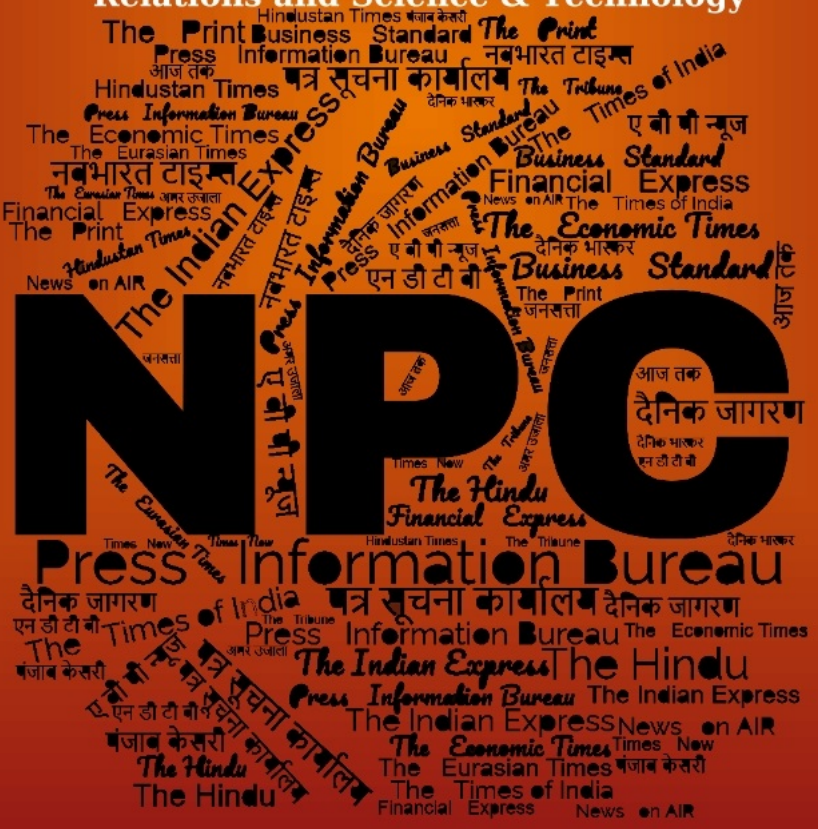
जनवरी
Jan
2025

खंड/Vol. : 50 अंक/Issue : 01
01/01/2025

समाचार पत्रों से चयनित अंश
Newspapers Clippings

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

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



रक्षा विज्ञान पुस्तकालय
Defence Science Library
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र
Defence Scientific Information & Documentation Centre
मेटकॉफ हाउस, दिल्ली - 110 054
Metcalfe House, Delhi - 110 054

CONTENTS

DRDO News

THE TIMES OF INDIA

Tue, 31 Dec 2024

Flow hive technology to harvest honey gets DRDO recognition, patent

Flow hive technology, developed by the Dharwad-based ‘Farmers First' organisation, is recognised as one of the top 100 technologies by DRDO and has received an India patent. This technology enables honeybee keepers to install artificial plastic nests in the boxes, and these nests dispense honey directly into bottles installed under the boxes.

Prakash Goudar, a nature conservationist who pitched the idea of developing the technology, told TOI that Apis Cerena Indica and Apis Mellifera honeybees are commonly used for honeybee keeping.

"Honeybee boxes contain two sections—the upper for honey collection and the lower for breeding. These sections have 6-8 wooden frames, and the queen bee is confined to the lower section. Worker bees are stored in the upper section and store the honey there in the existing system. However, plastic frames replace wooden frames in this technology, and honey is stored in the same frames. An injection-like device can push this honey to a chamber installed under the sections, from where a plastic straw can push it into bottles. It reduces human intervention in collecting honey," he claimed.

Vidya Desai, head of Farmers First, said that her startup aims to enhance the income of honeybee keepers.

"Since we aim to encourage women to take up this activity, this technology helps homemakers and others unaware of honeybee keeping to get involved, which brings income for keepers. It will help farmers to enhance their income in the fields," she commented.

Goudar said that when he explained the concept, the team at KLE Technological University, Hubballi, headed by Ravi Guttal, provided the technical support to materialise the idea.

"Now we have allied for validation of the technology from the honeybee department at GKVK Bengaluru. Once we get validation, we will launch advanced boxes to the market," he asserted.

https://timesofindia.indiatimes.com/city/hubballi/flow-hive-technology-to-harvest-honey-gets-drdo-recognition-patent/articleshow/116838047.cms

Defence News

Defence Strategic: National/International

THE ECONOMIC TIMES

Tue, 31 Dec 2024

HAL forms panel to negotiate GE-F414 deal with US, aims to ink it by March 2025

Working towards developing the LCA Mark 2 fighter aircraft, the Indian public sector firm Hindustan Aeronautics Limited has formed a contract negotiation committee early this month to conclude the deal with the US at the earliest.

The indigenous LCA Mk2 aircraft is set to be powered by GE-F414-INS6 engines.

The negotiations with the American firm have been going on and high-level visits have taken place between both sides. The two sides are now looking at concluding the deal at the earliest. The Indian side is aiming to conclude the deal in the next three months by the end of March 2025, sources told ANI.

Meanwhile, defence sources said that a Memorandum of Understanding (MoU) was signed between HAL and General Electric Company on 6th June 2023 for the production of GE-F414-INS6 Engines in India.

"In the MoU, it was agreed that HAL and GE will work on the Purchase and Business Agreements for the production of Engines in India," they said.

Engine parts representing 80 per cent of the value of the engines will be licensed through Transfer of Technology which is 22 per cent higher than what was agreed in 2012, they said.

The rough order values around USD one billion at the 2023 Price Level which is subject to negotiation would be the total value of these agreements.

The Manufacturing License Agreement (MLA) and DSP-83 (Non-Transfer and Use Certificate) are mandatory requirements for the Transfer of Technology.

"The MLA & DSP-83 were signed by all stakeholders including Defence Ministry and GE, in September 2024," the defence sources said.

Defence sources said that the HAL has constituted a Contract Negotiation Committee (CNC) and Negotiations with GE, USA were initiated earlier this month on December 3.

Defence sources said that HAL has also requested GE to submit a few technical documents for evaluation of the depth of transfer of technology.

"It is agreed by both the parties to continue CNC discussions in 4 phases including the Transfer of Technology including the manufacturing technology, along with an assessment of the depth of technology being transferred that is up to 80% of the value of the engine.

Terms and conditions associated with the Transfer of Technology including Technical Documentation, Technical Assistance, and Training are being discussed along with the terms and conditions associated with supplies including delivery schedule, statement of work, price escalation formula, warranty, option clause etc.

Defence sources said the negotiations are still going on and are yet to be concluded.

"Therefore, at this stage, it is premature to conclude that there would be serious cost escalation derailing the process of acquiring the GE 414 engines," Defence sources said.

https://economictimes.indiatimes.com/news/defence/hal-forms-panel-to-negotiate-ge-f414-deal-with-us-aims-to-ink-it-by-march-2025/articleshow/116837890.cms

THE ECONOMIC TIMES

Tue, 31 Dec 2024

2024: Indian military maintained assertive approach along LAC; focused on boosting operational might

In a year bookended by intractable conflicts and geopolitical fragmentation, India focused on ramping up military prowess by broadly firming up defence procurement worth Rs 4.22 lakh crore even as Indian and Chinese militaries completed pulling back their troops from border face-off points in eastern Ladakh. The disengagement of frontline forces at the last two friction points of Demchok and Depsang along the Line of Actual Control (LAC) following an understanding reached on October 21 marked a major thaw over four years after deadly clashes between the two nations' troops in the Galwan Valley severely strained the bilateral ties.

At the same time, the Indian military guarding the nearly 3,500 km LAC maintained an assertive approach, and bolstered its overall surveillance mechanism to closely track activities by People's Liberation Army (PLA) on the Chinese side of the de-facto frontier. The year also saw India expanding its strategic heft in the key maritime domain with the Indian Navy deploying more than 30 ships in the face of Houthi militants targeting a significant number of cargo vessels in and around the Red Sea with drone and missile attacks.

The Indian Navy responded to over 25 such incidents and safely escorted over 230 merchant vessels carrying around 90 lakh metric tonnes of cargo valued at over USD 4 billion, according to official data.The defence ministry said in a year-end review that the Indian Navy's swift actions saved more than 400 lives. India also leveraged its strategic strength in key waterways and firmly

asserted its influence over the Indian Ocean against the backdrop of China's relentless efforts to increase its presence in the region.

While the national security planners looked at formulating innovative policies drawing lessons from conflicts and tensions in various geographies around the world, the armed forces focused on boosting combat prowess by procuring new military hardware and technologies. The Defence Acquisition Council (DAC) and Defence Procurement Board (DPB) accorded Acceptance of Necessity (AoN) for 40 capital acquisition proposals worth Rs 4,22,129 crore in 2024 (up to November), the defence ministry said in a year-end report.

Out of these, AoNs worth Rs 3,97,584 crore (94.19 per cent) have been accorded for procurement from indigenous sources. In the last few years, the government has been focusing on promoting domestic defence manufacturing through a series of policy initiatives. A major focus of the government was to develop indigenous military hardware to deal with future national security challenges. However, the government's ambitious plans towards roll out the theaterisation to bring greater synergy among the Army, the Navy and the Air Force did not see much of a momentum.

In October, Prime Minister Narendra Modi inaugurated the Tata Aircraft Complex for production of C-295 transport aircraft for the Indian Air Force (IAF). The IAF is getting 56 C-295 transport aircraft under a previously finalised deal worth Rs 21,935 crore.

Forty of these aircraft will be built in India. The first domestically manufactured C-295 is likely to be delivered in 2026.Another significant milestone to enhance India's military might was induction of indigenously-built Arihant-class nuclear-powered submarine 'INS Arighaat' into the Indian Navy in August 29. The government has also approved construction of two indigenously designed nuclear attack submarines. In another move, India signed a mega deal with the US in October to procure 31 Predator long-endurance drones from American defence major General Atomics under the foreign military sales route at a cost of nearly USD 4 billion to boost Indian military's combat prowess.

India is acquiring the drones primarily to crank up the surveillance apparatus of the armed forces, especially along the contested frontier with China. The high-altitude long-endurance drones are capable of remaining airborne for over 35 hours and can carry four Hellfire missiles and around 450 kgs of bombs.

Indian Navy's Russian-manufactured guided missile frigate INS Tushil was commissioned into the force at Russia's coastal city of Kaliningrad this month. In 2024, Indian Light Tank (ILT) 'Zorawar' achieved a major milestone as it fired a number of rounds at different ranges at an altitude of more than 4200 metres with consistently accurate results. The year also saw India successfully test firing a number of key missiles and other weapon systems. In November, India tested a nuclear capable ballistic missile named K-4 that has a range of around 3,500 km. It was tested from a nuclear-powered submarine in the Bay of Bengal. With the test, India became part of a small group of nations having the capability to fire a nuclear missile from land, air and undersea.

In the same month, India successfully flight-tested a long-range hypersonic missile. The testing was seen as a major milestone as very few countries have the weapon system. Generally, the hypersonic missiles, capable of carrying conventional explosives or nuclear warheads, can fly in

the range of five times the speed of sound (Mach 5 which is roughly 1,220 km) per hour at sea level.The Indian military also focused on inducting critical technologies such as artificial intelligence and quantum computing in line with the changing nature of warfare.

In 2023-2024, India's defence production went up to a record-high of Rs 1,26,887 crore, reflecting a growth of 16.7 per cent over the previous financial year.Similarly, the defence exports touched a record Rs 21,083 crore in 2023-24, a growth of 32.5 per cent over the previous fiscal when it was Rs 15,920 crore.

In July, the government set aside 6.22 lakh crore as defence outlay for 2024-25. Out of the total allocation, Rs 1.72 lakh crore was given capital expenditure that largely includes purchasing new weapons, aircraft, warships and other military hardware. The Indian armed forces also participated in a number of mega wargames and hosted several of them throughout the year. The notable among them was the Malabar exercise featuring the navies of India, the US, Australia and Japan. India hosted the Malabar exercise in October that included both sea and harbour phases with a focus on expanding cooperation in the Indo-Pacific.

The wargame featured participation of various key naval platforms from the participating nations, including guided missile destroyers, multi-purpose frigates, submarines, fighter aircraft and helicopters. The Indian Navy has to deal with a couple of major accidents.In July, frontline warship INS Brahmaputra was severely damaged in a major fire.At least 13 people were killed in a crash between a passenger ferry and a navy speedboat in Mumbai this month. The three services also got new chiefs in 2024. In April, Admiral Dinesh Kumar Tripathi, who is a communication and electronic warfare specialist, became the 26th Navy Chief after R Hari Kumar retired from service.

In June, Gen Upendra Dwivedi, who has vast operational experience along the frontiers with China and Pakistan, assumed charge as the 30th Chief of the Army Staff, succeeding Gen Manoj Pande. Air Chief Marshal Amar Preet Singh assumed charge as chief of the Indian Air Force in September, succeeding Air Chief Marshal V R Chaudhari.

https://economictimes.indiatimes.com/news/defence/2024-indian-military-maintained-assertive-approach-along-lac-focused-on-boosting-operational-might/articleshow/116821290.cms

THE ECONOMIC TIMES

Tue, 31 Dec 2024

Quad vows to work vigorously towards free and stable Indo-Pacific

India and other Quad member nations on Tuesday reaffirmed the grouping's steadfast commitment to work towards a free, open and peaceful Indo-Pacific amid China's increasing military muscle-flexing in the region. The foreign ministers of the member nations of the grouping made the pledge in a joint statement commemorating the 20th anniversary of "Quad cooperation".

India, the US, Australia and Japan came together 20 years ago to extend assistance in response to the 2004 Indian Ocean earthquake and tsunami, and that coalition subsequently took form of the Quad.

In the last few years, the Quad has rolled out a number of initiatives addressing some of the most pressing needs and challenges of the Indo-Pacific region, including in areas of maritime security, infrastructure and connectivity. India is scheduled to host the next Quad Summit that is likely to take place in the second half of 2025. The foreign ministers of the four nations said the Quad will work together in responding to the future needs of the Indo-Pacific.

"As four partners, we share a vision of a free and open Indo-Pacific that is peaceful, stable and prosperous, underpinned by effective regional institutions," the joint statement said.

The Quad foreign ministers also talked about the centrality of 10-nation grouping Association of Southeast Asian Nations (ASEAN) in the Indo-Pacific.

"We reaffirm our unwavering support for ASEAN's centrality and unity as well as mainstreaming and implementation of the ASEAN Outlook on the Indo-Pacific," the ministers said.

"We respect Pacific-led regional architecture, foremost the Pacific Islands Forum. We are also steadfast in our support for the Indian Ocean Rim Association, the region's premier organisation," they said. The Quad foreign ministers also referred to the Indian Ocean earthquake and tsunami and how the four countries came together to respond to the challenges.

"The tsunami was one of the worst disasters in history, claiming the lives of nearly a quarter million people and displacing 1.7 million across 14 countries," they said.

"Together our four countries contributed over 40,000 emergency responders, working with other partners across the Indo-Pacific region to support millions of people affected by the catastrophe." In the statement, the ministers further noted that the foundational commitment of the four nations to humanitarian assistance and disaster relief remained strong.

"We continue to work side-by-side to prepare for and respond quickly and effectively to disasters across the region," they said."In 2024, our four countries collectively supported disaster preparedness and life-saving relief efforts across the Indo-Pacific and we continue to build on those efforts to identify new ways to respond rapidly to humanitarian crises and disasters," they added.

The ministers also briefly highlighted the Quad's focus on addressing complex challenges in the Indo-Pacific. "What began as an emergency response to a catastrophe has grown into a full-fledged partnership delivering positive outcomes for the people of our region," the statement noted.

It said the Quad countries now work together and with partners across the Indo-Pacific to address complex challenges -- from fighting climate change, cancer and pandemics, to bolstering quality infrastructure, counter-terrorism efforts, critical and emerging technologies, and cyber security. "Since 2021, the leaders of our four nations have met annually to drive the Quad's positive contributions across South Asia, Southeast Asia and the Pacific," the ministers said.

In the last Quad summit held in Wilmington in the US, top leaders of the grouping unveiled major steps to expand maritime security cooperation in the Indo-Pacific. They also called for rules-based global order that respects sovereignty and territorial integrity of nations.

https://economictimes.indiatimes.com/news/defence/quad-renews-pledge-towards-working-for-free-stable-indo-pacific/articleshow/116818883.cms

THE ECONOMIC TIMES

Tue, 31 Dec 2024

Another year where bilateral strategic ties bloomed: UK Defence Adviser highlights major events of 2024

The UK Embassy's Defence Adviser, Chris Saunders, on Tuesday highlighted that 2024 was a crucial year for the India-UK defence partnership. Saunders noted that one of the key highlights of 2024 was when Defence Minister Rajnath Singh visited the UK, marking a significant step in strengthening the defence relationship.

"As the sun sets on 2024, we look back at yet another year where our bilateral strategic ties bloomed further. Here are some key moments of significance in our defence partnership this year..." Saunders said, adding, "We began with the first visit of an Indian Defence Minister to the UK in more than 20 years. Honourable Raksha Mantri Shri Rajnath Singh travelled to the UK, signalling the growing importance of the strategic relationship and agreeing to new levels of cooperation and engagement."

The UK's Littoral Response Group (South) visited Chennai in March, further solidifying cooperation between both countries.

"The maritime partnership continued to be in focus when the UK's Littoral Response Group (South) visited Chennai in March. This was no ordinary visit as it marked the beginning of a new chapter in cooperation between the two countries," Saunders explained.

In a first, LRG vessels underwent scheduled maintenance in an Indian shipyard.

"The LRG vessels underwent a scheduled maintenance in an Indian shipyard for the first time, a testimony to the success of the logistics sharing agreement between the two countries," he said.

"Adding to the list of firsts, the Dartmouth Britannia Royal Naval College welcomed Lieutenant Commander N Dinesh Anand of the Indian Navy as one of its instructors. This marked the start of a new chapter in long-standing UK-India professional military education ties," Saunders said.

In the air domain, The UK Air Force contingent participated in India's maiden multi-lateral air exercise, Tarang Shakti.

"Moving from the maritime to the air domain, a Royal Air Force contingent participated in India's maiden multi-lateral air exercise - Tarang Shakti," Saunders said.

"Flying alongside the Indian Air Force and European partners, it was an excellent opportunity for the RAF to work closely with the IAF alongside other nations in a more challenging multilateral environment, significantly enhancing interoperability and sharing best practices.

"Both sides continued to have discussions on the range of defence, security and foreign policy issues. Alongside these high-octane military engagements, we continued to have discussions on a range of defence, security and foreign policy issues via channels like our joint working group on counter-terrorism, electric propulsion technology and the 2+2 dialogue."

London also welcomed INS Tushil as a part of its operational deployment.

"We concluded this year by welcoming INS Tushil to London, as she arrived in the UK as part of her operational deployment, providing another opportunity to our forces to engage and learn from each other," Saunders added.

He emphasized that 2024 marked significant growth in ties between the two countries. "All in all, 2024 was another year of significant growth in our strategic ties, setting the stage for even bigger things to come in 2025. With these hopes, we wish all of our friends in India a very happy new year!" he said.

https://economictimes.indiatimes.com/news/defence/another-year-where-bilateral-strategic-ties-bloomed-uk-defence-adviser-highlights-major-events-of-2024/articleshow/116835141.cms

THE WEEK

Tue, 31 Dec 2024

How China is revolutionising warfare with world's first mobile 5g base station

Even as China is said to be building the largest unmanned army in the world, its military communication technologies got a major upgrade with the introduction of the first mobile 5G base station in the world.

The mobile 5G base station, developed jointly by China Mobile Communications Group and the People’s Liberation Army (PLA), can offer high-speed, secure and reliable data exchange services to at least 10,000 users within a 3km radius, according to a South China Morning Post report.

The technology will ensure that there is uninterrupted communication connectivity even when the troops are advancing at high speeds in complex terrains like mountains or cities.

PLA, which has various unmanned combat platforms, need uninterrupted connectivity but does not always have ground base stations. Besides, the antenna on communication vehicles should not be too tall to avoid obstacles such as trees or buildings. To overcome these difficulties, scientists have developed a platform that can be mounted on a military vehicle to house a few drones. These drones then serve as an aerial base station.

According to PLA, the system can solve issues such as frequent disconnections and low speeds encountered in practical applications, offering a safe, reliable and rapid deployment.

Although electromagnetic interference is a threat to military 5G, innovation and equipment upgrades could help in resolving this, according to the project team led by senior engineer Hou Jie with PLA.

https://www.theweek.in/news/defence/2024/12/31/how-china-is-revolutionising-warfare-with-worlds-first-mobile-5g-base-station.html

ANI
South Asia's Leading Multimedia News Agency

Tue, 31 Dec 2024

From January 1, defence forces' chiefs to have ADCs from sister services

Moving towards deeper integration, the three services chiefs will have their Aide De Camps (personal staff officers) from sister services.

Defence officials said the three services chiefs till now have their ADCs from their own service but from January 1 onwards, they will have ADCs from their sister services.

"All the three service chiefs have voluntarily accepted their personal staff officers in the form of Aide-de-Camp (ADC) coming from different services," the officials said.

The Chief of Defence Staff Gen Anil Chauhan already has his ADC from the Indian Air Force.The move comes at a time when the Indian Defence forces are moving towards Theaterisation to be prepared for fighting wars of the future.

The officials said that India is transforming through a consensus-based approach moving toward theatre commands.This change will be adopted by all three service chiefs from January 1, signaling the major changes coming in 2025, the officials said.

The defence officials said that to some, it may appear a small step but it is one of the biggest signals for transforming Defence Forces to empower India.

Under the HR reforms being undertaken, the first set of cross-postings of junior officers was executed in mid-2023, with mid-level and senior officers being placed in important billets in mid-2024.

A special Joint Division has also been created at the Defence Services Staff College in Wellington, Tamil Nadu, to foster a collaborative and inter-service approach to jointness and integration in warfare and focus on inter-service understanding and cooperation, thus empowering them to lead the way in the upcoming era of Theatre Commands, they said.

https://www.aninews.in/news/national/general-news/from-january-1-defence-forces-chiefs-to-have-adcs-from-sister-services20241231230605/

Tue, 31 Dec 2024

Rewind 2024: India expands ties with Africa with naval cooperation, high-level visits

As the year 2024 comes to an end, firming up relationships with Africa, from Naval cooperation to high-level visits, was one of the key focus areas for the policymakers in Delhi. When it comes to the Indian Navy, they were involved in port calls, joint exercises, goodwill visits and Humanitarian Assistance and Disaster Relief (HADR) support to the continent.

Indian Navy Ship INS Tir and INS Sujata visited Mozambique and Tanzania in March to participate in the second edition of the India-Mozambique-Tanzania (IMT) Trilateral Exercise. Additionally, INS Gharial visited Mozambique in November 2024, where the Indian Navy handed over two Fast Interceptor Crafts to the Mozambican Armed Forces, enhancing maritime security for the southeast African country.

INS Sunayna visited Seychelles in June, a visit that coincided with Seychelles' 48th National Day, in which an Indian Navy contingent participated. In September, INS Talwar’s port visit to Mombasa facilitated professional exchanges and joint exercises with the Kenyan Navy. This was followed by its participation in IBSAMAR VIII exercises in October, a trilateral exercise between India, Brazil, and South Africa in Simon’s Town, reinforcing cross-continent multilateral maritime cooperation (Asia-Africa-South America). INS Sarvekshak, India's hydrographic survey vessel, visited Mauritius in December, and INS Tushil, a Russia-made Indian Navy ship commissioned by Indian Defence Minister Rajnath Singh, visited Kaliningrad in December.

The Indian Navy, essentially seen as a projection of India's maritime and diplomatic power, is critical to the Indian government's SAGAR (Security and Growth for All in the Region) policy. The SAGAR policy aims to enhance maritime security, support economic growth, and increase engagements in the Indian Ocean Region.

As part of the SAGAR policy, the Indian Navy has been helping in training and capacity building. Initiatives include training African naval officers in surveillance operations in large maritime areas, search and rescue (SAR), and counter-piracy operations. The Navy has been involved in joint surveillance missions with countries like Mozambique and Tanzania. With India's support, radar networks in countries like the Seychelles and Mauritius have been set up to enhance maritime domain awareness.

The Indian Navy’s role extends beyond security to humanitarian assistance. Its rapid response during natural disasters shows India is a reliable partner, not only in the region but wider Indian Ocean, from Africa to ASEAN. After Cyclone Hidaya this year, which caused significant flooding in Kenya, INS Sumedha, which was deployed for anti-piracy operations off Somalia, was diverted to deliver food, relief, and medicine supplies to the flood victims.

Not just naval cooperation, but it was a year of high-level engagements between the two sides. President Droupadi Murmu visited Algeria, Mauritania, and Malawi in October 2024. In November, PM Modi visited Nigeria, with an emphasis on defence and energy ties. The visit to Nigeria by an Indian Prime Minister came after a gap of 17 years. Earlier this year, Mozambique's President Nyusi visited Gujarat to attend the Vibrant Gujarat Summit. Next year is expected to be more active, with the India-Africa summit scheduled to take place. The last and third edition of the India Africa Forum Summit took place in Delhi in 2015.

Africa today is among the fastest-growing regions of the world, with a young population and natural resources. India has had a historic relationship with the continent, from the joint struggle against colonialism to working in the contemporary world. In fact, India has been a strong supporter of African presence at the reformed United Nations Security Council, and it was at the Delhi G20 summit that the African Union became part of the megaeconomic grouping.

https://www.wionews.com/india-news/rewind-2024-india-expands-ties-with-africa-with-naval-cooperation-high-level-visits-8581546

Business Standard

Wed, 01 Jan 2025

18th Exercise Surya Kiran: India-Nepal joint military exercise commences

The 18th edition of Exercise Surya Kiran, a joint military exercise between India and Nepal aimed at enhancing interoperability and fostering collaboration between the two nations' armies, began on Tuesday.

The annual training event is conducted alternatively in the two countries.

The exercise, taking place at the Nepal Army Battle School, Saljhandi in the Shivalik ranges of Western Nepal, will be conducted till January 13.

It "aims to enhance interoperability, primarily in the fields of Counter Terrorism (CT) Operations," according to an X post by the Indian embassy here.

"Exercise Surya Kiran signifies the strong bond of friendship, trust and common military linkages that exist between India and Nepal," it said.

The Indian Army contingent, comprising 334 personnel, is being led by a Battalion from the 11th Gorkha Rifles, according to a press release by the Defence Ministry in New Delhi.

The exercise aims to enhance interoperability in jungle warfare, counter-terrorism operations in mountains and Humanitarian Assistance and Disaster Relief under the United Nations Charter.

It will focus on enhancing "operational preparedness, aviation aspects, medical training, and environment conservation", through which the troops will "enhance their operational capabilities,

refine their combat skills and strengthen their coordination to operate together in challenging situations." The exercise follows Chief of Army Staff General Upendra Dwivedi's visit to Nepal, and the Nepali Chief of the Army General Ashok Raj Sigdel's visit to India.

It will achieve shared security objectives and foster bilateral relations between two neighbours, according to the press release.

https://www.business-standard.com/external-affairs-defence-security/news/18th-exercise-surya-kiran-india-nepal-joint-military-exercise-commences-124123101038_1.html

REPUBLICWORLD.COM

Wed, 01 Jan 2025

China's Sinicization Drive Continues with Heavy Troop Deployment Pushing Cultural Genocide in Tibet

The Sinicization of Tibet, a contentious issue for decades, has taken a new and alarming turn as China ramps up its military presence at Larung Gar Buddhist Academy, the world's largest Tibetan Buddhist study centre. Recent developments, highlighted in reports from MSN on December 30, 2024, and other global outlets, reveal escalating measures by Beijing to consolidate control over Tibetan religious and cultural institutions.

Military Presence at Larung Gar

China has stationed approximately 400 military personnel at the Larung Gar Buddhist Academy in Serthar County, eastern Tibet. The troop deployment on December 20, 2024, is part of a broader strategy to tighten its grip on the region, according to the report. Helicopter surveillance in the area signals heightened security measures, raising concerns over the suppression of religious freedoms.

New regulations proposed by the Chinese government include restricting the duration of residency for monks and nuns to a maximum of 15 years and mandating registration with the authorities. The population of religious practitioners at the academy is also expected to be reduced. In a move seen as targeted, Chinese students at the academy are being asked to leave, further depleting its population and diversity.

Linguistic Suppression and Cultural Erosion

Parallel to the military expansion, the suppression of the Tibetan language has raised alarm. Reports from the Central Tibetan Administration (CTA) on December 26, 2024, suggest that Tibetans may soon be eliminated from college entrance examinations in Tibet, sparking outrage among educators, students, and cultural advocates. Critics argue this policy is part of a "second Cultural Revolution," aimed at eradicating the linguistic and cultural identity of Tibetans.

Although Chinese officials claim that Tibetans will remain part of future exams, independent investigations reveal a systematic effort to marginalize the language. Schools in Tibet have

increasingly adopted Mandarin as the primary medium of instruction, placing Tibetan-speaking students at a significant disadvantage compared to their Mandarin-speaking peers.

Broader Context of Sinicization

The Sinicization of Tibet extends beyond language and religion. It is part of a comprehensive strategy to assimilate non-Han cultures into a homogenized Chinese identity. In Tibet, this has taken several forms:

- **Education:** Tibetan children are increasingly placed in state-run boarding schools where they are taught in Mandarin and indoctrinated with Chinese Communist Party (CCP) ideology.
- **Cultural Policies:** Reports suggest deliberate attempts to erase Tibetan traditions through bans on Tibetan-medium education and restrictions on religious practices.
- **Forced Relocations:** Data from VOA News indicates that over 930,000 rural Tibetans have been relocated since 2000, with most of these relocations occurring post-2016. Observers describe this as "Han settler colonialism," aimed at diluting Tibetan demographics.
- **Religious Regulation:** The CCP has imposed strict controls over Tibetan Buddhism, including the selection of lamas and translation of religious texts into Mandarin, to align them with socialist values.

Tibetan Resistance and Global Advocacy

The response from the Tibetan community has been one of alarm and resilience. Educators fear that removing Tibetans from educational systems violates China's laws on regional autonomy, which guarantee the right to use minority languages in education. Cultural advocates argue that the suppression of Tibetan identity constitutes an existential threat to their heritage.

Global organizations, including Human Rights Watch and the International Campaign for Tibet, have condemned China’s actions. They urge the international community to intervene, labelling these measures as violations of cultural and human rights.

Implications for Tibetan Identity

The intensifying Sinicization of Tibet reflects a systematic effort by the CCP to erase Tibetan cultural, linguistic, and religious identity. With measures such as military control, language suppression, and forced assimilation, the future of Tibetans as a distinct ethnic and cultural group within China faces a profound and existential threat.

As Beijing continues its aggressive policies, the global community watches closely, grappling with the challenge of holding China accountable for its actions while balancing broader geopolitical interests. The unfolding situation in Tibet remains a stark reminder of the ongoing struggle for cultural survival in the face of state-led assimilation efforts.

https://www.republicworld.com/defence/global-defence-news/chinas-sinicization-drive-continues-with-heavy-troop-deployment-pushing-cultural-genocide-in-tibet

THE TIMES OF INDIA

Tue, 31 Dec 2024

From importer to key player: 2024 saw India take center stage in defence sector

India’s defence sector in 2024 showcased significant progress in achieving self-reliance and gaining global recognition. With record-breaking indigenous defence production and exports, the nation transitioned from an importer to a key player in the global defence market. India commissioned new ships for its navy and added advanced aircraft to its air force.

The country also saw the opening of its first privately owned military aircraft factory. Additionally, high-value contracts and strategic international collaborations strengthened India's defence capabilities, stressing its commitment to "Aatmanirbharta.”

Here are the top defence achievements of India in 2024:

Aatmanirbharta in defence: India's journey to self-reliance

Prime Minister Narendra Modi announced on India's 78th Independence Day that the country is moving toward "Aatmanirbharta" (self-reliance) in defence and becoming a global manufacturing hub. Speaking from the Red Fort on August 15, 2024, PM Modi said, “There was a time when the majority of the defence budget was used to procure weapons/equipment from abroad, but his Government focused on indigenous manufacturing to make the nation self-reliant.”

The Prime Minister commended the ministry of defence and the armed forces for promoting local manufacturing. This includes five "Positive Indigenisation Lists" outlining over 5,600 items to be sourced exclusively from Indian manufacturers. PM Modi stressed India's transition from a defence equipment importer to an exporter.

The ministry of defence reported record-high indigenous defence production in the 2023-24 financial year, reaching Rs 1,26,887 crore, a 16.7% increase compared to the previous year. Public sector entities contributed approximately 79.2% of this production, while the private sector accounted for the remaining 20.8%.

For example, the Indian Light Tank "Zorawar," developed by the Defence Research and Development Organisation (DRDO) and manufactured by Larsen & Toubro, successfully completed high-altitude firing trials. This followed successful desert trials in September 2024. The tank demonstrated accurate firing capabilities in both environments.The defence ministry aims to reach Rs 3 lakh crore in defence production by 2029.

Defence exports hit record high

India's defence exports reached a record high of Rs 21,083 crore (approximately US$2.63 billion) in the fiscal year 2023-24. This marks a 32.5% increase from the Rs 5,920 crore achieved in the previous fiscal year. Exports have grown 31 times over the last decade compared to the fiscal year 2013-14.

Private companies and Defense Public Sector Undertakings (DPSUs) contributed approximately 60% and 40% to these exports, respectively.

The ministry of defence simplified export procedures in May 2024, expanding the Open General Export License (OGEL) to cover more countries and items. An online portal now facilitates the sharing of export leads with Indian defence companies, disseminating 153 leads since January 1, 2024. The ministry also organized ten webinars and seminars with other countries to promote exports. DPSUs are setting up overseas offices, supported by a new streamlined procedure.

Defence minister Rajnath Singh expressed confidence that the target of exporting defence equipment worth Rs 50,000 crore by 2029 will be achieved.

PM Modi and Spain's PM launch India's first private military aircraft factory

Prime Minister Narendra Modi and Spanish Prime Minister Pedro Sanchez inaugurated India's first private military aircraft manufacturing facility in October. The Tata Aircraft Complex will produce C-295 transport aircraft, a joint project between Airbus Spain and Tata Advanced Systems Ltd.

The factory is expected to deliver its first "Made in India" C-295 in 2026. Of the 40 aircraft to be built in India, six of the 16 "fly-away" condition aircraft from Airbus Spain have already been delivered to the Indian Air Force.

“The C-295 aircraft factory reflects the new work culture of ‘New Bharat.’ From idea to execution, the speed with which Bharat operates today is evident here,” PM Modi said, predicting future global exports of the aircraft.

This project is expected to generate thousands of jobs. PM Modi also stressed the potential for civilian aircraft production at the facility, citing recent orders by Indian airlines for 1,200 new planes. He emphasised the expansion of air connectivity to smaller Indian cities and India's ambition to become an aviation hub.

Sanchez stressed Spain's reliability as a partner. Both leaders praised the C-295 project as a symbol of growing defence cooperation and encouraged further joint ventures between the two countries’ defence industries.Multi-billion dollar deal with US for predator drones

India signed a deal with the US government for 31 MQ-9B predator drones, costing Rs 28,000 crore (US$3.3 billion), in October. A separate Rs 4,350 crore (US$520 million) agreement with General Atomics will establish a maintenance, repair, and overhaul (MRO) facility in India.

The first drone is expected to be delivered by January 2029, with all 31 delivered by October 2030.

An official told TOI, “Under the deal, the first MQ-9B high-altitude long-endurance (HALE) drone will be inducted by Jan 2029, with all the 31 being delivered in batches by Oct 2030. The `birds’ will provide a quantum jump in the ISR (intelligence, surveillance, and reconnaissance) capabilities of our armed forces.”

The Navy will receive 15 Sea Guardian drones, while the Army and Air Force will each get eight Sky Guardians. These drones, equipped with Hellfire missiles, GBU-39B guided bombs, and other weapons, will enhance India's surveillance capabilities, especially in the Indian Ocean Region, where China's presence has grown.

General Atomics will partially assemble 21 of the drones in India and provide logistical support for eight years. Although no technology transfer is included, the company will offer expertise to India's defence research and development organisation (DRDO) to develop similar drones.

The official addressed cost concerns and the drones' effectiveness: “The MQ-9Bs we will get are the latest variant capable of launching their weapons from long stand-off distances,” he said.

These drones can fly for 30-40 hours at high altitudes and are considered more advanced than Chinese drones. India plans to deploy them at command centers focused on the Indian Ocean Region and land borders. This purchase represents a major defence deal with the US, following acquisitions like C-17 Globemaster aircraft and P-8I maritime patrol aircraft.Approval of 52 new surveillance satellites

India will launch 52 new spy satellites to enhance its surveillance capabilities, the government announced in October. The cabinet committee on security, led by Prime Minister Narendra Modi, approved the third phase of the space-based surveillance (SBS-III) project.

The project, estimated at Rs 27,000 crore, will span five years. These satellites will monitor India's land and sea borders, focusing on areas of concern with neighboring countries Pakistan and China, including Chinese activity in the Indian Ocean.

This new network will complement existing Indian satellites like Risat, Cartosat, and the Gsat-7 series. The SBS program began in 2001 with four satellites launched. A second phase in 2013 added six more.

The new satellites will incorporate artificial intelligence (AI) for communication and data gathering.Induction of first C-295 tactical aircraft

The Indian Air Force (IAF) inducted its first C-295 transport aircraft in September, marking a significant upgrade to its airlift capabilities. Defence minister Rajnath Singh highlighted the role of the defence and aerospace sectors in India's self-reliance during the induction ceremony at Hindon Air Base near Delhi.

Nicknamed "The Rhino," the C-295 will be based in Vadodara, Gujarat. India signed a deal for 56 planes two years ago, costing Rs 21,935 crore. Airbus will deliver the first 16 aircraft by 2025, while the remaining 40 will be built in India at a new Tata-Airbus facility in Vadodara. This is the first instance of a private company producing military aircraft in India. Indian-made C-295 production will run from September 2026 to August 2031.

The C-295 will replace the older HS-748 Avro aircraft. “This medium-lift tactical aircraft is capable of taking off and landing from unprepared landing grounds. It will replace the HS-748 Avro aircraft,” Singh said.

Capable of carrying up to nine tons of cargo or 71 soldiers, the C-295 can operate from short, unpaved runways, making it ideal for deployment in mountainous areas, such as the border with China and the Andaman & Nicobar Islands. The aircraft also features Indian-made electronic warfare systems and a rear ramp for rapid troop and cargo deployment.

Akashteer project: Revolutionizing India's air defence

The Indian Army has deployed a new air defence system called Akashteer to modernize its defences. This project is part of the Army's "Decade of Transformation" and "Year of Tech Absorption" initiatives.

Akashteer automates and integrates India’s air defence network. It combines data from Army and Air Force sensors, creating a single, shared view of the airspace for all units. This shared view improves coordination and awareness.

The system has undergone real-world testing, simulating potential future conflicts. A senior military officer observed the testing and praised the project, saying it has “realised a transformative leap in the Indian Army's air defence capabilities.”

The system automates tasks previously done manually, significantly speeding up response times—critical for defending against fast-moving aircraft.

Akashteer allows frontline units to make quick decisions about engaging enemy aircraft while preventing friendly fire incidents. Units in the Northern and Eastern Commands are already using these systems.

The system combines data from various radars and weapon systems to create a comprehensive view of the airspace, aiding both planning and reactions to immediate threats.

Akashteer is built with backup communication systems to maintain connectivity in difficult situations. It can also be upgraded with new software and hardware as technology advances.

The system can be deployed on mobile platforms for some units and in fixed locations for others, depending on operational needs.

The phased induction of Akashteer is currently in progress. Of the 455 systems required, 107 were delivered by November 12, with 105 more scheduled for delivery by March 2025. The remaining units will be supplied by March 2027, ensuring extensive coverage across the Indian Army's defence formations.

New submarines, ships, and helicopters

India strengthened its military in 2024 with the addition of new submarines, ships, and helicopters.The Indian Navy inducted INS Arighaat, a submarine, on August 29, 2024, in Visakhapatnam. This submarine incorporates advanced technology and Indian-made systems.

The Navy also commissioned INS Tushil, a guided-missile frigate, on December 9, 2024, in Kaliningrad, Russia. This ship is an upgraded Krivak III-class frigate.

The Navy also commissioned survey vessels INS Sandhayak and INS Nirdeshak in February and December, respectively. Additionally, the Navy inducted INS Surat, a destroyer, and continued work on seven stealth frigates.

The Navy also introduced Drishti-10 remotely piloted aircraft for surveillance and equipped ships with unmanned aerial systems. Nine MH-60R helicopters were put into service, with the first MH-60R squadron (INAS 334) commissioned in March. These helicopters participated in exercises like MALABAR, SIMBEX, and MILAN 24.

The Indian Air Force added Light Combat Helicopters (LCH) in February 2024. Personnel trained on these helicopters and deployed them during Exercise Gagan Shakti in April 2024.

Series of contracts

India has signed several defence contracts in recent months, enhancing its military capabilities across land, sea, and air. These agreements span various equipment, including aircraft, missiles, ships, and electronic warfare systems.In October 2024, the ministry of defence (MoD) finalised a deal with the US government for 31 MQ-9B Sky/Sea Guardian drones. A related contract with General Atomics Global India will provide maintenance and repair services within India.

That same month, the Indian coast guard ordered six air-cushion vehicles (hovercraft) from Chowgule & Company Private Limited for Rs 387.44 crore.

November 2024 saw a Rs 1,207.5 crore contract with Cochin Shipyard Limited for the refit and dry docking of the aircraft carrier INS Vikramaditya.In December 2024, the MoD signed a contract with Hindustan Aeronautics Limited (HAL) for 12 Su-30MKI aircraft and associated equipment, costing approximately Rs 13,500 crore. Another contract with Larsen & Toubro Limited provided the Indian Army with 155 mm/52 caliber K9 VAJRA-T self-propelled artillery guns, valued at Rs 7,628.70 crore.

Global engagements

The ministry of defence significantly expanded its international defence cooperation in 2024 through high-level visits and military exercises. Defense minister Rajnath Singh spearheaded these efforts, visiting several key nations.Singh visited the United States in August, meeting with secretary of defence Lloyd Austin and national security advisor Jake Sullivan. Discussions included defence cooperation, industrial collaboration, and regional security.

In December, Singh traveled to Russia, co-chairing the India-Russia Inter-Governmental Commission on Military & Military Technical Cooperation. He also met with President Vladimir Putin.

In January, Singh visited the United Kingdom to meet defence minister Grant Shapps and then-Prime Minister Rishi Sunak, focusing on defence and industrial collaboration.

He also participated in the ASEAN Defence Ministers' Meeting-Plus (ADMM-Plus) in November, advocating for a "rule-based international order for peace & prosperity in Indo-Pacific." Singh held meetings with counterparts from China, the US, Malaysia, Laos, South Korea, Australia, New Zealand, and the Philippines.

In August, Singh and external affairs Minister S Jaishankar hosted the third India-Japan 2+2 ministerial dialogue in New Delhi with their Japanese counterparts, reviewing defence activities and discussing increased cooperation.

— rajnathsingh (@rajnathsingh) October brought the sixth India-Singapore defence ministerial dialogue to New Delhi, where Singh and Singapore's defence minister affirmed their commitment to regional peace and stability.

Finally, in February, Singh met with Netherlands defence minister Kajsa Ollongren in New Delhi to explore expanded cooperation, particularly in maritime and industrial domains. Both ministers stressed enhanced naval interaction and the shared goal of ensuring Indian Ocean security.

Successful military exercises in India

This year, India successfully conducted numerous military exercises across various states. Here are some of the key ones:

Desert Cyclone

The joint military exercise "Desert Cyclone" between India and the UAE was conducted at the Mahajan Range in Bikaner, Rajasthan, from January 2 to January 15, 2024. The exercise involved troops from the Indian Army and the UAE's Zayed First Brigade. The training focused on joint tactical operations, culminating in validation training in Rajasthan.

The exercise aimed to improve cooperation and understanding between the two forces, particularly in peacekeeping operations. Training scenarios included fighting in built-up areas (FIBUA) in desert environments, relevant to UN peacekeeping mandates.

Specific drills included setting up joint surveillance centers, cordon and search operations, controlling built-up areas, and helicopter operations. The exercise provided a platform for sharing best practices and enhancing combat skills.

Exercise Milan

The Indian Navy's largest multilateral naval exercise, Milan 2024, began in Visakhapatnam on February 19, 2024. Ships from the Indian Navy and 16 foreign navies, along with a maritime patrol aircraft and delegations from various countries, participated.

The exercise was divided into two phases. The harbor phase (February 19–23) included events like an international city parade, a maritime seminar, a technology expo, and sporting events. The sea phase (February 24–27) involved complex drills such as air defence, anti-submarine, and anti-surface warfare exercises, along with gunnery shoots and maneuvers.

Milan 2024, held under the Eastern Naval Command, was the largest and most complex edition to date. The exercise’s motto, ‘Camaraderie Cohesion Collaboration,’ reflects its focus on international maritime cooperation. It aimed to promote peace and prosperity in the region, aligning with “the Prime Minister's vision of Security & Growth for All in the Region (SAGAR).”

Exercise Tarkash

India and the US conducted their seventh annual joint counter-terrorism exercise, "Tarkash," from April 22 to May 15 in Kolkata. The three-week program involved the National Security Guard (NSG) and US special forces training together in urban counter-terrorism scenarios.

The exercise included mock drills in close-quarters battle, building entry, hostage rescue, surveillance, sniping, and complex multi-target operations.

An NSG spokesperson told the Times of India, “The primary objective of the Indo-US exercise 'Tarkash' is to build functional relations and enhance interoperability between their special forces

in conducting coordinated counter-terror operations, particularly in urban counter-terrorism contingencies."

The exercise aimed to enhance cooperation between the two countries in combating all forms of terrorism.

Exercise Shakti

India and France launched their seventh joint military exercise, Shakti, on May 13, 2024, in Umroi, Meghalaya. The exercise, held at a modern training facility, concluded on May 26.

French Ambassador to India Thierry Mathou and Major General Prasanna Sudhakar Joshi attended the opening ceremony.

Shakti is a biennial exercise, alternating between India and France. It aimed to enhance the ability of both nations to conduct multi-domain operations in sub-conventional scenarios as outlined in Chapter VII of the United Nations mandate.

The training focused on operations in mountainous and semi-urban terrain, with objectives including improving physical fitness, tactical drills, and sharing best practices. Drills included responses to terrorist territorial seizures, establishing joint command posts, securing landing sites, and using drones and counter-drone systems.

Tarang Shakti

The Indian Air Force (IAF) concluded its largest-ever multinational air exercise, Tarang Shakti, on September 12. The exercise involved 10 participating countries and 18 observer nations and was conducted in two phases.

The first phase, held in Sulur, Tamil Nadu (August 6–14), included participants from Germany, France, the UK, and Spain. The second phase, held in Jodhpur (August 29–September 12), involved other nations.

The exercise featured around 75–80 IAF aircraft, alongside 67 fighters and military aircraft from participating nations. The IAF said, "Tarang Shakti 24 was the first multinational exercise hosted by the organization, marking the first such event in nearly six decades."

12th Joint Military Training Exercise

The Indian Air Force (IAF) and the Republic of Singapore Air Force (RSAF) conducted their 12th Joint Military Training Exercise at Air Force Station Kalaikunda, West Bengal, starting October 21, 2024.

The main phase (November 13–21) included advanced air combat maneuvers and joint mission planning. The RSAF deployed its largest-ever contingent, including F-16s, F-15s, G-550 AEW&C planes, and C-130s. The IAF participated with Rafale, Mirage 2000 ITI, Su-30 MKI, Tejas, MiG-29, and Jaguar aircraft.

SIMBEX

The 31st annual maritime exercise SIMBEX between Singapore and India concluded on October 29, 2024. The exercise occurred in two phases: a harbor phase in Visakhapatnam and a sea phase in

the Bay of Bengal.The harbor phase (October 23–25) featured expert exchanges, ship visits, and pre-sail planning. The sea phase (October 28–29) included advanced warfare tactics like anti-air, anti-surface, and anti-submarine exercises.

SIMBEX aimed to enhance interoperability between the two navies.

https://timesofindia.indiatimes.com/india/from-importer-to-key-player-2024-saw-india-take-centerstage-in-defence-sector/articleshow/116830230.cms

The EurAsian Times

Wed, 01 Jan 2025

Armed With 'Cutting Edge' Vertical Launch Missile System, North Korea Reveals Largest-Ever Warship

North Korea has recently released the first detailed images of its new warship under construction, signaling a major step in its naval development. The vessel, expected to be the largest in the country's Navy, features a missile launcher system and could redefine Pyongyang's maritime capabilities.

Korean Central Television aired four photographs on December 29, showing Kim Jong Un inspecting the ship during at least two visits in 2024. The release was part of the regime's end-of-year coverage. While the photos lack specific dates, one image reveals an earlier stage of construction where the facility was camouflaged with netting.

Later images display a more permanent roof structure, which, according to NK Pro, an independent media outlet specializing in North Korean news, likely indicates the photo was taken before the roof was completed in October.

This marks the latest glimpse of the warship, previously seen in heavily cropped images released by state media in September and wide-angle shots from a defense exhibition in November. The earlier releases offered limited detail and focused primarily on the bow. The new warship is likely being constructed at the Nampo Shipyard in South Pyongan Province, a facility Kim visited in February.

During that visit, he underscored the strategic importance of bolstering naval power and stressed the need to complete shipbuilding projects outlined by the 8th Congress of the Workers' Party of Korea within a five-year timeline.

Experts consider this new vessel a major advancement in North Korea's naval development. Joseph Dempsey, a research associate at the International Institute for Strategic Studies, observed in October that the dockyard in Nampo includes a structure designed to conceal construction.

The warship under construction features a beam width of approximately 15 meters—substantially wider than the Amnok- and Tuman-class corvettes, which are about 77 meters long and are the largest warships North Korea has produced since the 1970s.

The new frigate is estimated to be over 100 meters long, with a displacement classification indicating its role as a principal surface combatant. North Korea has previously claimed its Amnok-class corvettes can launch nuclear-armed cruise missiles, potentially broadening its nuclear strike capabilities. However, analysts caution that North Korea's navy remains far from being able to challenge the capabilities of the United States or South Korea.

Capabilities Of North Korea's New Warship

The unveiling of these new images marks a rare insight into the Hermit Kingdom's evolving naval ambitions and its efforts to increase military strength amid ongoing tensions on the Korean Peninsula. The vessel has drawn attention due to its design, which suggests the potential inclusion of advanced technologies such as fixed-panel radars integrated into the superstructure and a vertical launching system (VLS) capable of launching cruise or anti-aircraft guided missiles.

Although the VLS has not yet been installed, its inclusion seems likely, given the ship's design and the common weapon configurations found on modern surface combatants. In line with the Amnok-class corvette, North Korea has tried to reduce the ship's radar cross-section (RCS), aiming for greater stealth. The ship's superstructure features two key openings forward of the bridge: a smaller one at the bow, likely for a naval gun, and a larger opening in front of the superstructure, possibly intended for vertically launched missiles, either for defense or offense.

Additionally, the small openings in the superstructure suggest the possibility of installing phased-array radars, which could be used for surveillance and missile guidance. Naval expert Dimitris Mitsopoulos observed that these features resemble the design of the unfinished Russian Project 20386 corvette (Derzky), an advanced variant of the Steregushchiy (pr. 20380) and Gremyashchiy (pr. 20385) classes.

The potential combination of VLS and phased-array radar strongly suggests that the ship is intended for air defense, fulfilling a long-standing gap in North Korea's naval fleet for an anti-air picket ship. If these systems are completed, North Korea will join a select group of navies with such advanced technologies in their fleets.

Until now, the only anti-aircraft missile system deployed on North Korean ships has been the Igla-S (SA-24) SAM, either as MANPADS or in an automated sextuple short-range SAM launcher, also seen on some ships in the Myanmar Navy. In addition to this new warship, North Korea is also developing other surface combatants, including smaller anti-submarine warfare vessels and missile boats.

North Korea's naval aspirations extend underwater as well, with evidence suggesting the country may be working on its first nuclear-powered submarine design, signaling its continued push to expand its naval capabilities.

https://www.eurasiantimes.com/armed-with-cutting-edge-vertical-launch/

The EurAsian Times

Wed, 01 Jan 2025

2nd U.S. Aircraft Carrier "Thunders" In China's Backyard! What Explains The "Sudden Uptick" Of USN In Malaysia?

The US Navy aircraft carrier USS Carl Vinson (CVN-70) docked at the Port Klang Cruise Terminal, Malaysia, on the morning of December 29, marking the second US Navy carrier visit to the country in just over a month. This follows the USS Abraham Lincoln's (CVN-72) visit to the same terminal on November 23, the first US carrier to do so since 2012.

The Carl Vinson, along with its strike group—including the guided-missile cruiser USS Princeton (CG-9) and guided-missile destroyers USS Sterett (DDG-104) and USS William P. Lawrence (DDG-110)—arrived at the port near Malaysia's capital, Kuala Lumpur, just after sunrise. The visit is part of a broader effort to strengthen US-Malaysia defense relations, which has been a key focus in recent years.

In a Navy news release, Rear Adm. Michael Wosje, commander of Carrier Strike Group One, highlighted the visit's significance, stating, "Malaysia is a key partner for us in the Indo-Pacific. Our visit reinforces the importance of this partnership to the United States."

"Visiting Port Klang provides us with an important and unique opportunity to collaborate with our Royal Malaysian Navy counterparts, continuing to build upon our strategic and mutually beneficial partnership, while also providing our Sailors well-deserved downtime to explore the area and build connections within the community," he added.

Although the exact length of Carl Vinson's port stay remains unspecified, the carrier is expected to remain in Malaysia through the New Year. A typical port call for a US aircraft carrier lasts around four days, as seen during the USS Abraham Lincoln's four-day stop in November. This visit is part of ongoing US efforts to strengthen its Indo-Pacific alliances. The two aircraft carrier visits this year coincide with the 10th anniversary of the US-Malaysia Comprehensive Partnership, which was formalized in 2014.

Carrier spokeswoman Lt. Cmdr. Devin Arneson specified that as part of their stay, sailors from the Carl Vinson will participate in community service, including volunteering at animal shelters and the Pure Life Society, a home for orphans and underprivileged children. The USS Carl Vinson, which last visited Malaysia in January 2011, departed its homeport at Naval Air Station North Island, California, on November 18 for a scheduled deployment to the Indo-Pacific.

Since it arrived in the region, the strike group has conducted flight operations in the Philippine Sea and transited the Surigao and Balabac straits in the Philippines. Before arriving in Malaysia, the group was operating in the South China Sea.

Why Visits to Malaysia Are On The Rise?

The recent uptick in US Navy warship visits to Malaysia, including the back-to-back carrier stops by USS Abraham Lincoln and USS Carl Vinson, is a notable shift after a decade-long decline tied to the fallout from the “Fat Leonard” corruption scandal.

This renewed engagement reflects both operational adjustments and strategic priorities in the Indo-Pacific. From 2009 to 2014, Leonard “Fat Leonard” Francis and his company Glenn Defense Marine Asia (GDMA) managed US port visits across Southeast Asia, steering them to terminals under their control. During this period, US Navy carriers routinely docked at the Glenn Cruise Terminal in Port Klang, averaging two visits annually.

However, the 2013 arrest of Francis in San Diego for orchestrating a corruption network led to the terminal being deemed off-limits by then-Navy Secretary Ray Mabus. A scheduled carrier visit in late 2013 was canceled, and US Navy ships ceased calling at the terminal.

Even after Malaysia’s Boustead Holdings acquired the terminal in 2014 and renamed it the Boustead Cruise Centre, the US Navy maintained its ban. The terminal, though operational, saw limited use, hosting foreign warships like Bangladesh Navy’s BNS Somudra Joy and the UK’s HMS Daring, but no US vessels. In 2017, the US Navy lifted its ban, allowing the Expeditionary Fast Transport ship USNS Fall River to dock during the Pacific Partnership 2017.

However, US carriers remained absent due to logistical concerns and reluctance to revisit a terminal tainted by GDMA’s monopoly over husbanding services. By 2019, the terminal had changed ownership again, becoming the Port Klang Cruise Terminal under a joint venture between North Port Malaysia and Westport Malaysia.

Yet, the COVID-19 pandemic further delayed the resumption of US Navy visits. Restrictions on foreign entry prevented port calls until July 2024, when the USS Blue Ridge (LCC-19), the US 7th Fleet command ship, docked at Port Klang for the first time in years.

One of the barriers to renewed carrier visits was GDMA’s former control over husbanding services, which left no alternative providers for supporting US carriers in Malaysia. The recent visits, however, indicate a shift in the Navy’s contracting approach. For example, Inchcape Shipping Services managed logistics for the Abraham Lincoln’s visit, with various companies sharing responsibilities to ensure no single entity monopolizes operations.

Beyond operational changes, strategic considerations are driving the renewed tempo of US Navy visits. Southeast Asia’s importance in the Indo-Pacific has grown amid increasing competition with China. Port Klang has hosted Chinese naval task groups, including during Beijing’s first bilateral military exercise with Malaysia in 2015. In May, the 45th Chinese Naval Escort Taskforce also stopped at Port Klang, Malaysia, for a four-day visit to rest and resupply.

By re-establishing a visible presence in Malaysia, the US Navy not only counters China’s influence but also rebuilds trust and reduces the lingering stigma of the GDMA scandal. The carriers’ return to Port Klang signals a commitment to fostering stronger ties with Malaysia and ensuring a stable, collaborative regional presence.

https://www.eurasiantimes.com/2nd-u-s-aircraft-carrier-thunders-in-chinas/

Press Information Bureau
Government of India

Ministry of Science & Technology

Tue, 31 Dec 2024

ISRO's SPADEX Mission: A Giant Leap for India in Space Technology by placing India among global leaders in Space Docking Technology", Says Union Minister Dr. Jitendra Singh

"India to lead in 'Space-Biology' under the leadership of Prime Minister Modi" says Dr. Jitendra Singh

Space economy to grow nearly 5 times in the next decade from $ 8.4 billion to around $44 billion- MoS Space Dr. Singh

ISRO's Space Docking Experiment (SPADEX) marks a groundbreaking achievement, placing India on par with global leaders in space docking technology. Union Minister Dr. Jitendra Singh hailed the mission as a milestone while addressing the media today in New Delhi following the successful launch of PSLV-C60 from Sriharikota on December 30.

Dr Jitendra Singh said, the SPADEX mission is a pivotal project by ISRO aimed at developing and demonstrating technologies for spacecraft rendezvous, docking, and undocking using two small satellites. These capabilities are critical for future missions, including satellite servicing, space station operations, and interplanetary exploration, he said.

The primary objectives of SPADEX, said the Minister, include Demonstrating technology for spacecraft rendezvous and docking, Showcasing controllability in docked conditions to extend the life of target spacecraft and Testing power transfer between docked satellites. The mission also includes post-docking activities, with spacecraft conducting independent payload operations. According to Dr. Jitendra Singh the docking is expected to occur on January 7, 2025, at noon.

Dr. Jitendra Singh highlighted a significant collaboration between the Department of Biotechnology and ISRO to explore the application of biology in Space.

"Under PM Narendra Modi's leadership, India will lead in 'Space-Biology' by studying physiological changes in space environments," he stated. Reflecting on the transformation of India's space journey, Dr. Jitendra Singh credited Prime Minister Modi for liberating the sector from a "veil of secrecy" that limited resources and innovation for decades. He noted the pivotal

role of the 2023 New Space Policy, which for the first time allowed private sector participation in ISRO's activities.

This policy has led to a surge in space startups, growing from a single-digit count in 2021 to nearly 300 in 2023. Notable startups include AgniKul Cosmos, which established a private launchpad on ISRO premises, and Skyroot, which executed India's first private sub-orbital launch. "These startups are reinforcing ISRO's infrastructure and attracting global attention from companies like SpaceX," Dr. Singh remarked.

According to Dr. Singh, the space economy—valued at $8.4 billion in 2023—is projected to grow to $44 billion by 2033. Investments in the sector reached ₹1000 crore in 2023 alone, placing India as a frontline player globally.

Dr. Singh outlined an ambitious timeline:January 2025: NAVIC advancements and the launch of a US satellite for mobile communication in February 2025: Vyommitra, a female robot, will undertake astronaut-like tasks for the Gaganyaan mission.2026: First crewed Gaganyaan mission.2035: India's own space station, Bharat Antariksh.2047: First Indian astronaut to land on the moon. He also highlighted achievements in 2024, such as the Aditya L1 solar mission and the launch of satellites for international clients.

India's space sector has emerged as a significant foreign exchange earner. Of the €220 million earned through launching foreign satellites, €187 million—85% of the total—was generated in the last eight years. Countries benefiting from ISRO's services include the USA, France, Japan, and more. Dr. Jitendra Singh emphasized the diverse applications of space technologies in agriculture, defense, water resource management, smart cities, and infrastructure development. Initiatives like Mission Mausam for weather forecasting demonstrate the impact of India's growing space capabilities.

Concluding the briefing, Dr. Jitendra Singh expressed optimism for India's space sector. "Under Prime Minister Narendra Modi's leadership, India's space and science capabilities are at their peak. The upcoming years will witness unparalleled achievements and contributions to global space exploration," he stated.

https://pib.gov.in/PressReleasePage.aspx?PRID=2089047

The Indian EXPRESS

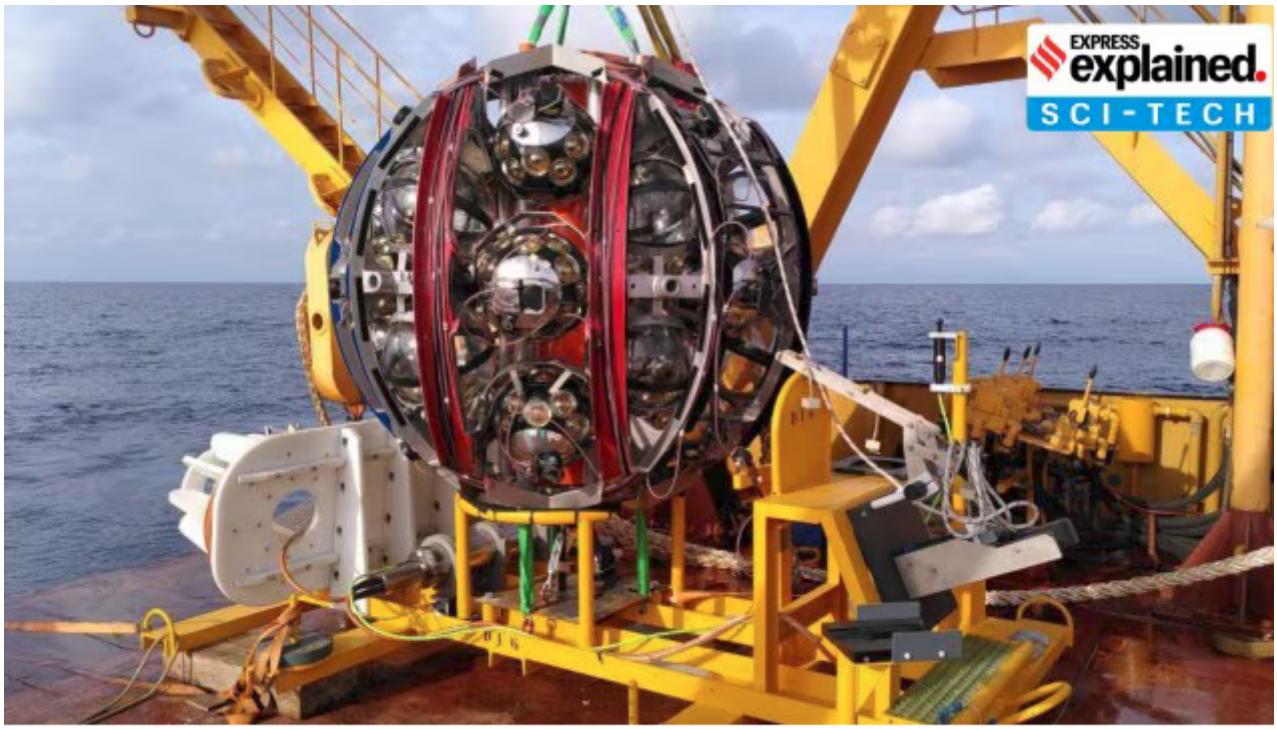
Tue, 31 Dec 2024

Why scientists are installing underwater telescopes to detect 'ghost particles'

Scientists are deploying two telescopes to detect high-energy neutrinos, also known as ghost particles, under the Mediterranean Sea. The two telescopes are part of the Cubic Kilometre Neutrino Telescope or KM3NeT. While one of the telescopes will study high-energy neutrinos from space, the other will examine neutrinos from the atmosphere.

These telescopes are much like the IceCube Neutrino Observatory, which can detect high-energy neutrinos from deep space but is under the frozen ice in the Antarctic rather than being in the water.

Here is a look at what neutrinos are, why scientists want to study high-energy neutrinos, and why the neutrino telescopes have been placed deep under the sea.



Equipment for the installation of the underwater neutrino telescope KM3NeT. (Photo: KM3NeT)

What are neutrinos?

Detected for the first time in 1959 — though their existence was predicted almost three decades earlier, in 1931 — neutrinos are tiny particles, very similar to electrons, but without any electric charge. They are one of the fundamental particles the universe is built of, and are the second most abundant subatomic particles after photons. Neutrinos are so numerous that about a billion of them pass through a cubic centimetre of space every second.

Why do scientists want to study high-energy neutrinos?

Although neutrinos are everywhere, not each one of them is important to study. Scientists are interested in examining super-fast, high-energy neutrinos that have come from far, far away. Such neutrinos are rare and mostly originate from exotic events such as supernovae, gamma-ray bursts or colliding stars.

Studying high-energy neutrinos can help astrophysicists investigate those space mechanisms and regions like the centre of our Milky Way Galaxy which are shrouded in dust. Dust absorbs and scatters the visible light from objects, making them difficult or impossible to observe with optical telescopes.

In a 2022 interview with Cosmos magazine, Elisa Resconi, an astrophysicist at the Technical University of Munich, Germany, said, “With neutrinos… we can study beyond any dense cloud or accretion disk.”

Not only this, high-energy neutrinos can also give clues about cosmic ray production or even dark matter.

“And of course, we could also discover something we cannot imagine today… We understand only a very small fraction of the universe.”

So why are scientists building underwater neutrino telescopes?

High-energy neutrinos, however, are not just rare but also extremely difficult to detect. One reason is that neutrinos barely interact with anything — despite billions of neutrinos around us, an average of only about one of them will interact with a person’s body during a lifetime.

Even the IceCube, which has been operational since 2011 and was the first telescope to detect high-energy neutrinos, has been able to only spot a handful of these messengers.

To detect high-energy neutrinos, there is a need for a large volume of optically transparent material in a place where it is extremely dark. “The location needs to be dark because the detectors look for flashes of Cherenkov radiation: light that neutrinos produce when they interact with a water or ice molecule,” according to a report by Cosmos magazine.

These flashes help scientists trace the path of that neutrino, giving them details about its source, the amount of energy it contains, and its origins.

Although both frozen ice and deep sea waters provide conducive conditions for detecting high-energy neutrinos, experts suggest that underwater neutrino telescopes could be more efficient than IceCube.

That is because water scatters light less, which gives a more accurate idea about where the detected neutrinos came from. The one disadvantage is that water absorbs light more and as a result, there will be less light to examine.

https://indianexpress.com/article/explained/explained-sci-tech/underwater-telescopes-neutrinos-9753438/

Hindustan Times

Tue, 31 Dec 2024

2024 set targets of building space station, starting fast breeder reactor, boosting research

India's hopes in the field of science took new wings this year with the government unveiling a space vision that seeks to establish a space station by 2035 and land an Indian on the moon by 2047 even as efforts to crack the code of quantum technologies got a boost.

The government also operationalised the National Research Foundation that seeks to make available ₹50,000 crore to encourage research in poorly-funded colleges and state universities over the next five years.

The year also saw Indian scientists publish research papers based on the observations of the Chandrayaan-3 mission that landed near the south pole of the moon in 2023 and also click photographs of hydro-thermal vents, which are a rich resource of minerals, at the bottom of the Indian Ocean.

An Indian astronaut will also fly to the International Space Station as part of the Axiom-4 mission as per an agreement between ISRO and NASA.

India's astronaut-designate Group Captain Shubhanshu Shukla is undergoing training in the US for the mission expected between March and June next year.

In the new year, ISRO will also carry out Space Docking Experiment , demonstrating docking of two orbiting spacecraft which is key for future missions such as Chandrayaan-4 and building of the Indian Space Station.

The first uncrewed mission of the Gaganyaan human spaceflight is also expected early next year. India aims to send its astronauts on a short space flight sometime in 2026.

The Anusandhan National Research Foundation was formally established in February to bridge the gap between research and funds in state universities and colleges that are home to 95 per cent of students.

The governing board of the Foundation, chaired by Prime Minister Narendra Modi, has approved an initiative to accelerate research in key strategic and emerging areas under the Mission for Advancement in High Impact Areas . Two priority areas for immediate support under the MAHA programme are electric vehicle technology and advanced materials.

It will also implement the Prime Minister's Early Career Research Grant program to assist young researchers to start their research career in an S&T institution.

India was also on the threshold of starting the second stage of its three-stage nuclear power programme with the Atomic Energy Regulatory Board granting approval to operationalise the 500 MWe Prototype Fast Breeder Reactor at Kalpakkam in Tamil Nadu.

"The PFBR is likely to achieve criticality in 2025," a senior official said, adding that the technology was complex and India would be the only country to operate such a type of atomic reactor.

The PFBR will use plutonium as a nuclear fuel and paves the way for the future use of thorium, a resource which is in abundance in India. Experts believe that mastering the technology to use thorium could secure India's energy future.

Fast breeder reactors "breed" more fissile material than the fuel they consume.

The Department of Atomic Energy also announced a significant discovery of new deposits in India's oldest Uranium Mine at Jaduguda. The discovery, made in and around the existing mine lease area, will increase the life of an otherwise depleting mine by more than 50 years.

The year also saw the unveiling of the Rashtriya Vigyan Puraskar for excellence in the fields of science and technology on the lines of the Padma Awards. The new awards were instituted after scrapping a number of awards given by various science departments as part of the exercise to rationalize such honours.

In its inaugural year, the Rashtriya Vigyan Puraskar was awarded to 33 distinguished scientists in four categories - Vigyan Ratna, Vigyan Shri, Vigyan Yuva, and Vigyan Team.

The government also unveiled the BioE3 Policy with the aim of transforming existing industrial and manufacturing processes across various sectors to make them more sustainable and environment-friendly, and less wasteful.

The policy seeks to harness the power of biotechnology, and develop new manufacturing methods that replicate, or mimic, processes found in natural biological systems.

After announcing the National Quantum Mission in 2023, four thematic hubs, each dealing with specific research areas, were established for Quantum Computing at IISc. Bengaluru, Quantum Communication at IIT Madras in association with C-DOT, New Delhi, Quantum Sensing & Metrology at IIT Bombay; and Quantum Materials & Devices at IIT Delhi.

The aim of the National Quantum Mission is to develop a quantum computer with a computation of 20-50 qubits in the next three years, 50-100 qubits in the next five years and 50-1000 qubits in the next 10 years.

Come January 1, about 1.8 crore students from state-funded higher education institutions, including universities and IITs, will have access to research papers published in top journals across the world.

Under the 'One Nation, One Subscription' initiative of the government more than 13,400 international journals covering science, technology, engineering, medicine, mathematics, management, social sciences and humanities would be made available to researchers.

As many as 451 state public universities, 4,864 colleges and 172 institutes of national importance will be among the 6,380 higher education and research institutes that will have access to top journals published by 30 publishers, including Elsevier, Springer Nature, and Wiley.

Earlier in December, ocean scientists from the National Centre for Polar and Ocean Research and National Institute of Ocean Technology have captured the image of an active hydrothermal vent located 4,500 m below the surface of the Indian Ocean.

The team of scientists launched an automatic underwater vehicle from research vessel Sagar Nidhi and captured historic photographs of hydrothermal vents.

The deposits from hydrothermal venting are generally rich in copper, zinc, gold, silver, platinum, iron, cobalt, nickel and other economically-beneficial minerals and metals.

https://www.hindustantimes.com/science/2024-set-targets-of-building-space-station-starting-fast-breeder-reactor-boosting-research-101735645677091.html

THE ECONOMIC TIMES

Tue, 31 Dec 2024

2024 science review: The 10 most intriguing breakthroughs of the year

It was a bad year for good news, but only because the tumult and drama surrounding the 2024 US election and ongoing wars overshadowed some of the discoveries made in the world's observatories, field studies and laboratories. Some of those findings could make us healthier, while others expand the outer limits of our knowledge of the universe.

Moon rocks from Terra Incognita

There's something mysterious about the side of the moon that always faces away from us. Flyby missions show a very different, lighter surface with fewer craters and a thicker crust than the familiar face. China landed the first craft on the moon's far side in 2019, and then in 2024, a Chinese craft, Chang'e-6, drilled beneath the surface and sent back two kilograms of rock and dirt.

Those samples could help scientists reconstruct how our own planet formed. And China's enterprising program is fueling a new space race with the US.

NASA's long-planned US crewed landing was recently pushed back to 2027. China plans to land a crewed mission in 2030.

A drug that prevents HIV

After nearly 40 years of failed attempts to develop a vaccine against HIV/AIDS, scientists found a drug that blocks infection if injected just twice a year. A clinical trial in South Africa and Uganda that wrapped up in 2024 showed 100% efficacy among 2,134 women and girls.

In the control group, girls and young women were given existing prevention drugs, also known as PrEP, which need to be taken as a daily pill. While PrEP has nearly eliminated new cases of HIV in San Francisco, stigma in Africa makes it hard for women to take the drug regularly. Science named the new twice-yearly drug, lenacapavir, the 2024 Breakthrough of the Year.

The new drug, made by Gilead, doesn't work the way a vaccine would. But scientists aren't giving up on a vaccine, which likely would cost less and might protect people permanently. The Gilead drug is likely to be approved in mid-2025, though it's unclear whether it will be affordable and accessible to those who need it.

AI delves into the human psyche

AI is shaking up every field of science, but social scientists have used it to gain particularly distinct new insights. They use large language models to study the way humans think and explore ways we might think smarter.

In a study published in September, psychologists surprised themselves when they trained an AI chatbot to persuade conspiracy theorists to consider that they might be wrong. It worked. People

let go of their beliefs in nefarious plots to cover up alien landings or curb population growth with biological weapons.

Conspiracy theorists often gather mountains of dubious evidence to support their beliefs, wearing out humans who don't have the time or energy to keep up. Chatbots can more than match them for the quantity of evidence.

Another study published this year found doctors often stuck with wrong diagnoses even after an AI suggested the correct answer. When pitted in a diagnosis contest against ChatGpt-4, the AI correctly diagnosed 90% of conditions taken from case reports, while the doctors got 74% correct. When doctors were allowed to confer with the AI, they were accurate only 76% of the time. They were too sure of their first intuitions.

The doctors' failure to fully benefit from AI shows that there is room for improvement in how they are trained to use it and how AI can be trained to help them.

According to another study, AI was not very good at helping people fact-check the news. ChatGPT-4 sometimes increased people's belief in fake headlines when they were unsure and made them disbelieve actual headlines when it made an error. AI seems to do best when it stimulates us to think differently, not when we rely on it to think for us.

Craft sets off for distant ocean world

On Oct. 14, the $5 billion spaceship Europa Clipper lofted far above budget cutters' reach and embarked on a journey to the most promising abode of extraterrestrial life in our solar system.

Europa, a moon orbiting Jupiter, doesn't look like a nice place on the surface, with a thick crust of ice and temperatures that never get above -120C. But previous flyby missions revealed signs of a vast ocean sloshing beneath the surface and occasionally bursting through.

Scientists estimate that Europa carries about twice as much water as all Earth's oceans combined, warmed by friction generated by Jupiter's monster tidal force. Astrobiologists consider liquid water the key ingredient for life — at least life of the kind earthlings could recognize.

When it arrives in 2030, the craft will make dozens of flybys over the surface, using its instruments to sniff for molecules that could serve as nutrients and map out the ice and ocean beneath. If the results are promising, a lander could follow.

The James Webb telescope recalculates universal expansion

New aspects of our distant universe came into view this year thanks to the James Webb Telescope, also known as JWST. Trained on distant galaxies, it showed stars "popping out" where the Hubble showed faint smudges, said astronomer Wendy Freedman of the University of Chicago. That's allowed her to recalculate the rate at which the universe is expanding.

This is all part of a bigger quest to figure out why the universe is expanding and where we're all headed — a dramatic collapse or dissipation into oblivion. Scientists are also looking back to the period known as "cosmic dawn" when the universe was 1% of its current age and all the galaxies and stars within them first took shape from primordial gases. So when they announced they'd captured the most distant galaxy ever seen — it was also the deepest in time, appearing as it was

more than 13 billion years ago.Scientists thought they had nailed the expansion rate in 2001 using observations from the Hubble Space Telescope. However, it didn’t match the measurements made using leftover radiation from the Big Bang, known as the cosmic microwave background.

Freedman says the new measurements her group did with JWST square with this radiation's behavior. She was recognized for this work as one of Nature’s top 10 scientists of the year.

Others, also using JWST, measure a faster expansion and argue that the incompatibility with other measurements is the universe trying to show us there’s some new physical phenomenon at play. As for our fate, we may yet end in a crunch or expand forever — it’s still unknown.

Aging spurts at 44 and 60

In an ambitious project aimed at fighting the ravages of aging, geneticist Michael Snyder and colleagues took blood and other biological samples from 108 volunteers. They monitored invisible age-related changes in a combination of microbes and molecules totaling 135,239.

That revealed a surprising pattern — sudden molecular-scale shifts when people turn 44 and again at 60. The changes indicated a loss of muscle mass, worse heart health, and a lessening ability to metabolize fats, alcohol and caffeine. At around 60, more changes indicated degeneration of the immune system.

At first, researchers thought that the shifts at 44 were associated with perimenopause in the women. However, the data showed the same thing happening in men, meaning either that this aging spurt happens independently from menopause or that male menopause is real.

Snyder said these changes could be the targets of interventions designed to help people stay healthy longer and eventually lead to ways to extend the human lifespan.

Reconstructing climate in deep time

A new reconstruction of Earth’s climate shows it fluctuated wildly over the eons. Scientists shocked the world in the 1990s with a graph of the last thousand years, using natural records to reveal temperatures shooting upward in the 20th century. This one goes back 485 million years — before dinosaurs, before forests, before fish started dragging themselves up primitive banks.

It shows that over the last 485 million years, the climate fluctuated between “hothouse” periods when the global temperature can be 30F hotter than it is now, and unstable “icehouse” periods when the temperature seesaws between ice ages and more temperate phases like recent history.

Sometimes, living things adapted to the hottest spells, with hippos and tropical palms slowly migrating to the Arctic. When change was sudden, the fossil record shows 80% to 90% of species went extinct, though life has never been extinguished completely. The researchers who made the plot say it has been a useful test of our climate models — they match these measurements-based approximations going back in time. So more steep warming is coming. The good news is that Earth will likely be a living planet for millions of years.

The health scare of the year: plastic in your brain

I've already made some effort to cut back on plastic, but the turn of a new year could give me more motivation. I don’t like plastic, but I like the convenience of food and drinks in plastic packaging.

It’s also not something most of us can give up entirely — the stuff is everywhere, seeping into tap water, meat, poultry and seafood.This year, several unnerving studies showed that plastic particles are building up in our organs. In mice, microplastic impairs male fertility, learning and memory.

We don’t know exactly what these particles do in us, but it can’t be good.One study found plastic in plaque that builds up in arteries, and more plastic was associated with a higher risk of stroke or heart attack. A review article associated plastic with oxidative stress, which is tied to aging.But what really put the fear in me was a preprint released last summer of a study showing that microplastic is probably accumulating in our brains.

Researchers looked for plastic during autopsies from 91 people and found their brains had stored up to 20 times as much microplastic as other organs. Those who had died from Alzheimer’s were carrying more plastic in their brains than those who were healthy but died from accidents or violence.

A study published in January showed that a typical bottle of water carries about 240,000 invisible particles of plastic, so cutting back on drinks in plastic bottles could be a starting point for a resolution.

Best occupations for fighting death and dementia

Two studies released this year provided some tantalizing hints about who is most likely to postpone mental decline and fend off the Grim Reaper. One, released in the British Medical Journal’s Christmas issue, used CDC statistics to show that ambulance and taxi drivers were less likely than those in other professions to die from Alzheimer’s disease. In another study released last summer, researchers compared male professional athletes and found pole vaulters and gymnasts lived longest, and volleyball players were surprisingly short-lived.

The lead author of the sports study told me that there might be something beneficial in the training regimens of pole vaulters and gymnasts and that many of the athletes with lower life expectancies did sports that put them at risk of injuries, especially blows to the head.

The taxi study excited scientists because it called to mind a fascinating finding from 2000. Compared to the general public, London taxi drivers had a more developed hippocampus — the part of the brain associated with memory and navigational skills. That was, of course, back when they didn’t use GPS.

Before considering taking up taxi driving or pole vaulting as part of a New Year’s resolution, scientists warn that both studies are preliminary. But studies like these can help set scientists in new directions.

A big step toward quantum computing

Until this year, quantum computing was one of those dream technologies that remained forever a decade away from doing anything useful. Now, things are happening faster than expected. Several groups have solved one of the major hurdles — an error problem. The units of information storage — called qubits — were error-prone in a way that stringing them together only multiplied the error rate.

If the latest round of optimistic predictions pans out, quantum computers could digest the real world's complexity to make otherwise impossible predictions — how experimental drugs would work in the human body, for example, or how some new type of material would handle stress. While ordinary computers store information in bits, which can take the values 0 or 1, a qubit can take any value in between. Qubits can consist of supercooled matter or atoms that are confined with lasers.

Last summer, Microsoft and the startup Quantinuum and Google announced they were making progress. They were able to string together qubits that decreased rather than increased the error rate.

Google extended the error correction yet further, connecting 105 qubits in a chip called Willow, which was announced in the journal Nature this month. The big sales line was that Willow could take five minutes to do a test problem that supercomputers couldn't do in 10 septillion years, or the universe's age squared.

The test problem wasn't anything useful, and the experts say real-world problems are more complex. But it should start to happen in less than a septillion years, maybe by 2030, if some new issue doesn't keep it perpetually five years away.

https://economictimes.indiatimes.com/news/science/2024-science-review-the-10-most-intriguing-breakthroughs-of-the-year/articleshow/116819125.cms

THE HINDU

Tue, 31 Dec 2024

Machine learning can help blood tests have a separate 'normal' for each patient

If you've ever had a doctor order a blood test for you, chances are that they ran a complete blood count, or CBC. One of the most common blood tests in the world, CBC tests are run billions of times each year to diagnose conditions and monitor patients' health.

But despite the test's ubiquity, the way clinicians interpret and use it in the clinic is often less precise than ideal. Currently, blood test readings are based on one-size-fits-all reference intervals that don't account for individual differences.

I am a mathematician at the University of Washington School of Medicine, and my team studies ways to use computational tools to improve clinical blood testing. To develop better ways to capture individual patient definitions of "normal" lab values, my colleagues and I in the Higgins Lab at Harvard Medical School examined 20 years of blood count tests from tens of thousands of patients from both the East and West coasts.

In our newly published research, we used machine learning to identify healthy blood count ranges for individual patients and predict their risk of future disease.

Clinical tests and complete blood countsMany people commonly think of clinical tests as purely diagnostic. For example, a COVID-19 or a pregnancy test comes back as either positive or negative, telling you whether you have a particular condition. However, most tests don't work this way. Instead, they measure a biological trait that your body continuously regulates up and down to stay within certain bounds.

Your complete blood count is also a continuum. The CBC test creates a detailed profile of your blood cells – such as how many red blood cells, platelets and white blood cells are in your blood. These markers are used every day in nearly all areas of medicine.

For example, hemoglobin is an iron-containing protein that allows your red blood cells to carry oxygen. If your hemoglobin levels are low, it might mean you are iron deficient.

Endocrine glands: the body's tiny titans

Platelets are cells that help form blood clots and stop bleeding. If your platelet count is low, it may mean you have some internal bleeding and your body is using platelets to help form blood clots to plug the wound.

White blood cells are part of your immune system. If your white cell count is high, it might mean you have an infection and your body is producing more of these cells to fight it off.

Normal ranges and reference intervalsBut this all raises the question: What actually counts as too high or too low on a blood test?

Traditionally, clinicians determine what are called reference intervals by measuring a blood test in a range of healthy people. They usually take the middle 95% of these healthy values and call that "normal," with anything above or below being too low or high. These normal ranges are used nearly everywhere in medicine.

But reference intervals face a big challenge: What's normal for you may not be normal for someone else.

Nearly all blood count markers are heritable, meaning your genetics and environment determine much of what the healthy value for each marker would be for you.At the population level, for example, a normal platelet count is approximately between 150 and 400 billion cells per liter of blood. But your body may want to maintain a platelet count of 200 – a value called your set point. This means your normal range might only be 150 to 250.

Differences between a patient's true normal range and the population-based reference interval can create problems for doctors. They may be less likely to diagnose a disease if your set point is far from a cutoff. Conversely, they may run unnecessary tests if your set point is too close to a cutoff.

Defining what's normal for you

Luckily, many patients get blood counts each year as part of routine checkups. Using machine learning models, my team and I were able to estimate blood count set points for over 50,000 patients based on their history of visits to the clinic. This allowed us to study how the body regulates these set points and to test whether we can build better ways of personalizing lab test readings.

Over multiple decades, we found that individual normal ranges were about three times smaller than at the population level. For example, while the “normal” range for the white blood cell count is around 4.0 to 11.0 billion cells per liter of blood, we found that most people’s individual ranges were much narrower, more like 4.5 to 7, or 7.5 to 10.

When we used these set points to interpret new test results, they helped improve diagnosis of diseases such as iron deficiency, chronic kidney disease and hypothyroidism. We could note when someone’s result was outside their smaller personal range, potentially indicating an issue, even if the result was within the normal range for the population overall.

The set points themselves were strong indicators for future risk of developing a disease. For example, patients with high white blood cell set points were more likely to develop Type 2 diabetes in the future. They were also nearly twice as likely to die of any cause compared with similar patients with low white cell counts. Other blood count markers were also strong predictors of future disease and mortality risk.

In the future, doctors could potentially use set points to improve disease screening and how they interpret new test results. This is an exciting avenue for personalized medicine: to use your own medical history to define what exactly healthy means for you.

https://www.thehindu.com/sci-tech/science/machine-learning-can-help-blood-tests-have-a-separate-normal-for-each-patient/article69046064.ece

THE HINDU

Wed, 01 Jan 2025

Young Scientist Award for CIFT scientist

Aniesrani Delfiya, a scientist at ICAR-Central Institute of Fisheries Technology (CIFT), has been honoured with the prestigious Young Scientist Award by the National Academy of Agricultural Sciences for 2025. Ms. Delfiya was chosen for the award for her contributions to Agricultural Engineering and Technology, said a communication. The award, which includes a citation, will be presented during the annual general body meeting of the Academy at the NASC Complex, New Delhi, on June 5, 2025.

https://www.thehindu.com/news/cities/Kochi/young-scientist-award-for-cift-scientist/article69046834.ece

ThePrint

Tue, 31 Dec 2024

Indian humanoid robot Vyommitra set for 2025 launch, Gaganyaan human spaceflight likely by 2026

Gaganyaan, the Indian Space Research Organisation (ISRO)'s first human spaceflight mission, is now likely to take flight only by 2026. Before the final mission, however, the Indian space agency will undertake an uncrewed mission with a humanoid robot, tentatively around the first half of 2025.

Union Minister for Science and Technology Jitendra Singh said at a press conference here Tuesday that a launch date for the crewed Gaganyaan mission is yet to be finalised. Considering the current preparations, the launch is likely only by the end of 2025 or early 2026, he said. "We are trying for late 2025, but there is a good chance that it might happen only by early 2026," Singh said. Singh said that the delays are also because ISRO is ensuring "utmost safety of astronauts".

Gaganyaan, which has already faced multiple delays, will be India's first human spaceflight mission. It aims to demonstrate ISRO's human spaceflight capability by launching a crew of three members to a 400-km low-Earth orbit for a three-day mission and bringing them back safely. If India succeeds in sending humans to space from the nation's own soil, it will become the fourth country in the world to have achieved this feat after the erstwhile Soviet Union, the United States and China.

Preparations in full swing

Senior scientists from ISRO told ThePrint that the space agency has made significant progress towards launching the uncrewed Gaganyaan mission. At least one such test flight will be undertaken before the three Indian astronauts take off.

Four elite fighter pilots from the Indian Air Force are currently being trained in various facilities. Earlier this year, Prime Minister Narendra Modi had introduced the astronaut designates, of whom three would be chosen for the final mission. The test flights will ensure the safe travel and return of astronauts.

"We have started the assembly for the human-rated LVM-3 (Launch Vehicle Mark-3)—the launch vehicle for the mission—at Satish Dhawan Space Centre for the uncrewed spaceflight," a senior ISRO official, who wished not to be named, told ThePrint. On 18 December, ISRO conducted a key recovery test with the Indian Coast Guard, in which the crew module was recovered from the turbulent seas of the Bay of Bengal.

An LVM3-X rocket lifted a model of the crew module, weighing around 3775 kilograms, to a suborbital altitude of 126 kilometres. The module was then controlled using thrusters to orient it, in order to ensure a safe re-entry. "The crew module descended using parachutes to have a smooth splashdown at the designated location," an ISRO document read.

Humanoid in space

Singh said that around March 2025, a humanoid robot named Vyommitra will be sent to space to test all contingencies before humans are sent for the mission. Vyommitra, designed as India's first female humanoid astronaut, will have its skull weighing 800 grams, measuring around 200mmx220mm, and is made of high-strength aluminium alloy. This material was chosen to withstand high pressure and vibrations in space. The robot will mimic every aspect of a human body and its responses to space travel.

https://theprint.in/science/indian-humanoid-robot-vyommitra-set-for-2025-launch-gaganyaan-human-spaceflight-likely-by-2026/2426009/

Tue, 31 Dec 2024

Thorium film can replace crystals in atomic clocks

Earlier in the year, scientists successfully raised the energy state of the nucleus of an atom by exciting it with a laser. Scientists had been attempting and failing the feat for 50 years, and people did not know if it was possible at all. The advancement paved the way for the development of more precise atomic clocks, that could measure time and gravity at granular levels that were previously not possible. The method used thorium-229-doped crystals, that are both scarce and radioactive. Now, the researchers have demonstrated the same feat using thorium film instead of crystals

The film is made from a precursor of thorium-229 that uses less thorium, allowing for smaller, less expensive, and more portable atomic clocks. The thorium-229 film is about as radioactive as a banana, and the scientists were able to demonstrate the same excitation of the atomic nucleus using a laser. Production of the thorium film can easily be scaled up to produce not just nuclear clocks, but also for a wide range of other quantum optics applications. A paper describing the findings has been published in *Nature*.

A unique material

Coauthor of the paper, Anastassia Alexandrova says, "A key advantage to using a parent material — thorium fluoride — is that all the thorium nuclei are in the same local atomic environments and experience the same electric field at the nuclei. This makes all thorium exhibit the same excitation energies, making for a stable and more accurate clock. In this way, the material is unique." Such atomic clocks could allow for extremely sensitive measurements of the nucleus of the atom, allowing for scientists to probe the underlying physical processes ongoing at the smallest scales of the universe. Such capabilities would potentially allow scientists to rewrite the fundamental laws of physics itself, by probing matter and energy at more fundamental levels.

https://www.news9live.com/science/thorium-film-can-replace-crystals-in-atomic-clocks-2786256

Tue, 31 Dec 2024

IIT Bombay researchers develop affordable tinnitus management device

According to data published in the Journal of the American Medical Association Neurology 2022, over 740 million adults around the world suffer from tinnitus globally, and is considered a major problem among over 120 million people. Tinnitus adversely impacts sleep cycles, and induces depression and anxiety with a negative impact on overall mental health. It also causes people to be more irritable and even impacts their social lives. Tinnitus has a negative influence on the quality of life. Researchers from IIT Bombay, along with M. Tech students and medical experts from Hinduja hospital have worked together on the design, development and clinical evaluation of a device for diagnosing and managing tinnitus.

The team has developed an affordable device for diagnosing and managing tinnitus, or a phantom sounds that are heard without any external stimulus or physical audio source. The device is accompanied by a mobile app for customising the management of the tinnitus. The device and the software together offer a comprehensive approach for precise tinnitus matching with a custom multimodal tinnitus management approach. The solution can also track the progress of tinnitus. The objective of the mission is to equip clinicians with the tools necessary for diagnosing tinnitus, and to provide patients with a custom solution that works for them.

Towards a commercial product

The researchers have demonstrated the capabilities of the system in a clinical evaluation, where the symptoms of the enrolled subjects improved towards the end of the trial. At the clinic level, the tool is IoT and IoMT enabled. The technology is also indigenous and affordable, and has been transferred to a startup that emerged from the project. The startup plans to expand the clinical trials, and work towards the regulatory approvals necessary for bringing a commercial product to the market. The device, the software and the results of the clinical trials were published in the International Journal of Clinical Skills.

https://www.news9live.com/science/iit-bombay-researchers-develop-affordable-tinnitus-management-device-2786309