IVERSITY OF ILLINOIS RESEARCH

[t's no stretch to see UI scientist is man to watch

rtificial retina will ave plenty of uses n cameras — and erhaps humans

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Silicon chips are hard, flat and brit-e. Human flesh is soft, curved and elding. They would not seem a good atch for each other.

But John Rogers, a University of linois materials science professor, as found a way to make silicon bend-ble and stretchable, so that it can rap around heart muscle to stimu-te it more effectively than a pace-aker, or stretch around brain tissue, r most recently, create an artificial etina.

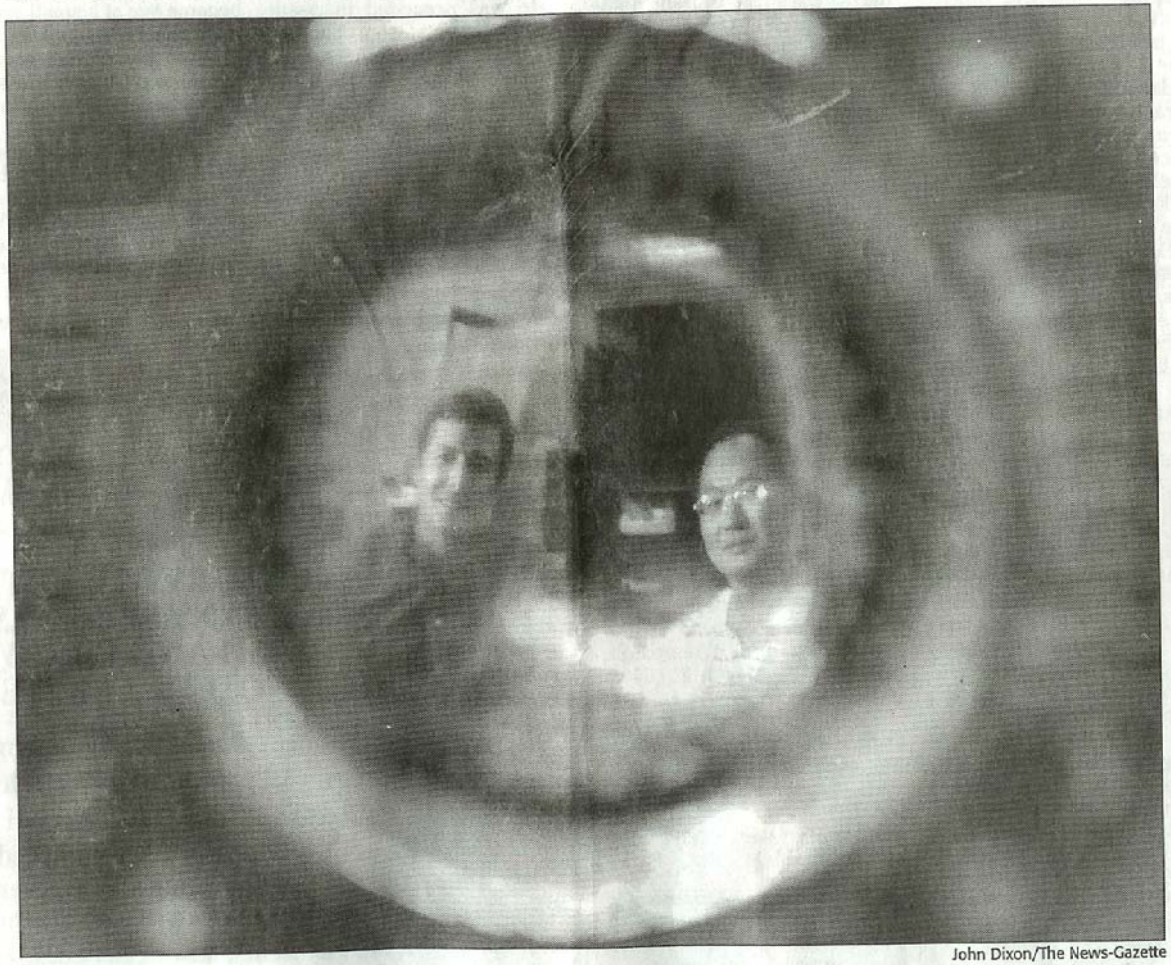
The retina is a hemispherical col-ction of photoreceptors at the ack of the eye. Rogers' new retina, nnounced in the scientific journal ature, shares the shape, with tran-istors replacing living nerve cells. Vith a simple lens not unlike the uman eye's, it makes a camera that ay have many commercial appli-ations, including infrared, Rogers aid.

It also has potential for use in uman beings.

Sigurd Wagner, a Princeton Uni-ersity professor who is a pioneer in naterials research, said Rogers is a nan to watch.

"John Rogers is doing first-class vork on stretchable electronics; he s a leader at the world level. He has deas, is a top experimenter who can ut to practice highly sophisticated concepts, and he gets super results," Wagner said Wednesday.

Postdoctoral researcher Heung Cho Ko actually makes the camer-as, which require 80 steps over 10 days of construction — following two years of research. His name appears first on the Nature paper, along with Rogers, Mark Stoykovich, Jishou Song, Viktor Malyarchuk, Won Mook Choi, Chang-Jae Yu, Joseph Geddes, Jianliang Xiao, Shuodao Wang and Yonggang Huang.



John Dixon/The News-Gazette

University of Illinois Professor John Rogers, left, and postdoctoral student Heung Cho Ko are seen through an artificial retina in an electronic testing lab at the Materials Research building in Urbana. Their latest device took more than two years to develop.

Rogers, a fellow of the UI's Center for Advanced Study, first attacked the problem of bending single-crystal silicon.

He found a solution in 2004, in part by attaching it to a plastic or rubber surface, and in part by trimming off a ribbon of silicon embedded with electronic components, like cutting wire off a bar of steel.

He likens it to cutting a strip of paper. The same material in a different form, a 2x4, won't bend.

Flexible electronics could make for newspapers and magazines of the future, as well as foldable satellite dishes, medical diagnostic blankets full of sensors or inexpensive, wallpaper-like televisions.

But to be housed in a living being that moves, electronics also need to be stretchable.

"We can make the silicon compressible, by engineering the layouts such that the silicon buckles upward under compression. This kind of 'accordion' type of response avoids any significant strains in the silicon itself," Rogers said in an e-mail.

But in the actual detector array, he said, "things are a little bit more complicated.

"The part that actually buckles consists of very tiny 'ribbon' cables that electrically interconnect adjacent silicon detector islands. These ribbon cables consist of a sandwich structure of polymer/thin metal/polymer, conceptually like a conventional ribbon cable, only much, much smaller in dimension."

Some of the Rogers group's bioengineering ideas are being researched in rats and pigs.

Rogers isn't willing to say that his group's creation could eventually become a "bionic eye" along the lines of the "Six Million Dollar Man."

But he's not ruling it out, either.