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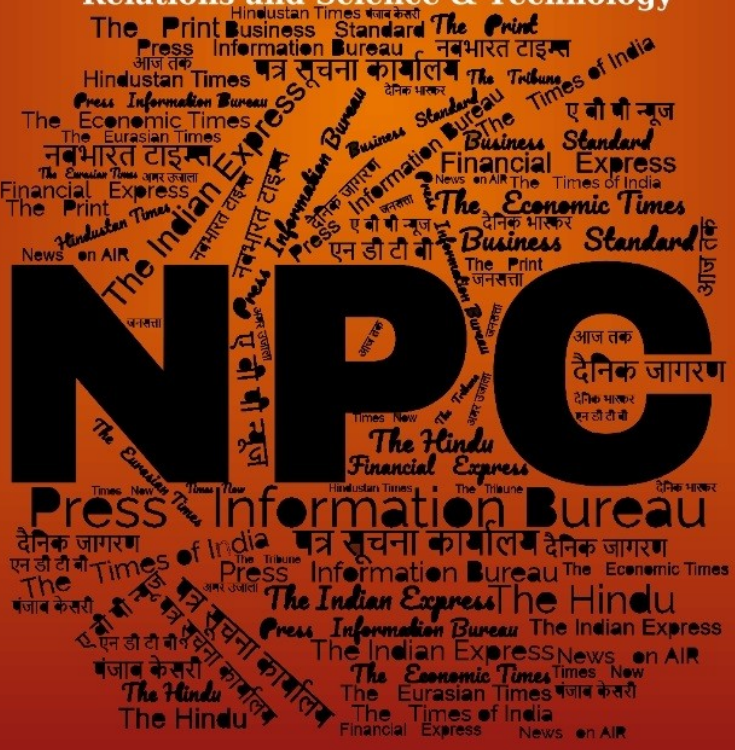
समाचार पत्रों से चयनित अंश
Newspapers Clippings

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

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



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DRDO News

पत्र सूचना कार्यालय
भारत सरकार

Fri, 03 Jan 2025

DRDO's 67th Foundation Day: Raksha Mantri meets senior scientists & officials in New Delhi

Lauds them for developing India's indigenous capabilities & strengthening the defence sector

Shri Rajnath Singh calls upon DRDO to continue moving ahead in sync with rapidly-evolving technological ecosystem & keep coming out with niche products

Raksha Mantri Shri Rajnath Singh, on January 02, 2025, visited DRDO Headquarters in New Delhi, and interacted with senior scientists & officials to mark the 67th Foundation Day of the organisation. Raksha Rajya Mantri Shri Sanjay Seth also attended the meeting. In his address, Shri Rajnath Singh commended DRDO for developing the indigenous capabilities of the country by equipping the Armed Forces with state-of-the-art technologies/equipment, and bolstering the defence sector through collaboration with the private sector.

On 2025 being declared as the 'Year of Reforms', Raksha Mantri asserted that DRDO will play a crucial role in achieving the set objectives. He called upon DRDO to continue moving ahead in sync with the rapidly-evolving technological ecosystem, and keep coming out with products that are relevant to the changing times. He urged the scientists to keep an eye on the products & processes being adopted by the technologically-advanced countries, and develop niche technologies with the aim to make DRDO one of the strongest R&D organisations in the world. He also expressed his view that each lab of DRDO should identify 2-3 critical projects, which should be completed by 2025. "By the next foundation year, we should have 100 such projects completed," he said.

Shri Rajnath Singh appreciated the efforts of DRDO towards increasing the collaboration with the private sector, including providing its technologies and free access to its patents. He urged the organisation to identify more such areas, which can enhance the participation of the private sector, emphasising that a nation can only progress when all stakeholders work together.

Raksha Mantri called upon DRDO to explore the possibility of including start-ups in its R&D efforts. This would promote valuable exchange of ideas and provide an opportunity for the Indian defence sector to come out with innovative technologies according to the changing times. He expressed that each lab should organise two open days every month for interaction with the

industry. He also suggested that laboratories can raise awareness about the works being carried out by DRDO and motivate the youth to contribute to nation building.

“DRDO can play the role of a catalyst for other similar organisations, academia, industry, etc., which can help in bringing a technological revolution in the country. A new ecosystem can be created, which focusses on defence as well as dual-technology areas, that can bring about a transformative change for civilian users,” added Shri Rajnath Singh.

During the meeting, Secretary, Department of Defence R&D and Chairman DRDO Dr Samir V Kamat briefed Raksha Mantri about the ongoing R&D activities, achievements of DRDO in 2024, various initiatives of DRDO in promoting industry, start-ups & academia and the roadmap of DRDO for 2025. He said, so far 1,950 Transfer of Technologies (ToTs) on DRDO-developed systems have been handed over to Indian Industries, of which, 256 Licensing Agreements for ToTs were signed with Indian industries in 2024.

The DRDO Chairman added that more than 19 Development cum Production Partners/Production Agencies were chosen last year for Mission Mode projects. The DRDO test facilities have been opened to the industries for utilisation and over 18,000 tests have been carried out for private industries/DPSUs in the past three years with more than 5,000 tests in 2024 itself.

Shri Rajnath Singh also felicitated the design team of Long Range Hypersonic Anti Ship Missile on the occasion. DRDO celebrates its foundation day on 1st January every year.

https://pib.gov.in/PressReleasePage.aspx?PRID=2089584

Defence News

Defence Strategic: National/International

REPUBLICWORLD.COM

Fri, 03 Jan 2025

Indian Navy Set to Commission INS Nilgiri, Surat, and Vaghsheer Together in Landmark Event

A historic milestone in India's naval history will be achieved on 15 January 2025, when the Indian Navy commissions three frontline combatants—Nilgiri, the lead ship of the Project 17A stealth frigate class; Surat, the fourth and final ship of the Project 15B stealth destroyer class; and Vaghsheer, the sixth and final submarine of the Scorpene-class project—at Naval Dockyard, Mumbai. This landmark event underscores India's progress in indigenous shipbuilding and highlights the growing self-reliance of the nation in the defence sector.

The commissioning of these advanced warships and submarines marks a significant boost to India's naval capabilities, enhancing the country's maritime strength and combat potential. All three platforms were designed and constructed entirely at Mazagon Dock Shipbuilders Limited (MDL), Mumbai, reinforcing India's position as a global leader in defence manufacturing.

Nilgiri: The Lead Ship of Project 17A Stealth Frigates

The first among the three combatants to be commissioned, Nilgiri, is the lead ship of the Project 17A class, which represents a major leap in naval design and technology. Nilgiri is a modern, multi-role, guided missile frigate, which incorporates several stealth features and advanced technologies. The ship is equipped with cutting-edge systems, including an advanced radar suite and anti-missile systems, which significantly reduce its radar cross-section, making it less detectable by adversaries.

Nilgiri is an upgraded version of the Shivalik-class frigates and is designed to undertake a variety of roles including anti-surface, anti-air, and anti-submarine warfare. This ship also boasts enhanced operational capabilities, with modern aviation facilities that can accommodate a variety of helicopters, including the Chetak, ALH, Sea King, and the newly inducted MH-60R helicopters. The Rail-Less Helicopter Traversing System and Visual Aid and Landing System ensure seamless operations during both day and night operations.

In alignment with the Navy's progressive steps toward gender inclusion, Nilgiri has also been equipped with specific accommodations for a sizable complement of women officers and sailors, supporting gender equality in frontline combat roles.

Surat: The Fourth and Final Project 15B Destroyer

The Surat, the fourth and final ship of the Project 15B class, is an advanced stealth destroyer that represents the culmination of years of design and engineering excellence. A follow-on to the Kolkata-class (Project 15A) destroyers, Surat has been built with substantial improvements in terms of design, firepower, sensors, and overall capabilities.

This multi-role destroyer is capable of operating in a wide range of maritime environments, with the ability to carry out offensive and defensive operations simultaneously. Like Nilgiri, Surat is equipped with the latest in radar and communication systems, advanced weapon systems, and high-performance sensors, making it a potent force on the seas.

With the ability to deploy various helicopters and support advanced naval operations, Surat enhances the Indian Navy's capabilities in areas such as anti-air, anti-submarine, and surface warfare. It also provides accommodation for women officers and sailors, making it a progressive step towards inclusivity in the Indian Navy's frontline combat units.

Vaghsheer: The Sixth and Final Scorpene-Class Submarine

The Vaghsheer, the final submarine of the Scorpene-class project, is set to be commissioned as part of the Navy's growing capabilities in undersea warfare. This submarine is among the quietest and most capable diesel-electric submarines in the world, designed for a variety of missions, including anti-surface warfare, anti-submarine warfare, intelligence gathering, and special operations.

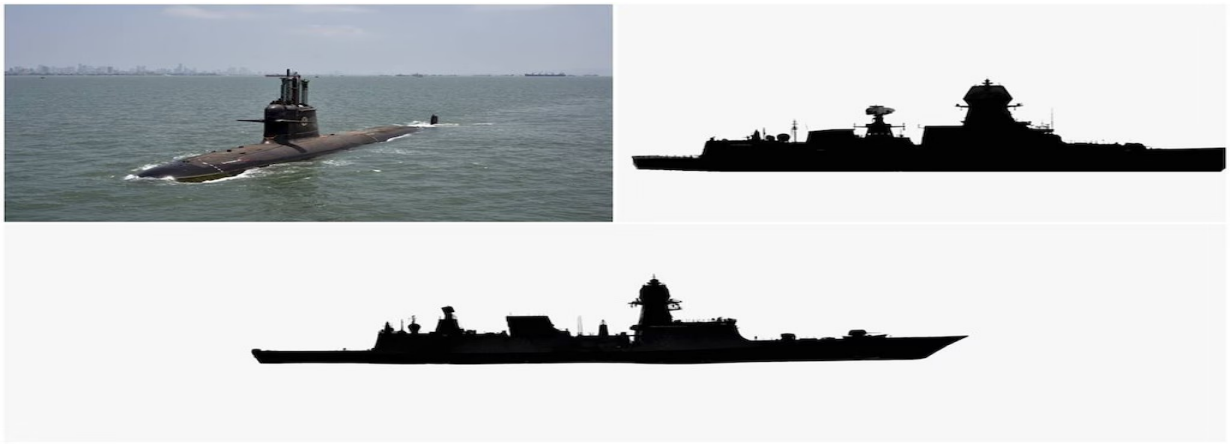
Vaghsheer is equipped with wire-guided torpedoes, anti-ship missiles, and advanced sonar systems, making it a versatile and formidable asset to the Navy. The submarine's modular construction also allows for future upgrades, such as the integration of Air Independent Propulsion (AIP) technology, further enhancing its stealth capabilities and operational range.

A Historic Day for India's Naval Self-Reliance

The commissioning of Nilgiri, Surat, and Vaghsheer is a testament to India’s rapid advancements in indigenous shipbuilding and defence manufacturing. These combatants have undergone rigorous sea trials, including machinery, hull, fire-fighting, and damage control assessments, to ensure their readiness for deployment.

This remarkable achievement underscores India’s growing self-reliance in defence production, which has been a key focus of the "Atmanirbhar Bharat" (Self-Reliant India) initiative. With the successful delivery of these ships and submarines, India not only enhances its maritime security but also positions itself as a major player in global defence manufacturing.

The combined commissioning of these three state-of-the-art platforms will significantly enhance the Indian Navy’s combat capabilities, ensuring greater protection of India’s maritime interests and reinforcing the nation’s strategic role in the Indo-Pacific region.



The platforms include Nilgiri, the lead ship of the Project 17A stealth frigates; Surat, the final ship of the Project 15B stealth destroyers; and Vagsheer, the last submarine of the Scorpene-class under Project 75. (Photo credit: Indian Navy)

A Proud Moment for the Indian Navy

The commissioning of Nilgiri, Surat, and Vaghsheer on 15 January 2025 is a historic moment for the Indian Navy and the country at large. It marks a giant leap in India’s defence capabilities, fortifying the nation’s self-reliance in building advanced warships and submarines. This event also symbolizes India’s determination to modernize its military forces and further establish itself as a global leader in indigenous defence manufacturing. The Indian Navy’s successful commissioning of these combatants not only boosts the nation’s naval strength but also sets a new benchmark for future advancements in the country’s defence sector.

https://www.republicworld.com/defence/indian-armed-forces/indian-navy-set-to-commission-nilgiri-surat-and-vaghsheer-together-in-landmark-event

Business Standard

Fri, 03 Jan 2025

RFI issued for manufacturing 23-mm anti-drone ammunition to boost defence

The Defence ministry has issued a Request for Information (RFI) for the manufacturing of 23-mm anti-drone ammunition by the Indian industry, which is intended to be used with an existing weapon system for boosting the Army's air defence capabilities.This ammunition is intended to be used with the existing "Zu 23mm and Schilka Weapon System" for the destruction of drones.

The RFI, issued on January 1, also reads that there is a requirement of 23-mm anti-drone ammunition in order to "increase the hit probability"."The Ministry of Defence, Government of India, Request for Information (RFI) from interested companies/firms/vendors for undertaking manufacturing of 23mm Anti Drone Ammunition in lndia," it says

The purpose of this RFI is to identify the prospective vendor (DPSUs/private vendors) to undertake the manufacturing of 23-mm anti-drone ammunition under "Make in India", the document adds.All defence public sector undertakings (DPSUs) and private vendors are eligible to respond to the RFI and participate in the project, it said.In the RFI, the government has mentioned about this new requirement by the Army.

Recent conflicts have demonstrated effective employment of drones (to include Commercially Off the Shelf (COTS) Unmanned Aerial Systems (UAS) and UCAVs) and loitering munitions for suppression of enemy air defence and precision strike against ground-based Army Air Defence platform. "Drones specially COTS variety have low radars cross section (RCS), small size, higher survivability and comparatively lower costs and countering them with the current gun ammunition is a challenge and hence, there is a requirement of anti-drone ammunition which can be fired from existing Zu 23mm and Schilka Weapon System," it added.

Zu 23mm and Schilka Weapon System "currently in service with Army AD are high rate of fire anti-aircraft system", which are employed for providing point air defence to critical vulnerable areas and vulnerable points. These anti-aircraft guns use 23-mm Armour Piercing Incendiary Tracer (APIT) and High Explosive Incendiary Tracer (HEIT) ammunition, the document says.

The hit probability of both the ammunitions are low as the guns are manually controlled and the ammunition gets activated (causes damage/destruction) on impact i.e on direct hit. Thus, in order to increase the hit probability, there is a requirement of 23-mm Anti Drone Ammunition," it adds.

The Schilka system is an air defence system against attacking aircraft and helicopters.

According to the RFI, the 23-mm anti-drone ammunition proposed to be procured should have a "proximity/timed fuse capable of being initiated in proximity to drone/loitering ammunition".The fragments of the shell should be of adequate number, size, shape and spread in a pattern to cause damage or destruction to the target and the cartridge case should be "compatible with the existing Zu 23mm and Schilka Weapon System held with the Army Air Defence", it says.

https://www.business-standard.com/external-affairs-defence-security/news/rfi-issued-for-manufacturing-23-mm-anti-drone-ammunition-to-boost-defence-125010200765_1.html

INDIA TODAY

Fri, 03 Jan 2025

Army Day 2025 to be celebrated in Pune with focus on heritage, future roadmap

For the first time, Pune will host the Army Day on January 15, marking two years of shift from the traditional venue of Delhi. This move underscores the Army's commitment to connecting with regions steeped in military heritage and fostering greater public engagement across the country. Army Day 2023 and 2024 were celebrated in Bengaluru and Lucknow respectively, while Pune will be the third venue outside Delhi for Army Day.

WHY PUNE?

Pune, often referred to as the "Oxford of the East" and a hub of India's military history, is home to key institutions like the National Defence Academy (NDA) and the Southern Command Headquarters. The city has been integral to the evolution of India's armed forces, serving as a training ground for military leaders and a centre for innovation in defence strategies. Hosting Army Day here honours Pune's contributions and aims to inspire a new generation to join the armed forces.

The decision to celebrate Army Day outside Delhi aligns with a tradition started in recent years to decentralise national military events. It reflects the Army's intent to engage more directly with citizens across different states, fostering a deeper understanding of its role and initiatives.

KEY ATTRACTIONS OF ARMY DAY 2025

This year's Army Day celebrations will focus on three core themes: modernisation, inclusivity, and public engagement. The Army will highlight its advancements in technology and combat readiness as part of its 2025 modernisation roadmap. Exhibitions at the Southern Command Parade Ground will include displays of indigenous defence equipment like the Arjun Mk-1A tanks, K9 Vajra self-propelled howitzers, and cutting-edge drone systems developed under the Make in India initiative.

A key focus will be on the Army's efforts to integrate women into combat roles and leadership positions. This aligns with the roadmap's goal of achieving greater gender balance within the armed forces.

Special interactive sessions for students and civilians are planned, including live demonstrations of para-jumping, combat drills, and cultural performances by Army bands. These events aim to inspire young Indians to consider careers in the military.

The tradition of moving Army Day celebrations outside Delhi began in 2023, intending to showcase the Army's presence across the nation and honour local communities that have significantly contributed to the armed forces. Last year's event in Bengaluru spotlighted the Army's technological partnerships and outreach in the southern region. This year, Pune will shine a light on the Army's historical roots and future ambitions.

ARMY'S ROADMAP FOR 2025

The Indian Army Roadmap for 2025 emphasises a multifaceted approach to modernisation and operational readiness. Key points include:

- Technology-Driven Warfare: Embracing artificial intelligence, robotics, and cyber capabilities to prepare for future conflicts.
- Strengthening Border Preparedness: Enhancing infrastructure and surveillance capabilities in critical areas like Ladakh and the Northeast.
- Support for Veterans and Families: Expanding welfare schemes, with a focus on education and healthcare for soldiers' families.
- Boosting Indigenous Defence Production: Increasing collaboration with Indian startups and industries to achieve self-reliance in defence manufacturing.
- Expanding International Collaboration: Strengthening ties with partner nations through joint exercises and knowledge-sharing programs.

SIGNIFICANCE OF ARMY DAY

Army Day is celebrated every year on January 15 to commemorate the day in 1949 when Field Marshal KM Cariappa took over as the first Indian Commander-in-Chief of the Indian Army from General Francis Roy Bucher. The day honours the bravery, and sacrifices of soldiers, and reinforces the Army's commitment to safeguarding the nation.

This year, the celebrations in Pune not only pay tribute to the city's historic role in India's defence forces but also emphasize the Army's evolving vision for modernisation, inclusivity, and community engagement. As the Indian Army marches forward with its ambitious plans in the year, Army Day 2025 will serve as a platform to inspire, innovate, and honour the nation's defenders.

https://www.indiatoday.in/india/story/army-day-2025-to-be-celebrated-in-pune-with-focus-on-heritage-future-roadmap-2658997-2025-01-03

THE ECONOMIC TIMES

Fri, 03 Jan 2025

Indian Army to Modernize Air Defence with Indigenous 23 mm Anti-Drone Ammunition

The Indian Army has unveiled plans to develop 23 mm Anti-Drone Ammunition, a crucial step in modernizing India's air defence systems and enhancing the nation's capability to counter the growing threat posed by drones. This initiative forms a core part of the "Make in India" campaign, aimed at bolstering indigenous production and self-reliance in defence technology.

With the increasing use of drones in modern warfare, the Indian Army has identified the need for specialized ammunition designed to target aerial threats such as commercial unmanned aerial systems (UAS) and loitering munitions. The 23 mm Anti-Drone Ammunition is engineered with advanced features like proximity or airburst fuzes and pre-fragmented shells to improve the hit probability and effectiveness when engaging high manoeuvrability targets. The ammunition is compatible with the Zu-23 mm and Schilka Weapon Systems, which are already employed for air defence.

Indian Army's Air Defence Gunners with ZU-23 MM Anti Aircraft gun system. | Credit- ADGPI

Indigenous Production to meet Stringent Technical Specifications

As part of the "Make in India" initiative, the development of this ammunition will adhere to the government's focus on indigenous production. The ammunition will be manufactured under a model ensuring 50% indigenous content, in line with the Defense Acquisition Procedure (DAP) 2020. Production will involve collaborations with domestic industries as well as licensed agreements with foreign partners to facilitate technology transfer.

The 23 mm Anti-Drone Ammunition will need to meet stringent specifications. It will include features such as proximity fuzes that activate based on the target’s proximity, with a range of activation at distances of 1000 m, 1500 m, and 2500 m. The ammunition's pre-fragmented shell design ensures efficient destruction or disabling of drones by dispersing fragments effectively over a wide area.

The ammunition will undergo rigorous testing to ensure that it meets Indian defence standards, including JSS-55555 Revision 4. Components such as propellants, primers, and fuze mechanisms will require advanced production techniques and close attention to ensure consistency in performance.

Addressing Challenges and Mitigation Strategies

While the project is promising, it faces challenges such as precision manufacturing for components like fuzes and ensuring a steady supply of high-performance raw materials. Additionally, meeting the stringent Indian defence testing protocols will require ongoing collaboration with research institutions and foreign OEMs. These obstacles will be addressed by fostering partnerships with

international manufacturers, establishing indigenous production capabilities, and enhancing local research and development initiatives.

Focus on Countering Low Radar Cross-section Drones

Once operational, the 23 mm Anti-Drone Ammunition will provide India's air defence systems with enhanced capabilities to counter low radar cross-section drones and other aerial threats. This development not only strengthens India's defence posture but also reduces dependence on foreign defence imports. It aligns with the government's Atmanirbhar Bharat (Self-Reliant India) initiative and bolsters India's position as a leader in defence technology.

Additionally, the successful development and deployment of this ammunition will promote private sector involvement in advanced defence technologies, supporting long-term defence self-reliance and establishing India as a credible global exporter of defence products. Enhanced technological expertise, strategic partnerships, and robust quality controls will ensure the successful execution of this critical initiative, ultimately fortifying India's defence against emerging threats in the 21st century.

https://www.republicworld.com/defence/indian-armed-forces/indian-army-to-modernize-air-defence-with-indigenous-23-mm-anti-drone-ammunition

Science & Technology News

Press Information Bureau
Government of India

Ministry of Science & Technology

Fri, 03 Jan 2025

Nano-formulation of darkness hormone could be therapeutic solution for Parkinson's disease

Scientists have proved that nano-formulation of Melatonin, the hormone produced by the brain in response to darkness, showed improved antioxidative and neuroprotective properties and could be a potential therapeutic solution for Parkinson's disease (PD).

Parkinson's disease (PD) is one of the most common neurological disorders caused by the death of dopamine-secreting neurons in the brain due to aggregation of synuclein protein inside it. Available medications can only minimize the symptoms but cannot cure the disease and this underlines the need to develop better therapeutic solutions for the disease.

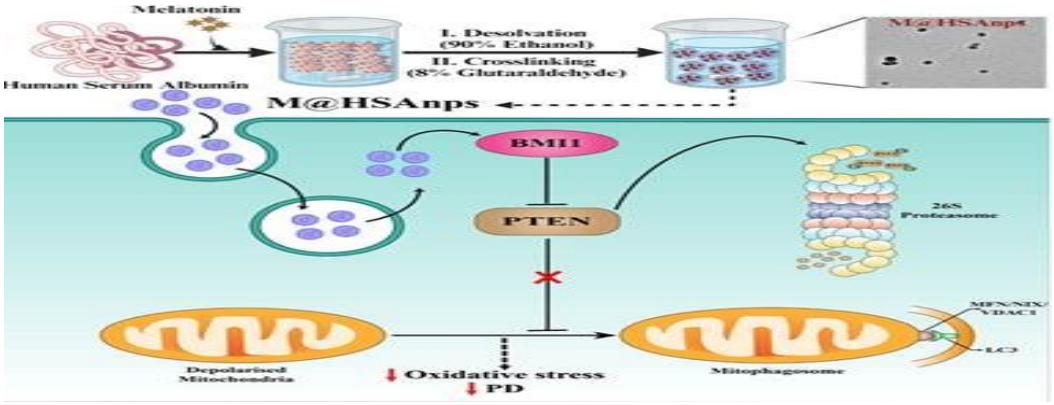
Studies over the last decade have shown the implications of PD-related genes in governing a quality control mechanism called "Mitophagy", which identifies and removes dysfunctional

mitochondria and reduces oxidative stress. Among many antioxidants, melatonin, a neurohormone secreted from the pineal gland, an endocrine gland present in the brain, that regulates the sleep-wake cycle and is used to treat insomnia could be a potential inducer of mitophagy to mitigate PD.

The molecular pathways melatonin follows as a PD antagonist, remain poorly elucidated, despite being a safe and a potential neurotherapeutic drug with a few limitations like less bioavailability, premature oxidation, brain delivery, etc.

A group of researchers from Institute of Nano Science and Technology (INST) Mohali, an autonomous institute of the Department of Science and Technology (DST) used human serum albumin nano-formulation to deliver the drug to the brain and studied the molecular mechanism behind melatonin-mediated oxidative stress regulation.

Using a biocompatible protein (HSA) nanocarrier for the delivery of melatonin to the brain, Dr. Surajit Karmakar and his team have proved that the nano-melatonin resulted in a sustained release of melatonin and improved bioavailability.



They found that the nano-melatonin demonstrated enhanced antioxidative and neuroprotective properties. It not only improved mitophagy to remove unhealthy mitochondria but also improved mitochondrial biogenesis to counteract a pesticide (rotenone) induced toxicity in an in vitro PD model.

The improvement is attributed to the sustained release of melatonin and targeted delivery to the brain resulting in increased therapeutic efficacy compared to bare melatonin.

The increased antioxidative effect is a result of mitophagy induction through the upregulation of a crucial epigenetic regulator called BMI1 that controls gene expression. The reduction in oxidative stress contributes to alleviating the symptoms of Parkinson's disease.

Their findings published in the journal ACS Applied Materials & Interfaces highlighted the significantly better in vitro and in vivo neuroprotective effect of nano-melatonin as well as the molecular/cellular dynamics it influences to regulate mitophagy.

The experiments showed that nano-formulation of melatonin also protected TH-positive neurons in the brains of rats against rotenone-mediated toxicity. Additionally, the study revealed for the first time that BMI1, a member of the Polycomb Repressive Complex 1, the most essential family of proteins responsible for epigenetic regulation, was overexpressed following nano-formulation treatment. This overexpression induced mitophagy could help in protecting neurons from degeneration.

The study unfurls the molecular mechanism behind melatonin-mediated mitophagy regulation. Enhanced mitophagy was crucial to reduce oxidative stress in the Parkinson's disease model.

Melatonin-mediated BMI1 regulation and the latter's role in inducing mitophagy to curb oxidative stress could set a path for establishing melatonin as a therapeutic candidate for Parkinson's Disease.

It can also be used to treat other diseases where dysregulated mitophagy is critical for pathological outcomes. With continued exploration, this could be established as a safer drug to improve the lives of patients.

https://pib.gov.in/PressReleasePage.aspx?PRID=2089588

Fri, 03 Jan 2024

AI cracks 2,000-year-old mysteries: Ancient texts revealed for the first time

Over the last few years, artificial intelligence has been advancing at a very fast rate in archaeology and ancient history. By applying modern neural networks, researchers can reveal secrets that have been concealed by ancient writers for centuries and even millennia.

The use of AI in deciphering charred scrolls from the eruption of Mount Vesuvius and other lost languages is revolutionising how the ancient world is viewed. One of the most fascinating examples is the Vesuvius Challenge that applies AI to decipher the Herculaneum papyri—the range of texts partially carbonised by the volcano and thus almost completely unreadable due to their fragility. Not only is AI making texts readable again, but it is also allowing scholars to find things that they would not have been able to find otherwise.

Accoding to Nature these developments have the potential of giving scholars more information than has been made available for hundreds of years. However, the incorporation of AI is not limited to the acceleration of a monotonous process. Thanks to the ability to analyse large amounts of data, AI is offering researchers new possibilities of posing questions and making connections that would have been impossible in traditional research.

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AI’s skill in the translation of remote languages and scripts means that new ages of historical revelation are possible, perhaps reshaping what has been already established about the earliest civilisations.

https://www.news9live.com/science/ai-cracks-2000-year-old-mysteries-ancient-texts-revealed-for-the-first-time-2787508

INDIA TODAY

Fri, 03 Jan 2025

India's space ambitions to soar in 2025, Isro eyes big-ticket missions

India's space ambitions are set to soar in 2025 as the Indian Space Research Organisation (ISRO) prepares for a robust series of launches. The lineup includes four GSLV Mk II flights and a commercial mission using the powerful LVM3.

Among the highlights is the G1 mission, the first uncrewed test flight under the Gaganyaan program, utilising the advanced Human-rated LVM3 (HRLV3).

Additionally, three PSLV missions are planned, carrying groundbreaking payloads, including electric propulsion systems, quantum communication experiments, and Earth observation technologies.ISRO will also launch the recently inducted SSLV for a commercial partner and conduct a dedicated mission to test the critical in-flight abort system (TVD2), a pivotal safety feature for the Gaganyaan program. We look at what's next for India in 2025.

Days of Gaganyaan

The launch campaign for the G1 flight of the Gaganyaan program has already commenced. This uncrewed mission, carrying the humanoid Vyomitra in a depressurised crew chamber, will pave the way for subsequent uncrewed flights, G2 and G3, before the crewed flight H1. The Gaganyaan program encompasses a broader vision, including G4, a mission to the International Space Station (ISS), and G5, a mission to BAS1, the first module of the Bharatiya Antariksha Station.

Notably, flight G1 will also test the newly developed uprated C32 cryogenic upper-stage engine. This significant technological advancement will enhance the launch vehicle's lifting capabilities by increasing propellant carrying capacity and thrust generation.

Readying the Communication Backbone

ISRO is readying the communication backbone for the upcoming mission of Gaganyaan, Bharatiya Antariksha Station and the man on the moon. In a crewed mission, 100% crew communication is a

must. The launch of the India Data Relay Satellite System (IDRSS-1) is scheduled in 2025 with GSLV MK II.

A data relay satellite system is a network of communication satellites that act as intermediaries between spacecraft in orbit and ground stations on Earth. Instead of directly communicating with ground stations, spacecraft transmit their data to the relay satellite. The relay satellite then forwards this data to the ground station. This system offers several advantages, including increased communication coverage, especially for spacecraft in low-Earth orbit that frequently lose direct ground station contact.

It also enables higher data transmission rates and more reliable communication links. By reducing the reliance on ground stations, data relay systems contribute to more cost-effective and easier-to-maintain space operations. Apart from IDRSS, the existing systems are NASA's Tracking and Data Relay Satellite System (TDRSS) and the European Data Relay System (EDRS).

Fail Safe Approach

The Indian space agency is also preparing for Test Vehicle Demonstration 2 (TVD2), a crucial step in validating the operational capabilities of the in-flight abort system for the Gaganyaan program.

This test will utilise a modified Liquid Vikas stage (L40) of the GSLV Mk II as the test vehicle. Building upon the success of TVD1, which demonstrated the "In-flight Abort Demonstration of Crew Escape System (CES)" at Mach 1.2, TVD2 will elevate the testing to the supersonic regime, specifically around Mach 1.4. This higher altitude and velocity will provide a more realistic and challenging environment to assess the performance of the abort mechanisms.

Beyond evaluating the Crew Escape System, ISRO will also explore alternative mission abort scenarios. These may include utilising the Service Module for an emergency abort, potentially with options for both an "abort to Earth" scenario, where the spacecraft returns to the ground, and an "abort to orbit" scenario, where the spacecraft is guided into a safe orbit.

Most Powerful Earth Observation Satellite

This year will also see the launch of NISAR, the most powerful Earth observation satellite ever built. NISAR, the NASA-ISRO Synthetic Aperture Radar mission, is a joint Earth-observing endeavour between NASA and the Indian Space Research Organisation (ISRO).

This advanced satellite will utilize synthetic Aperture Radar technology to map and monitor Earth's surface with unprecedented detail with complete global coverage every 12 days. NISAR will provide valuable insights into crucial environmental processes, including ice sheet collapse, sea-level rise, ecosystem disturbances, and natural hazards like earthquakes and landslides.

The mission's advanced S-band and L-band SARs, which can penetrate clouds and vegetation, will detect movements as small as 1 cm, aiding in the monitoring of natural hazards and environmental changes.

Test of Quantum and Electric Propulsion

The TDS01 (Technology Demonstration Satellite) is poised to test several cutting-edge technologies, pushing the boundaries of space exploration.

One key experiment involves demonstrating the capabilities of 300mN stationary plasma thrusters (SPTs), a type of electric propulsion system. While ISRO has previously flown 18mN electric propulsion thrusters on GSAT-9, these were primarily used for North-South Station Keeping, a crucial manoeuvre for maintaining the satellite's orientation. TDS01 will showcase the potential of

these more powerful SPTs to perform orbit-raising manoeuvres for geostationary satellites, significantly enhancing mission flexibility and efficiency.

While ISRO has previously flown 18mN electric propulsion thrusters on GSAT-9, these were primarily used for North-South Station Keeping, a crucial manoeuvre for maintaining the satellite's orientation. TDS01 will showcase the potential of these more powerful SPTs to perform orbit-raising manoeuvres for geostationary satellites, significantly enhancing mission flexibility and efficiency.

TDS01 will serve as a platform for demonstrating advancements in quantum communication technologies developed by ISRO. These experiments include Quantum Key Distribution (QKD) for establishing secure communication links, Quantum Random Number Generation (QRNG) for generating truly random numbers with applications in cryptography, and Quantum Cryptography for secure data encryption and decryption.

Additionally, the satellite will conduct rigorous evaluations of the performance and reliability of its optical beacon link, a critical component for establishing and maintaining stable communication channels in space.With the launch manifest ready, the Indian space agency is set to have a busy 2025 with bigger and bolder missions on the horizon.

https://www.indiatoday.in/amp/science/story/indias-space-ambitions-to-soar-in-2025-as-isro-eyes-big-ticket-missions-2658761-2025-01-03

ScienceNews
MAGAZINE OF THE SOCIETY FOR SCIENCE & THE PUBLIC

Fri, 03 Jan 2025

NASA’s Parker Solar Probe survived its closest approach to the sun

NASA’s Parker Solar Probe skimmed the sun on Christmas Eve and lived to tell the tale.The heat-hardened spacecraft made its closest solar flyby yet at 6:53 a.m. EST on December 24. It came within 6.1 million kilometers of the surface of the sun, beating its own 2023 record of 7.26 million kilometers.

At the time of closest approach, the spacecraft was also the fastest object ever made by humans. It swung around the sun at about 692,000 kilometers per hour — fast enough to travel from Philadelphia to Washington, D.C., in about a second.

This flyby was the culmination of six years in space for the probe. Parker launched in 2018 on a mission to study the sun’s outer atmosphere, or corona, from the inside. Because of the sun’s tremendous gravity, the craft couldn’t aim directly at its destination. Since launch, it has been swinging around Venus and using the planet’s gravity to gradually inch its orbit closer to the sun, making 21 increasingly close flybys along the way.

The last Venus flyby, on November 6, finally sent Parker to its optimal orbit: close enough to study the sun's processes in intimate detail but not so close that those processes destroy it.

The spacecraft was out of contact with Earth for about a week as it approached the sun. Shortly before midnight on December 27, scientists received a beacon signal confirming that the spacecraft survived the encounter.

More data on Parker's status arrived on January 1, showing that the spacecraft was healthy and able to take science data during the flyby. The probe will begin transmitting those data later this month, when it's in a better position to communicate with Earth.

The new orbit will last for at least the next nine months. Parker will make two more flybys at this distance in March and June before its primary mission ends in September 2025.

https://www.sciencenews.org/article/nasa-parker-solar-probe-approach-sun

Hindustan Times

Fri, 03 Jan 2024

ISRO to launch US satellite that enables voice calls via smartphones from space

The Indian Research Space Organisation (ISRO) is reportedly planning to launch an American communications satellite this year that will allow phone calls using direct connectivity from space.This satellite will enable users to make calls directly from space using their smartphones.

"In February or March we will be launching a US satellite for mobile communication, this satellite will enable voice communication on mobile phones. It will be an interesting mission," an NDTV report quoted as saying Dr Jitendra Singh, the minister of science and technology.

This will also mark the first time that an American company's large-scale communications satellite will be launched from an Indian rocket. ISRO officials, cited in the report, stated that the launch is a purely commercial endeavour, led by New Space India Limited (NSIL).While there has been no official confirmation on which satellite operator ISRO is collaborating with for the launch, sources cited in the report said that Texas-based company AST SpaceMobile had planned to launch its satellite with the Indian space agency.

AST SpaceMobile's CEO Abel Avellan said they "invented a technology that connects satellites directly to ordinary cell phones and provides broadband internet through the largest ever commercial phase array in low Earth orbit", the report mentioned.

In an investor call last year he had stated that AST would use a Geo-synchronous Satellite Launch Vehicle (GSLV) to launch a single Block 2 of the Bluebird satellite.

The Bluebird satellite will reportedly have an antenna which is 64 square meters and will weigh around 6000 kilograms and India's rocket will put it in a low Earth orbit.The company's mission seeks to bring "affordable 5G broadband service from space to billions of people worldwide, direct to everyday smartphones".

An ISRO official reportedly confirmed that the satellite would enable "direct to mobile communication" and that AST SpaceMobile had hired the services of India's Bahuballi rocket or the Launch Vehicle Mark-3 for launching it.

https://www.hindustantimes.com/india-news/what-is-blood-money-that-could-save-indian-nurse-nimisha-priya-on-death-row-in-yemen-101735816059422.html