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SKILLS GAP

Helping SA make a quantum leap into digital future

DR SOLOMON ASSEFA AND ABE ASFAW

SOUTH Africa was hit by the Covid-19 crisis just over a year ago and that forced companies and organisations to adapt to digital transformation.

Remote working, distance learning and e-commerce became the new normal amid the ongoing lockdown restrictions. We saw a surge in the use of IT services and solutions.

With this trend of accelerated digitisation set to increase, the urgency for Africa to address the skills gap, equipping the youth with the necessary skills to power the continent forward is vital. This will unlock new market opportunities, shape the economy and aid in economic recovery.

While Artificial Intelligence (AI) and other emerging technologies such as the internet of things (IoT) and cloud computing have been disruptive in the digital acceleration of companies. Quantum computing is also expected to stimulate the developments of new breakthroughs in science, medications to save lives, machine learning methods to diagnose illnesses sooner, materials to make more efficient devices and structures, financial strategies to live well in retirement and algorithms to quickly direct scarce vital resources such as ambulances.

In 2019,IBM Quantum revealed the expansion of its quantum computing efforts to Africa in a new collaboration with Wits University, which became the first African academic partner in the IBM Quantum Network and a gateway for academic collaboration across South Africa with 15 additional universities which form part of the African Research Universities Alliance. The goal: to enhance the skills of existing scientists and researchers.

This programme has enabled a number of milestones, for example, two students from Stellenbosch University, Unathi Skosana and Conrad Strydom, are testing small-scale quantum algorithms to understand the limitations of the quantum bits or qubits due to noise and imperfections, with the hope of providing answers about what is needed in processor performance for scaling up the algorithms for eventual applications in quantum chemistry for TB and HIV drug development.

DR SOLOMON Assefa and Professor Zeblon Vilakazi at the launch of the Wits university and IBM partnership.

There has also been an urgency to curb cyber threats and, as such,a long-term data encryption approach in South Africa would be a solution to curbing the breaches. In this regard Hjalmar Rall from Stellenbosch university uses the IBM Quantum processors to generate quantum resources (entangled states) to look at approaches that may help.

Also,in support of expanding research into the application of quantum computing, Wits is currently offering an honours level module, Full Stack Quantum Computing..

Amira Abbas from the University of KwaZulu-Natal, has recently joined IBM's quantum team in Joburg.

Abbas is the first author of two submitted papers on quantum machine learning, including a paper on quantum neural networks. With emerging technologies playing a vital part in shaping the digital economy transformation, the IBM SA quantum team is busy putting together a Quantum Challenge for African developers this year. Initiatives like this are important in ensuring South Africa won't be left behind as progress is made to explore the next frontier of computing, quantum computing. This is pivotal for Africa to remain competitive for the coming decades, and initiatives like this will assist in getting the next generation of students quantum read to enable researchers to better understand chemical reactions that will drive innovation and solve societal challenges.

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