The quantum chip 1,000 times smaller than its predecessors and that promises to revolutionize the security of online communications

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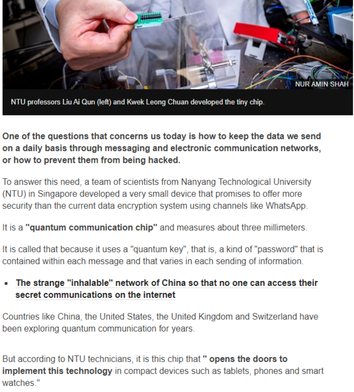


NUR AMIN SHAH

NTU professors Liu Ai Qun (left) and Kwek Leong Chuan developed the tiny chip.

One of the questions that concerns us today is how to keep the data we send on a daily basis through messaging and electronic communication networks, or how to prevent them from being hacked.

To answer this need, a team of scientists from Nanyang Technological University (NTU) in Singapore developed a very small device that promises to offer more security than the current data encryption system using channels like WhatsApp.

It is a **"quantum communication chip"** and measures about three millimeters.

It is called that because it uses a "quantum key", that is, a kind of "password" that is contained within each message and that varies in each sending of information.

- **The strange "inhalable" network of China so that no one can access their secret communications on the internet**

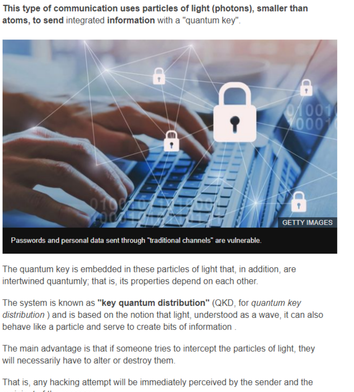
Countries like China, the United States, the United Kingdom and Switzerland have been exploring quantum communication for years.

But according to NTU technicians, it is this chip that **" opens the doors to implement this technology** in compact devices such as tablets, phones and smart watches."

The results of the NTU research were published in the specialized journal *Nature Photonics* in August.

Smaller, equally safe

Current quantum communication equipment can be as large as a refrigerator and occupy an entire floor of an office.



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The miniature chip developed by NTU is economical and easy to manufacture, researchers say.

But the NTU researchers say **the quantum communication chip they developed is 1 . 000 times smaller than current devices** , and it has the same security that this technology offers.

In addition, the NTU maintains that the chip is economical and that it is manufactured with standard materials such as silicon.

But before we continue talking about the chip, what is quantum communication, the technology behind this device?

Light particles

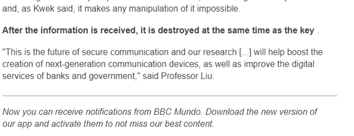
Traditional encryption of messages or keys works by hiding the content in a difficult mathematical equation.

But this mathematical encryption has an expiration time and, given the development of increasingly powerful computers, it is becoming increasingly vulnerable.

- **How the ultra-secure quantum cable that banks and large companies are using to protect their secrets works**

Quantum communication does not use mathematical ciphers, but is based on the principles of quantum physics, the science that studies matter at the level of subatomic particles.

This type of communication uses particles of light (photons), smaller than atoms, to send integrated **information** with a "quantum key".



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Passwords and personal data sent through "traditional channels" are vulnerable.

The quantum key is embedded in these particles of light that, in addition, are intertwined quantumly, that is, its properties depend on each other.

The system is known as **"key quantum distribution"** (QKD, for *quantum key distribution*) and is based on the notion that light, understood as a wave, it can also behave like a particle and serve to create bits of information .

The main advantage is that if someone tries to intercept the particles of light, they will necessarily have to alter or destroy them.

That is, any hacking attempt will be immediately perceived by the sender and the recipient of the message.

Quantum key

The NTU chip works according to the QKD system to encrypt the information and make it open only **with a quantum key** .

This key is **unique and specific for each message** , because quantum communication algorithms integrate passwords within the same encrypted information that is sent.

This creates an "almost incorruptible" coding, say the NTU experts.

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Quantum technology is revolutionary.

"Almost all platforms require users to enter their passwords and biometric data, and whenever this is the case, they can be spied on," says Professor Liu Ai Qun, of the NTU School of Electrical and Electronic Engineering, and co-author Of the investigation.

But quantum technology eliminates the need to enter passwords or additional biometric data.

Professor Kwek Leong Chuan, a physicist at the NTU and also the author of the study, says that **"it is like sending a sealed envelope and putting the key inside ."**

"The recipient needs that same 'key' to open the envelope," he says.

- **Micius, the pioneering Chinese quantum satellite that can revolutionize the world's communications**

According to the theory of quantum communication, the sending of the key is safe and, as Kwek said, it makes any manipulation of it impossible.

After the information is received, it is destroyed at the same time as the key .

"This is the future of secure communication and our research [...] will help boost the creation of next-generation communication devices, as well as improve the digital services of banks and government," said Professor Liu.