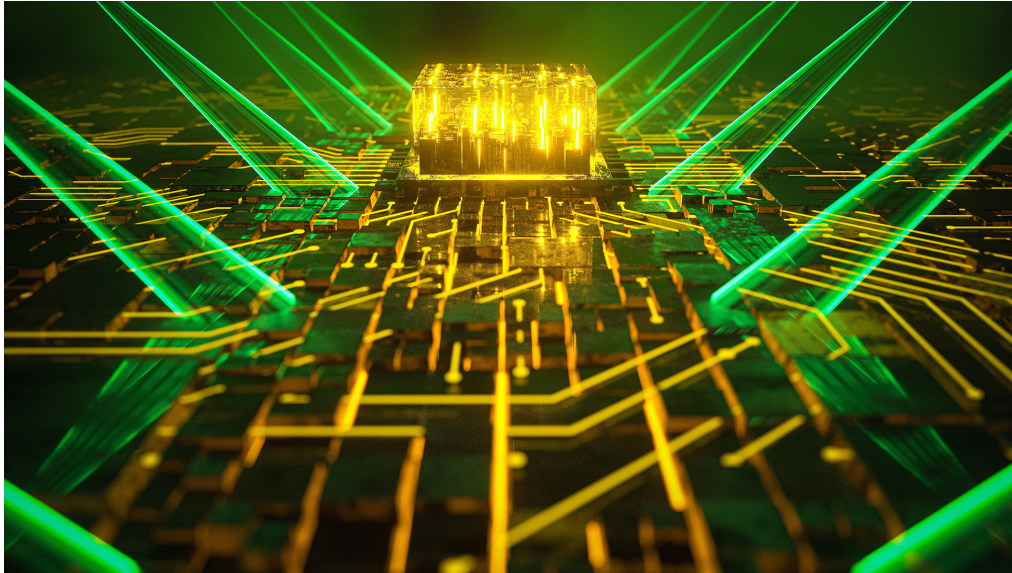


Electronics

Breakthrough development of quantum-based chip technology

taylorbutterfield • 11 hours ago



NTU Singapore has officially launched the Quantum Science and Engineering Center to facilitate the development of quantum-based chip technology.

Nanyang Technological University, Singapore ([NTU Singapore](#)) Has now announced the Center for Quantum Science and Engineering (QSec). The purpose of the center is to enable the development of devices and technologies that utilize quantum science, such as quantum-based chip technology.

The center is the first in Singapore to conduct research on the development and construction of quantum chips using semiconductor manufacturing technology. These chips are the foundation of quantum devices such as quantum chip processors, networks and sensors. They play important functions in various fields such as quantum computing, communication, encryption, cyber security, and sensor technology.

Development of quantum technology

Education Minister Chan Chun Sing, who witnessed the opening ceremony, said: Singapore has been a longtime investor in that potential and remains at the forefront of this area. In 2018, the National Research Foundation launched a quantum engineering program aimed at establishing a competitive quantum engineering research community and industry ecosystem for transforming technology into real-world applications. We look forward to the contribution of the Center for Quantum Science and Engineering (QSec) to Singapore's efforts in quantum technology advances, especially in the development of quantum computing chips and quantum communications. "

NTU President Subra Suresh said: "The Center for Quantum Science and Engineering (QSec) aims to conduct breakthrough research in several areas such as quantum key distribution chips, quantum computation, quantum and classical neural networks, cluster state computation, and quantum sensing. Masu. NTU's focus in these areas is part of our strategy to become a major enabler in the development of quantum science and technology that supports Singapore's quantum engineering efforts for the benefit of industry and society. "

International cooperation in quantum technology

Professor Liu Ai Qun, Co-Director of the Center for Electrical and Electronic Engineering at NTU, said: International cooperation in quantum technology that benefits Singapore. "

Dr. Kwek Leong Chuan, Principal Investigator and Co-Director of the Fellow Center at the Center for Quantum Technologies (CQT) hosted at the National University of Singapore, concludes: About our capabilities in chip-based devices. We also hope to train and inspire more engineers and junior high school students in this new direction. "

Light-based quantum chip

One of QSec's main research interests is the creation of quantum computing chips that can perform quantum computation using integrated photonic chips that can be constructed from semiconductor materials such as silicon wafers.

Such quantum processor chips have the potential to solve complex computations beyond the capabilities of traditional computers. Traditional computers rely on binary bits, reducing all computational information to 1s or 0s. In contrast, quantum processors use qubits or qubits. This can happen in quantum states that represent both 1s and 0s at the same time. This allows qubits to encode much more information than binary bits.

Secure communication

Another area of interest at the center is the protection of communication with quantum cryptography. As cyberattacks become more complex and hacking tools become more powerful, quantum cryptography offers alternatives to protect information from the future. **Cyber attack** And unexpected technological progress.

The most prominent application of quantum cryptography ever developed is Quantum Key Distribution (QKD). This is a way to allow two remote users embedded in an untrusted network, such as the Internet, to exchange private keys in the presence of an attacker. Owns unlimited computing resources.

The QKD chip can use the sensitivity of quantum signals to identify when an attacker attempts to spy on communications. Secret keys transmitted as a series of quantum signals are obstructed and scattered when an attacker intercepts them, making them ineffective.

QSec researchers have been able to develop quantum communication chips that are small enough to fit in everyday devices such as laptops and smartphones. This enables highly secure encrypted communication.

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