

Monitoring your vitals with a webcam

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You may have used a webcam on your computer to make a video call. Someday that same camera - or one like it - might help doctors monitor your health.

A team of researchers at Xerox is working on [technology](#) that would allow doctors to obtain patients' vital signs using a simple webcam. Already, the team is testing use of the technology to monitor the [pulse rate](#) of premature babies and to track [irregular heartbeats](#) in patients suffering from arrhythmia.

Lalit K. Mestha, a research fellow at Xerox's research center in Webster, N.Y., demonstrated the technology at a media event last week at Xerox's PARC research lab in Palo Alto, Calif. While Mestha was sitting about 10 to 15 feet across the room, one of his Xerox colleagues pointed a webcam at his forehead and quickly was able to get a read on his pulse.

Xerox's core business has long focused on developing technologies that help [office workers](#) print, scan, copy and manipulate documents. But the company's research labs, including PARC, have long been experimenting with using those technologies for other purposes. PARC researchers, for example, helped pioneer the printing of [electronic circuits](#) for use in things like sensors, [computer chips](#) and [solar cells](#).

At a separate presentation at the media event, another Xerox researcher discussed how the company is developing technology to print [lithium batteries](#). The company expects its new technique to boost the [storage capacity](#) of the batteries by 20 percent, which could extend the range of

[electric cars](#) or the amount of time you can surf the Web on your smartphone.

The webcam technology is based on scanners Mestha and his colleagues developed for commercial color printers to monitor the colors being printed in real time to make sure they remained true. The system had to be quick, accurate and able to detect changes that might be invisible to the human eye.

About three years ago, he came to the realization that the technology might have uses outside of printing, and specifically in health.

When light hits human skin, some of it penetrates as far as 1 centimeter, Mestha explained. As the light goes below the epidermis, it interacts with blood vessels. The wavelengths of light reflected from below the skin varies as blood pulses through the vessels, and those changes can be detected by the image sensor in a standard webcam, even though they are so minute that our eyes can't see them.

The fluctuations in light correspond directly with pulse rate. And irregularities in pulse rate tend to correspond with arrhythmia, allowing the system to monitor that as well.

The Xerox team is also testing the system to monitor patients' blood oxygen levels, which can also be detected by fluctuations in light. And Mestha thinks the system could be used to monitor blood pressure as well, because it can detect blood moving through the network of vessels, the rate of which is determined in part by pressure.

The project is still in its early stages. Before you see doctors or hospitals using webcams to monitor your vitals, the technology will likely have to go through clinical trials to prove its worth and accuracy. The team "still has a lot of work to do," Mestha said. "There are still a lot of

challenges."

If proven to work, the technology has obvious benefits. The set up is inexpensive, requiring little more than a standard PC, a webcam fitted with a special lens and the software needed to interpret the data. The system potentially could even be run on a smartphone or a tablet, Mestha said.

It's also noninvasive because it doesn't require patients to be attached to any equipment. Arrhythmia patients, for example, might be able to have their heartbeat monitored while they worked on their computer or rested on their couch.

And the system could allow doctors to monitor patients remotely, whether they were at home in the same town or half a world away.

It's pretty cool what a simple webcam could do. And it's pretty amazing where printing technologies are taking us.

More information: *Troy Wolverton is a technology columnist for the San Jose Mercury News.*

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