# ‘World’s first’ nanoprocessor offers advances in future electronics

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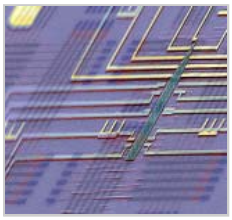
**Engineers and scientists from Harvard University and MITRE claim to have developed the 'world's first' programmable nanoprocessor. The prototype computer system, described in the online journal *Nature*, could represent a significant step forward in the complexity of computer circuits that can be assembled from synthesised nanometer scale components.**



"This work represents a quantum jump forward in the complexity and function of circuits built from the bottom up," said principal investigator Charles Lieber from Harvard University. "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."

According to Lieber, the work was enabled by advances in the design and synthesis of nanowire building blocks. "These nanowire components now demonstrate the reproducibility needed to build functional electronic circuits, and do so at a size and material complexity difficult to achieve by traditional top down approaches," he said. "Moreover, the tiled architecture is fully scalable, allowing the assembly of much larger and ever more functional nanoprocessors."

In recent years researchers working with nanowires, carbon nanotubes and other nanostructures have struggled to build all but the most basic circuits, in large part due to variations in properties of individual nanostructures. "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," noted Lieber.

The circuits in the nanoprocessor operate using very little power, even allowing for their minuscule size, because their component nanowires contain transistor switches that are nonvolatile. Unlike transistors in conventional microcomputer circuits, once the nanowire transistors are programmed, they do not require any additional expenditure of electrical power for maintaining 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," said co author Shamik Das, lead engineer in MITRE's Nanosystems Group. Das believes the new nanoprocessor represents a major milestone toward realising a nanocomputer, something that was first thought possible more than 50 years ago.

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**Supporting Information**
http://www.harvard.edu/
http://www.mitre.org/



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