India witnessing growing interest in quantum computing: IBM

'Quantum computers could open the door to new scientific discoveries, life-saving drugs, and improvements in supply chains, logistics and the modelling of financial data'

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MINI TEJASWI

Quantum requires multidisciplinary skills and IBM has the best scientists and engineers working together to improve the technology and drive applications of importance to the industry, says Sandip Patel, Managing Director, IBM India/South Asia region | Photo Credit: Special Arrangement

India has been witnessing growing interest in quantum computing, with students, developers, and academia actively participating. Consequently, the country is emerging as a talent hub for quantum computing, said Sandip Patel, MD, IBM India/South Asia region, in an interview. Edited excerpts

What are the cardinal differences between quantum and classical computing?

Quantum computing is an exciting new technology that will shape our world of tomorrow by providing us with an edge and a myriad of possibilities. Quantum computing is a fundamentally different way of processing information compared to today's classical computing systems. While today's classical computers store information as binary 0 and 1 states, quantum computers draw on the fundamental laws of nature to carry out calculations using quantum bits. Unlike a bit that has to be a 0 or a 1, a qubit can be in a combination of states, which allows for exponentially larger calculations and gives them the potential to solve complex problems which even the most powerful classical supercomputers are not capable of.

How will quantum computing provide an edge over classical computing in terms of solving mankind's everyday challenges around life and work?

Quantum computers tap into the quantum mechanical phenomenon to manipulate information and are expected to shed light on processes of molecular and chemical interactions, address difficult optimisation problems, and boost the power of artificial intelligence. Advances like these could open the door to new scientific discoveries, life-saving drugs, and improvements in supply chains, logistics and the modelling of financial data. IBM today is actively working with

major corporations and governments, to help advance their quantum roadmaps, and help grows their pool of quantum talent to make quantum computing practical for the benefit of science, industry and society.

What will be IBM India's contribution to Big Blue's global initiatives around quantum computing?

In India, we are witnessing a growing interest in quantum computing with active participation (amongst the highest) from students, developers, and academia in various initiatives like the IBM Quantum Challenge, IBM Quantum Summer School, Qiskit Challenge-India (Qiskit is an open-source software development kit built by IBM for the quantum developer community), and so on. We also have a growing community of Qiskit Advocates and IBM Quantum Ambassadors in India. Furthermore, we regularly organise India-focused programmes such as Qiskit India Week of Quantum, which celebrated women in quantum to kickstart their journeys in quantum, and was attended by almost 300 students. The Qiskit textbook is available in Tamil, Bengali and Hindi and was accessed more than 30,000 times by students in India in 2021 alone. We see India as a talent hub for quantum computing skills that is crucial for growing and maintaining such an interdisciplinary field.

Will you give us some details about IBM's collaboration with premier institutions in India to accelerate advanced training and research around quantum computing?

Academia plays an important role in building skills for any deep technology including quantum. Hence, last May, we announced our collaboration with leading educational institutions in India through the IBM Quantum Educators Programme. The faculty and students of these institutions will be able to access IBM Quantum systems, quantum learning resources and, quantum tools over IBM Cloud for educational purposes. This allows them to work on actual quantum computers and program them using the Qiskit open-source framework. In partnership with the Indian Institute of Technology – Madras, IBM conducted a course on Quantum Computing on the NPTEL platform last year, which had more than 10,000 participants. We are also collaborating with academia for joint research on quantum computing and recently, one of the research papers got accepted at a top Physics Conference.

At what stage is India in quantum computing, how long will it take to see commercialisation and where will it find mass applications?

India is poised to play a pivotal role in the quantum technology revolution globally. IBM is committed to helping India advance its quantum agenda by developing the talent and skills landscape and building an ecosystem with industry, business, academia and government. We are counting on the vibrant Indian talent and expertise to help solve some of the most pressing challenges. As per our quantum roadmap announced in 2021, IBM debuted its first 127-qubit processor. In 2022, IBM extended its quantum roadmap even further to clearly lay out how we will blaze a path towards frictionless quantum computing. This expanded roadmap includes our plans to build a 4,000+qubit processor by 2023, along with significant milestones to build an intelligent quantum software orchestration platform that will abstract away the noise and complexity of quantum machines, and allow large and complicated problems to be easily broken apart and solved across a network of quantum and classical systems. Once realised, this era of quantum-centric supercomputing will open up new, large, and powerful computational spaces for industries globally.

What is IBM's people strategy around quantum computing for Indian India?

In India, we have a strong team working across research, development, and consulting, working closely with academia, industry, and the public sector. Our team is working to support and accelerate India's national quantum mission and is participating in building a strong quantum ecosystem as that is crucial for succeeding. The team has been constantly growing to support the needs of the Indian ecosystem and is only expected to grow even further in the coming years as it supports more and more customers to take their quantum journey. We have quantum scientists and engineers around the world conducting fundamental research to improve the technology, as well as collaborating with our partners to advance toward practical applications with a quantum advantage for science and business. Quantum requires multidisciplinary skills and IBM has the best scientists and engineers working together to improve the technology and drive applications of importance to the industry.

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