New, Emerging & Strategic Technologies Division
Ministry of External Affairs
Government of India

TECH PULSE

NEST NEWSLETTER JULY 2025



Key Highlights

- *Digital twins are transforming the renewable energy sector*
- *China Proposes International AI Cooperation Organization To Counter US Deregulation*
- *India to host AI Impact Summit in February 2026*

➔ ***Tech Scholarships/Fellowships for Students & Researchers***

CONTENTS

ARTIFICIAL INTELLIGENCE 03

International

1. *Scientists develop tool to detect fake videos*
2. *This AI-powered Lab Runs Itself and Discovers New Materials 10x Faster*

National

3. *India's Ayush Innovations Featured in WHO's Landmark Brief on AI in Traditional Medicine*

BIOTECHNOLOGY & HEALTH 04

International

4. *Breakthrough microchip reveals how your body fights viruses - in just 90 minutes*
5. *In seconds, AI builds proteins to battle cancer and antibiotic resistance*

National

6. *India develops fungus resistant Pineapple Variety*

CLEAN TECHNOLOGIES 06

International

7. *Digital twins are transforming the renewable energy sector*
8. *Goodbye plastic? Scientists create new super-material that outperforms metals and glass*
9. *Scientists develop plastic that dissolves in seawater*
10. *The real-life Kryptonite found in Serbia and why it could power the future*

National

11. *Indian scientists engineer supercharged green energy material*

QUANTUM & PHOTONICS 08

International

12. *A Simple Twist Unlocks Never-before-seen Quantum Behavior*
13. *MIT scientists just supercharged the enzyme that powers all plant life*
14. *Scientists twist DNA into self-building nanostructures that could transform technology*
15. *This Flat Chip Uses Twisted Light to Reveal Hidden Images*

National

16. *Bengaluru scientists develop cost-effective smart windows*
17. *Complex greenhouse gas dynamics in the Central Himalayas revealed*
18. *Noise brings quantum surprise from Indian Scientists*
19. *Photocatalytic leap toward green synthesis of hydrogen peroxide disinfectant*
20. *Smart Nano-Materials Could Help Detect Explosives With Layers Of Innovation*

SEMICONDUCTORS 13

International

21. *Building electronics that don't die: Columbia's breakthrough at CERN*

CONTENTS

SPACE & DEFENCE 14

International

22. *UF students are bending metal with lasers to build massive structures in orbit*

National

23. *Decoding Ladakh's hot springs could help trace the origins of life on early Earth and Mars*

REPORTS/POLICY DOCUMENTS 15

24. *India advances its Quantum Preparedness; Meity Launches Whitepaper to guide India's shift towards an Atmanirbhar & Quantum-Safe Cybersecurity*
25. *The Office of PSA to GoI releases the report on 'ZET Adoption in India and Its Impact on Emission and Energy'*
26. *WEF - Quantum Technologies: Key Strategies and Opportunities for Financial Services Leaders*

TECHNOLOGY ENGAGEMENTS/NEWS BYTES 17

International

27. *China Proposes International AI Cooperation Organization To Counter US Deregulation*
28. *China's Global Governance Action Plan*
29. *China Reported 1509 Large AI Models - Most Worldwide*
30. *UAE and WEF Launch Global Regulatory Platform (Grip) for AI Governance*
31. *White House launches AI Action Plan with Executive Orders*

National

32. *ASSOCHAM International Conference on Sovereign Tech for India's Digital Transformation*
33. *DRDO conducts successful flight-trials of Advanced UAV Launched Precision Guided Missile-V3*
34. *DRDO successfully conducts two consecutive flight-tests of Pralay missile*
35. *India and UK Sign Comprehensive Economic and Trade Agreement (CETA)*
36. *India's First Private Test Facility for Depleted Heavy Water Upgradation*
37. *'Meri Panchayat' App Wins WSIS Champion Award 2025 in Geneva*
38. *NISAR Satellite - India's Scientific Handshake With World*
39. *Rio de Janeiro Declaration - Strengthening Global South Cooperation*

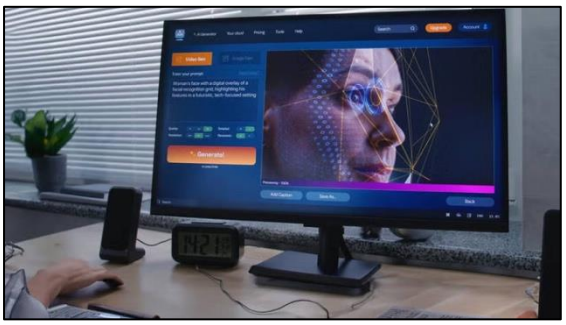
WHAT'S UPCOMING 23

40. *India to host AI Impact Summit in February 2026*
41. *Sixth Edition of International Energy Conference and Exhibition 2025 (22-23 Sept 2025)*

➔ The Tech Showcase!
➔ Tech. Scholarships/Fellowships for Students and Researchers!

International

1. *Scientists develop tool to detect fake videos*

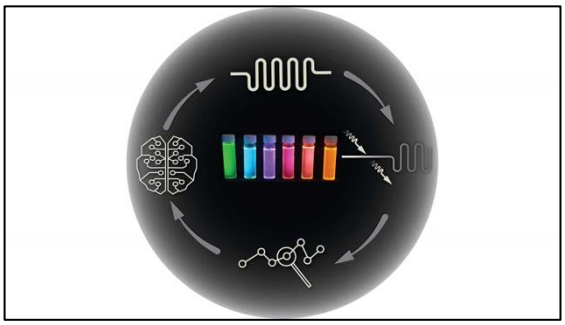


A new tool called UNITE (Universal Network for Identifying Tampered and synthEtic videos) has been developed by scientists at UC Riverside in collaboration with Google to combat the spread of deepfakes and other forms of video disinformation. The system represents a significant leap forward in fake video detection because it moves beyond the conventional approach of solely focusing on facial cues.

Instead, the AI model analyzes the entire video frame, including backgrounds and motion patterns, to detect subtle spatial and temporal inconsistencies that indicate tampering. This innovative method, which uses a transformer-based deep learning model and a unique training approach called "attention-diversity loss," prevents the AI from fixating on faces and enables it to identify forgeries even when a face is not present.

The UNITE system can handle a wide range of video manipulations, from simple face swaps to complex, fully synthetic videos that were generated without any real footage. The research findings were presented at the 2025 Conference on Computer Vision and Pattern Recognition (CVPR). Once fully developed, this tool could be a powerful asset for social media platforms, fact-checkers, and newsrooms in their efforts to stop the spread of fake videos and misinformation. Read More

2. *This AI-powered Lab Runs Itself and Discovers New Materials 10x Faster*



An AI-powered, self-driving laboratory developed by researchers at North Carolina State University is capable of discovering new materials significantly faster than traditional methods, operating at a rate of at least 10 times faster. This breakthrough is a result of a new approach that shifts from slow, traditional steady-state experiments to real-time, dynamic flow experiments. Unlike previous systems that had to wait for a reaction to complete before collecting a single data point, this innovative laboratory continuously monitors chemical mixtures and captures new data every half-second.

This constant stream of data is a game-changer. It allows the lab's machine-learning algorithm to collect a massive amount of information, which in turn enables it to make smarter and faster decisions on which experiment to conduct next. This increased data density allows the AI to become more accurate in its predictions and identify optimal material candidates on the first attempt after training. The efficiency of this system not only dramatically accelerates the materials discovery process but also has major environmental benefits. The ability to find

a solution with fewer experiments means a significant reduction in chemical use and waste, making the entire research process more sustainable. This breakthrough brings the world closer to a future where new materials for renewable energy, electronics, and sustainable manufacturing can be discovered in days instead of years. Read More

National

3. ***India's Ayush Innovations Featured in WHO's Landmark Brief on AI in Traditional Medicine***

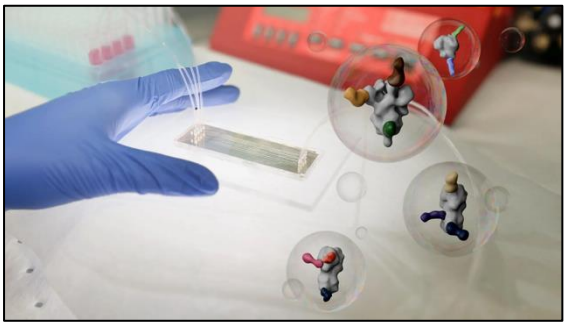


The World Health Organization (WHO) has released a landmark technical brief, 'Mapping the Application of Artificial Intelligence in Traditional Medicine', highlighting India's pioneering role in integrating AI with Ayush systems. This recognition stems from India's proposal, which led to WHO's first roadmap for AI in traditional medicine. With initiatives such as the Ayush Grid, SAHI portal, NAMASTE portal, and Ayush Research Portal, India is digitising centuries-old medical wisdom while advancing evidence-based, globally accessible healthcare. Key innovations include predictive diagnostics through Prakriti-based models, the Ayurgenomics project combining Ayurveda with genomics, and AI tools for cataloguing ancient texts and drug pathway identification. WHO has also lauded India's Traditional Knowledge Digital Library (TKDL) as a global model for safeguarding indigenous medical heritage. With a US$43.4 billion Ayush market, India is positioning itself as a leader in digital health innovation, aligning with Prime Minister Narendra Modi's vision of "AI for All.". Read More

BIOTECHNOLOGY & HEALTH

International

4. ***Breakthrough microchip reveals how your body fights viruses - in just 90 minutes***



A team at Scripps Research has developed a breakthrough microchip, called microfluidic EM-based polyclonal epitope mapping (mEM), that can map how antibodies in the body respond to viruses using just a drop of blood. The technology condenses a week's worth of antibody analysis into just 90 minutes, providing unprecedented speed and sensitivity. Unlike earlier methods such as EMPEM, which required large blood volumes and longer processing times, mEM uses only four microliters of blood and reveals previously undetected antibody binding

sites on viruses like SARS-CoV-2 and influenza.

The process involves flowing blood through a chip coated with viral proteins, capturing antibody-virus interactions, and imaging them via electron microscopy. Researchers successfully tracked antibody responses in humans and mice over time, an advance previously impossible due to blood volume limitations. Beyond speed, mEM offers clearer insights into immune responses, helping identify which antibodies provide the strongest protection, critical for designing next-generation vaccines. The team envisions automating and multiplexing the system to allow large-scale, parallel testing. This innovation holds promise for accelerating vaccine development, monitoring immune responses to infections, and enabling global researchers to study viruses from HIV to malaria more efficiently. Read More

5. ***In seconds, AI builds proteins to battle cancer and antibiotic resistance***



Australian scientists have, for the first time, successfully used Artificial Intelligence (AI) to generate a ready-to-use protein capable of killing antibiotic-resistant bacteria such as E. coli. Traditionally, developing custom proteins for diseases takes decades, but AI can now achieve this in seconds. The breakthrough positions Australia alongside global leaders like the US and China in AI-driven protein design, opening new pathways for affordable drug development, vaccines, nanomaterials, and diagnostics.

The project is supported by the AI Protein Design Program spanning Monash and Melbourne's Bio21 Institute. Their platform is the first in Australia to replicate pioneering work by Nobel Laureate David Baker, enabling de novo design of proteins with specific functions. The program's tools empower global researchers by democratizing access to AI-driven protein design. This initiative firmly places Australia at the forefront of biomedical innovation and next-generation therapeutic development. Read More

National

6. ***India develops fungus resistant Pineapple Variety***



Indian researchers have achieved a breakthrough in protecting pineapples from devastating fungal diseases. Pineapple, the most economically important fruit of the Bromeliaceae family, is highly vulnerable to Fusariosis, a destructive disease caused by the fungus Fusarium moniliforme. The infection deforms stems, blackens leaves, and rots fruit, resulting in severe yield losses for farmers. Traditional breeding methods have struggled to keep pace with the evolving fungus, making disease resistance an urgent priority.

Scientists at the Bose Institute, under the Department of Science and Technology, have identified and overexpressed the AcSERK3 gene in pineapples. This gene, part of the Somatic Embryogenesis Receptor Kinase (SERK) family, strengthens the plant's natural defences and stress tolerance. In controlled studies,

genetically modified pineapple lines expressing AcSERK3 exhibited enhanced resilience to Fusarium infection, staying green and healthy compared to wild varieties.

The innovation opens a pathway for developing multi-fungal resistant pineapple varieties through long-term field trials. If successful, growers could soon cultivate resilient varieties by propagating shoots from these modified plants, ensuring more reliable harvests and reduced economic losses. Read More

CLEAN TECHNOLOGIES

International

7. Digital twins are transforming the renewable energy sector



A new study from the University of Sharjah highlights how AI-powered digital twins are reshaping renewable energy systems, while also underlining their current limitations. The study finds that digital twins can accelerate the shift away from fossil fuels by optimising generation, management, and efficiency across clean energy platforms such as wind, solar, and geothermal.

The researchers note that digital twins improve wind energy reliability by predicting parameters and correcting measurements, but face challenges in modelling environmental impacts and simulating blade or gearbox degradation. In solar, they aid system design and efficiency optimisation, yet struggle with predicting long-term performance and panel degradation. For geothermal, they help simulate drilling and reduce costs, but lack sufficient high-quality data to model complex subsurface conditions.

Using AI and text mining to analyse existing literature, the authors identified research gaps and proposed a roadmap to enhance data collection, modelling, and computational power, steps crucial to unlocking the full potential of digital twins in driving the clean energy transition. Read More

8. Goodbye plastic? Scientists create new super-material that outperforms metals and glass

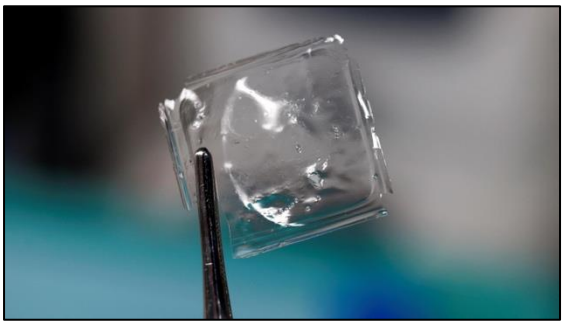


Scientists from Rice University and the University of Houston have developed a new, high-strength, eco-friendly material made from bacteria. The study introduces a dynamic biosynthesis technique that uses a rotational bioreactor to precisely align bacterial cellulose fibers during their growth. This innovative method overcomes the random formation of fibers that typically limits bacterial cellulose's strength.

The resulting biopolymer sheets are as strong as some metals and glasses, yet remain flexible, transparent, and biodegradable. With a tensile strength of up

to 436 megapascals, the material's strength can be further enhanced to 553 megapascals by incorporating boron nitride nanosheets, which also improve its thermal properties. The researchers describe the process as "training a disciplined bacterial cohort" to produce a material that is not only robust but can also be customized with various nanoscale additives for specific functions. This scalable, single-step process holds significant promise as a sustainable alternative to plastics for applications in packaging, textiles, green electronics, and structural materials, offering a solution to persistent plastic pollution. Read More

9. *Scientists develop plastic that dissolves in seawater*



A new study has found that a plastic called LAHB, which is made by microbes, can biodegrade in the deep sea. This is a significant breakthrough because conventional bioplastics like PLA do not break down in these cold, high-pressure environments with limited nutrients.

Researchers submerged LAHB and PLA films at a depth of 855 meters for 13 months. The LAHB films lost over 80% of their mass, while the PLA remained intact. The decomposition of LAHB was attributed to a community of deep-sea microbes that formed a biofilm on the plastic's surface. These microbes produced special enzymes to break down the polymer chains into smaller fragments, which other microbes then consumed and converted into harmless byproducts like carbon dioxide and water.

This research demonstrates for the first time that LAHB can be completely mineralized under deep-sea conditions. The findings offer a promising solution to marine plastic pollution by providing a more reliable biodegradable alternative to traditional plastics. The study supports the transition to a circular bioeconomy by showing that this new material can safely return to the marine ecosystem after its use. Read More

10. *The real-life Kryptonite found in Serbia and why it could power the future*



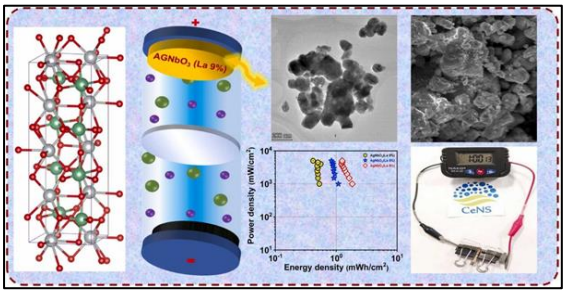
In 2004, scientists in Serbia's Jadar Valley discovered a unique mineral that has since drawn global attention for both its unusual chemistry and its potential importance to the clean energy transition. Named jadarite, this dull white crystal bears an uncanny resemblance in chemical composition to Superman's fictional kryptonite, though without the glowing green appearance. Officially recognized as a new mineral in 2006, jadarite has been dubbed "Earth's kryptonite twin" because its chemical formula, sodium lithium boron silicate hydroxide, is strikingly similar to the fictional compound used in the Superman films.

What makes jadarite significant, however, is not its pop culture connection but its rich content of lithium and boron. Lithium is a critical component of rechargeable batteries that power electric vehicles, smartphones, and renewable energy storage systems, while boron is used in various industrial and energy applications. The Jadar deposit, where the mineral was first identified, is

considered one of the largest lithium reserves in the world, positioning Serbia as a potential key player in the global supply chain for green technologies. Organizations such as Australia's Nuclear Science and Technology Organisation (ANSTO) are already researching methods to process jadarite for battery-grade lithium, underscoring its potential to advance sustainable energy solutions. Read More

National

11. Indian scientists engineer supercharged green energy material



Scientists from the Centre for Nano and Soft Matter Sciences (CeNS) in Bengaluru, in collaboration with Aligarh Muslim University, have developed a new material for supercapacitors that significantly improves their performance.

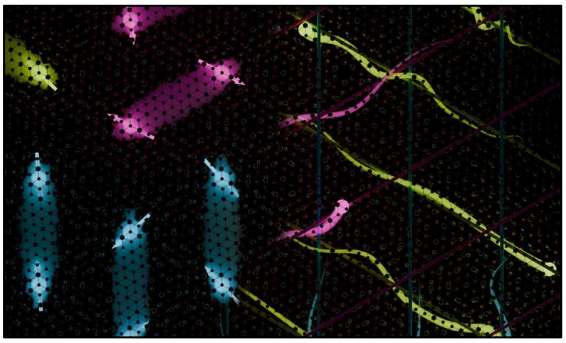
Supercapacitors, which are used to store and release energy quickly, are crucial for a wide range of technologies, from electric vehicles to renewable energy systems. The research team focused on a lead-free, eco-friendly material called silver niobate ($AgNbO_3$). By introducing a rare-earth element, lanthanum, into the material, they were able to shrink the nanoparticles, which increased their surface area for energy storage. The lanthanum also enhanced the material's ability to conduct electricity.

The new material showed remarkable results, retaining 118% of its initial energy capacity after extensive use and achieving 100% coulombic efficiency, meaning virtually no energy was lost during use. A prototype built with this material successfully powered an LCD screen, demonstrating its potential for real-world applications. This research paves the way for the creation of more compact and high-efficiency energy storage devices. Read More

QUANTUM & PHOTONICS

International

12. A Simple Twist Unlocks Never-before-seen Quantum Behavior



Researchers at Princeton University, in collaboration with international partners, have unveiled a groundbreaking approach to quantum materials by introducing a new class of twistable structures based on the M-point of electron momentum. Traditionally, moiré materials, created by twisting two atomically thin layers, have focused on the K-point, yielding discoveries like superconductivity in twisted bilayer graphene. By shifting to the M-point, the team has opened up an entirely new realm of quantum behavior with exotic properties.

In these materials, electron bands flatten significantly at small twist angles, slowing

electron motion and enhancing interactions. This effect allows electrons to localize into lattice patterns such as hexagonal or kagome, fostering conditions for novel quantum states including elusive quantum spin liquids and orthonormal valence bond phases. Unlike K-point systems, M-point twisted bands are topologically trivial yet highly symmetric, sometimes even exhibiting one-dimensional behavior.

The study identified hundreds of candidate materials, with SnSe2 and ZrS2 chosen for in-depth analysis. Computational models predicted strong interaction-driven phenomena, while experimental collaborators have already synthesized and exfoliated crystals for testing. This platform offers tunable, controllable pathways to study quantum states, potentially paving the way for future technologies in quantum computing, superconductivity, and advanced sensing. Read More

13. *MIT scientists just supercharged the enzyme that powers all plant life*

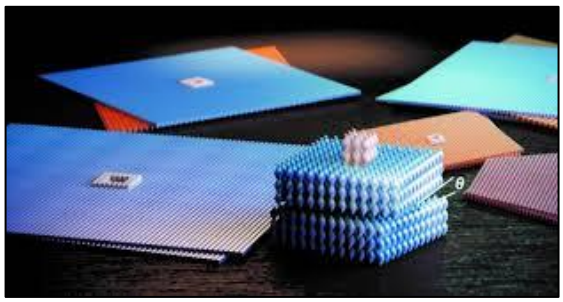


MIT chemists have developed a way to significantly boost the efficiency of rubisco, the enzyme that drives carbon fixation during photosynthesis but is notoriously slow and error-prone. Rubisco, considered the most abundant enzyme on Earth, catalyzes only a few reactions per second and often reacts with oxygen instead of carbon dioxide, leading to energy waste in plants through photorespiration. To address this, the MIT team applied a continuous directed evolution technique, called MutaT7, which allows for rapid mutation and screening inside living cells. This enabled them to generate and evaluate many more rubisco variants than traditional methods.

They began with a naturally fast version of rubisco from semi-anaerobic bacteria and subjected it to evolution in oxygen-rich conditions. After six rounds, they identified mutations near the enzyme's active site that reduced its tendency to react with oxygen, improving catalytic efficiency by up to 25 percent. This breakthrough suggests rubisco can be engineered to function better in challenging environments.

The researchers now aim to apply their approach to plant rubisco, with the goal of improving crop yields by reducing photorespiration losses. Since plants currently waste about 30 percent of absorbed solar energy, a more efficient rubisco could greatly enhance agricultural productivity and global food security. Read More

14. *Scientists twist DNA into self-building nanostructures that could transform technology*

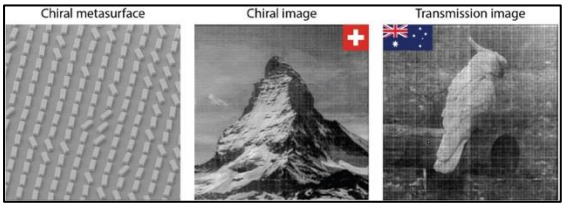


Researchers from the University of Stuttgart and the Max Planck Institute for Solid State Research have developed a new method to construct programmable DNA moiré superlattices, expanding design possibilities at the nanoscale. Moiré superlattices, usually created by stacking and twisting 2D materials, are central to condensed matter and photonics research but involve complex fabrication steps. The

Stuttgart team introduced a bottom-up approach using DNA self-assembly, where geometric parameters like rotation angle and lattice symmetry are encoded into a "nucleation seed." This blueprint directs the self-organization of DNA strands into precisely twisted bilayers or trilayers, eliminating the need for mechanical stacking.

By combining DNA origami and single-stranded tile assembly, the researchers achieved superlattices with unit cell dimensions as small as 2.2 nanometers, tunable symmetries, and gradient moiré structures with varying periodicity. These DNA-based lattices can act as scaffolds for nanoscale components, phononic crystals, metamaterials, and gradient-index photonic devices. Their programmable structures also hold potential in spintronics, enabling studies of spin-selective electron transport. The work opens up new opportunities in molecular engineering, nanophotonics, and materials science by embedding geometric control directly into molecular design, creating entirely new classes of structured matter. Read More

15. *This Flat Chip Uses Twisted Light to Reveal Hidden Images*

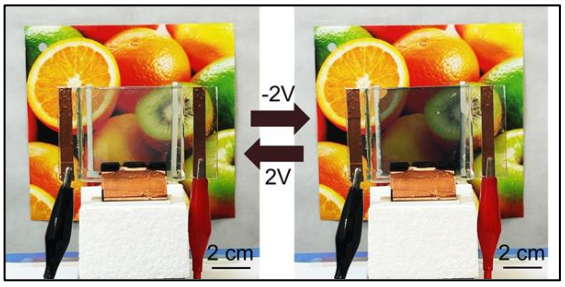


Scientists at EPFL's Bionanophotonic Systems Laboratory, in collaboration with Australian researchers, have developed a novel chiral metasurface that offers a powerful way to control light for applications in encryption, sensing, and quantum technologies. Chirality, or "handedness," refers to the property of shapes that are not superimposable on their mirror images, much like left and right hands. This principle is central in biology and chemistry, as molecules with opposite handedness can have drastically different effects. Light itself can also be chiral when circularly polarized, spiraling in either left- or right-handed twists. Since chiral materials interact differently with these polarizations, controlling chirality with precision is crucial but technically challenging.

The EPFL team's approach overcomes this by designing metasurfaces - 2D lattices of nano-sized elements called meta-atoms, whose orientation and symmetry determine their chiral response. Unlike earlier methods that relied on complex geometries, this "chiral design toolkit" achieves versatile control through simple orientation tuning. In a striking demonstration, the researchers encoded two invisible images into a metasurface: an Australian cockatoo revealed under unpolarized light, and the Swiss Matterhorn revealed under circularly polarized light. This dual watermark capability paves the way for advanced anticounterfeiting, security, and camouflage. Moreover, the approach shows promise in biosensing and quantum computing, where precise chiral interactions are essential. Read More

National

16. *Bengaluru scientists develop cost-effective smart windows*

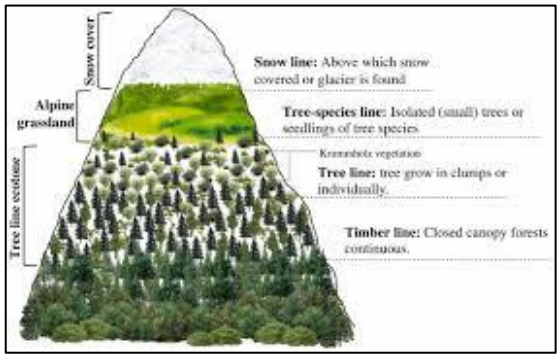


Scientists from the Centre for Nano and Soft Matter Sciences (CeNS) have developed cost-effective smart windows that can change colour, block heat, save energy, and store electricity. Traditional electrochromic smart windows, which

regulate visible and near-infrared (NIR) light to reduce energy consumption in buildings, have been commercially limited due to the high cost of tungsten oxide (WO3) and lithium-based electrolytes. The CeNS team addressed this by using titanium dioxide (TiO2) films and aluminum-ion-based electrolytes, both of which are affordable and earth-abundant alternatives.

To enhance TiO2's relatively low coloration efficiency, researchers engineered oxygen vacancies in the films, achieving one of the highest reported efficiencies for TiO2 at 27 cm^2/C, along with strong solar, luminous, and NIR transmittance modulation. The films also demonstrated energy storage capabilities, with a real capacitance of 34 mF/cm^2, and retained 96% performance over 2000 cycles, proving their durability. This dual-functionality, combining optical switching and energy storage, makes the innovation significant for sustainable and zero-energy buildings. Read More

17. *Complex greenhouse gas dynamics in the Central Himalayas revealed*

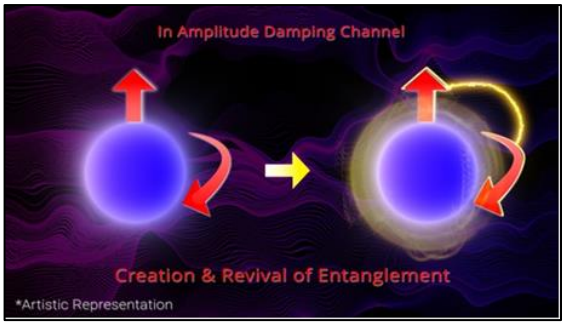


Indian scientists have, for the first time, conducted high-resolution, long-term monitoring of key greenhouse gases in the Central Himalayas, providing critical insights into how natural processes and human activities shape regional air quality and climate. Researchers at the Aryabhatta Research Institute of Observational Sciences (ARIES) gathered five years of continuous data from a high-altitude site in Nainital. Their findings reveal complex diurnal and seasonal patterns of carbon dioxide (CO_2), methane (CH_4), and carbon monoxide (CO), filling a major gap in South Asia's ground-based climate data.

The study shows CO_2 levels dip during the day due to photosynthesis, while CH_4 and CO peak as mountain winds transport pollutants upward. Seasonal spikes are linked to agricultural practices, biomass burning, and regional pollution transport. Importantly, long-term trends indicate CO_2 and CH_4 are rising faster than at global background sites like Mauna Loa, while CO is gradually declining, possibly due to improved combustion efficiency.

The research highlights the combined influence of solar radiation, temperature, atmospheric boundary layers, and human activities in driving emissions. By providing localized, real-time data, the study offers policymakers and climate scientists essential inputs for refining models, validating satellite observations, and designing effective mitigation strategies for South Asia's fragile mountain ecosystems. Read More

18. *Noise brings quantum surprise from Indian Scientists*



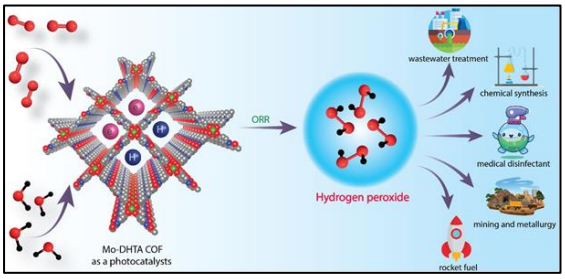
Indian scientists have uncovered a surprising twist in quantum research: noise, long considered a major obstacle for quantum systems, may actually enhance certain forms of entanglement. Researchers from the Raman Research Institute (RRI),

in collaboration with IISc, IISER-Kolkata, and the University of Calgary, found that intraparticle entanglement, correlations within a single particle, can not only survive quantum noise but also be revived or even generated by it. This contrasts with interparticle entanglement, where noise typically destroys correlations irreversibly.

Using mathematical models, particularly under amplitude damping noise, the team demonstrated that intraparticle entanglement behaves more robustly than previously thought. Unlike traditional models, they adopted a Global Noise Model, which treats a particle as a whole, offering a more realistic view of environmental interactions. Their results showed that while amplitude damping could revive entanglement, phase damping and depolarizing noise also impacted its stability, though intraparticle entanglement still decayed more slowly than interparticle correlations.

The findings have major implications for building practical, resilient quantum systems, especially in communication and computing. Supported by the National Quantum Mission, this breakthrough challenges the belief that noise is purely detrimental, opening new avenues for user-friendly and commercially viable quantum technologies. Read More

19. *Photocatalytic leap toward green synthesis of hydrogen peroxide disinfectant*



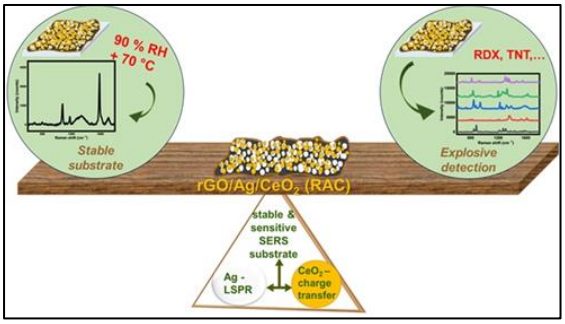
Researchers at the S.N. Bose Centre for Basic Sciences have achieved a breakthrough in green chemistry by developing a novel photocatalyst to produce hydrogen peroxide (H_2O_2) directly from sunlight and water. Hydrogen peroxide is widely used in wound cleaning, water purification, sterilization, fuel cells, and industrial processes, but conventional methods of production are energy-intensive, costly, and environmentally harmful. Photocatalysts like metal oxides or polymers have limitations due to wide band gaps and poor stability. To overcome these challenges, scientists designed a dimolybdenum paddlewheel-embedded covalent organic framework (Mo-DHTA COF), which combines the advantages of covalent organic frameworks - high surface area, tunable porosity, and photostability - with improved catalytic activity and electron mobility from embedded metal centers.

When exposed to visible light, Mo-DHTA COF drives photocatalytic reactions by reducing oxygen into superoxide radicals, which then produce H_2O_2. The material has shown excellent efficiency across different media, including pure water, and is stable and recyclable, making it suitable for long-term applications. Published in the journal Small, this work paves the way for cost-effective, eco-friendly hydrogen peroxide production. Its implications span pharmaceuticals, healthcare, water treatment, environmental remediation, and energy applications. The innovation represents a significant leap toward sustainable chemical synthesis and scalable green technologies. Read More

20. *Smart Nano-Materials Could Help Detect Explosives With Layers Of Innovation*

Researchers at the Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru, have developed an advanced nanomaterial that can detect harmful chemicals, including explosives like TNT and RDX, even at trace levels. The innovation is based on surface-enhanced Raman spectroscopy

(SERS), a technique known for its ability to amplify the molecular "fingerprints" of chemicals for highly sensitive detection. While noble metals such as gold and silver have traditionally been used in SERS, their high cost and poor stability have limited large-scale use.



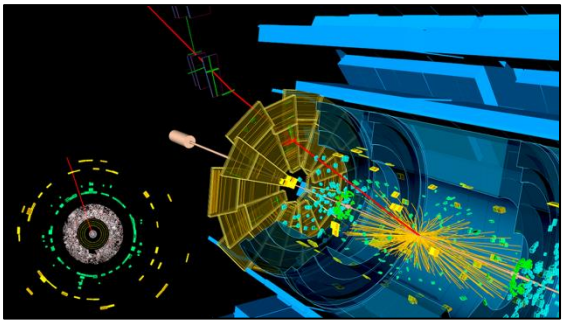
To overcome these challenges, the team created a multi-layer composite of reduced graphene oxide (rGO), silver nanoparticles (Ag), and cerium oxide (CeO_2) on a glass substrate using physical vapor deposition. Each layer plays a distinct role: silver nanoparticles enhance Raman signals, cerium oxide boosts charge transfer while protecting silver from degradation, and rGO suppresses unwanted fluorescence for clearer signals. Tests demonstrated that the material maintained stability under extreme conditions of 90% humidity and 70 °C.

The substrate showed remarkable sensitivity, detecting explosives at nanomolar concentrations, and demonstrated versatility with model analytes like 4-mercaptobenzoic acid. With its durability, low cost, and high precision, this technology could transform applications in airport security and environmental pollution monitoring. Read More

SEMICONDUCTORS

International

21. Building electronics that don't die: Columbia's breakthrough at CERN



Deep inside CERN's Large Hadron Collider (LHC), electronics face extreme radiation levels that destroy conventional components. To overcome this, Columbia University engineers designed ultra-rugged, radiation-resistant chips that play a central role in the ATLAS detector. These specialized analog-to-digital converters (ADCs) capture faint electrical signals from particle collisions and translate them into precise digital data, enabling physicists to probe elusive phenomena like the Higgs boson. Unlike commercial electronics that quickly fail under such conditions, Columbia's chips were designed using standard semiconductor processes validated by CERN, but with innovative circuit-level techniques that minimize radiation damage and self-correct errors in real time.

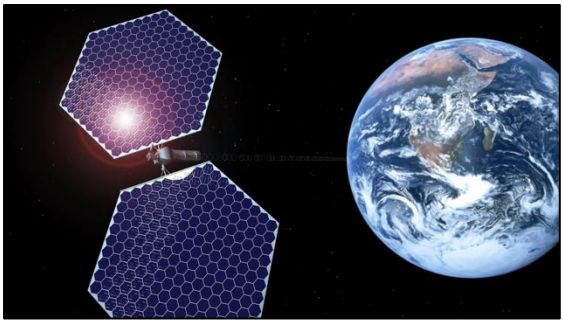
Two breakthrough chips emerged from this effort. The trigger ADC, already in use, filters a billion collisions per second to select the most promising events, while the data acquisition ADC, set for installation in the LHC upgrade, will digitize signals with unprecedented accuracy. This decade-long resilience ensures reliable performance in one of the harshest scientific environments. The project highlights the critical role of academia-industry-physics collaboration in advancing fundamental science. As Columbia's John Parsons noted, cutting-edge instrumentation is essential for discovery. These chips now stand at the

frontier of particle physics, supporting humanity's quest to understand the universe. Read More

SPACE & DEFENCE

International

22. UF students are bending metal with lasers to build massive structures in orbital

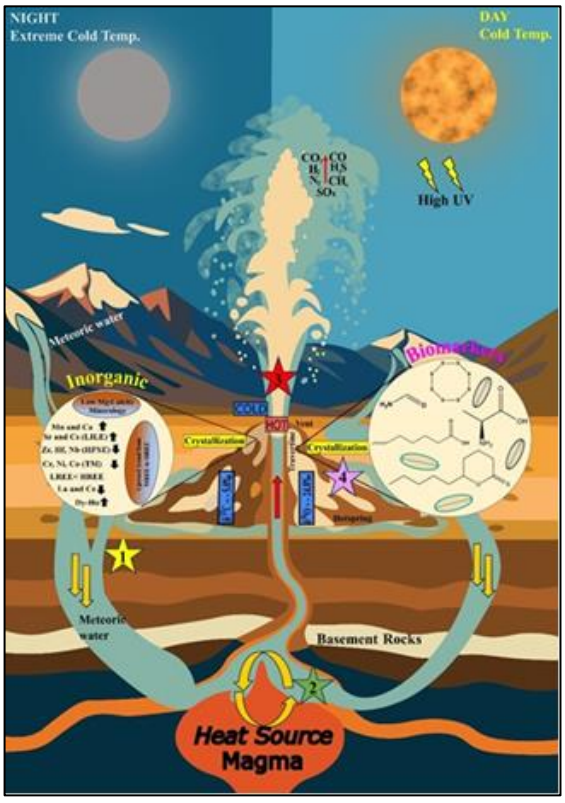


Engineers at the University of Florida (UF), in partnership with DARPA and NASA's Marshall Space Flight Center, are pioneering ways to build massive space structures directly in orbit using lasers. Their project, NOM4D (Novel Orbital and Moon Manufacturing, Materials, and Mass-efficient Design), aims to overcome rocket cargo size and weight limits by using laser-forming technology. Instead of launching fully assembled components, thin sheets of metal could be bent into shape in microgravity to create large solar arrays, antennas, telescopes, or even space station parts.

The UF team is the only university group focused specifically on laser forming for space. With $1.1 million in DARPA funding, the researchers are testing metals like aluminum, ceramics, and stainless steel to study how heat, gravity, and laser parameters affect bending and material strength. Collaboration with NASA allows testing in thermal vacuum chambers that mimic space conditions, addressing challenges such as extreme temperatures and microgravity. Key to success will be maintaining material integrity and integrating real-time sensors for feedback during forming. If successful, this technology could revolutionize space exploration by enabling lighter launches, sustainable orbital construction, and longer missions, heralding a new era of in-space manufacturing. Read More

National

23. Decoding Ladakh's hot springs could help trace the origins of life on early Earth and Mars



In Ladakh's Puga Valley, scientists have uncovered vital clues about how life may have originated on Earth and possibly on Mars. The region's geothermal hot springs create extreme environments, making them

natural laboratories for studying prebiotic chemistry. A team from the Birbal Sahni Institute of Palaeosciences (BSIP), under its newly formed Earth and Planetary Exploration Group, studied calcium carbonate (travertine) deposits formed in the hot spring environment. Unlike earlier global theories that emphasized silica's role in the origin of life, their research highlights the significance of carbonates, particularly calcite, in catalyzing and preserving organic molecules.

Through advanced geochemical techniques including microscopy, GC-MS-MS, Raman, XRD, IR, and isotope analysis, the team discovered preserved amino acid derivatives, fatty acids, formamide, and sulphur compounds within the calcite structure. These findings demonstrate that $CaCO_3$ can act as a natural template for trapping, stabilizing, and concentrating organic precursors in extreme conditions.

The study provides evidence that hot spring environments like Puga may have served as real-world prebiotic reactors on early Earth. Beyond Earth, this discovery strengthens astrobiological research by offering a framework for detecting biosignatures on Mars and supporting ISRO's future space exploration missions. It also deepens understanding of biomolecule preservation and origin-of-life chemistry. Read More

REPORTS/POLICY DOCUMENTS

24. India advances its Quantum Preparedness; Meity Launches Whitepaper to guide India's shift towards an Atmanirbhar & Quantum-Safe Cybersecurity



India has taken a significant step towards quantum-safe cybersecurity with the launch of a whitepaper, "Transitioning to Quantum Cyber Readiness," by MeitY, CERT-In, and cybersecurity firm SISA. The whitepaper emphasizes the urgent need for organizations - especially those in national security, financial services, and critical infrastructure, to begin migrating from traditional encryption systems like RSA and ECC, which will soon be vulnerable to quantum computing. It provides a comprehensive roadmap for adopting quantum-resistant algorithms, integrating new security protocols, and ensuring operational continuity.

MeitY Secretary Shri S. Krishnan underlined quantum readiness as a strategic imperative for safeguarding India's digital future, while CERT-In highlighted the evolving threat landscape and the role of public-private partnerships in building resilience. SISA's contribution focuses on future-proof cryptographic strategies and data-layer resilience. The initiative reflects India's proactive approach to digital innovation and cybersecurity, ensuring preparedness against quantum-era risks across government, BFSI, healthcare, and other regulated sectors. Download Report

25. The Office of the Principal Scientific Adviser to GoI releases the report on 'ZET Adoption in India and Its Impact on Emission and Energy'



The Office of the Principal Scientific Adviser to the Government of India released the report 'ZET Adoption in India and Its Impact on Emission and Energy' on 1 July 2025, highlighting the transformative potential of Battery Electric Trucks (BETs) in India's Medium and Heavy-Duty Truck (M&HDT) sector. As freight demand rises, this sector, which handles nearly 70% of logistics and accounts for about 40% of fuel consumption, is also a major source of emissions. The report projects that BETs, given current green hydrogen costs and infrastructure gaps, will serve as the primary zero-emission technology for M&HDTs in the near term, significantly cutting emissions and fuel use by mid-century. Based on extensive industry data and expert consultations, the report stresses early interventions like fiscal incentives, tailored product offerings, and robust charging infrastructure to boost market confidence. It positions ZET adoption as critical for India's Net Zero 2070 goals, cleaner air, and energy security. Download Report

26. WEF - Quantum Technologies: Key Strategies and Opportunities for Financial Services Leaders



WEF's white paper 'Quantum Technologies: Key Strategies and Opportunities for Financial Services Leaders', developed with Accenture, explores the rapid progress of quantum technologies and their growing applications in financial services. It draws on real-world case studies and insights from leaders across the quantum and financial sectors to highlight how early experimentation can guide secure and effective deployment. The paper identifies six foundational pillars essential for unlocking quantum's potential: advancing research and development, enabling infrastructure, fostering public-private collaboration, supporting entrepreneurship, strengthening education and workforce skills, and ensuring responsible deployment. By

prioritizing these areas, the financial services industry can prepare for a future where quantum computing drives breakthroughs in areas such as risk management, portfolio optimization, fraud detection, and secure transactions.

The report emphasizes that strategic action now will accelerate adoption, build market confidence, and ensure that quantum technologies are integrated responsibly, delivering long-term value to the financial ecosystem. Download Report

TECHNOLOGY ENGAGEMENTS/NEWS BYTES

International

27. China Proposes International AI Cooperation Organization To Counter US Deregulation



At the World Artificial Intelligence Conference in Shanghai, Premier Li Qiang announced China's proposal to establish a global organisation to coordinate AI cooperation and governance. Positioning itself as an alternative to the U.S., China emphasized that AI should not become the 'exclusive game' of a few countries or corporations. Instead, Li stressed the need for equitable access, with Beijing ready to share its AI development experience and products, particularly with the Global South. He noted that global AI governance remains fragmented due to differing regulatory approaches, institutional rules, and constraints such as limited AI chip supply and restrictions on talent exchange.

China's Vice Foreign Minister Ma Zhaoxu told representatives from over 30 countries, including Russia, South Africa, Germany, Qatar, and South Korea, that the proposed body could be headquartered in Shanghai and would promote pragmatic cooperation.

Alongside the announcement, China released an action plan for global AI governance, inviting governments, enterprises, and research institutions to collaborate, build open-source communities, and deepen international exchanges. The move comes amid intensifying U.S.-China technological rivalry, with Washington imposing export restrictions on advanced AI chips and equipment to curb China's progress. Read More

28. China's Global AI Governance Action Plan



The 'Global AI Governance Action Plan', released at the 2025 World Artificial Intelligence Conference, outlines a comprehensive framework to promote responsible, inclusive, and sustainable AI development worldwide. Recognizing AI as both a transformative opportunity and a source of risks, the plan emphasizes global solidarity to ensure safety, fairness, and reliability in line with the UN Global Digital Compact.

Key priorities include fostering innovation, advancing digital infrastructure, and expanding AI applications across industries such as healthcare, education, agriculture, and smart cities. It calls for building open-source communities, ensuring high-quality and diverse datasets, and promoting sustainable AI practices with green technologies and energy efficiency standards. The plan also stresses the need for global cooperation in setting transparent and interoperable standards, addressing algorithmic bias, and strengthening AI safety governance through risk assessment and traceability mechanisms.

Special attention is given to bridging the digital divide, supporting the Global South through capacity-building, joint laboratories, training programs, and equitable access to AI resources. The public sector is urged to lead in responsible AI deployment, while international collaboration is encouraged to advance innovation, data sharing, and ethical governance. Ultimately, the plan seeks to establish an inclusive, multilateral governance model with broad participation from governments, enterprises, academia, and civil society. Read More

29. *China Reported 1509 Large AI Models - Most Worldwide*



At the World Artificial Intelligence Conference (WAIC) in Shanghai, China revealed it now hosts 1,509 AI models, representing over 40% of the world's total 3,755. This underscores China's rapid progress toward becoming an AI powerhouse, narrowing the gap with the US. Major firms such as Tencent, Alibaba, SenseTime, and Huawei unveiled breakthroughs, including Tencent's 3D World Model, SenseTime's compute mall initiative, and Huawei's Supernode 384 AI processor system. The event also highlighted China's push for open-source AI, strong domestic collaboration, and expanding AI hardware capacity. Premier Li Qiang called for an international AI cooperation hub, reinforcing China's global ambitions. Read More

30. *UAE and WEF Launch Global Regulatory Platform (Grip) for AI Governance*



The UAE, in partnership with the World Economic Forum (WEF), has launched the 'Global Regulatory Innovation Platform (Grip)' in Geneva on July 4, 2025, to transform how nations govern emerging technologies like AI, digital finance, and biotech. Operating under the WEF's Centre for the Fourth Industrial Revolution (C4IR), Grip offers a two-year roadmap with three key deliverables: a 'Global Regulatory Playbook', a 'Regulatory Future Readiness Index', and a 'Global Regulatory Innovation Hub' for live policy testing. By bridging public trust, ethics, and real-world experimentation, Grip enables multistakeholder collaboration and anticipatory governance.

Supported by BCG and WEF industry networks, it will expand via regional labs in Africa, Asia, and Europe. Highlighting

UAE's digital leadership, including its National AI Strategy and integration of AI into governance - Grip positions itself as a "think-do tank" for agile, ethics-driven policymaking. It seeks to close regulatory gaps, reduce fragmentation, and empower legislators globally with adaptive, inclusive governance tools. Read More

31. White House launches AI Action Plan with Executive Orders on exports and regulation



The United States' newly released AI Action Plan and three accompanying Executive Orders mark a significant strategic pivot toward achieving global dominance in AI. The plan focuses on three pillars: accelerating AI innovation through deregulation and removing diversity, equity, and inclusion (DEI) considerations from federal AI tools; building large-scale AI infrastructure by fast-tracking data center projects and prioritizing fossil fuel and nuclear energy sources; and leading global AI diplomacy by promoting the export of a full American AI technology stack while countering Chinese influence in governance, standards, and supply chains. This approach emphasizes ideological neutrality as defined by the US administration, rapid industrial buildout with minimal environmental review, and incentivizing global adoption of US-developed AI systems through financing and diplomatic engagement. Read More

National

32. ASSOCHAM International Conference on Sovereign Tech for India's Digital Transformation



India's quest for digital self-reliance was the central theme at the recent ASSOCHAM International Conference on Sovereign Tech for India's Digital Transformation. The event brought together senior government officials and industry leaders to deliberate on the country's strategic roadmap for building a secure, scalable, and sovereign digital infrastructure. The discussions highlighted that sovereign tech is not merely a technical goal but a crucial enabler for national security, data privacy, and economic growth in an increasingly interconnected world. Key addresses from experts, including Sh. Mahaveer Singhvi from the Ministry of External Affairs, provided a strategic perspective on how a robust, domestic tech ecosystem is essential for India to assert its autonomy in the global digital landscape.

The conference also featured a deep dive into practical implementation, with industry leaders sharing their insights on creating trusted cloud ecosystems and other enablers for large-scale digital transformation. The participation of companies like SAP India Pvt. Ltd. underscored a significant trend: global technology players are actively aligning with India's sovereign tech agenda by developing specialized solutions that adhere to local data residency and security standards. The dialogue at the conference

served to reinforce that building India's sovereign tech stack is a collaborative effort, requiring strategic synergy between government policy and private sector innovation to pave the way for a digitally empowered and secure nation.

33. *DRDO conducts successful flight-trials of Advanced Unmanned Aerial Vehicle Launched Precision Guided Missile-V3*



The Defence Research & Development Organisation (DRDO) has successfully conducted flight-trials of the Advanced Unmanned Aerial Vehicle Launched Precision Guided Missile (ULPGM)-V3 at NOAR, Kurnool. An upgraded version of ULPGM-V2, the missile features a dual-channel seeker, day-night capability, two-way data link, and three modular warhead options—anti-armour, penetration-cum-blast, and pre-fragmentation. Released from a UAV developed by Bengaluru-based start-up Newspace Research Technologies, the trials validated the anti-armour configuration. The project involved DRDO labs, Adani Defence, Bharat Dynamics, and 30 MSMEs/start-ups. Defence Minister Rajnath Singh hailed it as a milestone showcasing India's readiness to indigenously produce advanced defence technologies. Read More

34. *DRDO successfully conducts two consecutive flight-tests of Pralay missile*

DRDO successfully conducted two consecutive flight-tests of the indigenously-developed Pralay missile from Dr APJ Abdul Kalam Island, Odisha, on July 28 and 29, 2025, as part of User Evaluation Trials. The tests validated its maximum and minimum range, with the missiles achieving pinpoint accuracy and meeting all objectives. Pralay is a solid-propellant quasi-ballistic missile capable of carrying multiple warheads with advanced guidance and navigation systems.



Developed by DRDO labs with industry partners including Bharat Dynamics and Bharat Electronics, the system will soon be inducted into the Armed Forces. Defence Minister Rajnath Singh hailed it as a major technological boost. Read More

35. *India and UK Sign Comprehensive Economic and Trade Agreement (CETA)*



India and the United Kingdom signed the landmark Comprehensive Economic and Trade Agreement (CETA) on July 24,

2025. Signed by Commerce Minister Piyush Goyal and UK's Business Secretary Jonathan Reynolds, the agreement secures unprecedented duty-free access for 99% of Indian exports, covering nearly the entire trade basket. It unlocks major opportunities for labour-intensive sectors such as textiles, leather, footwear, marine products, toys, and gems and jewellery, alongside engineering goods and chemicals, boosting employment and MSMEs. CETA also brings ambitious commitments in services, offering greater market access in IT, finance, education, telecom, and consulting, while easing mobility for Indian professionals including contractual service providers, engineers, chefs, yoga instructors, and musicians. A key breakthrough, the Double Contribution Convention, exempts Indian workers and employers from UK social security contributions for three years. With bilateral trade at USD 56 billion, both sides aim to double it by 2030. Read More

36. *India's First Private Test Facility for Depleted Heavy Water Upgradation*



TEMA India Ltd. has commissioned the country's first private test facility for upgradation of depleted heavy water, marking a major milestone in India's nuclear self-reliance. Inaugurated by senior officials from NPCIL and BARC, the facility has been developed under BARC technology transfer and a purchase order from NPCIL, and represents the first such achievement in the private sector. Earlier, such critical testing infrastructure existed only within BARC. The facility has already validated and dispatched its first consignment of eight distillation column sections - critical components for PHWRs - destined for projects at RAPP, GHAVP, and KAIGA. This development strengthens Atma-Nirbhar Bharat by reducing dependence on imports, building indigenous capability, and enabling private industry participation in strategic sectors. The collaboration reflects growing trust in TEMA's expertise and highlights the importance of public-private partnerships in advancing India's nuclear energy program and ensuring long-term energy security. Ceremonial activities, including a pooja and tree plantation, also marked the occasion. Read More

37. *'Meri Panchayat' App Wins Big on Global Stage; Bags WSIS Champion Award 2025 in Geneva, Switzerland*



The 'Meri Panchayat' mobile application has earned global recognition by winning the WSIS Prizes 2025 Champion Award in Geneva, Switzerland, under the category of Cultural and Linguistic Diversity and Local Content. The award, presented during the WSIS+20 High-Level Event organized by the ITU and co-hosted with UNESCO, UNDP, and UNCTAD, marks India's growing leadership in digital governance.

Developed by the Ministry of Panchayati Raj and NIC, the app empowers 2.65 lakh Gram Panchayats, 25 lakh elected representatives, and nearly 950 million rural citizens. It provides real-time access to Panchayat budgets, development plans, infrastructure details, grievance redressal,

and social audits, with multilingual support in 12+ languages. Minister Singh hailed the initiative for advancing transparency, participatory democracy, and bridging the grassroots knowledge divide. Read More

38. NISAR Satellite, India's Scientific Handshake With World



The successful launch of the NASA-ISRO Synthetic Aperture Radar (NISAR) satellite aboard GSLV-F16 from Sriharikota marks a new chapter in Indo-US space collaboration. Congratulating ISRO and NASA scientists, Union Minister Dr. Jitendra Singh described NISAR as a global benchmark in scientific partnership and a symbol of India's role as a trusted partner in advancing global good.

NISAR is the world's first Earth observation satellite to carry dual-frequency radars, L-band from NASA and S-band from ISRO on a single platform. This enables all-weather, day-and-night imaging with revisits every 12 days. Beyond disaster management and climate monitoring, NISAR will revolutionize sectors like aviation safety, maritime navigation, coastal management, and urban planning, making infrastructure and transport systems more resilient and efficient. Importantly, its open-access data policy will empower global researchers, developing nations, and disaster-response agencies. With a mission life of five years and a joint investment of over $1.5 billion, NISAR demonstrates India's growing technological maturity and its leadership in global scientific collaboration. Read More

39. Rio de Janeiro Declaration- Strengthening Global South Cooperation for a More Inclusive and Sustainable Governance



The Rio de Janeiro Declaration, adopted at the 17th BRICS Summit held in Brazil on 6 -7 July 2025, outlines a renewed commitment to enhancing Global South cooperation for a more inclusive and sustainable governance framework. Leaders reaffirmed BRICS principles - mutual respect, sovereign equality, and solidarity and pledged to strengthen collaboration across three pillars: political-security, economic-finance, and cultural/people-to-people ties.

The Declaration welcomed Indonesia as a full BRICS member and upgraded status for eleven partner countries, reflecting expanded global participation. It also endorsed key initiatives such as the BRICS Framework on Climate Finance, the global governance of AI, and the BRICS Partnership for the Elimination of Socially Determined Diseases, signaling commitment to inclusive solutions for emerging global challenges. Crucially, the Declaration called for comprehensive reform of UN institutions - including the Security Council, IMF, World Bank, and WTO to make them more democratic, effective, and representative of Global South aspirations. Together, these commitments reflect India's push for South-led multilateral governance and an equitable international order aligned with the interests of emerging economies. Read More

WHAT'S UPCOMING?

40. India to host AI Impact Summit in February 2026, focusing on democratizing AI to solve real-world challenges across sectors. (19-20 Feb 2026)



India will host the AI Impact Summit in February 2026, underscoring its emerging role as a global hub for responsible and inclusive AI development. The government, through the IndiaAI Mission, is building a comprehensive ecosystem that blends innovation with regulation to ensure AI benefits are widely shared. A key component of this strategy is a techno-legal framework designed to govern AI usage in areas such as fairness, safety, accountability, transparency, and privacy. This framework will help India set global benchmarks for AI governance while protecting citizens' rights.

Complementing regulation, India is also investing heavily in AI infrastructure and research. Under the Compute Infrastructure program, over 34,000 GPUs have been provisioned at subsidized rates (~₹67 per GPU-hour), ensuring affordable access for startups, MSMEs, academia, and government institutions. This democratization of high-performance computing aims to reduce barriers to entry and spur innovation across sectors. The AIKosh platform has been significantly expanded, now offering more than 1,000 curated datasets and 208 models covering diverse domains including agriculture, healthcare diagnostics, natural language processing, and climate science. These resources are open-access, enabling innovators, researchers, and developers to create India-centric solutions.

India is also supporting the creation of indigenous large language and foundational models, trained on Indian datasets and tailored to local languages, contexts, and priorities. These models are expected to enhance decision-making in healthcare, agriculture, education, governance, and disaster management, with open-source releases to encourage downstream innovation.

To further encourage innovation, 30 AI solutions addressing public-interest challenges are being funded, and AI startups are being connected with international incubators such as Station F and HEC Paris, enabling global outreach. Together, these initiatives highlight India's ambition to lead the world in responsible, inclusive, and human-centric AI innovation.

41. Sixth Edition of International Energy Conference and Exhibition 2025 (22-23 Sept 2025)



India is advancing its energy transformation with a strong commitment to achieving net-zero emissions by 2070, while ensuring inclusive economic growth. This transition emphasizes energy access, efficiency, and

secure supply chains across sectors. The 6th CII International Energy Conference & Exhibition (IECE), themed 'Driving Energy Transition: Solutions for a Net-Zero World,' will bring together global policymakers, industry leaders, researchers, and innovators to explore sustainable and scalable pathways to net zero.

Serving as a platform for transformative dialogue, the event aims to energize clean energy ecosystems and empower communities to accelerate the global journey toward a sustainable future. Know More

THE TECH SHOWCASE! (ANNEXURE)

Compilation of Technology Innovations by premier research institutions of India. The details are shared in the Annexure.

Council of Scientific and Industrial Research (CSIR)

1. Pink Bollworm-Resistant Genetically Modified Cotton

ICAR – New Delhi

1. Seed production of vermiculated spinefoot, Siganus vermiculatus
2. Multi-utility E-vehicle with arrangement of reaper for harvesting
3. Solar power operated free-flowing water for jute retting for quality fibre production
4. Pigeonpea Milling By-Product Agar (PMBA) Media
5. Biopolymeric Bacillus thuringiensis microcapsules by complex coacervation
6. CR Dhan 330 (Low nitrogen tolerant rice variety)
7. Bio NPK Liquid Formulation
8. Bio Phos (Kluyvera cryocrescens)
9. Bio Zn Liquid Formulation
10. Biogrow
11. Bio Potash Liquid Formulation
12. Bio-Bacter Liquid Formulation
13. RhizoNBAIM Liquid Formulation
14. Bio Phos (Plus) (Paenibacillus tylopili)
15. Bio Sulphur
16. Portable Device to Perform Isothermal Amplification
17. Nanoemulsion composition for pest management
18. Rapid diagnostic technique for identification of Fall armyworm (Spodoptera frugiperda)
19. Technology of Instant Buttermilk Powder
20. Colorimetric Urine Test for Early Pregnancy Detection in Livestock
21. Process technology for extraction of hesperidin from immature kinnow fruits
22. Natural Fibre Waste Biomass-based High-Quality Compost Preparation
23. Engineered Cotton Fabric Face Mask

IIT Roorkee

1. A Device for Analyte Detection and Method Therefor

2. A Method for Metal Free Trifluoroethylation and Perfluoroalkylation of Amines and Application Thereof
3. A Method for N-Methylation of Amines Using a Ni-Based Catalytic System
4. A Method of Synthesis of Paracetamol Using Cobalt Nanocatalyst
5. A Method for Synthesizing N-Formylated Amines Using CO2 as a Green Feedstock
6. A Method of Synthesis of Bis (Perfluoroalkoxyiodo) Benzene and Application Thereof
7. System and Method for Enhancing Fairness in Imaging Applications Through Mutual Correction and Groupwise Intra-Class Sample Interaction
8. Flexible Infra-red Metasurface Absorber for Large Incident Angles
9. A Sustainable Roof-top Harvested Rainwater Filtration System Based on Low-Cost Single Stage Vertical Filter
10. Accidental Quasi-Bound States in the Continuum with Extremely High Quality Factors in Visible Range: Sensing and Switching Applications
11. Microwave Assisted Synthesis of Manganese-Molybdenum Based Nanofertilizer in Aqueous Medium
12. Aerosol Foam Assisted Nanostructured Lipid Carriers for the Treatment of Psoriasis
13. A Printed Patterns of Thin Film Heaters on a Quartz Substrate Using Silver Nanoparticle Ink and Its Method of Printing
14. Coated Zinc Anode for Zinc Batteries and Process for Preparation Thereof
15. Biodegradable Biopesticide Formulation and Preparation Thereof
16. A Barnyard Millet Based Edible Straws and Its Method of Preparation

Tech. Scholarships/Fellowships for Students & Researchers*

A. Indian Council for Cultural Relations - Scholarship Schemes
https://a2ascholarships.iccr.gov.in/home/getAllSchemeList

1. **Dr. A.P.J. Abdul Kalam Commonwealth Scholarship Scheme (formerly Commonwealth Scholarship Scheme)** - Named after India's 'Missile Man', this scheme encourages STEM, including science, technology, and engineering disciplines.
2. **B.R. Ambedkar Scholarship Scheme (Aid to Bhutan Scholarship Scheme)** - Explicitly supports BE and B.Tech. studies for Bhutanese students.
3. **Maulana Azad Scholarship Scheme (for Sri Lanka, agriculture-related fields)** - Covers agriculture-related fields and sciences, including engineering.
4. **Rajiv Gandhi Scholarship Scheme (for Sri Lanka, engineering/information technology)** - Specifically for engineering and information technology.
5. **Quad STEM Scholarship Scheme (for Indo-Pacific region)** - Exclusively for STEM and undergraduate engineering programmes.

B. Fellowship of Ministry of Science & Technology(DST/DBT/CSIR(DSIR)/SERB)
https://dst.gov.in/fellowship-opportunities-researchers

1. **Extra Mural Research Funding (Individual Centric):** SERB provides funding to scientists for research in various areas of science and technology.
2. **Scheme for funding High Risk - High Reward Research:** This scheme supports proposals that are conceptually new and risky, with the potential for a paradigm-shifting impact on science and technology.
3. **Empowerment and Equity Opportunities for Excellence in Science (EMEQ):** This scheme provides research support to scientists from Scheduled Castes and Scheduled Tribes.
4. **Start-Up Research Grant (Young Scientists):** This grant has been restructured into two new schemes: the Early Career Research Award (ECRA) and the National Post-Doctoral Fellowship (NPDF).
5. **J C Bose National Fellowship:** A highly selective fellowship to recognize active scientists and engineers for their outstanding performance and contributions.
6. **Ramanujan Fellowship:** This fellowship is for brilliant scientists and engineers from all over the world who want to return to India to pursue scientific research.
7. **National Post Doctoral Fellowship (N-PDF):** A fellowship to support motivated young researchers in science and engineering under the guidance of a mentor.
8. **Early Career Research Award:** A scheme to provide quick research support to young researchers in their early careers**.**
9. **SERB Overseas Postdoctoral Fellowship (SERB-OPDF):** A fellowship that provides an opportunity for Indian researchers with a PhD to undertake postdoctoral research in top institutions abroad (excluding the USA).
10. **Scheme for Young Scientists & Technologist (SYST)**
11. **IYBA Innovative Young Biotechnologist Award**
12. **INSPIRE Scheme**: The Innovation in Science Pursuit for Inspired Research (INSPIRE) is a program from the Department of Science & Technology (DST) that attracts talented students to a career in science.
13. **VAIBHAV Fellowship:** The VAIshwik BHArtiya Vaigyanik (VAIBHAV) Fellowship encourages collaboration between Indian diaspora scientists and Indian academic and scientific institutions.
14. **Sponsored Research (RESPOND):** The Indian Space Research Organisation (ISRO) provides financial support for research and development activities related to Space Science, Technology, and Applications to academia in India.
15. **Indo-U.S. Fellowship for Women in STEMM:** This fellowship provides opportunities for Indian women scientists, engineers, and technologists to conduct collaborative research in premier U.S. institutions.

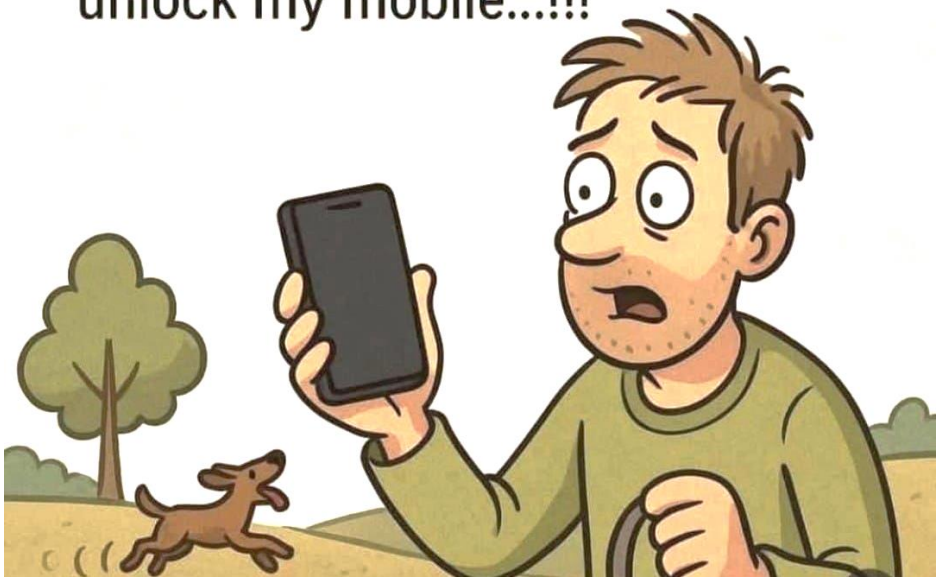
*More to be added in future editions

#NESTLaugh-orithm

Technology Disaster

I was setting the voice recognition password of my mobile, a dog barked and ran away...

I am still looking for the dog to unlock my mobile...!!!



For suggestions/feedback, please reach out to us on:
nestsection@mea.gov.in,
fellow3.nest@mea.gov.in



The New, Emerging, and Strategic Technologies (NEST) Division, established in 2020 under the Ministry of External Affairs (MEA), focuses on technology diplomacy and the international aspects of critical, strategic and emerging technologies. It enhances India's participation in global forums, shaping technology governance and safeguarding national interests. As technology has become central to economic and geopolitical agendas, the Division coordinates with domestic and international stakeholders on advancements like Artificial Intelligence, Quantum Technology, 5G/6G, Biotechnology, Green energy, Semiconductors, and others. NEST also builds internal capacity within MEA, facilitates policy engagement, and assesses foreign policy implications. It plays a key role in shaping India's stance on global tech governance and cooperation.

New, Emerging & Strategic Technologies Division
Ministry of External Affairs
Government of India