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## Bending technology

UI researchers introduce new, flexible circuits

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The next generation of computers could roll out of a pen.

Researchers at the University have been developing a new type of circuitry printed on thin plastic sheets. These flexible, stretchable circuits will eventually operate as full-fledged computers, with applications ranging from

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bendable displays to surgical gloves.

"It's very exciting to see this technology evolve into commercially viable products," said John Rogers, professor in Materials Science and Engineering. "It brings new capabilities and form factors to existing electronic devices."

Rogers is working on techniques that allow silicon-based, bendable circuitry to be printed on plastic sheets. By slicing the silicon into nanowires and ribbons, the circuits can be easily flexed beyond the range of normal electronic circuit boards. These nanowires can also be safely etched on plastic sheets without warping the plastic in the process.

Rogers explained how the flexible circuits would become the base for a paper thin, interactive display. Graphic elements, such as electronic ink and light emitting diodes, would be placed on the plastic sheet, allowing programmable images to be displayed. Rogers hopes that future developments would involve integrating sensors into the circuitry to make "smart" sensing devices.

"You can make silicon have any mechanical property you want," he said. "This could lead to applications like personalized health monitors or a smart surgical glove."

Roger's research team is also developing stretchable circuitry that can be bent and pulled in any direction. This is made possible by putting the nano-sized silicon circuitry on pre-stretched pieces of rubber. When the rubber sheets shrink, the silicon is crinkled into stretchable, wavy circuitry. These sheets can then be wrapped around materials like a camera lens or an airplane wing.

"The idea is to have silicon that can be stretchable, and to see what we can do with that," said Etienne Menard, a graduate student. "We can wrap it around the wing of an airplane and monitor its status in realtime."

One of the applications to come out of flexible circuitry is the idea of "smart walls."

Osman Ataman, professor in architecture, said smart walls could become the future of architectural design.

"This is a revolutionary structure that will replace bricks and mortars in the future," he said. "Smart walls will incorporate modern displays and sensing equipment."

Smart walls will integrate current electronic appliances inside a thin, wall based film, Atman explained. The smart wall can work as a display for a television or computer, allowing users to control content by activating built in sensors. The walls can also detect movement and function as a lighting system, becoming a living, interactive environment.

The technology is not due for commercialization for another few years.

"There will be at least a decade before smart walls become a standard option

for homes," Ataman said.  
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