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FUTURE TRENDS SPECIAL ISSUE

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INDIA TODAY

THE NEW AI FRONTIERS

LEADING EXPERTS ON HOW THE TECHNOLOGY WILL TRANSFORM OUR LIVES IN 2026

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FROM THE
EDITOR-IN-CHIEF

Unless you have been living under a rock, you will know about Artificial Intelligence (AI). Every era has a technology that rearranges the world. But AI is unlike any that came before. Earlier technologies, from the wheel to the computer, extended human capacity. This one has begun to simulate it. It is not only an accelerator but also a force that alters. Two years ago, in January 2024, we devoted a New Year's special issue to AI, at a moment when it was still largely experimental. The breakout version of ChatGPT was barely a year old. Large Language Models (LLMs) were still the dominant paradigm. By 2026, the frontiers of AI have expanded way beyond chatbots and clever prompts. It is moving decisively towards systems that plan, coordinate and act; models that learn continuously; machines that see, hear and reason across language, images and data. This is the phase where AI starts to manage workflows, write code, optimise factories, influence elections, extend credit, diagnose illness and personalise, as well as impersonate, reality itself.

This acceleration is unfolding at a time of global uncertainty, marked by geopolitical fragmentation, climate stress, demographic shifts and armed conflicts. AI is becoming both a multiplier of risk and a lever of possibility. The question is no longer whether it will transform our lives, but how deeply, how unevenly, and to whose advantage. For India, this is a moment of inflection. AI use is sweeping across India, seeping into all its corners, from Tier-2 cities to villages. With hundreds of millions of users, a mobile-first culture and a digital public infrastructure unmatched in scale, the choices India makes now, be it on data, governance, language, labour or ethics, will determine whether AI deepens inequality or becomes a genuine instrument of inclusion and growth.

▲ Jan. 15, 2024

This special issue sets out to examine those frontiers and fault lines. It looks at how AI is remaking offices and factories, art and medicine, banking and cinema, classrooms and courtrooms; how it is redrawing power between citizens and platforms, states and corporations; and how it forces us to confront fundamental questions about autonomy, accountability and the limits of automation itself. Above all, it asks what it will take to ensure that intelligence amplified by machines does not come at the cost of human judgement, dignity and democratic choice.

We have leading policymakers, technologists, industry leaders and scholars to examine how India is placed at this turning point. Ashwini Vaishnaw, Union minister of electronics and information technology, sets the policy horizon, outlining how the Narendra Modi government intends to build sovereign AI capabilities at scale. Fellow IITian and former Union minister Jayant Sinha widens the lens, warning that without deep private investment, India risks slipping into a new era of techno-colonialism, especially as both AI models and the electric power needed to drive them guzzle trillions of dollars. Arun Srinivas of Meta argues that India's mobile-first ecosystem and digital rails give it a realistic chance to lead, not follow, the global AI revolution.

A clutch of essays offers fascinating insights on how industry is driving and ingesting the change. Rohan Murty, founder of Workfabric AI, introduces the idea of 'multiplayer AI', where intelligent systems coordinate teams rather than merely assist individuals. Hyundai India director Gopalakrishnan C.S. tells us how data-based tech is now interlaced with the entire value chain of modern auto manufacturing, from "digital pre-assembly and virtual simulations", to automated "dark factories" that feature cobots or collaborative robots, to testing, maintenance and customer engagement.

While the threat of job loss gets a lot of attention, it is often missed how AI meets social needs. In finance, quantum scientist Utpal Chakraborty describes a quiet but profound shift from human judgement based on paperwork to algorithmic assessment of behaviour and context, expanding access to credit for those long excluded. Microsoft's Kalika Bali focuses on Indian-language AI, perhaps the most consequential frontier of all, as it could bring millions of first-time users into the AI universe while reshaping the technology itself in the process.

Many of the essays alert us to the perils, in heightened focus after the recent controversy over sexualised deepfake images on Grok. Touching on that, Urvashi Aneja, founder-director, Digital Futures Lab, turns the conversation towards the danger of handing over all decision-making powers to Big Tech. Legal scholar Chinmayi Arun concurs, questioning how we take "Big Tech's AI products as inevitable, eliding other forms technological progress can take". Former Stanford Internet Observatory head Renée DiResta expands the question to democracy itself, looking at the role of deepfakes in Indian elections.

Only a society afraid to evolve will shun a technology so full of possibilities. But only a mindless one will outsource its consciousness, and conscience, to it. As Carnatic maestro T.M. Krishna reminds us in a thoughtful meditation on art and AI, we should not forget that "there is something unique about us, organic beings who recognise and understand the self". This issue is not an argument for or against Artificial Intelligence. It is an invitation to think clearly about how much of ourselves we are willing to automate and how much we must consciously preserve.

(Aroon Purie)

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LEAD ESSAY

THE NEW FRONTIERS OF AI

With the fifth industrial revolution upon us, India is building the full AI stack. Union minister ASHWINI VAISHNAW outlines how it will help AI work at scale while being rooted in India's realities

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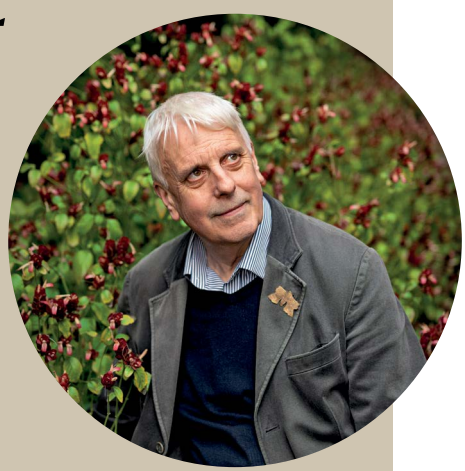
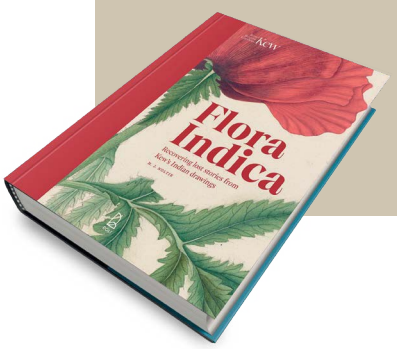




By **Ashwini Vaishnaw**

THE NEW FRONTIERS OF AI

WITH THE FIFTH INDUSTRIAL REVOLUTION UPON US, INDIA IS BUILDING THE FULL AI STACK. IT WILL MAKE AI WORK AT SCALE BUT ROOTED IN INDIA'S REALITIES, AND LEAVING A REAL IMPACT ON PEOPLE'S LIVES

In

In 1950, the mathematician and computer scientist Alan Turing asked a question far ahead of his time: can machines think? It was an era when computers functioned like mechanical calculators, capable of processing numbers but not ideas. He argued that intelligence lies in the ability to learn, reason and act intelligently, rather than by consciousness or emotions.

This idea came decades before computing power, data and algorithms could make it possible. Yet it introduced the world to the concept of intelligent machines. At the dawn of 2026, this journey reached a new phase of human progress—the Fifth Industrial Revolution—defined by Artificial Intelligence (AI) and its deep integration into everyday life.

Illustrations by **NILANJAN DAS / AI**

Fifth Industrial Revolution

Human progress has always been shaped by technology. Electricity transformed how we lived and worked. Computers changed how we processed information, and the internet connected the world. Later, mobile phones brought technology into the hands of everyone.

Each phase reshaped society. We are now entering the Fifth Industrial Revolution, where AI works alongside humans to transform every sector of the economy. It builds on the digital advances of the past decade. It focuses on humans and machines working together, using AI to improve lives and address challenges in agriculture, health, climate change and a host of other sectors.

AI a Multiplier

AI is often described as a technology enabler with a multiplier effect because it strengthens existing systems rather than operating in isolation. When used in areas like farming, healthcare, manufacturing or governance, it makes processes faster, more efficient and accurate.

Improvement in one sector creates multiple benefits across the economy, including higher productivity, lower costs and better decisions. Countries that develop and use AI effectively stand to gain an advantage in competitiveness and resilience. In this sense, AI is becoming a capability that strengthens the nation and improves the lives of its people.

Our prime minister has consistently emphasised that technology in India must be democratised, both in usage and in development. It should not be confined to a few companies, individuals or even nations. Every section of society must benefit from it.

India's digital revolution also reflects this philosophy. UPI transformed digital payments by making them open and accessible. Aadhaar enabled digital identity at scale. India built its own 4G/5G stack. AI must also follow the same path.

TAKEAWAYS

- **India is among the top three startup ecosystems. Today, nearly 90% of startups are AI-powered in some form**
- **India needs sovereign models to ensure data security, strategic autonomy; IndiaAI Mission has 12 AI models going**
- **In India, AI is used across sectors like agriculture, healthcare, education, manufacturing, governance, climate action**

AI Stack: Application First

In our understanding, the AI stack has five layers. At the top of this stack is the application layer. In the 1960s and '70s, semiconductors laid the foundation of modern electronics. But the actual impact was realised when these were widely adopted across industries. Similarly, the internet created value when people and systems began using it at scale. Mobile phones transformed society when they became part of everyday life. Sensors delivered real impact once they were widely deployed to observe and measure the physical world. The data they generated was used to solve real-world problems.

AI will follow the same pattern.

Those who apply it widely will derive the maximum value from it. Today, AI and algorithms are transforming the very nature of our society. They are being used across sectors such as agriculture, healthcare, education, manufacturing, transport, governance and climate action.

In agriculture, for instance, AI-based sowing advice has helped farmers in Andhra Pradesh increase crop yields by up to 30 per cent. AI-powered decision-making in Maharashtra has helped farmers increase sugarcane yield by 50 per cent. AI is also helping improve milk yield and animal health. Wearable IoT (internet of things) devices now track nutrition, fertility and early signs of disease in farm animals. In several states, these solutions have reduced methane emissions by up to 30 per cent.

In healthcare, AI solutions are bringing top-notch hospital capabilities to district hospitals. Indian startups are developing AI screening tools that support doctors by analysing medical images and other clinical data. AI is also helping detect neurological diseases earlier and more accurately by deciphering complex brain signals. It is clear that any nation that wants to grow rapidly must learn to use AI at scale across sectors. We are following this strategy of 'AI diffusion' or AI adoption at scale.

India is among the top three startup ecosystems. Today, it is estimated that nearly 90 per cent of startups are AI-powered in some form. This shows how deeply AI is already embedded in innovation.

> INDIA'S DIGITAL REVOLUTION PHILOSOPHY IS **THAT TECHNOLOGY MUST BE DEMOCRATISED**, BOTH IN USAGE AND DEVELOPMENT. **AI, TOO, WILL FOLLOW THE SAME PATH**

AI Models: Brain Behind the Applications

The second layer of the stack is AI models. While applications create visible societal impact, the AI model serves as the brain that powers them. Large global players, including OpenAI, Google and Meta, led the early progress in developing these frontier models. Those models demonstrated what AI could achieve at scale and expanded the boundaries of what was technologically possible.

However, training and running these models required enormous computing resources, making them expensive to develop and deploy. As a result, access to advanced AI development capabilities remained limited to a few players. Then came engineering innovations that brought a slew of models from China. Decades of investment in engineering and technological research propelled these innovations.

As the model layer evolves, we have a very large number of open-source models that are developed in so many countries. These models lower the entry barriers by reducing the cost of training and deployment.

Through these models, startups, researchers and developers can build on existing work rather than starting from scratch. This makes innovation faster, improves transparency and builds trust. It also allows AI to be tailored to local languages, specific sectors, and also adapt to national regulations. But in the age of AI, it is imperative for every nation to have its sovereign models too, for they ensure data security, cultural relevance and strategic autonomy. To achieve this goal, 12 indigenous AI models are being developed under the IndiaAI Mission. These models will be used to solve real-world problems at scale in the Indian context.

One example is Sarvam AI, which is building full-stack, India-first AI models in multiple Indian languages. It will help users for voice calls, documents and citizen services, understanding and responding in Indian languages. These models have been trained from scratch in 22 Indian and six UN languages.

In healthcare, the Qure.ai model uses AI to assist doctors in detecting TB, lung cancer and other conditions from medical images, reaching millions globally. NeuroDx is using AI to analyse brain signals (EEG) to detect neurological conditions like epilepsy and dementia early. This will enable specialised services in remote hospitals. BharatGen is developing open, India-centric foundation models in Indian languages, with 2 billion to 1 trillion parameters. These models will support research, startups and public sector applications. This shows how Indian startups are using AI to deliver af-

fordable, inclusive and population-scale solutions across sectors.

Compute Layer: The Chips Behind the Brain

The third layer of the AI stack is the compute needed for training and inference. This compute is powered by advanced chips. Modern AI relies on powerful processors such as NVIDIA's Blackwell GPUs, Google's TPUs, NPUs, and other server-grade chips that power large-scale training and inference.

Under the IndiaAI mission, we are supporting Indian researchers, startups and academia in training their AI models. Around 40,000 GPUs are being provided at a subsidised average rate of Rs 65 per hour, which is one-third of the global average cost. In addition, custom chips are being developed to meet specific training and inference requirements. In India too, several startups are designing specialised AI chips, strengthening domestic capabilities in AI compute.

This effort is being supported by India's growing semiconductor ecosystem. Ten semiconductor projects have already been approved, including two fabs (fabrication) and eight ATMP (assembly, testing, marking and packaging) units. These projects will create chip development capabilities in India and eventually support the compute needs of India's AI and digital infrastructure in future.

Data Centres: AI Infrastructure Layer

Data centre and network infrastructure is the fourth layer of the AI stack. Under the prime minister's forward-looking leadership, India has covered more than 85 per cent of the country with 5G services. Optical fiber cables criss-cross the country, providing network efficiencies. And now close to Rs 6 lakh crore is being invested in data centres to create the brain power that will propel us in the Fifth Industrial Revolution.

Innovation is also reshaping how data centres are built and operated. New approaches are improving cooling systems, enhancing water efficiency and reducing overall energy consumption. Expanding data centre capacity within India also reduces dependence on foreign digital infrastructure. It ensures that India's AI models, datasets and innovation pipelines remain within the country's digital jurisdiction.

Global technology leaders such as Google, Microsoft and Amazon have already announced major long-term investments in AI and data centre infrastructure in the country. Indian companies are also investing heavily.

> EXPANDING DATA CENTRE CAPACITY ENSURES THAT **INDIA'S AI MODELS, DATASETS AND INNOVATION PIPELINES** REMAIN WITHIN THE COUNTRY'S DIGITAL JURISDICTION

These reflect confidence in India's digital future. The growth of data centres also generates high-value employment and supports strong local innovation ecosystems.

Energy: Fifth Layer in the AI Stack

Energy is the final layer of the AI stack. AI data centres are energy-intensive. As AI adoption grows, the need for more data centres and high-capacity power will increase. The electricity demand for data centres is expected to increase significantly.

This makes sustainable and reliable power solutions critical. Solar and wind energy are central to India's clean energy transition. However, they are intermittent and cannot by themselves meet the round-the-clock power needs of large AI systems and data centres.

Nuclear energy, therefore, becomes an important energy source, providing clean, stable continuous power for AI infrastructure. Prime Minister Narendra Modi foresaw this challenge. The Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act, recently passed by Parliament, positions nuclear power as a stable and round-the-clock source of clean energy for AI and data centres.

As research in nuclear technology grows, we can expect small modular and micro reactors that will generate 15-50 megawatts of power and be deployed in compact, container-sized units. These will enable the supply of clean and reliable energy even while maintaining high safety standards. This makes nuclear power a practical on-site solution for energy-intensive digital infrastructure.

The SHANTI Act also facilitates public-private partnerships and foreign investment in India's nuclear sector. This will bring in capital, technology and expertise in the nuclear energy sector and ultimately help the development of AI and data centres.

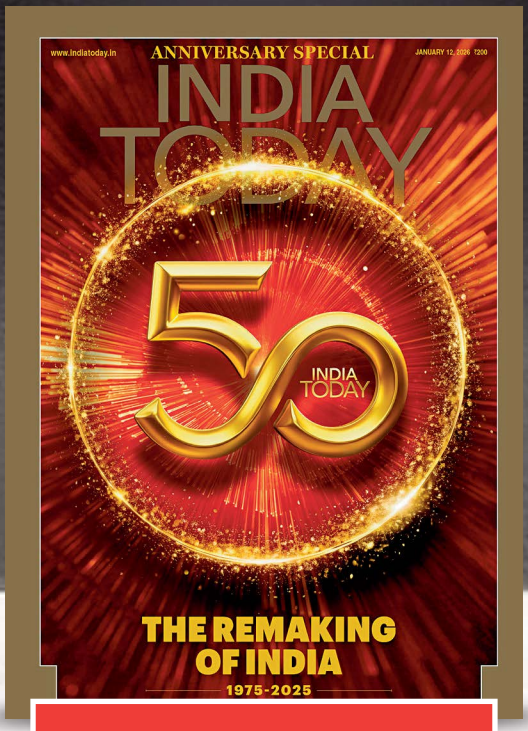
AI for Humanity

We are building the full AI stack, step by step. It is to make AI work at scale, rooted in India's realities, affordable for innovators, and delivering real impact in people's lives. Each layer of the stack, from applications and models to compute, infrastructure and energy, is designed to remove barriers and enable widespread adoption.

As PM Modi said at the Paris AI Action Summit last year, "AI is writing the code for humanity in this century." We are building each layer of this stack with a sense of responsibility towards our people. We are making sure that the code so written fits our context, reflects our values, and actually solves real problems of people. ■

Ashwini Vaishnaw *is Union Minister of Railways, I&B, Electronics and IT*

THE REMAKING OF INDIA
(1975 - 2025)



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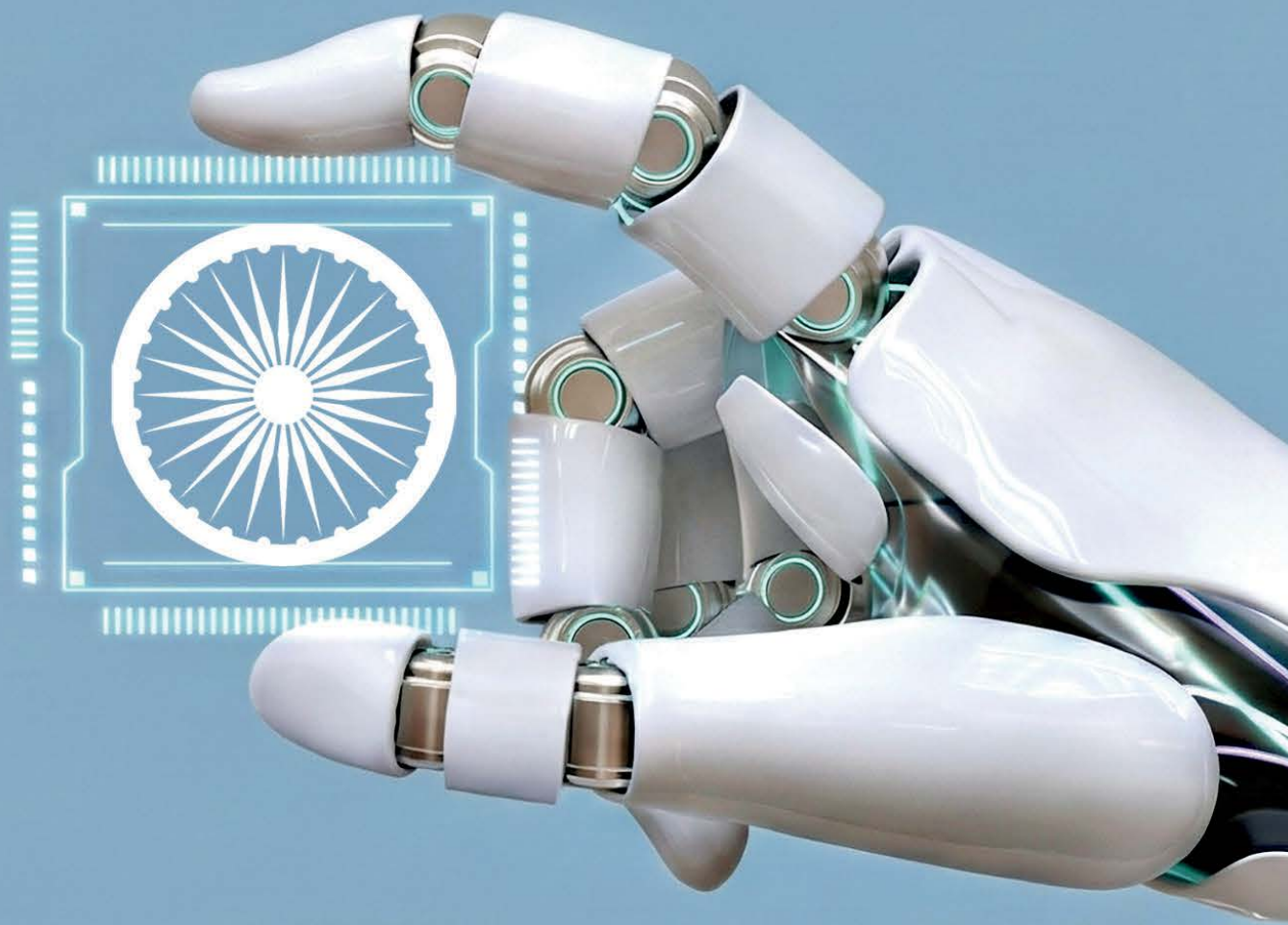
INDIA TODAY

MAKING SENSE OF INDIA

By **Arun Srinivas**



A LEADER IN THE MAKING

INDIA IS PRIMED TO LEAD THE GLOBAL AI REVOLUTION. AS AI RESHAPES HOW WE MARKET, CREATE AND LEARN, THE VAST POOL OF INDIAN DEVELOPERS WHO HAVE TRANSFORMED FROM CODERS TO PROBLEM-SOLVERS WILL GAIN PROMINENCE ACROSS THE WORLD

Over the past few years, the conversation around Artificial Intelligence has swung between extremes—will it save us or replace us? But as I look back on my discussions with industry leaders, creators and developers in 2025, it's clear that something more profound has happened. AI didn't make a dramatic entrance as many had anticipated; instead, it quietly wove itself into the fabric of our daily lives, often unnoticed.

The spectacle of viral demos and headline-grabbing models of 2023 and 2024 has given way to a new reality: in 2025, we no longer asked, "What can AI do?" but rather, "Where does AI fit?" In 2025, AI stopped trying to impress us and started trying to work for us.

From reshaping how we market, create and drive social change, its impact is immediate and tangible. And nowhere is this transformation more evident than in India, where we are uniquely positioned to lead the global AI revolution. With a vast, youthful and tech-savvy population, India stands out for its deep mobile-first culture and a thriving startup ecosystem. The country's robust digital public infrastructure—built on the strong foundation of mobile access, Aadhaar and UPI, the largest digital payment ecosystem in the world—further provides a powerful foundation for innovation at scale.

Illustration by **NILANJAN DAS / AI**

AI Power in Marketing

In my conversations with hundreds of business leaders, one thing has become clear: AI has become the silent engine powering modern marketing in India, transforming everything from campaign automation and copywriting to audience targeting and real-time analytics.

TAKEAWAYS

- **AI is powering marketing in India, transforming all, be it campaign automation or audience targeting**
- **With AI, Indian creators are setting trends and redefining what's possible in digital storytelling**
- **As firms race to build AI products, they will depend on Indian talent for research, design, deployment and scaling**

No longer limited by manual processes, marketers are embracing a faster, more iterative and data-driven creative workflow. This isn't a distant promise—it's the new reality across agencies, startups and global brands, with AI now an indispensable, if often invisible, collaborator in every campaign.

And we're seeing the impact of this on our platforms too. Not only do nearly all advertisers on Meta platforms use AI-powered ad tools known as Advantage+ to automate their campaigns, but research studies have also shown that returns to personalised advertising on our platforms increase by 25 per cent when advertisers in India leverage AI tools to augment targeting.

Over this past year, another thing has become clear: AI is not replacing marketers. Instead, it is elevating them. Indian marketing teams are discovering that AI removes the grunt work, freeing them to focus on what truly matters—strategy, storytelling and understanding human emotion.

There is understandable anxiety around AI's impact on creativity. But what we're witnessing is not a displacement of human expression; it's an expansion of it. With AI as a creative partner, Indian creators are setting trends and redefining what's possible in digital storytelling and self-expression. Take the example of the AI-enabled snow effect via the Restyle tool in the Edits app, which went viral in India in November. Weekly new Edits users in India doubled in that week compared to the previous one.

AI allows ideas to move from mind to draft at unprecedented speed with powerful text, image and video generation tools. India's creative community is embracing this shift in a distinctly Indian way—mixing tradition with innovation.

MANY INDIAN AI STARTUPS ARE NOT SIMPLY FOLLOWING GLOBAL TRENDS **BUT BUILDING INDIA-FIRST SOLUTIONS**

We recently announced that you will soon be able to use Meta AI to translate Reels in five new Indian languages, helping you discover more entertaining content from across India and around the world. Earlier this year, we launched the ability for creators to dub and lip-sync their reels to and from English, Hindi, Spanish and Portuguese, helping them reach more people globally. And now, the same capability will be available in Bengali, Tamil, Telugu, Kannada and Marathi. Instead of making creativity generic, AI is making it more accessible.

The World's AI Engine

If marketing and creativity show how AI is changing outputs, India's developer community shows how it is changing capabilities. India already has one of the world's largest pools of developers, and AI is accelerating their evolution even further. But the real transformation lies deeper: AI is enabling developers to become problem-solvers rather than just coders.

This shift positions India to lead the global AI revolution. As companies worldwide race to build AI products, they will increasingly rely on Indian talent not just for development, but for end-to-end innovation—research, design, deployment and scaling.

AI startups in India are already growing at an unprecedented rate, pushing innovation in healthcare, finance, education, agriculture, logistics and climate technology. Many of these startups are not simply following global trends, they are building India-first solutions that the world can learn from.

Take the example of Ekatra transforming last-mile education by delivering personalised, bite-sized learning directly on WhatsApp—meeting learners where they already are. Powered by Llama's open-source AI models, its conversational AI tutor adapts content in real time across languages, contexts and connectivity constraints. This WhatsApp-first, Llama-powered approach has enabled high engagement and completion, reaching over 35,000 learners across underserved communities globally with minimal data and infrastructure.

As we head toward 2026, the debate about whether AI will change the world feels outdated. It already has. The real question now is: how will we use it to shape the world in the AI era?

AI grew up this year. And India emerged as the place where the world's AI future will be built—not because machines are replacing people, but because AI is placing the power of technology in the hands of hundreds of millions of people. And it is only just the beginning. ■

Arun Srinivas is the Managing Director and Country Head for Meta in India

INDIA TODAY

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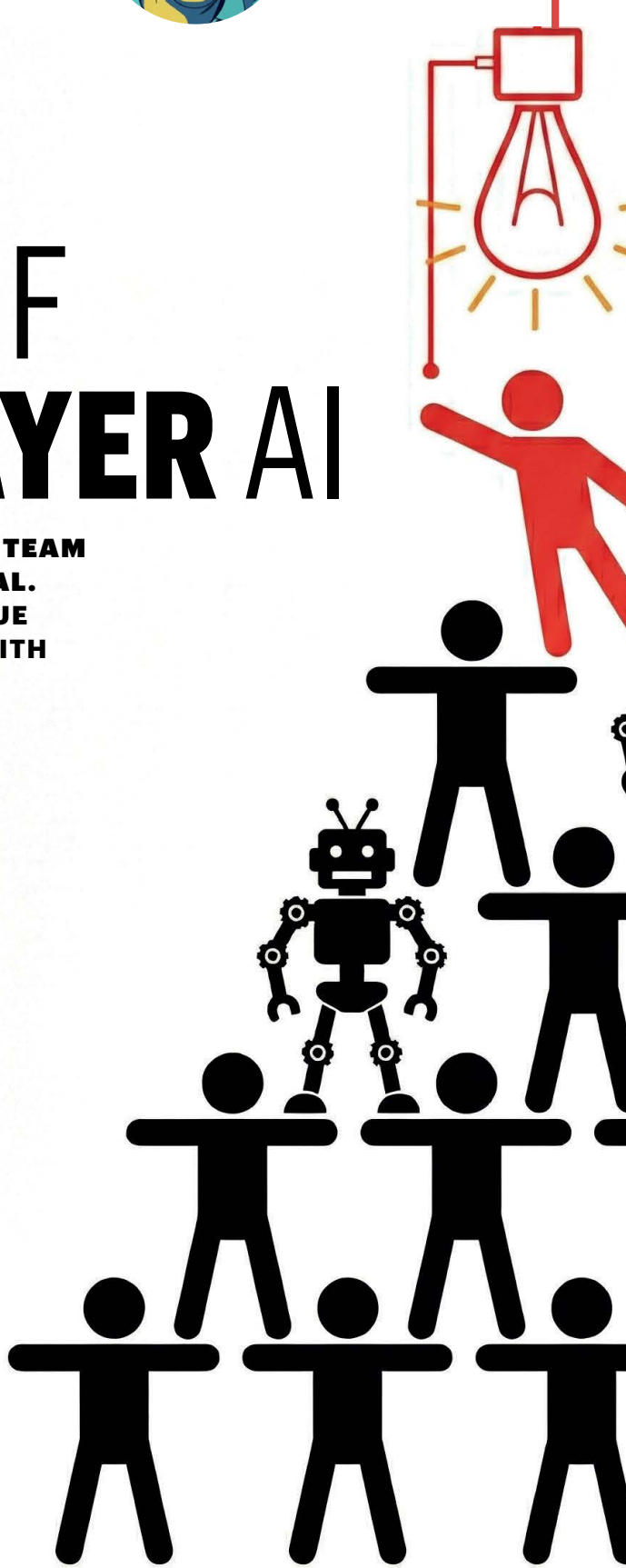
By **Rohan N. Murty**

THE RISE OF **MULTI PLAYER** AI

IN THE NEW AI ERA, CONTEXT OR LOCAL TEAM KNOWLEDGE IS THE REAL RAW MATERIAL. MULTI PLAYER AI WILL BE THE COLLEAGUE THAT HELPS EVERYONE MOVE FASTER WITH FEWER MISTAKES MADE



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Working with AI has mostly been a one-person sport till now. You open a chat window, ask for a draft, polish an e-mail or summarise a report—it feels like a smarter keyboard. The year ahead will feel different. AI is moving from single-player to multi-player. That is, shifting from helping individuals to participating in the shared flow of work in teams. Think less "my assistant" and more "our colleague". It will show up in meetings, live inside project boards, sit within approval chains, keep track of decisions and smooth

Illustration by **NILANJAN DAS**

handoffs between departments. That shift matters because most productivity problems are not personal. They are social.

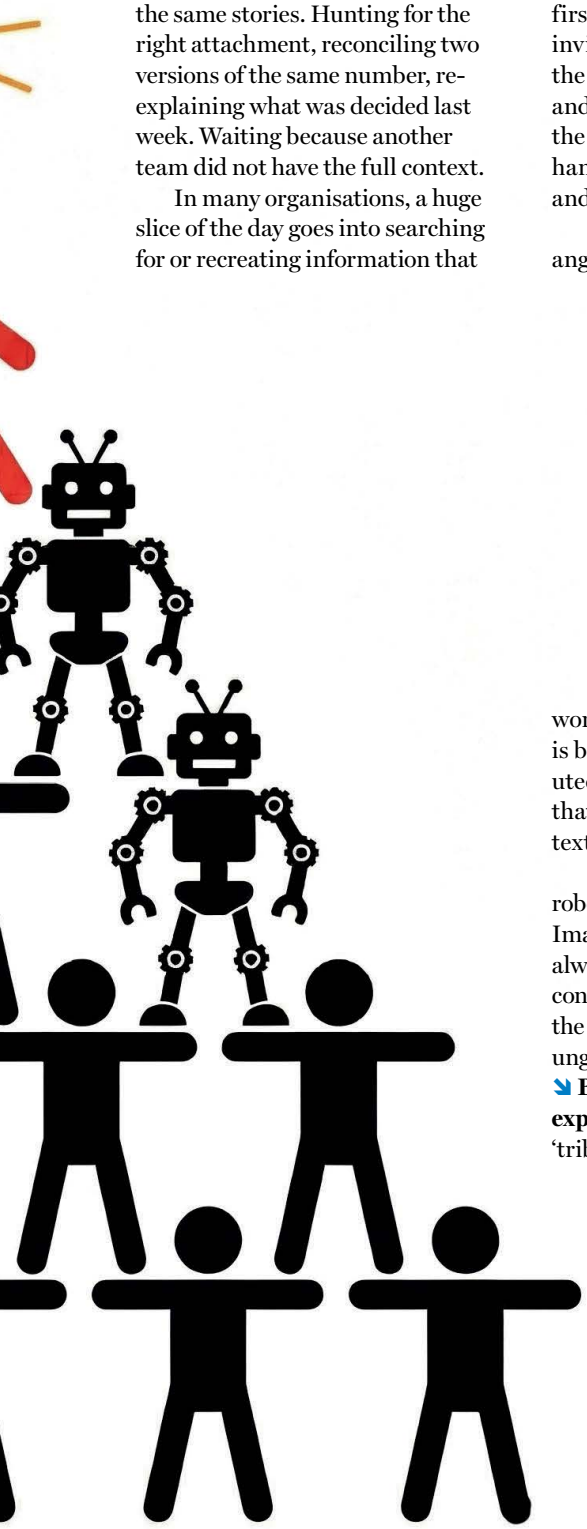
Coordination is the Real Productivity Leak

Ask any working professional where time goes and you will hear the same stories. Hunting for the right attachment, reconciling two versions of the same number, re-explaining what was decided last week. Waiting because another team did not have the full context.

In many organisations, a huge slice of the day goes into searching for or recreating information that already exists. The tragedy is that everyone is working hard, but not always on the right thing. Multi-player AI is attractive because it targets that hidden tax: coordination.

A personal AI copilot can help you write faster. But a team-level AI can help you avoid the e-mail chain that should not exist in the first place. They address the bigger, invisible tax inside organisations: the friction between people, teams and departments. They focus on the shared flow of work i.e., where handoffs break, context gets lost, and decisions quietly drift.

There isn't a uniquely Indian angle to this shift: it's a flat AI world. The move to multi-player AI is being driven globally by distributed work and the need for agents that act reliably with the right context, not just smarter models.



THERE ISN'T A UNIQUELY INDIAN ANGLE TO THIS SHIFT: **IT'S A FLAT AI WORLD.** THE MOVE TO MULTI-PLAYER AI IS BEING DRIVEN GLOBALLY BY DISTRIBUTED WORK AND **THE NEED FOR AGENTS THAT ACT RELIABLY WITH THE RIGHT CONTEXT**

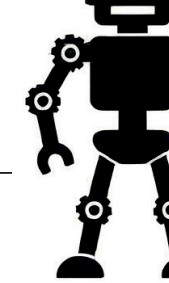
You do not need to imagine robots walking around the office. Imagine something simpler: an always-available colleague, who is continuously learning specifics from the team, and one who does three unglamorous jobs extremely well:

- **Becomes the team's shared experience.** Every team develops 'tribal knowledge' over time. These are not policies written in manuals, but lessons learned the hard way: what usually goes wrong, which shortcuts are risky, how similar problems were handled before, and which decisions turned out to be costly.

This knowledge is deeply collective. It lives across e-mails, chats, documents, tickets, meeting notes and—most importantly—in people's heads. It is shaped by past mistakes, debates and compromises. And it is rarely written down in one place.

A multi-player AI can learn from these day-to-day experiences and make that knowledge accessible to the whole team. When someone asks, "How did we handle this last time?", the answer is no longer dependent on who happens to remember. It becomes grounded in the team's actual history of decisions and outcomes.

- **Reduces friction across teams.** Most meaningful goals in organisations cut across functions. A product launch touches engineering, marketing, legal, finance and customer support. A compliance change affects sales scripts, contracts and operations. Problems often arise from small gaps in shared understanding. One missing clause, one outdated assumption, one forgotten dependency. Because multi-player AI sits inside real workflows, across documents, messages, approvals and handoffs, it can spot these disconnects earlier. It does not replace judgement, it reduces avoidable surprises.
- **Compresses onboarding.** Every workplace knows this pain. A new hire is talented, but they spend weeks asking 'basic' questions. The questions are not basic at all. They are contextual. Multi-player AI



can guide them to the right templates, decision logs, and 'how we do things here' patterns so they contribute sooner. These benefits sound straightforward. So why are teams not already living this future? Because AI is only as good as the context it is given.

Secret Ingredient: Context

A modern AI model can summon a lot of general information. But it usually knows nothing about the living reality inside your organisation. It does not automatically know which wording your compliance team insists on, which metrics trigger escalation, which vendor delays are normal, or what your boss means by 'keep it short'.

That is why the next chapter of AI at work will not be won by the fanciest model. It will be won by the teams that master context. Context is the organisation's recipe. The ingredients are your rules, your workflows, your templates, your decision history, and the small habits that make your company unique. And context engineering is the craft of packaging that recipe so AI can follow it reliably, safely and repeatedly. Done well, the same AI stops behaving like a generic chatbot and starts behaving like someone who has actually been hired into your business. Done poorly, it produces confident answers that do not fit your reality.

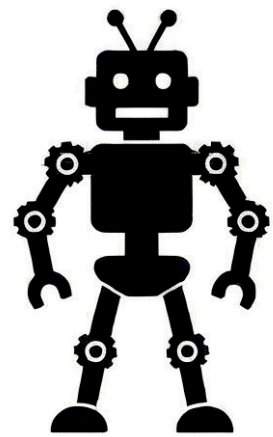
Action Fits, Minus the Hype

Once an AI has enough context, it can do more than suggest. It can take action within clearly defined boundaries. It can run repeatable workflows, it can draft a contract in your house style, prepare an audit packet with supporting evidence, reconcile exceptions, route an approval, or flag a missing step. Humans still handle judgement calls and exceptions. In other words, multi-player AI can evolve into agents that operate across tools, not just inside a chat box.

In enterprise settings, one practical idea is 'run-time context'. This means feeding the AI the specific situational details of the work item while it is executing, so it does not guess and does not behave generically. When context is captured properly, knowledge is no longer trapped in a few people's heads. Teams become less dependent on gatekeepers, and younger employees can ramp up faster. That can be good for speed, but also good for fairness.

TAKEAWAYS

- **AI will participate in shared flow of work in teams. Think less 'my assistant' and more 'our colleague'**
- **The next chapter of AI at work will not be won by the fanciest model but by the teams that master context**
- **We'll see AI as a participant in how work flows, moving from the side of the desk to the actual machinery of collaboration**



DONE WELL, **THE SAME AI STOPS BEHAVING LIKE A GENERIC CHATBOT** AND STARTS BEHAVING LIKE SOMEONE WHO HAS ACTUALLY BEEN HIRED INTO YOUR BUSINESS. DONE POORLY, **IT PRODUCES CONFIDENT ANSWERS THAT DO NOT FIT YOUR REALITY**

Prediction for 2026

We will stop talking about AI as a tool you open, and start experiencing AI as a participant in how work flows. It will move from the side of the desk into the actual machinery of collaboration. The winners will not be the teams that 'use AI for everything'. They will be the teams that decide which work is repeatable enough to delegate, which moments require human judgement, and which context makes the whole system trustworthy.

Because in the AI model era, context or local team knowledge is the real raw material. It becomes a source of advantage that competitors cannot copy overnight. Multi-player AI is coming. Super agents will be one of its most visible forms. But the deeper story, the one your grandmother can relate to, is simpler than it sounds.

The future office will have a new kind of colleague: one that remembers what the team learned the hard way, and helps everyone move faster with fewer mistakes. ■

Rohan N. Murty is Founder, Workfabric AI

FUTURE TRENDS AI

AUTOMOTIVE INDUSTRY

By **Gopalakrishnan C.S.**

THE THINKING FACTORY OF TOMORROW

WITH AI EMBEDDED ACROSS PLANNING, PRODUCTION AND QUALITY, AUTO COMPANIES ARE MAKING INTELLIGENT MANUFACTURING THE FOUNDATION OF INDUSTRIAL RESILIENCE

Artificial Intelligence is no longer a bolt-on upgrade to manufacturing—it is the operating system of modern industry. Global thought leaders converge on this point: PwC frames the shift as moving from "doing digital" to "being digital", embedding intelligence into the very fabric of workflows; McKinsey underscores that productivity gains now hinge on human-machine partnerships; Deloitte positions Industry 4.0 as a resilience strategy, wherein smart factories and intelligent applications are foundational to competitiveness, not optional extras. India is well placed to lead this transformation.

AI & Smart Manufacturing

At Hyundai Motor India Limited (HMIL), technology drives every aspect of operations through a data-centric, intelligent ecosystem. Our IT landscape integrates advanced digital infrastructure with streamlined processes, spanning the entire value chain—from production planning and state-of-the-art manufacturing to digital-first customer engagement.

Predictive analytics and real-time monitoring empower engineering teams to optimise equipment maintenance and process control. By continuously tracking critical parameters and applying AI models, we resolve bottlenecks before they become downtime. Quality assurance is equally transformed: digital pre-assembly, virtual simulations and AI vision systems ensure dimensional precision, validate torque specifications and rigorously test electronics—all culminating in structured sign-offs that protect our promise of uncompromising build quality.

Our Software Defined Factory (SDF) vision orchestrates production end-to-end by converging data, connectivity and intelligence. Over 2,000 critical machines generate

more than 20 billion data points annually, with dashboards monitoring 300+ process parameters in real time.

We are actively exploring Generative AI for engineering and quality root-cause analysis, industrial digital twins for scenario planning, and 5G integration for ultra-reliable low-latency communication. Collaboration across our global smart factory network, including Hyundai Motor Group Innovation Centre Singapore (HMGICS), accelerates learning cycles and ensures responsible scaling through shared standards in HMIL, cyber-physical security and AI governance.

THE NEXT ERA OF MANUFACTURING IS ALREADY HERE. **PREDICTIVE ANALYTICS, DIGITAL TWINS, AUTONOMOUS ROBOTS** AND SOFTWARE-INTEGRATED OPERATIONS ARE CONVERGING ON SHOP FLOORS

The industry as a whole is moving toward dark factories—high-automation environments where AI systems manage inspection, assembly and intralogistics, with minimal human presence. Digital tools expand human judgement and creativity, elevating roles from repetitive tasks to higher-order problem-solving and orchestration. Humanoid and collaborative robots (cobots) will increasingly share space with frontline teams, particularly in ergonomically challenging or high-precision tasks. Automation delivers consistency; humans provide adaptability and innovation. The result is a shop floor that is safer, more predictable and more resilient to demand fluctuations.

Illustration by **NILANJAN DAS / AI**

TAKEAWAYS

- **Manufacturing is shifting from digitisation to intelligence, with AI embedded deep inside workflows, decisions and production systems**
- **Smart factories can optimise equipment maintenance and process control, resolving bottlenecks before they become downtime**
- **The transformation of the shop floor is also reshaping the very concept of mobility, with driverless cars now becoming a shared reality**

The Driverless Shift

The transformation of the shop floor is not only revolutionising manufacturing; it is reshaping the very concept of mobility. What was once a futuristic vision—driverless cars—is now becoming a shared reality. Globally, autonomous technology is redefining how we move, work and live. Through strategic collaboration and cutting-edge research, the automotive industry is turning the vision of autonomous mobility into reality.

Hyundai Motor Group, for instance, has advanced this transformation through joint ventures with leading technology partners, resulting in next-gen solutions like the IONIQ 5 robotaxi in the United States. As mobility shifts from manual control to intelligent autonomy, the sector is setting new standards for safety, convenience and sustainability—ushering in a future where transportation is smarter, more efficient and deeply connected.

The Future of Work

As AI and Robotics reshape manufacturing, workforce skills must evolve rapidly. The World Economic Forum projects that 44 per cent of core skills will change within five years, with AI, big data and digital fluency among the most sought-after capabilities. McKinsey's research shows that manufacturers who scale AI achieve 20-30 per cent improvements in productivity and efficiency, while unlocking new roles in data science, automation engineering, digital quality and cyber-physical systems management. In other words, intelligent automation does not diminish human contribution—it elevates it, creating pathways for employees to move from repetitive tasks to higher-order problem-solving and orchestration.

At Hyundai too, we are investing in partnerships with leading institutions to train talent in these emerging disciplines. Our global smart factory network provides live learning environments, where teams can move from simply using digital tools to actively shaping them. The objective is clear: equip every function with the competencies to collaborate effectively with intelligent systems, ensuring that people remain the authors of progress in an AI-driven era.

The next era of manufacturing is already here. Predictive analytics, digital twins, autonomous robots and software-integrated operations are converging on our shop floors. What changes is the tempo and texture of work: faster feedback loops, fewer blind spots and higher confidence in decisions. What endures are the fundamentals—safety, quality and customer trust.

By embedding sustainability, enabling human–machine collaboration and cultivating future-ready skills, the automotive industry can set new standards for transformation, built on resilience and responsibility. AI is the architecture; data is the raw material; people are the authors of progress. The factory of the future is not just darker—it is smarter, cleaner and profoundly human in ambition. ■

Gopalakrishnan C.S. is Whole-time Director and Chief Manufacturing Officer, Hyundai Motor India Ltd

By **Jayant Sinha**

THE DANGERS OF **TECHNO-COLONIALISM**

INDIA NEEDS HUGE INVESTMENTS IN FRONTIER TECHNOLOGIES TO BE GLOBALLY COMPETITIVE. BUILDING OUR OWN DIGITAL INFRASTRUCTURE IS KEY OR WE RISK DEPENDENCE ON GLOBAL POWERS

Building a Viksit Bharat requires building a Harit Bharat as well. To deliver sustainable prosperity for the Indian people, we must not only position our economy at the global competitiveness frontier but also restore our environment. We can achieve this green frontier development model only through accelerated technological progress powered by massive financial investments.

The green frontier model is not defined by labour arbitrage or gleaming infrastructure. Instead, it is defined by the ability to deploy frontier technologies at speed and scale. It is defined by the ability to drive resource efficiency across the economy. The United States and China are rapidly shaping the technology standards, global value chains, energy grids and capital flows that will define the next era of global competition. If we do not keep up, we run the risk of being fully dependent on foreign technology, equipment and capital.

The capital requirements to stay in the game are enormous. In AI alone, the United States is committing $500 billion (Rs 45 lakh crore) annually across public and private channels to artificial intelligence, advanced computing infrastructure, data centres, clean power and associated supply chains. It is also investing hundreds of billions of dollars in space technology, semiconductors, biosciences and other advanced technologies. China is investing $100 billion (Rs 9 lakh crore) or more annually in AI and adjacent frontier technologies, alongside sustained investment in clean energy, batteries and advanced manufacturing. Both countries see winning the technology investment race as essential for long-term economic and strategic leadership.

India can't reach the global competitiveness frontier without massively hiking investments in frontier technologies. AI is only one part of the picture. India must also invest in quantum computing, biosciences, space technologies, advanced materials and both fission and fusion energy. Each needs long-duration capital and deep tolerance for technological risk.

At the same time, India's net zero pathway demands sustained investment across power, mobility, industry and urban systems. Renewable capacity must continue to expand. Transmission, distribution and storage infrastructure must scale rapidly. Hard-to-abate sectors such as steel, cement and chemicals remain capital-intensive and technologically immature, and require cleaner production pathways. These investments generate returns over long horizons and cannot be financed through short-term instruments.

Taken together, the scale of the challenge becomes clear. India's corporate capital expenditure has remained relatively steady in recent years at about $100 billion per year, even as balance sheets have strengthened and macroeconomic stability has improved. To reach the green frontier, corporate investment alone must rise by at least $100–200 billion (Rs 9-18 lakh crore) per year on an incremental basis. Note that we need to invest tens of billions of dollars annually in AI infrastruc-

Illustration by **NILANJAN DAS / AI**

ture, data centres, compute capacity and clean power. We also need to invest across the value chain in other frontier technologies such as nuclear fission and fusion. In parallel, as studies highlight, India needs to raise annual incremental climate and energy transition investment by roughly 2 per cent of GDP, or about $80-85 billion (Rs 7.2-7.7 lakh crore) in 2025 dollar terms.

India's financial system will have to be fundamentally redesigned to massively increase corporate capital expenditures. Much of India's financial architecture is geared toward short- to medium-duration lending, asset-backed finance and risk minimisation. That structure supported earlier phases of development focused on macroeconomic stability and basic infrastructure. We now need to pivot to a financial system that can finance high levels of technology risk, long gestation periods and irreversible capital commitments. Simply put, our investment managers have to be skilled enough to lose billions of dollars on individual technology bets but still make excellent returns through good portfolio construction.

Global capital, while important, cannot be the primary driver. Today, global investors are deploying capital in advanced economies where returns are attractive and risks are familiar. The surge in AI infrastructure investment in the US illustrates this clearly. Global capital can earn high returns in stable jurisdictions with deep markets and predictable regulation. We need to understand these realities.

To compete, we must deepen our pools of long-term domestic capital. This capital is more stable during periods of global volatility and is naturally aligned with national development priorities. Household financial savings are rising while pension and insurance assets are also expanding quickly. Our capital markets have matured significantly. Yet a large share of this capital remains locked into short-duration or low-risk instruments. We must modify alternative investment fund (AIF) structures to enable long-term investment into frontier technologies and sustainable infrastructure.

TAKEAWAYS

- **To compete globally, India must massively fund frontier tech. Also gumption to back intentional technological risks**
- **US commits $500 bn yearly to AI, China invests $100 bn; India's AI Mission: $1 bn over 5 years ($200 mn annually)**
- **Capital markets are now mature, must enable long-term investment in frontier tech, sustainable infrastructure**

COUNTRIES THAT **FAIL TO FINANCE THEIR OWN FRONTIER TECHNOLOGIES** WILL BECOME PRICE TAKERS IN SYSTEMS DESIGNED ELSEWHERE. **THIS CAN'T BE INDIA'S FUTURE**

The AI build-out illustrates the stakes with particular clarity. India's success with digital public infrastructure such as Aadhaar, UPI and the Account Aggregator framework shows that population-scale technology systems must be embedded within sovereign governance structures. AI represents the next layer of the digital economy, shaping education, healthcare, finance, logistics and public administration. If the intelligence layer is owned, trained and governed elsewhere, oversight weakens, and accountability erodes.

Our current investments in AI fall well short of what is required for global leadership. The government's IndiaAI Mission has been approved at about a billion dollars over five years; we will probably deploy just $200 million (Rs 1,803 crore) per year. India's largest technology firms and infrastructure players are investing more. TCS, alongside PE firm TPG (Texas Pacific Group), is building multi-billion-dollar AI data centre capacity. Microsoft, Google and Amazon have each announced long-term investments running into tens of billions of dollars to expand cloud and AI infrastructure in India. Reliance has unveiled an ambitious plan to build gigawatt scale AI compute capacity, while Adani is investing heavily in hyperscale data centres. Collectively, experts estimate that this adds up to about $10 billion (Rs 90,000 crore) annually.

This is how techno-colonialism may manifest itself in the 21st century. Most countries will not be able to invest sufficiently in building up their digital infrastructure. Global powers will foster dependence on external compute infrastructure, proprietary models, closed standard and capital structures beyond domestic regulatory reach. Countries that fail to finance their own frontier technologies will become price takers in systems designed elsewhere. This cannot be India's future.

A truly Samriddh Bharat will be achieved when we combine Viksit and Harit Bharat. But reaching this green frontier will require India to redesign its financial system to take risks intentionally, share that risk between public and private balance sheets, and mobilise large pools of long-term domestic capital. Our ambition will be fulfilled only when we make these structural shifts to our financial system. ■

Ex-Union minister Jayant Sinha is President, Everstone Group, and Visiting Professor in Practice at London School of Economics

FUTURE TRENDS AI

BANKING & FINANCE

By **Utpal Chakraborty**

THE MACHINE THAT NOW RUNS MONEY

FROM CREDIT SCORES TO TRADING FLOORS, AI IS BECOMING THE CENTRAL ACTOR IN AN AUTOMATED ECONOMY. THIS IS ALSO ALTERING THE FOUNDATIONS OF TRUST, RISK AND BEHAVIOUR

The financial world has always adapted to new tools, but what is taking shape today is not a routine technological shift. It is a deep restructuring of how decisions are made inside banks, markets and digital payment ecosystems. Artificial Intelligence has entered finance in many forms, yet its real influence comes from something more subtle. It is slowly changing the foundations of trust, risk, behaviour and value creation. As we move into a new year, it is clear that AI will not remain an auxiliary aid. It will become a central actor in how the automated economy operates.

For decades, the industry relied on historical data, fixed rules and human-driven judgement for every critical function. Lending, trading and fraud management were all shaped by a predictable rhythm. AI alters this rhythm because it works with probabilities rather than fixed rules. Models sift through an enormous flow of signals, identify shifting patterns and adjust their own understanding of risk. This shift from static rules to dynamic intelligence is what will separate the winners from the laggards in the coming years.

In India, the banking sector offers a uniquely rich testbed for AI at scale, given its vast population diversity, digital public infrastructure and rapid adoption of real-time payments. From AI-driven credit assessment for MSMEs to fraud detection across UPI and mobile banking, algorithms are increasingly shaping how trust and access are delivered in one of the world's fastest-growing financial ecosystems.

The New Shape of Credit

Credit assessment has always been a form of forecasting. Traditional underwriting relied on documented income, collateral and records of repayment. Today, AI expands this view by examining behavioural traits, digital interactions, micro-spending patterns and contextual indicators that were earlier invisible. When used responsibly, this leads to a remarkable widening of financial inclusion. Small merchants, gig workers and customers without long credit histories can be assessed more accurately, which allows them to access credit that would otherwise be out of reach.

However, the same technology introduces new responsibilities. Complex models often do not reveal their internal reasoning in clear terms. Without strong governance, there is a real risk that hidden biases or correlation traps can influence outcomes. The institutions that succeed will be those that view AI-based credit systems as transparent pipelines that must be continuously audited and validated, rather than black boxes that simply produce numbers.

WITHOUT GOVERNANCE, **HIDDEN BIASES MAY DISTORT OUTCOMES**. INSTITUTIONS THAT TREAT AI-BASED CREDIT SYSTEMS AS **TRANSPARENT PIPELINES, NOT BLACK BOXES,** WILL SUCCEED

Automated Trading

Trading has always rewarded speed, but AI has pushed this speed into a different realm. Modern trading engines absorb global economic signals, alternative datasets and market microstructure patterns at scales beyond human capacity. Reinforcement learning agents can identify opportunities that last only fractions of a second. They learn from the environment, try actions and adjust strategies without waiting for human input.

This creates a unique challenge. When multiple autonomous agents interact in a fast market, the system becomes tightly interconnected. A small imbalance can travel with surprising speed. Incidents like flash crashes are warnings of how fragile high-speed, automated environments can become. The financial institutions that handle this landscape well will be the ones that introduce strong model constraints, human supervision and stress tests designed specifically for AI behaviour.

Fraud Detection

The nature of financial crime has changed dramatically. Fraudsters are now equipped with the same level of computational power that institutions use to defend themselves. Identity theft, account takeovers and transaction spoofing often rely on AI-generated patterns. At the same time, banks use deep learning that learn customer behaviour at a fine level of detail. An unusual device fingerprint, an unexpected transaction path or an abnormal velocity of activity can be detected in real time.

This is no longer a static problem. It is a continuously evolving contest. The winners will be those that build systems capable of learning from new threats as quickly as adversaries innovate. The rise of synthetic identities and AI-amplified social engineering means that trust in the automated economy must be built on adaptive authentication, behavioural analysis, voice verification and resilient model architectures.

Winners and Losers

The financial sector is moving toward a new hierarchy shaped not by size alone but by readiness for algorithmic transformation. Institutions that rebuild their internal processes around AI will gain operational resilience, deeper insight and faster decision cycles. These organisations will treat data pipelines as strategic assets. They will experiment with new modelling approaches, maintain rigorous validation frameworks and invest in explainability.

A second group will consist of technology-driven challengers. They may not have the scale of traditional banks, but they possess agility and sharper analytical engines. Their advantage lies in the ability to personalise decisions at the level of individual transactions, rather than broad customer segments.

The risk lies with institutions that cannot adapt. Legacy systems, fragmented data stores and heavily manual processes will slow them down until the gap becomes difficult to close. These institutions may face higher operational costs, higher fraud exposure and loss of competitiveness.

The final group is the consumer. If institutions deploy AI without transparency or fairness, consumers may bear the consequences in the form of misclassified risk or limited recourse. The financial sector must therefore build clear customer-rights frameworks for automated decision making. The way Indian banks balance innovation with explainability and regulatory oversight may well become a global reference point for responsible AI in finance.

Rethinking Risk

Risk has always been present in finance, but the nature of risk is now evolving. We are moving from credit and market risk to model risk, data integrity risk, adversarial risk and interdependence risk. A sophisticated model can drift unnoticed if data quality changes. A compromised pipeline can distort predictions silently. A widely used third-party AI system can introduce systemic vulnerabilities across multiple institutions.

Regulators will increasingly look at AI the same way they looked at capital adequacy after the global financial crisis. Stress tests, scenario simulations and common governance standards will become essential. Responsible deployment of AI will require continuous monitoring, clear audit trails and human oversight at critical checkpoints.

The Role of Human Expertise

Although AI performs an extraordinary volume of work, it does not eliminate the need for human judgement. In fact, the value of domain expertise increases. Model governance, ethical reasoning, responsible deployment and understanding of systemic impact require seasoned professionals. The future of finance will be shaped by collaboration between human insight and machine intelligence. Institutions that recognise this symbiosis will lead with confidence and resilience.

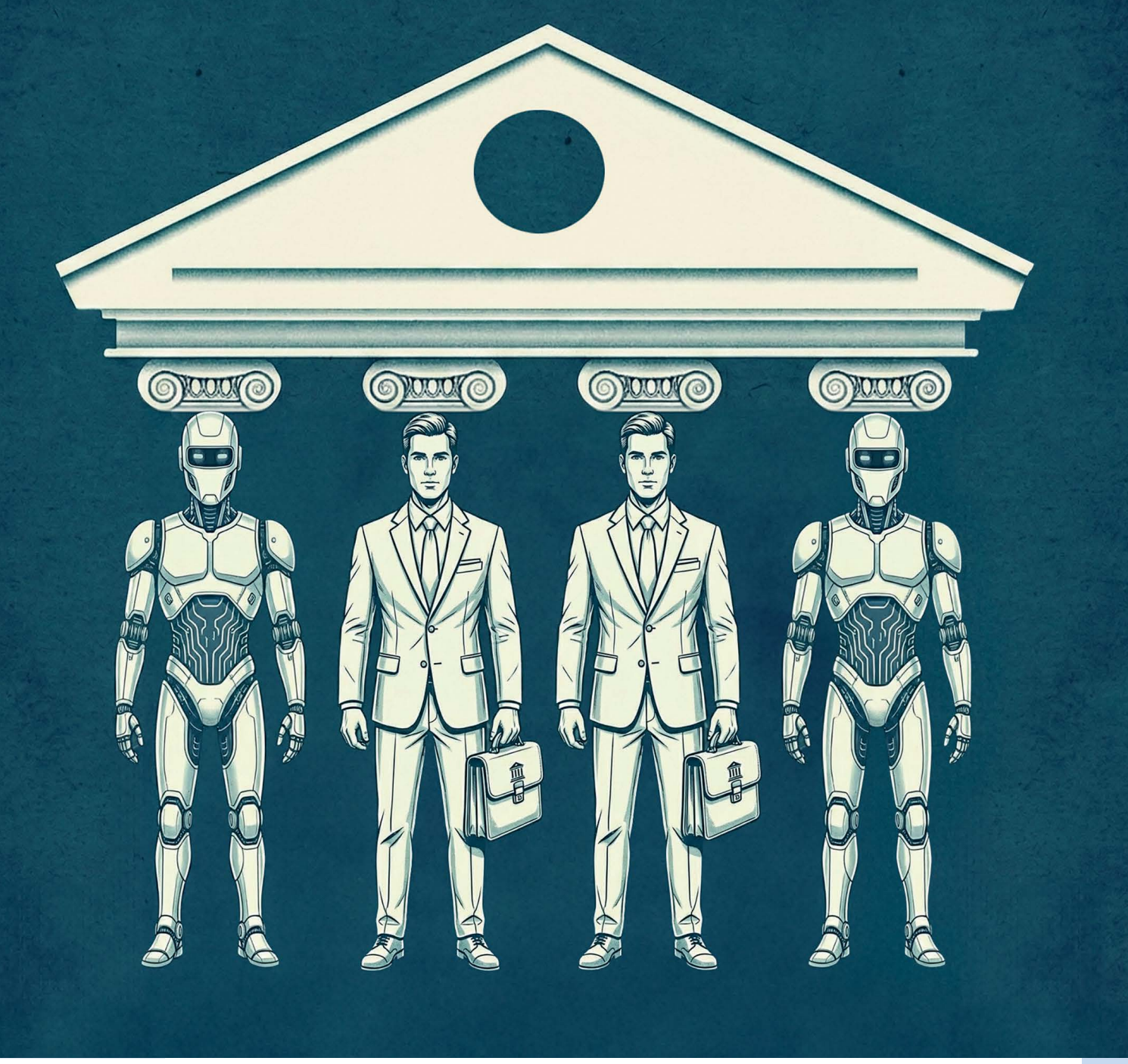
It's clear that the automated economy is no longer a theoretical

TAKEAWAYS

AI is reshaping finance's core logic by replacing static rules with adaptive, probability-driven models

This has changed the nature of risk—from credit and market risk to model, data integrity and interdependence risk

This requires stress tests, scenario simulations and common governance standards



possibility. It is emerging in front of us as algorithms influence the flow of credit, the movement of markets and the detection of fraud. The question now is not whether AI will transform finance, but how thoughtfully this transformation will be guided. If implemented responsibly, AI can expand inclusion, strengthen institutions and improve the overall stability of financial systems. If left without guardrails, the same tools can create opaque risks and widen existing inequalities.

THE WAY INDIAN BANKS **BALANCE INNOVATION WITH EXPLAINABILITY AND REGULATORY OVERSIGHT** MAY WELL BECOME A GLOBAL REFERENCE POINT FOR RESPONSIBLE AI IN FINANCE

The year ahead offers an opportunity to shape a more resilient and equitable financial landscape. The challenge is to ensure that innovation and governance grow at the same pace. Finance has always depended on foresight. Today, that foresight must extend to the algorithms that silently shape the choices, risks and opportunities of the automated economy. ■

Utpal Chakraborty is Founder and Chief Scientist, GAHNA AI Lab (ExorionAI)

Illustration by **NILANJAN DAS / AI**

By **Geetha Manjunath**

MEET DR. DOMUCH

AI WILL BE A FORCE MULTIPLIER IN SHAPING REAL CLINICAL OUTCOMES AND TRANSFORMING HOW HEALTHCARE REACHES THE UNDERSERVED WHILE FORCING HARD QUESTIONS ON REGULATION

Artificial Intelligence has crossed a critical threshold in healthcare. We are no longer debating whether AI can work in clinical care—we are now grappling with how it should work, who it should serve, and under what guardrails it must operate. As we move into 2026, AI promises to reshape diagnostics, personalise treatment pathways and even influence how clinical trials and experiments are designed. Yet alongside this promise lie fundamental challenges around liability, regulation, trust and the evolving role of clinicians.

AI's earliest successes in healthcare were largely technical—recognising patterns in images, signals and large datasets faster than humans could. Today, that capability is translating into real clinical value. In radiology and pathology, AI systems are demonstrating their ability to flag subtle abnormalities, prioritise high-risk cases and reduce diagnostic delays, particularly in primary care and preventive health. AI is enabling risk stratification at scale—identifying individuals who may otherwise never enter the healthcare system until disease has progressed.

At Niramai, we have seen this firsthand through Thermalytix, an AI-based breast cancer screening solution that combines thermal imaging with machine learning to detect early physiological changes associated with malignancy. The technology itself is important, but the larger lesson is this: AI can extend clinical reach. It can bring screening and triage closer to where people live and work, rather than forcing healthcare to remain confined within hospital walls.

India has fewer than one doctor per 1,000 people, and specialist availability drops precipitously outside urban centres. Screening rates for common cancers remain among the lowest globally, and preventable conditions are often detected far too late. Against this backdrop, AI's most powerful contribution will not be novelty, but reach—extending clinical intelligence to where clinicians are scarce and healthcare infrastructure is limited.

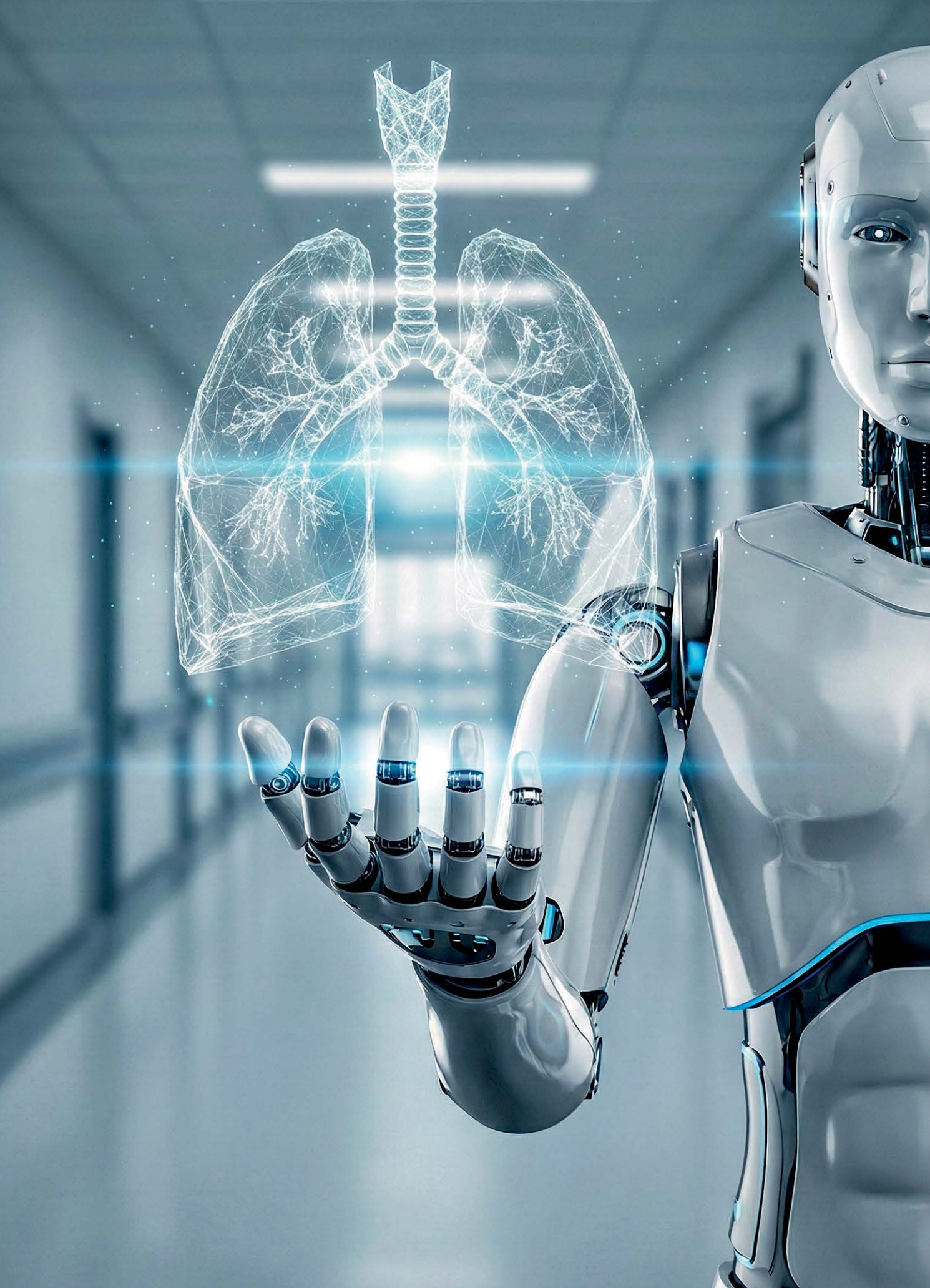
Augmenting Care in Scarce Settings

In the coming decade, AI in Indian healthcare will function primarily as a force multiplier. In clinical settings, AI-driven tools can help prioritise high-risk patients, reduce diagnostic oversight and support faster decision-making—particularly in radiology, pathology and triage-heavy specialties. In non-clinical or semi-clinical environments, AI enables task-shifting, empowering nurses, technicians and community health workers to perform early screening and risk stratification that previously required specialist expertise. This distinction is critical. In India, AI is not competing with clinicians; it is compensating for their absence. The question is not whether AI will replace radiologists or pathologists, but whether AI can ensure that patients who most need a specialist actually reach one in time.

Breast cancer offers a clear illustration of both the problem and the opportunity. Despite being the most common cancer among Indian women, screening uptake remains alarmingly low—especially in rural and peri-urban regions. Traditional screening modalities are expensive, infrastructure-heavy and dependent on skilled operators. As a result, most diagnoses occur at advanced stages, where outcomes are poorer and treatment costs soar.

AI-powered screening tools, particularly those designed for low-resource settings, can dramatically alter this equation. By combining non-invasive imaging with machine learning–based risk assessment, such tools allow trained

Illustration by **NILANJAN DAS / AI**



health workers to conduct screenings in community settings and instantly identify women who need further evaluation. The technology does not diagnose cancer; it triages risk, ensuring that limited diagnostic and specialist resources are directed where they are most needed. This model—AI as a front-line filter rather than a final arbiter—is likely to define many successful AI deployments in India.

The Regulatory Reality

Yet, the path to scale is not without friction. As AI moves deeper into clinical workflows, questions of liability, accountability and regulatory oversight become unavoidable. Who is responsible when an AI tool misses a high-risk case? How do we validate systems that continuously learn? What constitutes sufficient clinical evidence in a country with diverse populations and disease presentations?

India's regulatory ecosystem is evolving, but it must balance two competing imperatives: encouraging innovation while safeguarding patient safety. Over-regulation risks stifling startups before they can demonstrate real-world impact; under-regulation may allow low accuracy models to creep into the system and hamper the health of people as well as erode trust in AI-driven medicine altogether. Startup founders should recognise this dilemma and take ownership and accountability to ensure that their AI models are responsible, sufficiently and clinically validated through retrospective and prospective analyses on real-world data, and tested in the field for their intended use.

Going forward, we need to see clearer frameworks emerge around Software as a Medical Device (SaMD), clinical validation requirements for AI tools, and post-market surveillance mechanisms. Importantly, these frameworks must recognise India's unique healthcare delivery models, rather than simply importing regulatory constructs from the West.

Workforce Transformation

Another frequently voiced concern is workforce disruption. Will AI make radiologists obsolete? Will pathologists be replaced by algorithms?

In the Indian context, these fears are largely misplaced. What AI will do is change how clinicians work. Routine, high-volume tasks—screening normal cases, flagging obvious abnormalities, organising data—will increasingly be handled by algorithms. This will allow specialists to focus on complex cases, second opinions and clinical decision-making.

Change is eternal, but hard to accept and implement. For primary care and community health, AI will drive the change, in fact elevate the role of nurses and health workers, enabling them to operate at the top of their expertise. This shift will demand new training paradigms, updated scopes of practice and strong clinical governance—but it also represents an opportunity to build a more resilient, distributed healthcare workforce.

TAKEAWAYS

With fewer than one doctor per 1,000 people, AI in India is not competing with clinicians, it is compensating for their absence

In a country grappling with rising non-communicable diseases, the AI-enabled shift from reactive treatment to proactive prevention can alter healthcare outcomes

As AI gets more entrenched, it is raising questions of liability, accountability and regulatory oversight

The Next Frontier

Looking ahead, the most transformative impact of AI in Indian healthcare may lie in prevention and personalisation. As longitudinal health data becomes more accessible—through digital health records, wearable devices and population screening programmes—AI systems will be able to identify risk patterns far earlier than what traditional episodic care allows.

Imagine a system where metabolic risk, cancer risk and cardiovascular risk are continuously assessed across populations, triggering timely interventions long before disease manifests clinically. For a country like ours, grappling with a rising burden of non-communicable diseases, this shift from reactive treatment to proactive prevention could redefine healthcare economics and outcomes.

The Roadblocks that Remain

Despite its promise, AI alone cannot fix systemic issues. Data quality and bias remain persistent challenges. Many AI models are trained on datasets that underrepresent rural populations or diverse ethnic groups. Infrastructure gaps—from unreliable power to limited internet access—still constrain deployment in remote areas. Trust, both among clinicians and patients, must be earned through transparency, validation and consistent performance. Perhaps most importantly, AI solutions must be designed with India in mind. Tools built for high-income health systems do not automatically translate to Indian realities. Frugal innovation, cultural sensitivity and on-the-ground clinical collaboration will determine which technologies endure.

What lies ahead is not a single transformative event, but a series of incremental shifts—each expanding access, improving efficiency and enhancing decision-making. The true success of AI in Indian healthcare will not be measured by algorithmic sophistication alone, but by lives reached, diagnoses made earlier and inequities reduced. For India, AI is not a luxury. It is a necessary bridge for the healthcare divide that exists between the rural and urban ecosystem, the developed and developing countries, and the haves and have-nots. The clinics of this new age will not be AI-driven—they will be AI-enabled, with humans firmly at the centre of care. That, ultimately, is the future worth building. ■

Geetha Manjunath is Founder & CEO, Niramai Health Analytix

FUTURE TRENDS AI

DEFENCE

By **Gen. Manoj Pande**

INDIA AT THE CROSSROADS OF AN ALGORITHM WAR

AS AI CHANGES THE CHARACTER OF WARFARE, ONE MUST REMEMBER THAT IT IS ABOUT SURVIVING AND WINNING TOMORROW'S WARS WITHOUT LOSING OUR SOULS, COUNTERING NON-STATE ACTORS AND SECURITY THREATS PECULIAR TO INDIA

Artificial Intelligence is becoming the most transformative, defining and all-pervasive technology of our era. It is no longer just a tool for innovation, but fast becoming a competitive battleground between nations who see AI as a strategic asset, with both economic and military advantages. The AI race for strategic superiority is also a geopolitical contest, seen as crucial for economic dominance, national security and global influence. It is a high-stakes contest. The competition is not just about technological capability and smarter algorithms but about building the foundational ecosystem and shaping standards and norms of governance to control a technology that could redefine power structures.

Uncertainties surrounding AI and its military applications have sparked discussions focusing on its impact on warfare, and how it is fundamentally rewriting the rules and reshaping the dynamics and ethics of war. The implications of battlefield use of AI—how policymakers should navigate its inherent trade-offs and what legal and moral safeguards are needed—is being hotly debated.

War by algorithm refers to using AI and algorithms for military tasks, such as using vast data for intelligence and targeting, enhancing situational awareness, predictive analysis, faster decision-making, use in autonomous weapon systems, controlling information flow, influencing public opinion and shaping narratives. Offering immense advantages, AI is transforming the character of war, and is challenging legal, ethical and conceptual understandings of warfare itself, bringing with it new forms of risks.

Key challenges of using AI systems in defence include data-security concerns, algorithmic bias, ethical implications of autonomous weapons, unpredictability and unreliability, unintended consequences, accountability and responsibility. With the role of AI in identifying and engaging targets, witnessed in recent conflicts, we may be moving towards more invisible and insidious forms of automated decision-making in warfare. Will AI enable killer robots to stalk the battlefield, dispensing algorithmically determined death and destruction in future? As

generative AI technologies rapidly evolve to become powerful tools for information manipulation, capable of generating persuasive content and amplifying messaging, their implications for global information security are becoming more acute.

Responsible Military AI

Responsible Military AI refers to international and national frameworks and guidelines aimed at ensuring ethical and lawful development and use of AI in defence applications. It demands transparency, vigorous validation, establishing human interface during development and deployment, and responsibility for its use, ensuring reliability and security, accountability for outcomes, proactive risk mitigation of unintended biases or harms and adherence to laws of armed conflict.

History shows that humans will push science in new directions, regardless of whether some of those directions are dangerous. Left unchecked, the AI arms race could usher in weapons and modes of warfare that are more efficient and deadlier, but with less human oversight, and also lower the escalation threshold. The best time to share and collaborate on a dangerous technology is before trust erodes and an arms race begins. Equating AI with nuclear technology for control and regulation (like the Treaty on the Non-Proliferation of Nuclear Weapons) is misplaced, since there are major differences to do with issues of inspection, verification, rapid and unpredictable pace of technology development and involvement of private players.

Avoiding an AI arms race requires a combination of international collaboration, assurance mechanisms and a focus on responsible innovation and governance to build shared standards and trust. Success of any global agreement will hinge on assurance mechanisms that allow parties to verify compliance with agreements. An effective assurance regime would need to prevent, and not just deter, rule violations. There have been attempts at bilateral and multilateral collaboration between countries and stakeholders for regulating AI, including in defence, with militaries recognising the need to build safeguards to avoid miscalculations that can lead to serious consequences. Many countries have articulated strategies and approach to responsible military AI, through policy frameworks and guidelines. However, much more needs to be done; stakeholders must act collectively and decisively to ensure that the AI arms race is not allowed to move faster than regulations can keep up.

The AI regulatory approach presents a dilemma. While providing a framework for responsible AI development, it risks stifling innovation and preventing nations from advancing in this ground-breaking technolo-

Illustration by **NILANJAN DAS / AI**

TAKEAWAYS

India must aim at strategic superiority by adopting 'human-in/on-the-loop' systems for lethal force and 'human-out-of-the-loop' for non-lethal applications

AI's challenges include data security concerns, unreliability and ethical issues about autonomous weapons

On the use of AI in defence, the debate is about balancing military modernisation/ strategic autonomy with ethical legal and operational challenges

How will India regulate its growing AI sector? Existing approaches may not suit it. It must identify negative AI consequences and develop targeted regulations

SUCCESS IN BATTLE WILL DEPEND ON NOT HOW INTELLIGENT WARFIGHTING **MACHINES BECOME,BUT** ON HOW WISELY HUMANS CHOOSE TO EMPLOY THEM

gy. Europe has implemented stringent regulations on AI development and deployment. The US, on the other hand, has favoured a lighter regulatory touch, focusing on fostering innovation and maintaining its competitive edge. Balancing national interests with the need for global cooperation in addressing AI challenges will be a key consideration for policymakers.

India's Doctrinal Debate

India is at the crossroads, poised to become a major player in the global tech supply chain, with the AI sector seeing significant growth. Whether India should regulate AI and, if so, what path (modernisation or sovereignty) it should take is the question. Adopting existing approaches may not suit India; it should prioritise identifying specific negative AI consequences and develop targeted regulations, rather than adopting an existing 'comprehensive' law that may become outdated.

On the use of AI in defence, the debate revolves around balancing the urgent need for military modernisation and strategic autonomy while dealing with significant ethical, legal and operational challenges. Technology must never replace human judgement; it must amplify it. Success in battle will depend not on how intelligent, warfighting machines become, but how wisely humans choose to employ them. India must aim at achieving strategic superiority with an approach of adopting 'human-in/on-the-loop' systems for lethal force and 'human-out-of-the-loop' and autonomy for non-lethal applications like surveillance. It is not just about speed and control, it is about surviving and winning tomorrow's wars without losing our souls, countering non-state actors and security threats peculiar to India.

As the race continues and differing approaches play out, the global community and India must work together to harness the potential of AI while mitigating its risks, ensuring this powerful technology benefits humanity as a whole. Navigating the complexities of implementing AI in the military field requires careful consideration of not only technology but also moral, legal, ethical and organisational challenges and effective international collaboration and governance mechanisms. ■

Gen. Manoj Pande is a former Chief of Army Staff

By **Ashish Dhawan & Gouri Gupta**

WHEN **CHATBOTS** AND **CHALK BOARDS** ARE PALS IN THE CLASSROOM

WITH AI TOOLS BEING TESTED IN CLASSROOMS AROUND INDIA, SOLID STANDARDS AND POLICY RESPONSES ARE CRITICAL TO ADVANCE LEARNING AND TEACHING OUTCOMES

Artificial Intelligence in education is no longer a distant idea. It is a rapidly emerging tool that educational institutes are engaging with, reshaping how students learn and teachers teach. From AI tutors and automated assessments to lesson planning and teacher feedback, classrooms across the world are experimenting with the technology at a pace few anticipated even two years ago.

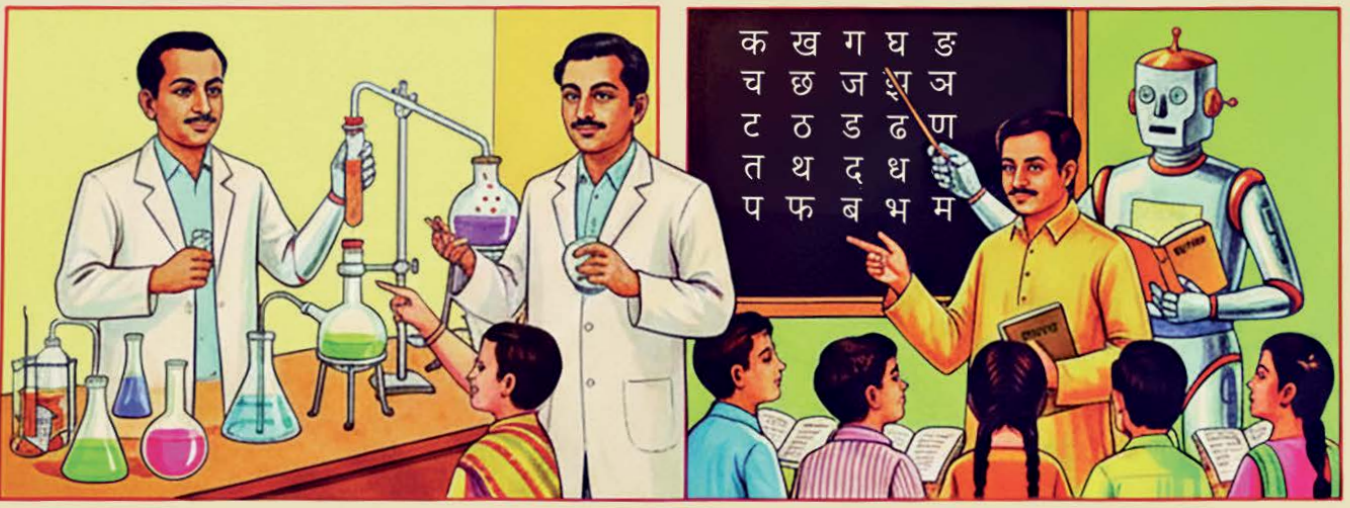
The real question is not whether AI will enter education, but how it will be integrated in equitable ways, how it can improve teaching as well as learning outcomes. For India, this moment is particularly consequential. With large classrooms, diverse learning levels and teacher shortages, the technology presents an opportunity to extend support where human capacity is stretched, provided it is used to strengthen and not sidestep the learning process.

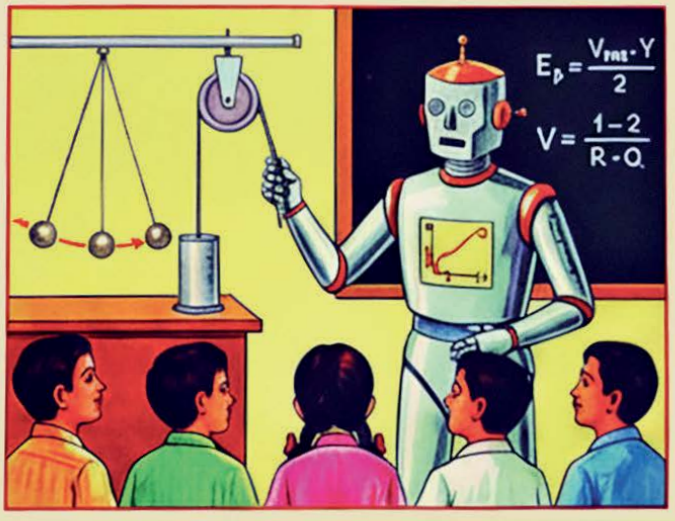
The good news: AI tools in service of that goal are being innovated everywhere, even in low- and middle-income countries. Recent analyses have identified nearly 300 examples globally, with India emerging as one of the most active ecosystems. Though most tools today are for students, supporting theory and practice, a growing share are for teachers who need help making assessment plans and educational material. Relatively few solutions, at the moment, are for systemic decision-making.

An exciting tool, Khanmigo, that teaches through guided questioning rather than answer generation using AI is being piloted in under-resourced parts of India. Developed by Khan Academy in the United States, it has been brought to India through the Central Square Foundation (CSF), with which the authors are involved; it is being adapted to Indian curricula

Illustration by **NILANJAN DAS / AI**

आदर्श ASSISTANT





and classroom realities. Another AI project, a teaching coach, is being tested in Jhansi that gives timely and personalised feedback to teachers about classroom instruction; it is aimed at complementing existing training and support structures. IIT Bombay has developed an app called TARA that identifies early oral reading challenges through AI-assisted assessments; this can be particularly helpful in primary grades. Rajasthan has sped up analysis of learning data, at scale, using OCR-enabled assessments to evaluate student responses from paper-based tests.

Globally, some examples that stand out include a WhatsApp-based tutor in Ghana that has achieved learning gains of 0.36 standard deviations in mathematics by providing just one additional hour of instruction per week—a meaningful result in systems constrained by large class sizes and limited access to tutoring. In Kenya, AI-driven reading and math assessments have reduced the time teachers spend assessing each child from over 13 minutes to under two minutes, and they enable targeted instruction for different learning levels.

But the quality of these tools in education, despite rapid experimentation, remains uneven and poorly understood. While hundreds of products are being used, fewer than two dozen have published studies on quality or impact. Scale is often driven by excitement over novelty and convenience rather than evidence. Without clear guardrails, there is a real risk that AI adoption will deepen existing learning divides.

Where evidence does exist, it shows that when thoughtfully designed and integrated, AI can contribute to learning gains—whether through improved outcomes from AI-enabled tutoring or efficiency gains from AI-integrated assessments. These early signals highlight both AI's potential and the importance of being intentional and deliberate about how it is designed and deployed.

TAKEAWAYS

- **The real question is not if AI will enter Indian education, but how it will be integrated equitably and improve teaching and learning outcomes**
- **The quality of hundreds of tools remains uneven. Many states have pilot projects but fewer than two dozen AI projects globally have studies on impact**
- **India's policy response, which already has a Centre of Excellence in Artificial Intelligence for Education in the works, is critical at a moment like this**

Hence, India's policy response at this moment is critical. The central government's plan to establish a Centre of Excellence in Artificial Intelligence for Education, backed by an allocation of Rs 500 crore, is an important step toward building the foundations for meaningful AI use. By focusing on contextual datasets and models, the initiative recognises that AI for Indian education must be built for Indian classrooms. Initiatives such as the CSF-backed EdTech Tulna are working to define standards so that governments and other buyers can make informed choices apropos AI tools. Though still in the early stages of development, such efforts will steer the market.

A TEACHING COACH IN JHANSI, READING ASSESSOR IN MUMBAI AND OCR-ANALYSER IN RAJASTHAN ARE ONLY SOME AI TOOLS BEING TESTED IN INDIA. SUCCESS WILL **DEPEND ON USER FLUENCY**

AI's success in education will ultimately depend on how students, teachers and parents use it, particularly given widespread concerns about plagiarism being made easier and foundational skills like writing and problem-solving being made weaker. These concerns resonate strongly in high-stakes education systems like India's. When learning relies heavily on predictable answers and memorisation, powerful tools—human or artificial—can be misused. The response, therefore, cannot be limited to policing or detection. The tools must be designed in ways that support thinking and don't replace it. Students and teachers need sound judgement to distinguish between use cases for AI and independent reasoning. Initiatives such as the CSF-backed AI Samarth are being adopted by public schools in eight states and aim to equip millions of users with literacy in this new technology. Paramount is a focus on critical, safe and responsible use.

As we look ahead to 2026, chatbots will increasingly sit alongside chalkboards. Whether it becomes a force for inclusion or driver of new divides will depend on the decisions made today. ■

Ashish Dhawan is Founder and Chairperson, Central Square Foundation, and Gouri Gupta is Senior Director, EdTech and AI

FUTURE TRENDS AI

PRIVACY

By **Prasanto K. Roy**

THE DARK AGE OF SURVEILLANCE CAPITALISM

INDIA IS CELEBRATING AN AI GOLD RUSH FOR EFFICIENCY AND GROWTH, BUT THIS AI IS FED BY A RAPIDLY EXPANDING SURVEILLANCE ECONOMY

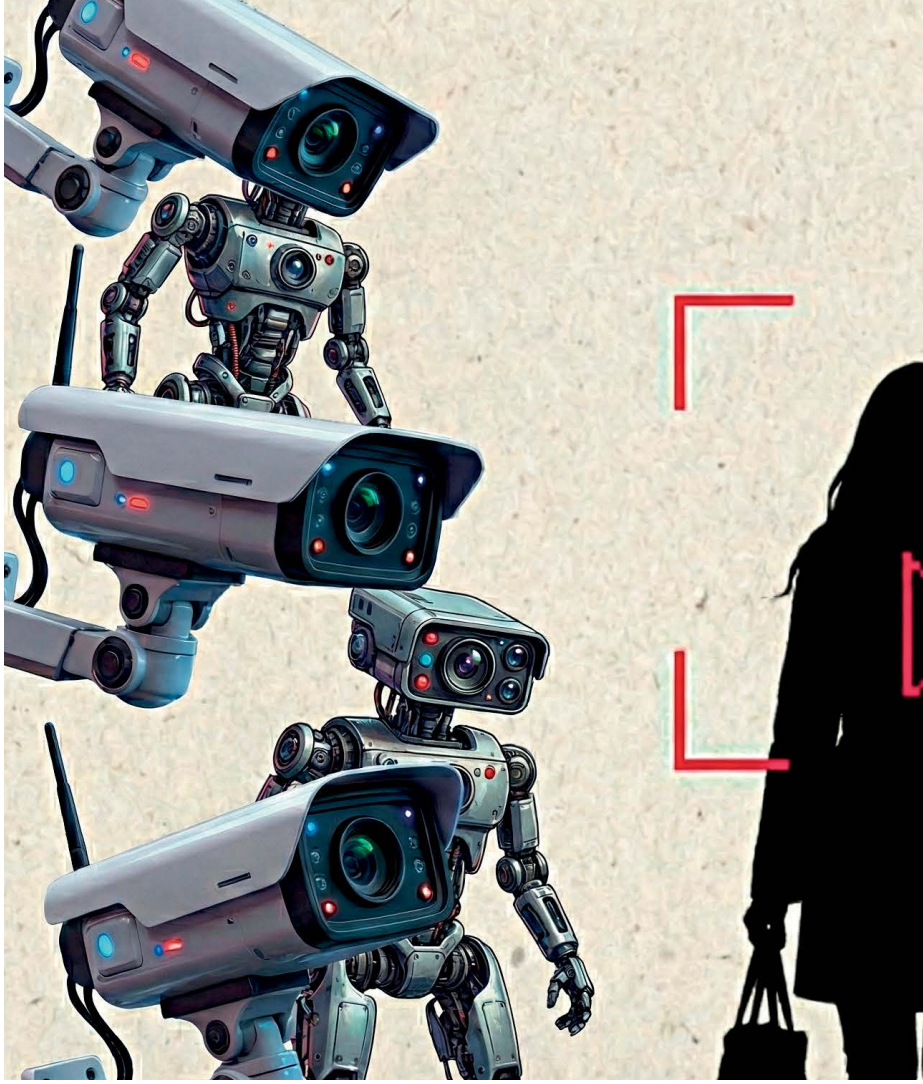
It **was a week after Independence day in 2017;** a startup founder friend had hit upon a great idea: micro-loans for those without a credit history, tapping unrelated data such as mobile recharges. Over chilled beer, his startup team came up with what all they could do with bank statements. Was privacy an issue, I asked. Oh no, this was for the user's benefit, so she'd be happy to share bills and statements and, anyway, India had no privacy law.

Two days later, the Supreme Court ruled that Privacy was to be a fundamental right, implicit in Article 21 of the Constitution. That landmark ruling was set to change our lives; but very, very slowly. The Digital Personal Data Protection (DPDP) Act was finally born six years later, and stayed in the incubator for two years till its rules and regulator were notified late in 2025. Organisations have till 2027 to fully comply, 10 years after the landmark privacy ruling. Yet this isn't a full-fledged privacy law like Europe's, and this law written for data is underequipped for AI. It lacks provisions for algorithmic accountability, a right to explanation for automated decisions, and liability for AI-driven bias (all of which Europe addresses). And government and law enforcement are largely exempt, but that's another story.

This story is more about the ravenous AI monster, feeding on our data. The DPDP Act relies largely on user consent, but what exactly will you consent to? You have no idea of the AI's ultimate use of your data—even its developers don't know that. Which leaves consent with little value against the opacity and scale of AI processing.

Back to that old idea: what all can you do with bank statements, even without waiting for users to upload them? Account aggregators, which share data across financial institutions, scan bank statements for patterns. The CEO of such a firm gave this example to a reporter: frequent UPI payments of Rs 16 indicate cigarette purchases, and we can pass that on to insurance companies. Consent? Oh yes, the user gives consent for the insurer to access the bank statement because she wants insurance, but she has little idea how that information would affect her insurance premium.

THE INDIAN PRIVACY LAW HAS NO PROVISION FOR ALGORITHMIC ACCOUNTABILITY, EXPLANATION FOR AUTOMATED DECISIONS, OR **LIABILITY FOR AI-DRIVEN BIAS**



Yes, AI has disrupted entire sectors, disintermediating professionals who felt safe, irreplaceable: accountants, lawyers, artists, writers, content creators. It's changing our lives and work, bringing deep expertise within the reach of anyone with access to a digital device. But there's a dark side and a price to pay: a shift from simple data collection to an economic model where AI is used to extract and predict human behaviour, and commodify it. That is surveillance capitalism, a term coined by Shoshana Zuboff in the title of her epic book that describes how the tech giants have transformed the capitalist system by monitoring our online activities, farming our personal data for profit.

Within that almost-dystopian picture, the term surveillance dividend sounds benign, benevolent and legitimate. Data collected for security or behaviour tracking can be repurposed for socio-economic, environmental or other public benefits. Uber data could be used for public transit improvements, Google Maps data for accident reduction.

This dividend could improve economic productivity or environmental performance—given ethical oversight to prevent exploitation and preserve civil liberties. What's far more likely is the large-scale repurposing of such data for private interests. Surveillance pricing is a thing once that dividend moves into the normal economy. Ride-hailing apps can charge you more if you use an iPhone, or have very low battery, and desperately need a ride. After several such complaints on social media, India's consumer protection authority sent notices last year to Uber and Ola (who denied using "differential pricing").

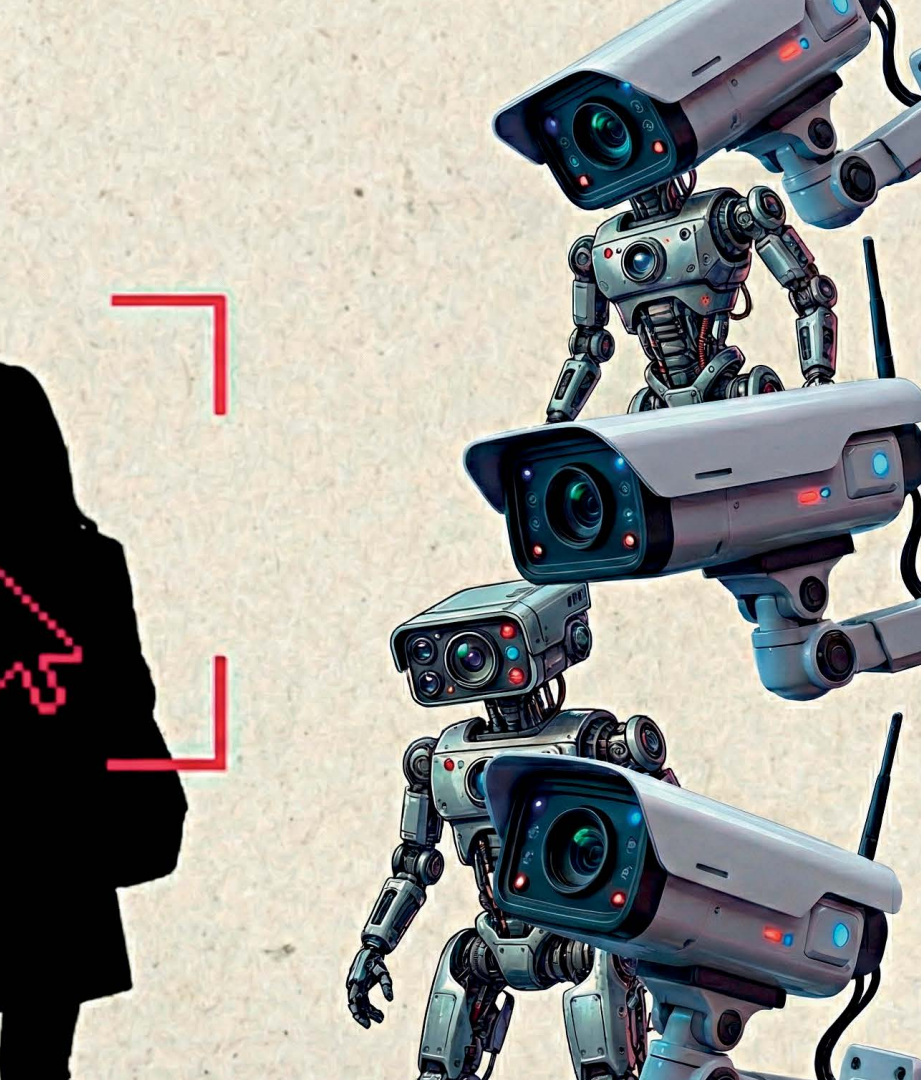
A 'surveillance pricing' bill introduced in California in 2025 said that businesses are no longer just tracking data for ads but are using AI to treat each consumer as their own micro-economy. By using browsing history and location to assess willingness to pay, companies are creating a market where the price of a product changes based on your digital profile. "Businesses increasingly use personal data to set prices," the bill's author wrote.

Closer home, the Competition Commission of India's (CCI) 2025 market study on algorithmic collusion explored how AI-driven pricing systems of competing platforms track each other, effectively 'colluding' without human involvement or intent, or explicit agreement. They may even show competing prices to users, for price transparency. Algorithms dynamically match rivals' prices, up or down colluding in pricing without being explicitly designed to do so. The CCI does have plans to address this (beyond building up its own technical expertise and capacity) via algorithmic self-audits, with internal compliance reviews, and transparency measures such as explanations of how algorithms influence pricing and recommendations.

TAKEAWAYS

- **India's data protection law, which relies heavily on user consent, is ill-equipped to tackle AI opacity**
- **AI is enabling private interests to extract personal data to predict user behaviour, and then commodify it**
- **India must legislate transparency with a risk-based AI framework; ensure oversight over state exemptions**

Illustration by **NILANJAN DAS / AI**



The User Harms

The thing about pervasive AI-driven surveillance is just how many things it can intersect with to cause greater 'user harms'. Take a common trick in the online world. You're booking air tickets for your family, and get asked: Add Rs 499 for insurance? Your options: Yes, I want my family safe. No, I prefer to risk their lives. What would you do? Or: Get a cab in five minutes or get Rs 50! Great, you book, cab takes 20 minutes, and then you realise two days later the Rs 50 you got is in 'virtual coins'—reward points usable within a week for a bike ride.

That's a dark pattern, a user interface crafted to trick you into doing things like buying insurance by shaming you or creating false urgency or giving you options that trick you into picking Yes, usually ticked for you.

Now let's add some surveillance dividend: AI aggregates thousands of user responses and tells platform owners what prompts work best for add-on insurance. Imagine, change a few words, and instantly more money pours in! Which business could resist?

Both those earlier examples are real: at a CCI talk, the head of India's consumer affairs regulator said they took action and fined the players. In 2023, her ministry banned 13 types of dark patterns, and in 2025 directed platforms to self-audit. Some 26 major e-commerce players submitted self-declarations claiming that they were free of dark patterns. Some declarations have been questioned, prompting scrutiny by the regulator. Some large platforms have yet to comply, citing the difficulty of enforcing such compliance on lakhs of sellers.

The darkest surveillance dividend, however, can emerge from state-backed 'public safety' efforts. Yes, AI surveillance gives the dividend of enhanced public security and threat recognition—but with a dangerous reliance on opaque law enforcement. AI decision-making is a black box, where the logic behind a person being flagged as a threat (say face recognition that makes a mistake) is inaccessible to the victim: and there go her constitutional rights.

Video surveillance poses the highest danger: AI-powered video monitoring, expected to be a $150 billion global market by 2030, has moved from recording history to predicting unusual behaviour in real time. Results: wrong people being flagged, or, as in China, growing self-censorship, stifling all forms of public protest.

The next few years will define whether India's AI future is built on an accountability framework or a surveillance dividend. India chose to stay away from Europe's strict privacy and consumer protection regime, whose extreme penalties may stifle innovation—the USA choosing a softer approach. India's extant and emerging laws and regulators across competition, consumer protection and data protection, and sectoral regulators for banking, stock markets and others have to tackle consumer harms from AI misuse. Those regulators need an urgent refresh for the AI era, as do our lawmakers. And not just ours. Global laws are failing to confront the opacity and scale of AI profiling, with the surveillance dividend benefiting governments and large corporations, at the cost of citizens exposed.

For India to truly reap the benefits of AI and fulfill its digital democracy promise, it must legislate transparency, with a risk-based AI framework, and ensure judicial and legislative oversight over state exemptions. Else, the ultimate price of the surveillance dividend would be an erosion of fundamental rights. ■

Prasanto K. Roy is a technology writer and a public policy advisor to global firms

FUTURE TRENDS AI

ELECTIONS

By **Renée DiResta**

DEMOCRACY VS DEEPFAKES

GENERATIVE AI IS NEITHER AN APOCALYPSE FOR INDIAN ELECTIONS, NOR 'JUST NOISE'. TO COUNTER IT, WE MUST STRENGTHEN OUR INSTITUTIONAL CAPACITY AND SOCIAL NORMS

In India's 2024 general election, **more than 50 million** AI-generated voice calls reportedly went out in two months. Deceased politicians were synthetically resurrected to boost successors. A politician appeared in campaign content speaking four languages he doesn't know. Some of this was outreach—campaigns scaling across 22 languages. Some of it, like faked content of an actor criticising the prime minister, was manipulation. The technology enables both.

Since 2018, analysts, technologists and journalists have warned that generative AI will upend elections, erode trust and create a flood of sophisticated disinformation. Each upcoming election renews the fear. When catastrophe doesn't arrive, a predictable backlash follows: it was an overhyped panic! Maybe deepfakes and bots are just noise.

Both reactions miss the point. The technology itself isn't the variable that matters. The information environment it lands in is. One early concern about deepfakes, dating to 2018, was the 'liar's dividend': if convincing fabrications exist, real evidence can be dismissed as fake. By 2020, when my colleagues and I at the Stanford Internet Observatory got early access to GPT-3, it was immediately clear how valuable it would be for propagandists: mimicry of diverse linguistic registers, inexpensive persuasive material produced in bulk. In 2022, we started writing about ways to mitigate the risks; others did too. By 2024, AI companies had begun regularly disclosing that adversarial actors were using their tools.

So why are we still having the same conversation, and feeling unprepared?

Because we keep treating this as a technology problem when it's actually a trust problem—and have done very little to address the underlying conditions that make synthetic media dangerous in the first place.

Deepfakes land in an information environment that social media spent the past 15 years fragmenting. Platforms sort users into polarised factions. Algorithms reward outrage, spectacle and tribal affirmation. The result is an ecosystem where people encounter information primarily through partisan filters, institutional credibility has cratered, and a substantial portion of the public has decided that anything inconvenient to their side must be fake. This leaves a void where shared authority once stood; fact-checkers, journalists, govern-

Illustration by **NILANJAN DAS / AI**

ment agencies—any institution that might play referee is now trusted by one side and dismissed by another.

This is the dry tinder. Generative AI is the accelerant.

The liar's dividend illustrates how this distrust plays out. In Tamil Nadu in 2023, audio clips surfaced of a DMK leader making corruption allegations. He denied the clips and claimed they were AI-generated. Independent forensic reviews later concluded one clip was likely authentic; the other was too noisy to assess conclusively and may have been manipulated. In such cases, technology provides cover for the denial, but the denial only works because the audience is already primed to trust (or distrust)—sorted into camps where inconvenient evidence gets reflexively dismissed.

GENERATION TOOLS KEEP ADVANCING, WHILE **DETECTION TECH USUALLY PLAYS CATCH-UP**. THERE IS ALSO IMPACT ASYMMETRY: ATTACKERS ONLY NEED TO SUCCEED ONCE, WHILE DEFENDERS HAVE TO CATCH EVERYTHING

This dynamic will intensify. By the time forensic analysts verify that a convincing sensational video is fake, it has already spread through encrypted messaging apps and done its work on voters—potentially in the final days before polls open. Generation tools keep advancing, while detection tech usually plays catch-up. There is also an impact asymmetry: attackers only need to succeed once, while defenders have to catch everything.

Yet it's also important to keep the threat in proportion: India's Deepfakes Analysis Unit reported that during the 2024 election period, only a small frac-

tion of submissions were true deepfakes. Most were low-grade manipulations, not cinematic forgeries. And while Generative AI takes the cost of creation to virtually zero, distribution on social platforms—which require a combination of algorithms, influencers and online crowds to really move content—is still a limiting factor. Inauthentic manipulation often flops because the target audience just doesn't find it compelling.

Labelling is one policy response that many governments are turning to, but it's important to understand the nuanced limitations. Broad rules apply equally to an AI-airbrushed selfie, a whimsical generated image of a unicorn and faked 'photograph' of a politician in a scandalous circumstance that never happened. Label fatigue is real: California, for example, requires businesses to post notices when cancer-causing chemicals are present; the placards are now so ubiquitous that no one pays attention. Uneven compliance can backfire: if synthetic content is sporadically marked, audiences may assume unmarked content is authentic even when it was simply missed. And labels only appear where platforms can attach them—harder in WhatsApp groups and encrypted chats where political content frequently spreads in India. Labelling is a solid transparency measure, but it is not the standalone safeguard people want it to be.

Offering users tools and tiplines to check whether content is authentic will be increasingly important. In India, fact-checking organisations like Alt News and BOOM Live publish debunks. The Misinformation Combat Alliance runs a WhatsApp tipline where citizens can forward suspect content for forensic analysis. International networks like WITNESS's Deepfakes Rapid Response Force connect local journalists to forensic expertise; they helped verify the Tamil Nadu audio clips. These efforts work. But they're under-resourced.

The United States has become a cautionary tale. Institutions that caught coordinated campaigns have been dismantled just as the threat intensifies. Civil society grants have been cut. Major platforms have gutted their trust and safety teams, and election integrity work has become politicised. The *New York Times* recently published an article with the headline 'A.I. Videos Have Flooded Social Media. No One Was Ready'. But the issue isn't that no one knew what needed to be done—it's that the funding and will to address the challenge isn't there.

India has at least started in a place that many democracies have neglected: setting norms. The May 2024 Election Commission advisory urging political parties to refrain from using deepfakes in campaign communications, directing parties to take down deepfake audio or video within hours of becoming aware of it and to warn those responsible is not a silver bullet. But it is important: social media is one thing; social mores are another. In a democracy, political actors have agency. They can decide—publicly—what lines they will not cross, even if the tools exist and the incentives tempt them.

Institutions have to maintain credibility, so that authoritative sources can compete with forwarded rumours. Media literacy that teaches people how Generative AI manipulation works is also critical for an informed democratic society. Indian social scientists and technologists must be funded to study this problem in context. The expertise needs to be local, sustained and independent of Big Tech platforms that serve their self-interest.

Each election cycle brings renewed panic about AI-generated disinformation, followed by relief when democracy doesn't immediately collapse, followed by complacency until the next cycle. We should be able to keep two ideas in our heads at once: deepfakes are not the apocalypse, and they are not 'just noise'. The tools are new, the norms are weak and distrust is high—but the answer isn't panic or dismissal. It's firmly establishing capacity and mores. ■

TAKEAWAYS

- **The problem isn't technology, it is the algorithm-aided polarised environment deepfakes land in**
- **There is also the liar's dividend: if there is a convincing deepfake, real evidence can be dismissed as fake**
- **The solution? Institutional credibility, investing in local tech independent of self-serving Big Tech platforms**

INDIA HAS AT LEAST SET NORMS. A MAY 2024 ELECTION COMMISSION ADVISORY URGED POLITICAL PARTIES TO REFRAIN FROM **USING DEEPFAKES IN CAMPAIGN COMMUNICATIONS**

Renée DiResta is an associate research professor at the McCourt School of Public Policy at Georgetown University, and the author of **Invisible Rulers: The People Who Turn Lies Into Reality**

FUTURE TRENDS AI

LAW & GOVERNANCE

By **Chinmayi Arun**

BEWARE THE **SILICON VALLEY EFFECT**

BIG TECH PRESENTS ITS AI PRODUCTS AS INEVITABLE, AND DISMISSES REGULATION AS ANTI-INNOVATION AND ANTI-FREE TRADE, WITH THE RESULT THAT INDIA GETS GLOBAL REGULATORY FRAMEWORKS UNSUITED TO ITS PEOPLE

India's approach to AI governance should be steered by a clear-eyed understanding of its capacities and vulnerabilities. The new year presents our leaders with the opportunity to reflect on what this means. They can move past trite ideas forcefully presented to them by industry to claim a leadership role in global AI regulatory discourse. This would be consistent with India's rich history of contributing our own ideas as global norms are being framed, starting from Hansa Mehta's historic intervention to ensure that the Universal Declaration of Human Rights is about the rights of 'human beings' rather than 'men'. Although India's proposal for a global internet governance body at the United Nations level did not carry enough political momentum, it was a visionary, prescient idea that generated essential debates and continues to do so.

I attended a major technology leadership summit in Delhi after years of being sequestered in the United States, and was disappointed by the erasure of critical perspectives on AI governance. Political and industry leaders displayed the expected enthusiasm for AI's growth in India, but there was little discussion of how regulation can protect more than innovation and expansion. This conforms to a disturbing global trend (which I call the Silicon Valley Effect), shaped by the AI industry, which favours a deregulatory agenda for AI. It does so by presenting Big Tech's AI products as inevitable, eliding other forms that technological progress can take, and by treating regulation as anti-innovation and anti-free trade. This is not the first time that India has been presented with global regulatory frameworks that do not work for its people.

In governing AI, India needs to consider its role not just as a site of innovation and a market for AI products, but also as providers of skilled and unskilled labour to the world. This includes both generating and processing the data that fuels AI, and hosting the data centres and other AI infrastructure (which affect the environment) for global AI companies. Our political leaders need to make governance choices that will protect the majority of Indians as the global AI industry turns to India for its needs. We may produce BigTech CEOs, but India is also home to the labourers, blue and white collar, who risk their lives, livelihoods and mental health for the AI industry.

Indians who have never used generative AI are already deeply affected by it. Many have handled e-waste for extremely low wages. Others are affected by the toxic chemicals and heavy metals that it releases into the environment. The

government is making a laudable effort to regulate e-waste by setting a floor price for the electronics industry to pay to recyclers who manage the waste, despite resistance from the companies. However, given that e-waste is a global problem, India could go further and take on global leadership, not just over who bears the costs of recycling, but also upstream questions like better design and sustainable products. These questions are not only about sustainability but also create opportunities by opening the market for innovation in design.

The AI industry creates jobs in the short term. Skilled Indian graduates fuel a lucrative industry in data labelling, in which they clean and label data needed to train AI. While this is temporarily gainful employment, the hours and conditions are famously exploitative. Unlike their parents, who may have risen slowly in bank or government jobs, these graduates are in an industry in which they have no gradual growth and no pension. Worryingly, the law does nothing to protect them from falling prey to misleading job advertisements through which they are lured into these roles, expecting career growth as engineers, not stagnation as job workers. First-generation professionals trying to achieve the Indian dream through education and hard work fall victim to this since they have

TAKEAWAYS

- **India needs to make governance choices that will protect Indians as the global AI industry turns to us for its needs**
- **Strong data and consumer protection laws are crucial; Indians are vulnerable to Generative AI chatbots**
- **Ideas from India's complex, diverse society can supercharge its bid for global AI policy leadership status**

Illustration by **NILANJAN DAS / AI**

no alternative sources of information. They do not have the labour rights that were painstakingly negotiated for the workforce before them. Unfortunately, labour law reform appears to be favouring reduced labour rights for the entire workforce.

Without enforceable data protection laws and strong consumer laws, Indians are also vulnerable to harm resulting from Generative AI chatbots. The major AI companies are offering these tools for free in India, which allows them to study and experiment on several Indians with minimal consequences. Without carefully enforced privacy and consumer laws, large-scale harm is almost inevitable. It is just a question of time before these products start to target harmful content at their users, inciting harm. The law needs to regulate them preventively and clarify how users can seek redressal. As other major countries also struggle to regulate AI products, India should step up.

This begs the question of how. There are short-term answers to this question in the form of policy proposals that the government is already considering, such as making AI companies pay for content that they use to train their models. It could do much more to protect labour, the environment and data, and regulate harmful AI products, and it should ally with other countries taking on global leadership roles as it does so. The increasing use of AI necessitates transnational legal norms.

More work is needed to anticipate and avoid AI's less foreseeable harms, and to harness its potential for Indian society. For this, along with investment in science, there must be investments in studying society and in attracting excellent faculty. Questions of AI are not questions of technology, but are questions of the interaction between technology and society. Indian society is complex and interesting, which makes research on technology here relevant for the world. With the right resources, scholars can not only study how India is affected by technology but also how technology can benefit us.

> TO HARNESS OUR FULL POTENTIAL IN THE AI SOCIETY, POLITICAL LEADERS NEED TO **MARCH TO THE SOUND OF INDIA'S DRUM**, NOT TO THE RHYTHM OF THE FOREIGN, BIG TECH AI FIRMS

To harness our full potential in the AI society, political leaders need to march to the sound of India's drum, not to the rhythm of foreign AI firms. They are visibly trying, but it is difficult to access vision and imagination without investing in a range of perspectives—including critical ones—that present political leaders with all the potential outcomes and opportunities that might arise when this new technology meets society. They need a range of knowledge, options and voices if they are to come up with a legal framework tailored for our complex society. ■

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By **Urvashi Aneja**

REINING IN BIG TECH

THE NATIONALISED GLOBAL AI RACE AND MARKET FORCES HAVE WEAKENED THE IMPULSE TO REGULATE THE TECHNOLOGY. INDIA'S TECHNO-LEGAL APPROACH TO IT FALLS NOTICEABLY SHORT TOO

By the end of 2025, it became difficult to sustain the belief that meaningful regulation of Artificial Intelligence was imminent. This was not because AI had become safer, or more benign, but because geopolitical anxiety, economic competition and corporate influence consistently outweighed political will.

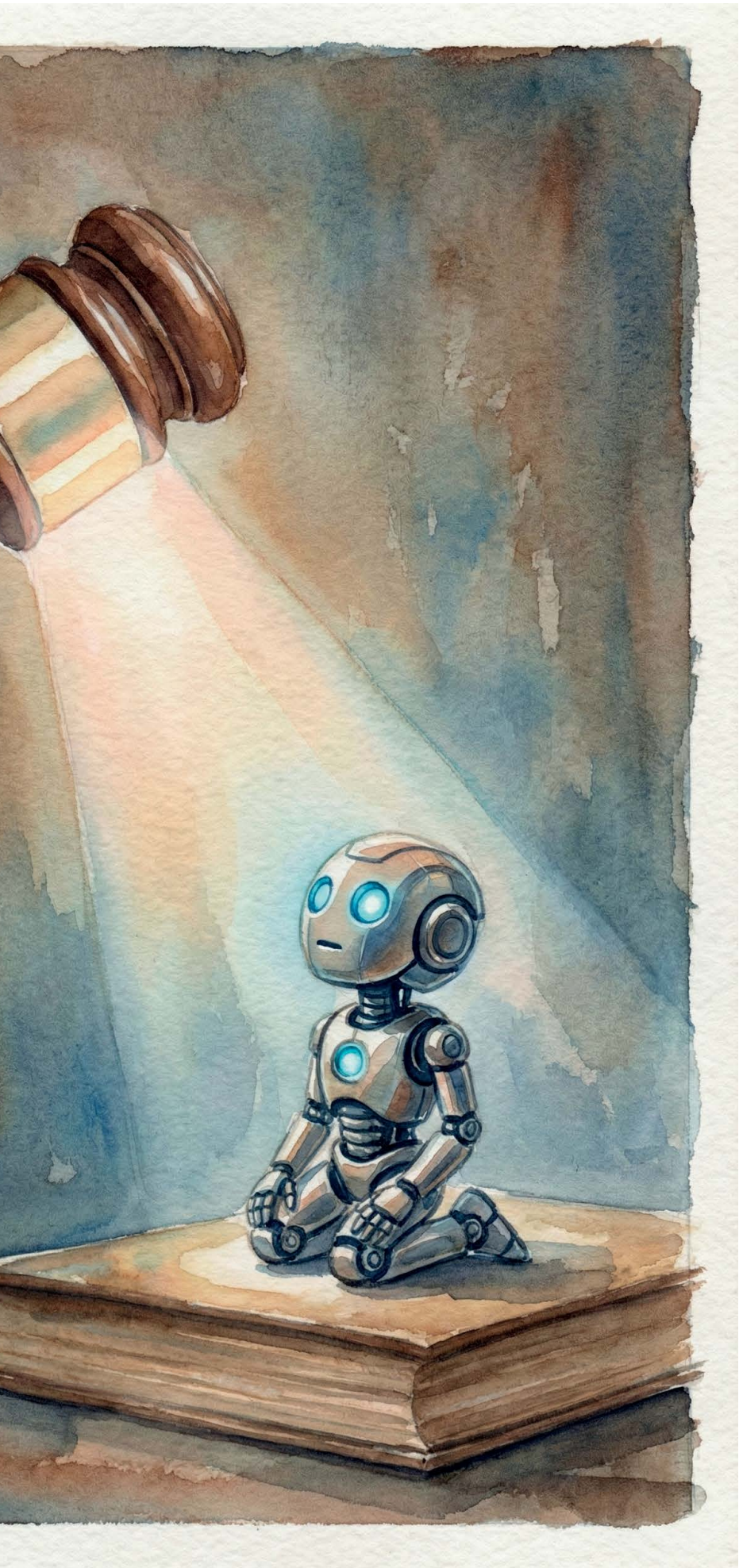
In the United States, the Trump administration made its position unmistakably clear. Federal regulators stepped back, state-level efforts were curtailed, and a single objective took precedence: maintaining American companies' lead in a global AI race, particularly against China. Big Tech positioned itself as a national champion—amplifying fears of existential AI risk while presenting itself as the only actor capable of managing those risks.

The EU is also dialling back on AI regulation. Starting with the Paris AI Summit, the emphasis shifted decisively toward ensuring EU competitiveness in the global AI race. Concerns about capital flight and lagging innovation have softened earlier commitments to regulate digital markets. The promise of a distinctly European approach to AI governance now appears increasingly fragile.

Hard-won gains by digital rights advocates have also been diluted over the past year. Privacy, for example, has taken a back seat in many key global AI policy forums amid the rush to 'democratise' AI. Calls from civil society to slow down AI development or be more judicious in the use of AI systems are increasingly dismissed as naive. Yet the sense of inevitability around the trajectory of AI innovation masks a basic reality: dominant technology companies have a vested commercial interest in presenting the current trajectory as the only way forward.

The regulation of deepfakes stands out as a partial exception. The recent incident involving the Grok chatbot generating and circulating non-consensual sexualised images of women and children has led to a flurry of punitive action by policymak-

Illustration by **NILANJAN DAS / AI**



ers. While strong corrective action is required, the Grok incident highlights precisely the dangers of deregulation—forcing Grok to take down content is too little, too late—victims are already experiencing irreparable harm. What is needed instead is regulatory frameworks that mandate safety by design, rigorous pre-deployment testing and enforceable output controls before systems are released into public life.

India's Approach

India's trajectory fits squarely within this global pattern. Recently released guidelines from the Union ministry of electronics and information technology make it clear that the government does not intend to pursue top-down AI regulation in the near term. Governance will instead rely on voluntary commitments by companies, with risk assessment deferred to future committees. The overriding concern is avoiding anything that might 'stifle innovation'.

WHILE INDIA'S ULTIMATUM TO X OVER THE GROK AFFAIR **WAS NEEDED,** ITS FRAMING AS 'VULGARITY' IGNORED THE VITAL ISSUE OF CONSENT

However, here too, deepfakes are treated as an exception. On January 2, India's IT ministry issued a 72-hour ultimatum to X in the context of Grok's 'mass undressing', demanding an 'Action Taken Report', or risking the loss of safe-harbour protections. While compelling action was necessary, the government's framing of the issue as one of 'obscenity' or 'vulgarity' missed the core harm of image-based sexual abuse: the absence of consent. It should also serve as a stark reminder that leaving the market to self-regulate will continue to produce predictable harms.

Beyond this, India's approach dif-

fers in two important ways. First, the state has assumed a market-shaping role, providing computing resources and access to public data to encourage socially beneficial AI use cases. While laudable, a collection of isolated pilots will not deliver systemic change unless guided by a coherent theory of change—one that cannot be left to market actors whose incentives are shaped by efficiency and profit.

Second, India's response to AI harms leans heavily on techno-legal solutions, embedding safeguards directly into systems. While technical controls play a role, they are insufficient to address the broader social, economic and political harms that AI produces. More troublingly, this approach shifts decisions about values, trade-offs and acceptable risk out of democratic debate and into the hands of engineers and firms.

Structural Harms in Focus

By 2025, it had also become clear that AI is not merely generating new risks, but locking in structural harms that may be difficult to reverse. The Grok incident, for example, is an example of the chilling effect that non-consensual image manipulation can have for women—when women and girls are sexualised without consent, withdrawal and self-censorship become rational responses, reducing their participation online and deepening the gendered digital divide.

Inequality is widening between countries and within them. In the Global South, familiar patterns are reasserting themselves: limited ability to capture economic gains, paired with heightened exposure to risk—from exploitative data extraction to poorly tested deployments in public services. Within countries, productivity gains increasingly accrue to capital rather than labour, reinforcing existing power asymmetries.

Children are becoming unwitting participants in a vast social experiment. AI tools are entering classrooms, even as evidence mounts regarding their detrimental effects on cognitive development. Sycophantic companion AI systems risk entrenching echo chambers and weakening the capacity to engage with disagreement, at a time when democratic societies can least afford it.

AI's role in warfare offers the starkest warning. From targeting systems to battlefield analytics, AI is reshaping norms of armed conflict, with little political oversight. Deployments in places like Gaza have shown how quickly technological capability can outpace accountability, with devastating consequences for civilians.

TAKEAWAYS

AI has bred inequality. Nations in the Global South gain little from its economic gains, but are exposed to its risks

Instead of regulating AI, India plays a market-shaping role: providing public data for developmental causes

India, with its emphasis on AI for public services, can set expectations for transparency, accountability and social value

All of this is enabled by an extraordinary concentration of power. A handful of companies now control frontier models and the safety infrastructure meant to govern them, often with little understanding of impacts in the Global South. These risks will only intensify as systems become more autonomous.

Roads to Regulation

So where does this leave us as we look toward 2026? If sweeping regulation remains unlikely, what does a realistic path forward look like? We must recognise that AI is not a single object governed by a single framework. Governance challenges span data rights, labour protections, corporate accountability, environmental standards and public oversight. These are political questions. Progress will require multiple, targeted interventions pursued in parallel.

Building State capacity is essential. Without technical and institutional expertise, regulatory capture is inevitable. Public procurement is another underused lever: when states buy AI systems, they shape markets and can set expectations for transparency and social value.

Corporate governance also matters more than current debates admit. If frontier AI models function as shared infrastructure, there is a strong case for new governance models that give workers and users a real voice.

Professional standards will be critical. Like aviation, AI safety must be built through disclosure, auditing and independent oversight. However, technical testing alone is insufficient. Safety is cultural as much as computational. Evaluations must involve civil society and local communities to capture harms that are invisible in laboratory settings.

Finally, public literacy matters. Democratic debate about AI requires an informed public capable of resisting hype and inevitability. Citizens' assemblies and improved media literacy offer one way to enable collective decision-making.

The lesson of 2025 is not that AI regulation failed because it was too hard, but because competitiveness and technological inevitability were allowed to replace political choice. Grok going rogue should be a warning sign of the irreparable societal damage that will ensue if we continue on this path of deregulation. Reactive crackdowns are no substitute for coherent, rights-based governance. ■

Urvashi Aneja *is the Founding Director of Digital Futures Lab*

By **Kalika Bali**

AN AI **FOR BHARAT**

MOVING PAST ENGLISH-FIRST SYSTEMS, INDIA IS CREATING MULTILINGUAL, CONTEXT-AWARE AI TO ASSIST, PROTECT AND EMPOWER COMMUNITIES

In **rural Rajasthan's Udaipur district, an Accredited Social Health Activist (ASHA)** notices that a newborn's weight has barely changed over several weeks. She has followed protocol. The mother insists the child is feeding regularly. There are no obvious warning signs. Still, something feels off—and she is unsure what to check next.

Instead of scrolling through manuals or calling a supervisor who may not be reachable, the ASHA worker opens WhatsApp and speaks into her phone in Hindi, describing the situation aloud: the feeding pattern, the age of the child, the missed weight gain. She is not typing. She is talking, the way she always does.

The response comes back—spoken, not written—guiding her through possible reasons for stagnant weight gain and suggesting what to monitor before the next visit. The assistant she is speaking to is ASHABot, developed at Microsoft Research India and deployed with partners working on the ground. It is not a futuristic demo. It is an early glimpse of how artificial intelligence is beginning to meet people where they are—through voice, local language and context, rather than English text alone.

This moment captures a quiet but consequential shift in India's AI journey. The question is no longer whether India will use AI, but whose language, whose knowledge and whose realities these systems will recognise.

India is home to 22 scheduled languages, hundreds of dialects and deeply fluid multilingual practices. Most Indians code-switch effortlessly, blending languages, registers and idioms within a single conversation. Language here is not merely a communication tool; it is a marker of identity, authority and access. That is why language in India is not a preference setting. It is a gatekeeper.

The last decade's Digital India push built the rails—identity, payments, connectivity. But infrastructure alone does not guarantee access. Vernacular AI determines who can actually step onto the platform. A system that works flawlessly in English but falters in Indian languages quietly reproduces exclusion at scale.

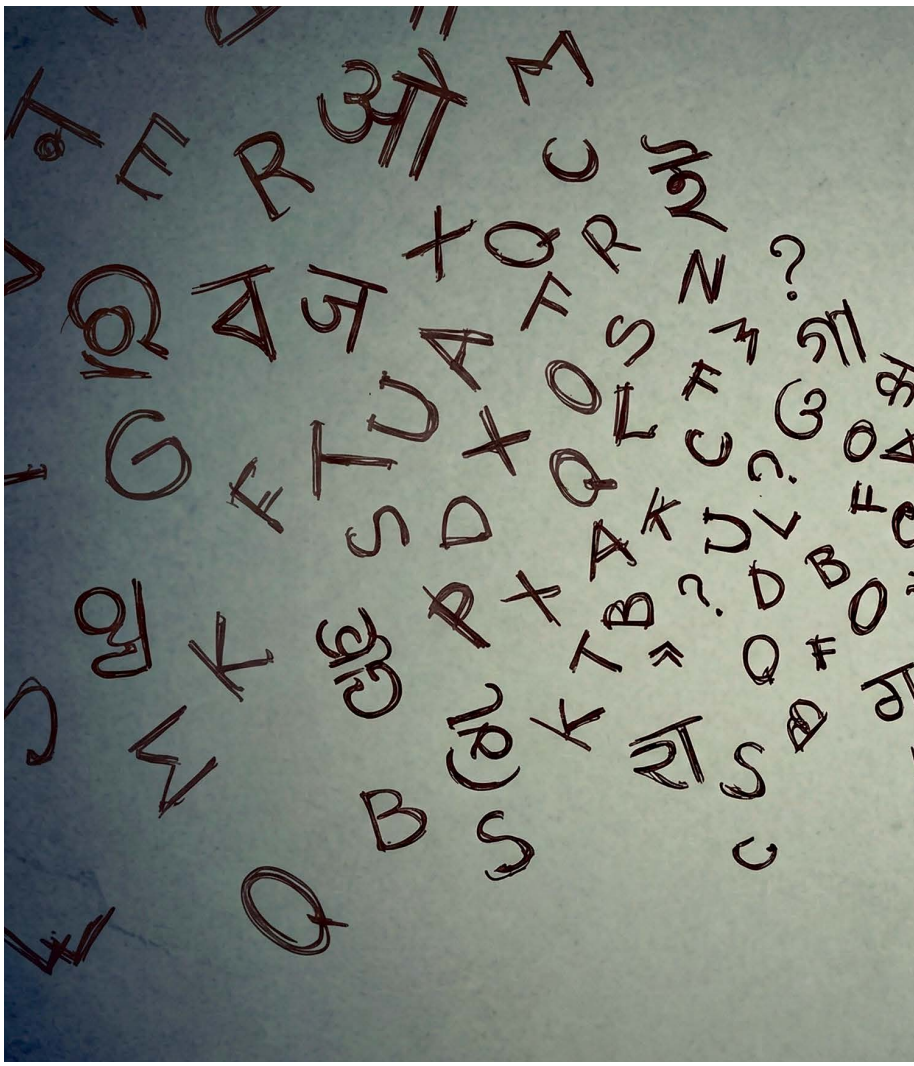
Much of today's multilingual AI rests on a seductive assumption: build powerful English models and trans-

> VERNACULAR AI DETERMINES WHO CAN STEP ONTO THE PLATFORM. A SYSTEM THAT **WORKS FLAWLESSLY IN ENGLISH BUT FALTERS IN INDIAN LANGUAGES** QUIETLY REPRODUCES EXCLUSION AT SCALE

late everything else. This approach works passably for global consumer applications. In India, it breaks down. Translation treats language as text. India speaks in context.

Consider a health query phrased by an ASHA worker in colloquial Hindi: "*Bachcha doodh pee raha hai, par wazan kyun nahin badh raha*?" A literal translation—"The child is drinking milk, but why is the weight not increasing?"—captures the words, but not the intent. What she is really asking is whether this pattern signals a feeding issue, an infection, a maternal nutrition problem, or the need for escalation. A generic translated response may return growth charts or calorie norms—technically correct, but practically useless.

In the field, meaning lives between the words: in tone, in what is left unsaid, in shared assumptions about age, diet and risk. Translation flattens uncertainty into text and strips away the conversational cues that guide real decision-making. The response sounds fluent. The advice feels confident. And yet, the system has misunderstood the question that mattered. In high-stakes domains such as healthcare, governance or education, this is not a technical limitation. It is a safety risk.



TAKEAWAYS

- **AI4Bharat proved that Indian languages can be treated as first-class citizens in modern AI systems, built and deployed at scale**
- **Bhashini operates as the language layer of India's digital public infrastructure, offering shared APIs and services for speech recognition, translation etc.**
- **BharatGen and Sarvam AI aim to build large, multilingual and multimodal foundation models rooted in Indian data, scripts and use cases**

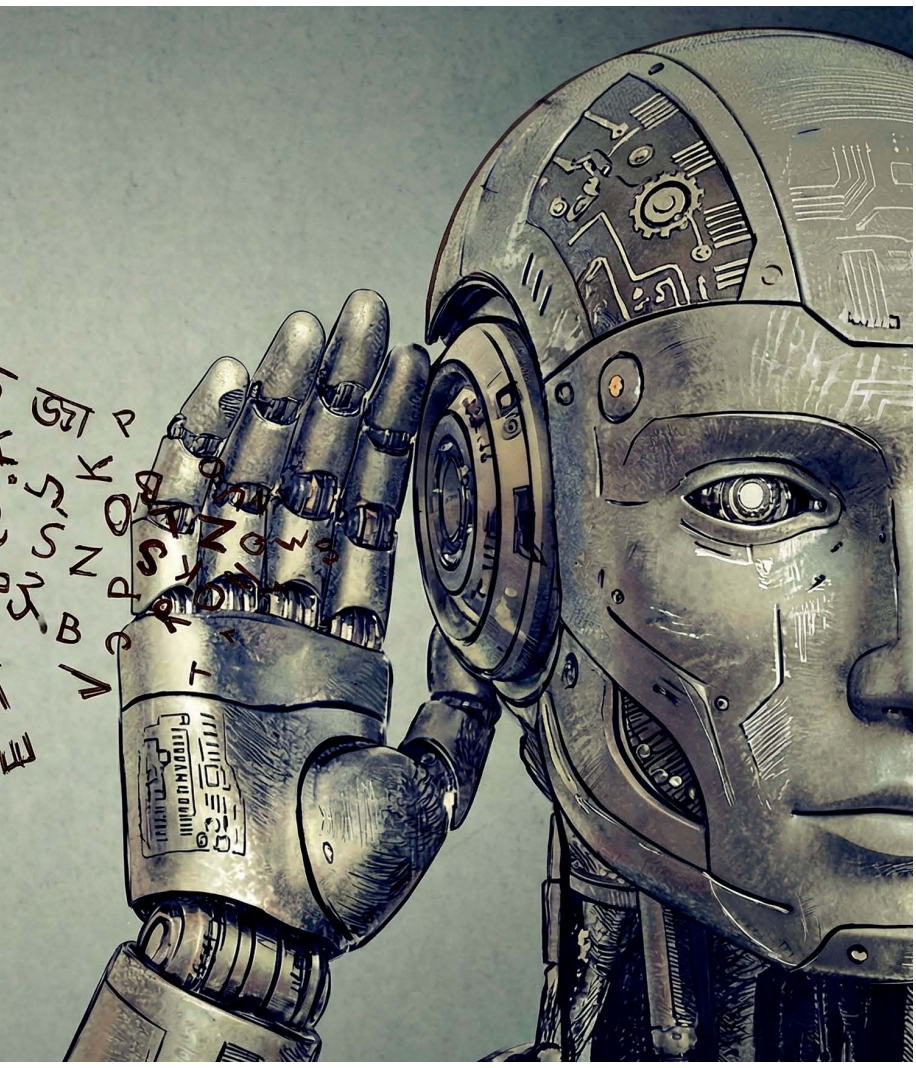
Building Foundations

This realisation has begun to reshape how language AI is imagined in India—not as a feature to be bolted on, but as shared infrastructure that must work across languages, regions and contexts. This shift is now being formalised through national efforts such as the IndiaAI Mission, which places language capability, compute, and public-interest deployment at the centre of India's AI strategy. But Indian-language AI did not emerge from a vacuum.

Over the past few years, AI4Bharat has played a pivotal role in changing how Indian-language AI is built and deployed. Its most important contribution has been to demonstrate—through data and models, not rhetoric—that Indian languages can be first-class citizens in modern AI systems. By releasing large-scale, open datasets across text, speech, translation, OCR and text-to-speech for all 22 scheduled languages, AI4Bharat helped dismantle the argument that Indian languages lack scale or relevance.

If AI4Bharat helped prove that Indian-language AI could be built at scale, Bhashini is about ensuring it can be used at scale. Conceived as a national language technology platform, Bhashini functions as the language layer of India's digital public infrastructure (DPI), providing shared APIs, datasets and services for speech recognition, translation, text-to-speech and OCR across Indian languages. Rather than a single application, it acts as an enabling backbone, allowing govern-

Illustration by **NILANJAN DAS / AI**



ment platforms, startups and developers to plug vernacular language capabilities into citizen-facing services.

This approach has drawn global attention. The Gates Foundation, for instance, has framed vernacular language technologies—across voice and text—as foundational enablers of inclusive AI in health, education, agriculture and government services. By supporting these capabilities as digital public goods, the emphasis shifts from isolated applications to long-term capacity-building—an approach that mirrors India's own DPI trajectory. Yet scale has also revealed how incomplete India's linguistic maps remain.

Through initiatives such as RESPIN and Project VAANI at IISc's SPIRE Lab, researchers have begun to address one of the deepest gaps in Indian-language AI: the absence of large-scale, representative speech data. These efforts have collected and transcribed speech across hundreds of districts, including languages not even listed in the Census—Agariya, Angika, Bajjika, Bearybashe, Malvani, Paniya, Shekhawati and Sylheti—capturing voices that formal datasets long ignored. Supported by a consortium of partners, including Google, Project VAANI reflects a simple recognition: India will not type its way into AI adoption—it will speak its way in.

But listening is only the first challenge. Understanding is harder. Transcribing Indian-language speech is skilled, interpretive work. Two transcribers often disagree—not because one is wrong, but because variation is intrinsic. Designing evaluation frameworks that respect linguistic diversity rather than suppress it remains one of the hardest problems in vernacular AI.

This is where safety comes sharply into focus. Community-centred efforts such as Karya make the limits of fluent-but-fragile AI especially visible. Karya works with communities across India to build high-quality language datasets, treating contributors as knowledge workers and paying them fairly. Teams working at another initiative, Soket.ai, supported through the IndiaAI Mission, encountered a reality that global systems often overlook: the internet captures only a thin slice of how Indians actually speak. Noise, code-mixing, unstable networks and low-end devices are not edge cases; they are the norm. In India, voice systems succeed not by impressing in demos, but by not breaking in the field.

Responsible AI

At the frontier of scale sit efforts such as BharatGen and Sarvam AI, signalling that India is no longer content with adapting global models. These initiatives aim to build large, multilingual and multimodal systems grounded in Indian data, scripts and use-cases, particularly for governance and citizen services.

As models grow more powerful, stewardship becomes essential. AI Kosh, another pillar of the IndiaAI Mission, is envisioned as a secure repository of curated datasets, models and benchmarks—enabling reuse while embedding safeguards around consent, privacy and accountability. In a country where language data carries deep social signals, such infrastructure is not overhead; it is protection.

By 2026, vernacular AI systems are likely to move from advisory tools to decision-adjacent infrastructure—embedded deeper into welfare delivery, healthcare triage, grievance redressal and local governance. Voice-first assistants will not just answer questions; they will flag risks, suggest next steps and escalate uncertainty.

Seen in this light, ASHABot is not just an early success. It is a preview of the future. Systems like ASHABot matter not because they always have the right answer, but because they are designed to listen, to reason aloud, and to support—not replace—human judgement. In India, the future of AI will be decided not by how confidently it speaks, but by how carefully it listens. ■

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By **T.M. Krishna**

ARTIFICIAL PERFECTION

AI MAY PERFECT FORM AND STYLE BUT IT LACKS THE SOCIAL INTERACTIVITY BETWEEN THE ARTIST AND HIS EXPERIENCE THAT GIVES ART ITS ETHICAL AND EMOTIONAL HEFT

Just the mention of the letters 'AI' generates a varied set of reactions, ranging from unlimited admiration to deep concern. Though everyone agrees that Artificial Intelligence is a product of the human mind, and debates about its ethical use are rife, we often endow AI with a mind of its own. Irrespective of whether a person loves or hates it, there is a subconscious acceptance that AI is a being of its own accord. This is obvious in the vocabulary we use and the tonality with which we address AI. This distancing allows human beings to disown responsibility for AI. But, as Nobel laureate Roger Penrose has long argued, the expression 'artificial intelligence' is a misnomer. We have created a very sophisticated learning computer, which does not have consciousness. Hence, it cannot possess intelligence. Without going into the debate about how intelligence is connected to consciousness, let me just say that it is important for us to remember that there is something unique about us, organic beings who recognise and understand the self.

As artists, our explorations always wander in the realm of the emotional. We conjure ways and means of abstracting the real world in sound, colour, movement and word. In doing so, we provide a dispassionate, yet intense, sense of reality. We do not stop with just that. We also suggest imagined possibilities and let the receivers take it further in their own minds. Technologies have always aided this endeavour. Paint brushes and musical instruments enabled artists to create these illusions. With the advent of digital technology, newer tools were made. And these, unlike their predecessors, completely altered the way art was even thought of. Art began to change in a manner that human beings did not expect. In the case

AI IS THE **WORLD'S BEST-KNOWN FORGER.** WHEN AI IMITATES ARTISTS, IT GIVES US WHAT WE BELIEVE IS AN IMPROVED VERSION OF THE ARTIST. THE TRUTH IS **WE ARE ALL DISSATISFIED WITH OUR PERCEPTIONS OF OURSELVES**

Illustration by **NILANJAN DAS / AI**

of music, from a time when listeners enjoyed exactly what the musician offered, we moved to a place where the gap between what the musician rendered and what was finally packaged for the listener widened. Digital technology enabled the alteration of music before the audience heard it. At one time, this was only possible in a recording studio. Now, this technology is sophisticated enough for it to be employed in a live concert. This led to the cleansing of those beautiful accommodations that occur naturally during the making of music.

When Tools Decide

AI has lifted digital technology to the stratosphere. It does not just make me sound better or art look prettier. It decides how I should sound, and makes those decisions on my behalf. Bizarrely, it can become me or somebody else and even manifest art that is imbued with the sensibilities of many artists. As you may have noticed, I seem to be falling into the trap I had warned you about when I began the piece. I have made AI an independent being. In order to stop myself from doing so, let me pose a question. In art creation, what do we seek from the use of AI? Simply put, we want to be the best edition of ourselves. We do not want the world to know our art with our flaws and aberrations. We also want elements that we do not possess. Those things that make us envious of another artist! With all this, we want to create a product that is creaseless, unreal and sanitised, devoid of any human-ness.

What AI takes from each artist is technique and signatures. As we know, forgeries are often 'better' than the original. AI is the world's best-known forger. When AI imitates artists, it gives us what we, as a collective society, believe is an improved version of the artist. In this artificiality lies a truth. We are all dissatisfied with our perceptions of ourselves. And somehow, we have been convinced that AI will fill that vacuum. We do not seek perfection, but a synthetisation. More than wanting a robot to execute our orders, we want to be able to perform like a robot.

AI performs this task stupendously well and, with its quick learning ability, builds on our aspiration for the processed by artificially creating colours, designs, tunes, pictures and stories that take us further down its path. I am told that AI can, if asked, replicate even our artistic imperfections.

TAKEAWAYS

We endow AI with agency, forgetting that true intelligence and consciousness remain uniquely human

Soon, artists may be compelled to make art that fits the 'AI' bill—an inversion of the power balance between machine and artist

In a world AI has decided for us, art won't ruffle feathers, challenge beauty. In other words, art will be dead

This, then, raises an existential question. Is there anything exclusively human in art? I do not have a definitive answer, but I can say that being an artist is not just about creating enjoyable, pretty art objects for other people to savour. Art is a conscious act with an intentionality that comes from a deeply ethical place. It is not about the end product, nor is it concerned with reception. The artist experiences something intangible while making art. In that intimate dialogue between the canvas and the painter, the notes and the musician, the movement and the dancer, art exists. The social interactivity of art is determined by this experience that every artist undergoes. Once this is destroyed, the art object is soulless and has nothing to share with the receiver.

The Receiving End

The audience, on its part, has to ask itself a similar question about what it means to engage with art. Consumption cannot be their driving force. They need to realise their own inextricable relationship with art. A relationship that is not defined by pleasure. Art does not exist in isolated suspension; it is the creation of the artist. Which means, every art experience is one in which the artist—whether present or not—is in conversation with the receiver. Severing this connection negates a fundamental aspect of art, which is communion. Audiences have to think about what they carry within when they watch a person sing or dance, or when an artist expresses their deepest feelings. Only such questions can lead us to any clarity about whether or not art by artists matters.

A world engulfed in AI is morphing all of us. As AI continues to learn and generate spotless and captivating 'art-like' art, our sensory perception is getting more attuned to what AI produces. Soon, artists will need to make art that fits the 'AI' bill. Which is an inversion of the power balance between the machine and the artist. But it does not end here. We will begin to view the world through the prism of what AI has decided is our world. Human behaviour will conform to the demands of the contrived. Homogenisation will be preferred. We might be happy in such a world, and still continue to do all the things we do today, but our relationship with each other and the natural world will be tuned to algorithmic computations. In such a world, art will not ruffle feathers, demolish conformism, challenge beauty and demand imagination. In other words, art will be dead. ■

T.M. Krishna is a musician, author, activist and public intellectual

FUTURE TRENDS AI

MOVIEMAKING

By **Shakun Batra**

WILL A ROBOT WRITE **THE NEXT SHOLAY?**

THE FEAR THAT AI WILL REPLACE STORYTELLERS IS REAL, BUT MOSTLY IT WILL REVEAL WHO REALLY HAS SOMETHING TO SAY, AND WHO IS RELYING ON STYLE PASSED OFF AS SUBSTANCE

Illustration by **NILANJAN DAS / AI**

The first time I watched an AI-generated film, my reaction was somewhere between "Wow, that's wild" and "Wait, are we in trouble?" It was beautiful, surreal, and oddly hollow. Like a dream where the camera moves expertly and captures beautiful shots but no one looks like they have a soul.

That's kind of where I'm at with AI and filmmaking right now. Caught between awe and anxiety. And I'm okay with that. Because let's be honest, we've never seen a shift like this before. Not just in how movies are made, but in who gets to make them, how fast and with what kinds of tools.

I'm not here to make grand predictions. I'm just a filmmaker trying to make sense of a rapidly changing room while still carrying the same compass I've always had: telling the story honestly, telling it well and, if I'm lucky, moving someone. I've always said this: filmmaking is just the format; storytelling is the profession. Some people use a pen, some a stage. I happened to pick a camera. And now, increasingly, I find myself typing prompts into AI tools and watching images materialise on screen like a magician pulling rabbits from very, very well-trained algorithms.

And, yes, it's weird. I'm used to being on set with 100 people, lights buzzing, walkie-talkies crackling, chai being passed around. Now I'm sitting in a quiet room with my laptop, asking a machine to imagine a car chase in the Himalayas, without ever touching a camera. It's bizarre. But strange isn't always bad.

What I'm learning is that AI doesn't replace creativity, it just challenges our orthodox definitions of it. It gives you options, sometimes too many at once. It speeds things up. It lets you experiment with ideas you wouldn't otherwise have the budget for. But it doesn't give you meaning. It doesn't know why that character needs to pause before answering.

It won't tell you when to linger in silence, or when a glance says more than dialogue. That's still on us, and I think it always will be. The fear that AI will replace storytellers is real, but in most cases, it'll just reveal who actually has something to say and who is relying on style passing off as substance.

No Need For a Crew

The most exciting part of AI, especially for Indian filmmakers, is access. The ability to start. To build a mood board, previsualise a sequence, test an idea without waiting for a studio to greenlight your pitch. This could genuinely democratise filmmaking. I've seen young storytellers already using these tools to shape their voice in new ways. It's exciting, it's raw and it's scrappy in the best possible way. The flip side? We're going to get flooded with content that looks good but says nothing. Most call it 'AI slop': competent visuals, generic emotion, no soul. The challenge is going to be separating signal from noise, craft from output.

Another tricky bit: most of these tools are trained on global (read: western) data. That means early outputs often don't reflect Indian faces, bodies, textures and rhythms. A lot of what I saw in early tests felt... off. Like watching a Hindi scene filtered through a Scandinavian art film. But that's not a reason to opt out. If we don't shape these tools, they won't reflect us. Indian filmmakers, artists, designers—all of us need to be part of the training process, which includes feeding data from our films and stories. Only that will shape a more authentic output. That's the only way these tools will evolve to handle our visual language, our emotional logic.

The Ethical Questions

Recently, there was that whole thing about an AI-generated alternate ending to *Raanjhanaa*. It raised some real questions: can people just remix someone else's film? Who owns that version? And what happens when a machine starts rewriting our past? I don't think that's the future we want. At Jouska, my studio, we've been exploring AI workflows, but we're also asking the hard questions: where are the ethical lines? Who gets credit? What's fair use, and what's theft in disguise? If this is going to grow, we need thoughtful guardrails that protect creativity without killing experimentation.

Where does that leave us? I don't have all the answers. I'm figuring it out as I go. Some days I'm excited by the possibilities, some days I just miss the messiness of a real shoot. But I do believe this: I'm going to just try to stay curious about what's possible in storytelling. In the end, the story still matters. The emotion still matters. And as long as we keep that at the centre, I think we'll find ways to use these tools not to replace the magic of cinema but to find new spells we didn't know we could cast. ■

Shakun Batra is the Founder of Jouska Films and the director of Gehraiyaan *(2022),* Kapoor & Sons *(2016) and* Ek Main Aur Ekk Tu *(2012)*

TAKEAWAYS

- **AI won't replace creativity, it will expand horizons, allow experimentation and democratise filmmaking**
- **Since most tools are trained on western data, Indian filmmakers will have to step in to evolve our visual language**
- **Copyright dilemmas are crucial to address, with guardrails that protect creativity without killing experimentation**

WHAT AI WON'T TELL YOU IS WHEN TO LINGER IN SILENCE, WHEN A GLANCE CAN SAY MORE THAN WORDS. THAT'S STILL ON US, AND I THINK IT ALWAYS WILL BE. WE HAVE TO **SEPARATE SIGNAL FROM NOISE, CRAFT FROM OUTPUT**

IndiaContent

SEARCH FOR EDITORIAL IMAGES ENDS HERE

LEISURE

THE LISTICLE: MUSICAL PERFORMANCES *PG 67*

Q+A: WITH FILMMAKER GURINDER CHADHA *PG 68*

EXHIBITION ▶

THE BOTANICAL ROOTS OF EMPIRE

AN EXHIBITION OF COLONIAL BOTANICAL ART AT LONDON'S KEW GARDENS GIVES INDIAN ARTISTS THEIR DUE

FLORA INDICA is on display at the *Royal Botanic Gardens at Kew, London, till April 12*

BOTANIST, CURATOR, DETECTIVE Dr Henry Noltie is a leading expert on Indian botanical art

HARDIK CHHABRA

T

The story of empire is the story of humans—that is how it is taught and generally understood. But what if it is, in fact, the story of plants? Poppies, pepper, nutmeg, cotton, tea—the British Empire was powered by plants. This botanical perspective is in fascinating focus at the Shirley Sherwood Gallery of Botanical Art at the Royal Botanic Gardens at Kew, London, currently.

Flora Indica: Recovering Lost Histories of Indian Botanical Art is an exhibition of 52 works by Indian artists between 1790 and 1850. They represent a tiny proportion of the more than 7,000 in Kew Gardens' unique archive commissioned by representatives of the East India Company. It has been put together by one of the world's leading experts on Indian botanical art, Dr Henry Noltie, and Hyderabad-based scholar and curator Dr Sita Reddy. I talked to them about how they had arrived at this particular selection, and what a story they were trying to tell.

THE EXHIBITION COMPRISES 52 WORKS BY INDIAN ARTISTS BETWEEN 1790 AND 1850. IN ALL, KEW GARDENS HAS 7,000 SUCH WORKS

"Easier to say what we left out," says Reddy, "there was such an embarrassment of riches." They decided to concentrate on North India, and largely to avoid well-known medicines and spices, selecting only works that held the richest and most layered stories: botanical, sociological and historical. And crucially, to bring these hitherto unknown artists out of anonymity and name them.

The exhibition is arranged in four softly lit galleries, the first of which is simply called 'The Artists' Room'. There was scant information to go on, but with forensic detail and painstaking cross-referencing, Noltie has been able to identify no fewer than 21 largely unknown Indian artists. It is almost as if these shadowy figures—Lutchman Singh, Kareem Bux, Kasim Ali and Vishnuprasad, Bhagoban Chaterjee and Ramanath Banerjee and others—step into the light to stand by their work two centuries later. The exhibition also includes the work of one unnamed artist, in acknowledgement of the many who still remain unnamed and unknown.

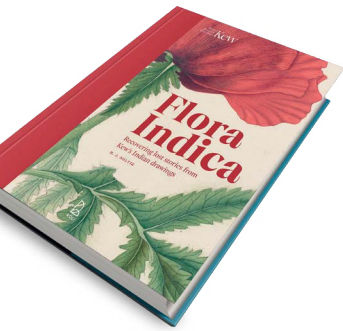
The next two rooms showcase the botanical gardens in Calcutta and Saharanpur, with the last room dedicated to Bihar, Awadh and Bengal and the paintings commissioned by Scottish surgeon Adam Freer (1793-1820) and the French soldier Claude Martin (1790s).

Each painting deserves close attention. The 'exquisite stylisation of the infloresence' of vetiver (*Chrysopogon zizanoides*) had me gazing, in awe, for several minutes. The curators believe this work was made between 1826 and 1832 by an unknown artist; the Devanagari script notes it was drawn in Karnal and is known by the local name *pamni*.

In the two glass display cases, you get a three-dimensional sense of the collection—plates from the original books, the painting of the plant alongside the dried, preserved original specimen. In one, there is an astonishing find—discovered by Henry Noltie—of a painting with a pop-up flap. The original painting of a pine (*Pinus gerardiana*), possibly by Vishnuprasad, did not have a cone, so the artist added one later, attaching it with two folded paper straps, aligning each pine needle with incredible precision.

It is difficult to get one's head around the sheer scale of Noltie's undertaking in delving into the archive to recover and reorder this vast collection. "When a collection came into Kew, the only interest in it was taxonomic.... All the paintings were dispersed." Paintings which had two different species on one sheet—such as the Himalayan balsam—were cut up and filed separately. Thanks to Noltie's combination of botanical knowledge, curatorial skill and dogged detective work, severed paintings have been made

whole, collections reassembled and individual artists reunited with their works. "It's a combination of detective work, botany, art history, archive work, translations...it all comes together," he says. Reddy underlines the importance of this: "There's nobody who would be able



FLORA INDICA
Recovering Lost Stories From Kew's Indian Drawings
By Henry Noltie
ROLI BOOKS
₹2,495; 224 pages

to do that with Indian botanical art. We call it 'Henry's method'."

Flora Indica is a superb exhibition, and one that they hope will travel to India. Working around the financial, logistical and conservation constraints, they intend to have the works printed in India as high quality giclée facsimiles. This, for them, is not simply an artistic ambition, but a moral and political one: an act of restorative justice, decolonialising botanical art history and going some way to finally giving these Indian artists—and their beloved plants—their due. ■

—Anita Roy

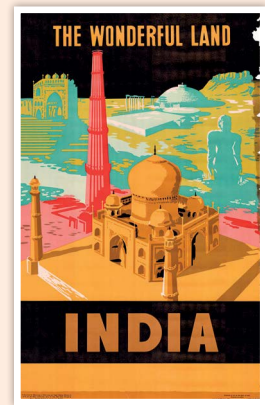
EXHIBITION ▶

Travel Dreams, Hand-Drawn

AN EXHIBITION AT GURUGRAM'S HERITAGE TRANSPORT MUSEUM TRACES HOW HAND-DRAWN POSTERS SHAPED INDIA'S TRAVEL IMAGINATION

Decades before social media gave us the travel bug, India learned to dream of distant places through posters pasted at railway stations, airline offices and shipping terminals. An exhibition at Gurugram's Heritage Transport Museum, titled *Posters That Moved India*, celebrates those forgotten visuals.

Drawn from founder Tarun Thakral's personal collection, it traces how travel in India was once imagined, marketed and sold—through hand-drawn railway posters, early aviation imagery, shipping advertisements and tourism promotions from the 1930s to the 1970s. "I am very fascinated by posters on paper," says Thakral, pointing to their individuality. "Artists used to paint these by hand, with illustrations and typography, before they were converted into posters."



MANY POSTERS PROMOTED RAIL TRAVEL, WHILE OTHERS HIGHLIGHTED PILGRIM ROUTES AND TEMPLES

Many works promoted rail travel, while others highlighted temples, pilgrimage routes and regional landmarks. Some posters, created for foreign audiences, adopted an Art Deco aesthetic, selling India through romanticised nightscapes or stylised street scenes. Yet others brought far-flung places like Europe into the Indian imagination, offering glimpses of ocean liners and modern lifestyles.

Air India's iconic advertising forms a key section here. Under advertising chief Bobby Kooka, the airline pioneered humour-led visual storytelling through its Maharaja mascot.

After its run at the museum until February 28, Thakral plans to take the exhibition to other cities. For now, it sits naturally within the larger ethos of the Heritage Transport Museum, India's first transport museum. It was built, Thakral says, to be "a visitor-centric attraction", where "everything is a story and a conversation piece", With *Posters That Moved India*, that philosophy finds one of its most evocative expressions yet—using fragile paper and forgotten ink to show how a country once learned to imagine movement, modernity and the promise of elsewhere. ■

–Satarupa Paul

THE THIRD EDITION OF BLR HUBBA PROMISES **350-PLUS EVENTS** ACROSS A GAMUT OF CURATED SUB-FESTIVALS

FESTIVAL

HULLABALLOO IN THE GARDEN CITY

BLR Hubba, a 10-day cultural extravaganza, is all set to sweep Bengaluru

Bengaluru often hits the headlines for its IT parks, pub culture and jam-packed roads. However, from January 16-25, the city is all set to paint a different narrative as the third edition of BLR Hubba will take over its streets and cultural spaces. Organised by the collaborative platform UnboxingBLR, the 10-day celebration promises 350-plus events through a gamut of curated sub-festivals such as 'Thindi Hubba' (food), 'Kala Hubba' (visual arts), 'Makkala Hubba' (children) and 'Rasthe Hubba' (streets), among others.

The festival will unfold at over 30 venues from iconic cultural spaces like Freedom Park, Sabha, Panchavati, Bangalore International Centre, MAP and National Gallery of Modern Art to neighbourhood sites in areas like Sadashivanagar and Basavanagudi.

The idea for BLR Hubba took shape from a 2023 book project called 'Unboxing Bengaluru' by Malini Goyal and Prashanth Prakash. "Cities around the world actively document and celebrate their cultural legacy, but Bengaluru, as a fast-growing tech and migrant hub, is experienced very differently. It needed something more alive and participatory, which is what led to the 'habba'," says Malini, co-founder and CEO of UnboxingBLR.

By blending 'hub' and 'habba' (the Kannada word for festival), BLR Hubba reflects a city that is at once globally connected and joyfully rooted in local culture. "We were inspired by cities like Edinburgh, which has left an indelible imprint on the global map thanks to the Edinburgh Festival Fringe, one of the world's top arts festivals," says V. Ravichandar, chief facilitator of the event. He highlights Anubhava Hubba, an immersive programme of multi-sensory experiences curated by several artists.

BLR Hubba also promises a dazzling line-up of musical acts through Kantha Hubba. Drawing its name from the Bengali word 'Kantha', which refers to interwoven strands of fabric, this segment will celebrate

ART 'N SOUL From left, Moitra and Chakraborty; a Koodiyattam performance of *Mrcchakatikam*; (bottom) guitar legend Marty Friedman

the richness and diversity of Asian music. The headlining acts include Marty Friedman (former lead guitarist of 'Megadeth'), The Manganiyar Seduction, Indian Ocean and Swarathma, among others. Fusion music-lovers can also enjoy the collaboration between Hindustani artiste Kaushiki Chakraborty and music composer Shantanu Moitra. "Another interesting part of Kantha Hubba is 'Bands Galore', a battle of the bands through which the opening acts have been shortlisted," elaborates Ravichandar. ■

—Deepa Natarajan Lobo

(For details, go to blrhubba.in)

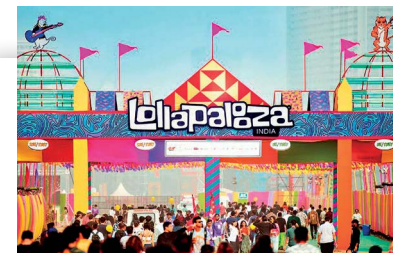
THE LISTICLE

Upcoming musical performances you should not miss

▲ **JAN. 23** | **From Zero World Tour 2026** | *Brigade Innovation Gardens, Bengaluru*

Linkin Park

The standalone show will blend material from their chart-topping new album with the era-defining tracks that shaped generations. Designed as a fan-first concert, the Bengaluru stop promises a night of unfiltered energy and connection.



▲ **JAN. 24-25** | **Mahalaxmi Race Course,** *Mumbai*

Lollapalooza India 2026

Lollapalooza India returns for its fourth edition, scaling up as the country's biggest multi-genre music festival. Top-billed acts include American rock giants Linkin Park, hip-hop star Playboi Carti, R&B singer-songwriter Kehlani, and genre-bending Brit rock artist Yungblud, alongside over 40 other artistes.

▶ **FEB. 7-21** | **Jamshed Bhabha Theatre,** *NCPA, Mumbai*

SOI Spring 2026 Season

The Symphony Orchestra of India launches its Spring 2026 season with concerts led by Martyn Brabbins and Carlo Rizzi. Also featuring mezzo-soprano Sarah Connolly and tenor Davide Giusti.

▶ **JAN. 19-25** | **Navagraha Symphony & Shanti Priya Ballet** | *Multi-City India Tour*

Lakshminarayana Global Music Festival 2026

The symphony premiere features Dr L. Subramaniam, Kavita Krishnamurti and others alongside the Shanti Priya dance ballet by Gakku Dance Ensemble. Tour includes Chandigarh, Kolkata, Chennai and Bengaluru.

◀ **JAN. 23** | **The Avenoir Tour 2026** | *The Piano Man, Delhi*

Calum Scott

Calum Scott, the multi-platinum singer, returns to India for a long-awaited Delhi show. Following his sold-out 2024 performances, Scott brings 'Avenoir', his latest and most personal album yet. Expect a moving evening of raw emotion, soaring melodies, and storytelling that flows from hushed ballads to cathartic anthems.

Compiled by Nikhil Sardana

Q+A

A Blend of East & West

Filmmaker ***Gurinder Chadha*** *on* Christmas Karma, *a multicultural adaptation of Dickens's* A Christmas Carol

GETTY IMAGES

Q. Looking back from *Bhaji on the Beach* to *Christmas Karma*, how do you see your journey?

I feel like I've been chronicling our histories, with each film being a document of its time on identity, migration and belonging. The industry has changed, and there are more women now, which is encouraging, but our stories still fight for space. Even today, getting a film made feels like a small miracle.

Q. Was filmmaking your childhood dream?

Absolutely not. I wanted to be a long-distance lorry driver! I loved the idea of being alone on open roads, in charge of a massive truck. The real turning point came when, as a student, I interned in Delhi at a magazine and read a powerful paper on how Indian women were portrayed in the media. The representations were so clichéd that they shook me. That's when I knew I wanted to get behind the camera and change those narratives myself.

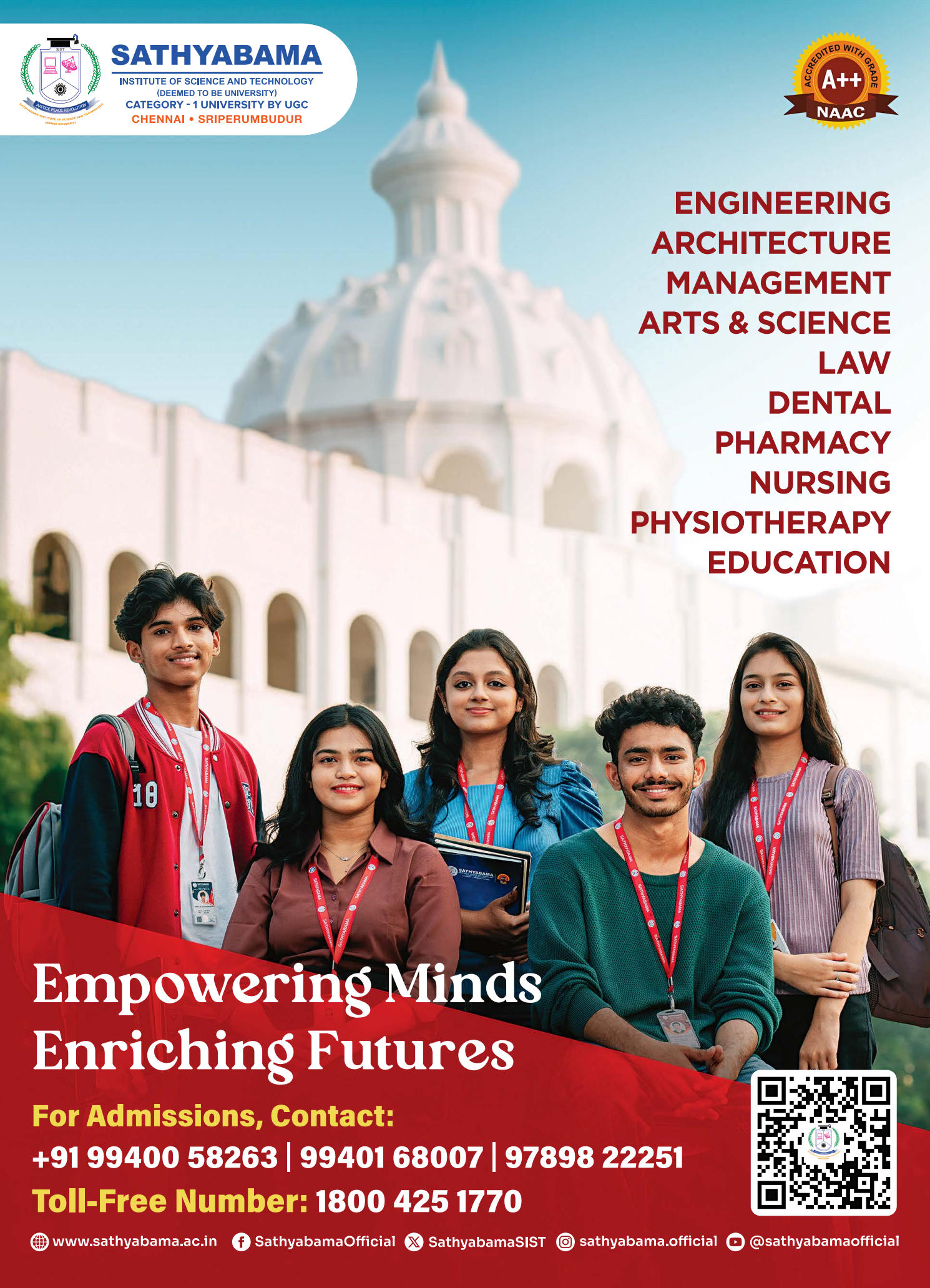
Q. Why did you reimagine *A Christmas Carol*?

I wanted to make a holiday film rooted in compassion and redemption. I've always loved *It's a Wonderful Life*, which also draws from Dickens. I went back to the source, but placed it within a painful historical chapter—the expulsion of Indians from Uganda in the 1970s and their resettlement in Britain.

Q. How was it to work with such an extraordinary international cast?

Actors like Kunal Nayyar, Eva Longoria and Boy George were an absolute joy. Shaznay Lewis, who worked on *Bend It Like Beckham*, composed original music. We had Panjabi MC, Anoushka Shankar, Gary Barlow, Boy George, Malkit Singh, as well as Priyanka Chopra, singing songs.

—with ***Deepa Natarajan Lobo***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