World's first programmable nanoprocessor unveiled

A Quantum Leap for computing

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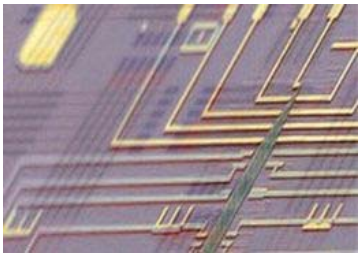

Scientists have successfully built and demonstrated what is believed to be the world's first programmable nanoprocessor.

The breakthrough, made by scientists and engineers from Harvard University and the MITRE Corporation, is a significant and tangible step forwards in the ability to produce working computer circuits that can be assembled from components made on a minute nano-scale, so they say.

The processor will be able to perform a number of basic mathematical and logical functions when programmed electronically.

"This new nanoprocessor represents a major milestone toward realizing the vision of a nanocomputer that was first articulated more than fifty years ago by physicist Richard Feynman," says James Ellenbogen, a chief scientist at MITRE.

The nanoprocessors are constructed by assembling nanocircuits made of fabricated germanium-silicon wires with functional oxide shells, and measure just 30 nanometres in diameter.

Following advances in the design and synthesis of nanowire building blocks it is now possible to easily reproduce the components at a size and material complexity that has been difficult to achieve through traditional top-down approaches.

"This work represents a quantum jump forward in the complexity and function of circuits built from the bottom up and thus demonstrates that this bottom-up paradigm, which is distinct from the way commercial circuits are built today, can yield nanoprocessors and other integrated systems of the future," says the principal investigator at Harvard Charles M. Lieber.

Vitally, it will be possible to scale the architecture up, meaning that the assembly of larger and more functional nanoprocessors will be possible.

Researchers have been working with nanowires, carbon nanotubes and other nanostructures for the past fifteen years, but have struggled to construct anything more than the most rudimentary circuits.

"We have shown that this limitation can now be overcome and are excited about prospects of exploiting the bottom-up paradigm of biology in building future electronics," said Lieber.

Another fascinating aspect of the new technology is that the nanoprocessor circuits require a very small amount of power to operate, even proportionally to their size.

This is because the nanowires contain switches that are non-volatile, meaning that they do not require additional expenditure of energy for maintain memory.

"Because of their very small size and very low power requirements, these new nanoprocessor circuits are building blocks that can control and enable an entirely new class of much smaller, lighter weight electronic sensors and consumer electronics," says co-author Shamik Das, the lead engineer in MITRE's Nanosystems Group.

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