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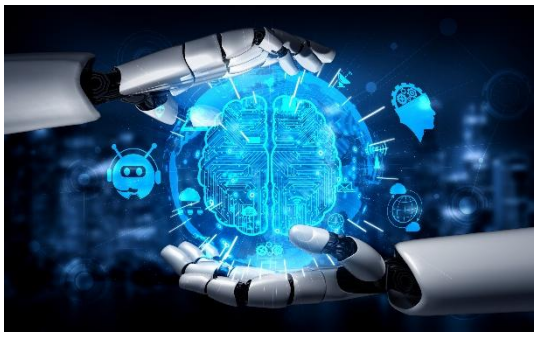
Published in Fortune India
Feb 06, 2025

India's AI ambitions: Are we really falling behind the U.S. and China, or i the picture more complex?



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Article Content:

As India accelerates its AI efforts, questions arise on whether it's lagging behin the U.S. and China or if its unique strengths offer a different path forward.

OpenAI CEO Sam Altman's latest visit to India has reignited discussions on the country's position in the global artificial intelligence (AI) race. His remarks-acknowledging India as OpenAI's second-largest market and walking back his past skepticism about India's ability to build large language models (LLMs)-suggest a notable shift in perception.

This visit, Altman's second after 2023, comes at a time when India's AI ecosystem is rapidly evolving. The government has rolled out policy initiatives like the IndiaAI Mission, and private AI investments have surged. However, his trip also coincides with the emergence of DeepSeek, an open-source LLM from China that has challenged OpenAI's dominance and raised questions about cost-effective AI development outside the U.S.

While India has made significant strides in AI adoption, particularly in healthcare, governance, and financial services, it still lags in foundational AI research, compute infrastructure, and homegrown LLMs that can compete with GPT-4 or Google's Gemini.

The ground reality: A work in progress

India has entered the AI race much later than global tech leaders, as countries like the U.S. and China have been investing heavily in AI research and infrastructure for years. OpenAI introduced ChatGPT in November 2022, setting off a generative AI revolution that spurred intense competition among global Alabs. In China, DeepSeek AI, which recently launched its open-source LLM, had already been in development for over a year before its public debut. Meanwhile, India is only now beginning to scratch the surface of a vision for building a globally competitive AI infrastructure, with efforts like the IndiaAI Mission still at an early stage.

Despite this, India's momentum in the AI space is growing, driven by a rapidly expanding startup

ecosystem and government-backed initiatives. While the country may lag behind in foundational AI research and large-scale compute capabilities, it is gaining ground in AI-driven applications across industries.

"India is emerging as a strong player in the global AI space. According to Stanford University's Global AI Vibrancy Tool, the U.S. leads in AI innovation, followed by China. India stands at fifth place, behind the UK and UAE. In terms of private investment, the U.S. attracted $67.2 billion in 2023, while India brought in $3.24 billion, making it fifth globally for AI investments," says Devroop Dhar, Co-founder and Managing Director, Primus Partners.

Dhar attributes India's AI growth to its vast talent pool and a growing ecosystem of over 4,500 AI startups, according to NASSCOM data. He also highlights government efforts, including Digital India and the IndiaAI Mission, which has been allocated ₹2,000 crore in the recent budget to promote research partnerships, infrastructure development, and AI adoption in sectors like healthcare, agriculture, and education.

Building India's AI infrastructure: Beyond GPUs

As India works to establish itself as a global AI hub, the IndiaAI Mission has emerged as a key policy initiative aimed at strengthening the country's AI infrastructure. The government has recognized the need for high-performance computing to drive AI innovation and has successfully managed to empanel over 18,000 high-end GPUs to power AI research, enterprise applications, and public-sector AI adoption. "India's AI ecosystem is rapidly evolving, and there is strong momentum toward building a globally Competitive AI industry. The government has already taken significant steps by prioritizing AI infrastructure, expanding semiconductor manufacturing, and investing in sovereign AI compute capabilities. Training and deploying large AI models require substantial computational power, and ensuring continued advancements in AI hardware accessibility will be key to scaling India's ambitions," says Sunil Gupta, Co-founder, CEO & MD, Yotta Data Services.

While this move is expected to significantly boost India's compute capabilities, enabling startups, academia, and research institutions to build competitive AI models, India's AI strategy must focus on other building blocks of AI infrastructure, including a comprehensive approach to connectivity, storage, and networking technologies that ensure seamless access to cutting-edge compute power.

Danish Faruqui, CEO of Fab Economics, a U.S.-based Greenfield Fab and OSAT consultancy and Semiconductor Investment Advisory firm, explains that India needs to invest in advanced computing and memory solutions. On the compute and memory side, India's AI infrastructure should aim to house NVIDIA GPUs and AM M1300x accelerators at the rack level, which faclude the most advanced 4nm TSMC Semiconductor Compute Chip and HBM 3 and 3e integrated DDR5 1-beta memory in 8- hi and 12-hi formats, cumulatively offering 3 TB/sec memory speed.

On the networking front, Faruqui highlights, "India's AI infrastructure should aim to house Datacenter Interconnects (DCI) infrastructure components for both within data centers and inter-data-center connectivity from PAM4 (Spica Gen 2 (5nm) 800 Gbps PAM-4 with integrated TIA (Trans-impedance Amplifier)) and Coherent DSP's to custom ASIC solutions for routing, switching, and compute offload. In addition to aiming for housing Analog Integrated solutions via DSP Centric Digital Front End (DFE) and Análog Front End (AFE) integration for optimization across front-end power consumption reduction, device, and SKU reduction." He also emphasizes Analog Integrated Solutions for power optimization and reducing hardware complexity, with Marvell and Broadcom among the leading providers in this space.

Also, large AI models, particularly LLMs; require massive data storage capacity to process and train on enormous datasets. Faruqui points to leading HDD solutions like 30 TB capacities from Seagate,

Toshiba, and WD, along with state-of-the-art SSD solutions from Micron and Samsung, reflecting 200+ 3D NAND integrations as some of the critical components of India's Al infrastructure.

The roadblocks to India's Al ambitions.

Despite the growing momentum around the IndiaAl Mission and the government's push for AI infrastructure, India still faces significant challenges in competing with global leaders like the U.S. and China.

One of the biggest challenges remains funding. Developing large, resource-intensive Al models like OpenAl's GPT-4 or Google's Gemini requires substantial capital and computational resources. Without higher investments in Al research, computing power, and training infrastructure, India risks falling behind as global Al innovation accelerates.

Policy delays are another concern. As Al rapidly evolves, quick decision- making is essential to ensure access to cutting-edge semiconductor technologies, cloud computing, and AI-specific hardware. A slow regulatory approach could limit India's ability to acquire or develop next-generation AI capabilities, further widening the gap with global Al leaders.

Beyond infrastructure and funding, India also struggles with data availability. Al models, particularly large language models (LLMs), rely on vast, high-quality datasets. However, India lacks diverse, high- quality data-especially in its many regional languages. This limitation makes it difficult to build inclusive Al models that cater to India's rich linguistic and cultural diversity. Without significant improvements in data collection and curation, India's Al models may lag behind those developed in English- and Mandarin-dominated Al ecosystems.

Gupta of Yotta Data Services adds, "We must treat the emergence of DeepSeek as a wake-up call. It has proved that resources should not be a constraint in building an Al model that's as good as the best in the world. I believe that India should capitalize on the fact that DeepSeek is open-source and requires fewer resources - we need to build our own models on it and fine-tune it using our data." He adds, India has some of the brightest minds in Al and machine learning, with top institutions like IITs, IISc, and leading startups actively contributing to Al research. DeepSeek shows us that globally competitive Al solutions can come from anywhere, including India.

D Talent retention is another pressing issue. India is home to a vast Al talent pool, yet many of its top researchers and engineers relocate abroad for better opportunities. The U.S., China, and even the Middle East offer superior research funding, advanced computing infrastructure, and higher salaries, drawing Indian Al professionals away. If India does not create an environment that supports Al research at scale, retaining top talent will become increasingly difficult.