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'Sounds of Silence' Proving a Hit: World's Fastest Random Number Generator

ScienceDaily (Apr. 13, 2012) — Researchers at The Australian National University have developed the fastest random number generator in the world by listening to the 'sounds of silence'.

The researchers -- Professor Ping Koy Lam, Dr Thomas Symul and Dr Syed Assad from the ANU ARC Centre of Excellence for Quantum Computation and Communication Technology -- have tuned their very sensitive light detectors to listen to vacuum -- a region of space that is empty.

Professor Lam said vacuum was once thought to be completely empty, dark, and silent until the discovery of the modern quantum theory. Since then scientists have discovered that vacuum is an extent of space that has virtual sub-atomic particles spontaneously appearing and disappearing.

It is the presence of these virtual particles that give rise to random noise. This 'vacuum noise' is omnipresent and may affect and ultimately pose a limit to the performances of fibre optic communication, radio broadcasts and computer operation.

"While it has always been thought to be an annoyance that engineers and scientists would like to circumvent, we instead exploited this vacuum noise and used it to generate random numbers," Professor Lam said.

"Random number generation has many uses in information technology. Global climate prediction, air traffic control, electronic gaming, encryption, and various types of computer modelling all rely on the availability of unbiased, truly random numbers.

"To date, most random number generators are based on computer algorithms. Although computer generated random numbers can be useful, knowing the input conditions to the algorithm will lead to predictable and reproducible output, thus making the numbers not truly random. To overcome this issue, random number generators relying on inherently random physical processes, such as radioactive decay and chaotic behaviour in circuits, have been developed."

Dr Thomas Symul added: "Vacuum noise is one of the ultimate sources of randomness because it is intrinsically broadband and its unpredictability is guaranteed by quantum theory. Because of this, we are able to generate billions of random numbers every second."

Dr Syed Assad said the team has linked their table-top laser experiment directly to the internet. "We can easily push this technology even faster but currently we have already reached the capacity of our Internet connection," he said.

The random number generator is online and can be accessed from anywhere, anytime around the world at http://photonics.anu.edu.au/qoptics/Research/qrng.php Moreover, anyone who downloaded live random numbers from the ANU website will get a fresh and unique sequence of numbers that is different from all other users.

In collaboration with QuintessenceLabs, an Australian quantum technology company, the ANU team is now looking into commercialising this device. The team hopes to have this technology miniaturised down to the size of a thumb drive.

Based on: http://www.sciencedaily.com/releases/2012/04/120413161235.htm

ZADANIA DO TEKSTU

ZADANIE 1
Match the words listed in the table (one of them will not be necessary) with the definitions below.

chaotic	reproducible	unbiased
inherent	spontaneous	unique
omnipresent	ultimate	unpredictable

1. changing so much that it is impossible to predict what it will look like
   ……..
2. being a natural part of something
   ……..
3. being the only one of its kind
   ……..
4. the last, the main, most important or better than previous ones
   ……..
5. not influenced by any factors
   ……..
6. existing everywhere
   ……..
7. not planned or arranged before
   ……..
8. happening in a confused way
   ……..

ZADANIE 2
Use the words from the table (one of them will not be necessary) to complete the sentences below.

broadcast	current	exploit
circumvent	decay	predictions
collaboration	encryption	vacuum

1. The data can be used to make useful economic _____ .
2. The new TV companies want to _____ fully the potential of satellite transmission.
3. Secure _____ of data was the essential stepping stone in the development of internet banking.
4. Live _____ of the trial attracted millions of viewers in the country.
5. Her husband's death left a _____ in her life.
6. The study was carried out in _____ with Prof Crofdon.
7. The company opened an account abroad, in order to _____ the tax laws.
8. The building had fallen into _____ so much that it had to be pulled down.

ZADANIE 3
Combine the words listed in the table with the verbs below to recreate some of the collocations used in the article.

a device a limit a technical problem	down to the size of… from anywhere random numbers	rise to sth the capacity

1. to be accessed .....
2. to commercialise .....
3. to generate .....
4. to give .....
5. to miniaturise .....
6. to overcome .....
7. to pose .....
8. to reach .....

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JĘZYK ANGIELSKI	**JĘZYK POLSKI**
able to be accessed from anywhere	być dostępnym z każdego miejsca
sensitive	czuły
give rise to sth	dać początek czemuś
reproducible	dający się odtworzyć
to date	do dzisiaj
availability	dostępność
affect	dotyczyć
thumb	kciuk
encryption	kodowanie, szyfrowanie
fibre optic communication	komunikacja opierająca się na światłowodach
random (e.g. ~ numbers)	losowe, przypadkowe
have many uses	mieć wiele zastosowań
computer modelling	modelowanie komputerowe
radio broadcast	nadawanie audycji radiowych
to tune (e.g. to ~ instruments, the radio)	nastawić, nastroić
inherent	nieodłączny, przyrodzony, inherentny
intrinsic	nieodłączny, wrodzony
unbiased	niepodlegający żadnym wpływom
unique sequence	niepowtarzalna, unikalna sekwencja
currently	obecnie
circumvent	obejść (prawo)
performance	osiągi
reach the capacity	osiągnąć (pełną) wydajność/ przepustowość
ultimate	ostateczny
thumb drive	pendrive
overcome an issue	pokonać problem
vacuum	próżnia
predictable	przewidywalny
climate prediction	przewidywanie zmian klimatycznych
extent	rozmiar, zakres
radioactive decay	rozpad radioaktywny
spontaneous	spontaniczny, niezaplanowany
pose a limit	stanowić granicę
commercialise	wdrożyć do produkcji
in collaboration	we współpracy
omnipresent	wszechobecny
exploit	wykorzystywać
annoyance	zdenerwowanie
miniaturise down to…	zminiaturyzować

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KLUCZ

ZADANIE 1

1. unpredictable
2. inherent
3. unique
4. ultimate
5. unbiased
6. omnipresent
7. spontaneous
8. chaotic

ZADANIE 2

1. predictions
2. exploit
3. encryption
4. broadcast
5. vacuum
6. collaboration
7. circumvent
8. decay

ZADANIE 3

1. to be accessed from anywhere
2. to commercialise a device
3. to generate random numbers (also: a technical problem)
4. to give rise to sth
5. to miniaturise down to the size of… (also; a device)
6. to overcome a technical problem
7. to pose a limit
8. to reach the capacity