Actuaries Institute.

Australia urged to broaden investment in quantum computing

Australia must significantly scale up public and private investment in quantum computing projects if it is to unlock the technology's full benefits, a new paper published by the Actuaries Institute recommends.

A range of quantum hardware and software is being developed in Australia amid a global race to build the world's first working quantum computer which could revolutionise the way we use data and computations.

And while some projects have attracted millions of dollars in funding from federal and state governments as well as the private sector, substantially more investment is needed in a broad range of projects, according to the Dialogue Paper*, *Introduction to Quantum Computing*.

Lead author Anthony Lowe said much of the current public investment had been directed to help US-based photonics company PsiQuantum build a working quantum computer in Brisbane.

"Nearly $1 billion is being invested by the Australian and Queensland governments in that project. But the work in this field is still very experimental," said Dr Lowe, who is an actuary, mathematical physicist and Actuaries Institute Council member.

"There are eight broad approaches to building a quantum computer, and Australia has globally recognised expertise in a number of those.

"Australia has several interesting quantum hardware development companies and teams of mathematicians and theoretical physicists at universities working on quantum algorithms. We need to invest more in a wide variety of the approaches they're taking to maximise the benefits for Australia and not get left behind."

Quantum computing is based on different mathematical principles from conventional computing. This allows quantum computers to perform certain tasks faster and more accurately.

While working quantum computers are not expected to arrive for another decade, the technology has the potential to transform complex problem solving in many areas, including pharmaceutical drug development, climate change modelling, financial services and artificial intelligence.

But while the potential benefits are huge, quantum computing also poses cybersecurity risks.

The paper supports recent calls by the Australian Signals Directorate for companies to start ramping up their cybersecurity systems to protect the personal data of millions of people from future attacks by cyberhackers using powerful quantum computers.

Dr Lowe said any organisation that holds personal data - banks, insurers, healthcare providers, retailers, and government departments - needs to act now and start planning to install quantum-resistant algorithms that will keep sensitive information safe.

"Hackers are already running harvest-now-decrypt-later style cyberattacks where they copy personal data held by a company and store it until they can access a working quantum computer," he said.

"Organisations that don't start preparing now will face significant cyber security risks in the future.

"Few organisations outside of the cybersecurity industry appreciate that transitioning to new encryption standards to protect people's data will be a long time-consuming process. The time to act is now."

Read the Paper.

Anthony Lowe is available for interview.

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