loads and storage systems. Energy management techniques in renewables-integrated microgrids provide social benefits by ensuring reliable electricity access, especially in remote communities”.

“They promote sustainable development, create local employment opportunities and improve living standards. Additionally, they reduce dependence on fossil fuels, enhance energy security and support community resilience through cleaner, affordable and more equitable energy solutions,” Roy said. The researchers claimed that their system works under several real-world scenarios, such as fluctuating solar radiation, changing wind speeds and varying electrical loads. The proposed system would also be effective in electric vehicle charging stations and standalone renewable energy systems.

https://www.dailypioneer.com/2025/india/nit-rourkela-develops-intelligent-hybrid-microgrid-to-manage-renewable-energy-flow.html

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What is Google’s ‘quantum advantage’ leap?

Source: The Hindu, Dt. 27 Oct 2025

In two papers published in Nature on October 22, researchers from Google, MIT, Stanford, and Caltech reported what they called a verifiable display of quantum advantage using the company’s Willow quantum processor. That is, the teams said they have shown that Willow clearly outperforms existing supercomputers on solving a specific problem.

How does a quantum computer work?

Imagine waves moving in a pond. When two wave crests meet, they combine to make a bigger wave. When a crest meets a trough, they cancel each other out. This is called interference. At the quantum level, particles can behave like waves and their “wave functions”, which describe their probabilities, can be made to interfere with one another. By controlling this interference, scientists can amplify the probability of finding the right answer to a problem while cancelling out the wrong ones. This is what a quantum computer does.

In one of the two new studies, researchers introduced a quantum algorithm designed to solve optimisation problems, which are puzzles where the goal is to find the best possible solution among many. The research team called it Decoded Quantum Interferometry (DQI).

DQI uses a quantum version of the Fourier transform to manipulate the wave-like nature of particles that the quantum computer uses as its bits. This process is engineered such that the waves corresponding to good solutions interfere constructively, reinforcing each other to create a strong signal. Meanwhile, the waves for bad solutions interfere destructively and fade out. By measuring the final state, the algorithm will have a higher chance of landing on a 'high-quality' answer. The researchers showed that for the optimal polynomial intersection problem, the DQI algorithm could find a good approximation much faster than any known classical computer.

What is scrambling?

In the second study, the authors measured how information becomes scrambled in a complex quantum system. Say you drop a small amount of dark blue dye into a still swimming pool. At the first moment, the 'information' is simple and local. "The blue dye is right here," you can say. But the dye doesn't stay there: it spreads out. The information is no longer in one place but distributed across a larger volume of water. After a few hours, the entire pool has a faint, uniform blue tint. You can no longer see the original drop. The information seems to be gone — but it isn't. It's been scrambled. Every single water molecule in the pool now carries an almost imperceptible piece of that "blue" information.

This is what happens in a quantum system. A piece of information, initially stored in one quantum bit, gets spread out across all the other bits as they interact. The information becomes 'hidden' in the complex relationships between all the particles. So the challenge is: how do you measure a pattern that's so intricately hidden?

To do this, the researchers used a clever experiment. Imagine you're standing in a large, empty warehouse. You shout. The sound waves spread out instantly, bouncing off every wall, the floor, and the ceiling. This is the scrambling: the sound's information is now everywhere. Now, while your shout is still echoing around, your friend on the far side of the warehouse strikes a large metal bell with a hammer. This 'kick' doesn't stop the echoes but it changes them. Any sound wave from your shout that happens to hit that specific bell at that exact moment now gets a little 'imprint' in the form of a faint metallic ring. Then, the researchers did the equivalent of hitting a magical rewind button that caused all the sound waves to travel perfectly backward. All the normal echoes, the ones that didn't hit the bell, trace their paths back perfectly and cancel each other out upon returning, resulting in complete silence.

However, the imprinted echoes are now slightly off-course. When they travel backward, they don't cancel out properly, and the researchers are left hearing a very faint, jumbled echo — one carrying the imprint of the kick. That leftover sound is the OTOC measurement, and this process of different paths mixing and cancelling (or not) is called interference.

By measuring the faintness and character of that leftover echo, the scientists could tell exactly how much the information had spread out and interacted with that specific part of the system (the bell). This is how they successfully measured the subtle, hidden patterns of scrambled information.

How do you show quantum advantage?

The second experiment involved circuits so intricate that researchers estimated simulating them on the world's second fastest supercomputer would have taken more than three years. The Willow

processor completed the same task in about two hours. This said, while the first paper described a quantum algorithm that solved a puzzle much faster than any known classical computer, researchers haven't mathematically proven that a clever trick for a regular computer to solve the same puzzle quickly doesn't exist. New research will be needed to prove the problem is permanently hard for all non-quantum computers.

Likewise, while the second paper showed a quantum computer solving a complex problem, the next step will be for an independent team to use the same method to solve an actual unsolved problem in, say, physics or chemistry.

Finally, while the two studies mark a decisive step, their applications remain largely prospective. These are still lab-designed tasks whose outputs don't yet translate to scientific discoveries. The next stage will depend on improving other parts of quantum computing, including error correction and scaling to thousands of reliable quantum bits. These are widely expected to take several years more.

What did Google claim in 2019?

In a 2019 experiment, Google researchers used a quantum system to attempt to solve a problem called random circuit sampling. Here, its Sycamore processor ran a random programme generating a list of answers, with the challenge of predicting which of those answers would appear most frequently. However, researchers can't check a single answer in random circuit sampling, if the statistical distribution of all the answers looks correct. On the other hand, the problem the new test solved concerned a scientifically meaningful physical quantity.

The result was also said to be "verifiable" because the same problem can be run on a classical computer or another quantum computer, and verifying the answer doesn't depend on statistical patterns. One likely early application of the findings is in Hamiltonian learning, the process of inferring unknown parameters of a physical system by comparing experimental data with simulated outcomes. The same principles that this year's physics Nobel Prize laureates developed are what make processors like Willow possible. One of the laureates, Michel Devoret, is the chief scientist of quantum hardware at Google Quantum AI. The new studies built on the laureates' work to solve an optimisation problem and then to track how information spreads in quantum systems.

https://www.thehindu.com/sci-tech/science/what-is-googles-quantum-advantage-leap-explained/article70202625.ece

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Google's new AI for drug discovery is a win for scientific discovery

Source: The Hindu, Dt. 26 Oct 2025

Google's launch of a suite artificial intelligence (AI) tools, which its researchers reported to be successful at not only suggested a new drug combination for cancer therapy but even stood up to early tests in the laboratory, is a signal that research-scientists ought to be integrating AI into the process of scientific discovery. Built on the Gemma family of open models, the Cell2Sentence-Scale 27B (C2S-Scale) is a 27-billion-parameter foundation model designed to "understand" the language of individual cells.

“This announcement marks a milestone for AI in science,” Shekoofeh Azizi and Brian Perozzi, staff scientists at Google DeepMind and Google Research respectively, in a post accompanying the announcement. “C2S-Scale generated a novel hypothesis about cancer cellular behaviour and we have since confirmed its prediction with experimental validation in living cells. This discovery reveals a promising new pathway for developing therapies to fight cancer,” they added.

A novel use

The C2S-Scale model was trained on a large dataset of real-world patients and cell-line data, based on which it suggested a drug called silmitasertib could be used to improve the immune system’s ability to identify cancerous tumours when they were nascent. To be sure, silmitasertib (CX-4945) is currently in several clinical trials to treat multiple myeloma, kidney cancer, medulloblastoma, and advanced solid tumours. In January 2017, the US Food and Drug Administration granted it orphan drug status for advanced cholangiocarcinoma.

However, the novelty of Google’s effort was not in (re)discovering the drug but that it had scanned the vast cancer biology literature to suggest a novel use for a drug candidate. Pharmaceutical companies in their usual course spend billions of dollars and employ highly trained personnel to reveal similar insights. “It’s a nice result and was a well-chosen problem to test the capabilities of an LLM [large language model],” Sunil Laxman, systems biologist at the Institute for Stem Cell Science and Regenerative Medicine, Bengaluru, told The Hindu. “This would, in the usual course, have taken a focussed team of dedicated researchers several months to suggest such a use of the drug.”

‘It’s very good’

Dr. Laxman however underlined that the model hadn’t suggested something that couldn’t have occurred to a trained biologist nor had discovered something new about cancer biology. “It’s very good. Not great. The average laboratory in India will not have access to a vast library of chemical compounds where they can be tested. This one had, and while it has certainly shortened the time [in this case] for a potential discovery, it isn’t a path-breaking discovery.”

LLMs are at the core of AI and are trained on human-annotated data to understand human language and solve problems. Drs. Azizi and Perozzi have contended that their results demonstrate that it’s possible to create LLMs that don’t have to be trained on the rules of biological systems. Instead, they wrote, the models can be encouraged to figure the rules out just by having their successes ‘rewarded’ and failures ‘punished’. This is how some of the most powerful chess-playing LLMs were trained.

Good reasoning

Indian Institute of Science, Bengaluru, mathematics professor Siddhartha Gadgil interpreted the findings as significant and reckoned that the best AI models in mathematics were today at the level of a “skilled mathematician but not at genius-human levels”. He said there were “no reasons” to suppose that AI development would one day not be able to solve the most challenging maths problems. “We can’t say when an AI model will solve the Riemann Hypothesis but there’s no reason to suppose it never can. Already there are several initiatives and even companies that are tackling unsolved mathematical problems and they do come up with novel hypotheses.”

Dr. Gadgil cited the International Mathematical Olympiad 2025, where OpenAI, the maker of ChatGPT, said an “experimental reasoning model” had figured out answers to the questions, which, if it were a human, would have won it a gold medal. The model followed the same time

limits as human participants. Significantly, this model wasn't trained for the Olympiad but was a general-purpose reasoning model with sufficiently good reasoning powers. This said, the Olympiad's problems aren't representative examples of the problems professional mathematicians work on; they're intended for talented high-schoolers and constitute a gold standard test of mathematical talent.

The Riemann hypothesis on the other hand is a problem many mathematicians are working on. It's a statement about the nature of prime numbers whose proof has eluded mathematicians for over a century. The Clay Mathematical Institute in the US has promised to reward its solver with $1 million.

'Still divided'

Given the vast literature to which these LLM are exposed, they're expected to come up with novel and useful ideas about how to approach a mathematical problem an equivalent human expert wouldn't always immediately see, he added. Prof. Gadgil, who embraces LLM tools in his own research, added that his field is "still divided" on incorporating them. According to him, there were several good models that "showed no signs of plateauing and had a lot of latent capabilities that still weren't fully explored", and therefore ought to be encouraged as tools that a working researcher ought to be incorporating.

https://www.thehindu.com/sci-tech/science/google-c2s-scale-27b-model-scientific-discovery/article70198397.ece

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ISRO to launch communication satellite on November 2

Source: The Pioneer, Dt. 27 Oct 2025

The ISRO on Sunday said its LVM3 launch vehicle is scheduled to lift off with the CMS-03 communication satellite on November 2, from the Satish Dhawan Space Centre, Sriharikota. "India's LVM3 launch vehicle is scheduled to launch the CMS-03 communication satellite in its fifth operational flight (LVM3-M5) on November 2, 2025," ISRO said in a statement.

According to the space agency, CMS-03 is a multi-band communication satellite designed to provide services across a wide oceanic region, including the Indian landmass. Weighing about 4,400 kg, it will be the heaviest communication satellite to be launched to a Geosynchronous Transfer Orbit (GTO) from Indian soil.

"The previous mission of LVM3 launched the Chandrayaan-3 mission, wherein India became the first country to land successfully near the lunar south pole," ISRO added. ISRO further said that the launch vehicle has been fully assembled and integrated with the spacecraft and was moved to the launch pad on October 26 for final pre-launch operations.

https://www.dailypioneer.com/2025/india/isro-to-launch-communication-satellite-on-november-2.html

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Please Mind the Gap

Making India a scientific, technological powerhouse needs reimagination of research architecture

Source: The Indian Express, Dt. 25 Oct 2025

A RECENT NEWSPAPER report (*IE*, October 22,) mentions that the government is considering a scheme to attract "Indian-origin star faculty" in STEM areas to come and work in Indian institutions. The idea is to capitalise on the Donald Trump administration's recent policies of squeezing higher education and research in the US, and strengthen the research ecosystem in our country.

While the recent policy changes in the US could act as a push factor, the government is also considering making the scheme attractive enough to act as a pull factor. Thus, the returning researchers will be given positions in premier research institutions and a substantial set-up grant to establish research infrastructure. The institutions include the research institutes as well as the IITs.

The idea of harnessing NRI talent is not a new one — previous schemes offered them short-term positions for collaborative research. These schemes were not terribly successful and in many instances were used by the NRIs as a paid vacation to visit their relatives, give their children a taste of Indian culture, etc. This one is different since it is designed for longer-term engagement. Globally, several countries are also offering incentives for researchers who would want to escape the stifling research environment in the US.

On the face of it, the scheme sounds like a win-win for all. The researchers will get to work in a relatively benign environment, be closer to their roots, and possibly feel a sense of pride in contributing to the motherland while we would gain from their experience and competence. However, as they say, the devil is in the details.

Setting up research infrastructure would involve equipment as well as human resources. A "substantial set-up grant" only makes the funds available. Procurement is another story altogether. Given the financial rules for spending government money, buying anything from state-of-the-art equipment to humble laptops can be a trying experience. The tendering process, the objections of the finance departments, delays in disbursement of funds, etc., are extremely time-consuming and tiresome. One frequently hears researchers complaining that they spend more time chasing files in the administration and finance departments than in pursuing research. The bureaucratic maze is one of the biggest headaches for even the resident researchers, though they have learned to navigate through it over time. Procedures for hiring qualified staff are also needlessly complicated, with multiple levels of oversight and regulation.

Since the researchers will be based in existing research institutions, there is also the question of cultural adjustment. Every institution has a culture to which the resident scientists have got accustomed. To be suddenly air-dropped into an institution's existing cultural environment and adjust to it could be challenging, especially for scientists who are used to a totally different ethos in the US. Although some of our research institutes might boast of world-class scientific infrastructure, it is the overall working atmosphere that the returnees might find difficult to get used to. There is also the issue of the huge differentials in salaries (even with PPP-based exchange rates) that the researchers would need to get used to.

The returning researchers, especially if they are coming for longer periods, would also be faced with the usual problems that living in India entails. The abysmal public services, the difficulties of finding suitable housing, organising children's education, etc., are all essentials that can test even a hardened resident and might be totally frustrating for the NRI used to relative seamless transitions from one city to another in the US. Add to this the fact that since most research institutions are based in metros, the quality of air is unhealthy, to put it mildly. Since most of the researchers would have children, this could be a huge deterrent.

Giving all kinds of incentives to the returning researchers would also have an impact on the existing manpower in the institutions. This officially sanctioned system of privileges would breed resentment among those who have spent their lives in those institutions and have a potentially demoralising impact in the long term.

One of the countries that has had a similar scheme with some degree of success is China. The scheme, officially called the Thousand Talents Plan, ensures lavish grants and housing as well as an easier visa process (something that we should think about, given the recent cases of academics being deported from airports). The returnees are colloquially referred to as "sea turtles", which in Mandarin is a homophone for the phrase meaning returning from abroad.

The Chinese situation is different from ours — first, Chinese-origin scientists have been having immigration and visa problems in the US and Europe for a much longer time. Second, by any metric, the number of truly world-class institutions in China is much more than in India. These include not just research institutes but also universities that regularly feature very high in institutional rankings. The overall spending on R&D in China was 2.7 per cent of the GDP, while in India it is a measly 0.65 per cent of a much lower GDP. Interestingly, there have been reports of a growing resentment among the native Chinese scientists of the implicit apartheid in treating the returnees as royalty.

The stated aim of utilising the experience and competence of NRI scientists is, of course, a noble one. However, making India a scientific and technological powerhouse needs sustained action on many fronts. These include a massive increase in R&D spending, implementing "ease-of-doing-research" regulations, broad-basing our scientific institutions, especially the universities where the future manpower is to be trained (instead of focusing solely on elite institutes) and a commitment of long-term funding. If we ensure all these things, there will be no reason for the Olive Ridley turtles to not return to their birthplace.

The writer is professor of Physics and Astrophysics, University of Delhi

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Posthumous Vigyan Ratna for physicist Jayant Narlikar

Source: The Times of India, Dt. 27 Oct 2025

Eminent physicist Jayant Vishnu Narlikar has posthumously been selected for the Vigyan Ratna Puraskar - an award for lifetime achievements and contributions made in the field of science and

technology - with the govt announcing names of 23 individuals and one institution for the 'Rashtriya Vigyan Puraskar 2025'.

Modelled on the Padma awards, the Rashtriya Vigyan Puruskar is the country's highest recognition for outstanding and inspiring contributions by scientists, technologists and innovators in diverse fields of science, technology and technology-led innovation. While the Vigyan Ratna is being awarded to Narlikar in the physics category, the Vigyan Shri is being conferred on Gyanendra Pratap Singh (agricultural science), Yusuf Mohammad Seikh (atomic energy), K Thangaraj (biological sciences), Pradeep Thalappil (chemistry), Aniruddha Bhalchandra Pandit (engineering sciences), S Venkata Mohan (environmental science); Mahan Mj (mathematics and computer science), Jayan N (space science and technology).

The Vigyan Yuva is being awarded to Jagdis Gupta Kapuganti and Satendra Kumar Mangrauthia (agricultural science), Debarka Sengupta and Deepa Agashe (biological sciences), Dibyendu Das (chemistry), Waliur Rahaman (earth science), Arkaprava Basu (engineering sciences), Sabyasachi Mukherjee and Shweta Prem Agrawal (mathematics and computer science); Suresh Kumar (medicine), Amit Kumar Agarwal and Surhud Shrikant More (physics), Ankur Garg (space science and technology) and Mohanasankar Sivaprakasam (technology and innovation).The Vigyan Team has been awarded to Aroma Mission CSIR (agricultural science).

https://timesofindia.indiatimes.com/india/posthumous-vigyan-ratna-for-physicist-jayant-narlikar/articleshow/124837567.cms

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Government of India Announces Rashtriya Vigyan Puraskar 2025 to Honour Excellence in Science, Technology, and Innovation

Source: Press Information Bureau, Dt. 26 Oct 2025

Rashtriya Vigyan Puraskar 2025, the nation’s highest recognition for outstanding and inspiring contributions by scientists, technologists, and innovators in diverse fields of science, technology, and technology-led innovation, is announced today. The Government of India instituted to recognise and promote pathbreaking research and inspiring achievement, the Rashtriya Vigyan Puraskar is conferred under four categories:

1. Vigyan Ratna (VR) award will recognize lifetime achievements & contributions made in any field of science and technology.
2. Vigyan Shri (VS) award will recognize distinguished contributions in any field of science and technology.
3. Vigyan Yuva-Shanti Swarup Bhatnagar (VY-SSB) award will recognize & encourage young scientists up to the age of 45 years who have made an exceptional contribution in any field of science and technology.
4. Vigyan Team (VT) award to be given to a team comprising three or more scientists/researchers/innovators who have made an exceptional contribution working in a team in any field of science and technology.

Awards are conferred across 13 domains: Physics, Chemistry, Biological Sciences, Mathematics & Computer Science, Earth Science, Medicine, Engineering Sciences, Agricultural Science, Environmental Science, Technology & Innovation, Atomic Energy, Space Science and Technology, and other allied fields. The Puraskar affirms India's commitment to fostering scientific excellence and technological leadership for national development. Nominations for Rashtriya Vigyan Puraskar 2025 were invited via the dedicated portal (https://awards.gov.in/) between October 4 and November 17, 2024, and underwent rigorous scrutiny by a panel of eminent scientific leaders, including the Principal Scientific Advisor to the Government of India, Chairperson of the Rashtriya Vigyan Puraskar Committee, Secretaries of Science Departments, heads of academies, and domain experts coordinated by the Rashtriya Vigyan Puraskar Secretariat. Rashtriya Vigyan Puraskar for the year 2025 in any field of Science and Technology is announced. The names of the awardees are as follows:

1. Vigyan Ratna: Prof. Jayant Vishnu Narlikar (Physics) Posthumously
2. Vigyan Shri: Dr. Gyanendra Pratap Singh (Agricultural Science); Dr. Yusuf Mohammad Seikh (Atomic Energy); Dr. K Thangaraj (Biological Sciences); Prof. Pradeep Thalappil (Chemistry); Prof. Aniruddha Bhalchandra Pandit (Engineering Sciences); Dr. S Venkata Mohan (Environmental Science); Prof. Mahan Mj (Mathematics and Computer Science); Shri Jayan N (Space Science and Technology)
3. Vigyan Yuva: Dr. Jagdis Gupta Kapuganti (Agricultural Science); Dr. Satendra Kumar Mangrauthia (Agricultural Science); Shri Debarka Sengupta (Biological Sciences); Dr. Deepa Agashe (Biological Sciences); Dr. Dibyendu Das (Chemistry); Dr. Waliur Rahaman (Earth Science); Prof. Arkaprava Basu ((Engineering Sciences); Prof. Sabyasachi Mukherjee (Mathematics and Computer Science); Prof. Shweta Prem Agrawal (Mathematics and Computer Science); Dr. Suresh Kumar (Medicine); Prof. Amit Kumar Agarwal (Physics); Prof. Surhud Shrikant More (Physics); Shri Ankur Garg (Space Science and Technology); Prof. Mohanasankar Sivaprakasam (Technology & Innovation)
4. Vigyan Team: Team- Aroma Mission CSIR (Agricultural Science)

By honouring the nation's visionaries in science and technology, the Rashtriya Vigyan Puraskar aims to motivate the next generation, strengthen the research ecosystem, and accelerate India's journey as a global leader in S&T innovation. The Rashtriya Vigyan Puraskar Award ceremony shall be held in due course and will be notified separately to the awardees.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2182615

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Google AI model helps unmask cancer cells to the immune system: Lead scientist explains breakthrough

Source: The Indian Express, Dt. 27 Oct 2025

Shekoofeh Azizi, Staff Research Scientist and Research Lead at Google DeepMind, speaks with Kaunain Sheriff M about the significance of this breakthrough.

In simple terms, what is C2S-Scale, how does it 'read' the language of individual cells, and why do you consider it a breakthrough in single-cell analysis?

C2S-Scale is a family of large language models (LLMs) built upon Google's Gemma-2 architecture. Think of it as a specialised AI model that we've taught to understand the language of biology in the form of gene expression inside of cells. We do this by taking the complex gene activity inside a single cell — measured by a technique called single-cell RNA sequencing (scRNA-seq) — and translating it into a simple "cell sentence," which is a list of the most active genes in order of their activity.

The model "reads" these sentences across millions of cells and learns the patterns of gene expression that define what a cell is and what it's doing. The paradigm shift is that this approach bridges the gap between raw genomic data and human language, and allows LLMs to perform complex tasks on cells in natural language.

Immune-context-neutral cell

Immune-context-positive cell

Blog.google

WHAT THE DISCOVERY COULD LEAD TO

- The breakthrough points towards a new generation of 'context-aware' cancer therapies.
- Instead of a drug that's always 'on,' treatments can be developed that act as amplifiers, working in specific scenarios when they are needed.
- This can lead to more effective therapies that can treat cancer with potentially fewer side effects.

Single-cell RNA sequencing lets scientists peek inside individual cells, but the data is massive and complicated. How does C2S-Scale make sense of all that information and understand what's happening inside a cell?

The key is in its training. Before we asked it to do a complex task like drug screening, we put C2S-Scale through a rigorous pre-training phase. We trained it on a massive dataset of over 50 million cells from public repositories like the Human Cell Atlas, covering a wide range of human and mouse tissues, diseases, and conditions.

During this pre-training, we gave it a series of fundamental tasks, like predicting a cell's type based on its "cell sentence," identifying its tissue of origin, or even generating a realistic new cell from scratch. By mastering these foundational tasks, the model learns the fundamental patterns of gene expression. This biological intuition is what allows it to make sense of new, complex information and perform sophisticated reasoning in later stages.

This model has 27 billion parameters, which is huge. Why does the scale of the AI matter when it comes to discovering new biology?

Scale is critical because biology is unimaginably complex. A large model, like our 27 billion-parameter C2S-Scale, has a greater capacity to learn and remember the countless subtle relationships between genes, cells, and tissues. There's a well-known phenomenon in AI called "scaling laws," where larger models don't just get incrementally better, they often develop entirely new, emergent capabilities that smaller models lack. For a problem as vast as understanding life at the cellular level, that massive scale is essential for the model to have enough capacity to uncover genuinely new biological insights.

The model predicted that a drug called silmitasertib could make certain cancer cells more visible to the immune system, but only under very specific conditions.

How did you test this in actual cells, and how did you confirm that the AI's prediction really works in the lab?

To validate the AI's prediction, we took it to the lab. We used human neuroendocrine cancer cell lines that the model had never seen before, and set up a controlled experiment with two scenarios: cells treated with silmitasertib alone, and cells treated with a low dose of the immune signal (interferon) along with silmitasertib.

The results confirmed the AI's prediction. The drug by itself had no effect on the cells' visibility markers. But when we combined it with low levels of interferon signaling, we saw a marked and significant increase in the molecules that make cancer cells visible to the immune system. It was a clear demonstration of the synergy the model had predicted, moving an AI-generated hypothesis from the computer to a real biological outcome.

It's important to note the limitations of this validation: these experiments were conducted in vitro, not in a living organism. Furthermore, this was observed in a specific neuroendocrine cancer cell line. While these results are highly promising, significant further research and clinical trials would be required to understand if this effect translates into a safe and effective therapy for patients.

If C2S-Scale can find ways to make cancer cells more visible to the immune system, what does that mean for developing new treatments or speeding up drug discovery?

Traditional drug discovery involves physically screening thousands of compounds in a lab, which is incredibly slow, expensive, and often misses the mark. C2S-Scale allows us to perform these massive screening experiments in silico — inside the computer — at a scale and speed that would be impossible in the real world. This shows AI can be a powerful accelerator for science.

This doesn't replace scientists, but it empowers them. It allows us to rapidly identify and prioritise the most promising and often non-obvious drug candidates. By narrowing the search space, AI can help researchers focus their lab experiments where they're most likely to succeed, dramatically shortening the timeline from an initial idea to a potential new therapy.

AI can connect different sources of knowledge to come up with new ideas. In this case, C2S-Scale didn't just look at cell data, it also read other biological notes. How does it combine all that information to generate something new?

This gets to the heart of our multimodal approach. During its training, C2S-Scale wasn't just fed raw cell sentences. It saw them alongside the human-generated context they came from — things like scientific annotations, tissue and disease labels, and even summaries from the research papers where the data was published.

By being trained on this rich mixture of biological data and natural language simultaneously, the model learns to connect the dots. It understands that a certain pattern of genes is not just a list, but corresponds to a “T-cell in a kidney from a patient with this disease,” as described in a scientific abstract. This ability to bridge the world of cellular data with the world of human knowledge is what allows it to generate novel hypotheses.

https://indianexpress.com/article/explained/an-expert-explains-painting-targets-on-cancer-cells-10328578/

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The Tribune
The Statesman
पंजाब केसरी जनसत्ता
The Hindu
The Economic Times
Press Information Bureau
The Indian Express
The Times of India
Hindustan Times
नवभारत टाइम्स
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