



New, Emerging & Strategic Technologies Division

Ministry of External Affairs

Government of India

TECH

PULSE

NEST NEWSLETTER

NOVEMBER 2025



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- *Scientists develop floating Device that harvests energy from raindrops*
- *Government of India launches 'YUVA AI for ALL' - a free national course to help everyone understand Artificial Intelligence*

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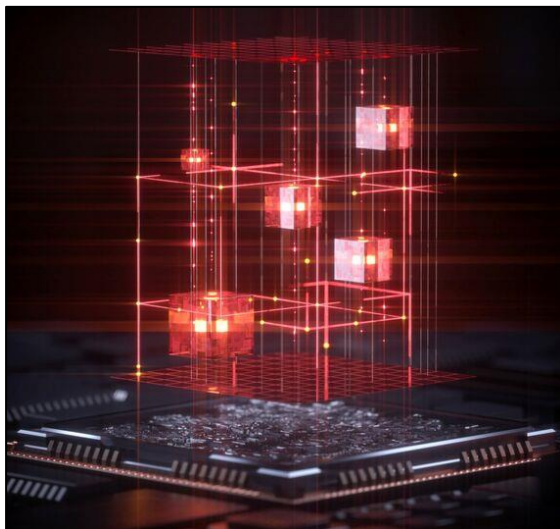
→ The Tech Showcase!



ARTIFICIAL INTELLIGENCE

International

1. *AI at the speed of light just became a possibility*



Aalto University researchers have shown that a single beam of light can perform the heavy mathematical work that powers modern artificial intelligence, reaching performance comparable to supercomputers while using far less energy. The research introduces a method called single shot tensor computing, where complex AI calculations are completed during one pass of light through an optical system.

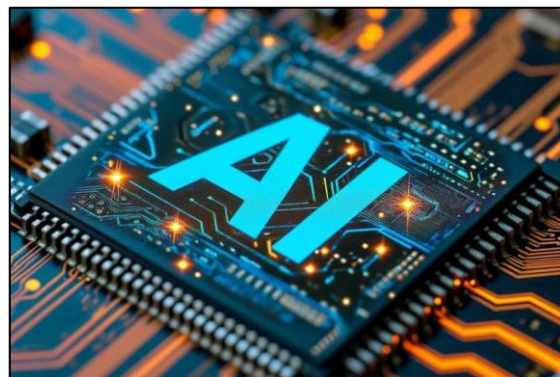
Tensor operations are essential to AI tasks such as image recognition, language understanding, and data analysis. These operations involve manipulating information across many dimensions, similar to rearranging a Rubik's cube in multiple directions at once. Conventional computers and GPUs must execute these steps sequentially, which limits speed and increases energy consumption as data volumes grow. Light, however, can process many operations simultaneously by nature.

The research team, led by Dr. Yufeng Zhang from Aalto University's Photonics

Group, encoded digital data into the amplitude and phase of light waves. When these waves interact, mathematical operations like matrix and tensor multiplication occur naturally. By using multiple wavelengths, the system can also manage higher order tensor calculations that are critical for deep learning models.

A key advantage of the approach is that it works passively. No electronic switching or active control is required during computation, since the calculations happen automatically as light propagates. According to Professor Zhipei Sun, this makes the method compatible with many optical platforms and suitable for integration into photonic chips. Looking ahead, the team expects adoption within three to five years, enabling faster, low power AI systems. [Read More](#)

2. *Why fears of a trillion-dollar AI bubble are growing?*



Fears of a trillion dollar artificial intelligence bubble are growing as spending on the technology accelerates faster than clear evidence of sustainable profits. Tech companies are pouring hundreds of billions of dollars into chips and massive data centers to support chatbots and future AI driven automation. Executives argue they

must invest aggressively to avoid falling behind rivals, even while privately questioning how quickly AI can be monetized. The result is an unprecedented level of capital committed to a technology that is still proving its business value.

Major players including OpenAI Meta and Microsoft are driving this surge, with plans that could ultimately cost trillions. Financing methods are also raising concern. OpenAI is exploring debt and unconventional partnerships, including large scale backing from Nvidia, whose customers often rely on its chips. Other firms such as Meta and data center developers are taking on tens of billions of dollars in loans. Critics warn that this web of spending and financing resembles past speculative cycles where growth expectations ran ahead of fundamentals.

The revenue outlook adds to the unease. Bain estimates AI companies will need two trillion dollars in annual revenue by 2030 to cover computing costs, yet they are likely to fall far short. Studies from MIT Harvard and Stanford suggest most organizations are not seeing meaningful returns from AI, and in some cases productivity may even be harmed by low quality AI generated work. At the same time developers are encountering diminishing returns from ever larger models, casting doubt on assumptions that scale alone will deliver dramatic breakthroughs.

Competition from low cost Chinese AI models and constraints on power grids further threaten the ability of companies to recoup massive infrastructure investments. Market volatility has already reflected these anxieties, including sharp selloffs following the release of cheaper competing models.

Industry leaders acknowledge the risk. Sam Altman and Mark Zuckerberg concede a bubble is possible but argue the bigger danger is underinvesting in a transformative

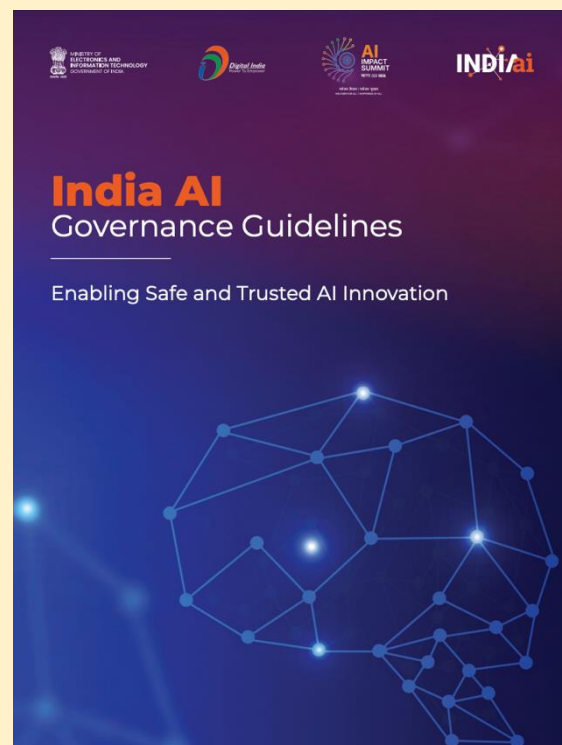
technology. Supporters note that large tech firms are financially strong and that AI adoption is rapid, with hundreds of millions of users and fast revenue growth at leading companies.

As with the dot com era, many firms may fail, but some could emerge as lasting giants. The central question is whether today's spending spree will be justified by future profits or remembered as one of the largest capital misallocations in history.

[Read More](#)

National

3. *India AI Governance Guidelines Released Ahead of 2026 Global Summit*



India has released its new AI Governance Guidelines ahead of the India-AI Impact Summit 2026, marking a significant shift in how the country approaches artificial intelligence. Unveiled by the Ministry of Electronics and Information Technology in November 2025 under the IndiaAI Mission, the framework treats AI governance not merely as regulation, but as a core element

of national economic and industrial strategy.

Rather than adopting a rigid, law heavy model, India has chosen a flexible, principle based approach built around six policy pillars covering infrastructure, capacity building, regulation, risk mitigation, accountability and institutions. These are guided by seven AI Sutras that emphasise trust, people first development, innovation, fairness, accountability, transparency and safety. The guidelines focus strongly on expanding access to computing resources such as GPUs, building India specific datasets, supporting indigenous foundation models, and integrating AI with Digital Public Infrastructure including Aadhaar and UPI.

The framework avoids introducing a standalone AI law, instead relying on existing legislation like the IT Act and the Digital Personal Data Protection Act. It promotes self regulation, regulatory sandboxes and voluntary risk frameworks, allowing sectors such as fintech and edtech

to innovate quickly without heavy compliance burdens. India specific risk assessment tools, transparency reporting, graded liability and grievance redressal mechanisms are encouraged to manage harms such as deepfakes and bias.

New institutions including the AI Governance Group, Technology and Policy Expert Committee, and AI Safety Institute will coordinate policy, technical oversight and international cooperation. The guidelines also place strong emphasis on large scale AI skilling for citizens and government personnel.

Overall, India is positioning AI governance as a lever for growth, workforce transformation and global competitiveness. The approach offers an alternative model for emerging economies seeking to scale AI adoption while maintaining ethical and societal safeguards. [Read More](#)

BIOTECHNOLOGY & HEALTH

International

4. *Scientists reveal a hidden alarm system inside your cells*



Scientists at Ludwig Maximilian University of Munich have discovered how ribosomes act as an internal alarm system that helps cells detect trouble early. Ribosomes are primarily known for producing proteins by reading genetic instructions on messenger

RNA, but the new research shows they also play a key role in sensing cellular stress. When protein production is disrupted by factors such as damaged RNA, a lack of amino acids, or viral infection, ribosomes can stall and collide with one another. These collisions serve as a warning signal that something is wrong.

The study explains how these ribosome collisions trigger a protective pathway known as the ribotoxic stress response. Central to this process is a protein called ZAK, which functions as a kinase that activates downstream signaling molecules. Using a combination of biochemical experiments and cryo electron microscopy, the researchers showed that ZAK is directly activated by ribosome collisions. The collided ribosomes present specific

structural features that allow ZAK to bind to them.

Once attached, ZAK molecules pair up in a process called dimerization. This pairing switches ZAK into an active state and starts a signaling cascade that helps the cell respond to stress. Depending on the severity of the damage, the response may aim to restore normal function or initiate programmed cell death to protect the organism as a whole.

Understanding how ZAK detects ribosome collisions is important because it reveals how cells recognize stress with remarkable speed. It also clarifies how protein production, quality control mechanisms, and immune responses are coordinated. Since abnormal ZAK activity is linked to inflammatory diseases and chronic cellular stress, these findings provide valuable insight into fundamental stress biology and may inform future medical research. [Read More](#)

National

5. *AI unlocks cancer's secrets for personalized therapy*



Researchers in India have developed a powerful artificial intelligence framework that could transform how cancer is understood and treated by focusing on its molecular behavior rather than just tumor

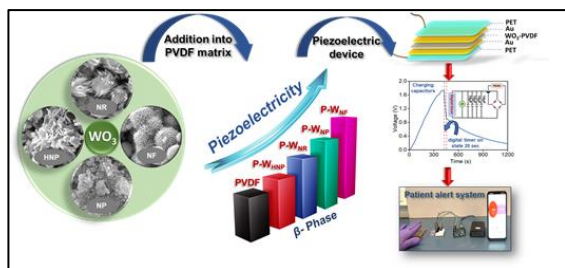
size or spread. The study, led by scientists from the S N Bose National Centre for Basic Sciences in collaboration with Ashoka University, introduces a system called OncoMark that analyzes cancer through its underlying biological programs known as the hallmarks of cancer.

Traditionally, cancer diagnosis and treatment decisions rely on staging systems such as TNM, which describe how large a tumor is and how far it has spread. While useful, these systems often fail to explain why patients with the same cancer stage can have very different outcomes. Cancer progression is driven by hallmarks such as metastasis, immune evasion, genomic instability, and resistance to therapy, which reflect the molecular personality of a tumor.

OncoMark uses artificial intelligence to decode this molecular complexity. The framework was trained on data from 3.1 million individual cancer cells across 14 cancer types, generating synthetic pseudo biopsies that capture hallmark driven tumor states. This allowed the AI to learn how multiple hallmarks interact to drive tumor growth and treatment resistance.

The system demonstrated more than 99 percent accuracy in internal tests and maintained over 96 percent accuracy across independent datasets. It was further validated using around 20,000 real patient samples from eight major datasets. For the first time, researchers were able to visualize how hallmark activity increases as cancer advances. The framework can identify which hallmarks are active in an individual patient's tumor, helping clinicians choose therapies that directly target those processes. It may also flag aggressive cancers earlier, enabling more personalized and timely treatment. [Read More](#)

6. *Flexible piezoelectric nanocomposites developed for biomedical and wearable sensors*



Researchers at the Centre for Nano and Soft Matter Sciences in Bengaluru have developed a flexible piezoelectric nanocomposite that shows strong potential for biomedical and wearable sensor applications. The innovation is based on a polymer nanocomposite made by embedding flower shaped tungsten trioxide nanomaterials into a polyvinylidene fluoride matrix. The goal of the research was to improve the conversion of everyday mechanical energy into electrical energy, an area of growing interest for self powered devices.

The team followed a systematic experimental approach to understand how different nanomaterial characteristics influence piezoelectric performance. Using the same nanofiller with varying morphologies, crystal structures, and surface charges, they examined how each interacted with the polymer. Among four distinct morphologies, the nanoflowers stood out due to their unique crystal structure and high surface charge. These properties enabled stronger interaction with the polymer, leading to a higher proportion of the piezoelectric phase in the composite.

To further improve performance, the researchers optimized the concentration of nanoflowers within the polymer matrix. This process involved fabricating and testing self powered energy harvesting devices to identify the most efficient composition. The study provides valuable insight into how nanoparticle shape and surface properties can be used to enhance the piezoelectric behavior of flexible polymers.

Published in ACS Applied Electronic Materials, the work also demonstrated the feasibility of using this technology for real time biomedical monitoring. The resulting device is sensitive, energy efficient, and capable of capturing biomechanical energy from movements such as heartbeats, breathing, and walking. This makes it well suited for wearable health monitoring systems that operate without external power sources and supports the development of compact, sustainable healthcare technologies. [Read More](#)

7. *India Launches First Indigenous CRISPR Gene Therapy for Sickle Cell Disease*



India has launched its first indigenous CRISPR based gene therapy for Sickle Cell Disease, marking a major milestone in the country's public health and genomic medicine journey. The therapy, named BIRSA 101, was launched by Union Minister for Science and Technology Dr. Jitendra Singh and is dedicated to Bhagwan Birsa Munda on the occasion of his 150th birth anniversary. The initiative represents a decisive step toward the national goal of eliminating Sickle Cell Disease, which disproportionately affects tribal populations in central and eastern India.

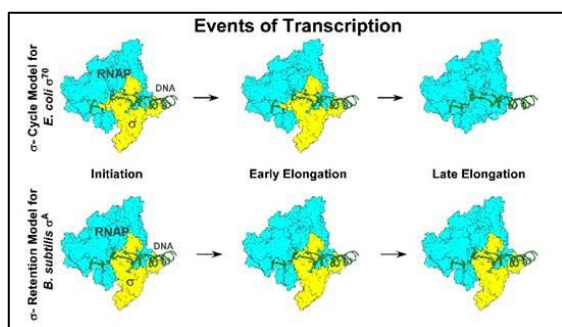
Dr. Singh highlighted that the development of BIRSA 101 demonstrates India's growing scientific capability to deliver advanced and innovative therapies at a fraction of global costs. While similar gene therapies abroad can cost between 20 and 25 crore rupees, the indigenous approach promises far more affordable access. This

breakthrough is especially significant for underserved tribal communities, where the disease burden is highest and treatment options have traditionally been limited.

The Minister emphasized the importance of making complex scientific achievements accessible to the public. He urged research institutions to communicate breakthroughs in simple language using infographics and social media, ensuring wider awareness and understanding of their societal impact. He also praised the strengthening collaboration between government research institutions and Indian industry, particularly partnerships with organizations such as the Serum Institute of India.

According to Dr. Singh, such public private synergy has already delivered globally recognized successes in vaccines for COVID 19, HPV, and other diseases. He expressed confidence that similar collaborations will now position India as a leader in gene therapy innovation. The launch of BIRSA 101 signals a historic shift toward affordable, homegrown solutions for genetic disorders and reinforces India's ambition to transform its healthcare landscape through science and technology.
[Read More](#)

8. Indian scientists helped rewrite a 50-Year-Old biological rule



Indian and international researchers have overturned a long accepted biological model that has shaped the understanding of bacterial gene regulation for nearly five decades. The study, led by scientists from

the Bose Institute under the Department of Science and Technology in collaboration with Rutgers University, challenges the classical sigma cycle model that explains how bacteria initiate gene transcription.

For almost 50 years, textbooks have taught that bacteria regulate gene expression through a cycle in which sigma factors bind RNA polymerase to start transcription and then detach once elongation begins. This model was largely based on studies of the Escherichia coli sigma70 factor and was assumed to apply universally across bacteria. The new research shows that this assumption is incorrect.

The study reveals that in Bacillus subtilis, the main sigma factor sigmaA remains bound to RNA polymerase throughout the entire transcription process instead of being released after initiation. A modified version of the E. coli sigma70 factor was also found to behave in the same way. Only the full length E. coli sigma70 followed the traditional pattern of dissociating during elongation.

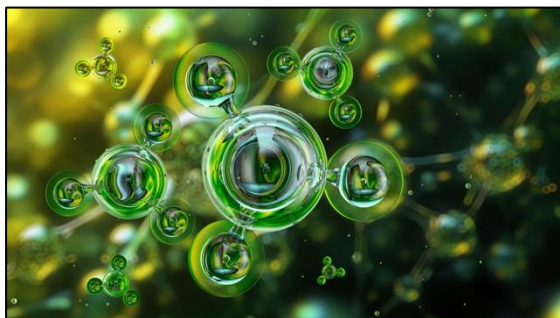
Using advanced biochemical methods, chromatin immunoprecipitation, and fluorescence based imaging, the researchers tracked sigma factor behavior in real time. Their findings demonstrate that the sigma cycle is not a universal mechanism but varies across bacterial species.

This discovery reshapes fundamental ideas about bacterial gene regulation and its evolution. It has important implications for understanding bacterial stress responses and physiology and could influence the development of new antibiotics that target transcription. The findings may also help scientists better engineer bacteria for applications such as biofuel production, biodegradable materials, and therapeutic compound synthesis.
[Read More](#)

CLEAN ENERGY

International

9. *Hidden copper switch supercharges green ammonia production*



Researchers at Tokyo Metropolitan University have uncovered a hidden mechanism that could significantly improve green ammonia production, offering a cleaner alternative to the energy intensive Haber Bosch process. Ammonia is essential for fertilizer and global food production, yet its conventional manufacturing contributes substantially to carbon dioxide emissions. As a result, low temperature and low pressure methods have become a major focus of sustainable chemistry research.

The team investigated the electrochemical nitrate reduction reaction, a promising approach that produces ammonia from nitrate ions at room temperature and atmospheric pressure. Copper oxide is known to be one of the most effective catalysts for this reaction, but the detailed mechanism behind its performance was not fully understood. Led by Professor Fumiaki Amano, the researchers discovered that the catalyst does not remain chemically unchanged during the reaction, as previously assumed.

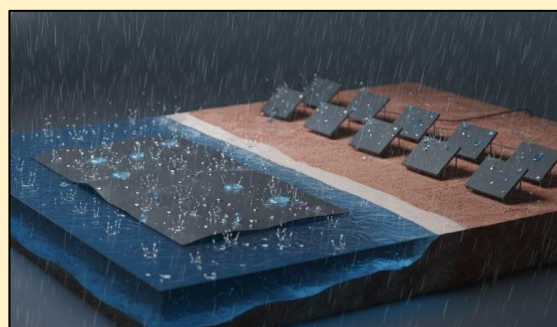
Using operando X ray absorption techniques, the scientists tracked changes in the catalyst structure while the reaction was taking place. They observed that under certain conditions, copper oxide partially

transforms into metallic copper during the reaction itself. At higher positive voltages, nitrate ions bind to the catalyst surface and prevent this transformation, leading mainly to the formation of nitrite ions. When the voltage becomes more negative, this surface passivation is lifted and metallic copper particles appear.

This shift coincides with a sharp rise in ammonia production. The researchers found that metallic copper plays a crucial role in converting nitrite ions into ammonia by facilitating hydrogen addition. The discovery reveals that the in situ formation of metallic copper is essential for high efficiency ammonia generation.

These insights provide a clear roadmap for designing improved electrocatalysts and advancing sustainable ammonia production technologies, bringing truly green fertilizer production closer to reality. [Read More](#)

10. *Scientists Develop Floating Device That Harvests Energy From Raindrops*



Scientists have developed a floating device that can generate electricity directly from falling raindrops, offering a new approach to renewable energy harvesting. The research, carried out by a team at Nanjing University of Aeronautics and Astronautics, introduces a water integrated droplet electricity generator that floats on water surfaces and uses water itself as both a structural base and an electrical electrode.

Traditional droplet electricity generators rely on rigid substrates and metal electrodes beneath dielectric films. While capable of producing high voltages, these systems are often heavy, expensive, and difficult to scale. The newly developed floating design replaces solid components with natural water, reducing overall material weight by about eighty percent and cutting costs by nearly half, while still achieving comparable electrical output.

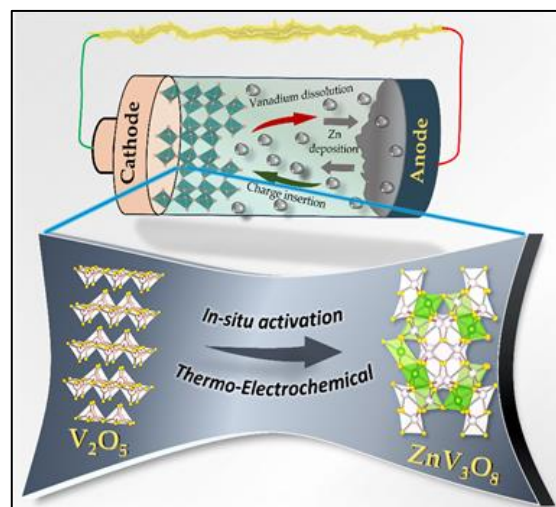
When raindrops strike the floating dielectric surface, water's natural incompressibility and surface tension provide mechanical stability and allow droplets to spread efficiently. At the same time, ions in the water act as charge carriers, enabling electricity generation. Experiments showed that each droplet could generate peak voltages of around 250 volts, matching conventional land based systems.

The device also demonstrated strong durability, maintaining stable performance across different temperatures, salt concentrations, and even in outdoor lake water affected by biofouling. A self regulating drainage design prevents excess water buildup and preserves efficiency. To demonstrate scalability, the researchers built a larger integrated system that powered fifty LEDs and charged capacitors within minutes.

This floating generator could be deployed on lakes, reservoirs, or coastal areas without using land, making it suitable for powering sensors, small electronics, and environmental monitoring systems. While further work is needed for large scale outdoor deployment, the study highlights the promise of nature integrated designs for future green energy technologies. [Read More](#)

National

11. Research paves the way for efficient Zinc-ion batteries (ZIBs) for a greener future



Bengaluru based scientists have reported a major advance that could accelerate the development of efficient and environmentally friendly zinc ion batteries, offering a strong alternative to lithium based energy storage. While lithium batteries dominate today due to their high energy density, they raise concerns related to safety, cost, and environmental impact. In contrast, aqueous zinc ion batteries are safer, more sustainable, and rely on abundant materials, but their performance has been limited by unsuitable cathode materials.

A research team led by Dr Ashutosh Kumar Singh at the Centre for Nano and Soft Matter Sciences, an autonomous institute under the Department of Science and Technology, has addressed this challenge by developing a simple and effective strategy to enhance cathode performance. The researchers focused on vanadium oxide, a commonly studied cathode material that previously failed to deliver strong results in zinc ion systems. Using an in situ thermo electrochemical activation process, they deliberately modified its structure to create a new form known as zinc vanadium oxide.

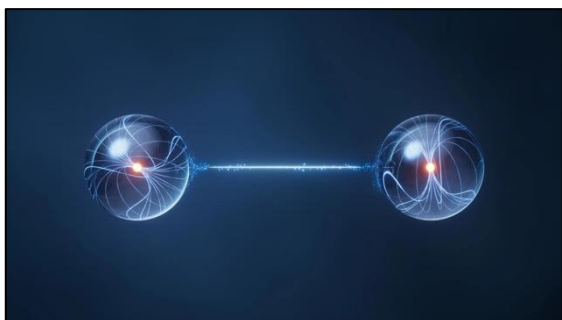
This activation process introduces controlled structural defects that increase internal pathways and storage sites, allowing zinc ions to move more easily during charging and discharging. The modified structure also enables interaction with hydrogen ions from the electrolyte, which improves structural stability and reduces resistance to ion transport. As a result, the activated cathode shows much higher energy density and exceptional cycling stability, maintaining performance over thousands of charge cycles.

Published in *Advanced Energy Materials*, the study tackles a long standing limitation in zinc ion battery research. The team emphasizes that this oversimplified yet novel activation strategy can be extended to other cathode materials, opening new opportunities for scalable, safe, and sustainable energy storage technologies that support a greener future. [Read More](#)

QUANTUM & PHOTONICS

International

12. *A Breakthrough could connect quantum computers at 200X the distance*



Scientists at the University of Chicago have achieved a major breakthrough that could dramatically extend the reach of quantum communication, bringing the idea of a global quantum internet much closer to reality. The challenge in building large scale quantum networks lies in maintaining quantum coherence, the fragile state that allows particles to remain entangled as information travels through optical fibers. Until now, limited coherence times meant quantum links could only span a few kilometers.

A research team led by Assistant Professor Tian Zhong demonstrated a new way to build rare earth doped crystals that significantly boosts coherence times. By using a precise atom by atom construction

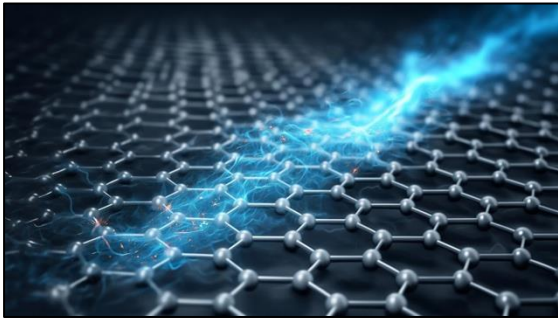
technique known as molecular beam epitaxy, the researchers increased coherence from around 0.1 milliseconds to more than 10 milliseconds, with a peak of 24 milliseconds. This represents a two hundred fold improvement and could theoretically enable quantum communication over distances of up to two thousand kilometers or more.

Rather than changing the type of material used, the team reimagined how it is made. Traditional crystal growth involves melting materials at very high temperatures and then shaping them afterward, which introduces impurities and defects. Molecular beam epitaxy avoids this by assembling the crystal layer by layer with exceptional purity, allowing quantum properties to remain stable for much longer.

The advance opens a realistic path toward linking quantum computers across cities, countries, and even continents. The researchers are now preparing laboratory scale tests using long coils of optical fiber to simulate real world distances. If successful, this work could mark a turning point in the development of secure global quantum networks. [Read More](#)



13. Graphene's Quantum Leap: How a 'Miracle Material' Could Transform Electronics



Scientists have uncovered a powerful new way to control graphene, a material already famous for its extraordinary strength and electrical conductivity. In a study led by the University of Göttingen, researchers have directly observed Floquet effects in graphene for the first time, resolving a long standing scientific debate and revealing new possibilities for future quantum technologies.

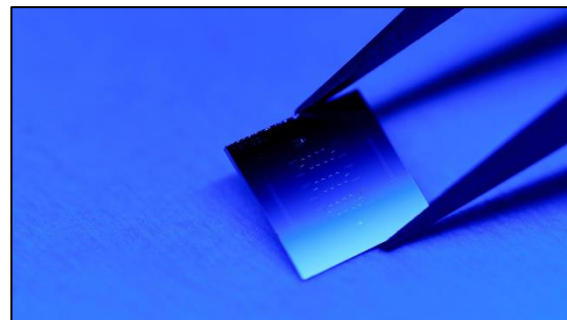
Graphene consists of a single layer of carbon atoms arranged in a tightly bonded lattice. It is only one atom thick, yet it conducts electricity extremely efficiently and remains highly stable. Because of these properties, it has been widely studied for applications such as flexible electronics, advanced sensors, batteries, and solar cells. The new research shows that graphene's capabilities extend even further into the quantum realm.

The team demonstrated that graphene's electronic properties can be reshaped almost instantaneously using ultrafast laser pulses. This process, known as Floquet engineering, uses periodic bursts of light to temporarily alter the quantum states of electrons. Until now, it was unclear whether this technique could work in metallic or semi metallic materials like graphene. The direct observation of Floquet states confirms that it can.

Using femtosecond momentum microscopy, the researchers tracked how electrons in graphene responded to light on extremely short timescales. Their measurements showed that light can dynamically modify graphene's electronic structure in a precise and controllable way. This means the material can be tuned on demand without permanent chemical changes.

The ability to manipulate quantum states with light opens the door to custom engineered quantum materials. Such control could lead to new kinds of electronics, highly sensitive detectors, and more reliable quantum devices. By showing that light can act as a fast and flexible control tool, this work brings laser engineered quantum technologies much closer to practical use. [Read More](#)

14. Princeton's new quantum chip marks a major step toward quantum advantage



Researchers at Princeton University have developed a new superconducting quantum chip that marks a major advance toward practical quantum computing. The team created a transmon qubit with a coherence time exceeding one millisecond, a dramatic improvement over existing designs. This lifetime is roughly three times longer than the best results previously achieved in laboratory experiments and nearly fifteen times longer than the standard coherence times used in today's large scale quantum processors.

Quantum computers are limited not only by how many qubits they contain but also by how long each qubit can reliably store information before errors occur. Short coherence times have been a central obstacle to achieving quantum advantage, where quantum machines outperform classical computers. By significantly extending qubit lifetimes, the Princeton design strengthens error correction and enables more complex computations.

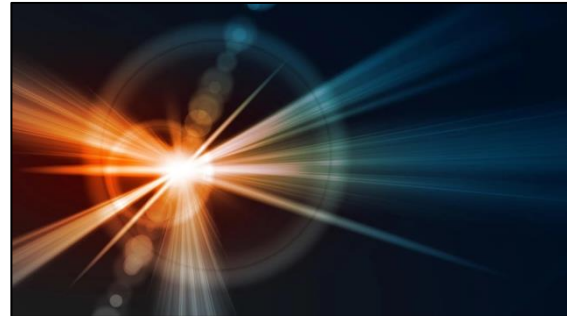
The breakthrough comes from a new materials strategy. The researchers used tantalum, a metal with fewer microscopic defects than commonly used aluminum, and paired it with a high purity silicon substrate instead of sapphire. Surface defects and substrate losses are known to drain energy from qubits, and the tantalum silicon combination greatly reduces these losses. Importantly, the new qubit design is compatible with existing quantum chip architectures used by major companies, making it easier to integrate into current processors.

The team demonstrated the approach by building and testing a working quantum chip, showing that the design can scale and support error correction. Analysis suggests that adopting this technology could increase the effective performance of advanced processors by orders of magnitude as systems grow larger. The work represents the largest single improvement in transmon qubit coherence in more than a decade and highlights how advances in materials science can unlock the next stage of quantum computing. [Read More](#)

15. Scientists just teleported information using light

Scientists at the University of Stuttgart have successfully teleported quantum information using light, marking a major milestone toward building a real quantum internet. The breakthrough demonstrates quantum teleportation between photons

generated by two separate quantum dots, a challenge that had not been overcome before and is essential for secure long distance quantum communication.



Quantum communication relies on individual photons to carry information encoded in their polarization. Because of the laws of quantum physics, any attempt to intercept this information leaves detectable traces, making the method inherently secure. However, transmitting quantum information over long distances through optical fibers is difficult because quantum signals cannot be amplified like classical data. Instead, they must be renewed through a process known as quantum teleportation, which transfers the quantum state from one photon to another without copying it.

The Stuttgart team focused on developing a key building block of future quantum networks, the quantum repeater. They achieved teleportation by using highly similar semiconductor quantum dots that act as artificial atoms and emit single photons with nearly identical properties. One quantum dot produced a photon carrying information, while another generated an entangled photon pair. Through carefully controlled interaction and overlap, the quantum state of the first photon was transferred to a distant photon from the entangled pair.

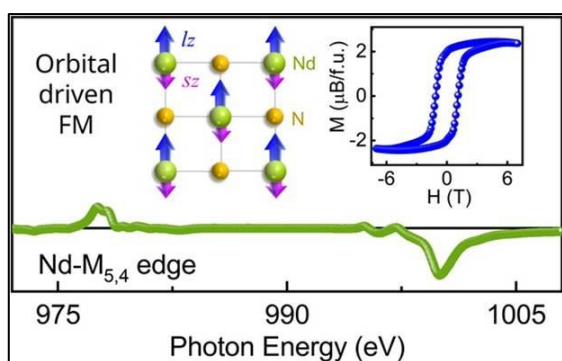
A crucial part of the experiment was the use of quantum frequency converters, which corrected small differences in photon color and ensured successful interference. The

experiment was carried out over a fiber distance of about ten meters and achieved a success rate of over seventy percent.

Published in Nature Communications, the study shows that quantum information can be reliably teleported between independent light sources. This result brings scalable quantum repeaters and secure fiber based quantum networks significantly closer to reality. [Read More](#)

National

16. Breakthrough in rare-earth magnetism promises more efficient quantum technologies



Scientists at the Jawaharlal Nehru Centre for Advanced Scientific Research in Bengaluru have reported a major breakthrough in the understanding of magnetism in rare earth materials, with important implications for quantum and spintronic technologies. The study reveals a new form of ferromagnetism in neodymium nitride that is driven not primarily by electron spin, as traditionally believed, but by the orbital angular momentum of electrons. This finding challenges a long standing textbook view of how magnetism arises in rare earth compounds.

Rare earth materials, particularly neodymium based magnets, are essential to modern technologies such as electric vehicles, wind turbines, smartphones, and defense systems. Until now, their strong magnetic behavior was largely attributed to

spin based interactions. The new research demonstrates that single crystalline thin films of neodymium nitride exhibit ferromagnetism where orbital contributions play a dominant role. This represents a fundamental shift in the understanding of magnetic behavior in such systems.

The research team, led by Professor Bivas Saha, used advanced thin film growth techniques, detailed magnetic measurements, and electronic structure analysis to uncover how crystal symmetry, electronic hybridization, and rare earth orbital states stabilize this unusual magnetic state. Their results were supported by sophisticated characterization tools such as X ray magnetic circular dichroism. The study opens the door to the emerging field of orbitronics, which aims to exploit the orbital motion of electrons rather than relying solely on spin. Materials with tunable spin and orbital moments could enable faster, more energy efficient quantum and magnetic devices that surpass current spin based technologies.

The discovery is also strategically significant as global competition for rare earth resources increases. With substantial rare earth reserves, India is well positioned to contribute to future advances in materials science and quantum technology. [Read More](#)

17. Quantum Diamond Microscopy unveiled can help neuroscience & materials research

Indian researchers have unveiled the country's first indigenous Quantum Diamond Microscope, marking a major milestone in quantum sensing under the National Quantum Mission of the Department of Science and Technology. Developed by the PQuest Group at IIT Bombay, this new instrument enables dynamic three dimensional magnetic field imaging at the nanoscale and has earned India its first patent in the quantum

diamond microscopy domain. The technology was formally announced during the Emerging Science Technology and Innovation Conclave 2025 in the presence of senior government and scientific leaders.



The Quantum Diamond Microscope is based on nitrogen vacancy centers in diamond, which are atomic scale defects where a nitrogen atom sits next to a missing carbon atom. These centers possess remarkable quantum properties, including strong coherence even at room temperature. Because of this, they are extremely sensitive to magnetic, electric, and thermal changes. Using optically detected magnetic resonance, the microscope converts tiny variations in magnetic fields into measurable changes in light, allowing precise optical readout.

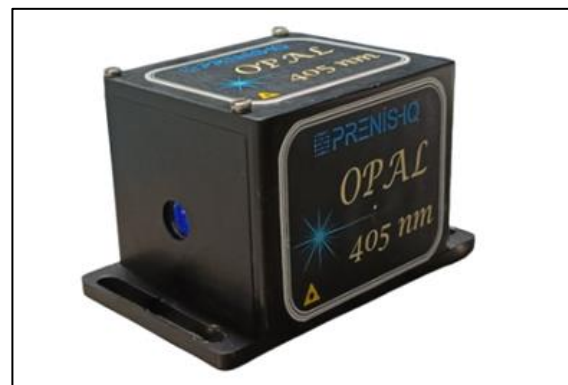
By engineering a thin diamond layer with a high density of nitrogen vacancy centers, the system enables widefield imaging of dynamic magnetic activity, similar in concept to an optical microscope but operating at the quantum level. This capability opens new possibilities in neuroscience, where weak magnetic signals from neural activity could be studied, and in materials science, where subtle magnetic phenomena can be visualized non destructively.

The technology is especially promising for advanced electronics. As modern devices increasingly rely on complex three dimensional chip architectures, existing

diagnostic tools struggle to image buried current paths. The Quantum Diamond Microscope can map magnetic fields across multiple layers inside encapsulated chips, batteries, and microelectronic devices.

Aligned with national goals, the IIT Bombay team plans to integrate the microscope with artificial intelligence and machine learning tools, creating a powerful quantum imaging platform for applications ranging from chip diagnostics to biological and geological studies. [Read More](#)

18. NQM supported start-up demonstrates India's first indigenous high precision diode laser for quantum encrypted communication and computing



India has taken a major step forward in quantum technology with the launch of its first indigenous high precision and compact diode laser, developed by Prenishq Pvt Ltd, a startup supported under the National Quantum Mission. Prenishq is a spin off from IIT Delhi, and its innovation strengthens India's self reliance in critical hardware required for quantum encrypted communication, quantum computing, and advanced scientific research.

The laser was formally launched at the Emerging Science Technology and Innovation Conclave 2025 by Union Minister for Science and Technology Dr Jitendra Singh, in the presence of senior government officials and scientific leaders. Designed specifically for quantum research

and higher education, the diode laser delivers excellent beam quality, high wavelength precision, strong long term stability, and reliable performance across diverse environments.

One of the key strengths of the system is its operational simplicity combined with flexibility. It covers a wide wavelength range from ultraviolet to near infrared, making it suitable for a broad spectrum of quantum optical experiments. Integrated driver electronics provide stable output power and precise temperature control, while the compact and energy efficient design ensures low power consumption. The laser offers both free space and optional fiber coupled output, along with a plug and play configuration, enabling easy

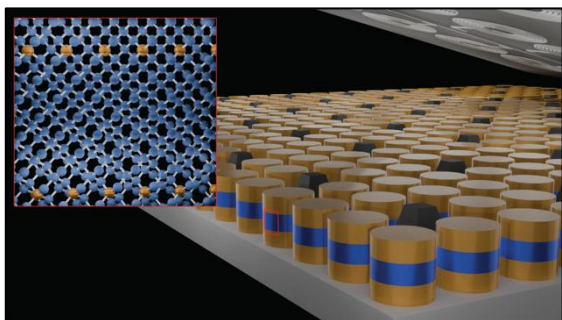
integration into laboratories and industrial setups.

The technology has important real world implications. In the financial and banking sectors, it can enable quantum safe communication to protect sensitive transactions and data. It also supports photonic quantum computing, with applications in complex problem solving such as drug discovery and chemical process analysis. With low cost of ownership, minimal maintenance, and assured availability, Prenishq's diode laser reinforces India's position in indigenous quantum grade instrumentation and aligns with the national vision of becoming a global leader in quantum technology manufacturing. [Read More](#)

SEMICONDUCTORS

International

19. Scientists Create New Type of Semiconductor that Holds Superconducting Promise



Researchers have achieved a long sought breakthrough by turning germanium, a widely used semiconductor, into a superconductor, opening new possibilities for future electronics and quantum technologies. The international team, led by scientists at New York University, demonstrated for the first time that germanium can conduct electricity with

zero resistance when its atomic structure is precisely engineered.

Semiconductors such as germanium and silicon are the backbone of modern computing, solar cells, and communication systems. However, they normally do not exhibit superconductivity, a property in which electric current flows without energy loss. Achieving superconductivity in these materials has been difficult because it requires carefully modifying their atomic arrangement without destabilizing the crystal structure.

In this study, the researchers introduced gallium atoms into germanium at very high concentrations. Gallium adds extra charge carriers that are necessary for superconductivity, but excessive doping usually disrupts the crystal. The team overcame this challenge by using molecular beam epitaxy, a highly controlled growth technique that inserts gallium atoms directly into the germanium lattice with

atomic precision. Advanced X ray measurements helped guide the process and confirm that the crystal structure remained stable.

The resulting material became superconducting at temperatures around 3.5 Kelvin, allowing electrons to pair up and move without resistance. Because germanium is already compatible with existing semiconductor manufacturing, this discovery could enable seamless

integration of superconducting and semiconducting regions on the same chip.

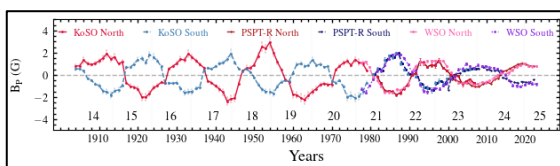
Such materials could significantly reduce energy consumption in electronics and accelerate the development of scalable quantum circuits, sensors, and cryogenic computing systems. By combining superconductivity with a mainstream semiconductor, the research marks an important step toward more efficient and powerful next generation technologies.

[Read More](#)

SPACE & DEFENCE

National

20. Century-long data of Kodaikanal Observatory reveals clues to Sun's future



Astronomers have uncovered a new way to understand the Sun's long term magnetic behavior by analyzing more than a century of historical solar images from the Kodaikanal Solar Observatory. This breakthrough helps fill a major gap in solar science, as direct measurements of the Sun's polar magnetic fields only began in the 1970s, leaving most of the twentieth century poorly understood.

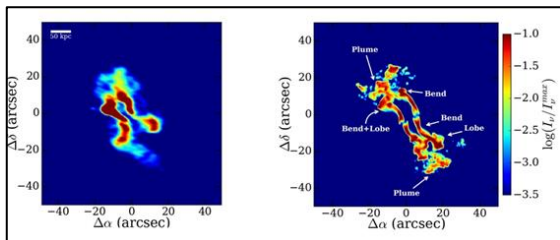
The study was led by researchers from the Aryabhata Research Institute of Observational Sciences, in collaboration with scientists from India, the United States, Germany, and Italy. They focused on solar observations recorded at Kodaikanal since 1904 in the Ca II K wavelength, which captures activity in the Sun's chromosphere. This layer reveals bright magnetic features such as plages and networks that are closely linked to the Sun's magnetic field.

By digitizing and systematically analyzing these historical images, the researchers identified small bright structures near the Sun's poles known as the polar network. Using advanced automated feature identification techniques, they demonstrated that the polar network can act as a reliable proxy for the Sun's polar magnetic field strength. Combining the Kodaikanal data with more recent observations from the Rome Precision Solar Photometric Telescope, the team reconstructed the evolution of the Sun's polar magnetic fields from 1904 to 2022.

This long term reconstruction provides valuable insight into how solar cycles evolve and improves the ability to predict future solar activity, including the strength of the ongoing Solar Cycle 25. Understanding polar magnetic fields is crucial for forecasting solar storms that can disrupt satellites, navigation systems, and power grids on Earth.

The researchers have made their reconstructed datasets publicly available, enabling scientists worldwide to further explore the Sun's past and refine predictions of its future behavior. [Read More](#)

21. Simulations decode rare twin radio galaxies twisting in space



Astronomers have used advanced computer simulations to decode the unusual structure of one of the rarest cosmic objects known, twin radio galaxies. These systems form when two supermassive black holes, each launching its own pair of powerful plasma jets, coexist within merging galaxies. Only three such systems are known, and the most recent one, TRG J104454+354055, was discovered in 2022 using India’s upgraded Giant Metrewave Radio Telescope.

In this system, the two black holes are separated by about 0.1 million light years, and each produces jets that extend up to 0.3 million light years. Observations revealed striking features such as bends, wiggles, and helical patterns in the jets, raising questions about how such clean yet complex structures form without the jets colliding.

A research team led by scientists at the Indian Institute of Astrophysics carried out three dimensional hydrodynamical simulations to reproduce the observed radio morphology. Their results show that the key mechanism shaping these jets is slow precession. This means the jets gradually change direction over time, similar to the wobble of a spinning top, due to gravitational interactions between the two black holes and their accretion disks.

The simulations successfully reproduced the observed bends, lobes, and plumes only when jet precession was included. They also revealed that while the jets move steadily outward, they undergo sideways oscillations over nearly 190 million years of evolution. Importantly, the study demonstrates that precession can remain effective even when black holes are separated by extremely large distances.

These findings provide new insight into how black hole driven jets interact with their environment, deposit energy into galaxies, and evolve over time. The approach will be valuable for interpreting future discoveries of twin radio galaxies with next generation radio telescopes such as the Square Kilometre Array. [Read More](#)

REPORTS/POLICY DOCUMENTS

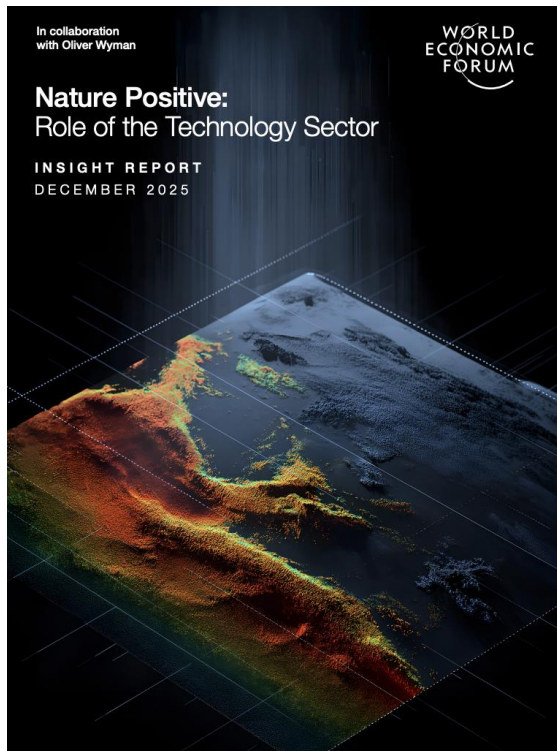
International

22. WEF: Nature Positive - Role of the Technology Sector

The report highlights the growing dependence of the global technology sector on nature and the urgent need to shift toward nature positive practices. Technology now underpins daily life, with over one trillion semiconductors sold each year and more than eleven thousand data centres supporting digital services and artificial intelligence.

At the same time, the sector places heavy pressure on natural resources, consuming vast amounts of water, energy, metals, and critical minerals. Semiconductor manufacturing alone uses over one trillion litres of freshwater annually, while data centres draw more than sixty gigawatts of power. The sector also generates around sixty billion kilograms of electronic waste each year, most of which is not recycled. Climate change and nature loss further expose technology infrastructure to physical risks such as extreme weather. The

report outlines seven priority actions for technology leaders to reduce environmental impact, strengthen resilience, and secure long term growth.



It emphasizes that nature positive strategies can unlock financial opportunities through efficiency gains, material recovery, and reduced resource costs. [Download Report](#)

23. *WEF: Quantum Technologies - Strategic Imperatives for Health and Healthcare Leaders*

The report examines how rapidly maturing quantum technologies can help health systems respond to mounting global challenges. Healthcare today faces rising chronic disease burdens, escalating costs, workforce shortages, persistent inequities, and growing data security and cyber risks. At the same time, advances in quantum computing, quantum sensing, and quantum communication are moving from theory toward practical application.

Published by the World Economic Forum in collaboration with Accenture, the report

identifies four key value pillars where quantum technologies can deliver impact: accelerating biomedical discovery, enabling precision diagnostics, optimizing healthcare operations, and strengthening trusted data infrastructure. It also assesses readiness across key stakeholders, including technology creators, healthcare providers, and system enablers.



Through real world case studies from organizations such as Moderna, Merck, Mayo Clinic, and Wellcome Leap, the report shows how early pilots are already improving research and development, diagnostics, and data protection. It outlines strategic actions leaders must take now to ensure quantum innovations translate into safer, more efficient, and more personalized healthcare systems. [Download Report](#)

National

24. *NITI Aayog - 'Reimagining Agriculture: A Roadmap for Frontier Technology Led Transformation'*

NITI Aayog has unveiled a comprehensive roadmap titled Reimagining Agriculture A Roadmap for Frontier Technology Led Transformation to guide the future of

Indian agriculture. Launched in Gandhinagar, the roadmap presents a strategic vision to harness frontier technologies such as climate resilient seeds, digital twins, precision agriculture, agentic AI, and advanced mechanisation to boost productivity, sustainability, and farmer incomes.



Recognising India’s diverse farming landscape, the roadmap segments farmers into three archetypes aspiring, transitioning, and advanced and proposes tailored, actionable solutions suited to their specific needs and capacities. It emphasises inclusive growth by ensuring smallholders and commercial cultivators alike benefit from technological progress.

The roadmap highlights the potential of digital integration, data driven decision making, and customised technology deployment to improve resilience, reduce costs, and enhance competitiveness. Developed with support from industry, academia, and knowledge partners, the initiative aligns with the vision of Viksit Bharat 2047 and aims to position India as a global leader in agri technology innovation.

[Download Report](#)

TECHNOLOGY ENGAGEMENTS/NEWS BYTES

International

25. China Bans Foreign AI Chips from State-Funded Data Centres



China has banned the use of foreign made AI chips in all state funded data centre projects, marking a decisive escalation in its push for semiconductor self reliance. Under a directive reported in November 2025, any

data centre receiving state money must exclusively use domestically produced processors. Projects that are less than thirty percent complete are required to remove or cancel foreign components, while more advanced facilities will be reviewed individually. This move formalizes earlier informal guidance into a binding exclusion policy.

Given that most data centres in China receive some form of government support, the policy is expected to affect a large share of existing and planned infrastructure. Since 2021, more than one hundred billion dollars of state linked funding has flowed into AI data centre construction, and several projects have already been halted or redesigned. The ban has effectively shut out

US chipmakers such as Nvidia, AMD, and Intel from state backed deployments. Nvidia's share of China's AI accelerator market has already collapsed, and the new rule further closes the door on compliant or grey market products.

Domestic firms including Huawei, Cambricon, and several startups are positioned to benefit, although challenges remain around performance, manufacturing constraints, and software ecosystem maturity. The policy builds on earlier tech sovereignty actions, such as restrictions on Micron and limits on Nvidia purchases. While it strengthens China's domestic AI hardware industry, it also risks widening a computing capacity gap with US hyperscalers investing heavily in advanced Nvidia based systems. The decision redraws the global AI hardware landscape and signals a deepening technological divide. [Read More](#)

26. *European Commission could water down EU AI Act amid pressure from U.S., Big Tech, and European Industry*



The European Commission is considering delaying enforcement of key provisions of the EU AI Act, signaling a potential recalibration of Europe's approach to artificial intelligence regulation. The AI Act, the world's first comprehensive legal framework for AI, is scheduled to impose its most demanding obligations on high risk AI systems from August 2026. These

include systems used in healthcare, law enforcement, employment, and other sensitive domains. However, growing pressure from U.S. technology firms, European industry leaders, and geopolitical considerations is pushing Brussels to adopt a more flexible timeline.

Draft proposals suggest introducing one year grace periods for companies found in breach of high risk AI rules, as well as adjustment windows for providers of generative AI models already on the market. Fines for transparency violations could also be deferred until 2027. The Commission is reportedly exploring less prescriptive monitoring requirements and greater reliance on centralized oversight through an expanded EU AI Office, aiming to reduce compliance complexity and regulatory fragmentation.

Lobbying from major U.S. companies such as Meta and Alphabet has been intense, with arguments that strict enforcement could stifle innovation and limit access to advanced AI models. The Trump administration has added geopolitical pressure, warning that excessive regulation could trigger trade retaliation. European industry has echoed these concerns, with major firms calling for a pause to protect competitiveness and investment.

While Commission officials insist they remain committed to the AI Act's objectives, critics warn that delays could weaken legal certainty and dilute protections for citizens. The debate highlights a pivotal choice for Europe between maintaining global leadership in ethical AI governance and adapting to economic and geopolitical realities. [Read More](#)

27. *Microsoft, NVIDIA and Anthropic Announce \$30B Compute Deal and Strategic Alliance*

Microsoft, NVIDIA, and Anthropic have announced a landmark strategic alliance that reshapes the global artificial intelligence landscape through unprecedented scale in compute, capital, and co design. Central to the partnership is Anthropic's commitment to purchase 30 billion dollars worth of Azure cloud compute, along with access to up to one gigawatt of additional capacity. This makes it one of the largest cloud infrastructure agreements ever signed and secures long term access to frontier scale resources for training and deploying advanced AI models.

The alliance also includes up to 15 billion dollars in new investments, with NVIDIA contributing up to 10 billion dollars and Microsoft up to 5 billion dollars. This funding round has pushed Anthropic's valuation to 350 billion dollars, nearly doubling in just two months, reflecting intense market confidence in its role as a leading frontier model developer. A key differentiator of the partnership is a deep technology collaboration between NVIDIA and Anthropic, focused on co designing future AI architectures optimized for Anthropic's Claude models on next generation NVIDIA platforms such as Grace Blackwell and Vera Rubin.

Claude models will be made broadly available through Microsoft Azure AI Foundry, while remaining accessible on AWS and Google Cloud, reinforcing a multi cloud strategy that appeals to enterprises seeking flexibility and reduced vendor lock in. Microsoft will also integrate Claude across its Copilot ecosystem, expanding product options beyond its existing OpenAI partnership.

Together, the collaboration aligns NVIDIA's hardware leadership, Microsoft's cloud scale, and Anthropic's model research. It signals a new phase in AI development defined by multi gigawatt infrastructure, massive capital flows, and

tight integration between hardware and frontier model design. [Read More](#)

National

28. Cabinet Approves Rs.7,280 Crore Scheme to Promote Manufacturing of Sintered Rare Earth Permanent Magnets (REPM)



The Union Cabinet has approved a major national initiative to promote the domestic manufacturing of Sintered Rare Earth Permanent Magnets with a financial outlay of Rs. 7,280 crore. The scheme aims to establish India's first integrated manufacturing ecosystem for rare earth permanent magnets with a total capacity of 6,000 metric tonnes per annum. This move is designed to reduce import dependence, strengthen strategic supply chains, and position India as a competitive player in the global rare earth magnet market.

Rare earth permanent magnets are critical components for electric vehicles, renewable energy systems such as wind turbines, consumer electronics, aerospace, and defence technologies. Currently, India relies heavily on imports to meet its growing demand, which is expected to double by 2030. The new scheme addresses this gap by supporting end to end domestic production, covering the conversion of rare earth oxides to metals, metals to alloys, and alloys to finished magnets.

The scheme includes sales linked incentives worth Rs. 6,450 crore over five years and

capital subsidies of Rs. 750 crore for setting up manufacturing facilities. Capacity will be allocated to five beneficiaries through a global competitive bidding process, with each entity eligible for up to 1,200 metric tonnes per annum. The total scheme duration is seven years, including a two year gestation period.

Beyond industrial growth, the initiative is expected to generate employment, support the Atmanirbhar Bharat vision, strengthen sectors such as automotive and defence, and contribute meaningfully to India’s Net Zero 2070 commitment. [Read More](#)

29. Conference on “Harnessing AI and Digital Public Infrastructure (DPI) for Viksit Bharat”



The National Institute for Smart Government, in partnership with the Ministry of Electronics and Information Technology and the Directorate of IT, Government of Tripura, organised a high level conference titled Harnessing AI and Digital Public Infrastructure for Viksit Bharat in New Delhi on 5 December 2025. The conference brought together policymakers, technologists, industry leaders, and experts to examine how artificial intelligence and digital public infrastructure can strengthen governance and public service delivery in line with the vision of Viksit Bharat 2047.

Addressing the inaugural session, S. Krishnan, Secretary MeitY, emphasised that India’s digital success rests on

collaboration between government, industry, civil society, and academia. He highlighted that democratising technology by making it accessible and affordable must guide the evolution of DPI across sectors. M. Nagaraju, Secretary Department of Financial Services, underscored how initiatives such as Jan Dhan and DPI have expanded financial inclusion to over 80 percent of the population.

Discussions highlighted the convergence of AI and India’s DPI stack including Aadhaar, UPI, DigiLocker, and BHASHINI, and how AI is enabling anticipatory, citizen centric, and scalable services. Speakers from government, industry, and civil society showcased use cases across finance, agriculture, welfare delivery, and language access. A key highlight was the release of the NISG EY report, which concluded that integrating AI with DPI could unlock exponential gains in governance efficiency, economic empowerment, and inclusive growth, positioning India as a global leader in digital public systems.

Shri Mahaveer Singhvi, Joint Secretary, NEST Division, Ministry of External Affairs, Government of India delivered a keynote address and emphasised that AI is no longer an abstract concept. It influences our daily lives in ways we may not even notice. For India, the question is whether we will only consume AI or also create it. Through the IndiaAI Mission, we have chosen to become creators by building our own compute capacity, datasets, foundational models, innovation centres and frameworks that reflect India’s realities and priorities. [Read More](#)

30. DPDP Rules, 2025 Notified A Citizen-Centric Framework for Privacy Protection and Responsible Data Use



The Government of India has notified the Digital Personal Data Protection Rules, 2025, completing the operational framework of the Digital Personal Data Protection Act, 2023 and marking a major milestone in India's digital governance journey. Notified on 14 November 2025, the Rules were shaped through extensive nationwide consultations that received 6,915 inputs from citizens, startups, industry bodies, civil society groups, and government departments. Together, the Act and Rules establish a clear, citizen centric system that balances individual privacy rights with lawful and responsible data use.

The framework is built on seven core principles, including consent, transparency, purpose limitation, data minimisation, accuracy, storage limitation, security safeguards, and accountability. It clearly defines the roles of Data Principals, Data Fiduciaries, Data Processors, and Consent Managers, and places strong obligations on organisations to protect personal data. A phased eighteen month implementation period has been introduced to allow smooth compliance, while clear protocols are set for breach notification, transparency, audits, and impact assessments, especially for Significant Data Fiduciaries.

A key feature is the establishment of a fully digital Data Protection Board of India, which will oversee compliance, handle complaints, and enforce penalties through an online system. The Rules significantly strengthen individual rights, including rights to consent, access, correction, updating, erasure, nomination, and timely responses within ninety days. Special

safeguards are provided for children and persons with disabilities.

The framework also aligns privacy protection with transparency under the RTI Act, respecting the Supreme Court's recognition of privacy as a fundamental right. Overall, the DPDP Rules create a practical, innovation friendly, and trust based data protection regime, supporting a secure and globally competitive digital economy under the leadership of the Government of India. [Read More](#)

31. ***Government of India launches 'YUVA AI for ALL' - a free national course to help everyone understand Artificial Intelligence***



The Government of India has launched 'YUVA AI for ALL', a free national course aimed at making Artificial Intelligence accessible to every citizen, especially young learners. Introduced by the Ministry of Electronics and Information Technology under the IndiaAI Mission, the initiative seeks to empower one crore people with foundational AI skills and support India's transition toward an AI ready society.

The course is short, simple, and practical, designed as a 4.5 hour self paced learning experience. It introduces the basics of AI in an easy to understand manner and explains how AI is transforming education, creativity, work, and everyday life. Real world examples from India are used to make learning relatable, while strong emphasis is placed on ethical, responsible, and inclusive use of AI.

YUVA AI for ALL is available free of cost on platforms such as FutureSkills Prime and iGOT Karmayogi, with learners

receiving an official Government of India certificate upon completion. The course is open to students, professionals, and anyone curious about AI, allowing learning anytime and anywhere.

By bridging the digital divide and building future ready skills, the initiative aims to prepare India's workforce for emerging opportunities. Institutions and organizations are encouraged to partner with IndiaAI to expand the course's reach across the country. [Read More](#)

32. India and Central Asian Countries conclude Strategic Cyber Exercise on Cyber Threat Hunting and Incident Response Management



India and five Central Asian countries have concluded a three day Strategic Cyber Exercise on cyber threat hunting and incident response management, marking a key step in strengthening regional cyber security cooperation. The exercise was organised in New Delhi from 12 to 14 November 2025 by the National Security Council Secretariat in partnership with the Ministry of External Affairs and the National Critical Information Infrastructure Protection Centre.

The programme brought together technical teams from cyber security agencies, national Computer Emergency Response Teams, and security organisations from Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan. It fulfilled a

commitment made by India under the India–Central Asia Meeting of Secretaries of Security Councils and National Security Advisers.

The exercise focused on building advanced capabilities to detect, hunt, and respond to increasingly sophisticated transnational cyber threats, particularly those targeting critical infrastructure. Alongside hands on technical training, participants engaged in strategic level discussions aimed at improving policy coordination and decision making during cyber incidents.

Heads of cyber security agencies from the participating countries also explored frameworks for sustained strategic cyber cooperation. The successful conclusion of the exercise reflects a shift from isolated national cyber defenses toward a more interconnected and resilient regional cyber security ecosystem, reinforcing collective security ties between India and Central Asia. [Read More](#)

33. India announces new trilateral partnership with Australia and Canada to enhance cooperation in emerging technologies



India has announced a new trilateral partnership with Australia and Canada to deepen cooperation in critical and emerging technologies. The Australia-Canada-India Technology and Innovation Partnership, known as ACITI, was unveiled following a meeting between PM Narendra Modi,

Anthony Albanese, and Mark Carney on the sidelines of the G20 Summit in Johannesburg.

The ACITI Partnership aims to leverage the complementary technological and industrial strengths of the three countries to build a secure, sustainable, and resilient innovation ecosystem. Key areas of collaboration include clean energy technologies, resilient and diversified supply chains, and cooperation in critical minerals, which are essential for the energy transition and advanced manufacturing. The partnership will also explore joint efforts to accelerate the development and responsible adoption of artificial intelligence to improve public services, economic productivity, and quality of life.

According to a joint statement, ACITI will support shared objectives such as achieving net zero emissions, reducing vulnerabilities in global supply chains, and strengthening technological security. Officials from India, Australia, and Canada are expected to meet in the first quarter of 2026 to outline concrete work programmes and implementation mechanisms. The initiative aligns with India's broader strategy to expand global technology partnerships and reinforce supply chain resilience through multilateral platforms, including the G20.

[Read More](#)

34. *India - United Kingdom Science and Technology Partnership (IN-UK-STP) Dashboard unveiled*

The Principal Scientific Adviser to the Government of India and the National Technology Adviser to the United Kingdom have jointly unveiled the pilot India-United Kingdom Science and Technology Partnership Dashboard, marking a significant step in strengthening bilateral science and innovation cooperation. The dashboard was launched in New Delhi by Ajay Kumar Sood and David Warren Smith during a bilateral

meeting attended by senior officials from both countries.



Developed collaboratively by the Office of the Principal Scientific Adviser and the British High Commission in India, the pilot dashboard maps 143 India-UK joint projects supported since 2018. It provides structured insights into funding values, implementing partners, and funding agencies on both sides. Importantly, the projects are aligned with the India-UK Science and Innovation Council goals, the 17 Sustainable Development Goals, and key priority technology domains, enabling a clearer understanding of strategic alignment and impact.

The dashboard is envisioned as an evidence based policy tool to help decision makers identify strengths, gaps, and emerging trends in the bilateral partnership. It is expected to complement recent initiatives such as the India-UK Technology Security Initiative and the Research and Innovation Corridor. Going forward, both sides agreed to expand the dashboard to include outcome and impact indicators such as publications, patents, startups, and human resource development, supported by regular data inputs to deliver real time insights for the scientific ecosystems of both nations. [Read More](#)

35. *India's Green Hydrogen CEOs Call for Demand Creation as MNRE Signals Strong Policy Backing at International Conference on Green Hydrogen (ICGH) 2025*

At the International Conference on Green Hydrogen 2025, GH2 India convened a high level CEO Roundtable to accelerate India’s green hydrogen transition. The discussion was chaired by Pralhad Joshi, Union Minister for New and Renewable Energy, and attended by senior officials from the Ministry of New and Renewable Energy, SECI, the National Green Hydrogen Mission, and the Ministry of External Affairs, along with leading developers and electrolyser manufacturers.

Industry leaders acknowledged that India has built a strong supply foundation, with more than 10 million metric tonnes of announced green hydrogen capacity and globally competitive price discovery through SECI’s green ammonia auctions. However, they stressed that demand creation is now the most urgent priority to unlock final investment decisions and enable timely project commissioning.

Key recommendations included introducing time bound Hydrogen Purchase Obligations for refineries, fertilisers, and



steel, developing a clear city gas distribution blending roadmap, and expanding SECI led demand aggregation and H2Global type offtake mechanisms to de risk early projects. Participants also highlighted the need to resolve infrastructure bottlenecks, streamline grid charges and approvals, align certification with EU RFNBO standards, and build hydrogen port hubs for exports. The roundtable reflected strong policy backing from the government and underscored the shift from capacity announcements to market creation as the next critical phase of India’s green hydrogen journey. [Read More](#)

WHAT’S UPCOMING?

36. *Cybertech Global Tel Aviv 2026, 26–28 January 2026*

Cybertech Global Tel Aviv 2026 is one of the world’s premier international cybersecurity conferences, scheduled for 26-28 January 2026 at Tel Aviv Expo, and will bring together government officials, industry leaders, academics and startups from across the globe.

Over three days it will feature high-level keynotes, specialised tracks on cyber, AI, defense, fintech and critical infrastructure, and a large exhibition that will showcase cutting-edge technologies and solutions. The event will position itself as a global hub for networking, B2B meetings and policy-

technology dialogue, offering exclusive side events and curated business platforms that will foster new partnerships and strengthen the international cyber ecosystem. [Know More](#)





37. India Sustainable Aviation Fuel Conclave 2026, Bharat mandapam, Feb 2026

The India Sustainable Aviation Fuel Conclave 2026, Organised by the Sustainable Aviation Fuel Association, the Conclave will bring together policymakers, industry leaders, technology providers, financiers, researchers, and the farming community aims to accelerate the adoption of Sustainable Aviation Fuel across the country.

Timed with India's move toward SAF blending mandates and deeper participation in global sustainable fuel markets, the event will focus on translating ambition into action through policy dialogue, technology showcases, and investment pathways.

It will catalyse partnerships that connect rural feedstock ecosystems with global aviation demand, enabling inclusive and scalable value chains. Key outcomes include a strategic roadmap for SAF deployment, policy recommendations, mobilisation of investments, and strengthened multi stakeholder collaboration. The Conclave will also host the India SAF Awards, recognising leadership and innovation that are shaping the future of sustainable aviation in India.

[Know More](#)

THE TECH SHOWCASE! (ANNEXURE)

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

IIT Roorkee

1. 2D-Sliding Discrete Fourier Transform (DFT) Kernel Based Analog IC for Edge Detection
2. An Adaptive Response System for Seismic Response Control
3. A High Entropy Alloy/MXene-Based Composite Electrocatalyst for Water Splitting
4. Reconfigurable Intelligent Surface Employing Switchable Reflective Loads



Autocorrect Catastrophe!

I sent a diplomatic cable saying 'We look forward to your visit.'
Autocorrect changed it to 'We look forward to your vomit.'

I'm now in a meeting explaining why I'm not plotting biological warfare.



#NESTLaugh-orithm

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

