Who can learn quantum computing?

Quantum computing is a revolution whose time has come

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ALOK BANSAL

Quantum Computing has the potential to impact a range of sectors including defence, healthcare, banking among others.

Be it automotive giant BMW launching a 'Quantum Computing challenge' or researchers with Google's Quantum Computing division claiming to have created "Time Crystals" using the company's Sycamore quantum computer, or The University of Tokyo and IBM Corp. initiating Japan's first commercial-use quantum computer, this is a revolution whose time has come.

Quantum Computing can solve complex optimisation issues, process information faster than conventional computers, counter cybercrime and help us to effortlessly embrace Machine Learning, AI (Artificial Intelligence) and Cloud Computing. Its impact on defence, healthcare, banking among many other industries will also be momentous.

In 2020, a *Harvard Business Review* article by quantum physicist Shohini Ghose stated that quantum physics has already changed our lives with inventions of the laser and the transistor and almost every electronic device that we use today. Quantum Computing is especially needed in the post-pandemic world to galvanise drug development, sort large volumes of data, whether we are researching climate change, exploring space, managing large organisations, trying to simplify supply chain complications or just trying to forecast weather. Quantum information is also hard to copy and would defy hackers from accessing sensitive communications .

Who can learn?

Anyone with B.E., B.Tech or equivalent degree in an engineering discipline can progress to quantum computing. An understanding of linear algebra, complex numbers, Python skills, machine learning, classical software development is a good start and there are many good online resources also to hone your skills.

Career prospects

With the Government announcing the 'National Mission on Quantum Technologies and Applications' in 2020 and promising a financial support of ₹8000 crore over a span of five years, there is an urgent need for trained professionals in the field. A trained workforce can pursue a career in MNCs like IBM and Google, academics, government research labs, in data security and defence spaces as well as fields that require scenario simulation.

There are many instructor-led online training modules in India. In June this year, IIT-Madras and IBM invited applications for a free online course on Quantum Computing on the NPTEL platform. To amplify research, IBM's Quantum Educator Programme will be accessible to faculty and students of Indian Institute of Science Bangalore, IIT-Kanpur, IIT-Kharagpur, IIT-Jodhpur, Indian Institute of Science Education & Research Pune and Thiruvananthapuram, Indian Statistical Institute Kolkata, Indraprastha Institute of Information Technology Delhi, Tata Institute of Fundamental Research Mumbai, and the University of Calcutta.

The BFSI sector

Quantum Computing can revolutionise the Banking, financial services and insurance (BFSI) sector. It can cut costs, manage a large workforce, systemise work flow and offer multiple simulation options. It can also enhance cybersecurity, protect financial data, streamline securities pricing, and assess risks and challenges yet to come via statistical probabilities. Encryption-based skills will also serve capital markets and corporate finance.

Financial institutions have to harness quantum computing in order to analyse large, unstructured data with more competence to gain better and quicker insights on improving their way of functioning. Be it customer service, processing mortgage requests, reading capital markets, unravelling corporate finance, sorting portfolio management, or staying abreast of encryption-related activities, quantum computing can be a real asset. Quantum computers can sift live data streams in real-time, address financial problems, make calculations that reveal arbitrage possibilities, employ behavioural data to improve customer engagement, and to quickly respond to the shifts in the market.

The writer is Visionet Systems India's MD and Global Head of BFSI Business.

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