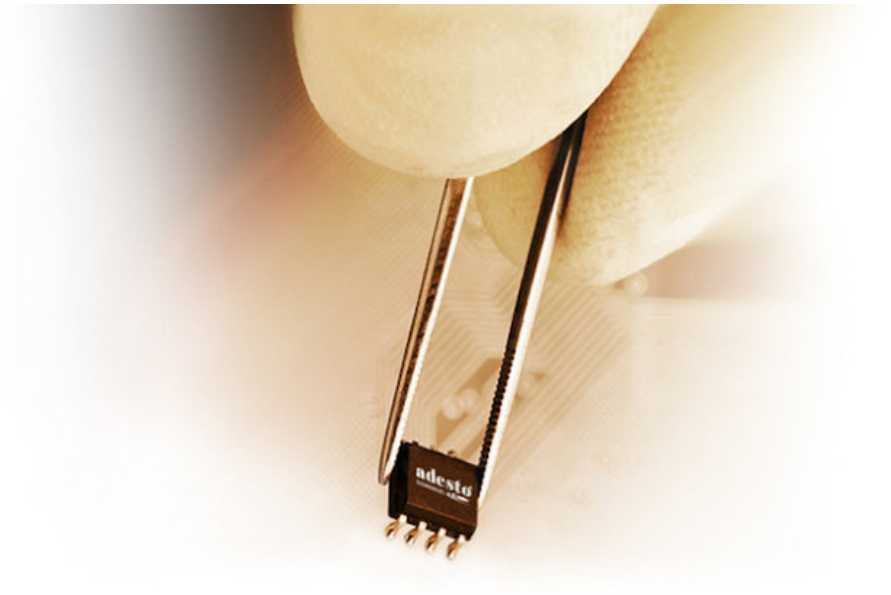
Scientists develop memory chips that can replace computer processors

Nayela Deeba | Jan. 4, 2017
This could lead to much faster and thinner mobile devices and computers in future.



Scientists from Singapore and Germany have developed a new computing circuit, which can make memory chips perform computing tasks traditionally done by computer processors.

The circuit is built using a Redox-based resistive circuit (ReRAM), a type of memory chip that is usually used to only store information.

Currently, computer processors in the market are using the binary system, which is composed of two states - either 0 or 1. This means that all information has to be translated into a string of zeros and ones before it can be processed, which is a time-consuming and effort-intensive process.

To counter this, the prototype ReRAM circuit - built by NTU's Assistant Professor Anupam Chattopadhyay, Professor Rainer Waser from RWTH Aachen University and Dr Vikas Rana from Forschungszentrum Juelich - processes data in four states instead of two. For example, it can store and process data as 0, 1, 2, or 3, known as Ternary number system. This makes it possible to store the data in an even higher number of states, hence speeding up computing tasks.

In addition, by making the memory chip perform computing tasks, there is no longer a need for processors. This could lead to new design possibilities for thinner, smaller and lighter consumer electronics and wearable technology.

"ReRAM is a versatile non-volatile memory concept. These devices are energy-efficient, fast, and they can be scaled to very small dimensions. 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," explained Prof Waser.

Following this development, the researchers are now looking to engage industry partners to leverage this important advance of ReRAM-based ternary computing.

They will also work on developing the ReRAM to process more than its current four states to further improve the computing speeds, as well as to test its performance in actual computing scenarios.