THE EDITORIAL PAGE

ZOIJILA BREAKTHROUGH

The breakthrough in Zojila tunnel is stupendous moment in the history of the region. It not only brings us close to a new connectivity but it seeks to bridge gap between two geographically distinct regions of Kashmir and Ladakh. For centuries, navigating between Kashmir and Ladakh in winter was impossible. The road would get closed at Zoji la by November and open only by May.` Generations of Ladakhis have suffered this disconnection with the mainland and they had to spend money on expensive flights to go out of Ladakh for work, study, business, etc. Given the topography of Zojila, the construction ofthis tunnel is indeed a challenge and it has been overcome. The tunnel opens myriad opportunities for business, tourism and eases the life of locals especially the people of Kargil and Leh and beyond. It has often been seen all over the world that connectivity automatically leads of good business and prosperity. The road and rail connectivity is bound to change the destiny of the people of the werstwhile J&K state.

POJK VIOLENCE

The POJK is on the boil as the people there seem to be on a warpath against Islamabad for neglecting the area for so long. Though Islamabad had imposed ban on internet so that the realities do not leak out, the social media is flooded with very disturbing images of firing on unarmed civilians by the security forces. The fact is Pakistani government was taken aback by the intensity of the protests. The protests come after the repeated demand for talks by the local people. Though Islamabad had agreed to consider their demands, nothing happened leading to resurgence of agitation. The entire area usurped by Islamabad is extremely scenic but there is no development of basic infrastructure. No wonder people of this area go to guld countries and Europe for work as cheap labour.

12 years of science in service of India

Dr Jitendra Singh

When a lavender farmer in the Doda district of Jammu plucks the first blossoms of the season, she is not thinking about science policy. Yet it is precisely a decade of deliberate, mission-driven scientific investment that transformed barren hillsides in the Union Territory into fragrant fields of purple — a revolution in rural livelihoods born in a laboratory. This, in essence, is what twelve years of sustained commitment to science and technology in India has meant: not the advancement of knowledge for its own sake, but science as a living, breathing force in the daily lives of our citizens.

When Prime Minister Narendra Modi assumed office in 2014, he articulated a vision that challenged us to think of science not as a departmental function but as a national mission. The years that followed have borne that vision out in ways that would have seemed extraordinary a generation ago. Today, India has landed a spacecraft at the Moon's south pole, developed its own antibiotic for the first time, built supercomputers from Pune to Patna, and created a space economy teeming with homegrown startups. But the deeper story — the one that deserves to be told — is how each of these achievements rippled outward into the lives of ordinary people.

Science is no longer confined to laboratories — it has become the single most powerful driver of national development and citizen empowerment.

Consider the farmer. Weather, always the silent sovereign of Indian agriculture, has become far more legible over the last decade. A comprehensive overhaul of our earth observation and forecasting infrastructure now gives farmers accurate, hyperlocal weather predictions — not in the vague language of probability, but with the kind of precision that allows a family to decide whether to harvest tomorrow or wait. When a cyclone forms over the Bay of Bengal today, our early warning systems give coastal communities hours — sometimes days — of advance notice. The difference is not statistical; it is counted in lives saved and livelihoods preserved.

In the mountains and river valleys of Jammu and Kashmir, science arrived in the form of the Aroma Mission — a programme that introduced lavender cultivation and supported farmers with technology, seeds and market linkages. What began as a pilot has since transformed into what is now celebrated as India's Purple Revolution: thousands of farming families earning dignified incomes from aromatic and medicinal plants, with science as the quiet architect of this prosperity. Similar work in saffron expansion, medicinal herb cultivation, and the first-ever introduction of asafoetida cultivation in India has demonstrated that innovation, rooted in the soil, can be as transformative as any industrial technology. Rural empowerment through science has extended well beyond agriculture. From 3D-printed housing prototypes designed for affordable rural construction to AI-powered systems that detect food adulteration, technology is being deliberately directed at solving the problems that matter most to the people who can least afford them. The National Mission on Interdisciplinary Cyber Physical Systems — which connects computing, sensing and physical engineering — has established twenty-five Technology Innovation Hubs across the country, seeding more than a thousand startups working on problems as varied as precision agriculture, clean water access, and rural healthcare delivery.

Healing India: The biotechnology breakthrough

Perhaps no domain illustrates the transformative power of Indian science more vividly than biotechnology and healthcare. For decades, India's pharmaceutical strength lay in manufacturing — in producing generic versions of drugs discovered elsewhere. That story is changing. The development of Nafithromycin, India's first indigenously discovered antibiotic in decades, is not merely a scientific milestone: it is a declaration of pharmaceutical self-reliance. Born from a government-supported collaboration between researchers and industry, it signals that India's laboratories can now do what only a handful of nations have managed — innovate at the frontier of drug discovery.

Equally significant is the country's first successful indigenous gene therapy clinical trial for Haemophilia — a condition that requires lifelong, expensive treatment — conducted at the Christian Medical College in Vellore. Gene therapy works by correcting the underlying genetic fault rather than managing its symptoms; for a country with a large burden of genetic disease, the implications are profound. Combined with the GenomeIndia Project, which has now sequenced over ten thousand human genomes drawn from India's extraordinarily diverse population, we are laying the scientific foundation for a future in which medicine is tailored to each patient's biology.

The COVID-19 pandemic revealed, with painful clarity, how essential domestic biomedical capacity is to national security. India's response — developing and manufacturing its own vaccines at scale, deploying them across a population of 1.4 billion — drew on years of investment in our biotechnology ecosystem. The Biotechnology Industry Research Assistance Council, or BIRAC, has been instrumental in nurturing biotech startups, bridging the gap between academic research and commercial scale-up, and ensuring that scientific innovation finds its way into the hands of those who need it most. Today, a new generation of bio entrepreneurs is working on precision medicine, sustainable bio-based materials and next-generation diagnostics — and they are doing so from Indian cities and campuses, not just Silicon Valley.

The GenomeIndia Project has sequenced over ten thousand human genomes — laying the foundation for medicine tailored to every Indian's unique biology.

Reaching for the stars, grounding every citizen

On the 23rd of August 2023, as the Vikram lander of Chandrayaan 3 made its final descent toward the lunar south pole — a region no nation had ever reached — millions of Indians watched with a collective held breath. The moment of touchdown was not just a technological triumph; it was a national affirmation. India had done what no one else had managed. What followed — the analysis of the Moon's surface, the data transmitted back across three hundred and eighty thousand kilometres of space — mattered enormously to planetary science. But what mattered just as much was what that landing did to the imagination of a country. India's space story over the past twelve years has been one of simultaneous ambition and utility. While Chandrayaan-3 captured the world's attention, Aditya-L1 — our first dedicated solar observatory — quietly began its mission to study the Sun, advancing our understanding of space weather that affects satellites, power grids, and communication systems on Earth. The SpaDeX mission placed India in an elite club of nations that have demonstrated the ability to dock two spacecraft in orbit — a capability essential for future space stations and crewed missions. Group Captain Shubhanshu Shukla's historic eighteen-day stay aboard the International Space Station brought India's human spaceflight ambitions from aspiration to lived experiene.

The transformation of India's space sector goes beyond missions, significant as they are. The Indian Space Policy of 2023 opened the entire value chain — launch vehicles, satellites, ground systems — to private enterprise. The result has been electric. From just eleven space startups in 2014, India today hosts over four hundred, building rockets, designing satellites and creating applications that range from agricultural monitoring to disaster response. Indian launch vehicles have carried three hundred and ninety-nine foreign satellites into orbit since 2014, making us a preferred partner for space agencies around the world. The space economy is no longer a public-sector preserve; it is a national asset being built by thousands of young engineers and entrepreneurs. With the Bharatiya Antariksh Station — India's own space station — envisioned for 2035, and a crewed lunar mission targeted for 2040, the arc of this ambition is long, and its trajectory is upward.

Self-reliance through innovation

Atmanirbhar Bharat — self-reliant India — is not merely a political slogan. In science and technology, it has become a governing philosophy. The National Quantum Mission, backed by more than six thousand crore rupees, is an investment not just in a technology but in India's strategic position in the twenty-first century's most consequential technological race. Quantum computing promises to solve problems that classical computers cannot; quantum communication offers theoretically unbreakable encryption; quantum sensing could transform navigation, medical imaging and geological exploration. India is now building all of these capabilities at home, through Thematic Hubs that bring together universities, research institutions and industry. The National Supercomputing Mission has seeded high-performance computing infrastructure across the country — in Pune, Chennai, Kharagpur and beyond — giving Indian researchers, engineers and startups access to computational power that was once the preserve of a handful of elite institutions. Alongside this, BharatGen — the country's first government-funded multilingual Generative AI programme — is developing large language models that can think and communicate in Indian languages, ensuring that the benefits of artificial intelligence are not confined to English-speaking users.

CSIR's contribution to this vision of self-reliance deserves particular mention. The indigenously developed HANSA-NG trainer aircraft, produced for domestic and export markets, represents a capability built from scratch by Indian engineers. India's first hydrogen fuel-cell powered vessel points toward clean maritime transport.

Work on sustainable aviation fuel opens pathways to decarbonising air travel without dependence on foreign technology. The CSIR Innovation Complex, India's first such facility, is designed to be a crucible where laboratory research meets entrepreneurial energy — a place where the distance between a scientific idea and a market-ready product is systematically compressed.

From just 11 space startups in 2014, India today hosts over 400 — a testament to the power of policy, public investment, and entrepreneurial spirit working in concert.

Energy security and future-ready technologies

No account of India's scientific transformation is complete without acknowledging the strategic depth being built in nuclear energy.

The first criticality of the 500 MWe Prototype Fast Breeder Reactor at Kalpakkam in April 2026 is a milestone of historic proportions. Developed entirely by Indian scientists and engineers at the Indira Gandhi Centre for Atomic Research and built by Bharatiya Nabhikiya Vidyut Nigam, this reactor is the critical bridge to the second stage of India's three-stage nuclear programme — a pathway designed to eventually harness our country's vast reserves of thorium, one of the most abundant elements in Indian soil. In an era of energy transition, the ability to generate clean, continuous power from domestic fuel is not merely economical; it is a matter of sovereign security. The nuclear sector has also extended its reach into medicine. The Tata Memorial Hospital's recognition by the International Atomic Energy Agency as a 'Rays of Hope' Anchor Centre, the expansion of cancer hospitals under the Homi Bhabha Cancer Hospital network, and the deployment of advanced radiopharmaceuticals — medicines that use radioactive particles to diagnose and treat cancer — are bringing world-class oncology care to patients across the country. The SHANTI Act of 2025 has modernised the legal architecture of India's nuclear sector, enabling greater participation and investment in an industry that will be central to our clean energy future.

Meanwhile, the Deep Ocean Mission is extending India's scientific reach into the last great unexplored frontier on our planet. Our ocean floor holds vast reserves of minerals essential for clean energy technologies — polymetallic nodules and cobalt-rich crusts that could reduce India's dependence on imported critical minerals. The mission is also building the underwater vehicle and sensor technologies that give India strategic and scientific presence in its maritime domain.

Towards Viksit Bharat: Science as destiny

As India counts down the years to 2047 — the centenary of our independence and the target year for becoming a fully developed nation — science and technology will not merely support that journey; they will determine its pace and character. The investments made over the last twelve years have created not just institutions and infrastructure, but something more durable: a culture of scientific ambition, entrepreneurial energy and national confidence.

The Anusandhan National Research Foundation, created to transform India's research ecosystem through mission-led science, academia-industry collaboration and empowerment of young researchers, and the newly constituted Research, Development and Innovation Fund with a corpus of one lakh crore rupees, represent the largest bet India has ever placed on its own intellectual capacity.

They signal a conviction — hardened by twelve years of evidence — that the solutions to our most pressing challenges lie within our own laboratories, campuses and communities.

The lavender farmer in Doda, the genomics researcher in Vellore, the space startup founder in Bengaluru, the nuclear engineer in Kalpakkam — they are all characters in the same story. It is the story of a nation that chose, deliberately and decisively, to place science at the centre of its development.

The writer is Union Minister of State (Independent Charge) for Science & Technology, Earth Sciences, and MoS, Prime Minister's Office, Personnel, Atomic Energy & Space, Government of India; Views presented are personal.

Laos pledges all-out offensive against cyber scam networks

Ashoke Raj

As cybercrime syndicates spread across Southeast Asia and increasingly target Indian citizens, Laos has vowed a tougher crackdown on transnational scam centres that have evolved into one of the world's most lucrative criminal enterprises.

In an exclusive interaction with The Pioneer during his official visit to India, Laos Deputy Prime Minister and Foreign Minister Thongsavan Phomvihane said dismantling cyber-scam operations and human trafficking networks has become one of his government's highest priorities, amid growing international concern over the rapid expansion of organised crime groups across the region.

"Scam centres are a challenge for Laos and other countries. It is a priority to tackle them. Our government is actively battling them," Phomvihane said, stressing that Laos is working closely with neighbouring countries to disrupt criminal syndicates operating across borders.

His remarks come at a time when India is grappling with a rising number of citizens being lured into cyber-fraud operations based in parts of Southeast Asia, particularly Laos, Myanmar and Cambodia. Many victims are recruited through fake job advertisements and fraudulent employment agencies promising lucrative overseas careers. Instead, they find themselves trapped in heavily guarded scam compounds and forced to participate in online fraud schemes targeting victims worldwide.

According to information provided by the Government of India in Parliament, cybercrime networks have increasingly exploited social media platforms and recruitment channels to lure Indians abroad. Once transported to scam hubs, many are allegedly coerced into conducting online investment frauds, romance scams, cryptocurrency scams and other digital crimes.

In response, Indian missions in Laos, Cambodia and Myanmar have stepped up rescue and repatriation efforts. New Delhi has repeatedly raised the issue with host governments while embassies continue to coordinate with local authorities, immigration agencies and law-enforcement bodies to secure the release and return of affected citizens.

The challenge facing governments across the region has become even more complex following a recent warning from the United Nations Office on Drugs and Crime (UNODC), which says criminal groups originating in East and Southeast Asia are rapidly expanding beyond their traditional bases.

In a major report released this year, the UN agency warned that organised crime syndicates behind large-scale online scam operations are increasingly relocating from traditional hotspots such as Cambodia, Laos, Myanmar and the Philippines to newer destinations across Asia and other regions of the world. According to the report, criminal networks are adopting what investigators describe as a "hedging strategy" — expanding into multiple jurisdictions simultaneously to protect their operations from law-enforcement crackdowns.

The agency noted that whenever authorities dismantle scam compounds in one country, criminal operators frequently relocate, rebuild and resume operations elsewhere, exploiting weak governance systems, porous borders and regulatory loopholes.

UNODC estimates that hundreds of industrial-scale scam centres across the region generate nearly US$40 billion annually. These operations increasingly rely on cryptocurrencies, underground banking networks and sophisticated money-laundering systems that allow illicit profits to move rapidly through the global financial system.

The report warns that cyber-enabled fraud and illicit financial networks have evolved into a highly organized transnational industry capable of undermining governance, fuelling corruption and weakening state institutions in vulnerable countries. Against this backdrop, Laos is seeking deeper regional cooperation to tackle both cybercrime and human trafficking linked to scam compounds.

Phomvihane said joint operations involving neighbouring countries have produced encouraging results and underlined the importance of sustained coordination among governments, law-enforcement agencies and international organizations. Security concerns, however, were only one part of the minister's visit to India.

The trip comes as India and Laos celebrate the 70th anniversary of diplomatic relations and marks the first visit by a Lao foreign minister to India in more than a decade.

During talks with External Affairs Minister Dr S. Jaishankar, both sides reviewed cooperation in areas ranging from development partnerships and capacity building to healthcare, pharmaceuticals, connectivity and cultural exchanges.

Phomvihane highlighted the deep civilisational links between the two countries, pointing particularly to their shared Ramayana heritage, which continues to serve as an enduring cultural bridge between India and Laos.

He also praised India's role in preserving Laos' cultural heritage, especially through the restoration of the UNESCO-listed Vat Phou temple complex. The project is widely regarded as one of India's most successful cultural diplomacy initiatives in Southeast Asia.

The Lao minister also welcomed India's Quick Impact Projects under the Mekong-Ganga Cooperation framework, which have supported community-development initiatives across Laos.

He expressed interest in expanding cooperation in pharmaceuticals and healthcare.

Yet the shadow of cybercrime loomed large over discussions surrounding regional security. For India, the issue is no longer simply a matter of online fraud. It increasingly intersects with human trafficking, organized crime, money laundering and national security concerns. For countries such as Laos, the challenge lies in preventing criminal syndicates from exploiting geographical vulnerabilities and cross-border networks.

As governments across Southeast Asia intensify efforts to dismantle scam compounds, experts caution that isolated crackdowns will not be enough. Without sustained intelligence-sharing, coordinated enforcement operations and stronger international cooperation, criminal groups may simply shift locations and continue operating under new identities.

The convergence of Laos' renewed enforcement push and the UNODC's warning serves as a reminder that cyber-scam networks are no longer a regional problem. They have evolved into a global criminal industry-one that increasingly demands a global response.