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

# TECH PULSE

NEST NEWSLETTER

SEPTEMBER 2025


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- *WEF Report - 10 Emerging Technology Solutions for Planetary Health*
- *India's Chip Revolution: Ten projects, rising design innovation, and the road to 2 nm technology*

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## ARTIFICIAL INTELLIGENCE

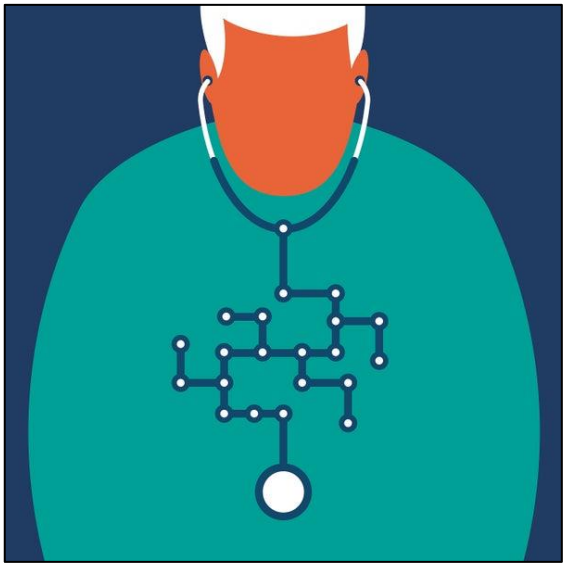
### International

1. ***Albania appoints AI bot 'minister' to fight corruption in world first***

In a world first, Albania has appointed an AI-generated 'minister', named Diella, to oversee public procurement and combat corruption, a major barrier in its bid for EU membership by 2030. Announced by Prime Minister Edi Rama on 12 September 2025, Diella's appointment aims to ensure transparency and accountability in public tenders, though her position remains symbolic due to constitutional limitations requiring ministers to be human citizens. Developed through a partnership with Microsoft and integrated into the e-Albania platform, Diella has already handled over a million digital service requests and now will expand to evaluate tenders using AI-based assessment models.

Rama described Diella as free of 'human weaknesses', presenting her as a step toward fully AI-driven governance. The initiative, however, has stirred debate as supporters see it as an innovative anti-corruption measure aligned with EU reform demands, while critics, including the opposition, label it 'unconstitutional buffoonery'. Diella's creation reflects Albania's ambition to use technology to 'leapfrog' traditional governance systems and modernize public administration. If successful, it could become a model for AI-integrated governance, demonstrating how emerging technologies might promote transparency; if not, it risks being remembered as political theater in the name of digital reform. Read More

2. ***New AI Tool Predicts Which of 1,000 Diseases Someone May Develop in 20 Years***



Delphi 2M is a next generation AI model designed to forecast the risk and timing of 1,258 diseases up to 20 years in advance, marking a major breakthrough in predictive healthcare. Developed collaboratively by EMBL EBI, DKFZ, the University of Copenhagen, and UK/Swiss partners, it was trained on 400,000 UK Biobank records and validated on nearly 1.9 million Danish health records. Using a GPT style generative transformer, Delphi 2M integrates clinical, demographic, and lifestyle data including age, sex, BMI, smoking, and alcohol use to model personalized health trajectories and identify competing risks across multiple conditions, including death.

The model matches or outperforms specialized single disease tools, particularly for cardiovascular disease, diabetes, and short term mortality. It estimates not just which diseases might occur but also when, using daily hazard rates and time to event predictions. Its explainable design enables synthetic simulations to anticipate disease patterns while maintaining data privacy.

Despite limitations such as demographic biases in the UK Biobank dataset, Delphi 2M represents a scalable step toward proactive, preventive medicine. With continued validation, it could reshape healthcare planning, clinical decision making, and population level forecasting, making disease prediction as dynamic and data driven as weather modeling, anchored in long term reliability and interpretability. Read More

## BIOTECHNOLOGY & HEALTH

**International**

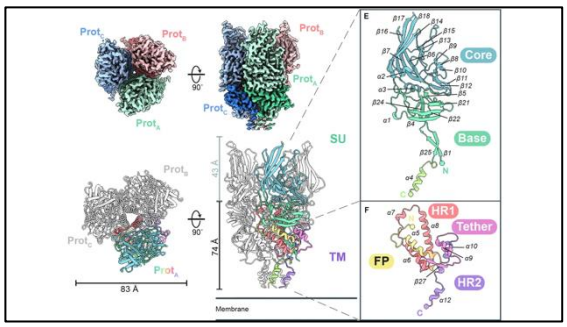
### 3. *CRISPR's efficiency triples with DNA-wrapped nanoparticles*

Scientists at Northwestern University have developed a new nanotechnology based system that makes CRISPR gene editing three times more efficient and far safer for use in medicine. The innovation, known as lipid nanoparticle spherical nucleic acids (LNP SNAs), wraps CRISPR components including Cas9 enzymes, guide RNA, and DNA repair templates inside a protective DNA shell. This structure shields the genetic material, directs it to specific organs, and allows it to enter cells with remarkable efficiency.

In lab tests on various human and animal cell types, the LNP SNAs entered cells up to three times more effectively than conventional lipid nanoparticles and reduced toxicity, while tripling CRISPR's editing success rate and improving precise DNA repair by over 60 percent. The research highlights how a nanomaterial's structure, rather than its composition alone, can dramatically enhance therapeutic outcomes, a principle known as structural nanomedicine.

The team plans to test the technology in disease models, with commercial development underway through Flashpoint Therapeutics. By merging CRISPR with SNAs, the study marks a major step toward practical genetic medicines, potentially enabling precise, efficient, and safer gene therapies for a wide range of diseases. Read More

### 4. *Hidden viruses in our DNA could be medicine's next big breakthrough*




Scientists at the La Jolla Institute for Immunology (LJI) have achieved a groundbreaking discovery by unveiling the

first three-dimensional structure of a viral protein embedded within the human genome. The study focuses on the HERV-K envelope glycoprotein (Env), part of ancient human endogenous retroviruses (HERVs) that make up about 8 percent of human DNA. These viral remnants, normally silent, can reactivate in diseases such as cancer, lupus, and rheumatoid arthritis.

Using cryo-electron microscopy, the researchers mapped HERV-K Env in its delicate pre-fusion state, revealing a tall, uniquely folded trimer unlike any known retrovirus, including HIV and SIV. The team engineered stabilizing mutations and developed new antibodies to capture its structure, marking a major advance in structural biology.

This discovery has significant clinical potential. HERV-K Env proteins appear on the surface of tumor and autoimmune cells but not healthy ones, making them promising targets for diagnostics and therapies. The antibodies developed by the LJI team could help detect or attack cells displaying HERV-K Env, paving the way for new cancer immunotherapies and autoimmune treatments. Ultimately, the finding deepens understanding of how ancient viral elements continue to influence human health and disease. Read More

5. ***Smart device uses AI and bioelectronics to speed up Wound Healing Process by 25% faster***

Engineers at the University of California, Santa Cruz, have developed a wearable bioelectronic device called ‘a-Heal’ that uses artificial intelligence and real-time imaging to accelerate wound healing. Designed as a 'closed loop system,' a-Heal integrates a miniature camera, bioelectronic actuators, and AI to continuously monitor wounds and deliver personalized treatments such as medication or electric stimulation based on the healing stage. Described as 'a microscope in a bandage,' the device captures images every two hours and uses an AI model, dubbed the 'AI physician,' to assess healing progress and adjust interventions accordingly.


The AI employs reinforcement learning to minimize healing time, dynamically adapting dosage and electric field strength to optimize recovery. Preclinical trials conducted at UC Davis showed that wounds treated with a-Heal healed about 25% faster than those under standard care, with reduced inflammation and improved tissue closure. The system’s data can also be transmitted securely for remote physician monitoring, making it ideal for patients in remote or underserved areas.

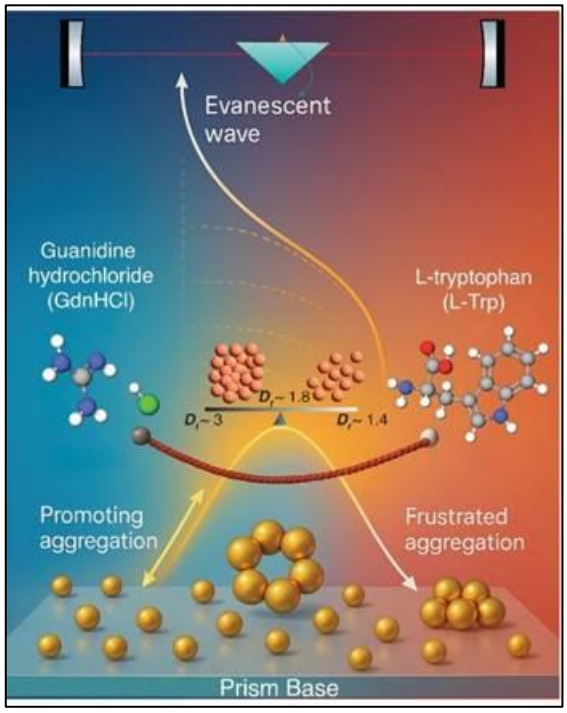
Funded by the DARPA BETR program, the innovation demonstrates how AI-driven bioelectronics can revolutionize wound management by offering continuous, adaptive, and personalized care, paving the way for future applications in chronic and hard-to-heal wounds. Read More

**National**

6. ***A tug of war in gold nanoscale assembly can help produce better biosensors***

Scientists at the S. N. Bose National Centre for Basic Sciences, under the Department of

Science and Technology (DST), have discovered how everyday molecules such as amino acids and salts influence the behaviour of gold nanoparticles - tiny particles crucial to biosensors, imaging, and drug delivery. The research team led by Prof. Manik Pradhan studied how Guanidine Hydrochloride (GdnHCl), a powerful salt, causes gold nanoparticles to rapidly aggregate into dense clusters. However, when L-Tryptophan (L-Trp), an amino acid commonly found in food, was added, it disrupted this process, leading to a looser, branched network of particles, a phenomenon termed 'frustrated aggregation'.




Using a cutting-edge optical method called Evanescent Wave Cavity Ringdown Spectroscopy (EW-CRDS), the researchers observed these nanoscale interactions in real time. The study revealed that L-Trp stabilizes guanidinium ions, slowing aggregation and altering nanoparticle structure. This breakthrough, deepens understanding of how molecular interactions can be controlled at the nanoscale and could lead to the development of smarter biosensors, more accurate diagnostic devices, and improved drug delivery systems through better manipulation of nanoparticle behaviour. Read More

### 7. *AI algorithms can detect vision problems years before they actually appear, says ZEISS India*

ZEISS India has highlighted how artificial intelligence (AI) and deep technologies can revolutionize eye care by detecting vision problems years before symptoms appear, helping prevent irreversible blindness. According to Dipu Bose, Head of Medical Technology at ZEISS India and Neighbouring Markets, AI can analyse thousands of retinal images in seconds, identifying subtle changes linked to conditions such as diabetic retinopathy, glaucoma, and macular degeneration, long before patients notice vision loss. This shift from reactive to predictive and preventive eye care could significantly reduce India's economic burden from blindness.

ZEISS is integrating AI into diagnostic and surgical tools like the Surgery Optimiser App, which uses AI to help young surgeons learn from experienced practitioners, and Pathfinder, an AI-based diagnostic support tool that visualises clinical workflows. These technologies enhance precision, improve decision-making, and increase surgical consistency. Bose emphasized that India's challenge lies in low rates of preventive eye check-ups, making early detection technologies crucial. The ophthalmic devices market in India is projected to grow from $943.8 million in 2024 to $1.54 billion by 2033, driven by

innovations in AI, robotics, and deep-tech, signalling a major transformation toward data-driven, personalized eye care. Read More

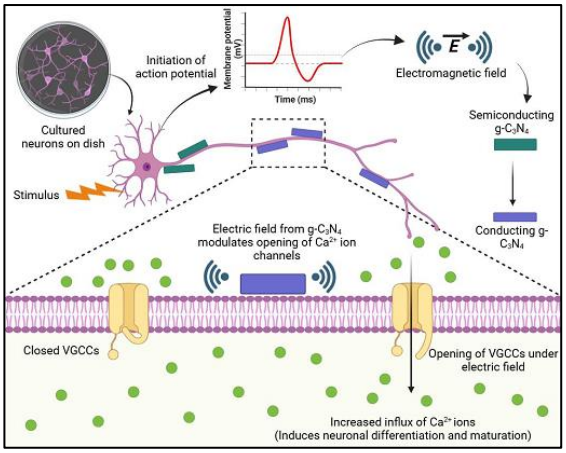
### 8. *Cholesterol could power tomorrow's electronics*

Scientists from the Institute of Nano Science and Technology (INST), Mohali, an autonomous institute under the Department of Science and Technology (DST), have made a breakthrough by using cholesterol to control the spin of electrons, a fundamental quantum property. This innovation could significantly advance spintronics, a next-generation field of electronics that leverages electron spin instead of charge to transmit and store information, promising faster, smaller, and more energy-efficient devices.

The team, led by Dr. Amit Kumar Mondal, developed cholesterol-based nanomaterials that act as spin filters, capable of selectively separating and manipulating electron spins. Cholesterol, known for its natural chirality (handedness) and structural flexibility, provides an ideal molecular scaffold for supramolecular spintronic materials. By integrating metal ions into the cholesterol framework, researchers demonstrated that spin orientation could be precisely tuned by adjusting the type and concentration of metal ions. Remarkably, both spin directions could be controlled within the same system through minor chemical modifications or external achiral stimuli.

This discovery showcases a powerful, bio-inspired approach to quantum control, enabling the creation of sustainable and energy-efficient spin-based materials. The findings open new frontiers for quantum computing, advanced memory chips, molecular electronics, and bioelectronic devices, marking a major step toward greener and smarter technologies. Read More

### 9. *Indian researchers pioneer nanomaterial that stimulates brain cells without surgery*




Scientists from the Institute of Nano Indian and Technology (INST) have developed a groundbreaking nanomaterial that can stimulate brain cells non-invasively, marking a major advance in neurotechnology. The study shows that graphitic carbon nitride ($gC_3N_4$) can activate neurons without the need for electrodes, lasers, or magnets traditionally used in deep brain stimulation (DBS) and other invasive therapies.

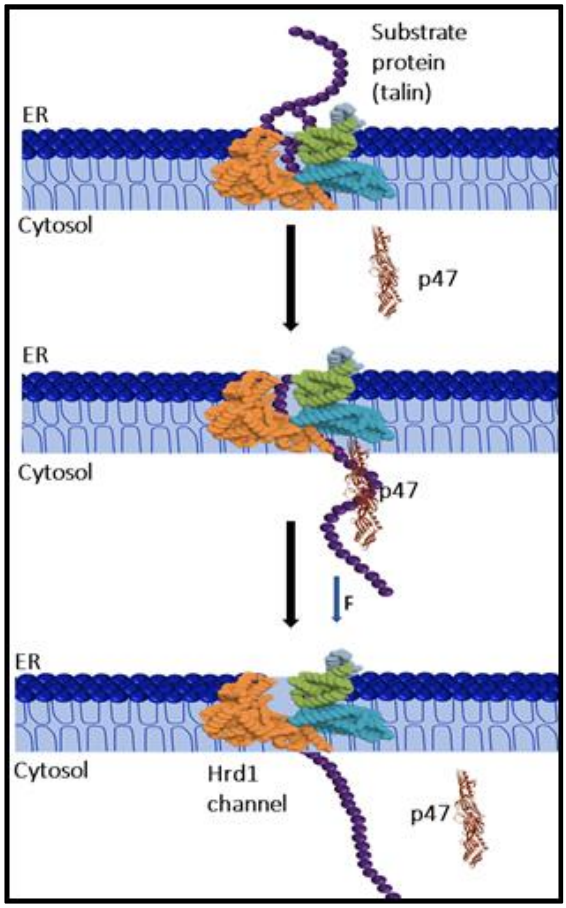
The material naturally interacts with neurons by generating tiny electric fields in response to brain signals, helping open calcium channels, promoting neuronal growth, and enhancing communication between cells. It also boosted dopamine levels and reduced toxic proteins linked to Parkinson's disease in animal models, highlighting its therapeutic potential for neurodegenerative disorders such as Parkinson's and Alzheimer's.

The researchers demonstrated that $gC_3N_4$ acts like a biological switch, turning 'on' or 'off' depending on the neuron's voltage state, preventing cellular fatigue and improving overall network activity. This first ever demonstration of semiconducting nanomaterials directly modulating neurons without external stimulation could pave the way for non-invasive treatments, neuroregeneration therapies, and even future 'brainware computing' applications using brain organoids. Read More

10. ***Unsung helper that protects cells from mechanical stress holds the therapeutic promise***

Scientists from the S. N. Bose National Centre for Basic Sciences (SNBNCBS), have discovered a hidden protein function that could transform treatments for diseases linked to protein instability, such as heart disorders and laminopathies. The team found that p47, previously known as a helper protein for p97 involved in protein transport and degradation, can act independently as a 'mechanical chaperone'.

Using single-molecule magnetic tweezers, researchers demonstrated that p47 can directly stabilize proteins exposed to mechanical stress, helping them refold even under continuous strain. This finding reveals that accessory proteins, once considered passive participants, play an active role in maintaining protein stability under force.




The study provides the first direct evidence of cofactor proteins exhibiting autonomous, force-dependent protective activity. The discovery opens new avenues for therapeutic strategies targeting mechanical cofactors like p47 to treat diseases caused by impaired protein stability and mechanical dysfunction in cells. Read More

## QUANTUM & PHOTONICS

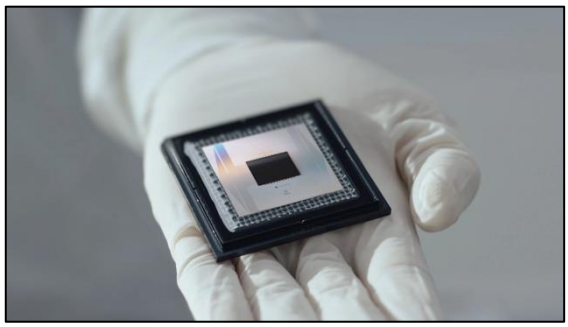
**International**

11. ***Exotic Phase of Matter realized on a Quantum Processor***

Researchers from the Technical University of Munich, Princeton University, and Google Quantum AI have successfully used a 58-qubit superconducting quantum processor to observe an entirely new phase of matter that exists only out of equilibrium. The study demonstrates how quantum computers can serve as experimental platforms to explore exotic quantum states beyond traditional physics.

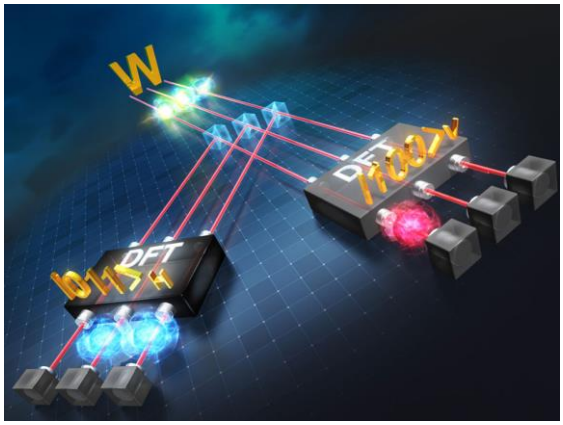
The team realized a Floquet topologically ordered state, a long-theorized but previously unobserved form of matter that arises when quantum systems are rhythmically driven in time. Using advanced imaging and interferometric

algorithms, they visualized directed edge motions and witnessed the transformation of exotic quantum particles, confirming theoretical predictions.



These findings highlight that quantum processors can do more than computation, they can act as laboratories for studying non-equilibrium quantum phenomena that classical computers cannot simulate. This breakthrough marks a major step toward using quantum machines to investigate the behavior of matter under dynamic conditions, potentially shaping the foundation for future quantum technologies and materials. Read More

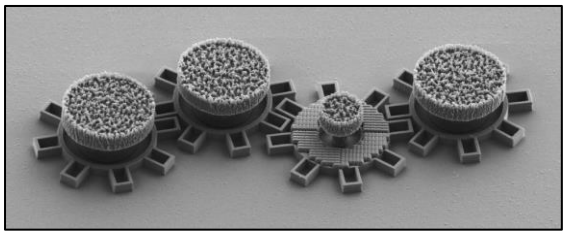
### 12. *New quantum breakthrough could transform teleportation and computing*




Researchers at Kyoto University and Hiroshima University have achieved a major milestone in quantum physics by successfully developing and experimentally demonstrating an entangled measurement method for the quantum W state, one of the two fundamental types of multi-photon entanglement, alongside the Greenberger-Horne-Zeilinger (GHZ) state. Using a high-stability optical quantum circuit capable of performing quantum Fourier transformations, the team managed to identify three-photon W states in a single measurement, a feat that had not been realized in over 25 years since GHZ entanglement measurement was first proposed. Their setup could distinguish between different W states based on unique correlations among the photons, achieving high fidelity and stability without the need for active control.

This breakthrough paves the way for practical applications in quantum teleportation, quantum communication, and measurement-based quantum computing. By enabling efficient identification of multi-photon entangled states, it marks a critical advance toward scalable quantum technologies. The researchers now plan to extend their approach to larger multi-photon systems and develop integrated on-chip photonic circuits to further enhance the capability of quantum information processing. Read More

### 13. *Scientists build micromotors smaller than a human hair*



Researchers at the University of Gothenburg have developed the world's smallest light-powered gears, microscopic machines so tiny they can fit inside a single strand of hair. Each gear, only about 0.016 millimeters in diameter, is made of silica and features an optical metamaterial that reacts to laser light, allowing it to move without any mechanical contact.

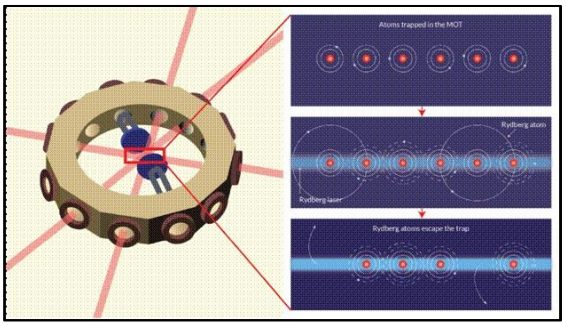
When illuminated by a laser, the metamaterial captures and manipulates

light to spin the gear, with the speed controlled by light intensity and direction changed through polarization. This innovation eliminates the need for conventional mechanical drive trains, marking a breakthrough in creating on-chip micromotors after decades of stagnation in miniaturization.

These laser-driven microgears can perform various mechanical functions such as converting rotational motion into linear movement or controlling microscopic mirrors. The approach paves the way for a new generation of light-powered microsystems that could be used in medicine, including pumps or valves operating within the human body, and in technologies like lab-on-a-chip systems and nanoscale robotics. Researchers describe this as a fundamentally new way of reimagining mechanics at the microscale by replacing bulky physical couplings with controllable light. Read More

**National**

14. ***High energy pushes atomic brotherhood making way for next generation quantum devices***

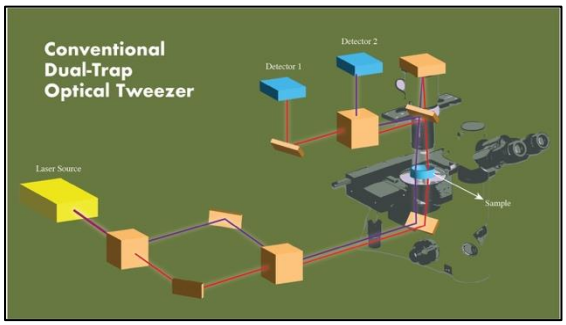



In a breakthrough for Indian quantum research, scientists at the Raman Research Institute (RRI), Bengaluru, have demonstrated how atoms begin to behave collectively rather than independently when pushed to extremely high energy levels. By cooling rubidium atoms to near absolute zero and exciting them beyond the 100th energy level into Rydberg states, the researchers observed interaction-driven distortions in their light response, marking the first global observation of such effects at these high states.

Ordinarily, excited atoms display a clear Autler Townes splitting pattern, but at these extreme energies, the signals blurred and broadened, indicating that the atoms were talking to each other and acting as a unified system. This discovery provides critical insight into where the boundary lies between isolated and interacting atoms, knowledge vital for designing next generation quantum computers, sensors, and communication systems.

Led by Prof. Sanjukta Roy and her team at RRI, with theoretical support from IISER Pune, the experiment used a highly sensitive detection setup capable of capturing even a few photons. This work establishes India as a leader in probing high energy atomic phenomena and opens new pathways for developing scalable quantum technologies based on collective atomic behavior. Read More

15. ***Trapping the future with light can push boundaries of biology, medicine & nanoscience***




Researchers at the Raman Research Institute (RRI), Bengaluru, have developed a novel dual-trap optical tweezers system that can manipulate microscopic particles using laser light with unprecedented precision. This innovation makes high-end biophysical research tools more accessible in India and holds immense potential for

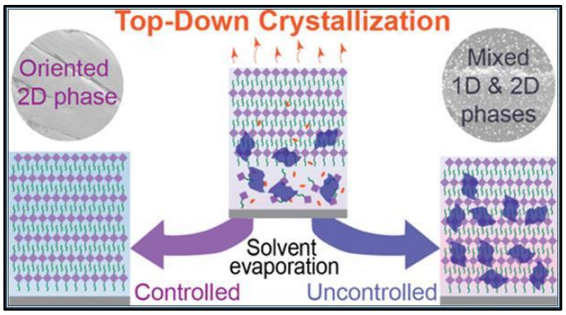
advancing neuroscience, nanoscience, and medical research, including drug development.

Optical tweezers, which won the Nobel Prize in 2018, use light to trap and move tiny particles, allowing scientists to measure forces at the molecular level. Traditional dual-trap systems, however, face major limitations such as signal interference, misalignment during motion, and poor compatibility with existing microscopy techniques. RRI's new design overcomes these challenges through a confocal detection scheme that measures backward-scattered light—ensuring independent, interference-free signals from both traps even when they move.

This modular, cost-effective setup is compatible with standard microscopes and can perform long, stable, high-precision measurements. The innovation enables precise force studies on single molecules, biopolymers, and soft materials, offering new tools for cell mechanics and biomolecular research. The team, plans to commercialize this patentable system as a plug-and-play module for research laboratories worldwide. Read More

### *16. Unlocking the power of chirality for next-generation optoelectronics*

Scientists at the Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru, have uncovered how to precisely control the crystallization of chiral perovskite films, materials that could revolutionize next generation optoelectronic and quantum devices. Chirality, a property where objects are mirror-image asymmetrical like DNA, enables unique light–matter interactions such as detecting circularly polarized light and controlling electron spin. These features are vital for developing devices like spintronic elements, photonic synapses, and circularly polarized light detectors.




While most chiral materials have been organic and poor at conducting electricity, chiral halide perovskites combine efficient charge transport with tunable optical properties. The CeNS team studied thin films of methylbenzylammonium copper bromide and found that crystallization starts at the air–film interface, with impurities forming due to trapped solvents. By optimizing solvent selection and using vacuum processing, they achieved phase pure, well oriented films free of defects.

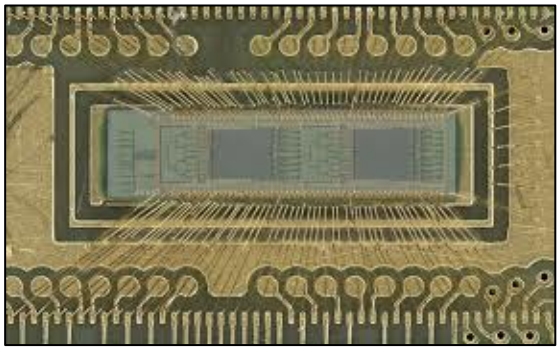
This discovery provides a blueprint for fabricating high quality chiral perovskite films and integrating them into advanced optoelectronic systems. The team is now developing photodetectors using these materials, positioning India at the frontier of light based and quantum technologies critical for future semiconductor innovation. Read More

## SEMICONDUCTORS

**International**

### *17. New light-based chip boosts power efficiency of AI tasks 100 fold*

Engineers at the University of Florida, in collaboration with UCLA and George Washington University, have developed a groundbreaking computer chip that uses light instead of electricity to perform one of AI's most power-intensive operations, convolution, a key process in image and pattern recognition. This innovation boosts power efficiency by up to 100 times compared to conventional chips while maintaining accuracy rates of around 98%.



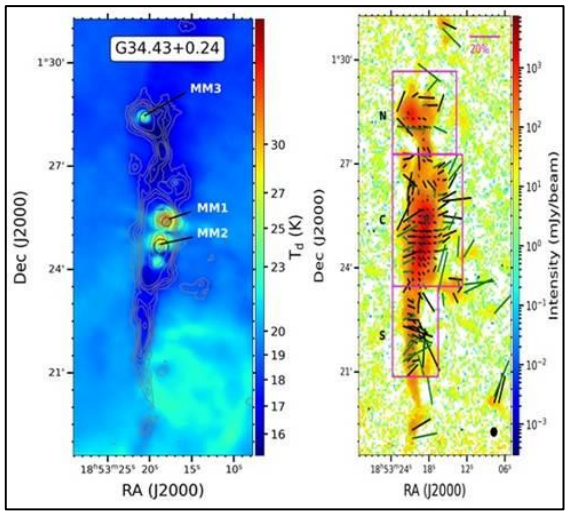
The optical chip integrates lasers and microscopic Fresnel lenses, thinner than a human hair, onto a circuit board. Data from images or other inputs are converted into laser light, processed through these lenses, and then reconverted into digital signals, completing AI computations with minimal energy use and faster speeds.

Beyond efficiency, the chip's photonic design allows multiple wavelengths (colors) of light to process data streams simultaneously, enabling massive parallel computing. Supported by the US Office of Naval Research, the study marks the first successful integration of such optical computation into an AI neural network. Researchers believe this advance could significantly cut global AI energy demands and pave the way for light-based AI processors in mainstream semiconductor manufacturing. Read More

## SPACE & DEFENCE

### National

***18. Astronomers unveil observational evidence of how cosmic dust grains line up with the Galaxy's magnetic field***




Astronomers from the Indian Institute of Astrophysics (IIA), Bengaluru, have provided the strongest observational evidence yet of how interstellar dust grains align with magnetic fields in the Milky Way, a long-standing mystery in astrophysics.

Using the POL2 polarimeter on the James Clerk Maxwell Telescope in Hawaii, the team studied the massive star-forming cloud G34.43+0.24, located about 12,000 light years away. This dense filament, rich in protostars like MM1, MM2, and MM3, revealed how tiny, non-spherical dust grains interact with radiation and magnetic fields in different ways.

The researchers observed three alignment mechanisms: Radiative Torque Alignment (RATA), where dust grains spin and align with magnetic fields under radiation; Radiative Torque Disruption (RATD), where intense radiation causes large grains to break apart, weakening alignment; and Magnetically enhanced Radiative Torque

Alignment (MRAT), where strong magnetic relaxation boosts alignment efficiency.

These findings show that dust grains respond differently based on their local environment, sometimes aligning, sometimes fragmenting, or becoming highly efficient magnetic tracers. The study enhances understanding of how magnetic fields shape cosmic structures, from star formation to galactic evolution, marking a milestone in interstellar astrophysics and magnetic field mapping. Read More

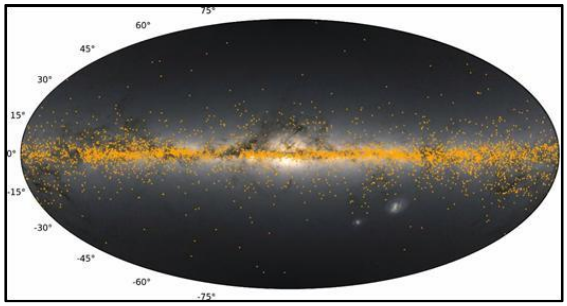
### 19. *DRDO transfers three advanced materials technologies to the industry*

The Defence Metallurgical Research Laboratory (DMRL) of DRDO, Hyderabad, has transferred three advanced materials technologies to Indian industry partners, marking a milestone in self-reliance for defence materials. DRDO Chairman and Secretary, Department of Defence R&D, Dr Samir V Kamat, handed over the Licensing Agreement for Transfer of Technology (LAToT) documents.

The technologies transferred include high strength radomes to BHEL, Jagdishpur, for producing protective covers for missile sensors to boost indigenous missile programs; DMR-1700 steel sheets and plates to JSPL, Angul, featuring ultra-high strength and fracture toughness for defence applications; and DMR 249A HSLA steel plates to SAIL's Bhilai Steel Plant for naval vessels, meeting stringent mechanical and metallurgical standards.

Dr Kamat lauded DMRL's role in driving innovation and fostering industry partnerships that translate advanced R&D into practical use. The collaboration strengthens India's defence manufacturing ecosystem and showcases DMRL's multidisciplinary expertise in strategic materials. Additionally, an MoU was signed between DMRL and the Aircraft Accident Investigation Bureau of the Ministry of Civil Aviation to leverage DMRL's expertise for aircraft investigation and safety initiatives. Read More

### 20. *Scientists used Data from more than 6,000 open clusters to map the dusty veil of Milky Way*




Astronomers from the Aryabhatta Research Institute of Observational Sciences (ARIES) have created a detailed map of the interstellar dust spread across the Milky Way's galactic plane using data from over 6,000 open star clusters. This cosmic dust, which dims and reddens starlight, plays a crucial role in understanding where new stars form and how the Galaxy is structured.

The study, led by Dr. Y. C. Joshi, revealed that the dust does not form a uniform layer but rather a thin, wavy structure that lies slightly below the Galaxy's central plane, shifting up and down in a wave-like pattern. Most of the dust is concentrated near the Galactic longitude of 41°, with the least found around 221°. The Sun itself is positioned about 50 light-years above this dusty layer.

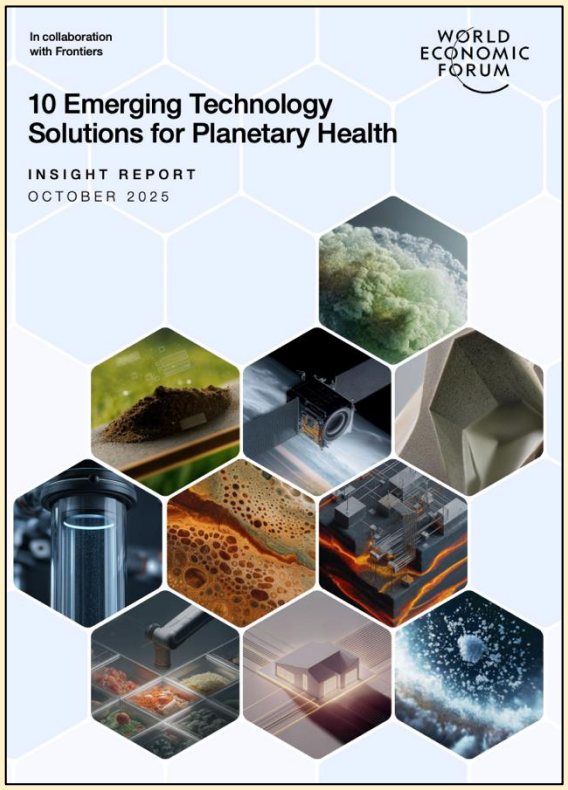
This mapping offers fresh insights into the dynamic structure of the Milky Way, showing how dense regions of dust correspond to active star-forming zones. It also refines how astronomers interpret stellar light and galactic features.

Future missions such as the upcoming Gaia data release and the Vera C. Rubin Observatory's LSST are expected to extend this three-dimensional dust mapping to more distant parts of the Galaxy. Read More

## REPORTS/POLICY DOCUMENTS

### International

***21. WEF - 10 Emerging Technology Solutions for Planetary Health***




The World Economic Forum's report 10 Emerging Technology Solutions for Planetary Health, developed in collaboration with Frontiers, presents innovative technologies designed to help restore Earth's environmental balance as seven of the planet's nine natural boundaries have been breached. The report highlights breakthroughs such as precision fermentation, green ammonia production, modular geothermal energy, and regenerative desalination as key tools to address critical ecological and resource challenges.

These technologies span clean energy, sustainable materials, biotechnology, and advanced Earth observation, offering solutions to reduce emissions, restore ecosystems, and promote efficient resource use. Each is evaluated through policy, finance, and equity perspectives to ensure responsible deployment and broad social benefit. Collectively, the report underscores how technological innovation can drive systemic change toward a more sustainable, resilient, and equitable planet. Download Report

***22. WEF - Quantum Technologies: Key Opportunities for Advanced Manufacturing and Supply Chains***

The report Quantum Technologies: Key Opportunities for Advanced Manufacturing and Supply Chains explores how quantum innovations are poised to revolutionize the manufacturing ecosystem. It outlines how quantum computing, sensing, and communication can deliver breakthroughs in material discovery, production design, and real-time supply chain optimization.

Quantum computing can simulate complex molecular and material interactions far faster than classical computers, accelerating the development of stronger, lighter, and more sustainable materials. Quantum sensors can enhance precision in manufacturing by detecting minute variations in temperature, pressure, and

electromagnetic fields, leading to improved quality control and predictive maintenance. Meanwhile, quantum communication promises ultra-secure data exchange across global supply chains, ensuring greater resilience and trust in industrial networks.


By integrating these quantum technologies, industries can achieve smarter automation, lower waste, and more adaptive supply chains. The report underscores that early adoption and investment in quantum R&D will be key for countries and companies aiming to stay ahead in the next generation of advanced manufacturing. Download Report

**National**

***23. NITI Aayog's Frontier Tech Hub releases 4th edition of its Quarterly Insights Future Front on "Introduction to 2D Materials", in partnership with Indian Institute of Science***

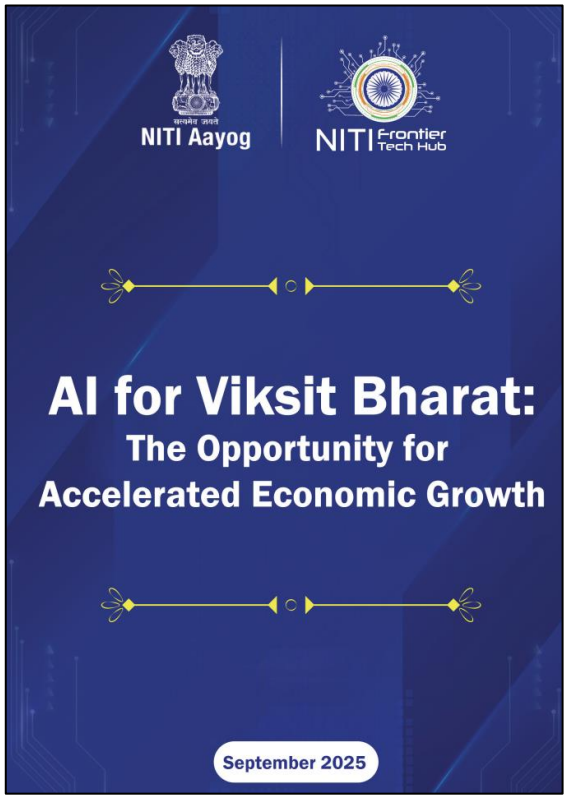
NITI Aayog's Frontier Tech Hub, in collaboration with the Indian Institute of Science (IISc), Bengaluru, released the fourth edition of its Future Front Quarterly Insights titled Introduction to 2D Materials. The report highlights how ultra-thin two-dimensional materials, just 1/80,000 the width of a human hair yet 200 times stronger than steel, are poised to transform industries such as semiconductors, energy, electronics, and quantum computing.


The publication emphasizes that early investment in 2D materials research and innovation will yield strategic advantages for India, including energy efficiency, intellectual property ownership, and technological self-reliance. It calls for building resilient innovation ecosystems, securing access to critical materials, and fostering global partnerships to stay competitive as traditional silicon technology nears its physical limits.

The report warns that inaction in this area could lead not just to economic losses but to strategic disadvantages in emerging technology domains. Download Report

***24. NITI Aayog - 'AI for Viksit Bharat Roadmap' and 'Frontier Tech Repository'***

NITI Aayog launched two major initiatives under its Frontier Tech Hub, the AI for Viksit Bharat Roadmap and the NITI Frontier Tech Repository, to accelerate India's transformation into a developed nation by 2047. The launch event was attended by Finance Minister Nirmala Sitharaman, IT Minister Ashwini Vaishnaw, NITI Aayog Vice Chairperson Suman Bery, CEO B.V.R. Subrahmanyam, and MeitY Secretary S. Krishnan.




The AI for Viksit Bharat Roadmap outlines a practical action plan to harness AI for economic growth, focusing on two levers: accelerating AI adoption across industries to boost productivity and transforming research and development through generative AI to drive innovation. The roadmap envisions AI as a catalyst for inclusive, technology-driven development across all districts of India.

Complementing this, the Frontier Tech Repository features over 200 impact stories from across India in agriculture, healthcare, education, and national security. It highlights real-world examples of how states, startups, and innovators are deploying frontier technologies to improve governance and livelihoods.

NITI Aayog CEO B.V.R. Subrahmanyam emphasized that achieving India's 8% growth target requires a major productivity leap powered by AI and innovation. He announced two new initiatives: the Frontier 50 Initiative to deploy frontier technologies in 50 Aspirational Districts, and the NITI Frontier Tech Impact Awards to recognize states leading in technology-driven governance and service delivery.

Finance Minister Sitharaman described the Frontier Tech Hub as a honeycomb bringing together government, industry, and innovators, while Minister Vaishnaw noted that AI is fundamentally changing the way India works and lives. The launch marked a significant step toward embedding AI and emerging technologies at the core of India's growth strategy. Download Report

### 25. *PSA launched 'AI Playbooks for Agriculture and SMEs' and 'AI Sandbox White Paper' to accelerate Responsible AI Adoption across India*

Principal Scientific Adviser to the Government of India, Prof. Ajay Kumar Sood, launched three major publications under the AI for India 2030 initiative of the World Economic Forum's Centre for the Fourth Industrial Revolution (C4IR) India. These include 'Future Farming in India: AI Playbook for Agriculture', 'Transforming Small Businesses: An AI Playbook for India's SMEs', and 'Shaping the AI Sandbox Ecosystem for the Intelligent Age: White Paper'. The launch was attended by

senior officials from MeitY, MSME, OPSA, and the Ministry of Agriculture.

Developed under the guidance of the Office of the PSA and MeitY, the playbooks provide actionable roadmaps to scale responsible and inclusive AI adoption in agriculture and small business sectors. They are based on field consultations, pilot studies, and inputs from government, academia, industry, and farmer organisations. The reports introduce the IMPACT AI framework, which promotes collaboration among government enablers, industry innovators, and last-mile implementers.

The AI Playbook for Agriculture focuses on boosting crop yields, improving risk management, and enhancing market access for farmers through locally adapted, data-driven tools. The AI Playbook for SMEs outlines strategies to democratize AI for small enterprises by improving productivity, credit access, and competitiveness through a cluster-based model.

The AI Sandbox White Paper proposes a framework for creating controlled environments to test and scale AI innovations responsibly. It aims to ensure safety, reliability, and alignment with India's national priorities.

Prof. Sood emphasized that India's AI journey must remain inclusive and impact-driven, urging collaboration across ministries and sectors. Dr. Parvinder Maini highlighted that OPSA's S&T clusters could play a key role in implementing these frameworks through capacity building and knowledge sharing.

The initiative's next phase will bring together state governments, industry, and technology partners to turn the playbooks into funded projects. Progress will be tracked through indicators such as AI adoption, productivity gains, and improved market access, ensuring measurable impact on India's path to responsible AI-led growth. Download Report

## TECHNOLOGY ENGAGEMENTS/NEWS BYTES

**International**

### *26. Alibaba and Nvidia's Deal Highlights the New Frontline in US - China AI Rivalry*

Alibaba and Nvidia have announced a landmark collaboration that integrates Nvidia's Physical AI software suite into Alibaba Cloud's Platform for AI (PAI), marking a major shift in the U.S - China AI competition from hardware dominance to control over software and platforms. The Physical AI tools simulate 3D environments for robotics, autonomous vehicles, and smart factories, enabling large-scale synthetic data generation and industrial automation.

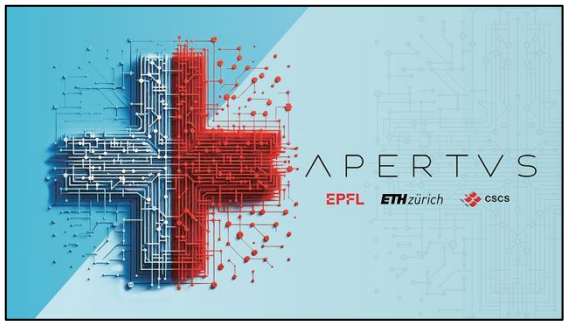
The deal comes amid regulatory tensions as China's Cyberspace Administration recently instructed domestic firms to halt purchases of Nvidia's RTX Pro 6000D chips, pushing companies toward local alternatives. By focusing on software rather than hardware, Alibaba's agreement avoids direct conflict with these restrictions but may still draw scrutiny.

Alibaba is intensifying its AI focus, boosting investment beyond $50 billion and

unveiling Qwen 3-Max, a trillion-parameter model for coding and agentic tasks. It is also expanding its global infrastructure with new data centers across multiple continents, now totaling 91 sites in 29 regions, strengthening its position against global cloud leaders.

For Nvidia, this partnership ensures continued relevance in China through software licensing, even as U.S. export controls limit chip sales. Analysts see this as a new front in the global AI race, where influence over ecosystems, platforms, and development environments becomes as crucial as semiconductor manufacturing itself. Read More

### 27. *Switzerland Releases Apertus, a National Open-Source AI Model*




Switzerland has launched 'Apertus', a fully open-source national large language model (LLM) developed by leading public institutions - EPFL, ETH Zurich, and the Swiss National Supercomputing Centre (CSCS). Positioned as part of the Swiss AI Initiative, Apertus aims to provide a transparent, regulation-compliant alternative to proprietary AI models such as OpenAI's ChatGPT, supporting Europe's digital sovereignty goals.

Trained on 15 trillion tokens across more than 1,000 languages, including Swiss German and Romansh, Apertus is available in 8B and 70B parameter versions on Hugging Face and via Swisscom's national AI platform. The model's training process is fully documented, featuring open weights, open data, reconstruction scripts, and compliance materials aligned with the EU AI Act. Its data corpus relies exclusively on publicly available and ethically sourced content, ensuring compliance with privacy and copyright laws.

Funded and governed under the ETH Board, Apertus represents over 10 million GPU hours of compute and is being treated as national digital infrastructure. It serves as a foundation for future domain-specific variants in law, health, climate, and education. Described as "AI as public infrastructure," Apertus demonstrates how nations can build sovereign, transparent AI systems that meet both innovation and regulatory needs while reducing deployment risks for sensitive sectors. Read More

## National

### 28. *Cabinet approves Rs.1,500 crore Incentive Scheme to promote Critical Mineral Recycling in the country*

The Union Cabinet, chaired by PM Narendra Modi, has approved a Rs. 1,500 crore Incentive Scheme to promote the recycling of critical minerals in India. The initiative, part of the National Critical Mineral Mission (NCMM), aims to strengthen domestic capacity and ensure supply chain resilience by extracting critical minerals such as lithium, cobalt, and nickel from secondary sources like e-waste, lithium-ion battery (LIB) scrap, and catalytic converters.

Spanning six years from FY 2025-26 to FY 2030-31, the scheme will provide financial support through a 20% capital expenditure subsidy for plant and machinery, along with an operating expenditure subsidy tied to incremental sales. Large entities can avail incentives up to Rs. 50 crore, while small units and start-ups have a limit of Rs. 25 crore.

The scheme is expected to create at least 270 kilotonnes of annual recycling capacity and yield around 40 kilotonnes of critical minerals each year. It aims to attract Rs. 8,000 crore in private investment and generate approximately 70,000 direct and indirect jobs. By focusing on both established recyclers and start-ups, the scheme seeks to build a sustainable domestic ecosystem for critical mineral recovery and reduce import dependence in the clean energy and technology sectors. Read More

### 29. *Government of India Unveils the Logo and Key Flagship Initiatives for the AI Impact Summit 2026*

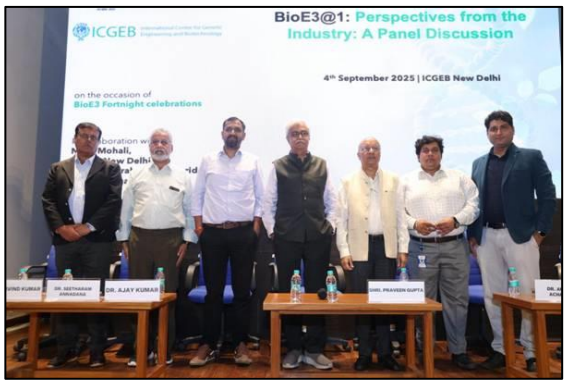

The Government of India has unveiled the logo and key initiatives for the India AI Impact Summit 2026, to be held on February 19-20, 2026, at Bharat Mandapam, New Delhi. Hosted by the Ministry of Electronics and Information Technology (MeitY), this will be the first AI summit of its scale led by a Global South nation, guided by the principles of People, Planet, and Progress.

Union Minister Shri Ashwini Vaishnaw launched the summit's logo and flagship programs, including UDAAN, the Global AI Pitch Fest, YuvaAI Innovation Challenge, AI by HER, Global Innovation Challenge for All, AI Expo, and a Research Symposium. The event will also feature eight indigenous foundational model projects covering domains such as healthcare, governance, science, and multilingual AI. Developed by institutions and startups like IIT Bombay, Tech Mahindra, Fractal Analytics, and Zenteiq, these models, ranging from 2B to 1T parameters, aim to boost India's AI self-reliance and innovation capacity.

The launch also marked the establishment of 30 Data and AI Labs under the IndiaAI Mission, the start of foundational AI training courses, and the expansion of the IndiaAI Fellowship Program to support 13,500 scholars across disciplines.

The Summit will focus on seven thematic Chakras - Human Capital, Inclusion, Safe and Trusted AI, Resilience, Science, Democratizing AI Resources, and Social Good, showcasing India's vision to use AI for inclusive development, sustainability, and equitable global progress. Read More

### 30. *ICGEB New Delhi commemorated first anniversary of BioE3 Policy*




The International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi, marked the first anniversary of the BioE3 Policy with the event 'BioE3@1', celebrating India's progress in integrating biotechnology with the economy, environment, and employment.

Themed "Institute–Industry Interaction for Climate Resilient Agriculture and Clean Energy," the event brought together leading research institutions and industry representatives to strengthen collaboration between science and enterprise.

National institutes showcased their latest research in agri-biotech and clean energy, while industry leaders discussed ways to accelerate the lab-to-market transition of innovations under the BioE3 framework. An exhibition highlighted technologies in sustainable agriculture, energy, and biotechnology with applications for India's growing bioeconomy.

The BioE3 Policy, approved in 2024, aims to position biotechnology as a driver of India's economic and environmental transformation, supporting the country's commitment to achieving Net Zero emissions by 2070 through innovation-led and sustainable growth. Read More

### 31. *India now accounts for 21 out of 121 Bio-Companies globally*


India has launched 21 high-performance biomanufacturing platforms under the national biotechnology policy, marking a major step toward becoming a global hub for bio-based innovation and sustainable growth. The initiative aims to make the country self-reliant in critical sectors and reduce import dependence by creating shared infrastructure for startups, industries, and research institutions to test, scale, and commercialize new technologies.

The new bio-enabler facilities will support work in microbial manufacturing, smart proteins, sustainable agriculture, functional foods, carbon capture, marine biotechnology, and advanced cell and gene therapies. India's bioeconomy has expanded rapidly, from about $10 billion to nearly $100 billion, with a target of reaching $300 billion in the coming years, supported by thousands of biotech startups and dedicated incubators.

The program envisions biotechnology as a cornerstone of future economic growth, similar to the role of information technology in earlier decades. By promoting collaboration between industry, academia, and government, it seeks to position India as a leader in biomanufacturing while advancing innovation in health, agriculture, and environmental sustainability. Read More

### 32. *India Targets Swadeshi Solar Cells by 2028; Moving Towards Indigenous Wafers and Ingots*


India is advancing toward full domestic solar manufacturing by 2028, aiming to produce indigenous solar cells, wafers, and ingots as part of its broader clean energy strategy. At a national review meeting on renewable energy, it was highlighted that the country has already achieved over 251.5 GW of non-fossil capacity, surpassing half of its 2030 target of 500 GW. The government emphasized that India's rapid progress in renewable energy reflects its growing leadership in clean technology and

its commitment to a self-reliant energy future.

Flagship schemes such as PM Surya Ghar and PM-KUSUM are central to this effort. Nearly 20 lakh households have benefitted under PM Surya Ghar, while PM-KUSUM has installed or solarised over 16 lakh pumps, saving 1.3 billion litres of diesel annually and cutting 40 million tonnes of $CO_2$ emissions. The second phase of PM-KUSUM will be launched after March 2026.

The meeting urged states to expedite power purchase agreements, renewable purchase obligations, and land allocations, while promoting ease of doing business through single-window systems. The PLI Scheme for High Efficiency Solar PV Modules has already attracted ₹50,000 crore in investments and created over 12,000 jobs, contributing to India's 100 GW solar module manufacturing capacity.

The government reaffirmed its vision of achieving energy security, sustainability, and citizen empowerment through collaborative action across the Centre, states, industry, and communities, positioning India as a global leader in the green energy transition. Read More

### 33. *India and UK Forge Strategic Partnership with the Launch of the India-UK Connectivity & Innovation Centre*

India and the United Kingdom have launched the India-UK Connectivity and Innovation Centre, marking a major step in their strategic technology partnership to advance secure, inclusive, and next-generation communications. Supported by a joint commitment of £24 million over four years, the Centre aims to unite research institutions, industry, and innovators to accelerate breakthroughs in advanced telecommunications and drive commercial opportunities across both nations.

The initiative will focus on three priority areas: applying artificial intelligence to enhance network efficiency and service innovation; developing non-terrestrial networks such as satellite and airborne systems to extend high-speed connectivity to remote regions; and strengthening telecom cybersecurity through open, interoperable, and resilient network solutions.


Serving as a key component of the UK-India Technology Security Initiative, jointly implemented by the Department of Telecommunications (DoT) and UK Research and Innovation (UKRI), the Centre embodies the shared vision outlined in the India-UK 2035 roadmap. By fostering joint research, testbeds, and global standards collaboration, the partnership aims to position both countries as leaders in the evolution of 6G and secure digital infrastructure, while promoting economic growth and technological resilience. Read More

### 34. *India's Chip Revolution: Ten projects, rising design innovation, and the road to 2 nm technology*

India is accelerating its semiconductor revolution, marking a major milestone with the development of its first 2-nanometre (nm) chip design. The inauguration of ARM's new semiconductor design office in Bengaluru signifies India's entry into the most advanced stage of chip innovation, crucial for powering next-generation technologies in artificial intelligence,

mobile computing, and high-performance systems.

Under the India Semiconductor Mission (ISM), ten projects worth ₹1.6 lakh crore have been approved across six states, with an overall outlay of ₹76,000 crore to build a robust semiconductor ecosystem. The country has already advanced from 7 nm and 5 nm designs to 3 nm, and now aims to pioneer 2 nm chip design. Electronics manufacturing has expanded sixfold over the past decade, driving a surge in domestic semiconductor demand.


India's innovation ecosystem is rapidly growing, with 23 chip design projects sanctioned under the Design Linked Incentive (DLI) Scheme, 72 companies using advanced design tools, and over 278 academic institutions engaged in chip research. Student-led innovation has also gained momentum, with 28 chips successfully taped out.

Globally, as the semiconductor industry heads toward USD 1 trillion by 2030, India's domestic market is expected to reach USD 100 -110 billion. By investing in advanced chip design and manufacturing, India is transitioning from assembly-based production to end-to-end semiconductor leadership, aligning with its Atmanirbhar Bharat vision and positioning itself as a trusted global partner in diversifying chip supply chains. Read More

### 35. *India Secures Exclusive Rights for Exploration of Polymetallic Sulphides in the Carlsberg Ridge in the Indian Ocean*

India has achieved a major milestone by becoming the first country in the world to secure two exploration contracts for polymetallic sulphides (PMS) with the International Seabed Authority (ISA). The new 15-year agreement between the Ministry of Earth Sciences (MoES) and ISA grants India exclusive rights to explore a 10,000 sq km area in the Carlsberg Ridge of the Indian Ocean.

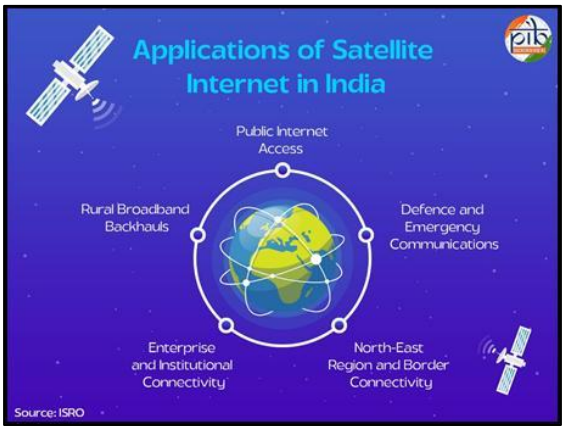
This achievement strengthens India's leadership in deep-sea exploration and advances the objectives of the Deep Ocean Mission, which focuses on seabed mineral discovery, development of mining technology, and enhancing the nation's blue economy initiatives. Polymetallic sulphides, rich in valuable metals like copper, zinc, gold, and platinum, have immense strategic and economic potential, placing India at the forefront of global marine resource exploration.

India's partnership with ISA spans three decades, beginning with its recognition as

the first "Pioneer Investor" for polymetallic nodule exploration. With this second PMS contract, covering both the Central and Southwest Indian Ridge and the Carlsberg Ridge, India now holds the world's largest exploration area for PMS in the international seabed.

As part of its continued collaboration with ISA, India will host the 8th ISA Annual Contractors Meeting in Goa, reaffirming its long-term commitment to sustainable ocean resource management, scientific research, and environmental protection in deep-sea ecosystems. Read More

### 36. *Satellite Internet in India: The Future of Internet Above Us*




India is rapidly advancing toward universal digital connectivity through satellite internet, which is emerging as a vital solution for bridging the rural-urban digital divide. With over one billion internet subscribers and rural penetration still at 46 per 100 people, satellite-based broadband is poised to extend reliable, high-speed access to remote and underserved regions such as border areas, hilly terrains, and islands.

Enabled by space sector reforms and the Indian Space Policy 2023, private companies now have 100% FDI access and a clear regulatory framework under DoT, TRAI, IN-SPACe, and NSIL. More than ten satellite operators, including Starlink, Jio Satellite Communications, and OneWeb India, are licensed to provide services, marking a new era of private participation in India's space ecosystem. The transition from traditional geostationary satellites to Low and Medium Earth Orbit (LEO/MEO) constellations promises lower latency, higher bandwidth, and nationwide coverage.

Government initiatives like Digital Bharat Nidhi, National Broadband Mission 2.0, BharatNet, and PM-WANI are integrating satellite internet to expand connectivity across rural India, islands, and the Northeast. High-throughput satellites such as GSAT-11, GSAT-19, GSAT-29, and GSAT-N2 form the backbone of India's satellite broadband network.

Aligned with the vision of Viksit Bharat 2047, India's push for satellite internet is strengthening digital inclusion, supporting economic growth, enhancing defence and disaster communication systems, and positioning the nation as a leader in space-based connectivity and innovation. Read More

## WHAT'S UPCOMING?

### 37. *Cyber and Tech Retreat, November 3-5, 2025, San Francisco*

The Cyber and Tech Retreat, scheduled for November 3-5, 2025, in San Francisco, is a high-level foreign and security policy initiative jointly led by Denmark and Australia. This event gathers senior representatives from over 20 countries to engage in candid discussions at the intersection of cybersecurity, technology, and foreign policy. A unique feature of the retreat is the direct interaction with executives from leading tech companies, specialized cybersecurity firms, and top academics, offering inside perspectives on

emerging technologies and the societal responsibilities of tech companies.


The retreat also addresses policy and regulatory gaps, fostering collaborative approaches to global cyber challenges in a retreat setting conducive to frank dialogue and strategic thinking. This gathering aims to strengthen international cooperation on cyber and technology governance amid rapidly evolving digital threats and innovations.

***38. Emerging Science, Technology & Innovation Conclave (ESTIC-2025), November 3-5, 2025, Bharat Mandapam, New Delhi***


The Emerging Science, Technology & Innovation Conclave (ESTIC-2025) is India's flagship annual event organized by the Department of Science and Technology, aimed at accelerating the country's science, technology, and innovation ecosystem in line with the vision of "Viksit Bharat 2047." Scheduled from November 3 to 5, 2025, at Bharat Mandapam, New Delhi, ESTIC convenes policymakers, researchers, industry leaders, startups, and global experts. The conclave focuses on eleven thematic areas, spanning AI, quantum computing, biotechnology, energy, space technologies, and advanced materials, designed to foster collaborations, showcase disruptive innovations, and drive inclusive, future-ready technological advancement. ESTIC-2025 serves as a transformative platform promoting India's scientific leadership and innovation-driven growth to realize its developed-nation ambitions by 2047. Key features include plenary talks, panel discussions, startup pitches, exhibitions, and cross-sectoral dialogue to shape national priorities and accelerate technology deployment for social and economic impact.

***39. The Global DPI Summit 2025, November 4-6, Cape Town, South Africa***


The Global Digital Public Infrastructure (DPI) Summit 2025, taking place November 4-6 in Cape Town, South Africa, is a premier global platform uniting policymakers, technologists, development partners, and innovators to accelerate inclusive, safe, and sustainable digital transformation.

Co-hosted by key institutions including the World Bank, ITU, UNDP, and Co-Develop, the summit builds on its successful inaugural edition in Cairo by focusing on translating dialogue into action. It highlights how DPI, such as secure digital identity, interoperable payment systems, and trusted data sharing, can drive economic growth, improve governance, and foster inclusion worldwide. Through keynote presentations, panel discussions, workshops, and an exhibition, the summit provides actionable insights, showcases country experiences, and fosters

collaboration to advance global digital public goods under the theme "DPI in Practice: Implementing Tomorrow's Digital Society Today." The event reinforces Cape Town's role as a hub for innovation while shaping the future global agenda for equitable digital infrastructure.

***40. Supercomputing India 2025 (SCI 2025), December 9 to 13, 2025, Manipal Institute of Technology, Bengaluru***


Supercomputing India 2025 (SCI 2025), organized by the Centre for Development of Advanced Computing (C-DAC), under the Ministry of Electronics & Information Technology (MeitY), with support from NEST Division of MEA, is India's inaugural flagship conference on high-performance computing (HPC), artificial intelligence (AI), and quantum technologies.

Scheduled from December 9 to 13, 2025, at the Manipal Institute of Technology in Bengaluru, SCI 2025 aims to bring together researchers, industry leaders, policymakers, and startups to showcase cutting-edge breakthroughs and foster collaborations in HPC-driven innovation. Anchored by the National Supercomputing Mission (NSM), the event emphasizes India's technological self-reliance and global leadership ambitions in computing for applications ranging from climate modeling to healthcare and defense.

SCI 2025 serves as a catalyst for accelerating scientific discovery and advancing quantum and AI-powered supercomputing capabilities in India and beyond. It features plenary sessions, workshops, and technology exhibitions designed to connect diverse stakeholders across academia, industry, and government to build a robust HPC ecosystem. Read 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)*

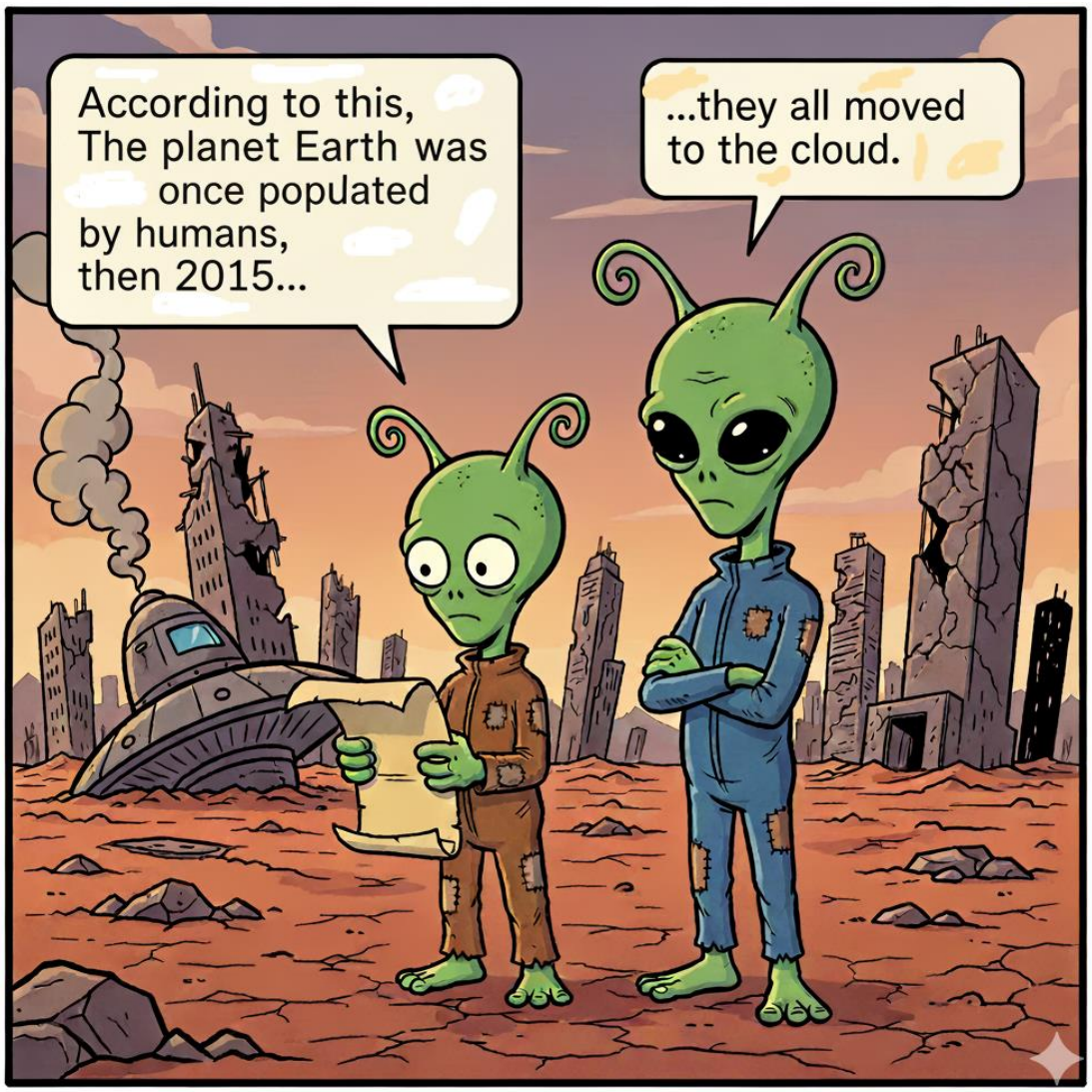
Make in India Raman Spectrometer (IndiRam CTR Series Raman Spectrometers)

### *IIT Roorkee*

1. A hexagonal structure packaging solution using banana pseudo-stem fibers and its method of preparation
2. Microwave-assisted process for synthesizing graphene oxide (GO) nanosheets from agricultural waste
3. A process and an apparatus for synthesis of metal-loaded multiwalled carbon nanotubes

4. System and method for cyberattack mitigation and delivery of updates using containerized microservices
5. A thermal fluid and a method for producing the same
6. A cellulose-based biodegradable hybrid adsorbent for selective phosphate and nitrate recovery from aqueous solutions
7. A hydroxy-modified biomass for rubidium adsorption
8. A multifunctional colourimetric sensor for detection of volatile aldehydes, ketones and cigarette smoke
9. Reconfigurable beam switching network for antenna arrays
10. A multi-purpose seating device
11. A power management unit for battery operated powertrain and a control method thereof
12. A small scale low-cost multi-millet de-husking machine
13. A manually operated water flow control apparatus for gharats
14. Thermal contact conductance and conductivity measurement system
15. Titanium Carbide MXene/Graphitic Carbon Nitride ($Ti_3C_2$/g-$C_3N_4$) Based Electrochemical Immunosensor for Detection of TNF-α
16. System and method for quantifying coexisting gas hydrate morphologies in geological formations

#NESTLaugh-orithm



## Recent High Level Tech engagements in India

For details - https://www.mea.gov.in/incoming-visits.htm?1/incoming_visits

- Singapore

The recent Official Visit of the Prime Minister of Singapore, H.E. Mr. Lawrence Wong, in September 2025 formalized a Roadmap for the Comprehensive Strategic Partnership that prioritizes several high-tech domains, specifically naming **Digitalisation** as one of the eight core areas for deepened cooperation. Key outcomes include strengthening **Digital Finance and Fintech cooperation** and capital market linkages via a Fintech Joint Working Group, alongside enhanced collaboration on cyber policies, CERT-CERT information exchange, and cybersecurity capacity building. Furthermore, both nations are exploring collaboration in **critical and emerging technologies** through the Joint Working Group on Digital Technologies, with specific plans to explore cooperation on **Artificial Intelligence (AI)** by sharing best practices and building data-driven AI use cases in sectors like health care and education. Cooperation was also established under the **India-Singapore Semiconductor Policy Dialogue** to facilitate resilient supply chains and R&D collaborations, and an MoU was signed to promote collaboration in the **Space Sector** between India's IN-SPACe and Singapore's Office for Space Technology & Industry.

- Mauritius

The State Visit of Prime Minister Dr. Navinchandra Ramgoolam in September 2025 yielded several tangible agreements to boost Science and Technology cooperation. A central outcome was the signing of a **Memorandum of Understanding on Cooperation in the Field of Science and Technology**, which includes India assisting Mauritius in preparing a **National Science and Technology Strategy** and setting up a Science and Technology Directorate. Notably, the space domain saw elevated engagement with the signing of an **Agreement on Cooperation for the Establishment of Telemetry, Tracking, and Telecommunications Station for Satellites and Launch Vehicles**, which also encompasses cooperation in space research, science, and application, aiding Mauritius in satellite navigation and remote sensing. Additionally, an MoU was signed between the CSIR - National Institute of Oceanography and the Mauritius Oceanography Institute to foster cooperation in **oceanography and capacity building**, and institutional collaborations were expanded between the University of Mauritius and India's premier technical and management institutes, such as IIT Madras and the Indian Institute of Plantation Management.

- UK

India and the UK reaffirmed their strong commitment to harnessing **frontier technologies** during the visit of UK Prime Minister Sir Keir Starmer in October 2025, with technology and innovation being highlighted as a major pillar of the partnership. Building on the **Technology Security Initiative (TSI)**, leaders announced the establishment of the **India–UK Connectivity and Innovation Centre** focused on developing **AI native networks for 6G, Non-Terrestrial Networks (NTNs), and cyber security for telecoms**. They also launched the **India–UK Joint Centre for AI** to advance responsible and trustworthy AI across various sectors, including

health and fintech. Further commitments included the launch of Phase 2 of the **UK-India Critical Minerals Supply Chain Observatory** and the establishment of a related Critical Minerals Industry Guild, alongside a new satellite campus at IIT-ISM Dhanbad. Collaboration was also advanced in **Biotechnology** for areas like Biomanufacturing and Genomics, and a new joint investment was announced for the **Climate Technology Start-up Fund** supporting entrepreneurs in climate technology and AI.

- Mongolia

High-level technological engagement with Mongolia was significantly advanced during the State Visit of President Khurelsukh Ukhnaa in October 2025, centering heavily on IT capacity building and digital transformation. A major highlight is India's assistance in establishing the **Atal Bihari Vajpayee Centre of Excellence in Information Technology, Communication and Outsourcing**, which is intended to train over 1,000 Mongolian youth annually in advanced technologies, including **Artificial Intelligence and related fields**. This focus on digitalization was reinforced by the signing of an **MoU on Cooperation in Digital Transformation** between MeitY (India) and MoDDIC (Mongolia). Additionally, recognizing India's global leadership, the countries signed an MoU on Cooperation in Geology and Mineral Resources to facilitate technological exchange, and they agreed to explore renewing their Memorandum of Understanding on **Renewable Energy Cooperation** to foster innovation and elevate bilateral energy ties.

- Sri Lanka

During the Visit of Prime Minister of Sri Lanka Dr. Harini Amarasuriya to India in October 2025, specific high-level engagements were structured to explore technology and education collaboration. Dr. Amarasuriya, who also serves as Sri Lanka's Education Minister, was scheduled to visit the **Indian Institute of Technology (IIT) Delhi** as well as **NITI Aayog**. These visits were explicitly intended to explore avenues of collaboration in the domains of **education and technology**.

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For suggestions/feedback, please reach out to us on:
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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**