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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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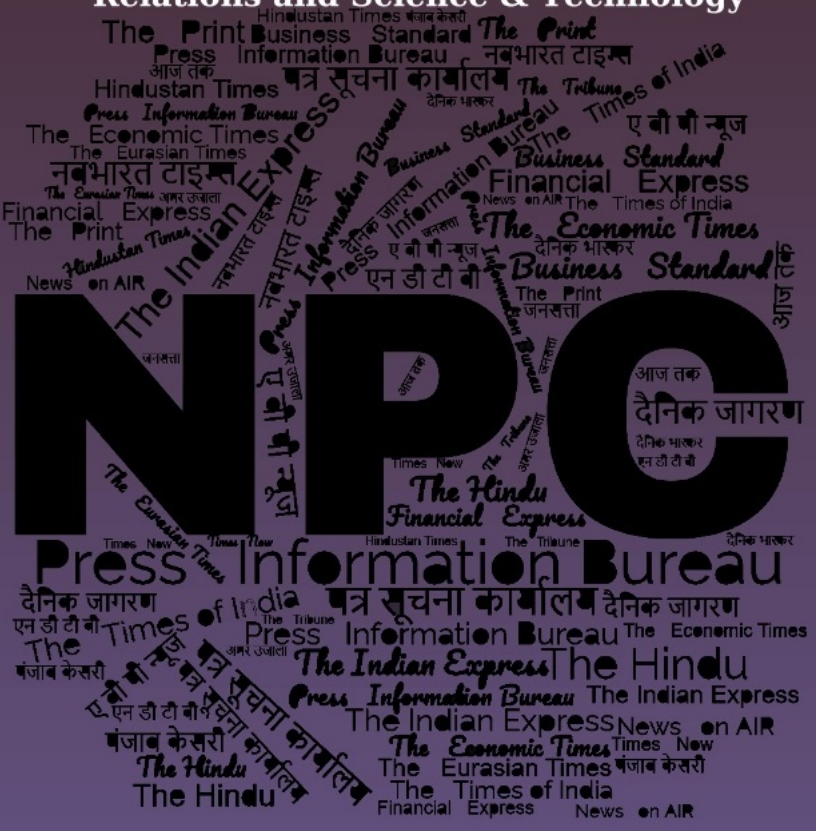

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Defence News

पाक सीमा पर वायु सेना के लड़ाकू विमान दिखा रहे दम

Source: Dainik Jagran, Dt. 24 Jul 2025

जागरण संवाददाता, जयपुर : पहलगाम आतंकी हमले के बाद पाकिस्तान के साथ जारी तनाव के बीच भारतीय वायुसेना ने बुधवार से बड़ा युद्धाभ्यास शुरू किया, जिसमें लड़ाकू विमान अपना दम दिखा रहे हैं। पाकिस्तान सीमा से सटे राजस्थान के बाड़मेर और जोधपुर के रेगिस्तान में 25 जुलाई तक चलने वाले इस युद्धाभ्यास का नाम 'आक्रमण' रखा गया है। इसका मकसद पश्चिमी सीमा पर वायुसेना की क्षमता को परखना और मजबूत करना है।

वायुसेना के अभ्यास को देखते हुए इस क्षेत्र के लिए नोटम जारी किया गया है। इसके तहत इस वायु क्षेत्र में किसी यात्री विमान को उड़ान भरने की अनुमति नहीं होगी। अभ्यास में फ्रंटलाइन फाइटर जेट्स राफेल, सुखाई-30 जैसे लडाकू विमानों के साथ अन्य विमानों को भी शामिल किया गया है। इनके साथ ही एयर डिफेंस सिस्टम और रात में

राजस्थान के बाड़मेर और जोधपुर के युद्धाभ्यास वाले वायु क्षेत्र में यात्री विमान को उड़ान भरने की अनुमति नहीं

संचालन की विशेष तकनीकों पर भी जोर दिया जा रहा है। अधिकारियों के मुताबिक, यह अभ्यास वायुसेना के नियमित संचालन तैयारी कार्यक्रम का हिस्सा है, लेकिन हाल के ड्रोन खतरों को देखते हुए इसका सामरिक महत्व बढ़ गया है। युद्धाभ्यास के तहत वायुसेना के पायलट लंबी दूरी की उड़ानें भर रहे हैं। पायलटों को वास्तविक युद्ध जैसा अनुभव देने के लिए व्यापक इंतजाम किए गए हैं। इस अभ्यास की शीर्ष स्तर पर भी निगरानी की जा रही है।

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East Ladakh's Nyoma airfield set to be operational by October

Source: The Times of India, Dt. 24 Jul 2025

In a boost to India's military capabilities close to the Line of Actual Control (LAC) with China, the crucial Mudh airfield project in the high-altitude Nyoma area in eastern Ladakh is all set to be completed by Oct.

The upgrade work by (BRO) at the airfield, among the world's highest at an altitude of 13,710 feet, included extending and strengthening the original airstrip into a 2.7km 'rigid pavement' runway with a dispersal area and turning pads, among other things.

The Rs 230 crore upgrade will allow operations by all kinds of fixed-wing aircraft like heavy-lift transport planes and fighter jets from both directions. "The runway, with 46m width, is fully ready. The allied infrastructure, including the ATC complex, hangar, crash bay, watch towers, accommodation and the likes, is also more or less complete," an official told TOI.

"Nyoma will prove crucial as a forward staging ground for troops deployed in the region and transporting supplies quickly to them. The airfield will also be available for fighter operations by early 2026, though high altitude will be a limiting factor, much like what Chinese air force faces across LAC," he said.

China, in fact, has systematically worked over the last five years to offset terrain constraints at its airbases facing India due to high altitude and rarefied air, which limits weapon and fuel-carrying capacity of aircraft.

With new and extended runways, hardened shelters, fuel and ammunition storage facilities, China has managed to deploy additional jets, including advanced J-20 stealth fighters as well as bombers, reconnaissance aircraft and drones, at its airfields like Hotan, Kashgar, Gargunsa, Shigatse, Bangda, Nyingchi and Hoping. It has also built many new heliports along the 3,488km LAC, stretching from eastern Ladakh to Arunachal Pradesh.

India is trying to play catch-up. Located about 35km from LAC, Nyoma will be another operational base for IAF in Ladakh after the Leh, Kargil and Thoise airfields and Daulat Beg Oldie ALG (advanced landing ground). Nyoma was reactivated as an ALG when a medium-lift AN-32 transport aircraft first landed there in Sept 2009. The upgrade project began during the military confrontation with China that erupted after the People's Liberation Army made multiple incursions into eastern Ladakh in April-May 2020.

In addition to strengthening the capacity of existing airbases to handle more aircraft, India has progressively upgraded the infrastructure at ALGs like Fukche and DBO in Ladakh, as well as Pasighat, Mechuka, Walong, Tuting, Along and Ziro in Arunachal Pradesh. Similarly, civil ALGs in the middle sector (Uttarakhand, Himachal Pradesh) of LAC are also now being increasingly used for military purposes.

https://timesofindia.indiatimes.com/india/east-ladakhs-nyoma-airfield-set-to-be-operational-by-october/articleshow/122869370.cms

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India, Israel seek to further strengthen defence ties

Source: The Times of India, Dt. 24 Jul 2025

India and Israel on Wednesday agreed to further strengthen their already expansive defence cooperation with a long-term perspective, even as Tel Aviv strongly condemned the terrorist attack in Pahalgam on April 22. The countries also decided to work towards developing an institutional framework to further deepen their bilateral defence ties in talks between defence secretary Rajesh Kumar Singh and director general of Israeli defence ministry Major General Amir Baram here.

"The Israeli DG condemned the terrorist attack in Pahalgam and conveyed full support for India's fight against terrorism. Singh, in turn, reiterated India's zero tolerance approach to terrorism. Singh also condemned the terrorist attacks in Israel on Oct 7, 2023, and called for release of all hostages," an official said.

The two sides reviewed progress of the ongoing defence collaboration activities since the last joint working group meeting held in July 2024. "This visit by the Israeli DG Israel marks a pivotal step in India-Israel defence relations and reinforces both sides' commitment to enhance their strategic partnership," the official said.

India had extensively used Israeli-origin weapon systems during the cross-border hostilities with Pakistan from May 7 to 10. India, for instance, used the Israeli Harop and Harpy kamikaze drones, which act as cruise missiles by exploding into enemy targets and radars, to hit air defence sites and other targets deep inside Pakistan, as was earlier reported by TOI.

India also used Barak-8 medium range surface-to-air missile systems, jointly developed with Israel, as part of its multi-layered air defence network to thwart the multiple waves of Turkish drones and Chinese missiles fired by Pakistan.

https://timesofindia.indiatimes.com/india/india-israel-seek-to-further-strengthen-defence-ties/articleshow/122869823.cms

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India, Nepal review security cooperation, agree to strengthen border management

Source: The Times of India, Dt. 24 Jul 2025

Strengthening of mutual cooperation to curb trans-border criminal activities, improve border infrastructure and ensure effective disaster management dominated discussions at the Indo-Nepal home secretary-level talks held here on Tuesday.

Leading the Indian side was Union home secretary Govind Mohan, while the Nepali side was led by his counterpart Gokarna Mani Duwadee.During the talks, both sides reviewed the entire gamut of bilateral security cooperation as well as border management and agreed to strengthen it further, the home ministry said in a release on Wednesday.

The deliberations included issues related to the repair and maintenance of boundary pillars; trans-border criminal activities; working of border district coordination committees; and strengthening of border infrastructure, particularly integrated check posts (ICPs), roads and railway networks. The home ministry release said empowerment and capacity building of various security-related institutions, and ways to strengthen cooperation in disaster risk reduction and management, were also taken up for discussion.

Both the sides welcomed the finalisation of the text of the agreement on mutual legal assistance in criminal matters and agreed to work towards early conclusion of the revised extradition treaty.

The unfenced Indo-Nepal border is prone to being exploited by criminals, including terrorists, to escape scrutiny and investigation by the law enforcement agencies, particularly on the Indian side.

It was agreed that the next home secretary level talks will be held in Nepal at a mutually convenient date.

https://timesofindia.indiatimes.com/india/india-nepal-review-security-cooperation-agree-to-strengthen-border-management/articleshow/122863627.cms

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Indian, Chinese officials review situation in border areas

Source: The Tribune, Dt. 24 Jul 2025

Ahead of the next round of talks on the India-China boundary issue, senior officials of both sides met here on Wednesday to review the situation in border areas and explore measures on effective management of the undemarcated boundary between the two countries.

The 34th meeting of the Working Mechanism for Consultation & Coordination on India-China Border Affairs (WMCC) was held on Wednesday to prepare for the next round of the Special Representatives' talks in India later this year.

Indian National Security Adviser Ajit Doval and Chinese Foreign Minister Wang Yi are the Special Representatives of the respective countries. At the last meeting in China in December 2024, Doval and Wang had reiterated on having a "fair, reasonable and mutually acceptable framework for settlement of the boundary question".

On Wednesday, the WMCC expressed satisfaction with the general prevalence of peace and tranquillity in the border areas, leading to gradual normalisation of bilateral relations, said the Ministry of External Affairs (MEA) said in statement.

“The WMCC agreed to maintain regular exchange and contact on issues related to the boundary affairs at the diplomatic and military levels through established mechanisms,” said the MEA, adding that the two sides “deliberated on various measures explored during the previous round of SR talks”.

The Indian delegation was led by Gourangalal Das, Joint Secretary (East Asia), and the Chinese delegation was led by Hong Liang, director general of the boundary & oceanic affairs department of the Chinese Ministry of Foreign Affairs.

The leader of the Chinese delegation also called on Foreign Secretary Vikram Misri.

The decision to revive the SR dialogue mechanism was taken at a meeting between Prime Minister Narendra Modi and Chinese President Xi Jinping in Kazan, Russia, on October 23, last year. That was two days after India and China firmed up a pact for disengagement in Demchok and Depsang in eastern Ladakh, effectively ending the over four-year border standoff in the region.

https://www.tribuneindia.com/news/top-headlines/indian-chinese-officials-review-situation-in-border-areas/

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New security code kicks in for defence companies in India

Source: The Economic Times, Dt. 24 Jul 2025

The government has mandated new rules for defence companies operating in the country, with a special focus on enhancing cybersecurity to prevent data breaches and upgrading perimeter security for manufacturing facilities. The new Security Manual for Licensed Defence Industries will require all players to invest in both information and physical security and conduct regular emergency drills, besides coordinating closely with law enforcement to verify the antecedents of employees.

There has been a massive surge in cyber attacks on Indian defence entities in recent years, with attempts peaking in the run up to Operation Sindoor when Pakistani and Chinese attackers attempted to take on critical cyber infrastructure. This is the first major overhaul of security rules for defence companies since the manual was issued in 2014.

As per the new rules, Indian companies will need to appoint a cyber information security officer who will be tasked to implement cyber security measures as recommended by the government. The cyber information security officer will also coordinate with government cyber security agencies to ensure that "systems handling classified and sensitive information are compliant with national cyber security directives".

Companies have also been mandated to conduct annual cyber security audits by CERT-IN empanelled auditors. The findings of the audits need to be addressed and updates have to be shared regularly with the defence ministry. Companies have also been told to invest in implementing measures to safeguard critical information infrastructure with things like multi factor authentication for access, encryption of sensitive communications and strict access control to systems handling defence-related data.

Defence companies will also need to create watch towers and physical perimeter security grids as per specifications mandated by the defence ministry. Biometric access control systems will also need to be installed at all entry and exit points. Employees handling classified information will also need to undergo periodic re-vetting. India has seen an unprecedented boom in domestic defence

manufacturing companies in the last decade, with dozens of players setting shop to produce defence equipment from drones to ammunition, explosives and small arms as the government has fully opened doors for the private sector.

https://economictimes.indiatimes.com/news/defence/new-security-code-kicks-in-for-defence-companies-in-india/articleshow/122866419.cms?from=mdr

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End of an Era: MiG-21 did IAF proud, but overstayed its welcome

Source: The Tribune, Dt. 24 Jul 2025

THE legendary MiG-21 aircraft is set to fly into the sunset after having served as the mainstay of the Indian Air Force (IAF) for decades. The Russian-origin fighter jet, which was inducted in 1963 in the wake of the India-China war, made its presence felt in the 1965, 1971 and 1999 wars against Pakistan, besides the 2019 Balakot airstrikes. However, its safety record repeatedly came under scrutiny. According to government data, more than 500 MiG-21s crashed in 60-odd years, killing over 170 pilots; these mishaps claimed the lives of dozens of civilians as well. The notorious tag of "flying coffin" was too hard to shed.

Many lives could have been saved had the IAF retired the MiG-21 a few years ago. The phaseout took an inordinately long time because of delays in the supply of the indigenously built Tejas Light Combat Aircraft (Mark1A) by the state-run Hindustan Aeronautics Limited. Air Chief Marshal AP Singh has been flagging such project delays ever since he took over as the Chief of Air Staff last year. The lesson from the MiG saga is that timelines are of the essence for modernisation in the defence sector.

The MiG-21 was upgraded over the years and equipped with advanced missiles as well as radars and better avionics, but the risk factor remained high due to a lack of ultra-modern safety features. There is no doubt that today's warfare cannot be fought with yesterday's weapon systems, as pointed out by Chief of Defence Staff Gen Anil Chauhan recently. The IAF should proactively make efforts to replenish its fighter squadron strength, which has dropped to a worrisome 29 — far short of the sanctioned strength of 42. Playing a waiting game can be perilous as China and Pakistan are bent on keeping India on its toes.

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Fighter Jets: Flying towards scary parity with Pakistan

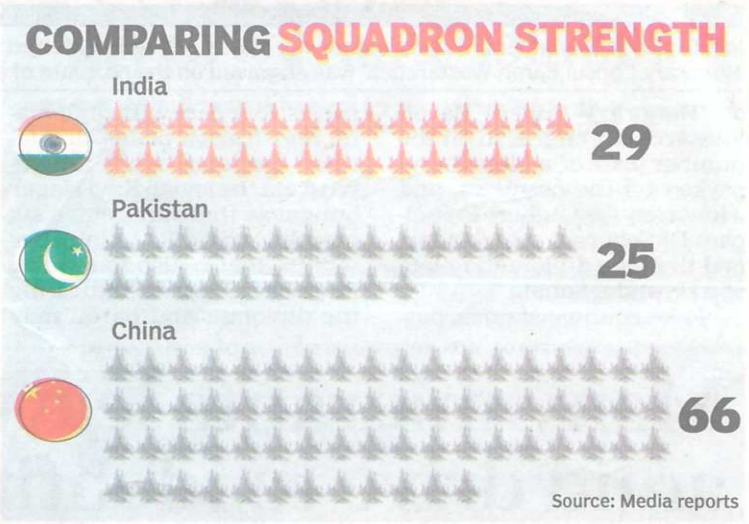
Source: The Times of India, Dt. 24 Jul 2025

October onwards, India will have just 29 fighter jet squadrons — Pakistan has 25. That's near-parity — and a scary one, especially because Pakistan's 'iron brother' China has 66 squadrons. A squadron typically has 18-20 fighter jets. In two months' time, India will have 522 fighter jets. Pakistan has 450, and China, 1,200.

Air chief A P Singh said India needs to induct at least 40 fighter jets every year. That, currently, looks worse than impossible.

Some pundits say that unless India ups its game — more squadrons with old fighter jets, Mirage, Jaguar and other MiG variants, will be phased out — it will have the same number of fighter squadrons as Pakistan in less than 10 years. The proximate cause for this worry is IAF phasing out its last two MiG-21 squadrons. But the bigger reasons have been at play for years.

File photo of an IAF MiG-21 passing in front of Sukhoi-30 jets before a drill at Kalaikunda airbase in Bengal



The MMRCA Shock: The 2015 cancellation of the 126-jet Medium Multi-Role Combat Aircraft deal made a huge difference. The 36 Rafale jets India acquired through a govt-to-govt deal with France were nowhere near enough given IAF's ageing fighter fleet. India has ordered 26 more Rafales — but for the Navy.

Plans, Plans, Plans...: There are plans to buy 114 Multi-Role Fighter Aircraft. But nothing's moved on this.

Made In India? The grand plan was that indigenous Tejas Light Combat Aircraft will maintain India's air superiority over Pakistan. IAF currently has just about two squadrons, 38 fighters, of Tejas Mark-1. Delivery of the improved Tejas Mark-1A jets, 83 of which are supposed to be delivered by HAL, has blown through multiple production deadlines. Not even one is in service. This is in part thanks to massive delays in the delivery of GE's F-404 engines, and partly because of so-far-unsolved issues with integrating Astra air-to-air missiles and fixing certain critical avionics.

IAF hopes another 97 Tejas Mark-1A will come through, along with another 108 Tejas Mark-2 variant with the more powerful GE F-414 engine. The engine is to be co-produced in India with 80% transfer of technology. But it's all on paper now.

Then, there's the proposed 5th generation Advanced Medium Combat Aircraft. The most that can be said about this is that it's an idea.

Engine Failure: The key hurdle in Made in India programme is the inability to produce an indigenous jet engine. The old Kaveri engine development project failed to meet standards. Modern fighter jet engines are complex machines with thousands of parts that must withstand high pressure and temperatures. It requires billions of dollars to develop a fighter jet engine.

Essentially, an engine has four parts — compressor, combustion chamber, turbine and nozzle.

The hot part of the engine — combustion chamber and turbine blades — is tricky to get right, requiring advanced ceramics. But India's talent depth in material science is shallow. Only a few thousand materials engineers graduate each year. India even struggles to manufacture basic stuff like ceramic-coated electrodes, required in the production of green hydrogen. These are imported. So, forget about fighter jet engines made here — at least in the near future.

Are Drones The Solution? Many pundits reckon large military platforms like fighter jets and warships are becoming redundant, given the changing nature of warfare. Ukraine has done amazing things with drones in its war against Russian aggression, taking out Russian warships and fighter jets with UAVs that cost a fraction of the price of a jet.

Ukraine will produce 4 million drones this year. India's armed forces have talked about using many more drones. But there are two issues. Any domestic production will have to account for ever-evolving drone tech. And India needs a specialist corps to operate drones or specialist drone subunits.

Those who challenge the drones-are-it strategy point out that India's strategic-security theatre is very different from Ukraine's, and fighter jets provide a penetrative, offensive capability that drones can't, at least not now.

So, the reality that India and Pakistan are almost at parity when it comes to fighter jets is still scary.

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National seminar on ‘India’s Maritime Vision’ to be held in New Delhi with focus on heritage, security & vision for Viksit Bharat by 2047

Source: Press Information Bureau, Dt. 23 Jul 2025

The Centre for Joint Warfare Studies, the Tri-services think-tank under Headquarters Integrated Defence Staff, is organising a two-day national seminar on ‘India’s Maritime Vision’ in New Delhi on July 24-25, 2025. The event is being conducted in collaboration with Maulana Abul Kalam Azad Institute of Asian Studies, Ministry of Culture.

The seminar is aligned with the vision of a ‘Whole of Nation’ approach, bringing together strategic, cultural, and developmental stakeholders to explore India's evolving maritime narrative. The event reflects the synergy of defence, diplomacy, academia, industry and cultural institutions - a hallmark of comprehensive national power in the making.

The seminar is designed to explore India’s maritime journey - from its ancient seafaring traditions and historical port networks to contemporary maritime challenges and opportunities in the Indo-Pacific. Sessions will delve into strategic connectivity, maritime security, economic linkages, blue economy and the role of coastal infrastructure and governance in shaping India’s future.

The event brings together an illustrious panel of speakers and participants, including senior serving officers from the Indian Navy & Indian Coast Guard; Scholars from leading universities & maritime research institutions; Representatives from the shipping & port infrastructure sectors; Experts from think-tanks, policy bodies & strategic affairs institutions; and Cultural historians & practitioners.

The seminar directly contributes to the national goal of achieving Viksit Bharat by 2047 as envisioned by Prime Minister Shri Narendra Modi. India’s aspiration to become a global maritime powerhouse by its centenary year of independence hinges on integrated thinking, sustained policy engagement and civil-military-academic collaboration.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2147586

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Indian Navy concludes Shipbuilding Seminar - "Nation Building through Shipbuilding"

Source: Press Information Bureau, Dt. 23 Jul 2025

One day ‘Shipbuilding Seminar – Nation Building Through Shipbuilding’ was conducted by Warship Design Bureau on 23 Jul 25 at the Manekshaw Centre, Delhi Cantt. The event brought together senior dignitaries, industry leaders and subject matter experts from across the maritime and defence sectors.

Admiral Dinesh K Tripathi, Chief of the Naval Staff, delivered the keynote address for the event virtually. During his address, CNS brought out Indian Navy’s Vision 2047 to transform into a ‘Aatmanirbhar’ force through leadership-driven focus on invention, innovation, indigenisation and integration of niche, disruptive and emerging technologies. The CNS underscored the milestone of delivering indigenously designed 100th ship, as not just a numerical achievement by the Navy but

a symbolic testament in our journey towards maritime self-reliance, technological excellence and strategic foresight.

The seminar witnessed participation from stakeholders from Government of India (GoI), Indian Navy, Shipyards, Industry, Classification Societies and Academia. Discussions were held on policy aspects related to shipbuilding with an aim to enable cohesive and progress-oriented brainstorming on different aspects of shipbuilding. The Shipbuilding seminar also gave an outlook on the futuristic technologies being implemented globally and challenges being faced by Indian shipyards and industry in delivering ships at par with global standards. The seminar highlighted the importance of shipbuilding industry towards nation building and potential opportunities that can be capitalized towards growth in this sector.

The seminar enabled effective interactions and fruitful brainstorming sessions with senior hierarchy of MoD, MoPSW, MSDE, Indian Navy, Shipyards, Classification Societies and Academia. The occasion also highlighted the design expertise at Warship Design Bureau and an accumulated experience of Sixty plus years in designing technologically potent warships, spanning 20 designs and over 100 vessels. The seminar featured four technical sessions focusing on policy frameworks, indigenous ship design, emerging technologies, skill development, and strategies to enhance ease of doing business in shipbuilding. Eminent experts shared insights to strengthen India's maritime industrial base and transform the ecosystem into a global powerhouse. Policy interventions, requirements and techniques for upskilling human resources and incorporating contemporary design practices making the industry globally competitive were the major outcomes of the seminar.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2147556

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Indian Naval Ships Conclude visit to Singapore

Source: Press Information Bureau, Dt. 23 Jul 2025

Eastern Fleet Concludes Singapore Port Call as Part of Operational Deployment at South East Asia Indian Naval Ships Delhi, Shakti, Satpura, and Kiltan of the Eastern Fleet, under the command of Rear Admiral Susheel Menon, Flag Officer Commanding Eastern Fleet (FOCEF), concluded a port call to Singapore from 16 – 19 Jul 2025 as part of the Indian Navy's Operational Deployment to South East Asia.

During the visit, FOCEF called on the High Commissioner of India to Singapore and the Fleet Commander of the Republic of Singapore Navy and discussed further opportunities and avenues for enhancing bilateral naval ties and maritime cooperation in the Indo-Pacific. The FOCEF also held informal discussions with the academic community on Indian Navy's perspective on maritime security and regional developments.

The Commanding Officers of Eastern Fleet ships participated in a solemn wreath-laying ceremony at the Kranji War Memorial, paying homage to the Indian soldiers who made the supreme sacrifice during World War II.

Professional interactions between the two navies included cross-deck visits, Subject Matter Expert Exchanges (SMEEs), and friendly sports activities, aimed at strengthening interoperability and mutual understanding. A deck reception was hosted onboard INS Shakti, bringing together RSN personnel, eminent persons, members of the diplomatic community, and the Indian diaspora to celebrate and strengthen the bonds of maritime partnership.

The port call to Singapore highlighted the Indian Navy's commitment and contribution to regional stability, security, and maritime cooperation, in line with the vision of Security and Growth for All in the Region (SAGAR).

https://www.pib.gov.in/PressReleasePage.aspx?PRID=2147151

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Science & Technology News

Big step in Deep Ocean Mission: Key weld on submersible after '700 trials'

Source: The Times of India, Dt. 24 Jul 2025

Bengaluru/New Delhi: In a landmark achievement for India's Deep Ocean Mission, Isro has successfully developed the personnel sphere for the submersible vessel MATSYA-6000, designed to carry humans up to 6,000 metres (6km) below the ocean surface, by completing a critical welding process after 700 weld trials.

'Samudrayaan', a project under the Deep Ocean Mission of the ministry of earth sciences (MoES), aims to strengthen India's capabilities in deep-sea exploration. The National Institute of Ocean Technology (NIOT), under MoES, collaborated with Isro's Vikram Sarabhai Space Centre (VSSC) to design and fabricate the spherical crew compartment. The Deep Ocean mission will allow scientists to explore unexplored deep-sea areas, assess mineral resources like nickel, cobalt and rare earth elements, and study marine biodiversity. The mission is expected to be realised by 2026.

Central to the Samudrayaan effort is the creation of a human occupied vehicle (HOV) that can withstand extreme pressure and temperature conditions on the seafloor. "At the heart of the HOV is a titanium personnel sphere, a 2,260mm diameter enclosure with 80mm thick walls, made from a high-strength alloy. Designed by VSSC, the sphere is built to endure pressure up to 600 bar and temperatures as low as -3°C," Isro said Wednesday.

'Samudrayaan', a project under the Deep Ocean Mission, aims to strengthen India's capabilities in deep-sea exploration

One of the biggest challenges scientists faced in creating this weld lay in the properties of titanium as a metal. While titanium is known for its strength, it can be difficult to weld. The technical challenge was developing a reliable electron beam welding process capable of fusing thick (80-102 mm) titanium plates. Isro's Liquid Propulsion Systems Centre (LPSC), Bengaluru, took charge of augmenting its welding facility from a 15kW to a 40kW EBW capacity.

LPSC developed the process and infrastructure for the welding process and non-destructive evaluation (NDE). While LPSC had the expertise to carry out welding up to 20mm thickness, it augmented the EBW machine from a 15kW rating to 40kW, while also making alterations to the chemical cleaning and handling equipment to accommodate the increased size and mass. TNN

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New nano-sensor developed can detect deadly infections in minutes

Source: Press Information Bureau, Dt. 23 Jul 2025

A new highly sensitive, low-cost, point-of-care device with an electrochemical biosensor could help early diagnosis of sepsis at the bedside of the patient.

Sepsis is a serious medical condition caused by an infection that can lead to multiple organ failure, shock and even death. Early and accurate diagnosis is crucial for timely therapeutic intervention and improving patient outcomes, which in turn directly impact mortality rates. Early diagnosis is possible with the precise and sensitive detection of specific biomarkers. Endotoxin, a toxic component of the outer membrane of Gram-negative bacteria, acts as a key biomarker, signalling the presence of an infection that could lead to sepsis.

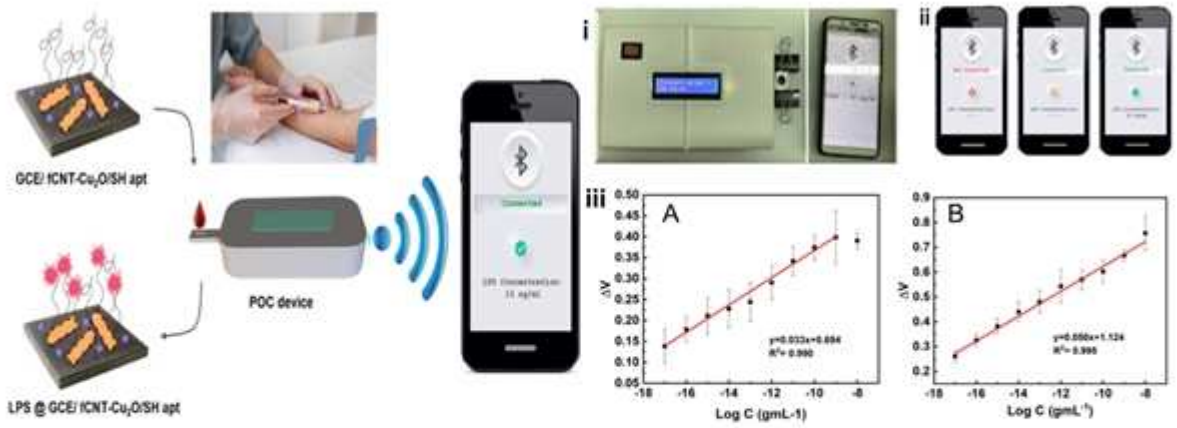

Fig. Schematic diagram showing the sensor chip and working of the device. (i) Photographs of the portable endotoxin detection device, (ii) Operational steps in the Android smartphone user interface for the device, (iii) (A) calibration plot of endotoxin detection with the device in (A) blood samples and (B) grape juice samples. The log (concentration of endotoxin in g mL^{-1}) vs change in voltage received is plotted.

A group of scientists from the National Institute of Technology Calicut developed eight distinct sensor architectures and a sensitive, low-cost, portable device for detecting endotoxins rapidly and accurately, which in the future can be used at the bedside of the patient.

Seven of them developed by Dr. N. Sandhyarani, Professor, National Institute of Technology Calicut and her team employed electrochemical detection and one utilized optical detection. In all the sensors, appropriately modified nanomaterials such as gold atomic clusters or nanoparticles, CuO, or Cu nanoclusters, MoS2, reduced graphene oxide, or carbon nanotubes were used for enhancing the sensitivity.

In a paper published in the journal Langmuir, the team has demonstrated a highly sensitive electrochemical sensor chip designed for the selective detection of Lipopolysaccharide (LPS), which is compatible with a portable analyzer for on-site detection. The sensor is fabricated using functionalized CNT (fCNT) and copper(I) oxide nanoparticles (Cu2O).

The specific binding of endotoxin to LPS-binding Aptamers or polymyxin B was used to improve selectivity. All the sensors have exhibited high selectivity and detected endotoxin in the presence of other interfering compounds. The presence of endotoxin is also detected in pharmaceutical drug-Biphasic isophane insulin, fruit juices, and whole blood by the standard addition method. Endotoxin recovery was within 2% error in all the cases.

Two of these electrochemical platforms demonstrated versatility by enabling the sensitive detection of Gram-negative bacteria, specifically E. coli, in water samples.

The analysis demonstrates that the quantification of E. coli using these platforms is comparable to traditional biological methods, and also reduces analysis time. This highlights their potential for efficient water quality monitoring.

After creating various electrochemical sensor surfaces, we the team shifted focus to building a point-of-care device. The team has designed, built, and tested a portable and cost-effective electrochemical biosensor prototype specifically for endotoxin detection. This device detects endotoxin in blood serum using a standard addition method, providing results within 10 minutes.

This research, supported by the Nano Mission of the Department of Science and Technology (DST), has resulted in seven publications in reputed international journals such as Biosensors and Bioelectronics, Langmuir (two cover pages), Analyst, and Analytica Chimica Acta and one granted patent for the prototype device.

The researchers are now improving the sensitivity of the prototype device by refining the electronic design to enable a highly sensitive and selective point-of-care (POC) device suitable for rapid, bedside biomarker detection.

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Parliament Question: Carbon Capture And Utilisation (CCU) Testbeds

Source: Press Information Bureau, Dt. 23 Jul 2025

The Department of Science & Technology (DST) is in the process of considering the recommendation of the Expert Panel for five Carbon Capture and Utilization (CCU) testbeds in the Cement sector in different parts of the country. The objectives of these CCU testbeds are to capture Carbon Dioxide (CO_2) emission from cement manufacturing and convert it into value-added products like synthetic fuels, urea, soda ash, concrete aggregates, and food- grade CO_2. These testbeds are going to act as a platform for validating and demonstrating CCU technologies at small scale in real industrial settings through Industry-Academia collaborations. This initiative has significant relevance to enable Industrial decarbonisation in the country with special focus on emissions-intensive sectors like Cement by promoting circular carbon economy, thereby aligning well with India's overarching target of net-zero by 2070.

The Expert Panel constituted by DST has recommended five CCU testbeds, and the Department is in the process of considering the recommendations of the Expert Panel for further processing and financial sanctions.

The site-wise details of Institutions and Industry partners involved in these recommended CCU testbeds along with proposed technological solutions to be deployed, are given below:

Sl. No.	Site location	Institutions	Industry Partner	Technological Solutions
1.	Chittorgarh, Rajasthan	National Council for Cement and Building Material, Ballabhgarh and Indian Institute of Technology, Roorkee	JK Cement Limited	Oxygen-based Calcination to capture 2 TPD (Tonnes Per Day) of CO2 and its utilization (0.4 TPD) in lightweight concrete products and olefins.
2.	Sundergarh, Odisha	Indian Institute of Technology, Kanpur	JSW Cement Limited	Carbon-negative using solvent-based carbon capture technology at a scale of 1 TPD and utilizing captured CO2 for mineralization into concrete using ICCM (Integrated Carbon Capture and Mineralization technology)

3.	Rajganjpur, Odisha	Indian Institute of Technology Bombay, Mumbai	Dalmia Cement (Bharat) Ltd.	Water-based catalyst-driven CO2 capture process, at a scale of 2 TPD, designed for integration within a live cement plant, enabling conversion of captured CO2 into calcium carbonate, sodium bicarbonate and formic acid.
4.	Kurnool, Andhra Pradesh	CSIR-Indian Institute of Petroleum, Dehradun, Indian Institute of Technology, Tirupati, and Indian Institute of Science, Bengaluru	JSW Cement Limited	Vacuum Swing Adsorption Process for CO2 capture (1 TPD) from Cement Kiln Gas and its utilization within the construction material value chain.
5.	Reddipalayam, Tamil Nadu	Indian Institute of Technology Madras and Birla Institute of Technology and Science (BITS) Pilani, Goa	Ultratech Cement Ltd.	New kiln burning technology based on oxygen-enriched burning, capture using adsorption/absorption, and mineralization of captured CO2 (2 TPD) using concrete blocks, waste concrete fines and concrete plant sludge.

The Carbon Capture and Utilization (CCU) testbeds are expected to lower Carbon Dioxide (CO2) emissions within India's cement sector, which constitutes approximately 7-8% of the Nation's industrial carbon emissions. These recommended CCU testbeds are envisaged to demonstrate the carbon capture and utilization at small scale i.e. up to 02 TPD (Tonnes Per Day). Apart from reduction in CO2 emissions, these testbeds are expected to generate valuable by-products, such as synthetic fuels and construction materials, and thereby contributing to the circular carbon economy.

Further, the successful implementation of testbeds is going to enable Indian industries to adopt the technologies and scale up them to a full commercial level. These modular solutions have the potential to replicate in other hard-to- abate sectors, including power, iron & steel, oil & natural gas, chemical industry, etc. through customized engineering into pre-existing industrial frameworks.

This information was given by Dr. Jitendra Singh, Union Minister of State (Independent Charge) for Science & Technology, Minister of State (Independent Charge) for Earth Sciences, MoS PMO, Department of Atomic Energy and Department of Space, MoS Personnel, Public Grievances and Pensions, in a written reply in the Lok Sabha today.

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Parliament Question: Domestic Research Ecosystem

Source: Press Information Bureau, Dt. 23 Jul 2025

There is no statistical evidence or data which shows that large number of Indian students and researchers are going abroad to pursue advanced research due to lack of adequate infrastructure, funding and opportunities in India.

Several initiatives have been taken up by the Government to improve the domestic research ecosystem like: instituting high-stakes mission-driven initiatives, namely National Quantum Mission; National Mission on Interdisciplinary Cyber-Physical Systems, National Geospatial Mission focusing on the development of key technologies to reduce dependency on imports,

promote domestic innovation, and position India as a global leader in the identified sectors. Government has launched several programmes to catalyze startup culture and build a strong and inclusive ecosystem for innovation and entrepreneurship in the country. Several policy measures have been introduced by the Government including the Geospatial Policy 2022 and BioE3 (Biotechnology for Economy, Environment and Employment) Policy 2024.

The Government has established the Anusandhan National Research Foundation (ANRF) through the ANRF Act 2023 towards strengthening our technological leadership, marking a paradigm shift in our R&D ecosystem. The government has been strengthening research infrastructure through multiple schemes / programs such as: Fund for Improvement of S&T infrastructures in universities and higher educational institutions (FIST), Promotion of University Research and Scientific Excellence (PURSE), Scientific Infrastructure Access for Harnessing Academia University Research Joint Collaboration (DBT-SAHAJ Infrastructure) etc. The schemes of ANRF (erstwhile, Science and Engineering Research Board) such as Core Research Grant (CRG), Prime Minister's Early Career Research Grant (PMECRG), Partnerships for Accelerated Innovation and Research (PAIR) program, etc. have been instrumental in strengthening the domestic research ecosystem of the country. The government is also fostering International cooperation in Science & Technology through bilateral cooperation with several developed and developing countries including USA, UK, France, Germany, Russia, Japan; regional cooperation such as with ASEAN, BIMSTEC, etc; and multilateral cooperation through EU, TWAS, IBSA, BRICS, UNESCO, SCO, QUAD etc.

Further, government has taken up several programme/schemes aimed at empowering the young researchers in the country to pursue world-class research in cutting edge areas of science and technology by improving access to better funding, high-end research laboratories, mentorship, and international-level collaboration opportunities. Some of the key programmes like National Post-Doctoral Fellowship (NPDF), Ramanujan Fellowship; INSPIRE Faculty Fellowship; Ramalingaswami Re-entry Fellowship; Biomedical Research Career Programme and MK Bhan-Young Researcher Fellowship have supported a large number of young researchers and have also attracted brilliant Indian researchers from abroad to return to India and conduct high quality research.

The VAIBHAV fellowship of DST provides a platform for overseas scientists including Non-Resident Indians to undertake collaborative research in Indian Institutions and Universities for a finite period of time. In addition, the Flexible Complementing Scheme / Merit based promotion scheme positioned in scientific departments and introduction of Performance Related Incentive Scheme (PRIS) in strategic Departments have also been instrumental in recruiting and retaining the scientists. All these efforts made by the government contribute towards promoting research excellence within the country and thereby reversing the brain drain.

This information was given by Dr. Jitendra Singh, Union Minister of State (Independent Charge) for Science & Technology, Minister of State (Independent Charge) for Earth Sciences, MoS PMO, Department of Atomic Energy and Department of Space, MoS Personnel, Public Grievances and Pensions, in a written reply in the Lok Sabha today.

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Parliament Question: Participation Of Women In Research And Development

Source: Press Information Bureau, Dt. 23 Jul 2025

The Government has implemented various schemes to increase the participation of women in research and development across all States and Union Territories, including Maharashtra. The Department of Science and Technology (DST) has launched the 'Women in Science and Engineering – KIRAN (WISE-KIRAN)' initiative to encourage women's participation in STEM (Science, Technology, Engineering, and Mathematics) fields at various career stages.

Under WISE-KIRAN, the WISE-Ph.D. program supports women pursuing doctoral research in basic and applied sciences. The WISE-PDF and WISE-SCOPE programs encourage women to engage in post-doctoral research, lab-based studies, and translational research from lab to land, respectively.

The WISE Internship in Intellectual Property Rights (WISE-IPR) program provides one-year, on-the-job training to develop expertise in Intellectual Property Rights. The WIDUSHI (Women's Instinct for Developing and Ushering in Scientific Heights & Innovations initiative) enables senior women scientists who are retiring within a year or have already retired to continue and advance their scientific careers.

In addition to fellowship programs, DST also provides institutional and policy support through initiatives such as CURIE (Consolidation of University Research for Innovation & Excellence in Women Universities), which strengthens research infrastructure in women's institutions to enhance participation in research and development; GATI (Gender Advancement for Transforming Institutions) which encourages institutions to implement evidence-based policies to retain women in STEM careers up to leadership positions; Science & Technology for Women (STW), which enhances women's livelihoods and promotes social entrepreneurship through Women Technology Parks (WTPs).

The Department of Biotechnology, Ministry of Science & Technology, had initiated a special scheme "Biotechnology Career Advancement and Re-orientation (BioCARe)" Fellowship Program, which aims to increase the participation of women scientists in biotechnology and allied areas.

The Department of Health Research, Ministry of Health & Family Welfare, implements the Women Scientist Scheme (WSS) under the Central Sector Scheme titled 'Human Resource Development for Health Research'. This initiative is specifically designed to support women researchers and scientists who have experienced a career break due to motherhood, family responsibilities, or similar reasons. The program aims to encourage their return to active research by providing opportunities in the field of biomedical and health research. Its primary objective is to reintegrate talented women scientists into mainstream research.

The Department of Scientific and Industrial Research (DSIR), Ministry of Science & Technology, implements the Technology Development and Utilization Programme for Women (TDUPW) scheme to promote technology adoption and training among rural and peri-urban women and self-help groups (SHGs). In 2023, Council of Scientific and Industrial Research (CSIR) launched "A Scheme for Promotion of Innovation, Rural Industries and Entrepreneurship (ASPIRE)", under which 301 R&D projects were sanctioned exclusively to women scientists.

The details of funds allocated/utilized for the said schemes during the last five years is given below:

Scheme	FY 2020-21 (Rs. in Crore)	FY 2021-22 (Rs. in Crore)	FY 2022-23 (Rs. in Crore)	FY 2023-24 (Rs. in Crore)	FY 2024-25 (Rs. in Crore)
DST-WISE-KIRAN	79.1	95.0	96.8	79.72	77.59
DBT-BioCARe Fellowship	4.44	3.90	0.50	10.36	5.70
DHR-WSS	5.3	4.2	6.77	6.79	13.46
DSIR- TDUPW	8.525				
CSIR-ASPIRE	-	-	-	-	34.23

These schemes have increased women's interest in science and technology. This is evident from the significant rise in women's participation in extramural R&D projects from 13% in 2000–01 to 18.6%, as reported in the Research & Development Statistics 2023 by the Department of Science and Technology (DST). This growth can be attributed to the various initiatives undertaken by the Government in the science and technology sector. Furthermore, the All India Survey of Higher Education (AISHE) Report 2021–22 indicates that women now constitute 41% of total Ph.D. enrolments in science, engineering and technology disciplines, reflecting the growing interest and engagement of women in science and technology.

This information was given by Dr. Jitendra Singh, Union Minister of State (Independent Charge) for Science & Technology, Minister of State (Independent Charge) for Earth Sciences, MoS PMO, Department of Atomic Energy and Department of Space, MoS Personnel, Public Grievances and Pensions, in a written reply in the Lok Sabha today.

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Space: The Final Frontier for a Future-Ready India?

- by Sanjeev Ahluwalia, a Distinguished Fellow, Chintan Research Foundation

Source: The Asian Age, Dt. 24 Jul 2025

The affirmation -- if any was needed -- that Bharat is still "Saare Jahan Se Achcha" (the best in the whole wide world) from the vantage view of the International Space Station (ISS) cost Rs 5 billion. Was it worth it? Yes, it was, if evaluated on a per capita basis. It cost just Rs 3.40 per Indian -- about the same as the price of a share in Jaiprakash Associates these days, or a small, non-branded toffee.

More importantly, Group Captain Subhanshu Shukla's well-crafted message from the ISS, established continuity, over four decades by linking with the comment by India's first astronaut, Wing Commander Rakesh Sharma, aboard a Russian space launch vehicle in 1984. Asked how India looked from space, his straight from the heart response was: India looked better than the entire world.

Dabbling in space forays is for the big boys with cash to spare. China has a permanent Tiangong Space Station since 2022 serviced by periodic crewed and supply flights. This reflects China's penchant for planting flags everywhere -- on remote Oceanic islands, in the Arctic and the Antarctic, or wherever authority and ownership is hazy, as a marker of potential territorial rights. The only other space station is the ISS, managed jointly by the United States, Russia, Japan, Canada and the European Space Agency.

India plans to have its own space station by 2035 by when the ISS would need to be phased out. This is overreach, unless it teams up with partners to replace the ISS.

China had a cash flow (GDP in current terms) of $18 trillion in 2022 when it set up Tiangong. Russia, with cash flow below India's since 2014, shares the ISS. By 2035, India's cash flow will not exceed $10 trillion (it was $3.91 trillion in 2024), even if it grows steadily at 9.2 per cent per year in current US dollar terms. China is suffering from poor returns on gigantic capital investments over the last three decades.

India's target for a crewed mission landing on the moon by 2040 is another stretch target. Till now only the US has landed astronauts on the moon in 1969. The logic of doing so also seems debatable since robots work as well at a lower cost. The "Gaganyaan" mission planned for 2027 is more practical. It will take three astronauts to a low earth orbit of 400 km and return after three days. This fits in with the hallmark of Isro's functioning – cost-efficient investment, just enough to enable system checks and provide team exposure to real-life risks, and yet easy on the budget.

India's space vehicles and satellites have two virtues. They are increasingly produced by the private sector, and they are low-cost, courtesy of local development. If the existing bonhomie with the US continues beyond 2025, collaborating with the US, Japan, Russia and the EU is possible. For most Indians, America still remains "that shining city on a hill" -- embodying all that is good and decent, which is also the bipartisan assessment -- John F. Kennedy, 1961, and Ronald Reagon, 1981.

Collaboration with China would make more sense for India and feed into better cross-border relations. But these hopes seem distant now. In either case, an early start for space capabilities makes perfect sense commercially and from the security viewpoint.

Consider that by as early as 2040, the value of the space economy could be $1.5 trillion to $2 trillion based on trends in satellite services, the possibility of space highways with "pit-stop" habitats between the moon and earth, manned by autonomous robots and AI-supported applications, orbital maintenance services, solar powered satellites, lunar mining and 3D printing in microgravity, to supply the tools and materials needed to derisk space travel.

India's space economy is already worth about $8 billion annually. Even if India gets a low five per cent share in the incremental business till 2040, it could gross at least $80 billion, making it well worth spending around $1.6 billion a year, which is what it intends. India spends more than Brazil, Mexico, Egypt or South Africa and less than Japan and Russia, though China and the US are an order of magnitude ahead. The clear advantage from long-term collaborations is now reaped by the EU, which spends four times as much as India, but divides the bill amongst the 22 members of

the European Space Agency members -- a sensible, cost-conscious, typically European way to go -- a possible lighthouse for the Indian space journey.

Cash-rich partners are available in the Middle East -- the UAE and India signed a Comprehensive Economic Partnership Agreement in 2022. The UAE is also a partner in the proposed marine plus overland trade link between India's western coast and Haifa in Israel to feed Europe and the East Coast of America. If highways are to be built in space, similar partnerships can be extended. Japan is collaborating with the Indian Space Research Organisation for the Lumar Polar Explorer mission (LUPEX), to cost about $160 million.

With about 3.6 million STEM graduates a year (comparable with China), India has the potential human talent for deep tech (quantum and AI) research, including space applications and exploration. The difference is that China invested in creating the manufacturing, deep tech research and AI ecosystem which provides the commercial and institutional capacity to absorb these graduates. One half and usually the best Indian STEM graduates get sucked into commercial services. It will take a decade of significant investment in deep tech by India to shift the flow of STEM talent from services to manufacturing technology and related R&D.

Over the next two decades, incremental investment could boost space-based military capacity, racing to beat future constraints imposed by an Outer Space Treaty, like orbital laser systems for missile interception and strikes on hostile satellites. Wars will be fought and won on the efficiency of cyber security for satellites, led by integration of AI into detecting and neutralising threats, assure seamless command and control and battle awareness across continents with precise navigation and targeting. Sadly, climate change might recede in the public imagination as a future threat, versus the near-term dystopia in space. The bright side is that, as always, the instruments of war will generate unintended positive outcomes like predicting and managing natural holocausts better and flood us with abundant solar energy to power the world.

https://www.asianage.com/opinion/columnists/sanjeev-ahluwalia-space-the-final-frontier-for-a-future-ready-india-1893304

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