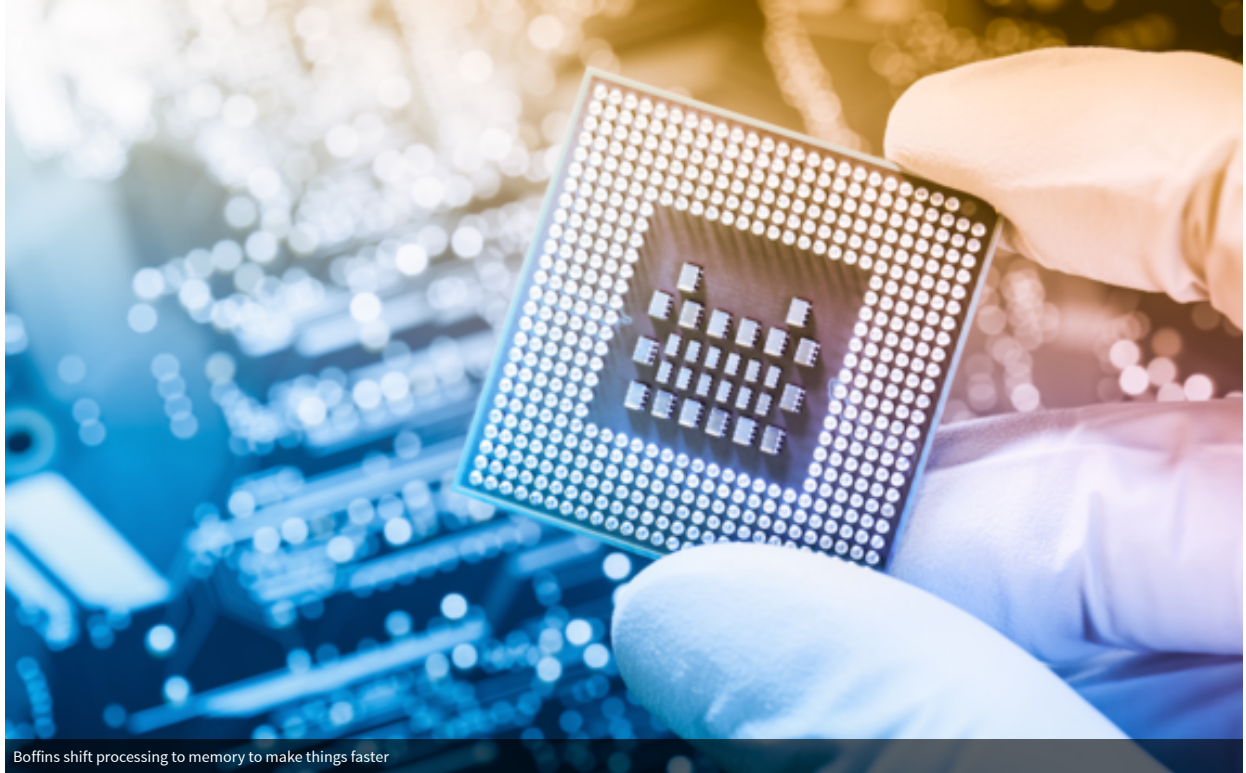


Boffins shift processing to memory to make things faster

Moore's Law, Schmoore's Law



Boffins shift processing to memory to make things faster



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WITH MOORE'S LAW approaching a hard limit, techies are always on the lookout for new approaches to keep the smaller-quicker-cheaper party going.

A promising new approach has recently been announced by a team of boffins based in Singapore and Germany, who have developed a new system of processing data in RAM rather than having to move it to the CPU.

The circuitry they've developed doesn't work on normal RAM, though. Instead, it is based on a new technology called Redox-based resistive switching random memory (ReRAM) that's being developed by a number of major semiconductor firms and should be commercially available soon.

ReRAM is a non-volatile RAM that works by changing the resistance across a dielectric solid-state material. It has a good long-term storage capacity and can be produced at nanoscale. It promises to increase I/O speeds while also reducing power consumption.

The circuitry developed on top of ReRAM by the scientists not only allows data to be processed in situ, which is far more efficient than having to transfer it to and from a CPU, but it also dispenses with binary in favour of a quaternary system that's enabled by ReRAM. This should increase the processing efficiency because a quaternary number (which uses integers 0, 1, 2, and 3) is shorter than its binary equivalent (which can only use 1s and 0s).



Assistant professor Anupam Chattopadhyay from Nyang Technology University, Singapore explained that in current computer systems, all information has to be translated into a string of zeros and ones before it can be processed.

"This is like having a long conversation with someone through a tiny translator, which is a time-consuming and effort-intensive process," he said.

"We are now able to increase the capacity of the translator, so it can process data more efficiently."

His associate Professor Rainer Waser from RWTH Aachen University, Germany explained that the new system is promising for the development of future IoT and **wearable devices**.

"These devices are energy-efficient, fast, and they can be scaled to very small dimensions," he said.

"Using them not only for data storage but also for computation could open a completely new route towards an effective use of energy in the information technology."

The findings will be published in *Scientific Reports*. μ

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