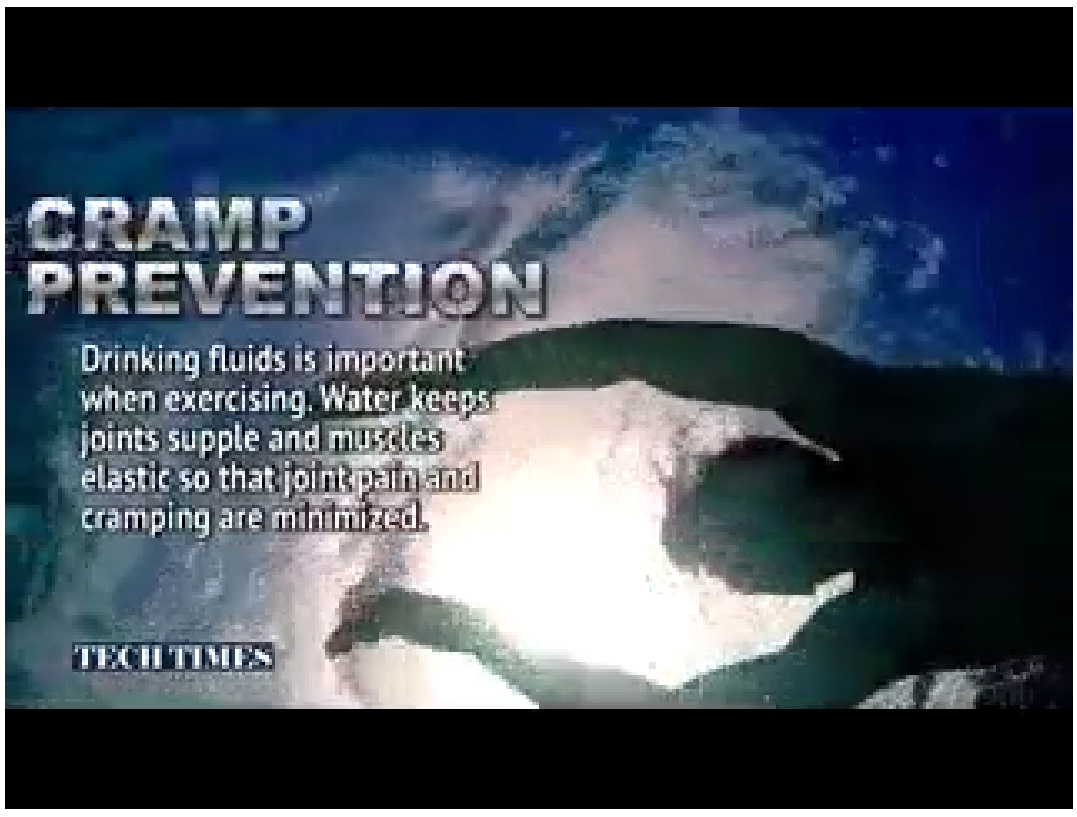
Random Number Generator Uses Ultrafast Lasers Hundreds of Times Faster Than Today's Tech

Mark Bustos Feb 25, 2021 11:57 PM EST



An international team of researchers has created a system of ultrafast lasers that can generate a random number over a hundred times faster than existing technologies - opening doors for better data encryption technologies.

The new random number generator (RNG) system was created by researchers from Nanyang Technological University (NTU) in Singapore, together with Yale University from the United States and Trinity College from Ireland. The system prototype was also developed in the NTU campus.

Random Number Generation

Random number generation refers to the process of creating a sequence of values or characters that cannot be easily predicted. These RNGs are used in a variety of applications: from drop chances in video games to generating data encryption keys and one-time passwords. This makes RNG important in online processes, especially now in the Information Age, used in online banking, e-commerce, and even in accessing social media accounts as a form of security.

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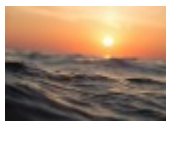
Weakening Gulf Stream in Atlantic Ocean Could Spell Disaster for European Weather, US Coasts 

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British politician Charles Hill (1904 - 1989), the Postmaster-General, with a demonstration model of ERNIE (Electronic Random Number Indicator Equipment) at a press conference on Premium Bonds, 26th July 1956.

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Randomness - the state of being random or the lack of pattern and predictability - has remained a significant point of interest for various fields.

While achieving an absolutely true random system remains elusive, scientists have developed increasingly complex methods of generating virtually unpredictable systems. Hardware RNGs generate a random number by using inputs from an environmental input that is currently unpredictable - dice rolls, signal noises, nuclear decay of molecules, and more.

On the other hand, pseudorandom number generators (PRNGs) rely on a complex yet deterministic algorithm to generate their random number. Its randomness is only maintained for as long as the state remains unknown to the observer.

Developing the New RNG With Lasers

The new random number generator based on ultrafast laser could pave the way for faster, cheaper, and more secure forms of data encryption.

In the new system led by the Nanyang team, a laser passes through an especially fabricated hourglass-shaped cavity. As the light from the laser reflects and interacts with itself in the cavity, it generates random patterns which are read and are used to generate multiple random numbers simultaneously.

Researchers discovered that no two random number sequences generated by their system were the same, mainly because of how light reflects and interacts with itself within the hourglass-shaped cavity. The laser emitted is only close to a millimeter long, is energy efficient since it only requires one ampere of current - easily compatible with standard household power sources.

scale laser.

In the published report, the laser RNG developed in Nanyang produced results at rates far exceeding those currently available.

"Current random number generators run by computers are cheap and effective," notes Wang Qijie, who led the Nanyang team and is a professor from the School of Electrical and Electronic Engineering and School of Physical and Mathematical Science at NTU. He notes, however, that these systems are vulnerable to attacks, especially when hackers learn the algorithm behind these RNG systems.

With their new system built on lasers, Qijie says that it is safer since "it uses an unpredictable method to generate numbers," adding that even those with the same device as they do could never replicate the same results.

Is Anything Truly Random?

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