

[Register](#)

[All](#) [Health](#) [Bioscience](#) [Physical Science](#) [Environment](#) [Space](#)
[Releases](#) [Blogs](#)

Press Release

Researchers produce world's first programmable nanoprocessor

Wednesday, February 9, 2011

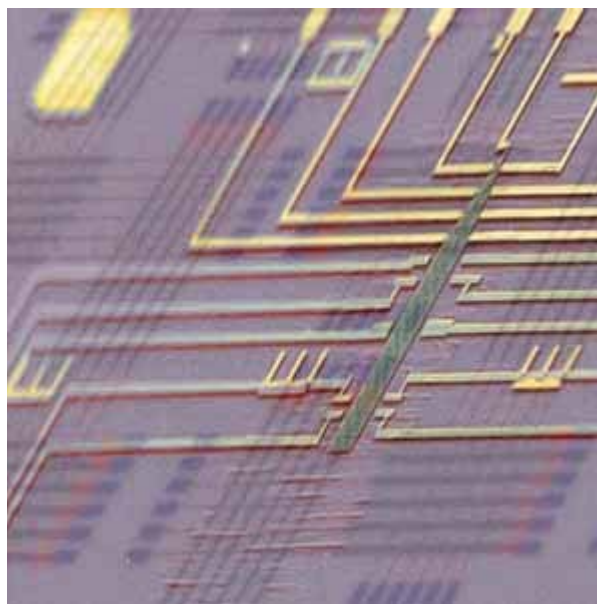
Engineers and scientists collaborating at Harvard University and the MITRE Corporation have developed and demonstrated the world's first programmable nanoprocessor.

The groundbreaking prototype computer system, described in a paper appearing today in the journal *Nature*, represents a significant step forward in the complexity of computer circuits that can be assembled from synthesized nanometer-scale components.

It also represents an advance because these ultra-tiny nanocircuits can be programmed electronically to perform a number of basic arithmetic and logical functions.

"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 principal investigator Charles M. Lieber, who holds a joint appointment at Harvard's Department of Chemistry and Chemical Biology and School of Engineering and Applied Sciences.

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 also do so at a size and material complexity difficult to achieve by traditional top-down approaches.



This is a false-color scanning electron microscopy image of a programmable nanowire nanoprocessor super-imposed on a schematic nanoprocessor circuit architecture. Credit: Photo courtesy of Charles M. Lieber, Harvard University.

Moreover, the tiled architecture is fully scalable, allowing the assembly of much larger and ever more functional nanoprocessors.

"For the past 10 to 15 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," says Lieber, the Mark Hyman Professor of Chemistry. "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."

An additional feature of the advance is that the circuits in the nanoprocessor operate using very little power, even allowing for their miniscule size, because their component nanowires contain transistor switches that are "nonvolatile."

This means that 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," says co-author Shamik Das, the lead engineer in MITRE's Nanosystems Group.

"This new nanoprocessor represents a major milestone toward realizing the vision of a nanocomputer that was first articulated more than 50 years ago by physicist Richard Feynman," says James Ellenbogen, a chief scientist at MITRE.

###

Harvard University: <http://www.harvard.edu>

Thanks to Harvard University for this article.

This press release was posted to serve as a topic for discussion. Please comment below. We try our best to only post press releases that are associated with peer reviewed scientific literature. If you need help finding a link to the original article, please contact us on twitter or via e-mail.

This press release has been viewed 174 time(s).



18

Share

submit

reddit

3
tweets

retweet

Comments

No comments recorded.

Top Biotechnology Stocks

3 Pharmaceutical Companies To Invest In Now! Get The Free Report.

Boston Coupons

1 ridiculously huge coupon a day. It's like doing Boston at 90% off!

Ads by Google

Add Comment?



For youtube videos, paste embed code directly in the text box



- Notify me by email when future posts are made



- Preview before posting

Email:

Members do not need to provide an address

Rate Article

Total votes: 0

Select Comment Validation Method



Member



Name/URL (Guest)



FaceBook (Guest)

Advertisements

Flood Barriers FloodBreak automatic floodgates need no people, no power! www.floodbreak.com
Diamantane Diamantane CAS 2292-79-7 New lower prices and quantities www.Diamantane.info
M.S. in Clinical Research Practical FDA-compliance Masters in Clinical Trial Studies. Free Inf
Affordable Vet Ultrasound SonoSite, Mindray Ultrasound Online Pricing, Onsite Service www.

Friends



Facebook



Carver College of Medicine



Twitter



LabX.com



[About](#) [Labs](#) [Users](#) [Groups](#) [RSS Feeds](#) [Link to Us](#) [Terms of Service](#) [Privacy Policy](#)