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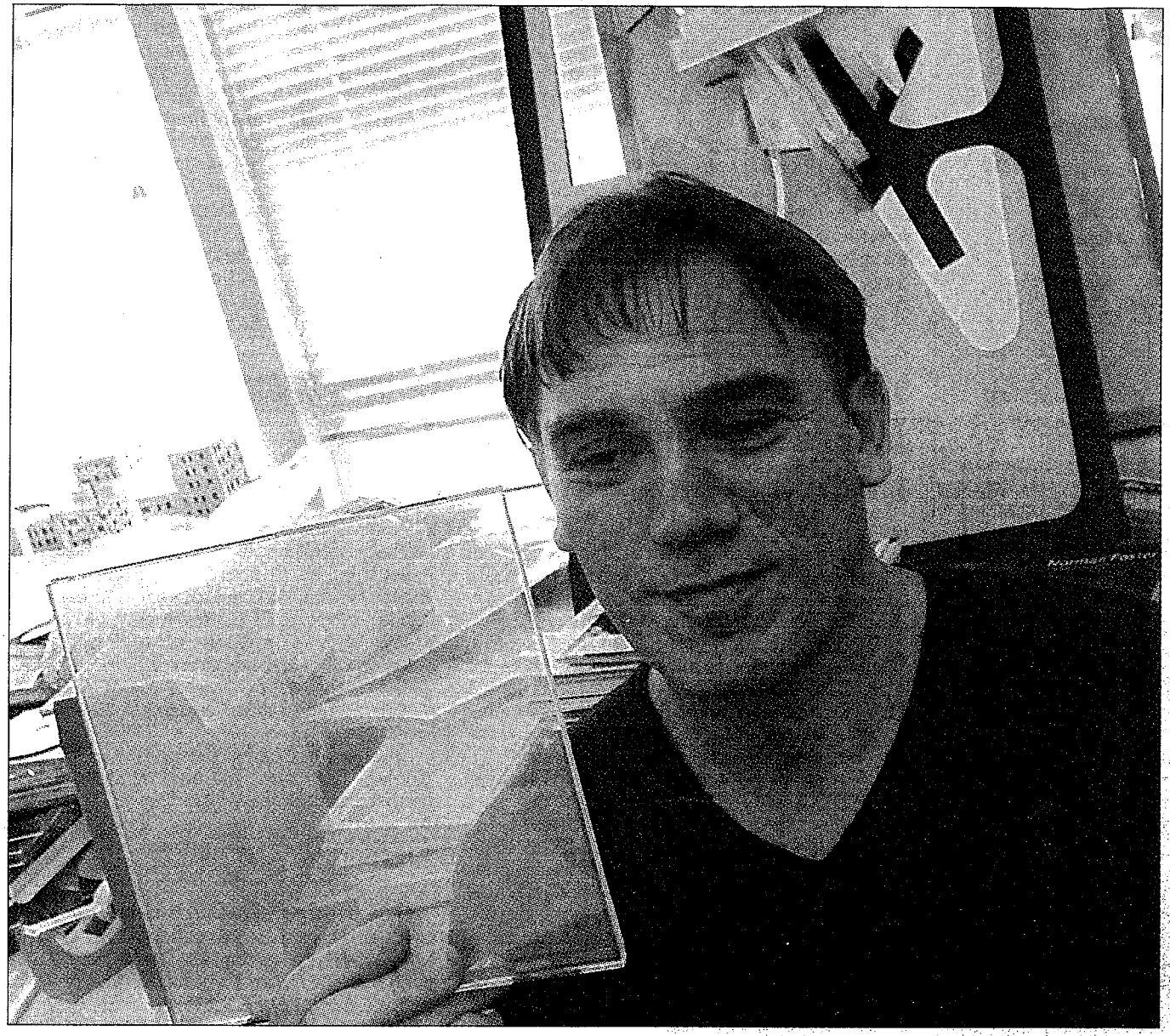
UNIVERSITY OF ILLINOIS

LIVING IN A COMPUTER



Robert K. O'Daniell/The News-Gazette

University of Illinois Professor Osman Ataman holds an electronics-imbedded glass panel that can be manipulated with the flick of a switch.

UI profs predict new building materials will change our lives

By GREG KLINE
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In Osman Ataman's living room of the future — a decade or so in the future, he thinks — there's no TV set, no stereo, no media center computer, nary a lamp.

The paintings and family photos on the walls can change at will, not to mention the wall color. So can the location of the windows.

Because the walls and windows will, in essence, be computers made of materials, flexible and strong, laced with microelectronics.

"You're sort of living in a Pentium," is the way University of Illinois Professor John Rogers, Ataman's collaborator on a project to develop technology for such "smart walls," put it. He was only half joking.

"We're going to create a habitable computer," said Ataman, a UI architecture and design professor. "It includes all the electronics. Lighting is included, the color ... all the electronic devices. The windows are also user-defined."

"It's going to be your partner," he added. "It's going to be like a living organism. The technology is going to be completely imbedded. You're not going to see it."

Ataman showed a square of material that looks like a piece of window glass with a wire running out the bottom connected to a switch box. Move a switch on the box and the glass is clear. Move it again and the glass becomes opaque, or pretty much any state in between.

"You can turn small regions on and off in any pattern you want," Rogers said.

The idea is to imbed such capabilities

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WALLS

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in flexible plastic-like materials and high-tech composites akin to the stuff now used to make everything from golf clubs to stealth fighter jets.

Even the outside of a building might become a big solar cell capable of powering the structure, Ataman said, which sounds pretty good if you've received the power bill for running your air conditioning over the past month.

Inside, imbedded sensors might adjust the temperature and lighting when you walk into a room and pull down the virtual shades when night falls.

In the case of elderly folks living alone, those sensors might monitor how well they're getting around or check to see whether they're eating and maintaining their weight, not to mention report the data to a loved one or health care professional.

"There may be a societal benefit," said Rogers, a UI materials science and engineering professor.

Ataman sees building materials with computing power as a sea change in architecture.

"For the last 2,000 years, nothing has changed," he said. "We've been using the same materials."

When Ataman, whose research focuses on new architectural technology and tools, went looking for a partner, Rogers was a natural.

Also a professor at the UI's Beckman Institute, Rogers and his lab have attracted a lot of attention for work on flexible electronics using plastics and other soft materials. Scientific American tagged the research as among the 50 most influential efforts in science and technology for 2005.

But Rogers, who's also started a company to advance the technology commercially, had been thinking more in terms of things like portable computer screens you can roll up and put in your pocket, electronic newspapers and computing-enabled clothing than wallpaper.

"It was kind of cool to me because I hadn't thought of that level of implementation," Rogers said when asked what interested him in a collaboration with Ataman. "It's stimulating to us. It brings a whole new perspective."

He tends to look at the effort, which the UI has funded with some seed money, from an engineer's practical perspective. How do you make such materials, on a large scale, cost effectively, and with the necessary robustness? Ataman said the UI researchers are looking for industrial partners to help them answer such questions.

For example, a process Rogers' lab has been developing basically prints electronics onto flexible materials. But in printer's terms, it's an old-fashioned sheet-fed press that stamps individual pages. Something like smart walls might require a system that can print on a continuous roll of material, kind of like modern presses print on rolls of paper.

Still, Rogers said the technology works at the scale it can be produced in the lab and he believes it can be scaled up.

"I don't see any reason why (smart architecture) can't work," he said.