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Smart Skin

By [Cade Metz](#)

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One day, your baby monitor will alert you to a great deal more than a crying fit down the hall. Thanks to hundreds of tiny wireless sensors laced into your baby's clothing, you'll be alerted to the slightest changes in temperature, pulse, or movement. Whether your baby develops a fever or has trouble breathing, you'll know about it—in a matter of seconds.

At the University of Texas at Arlington, Zeynep Celik-Butler and Donald Butler are well on their way to creating that sort of all-knowing baby monitor. Just as other scientists are building flexible computer chips and displays, this husband-and-wife team is working to build flexible microsensors, tiny devices supple enough to sit inside a window curtain or an ordinary piece of clothing yet smart enough to detect changes in their immediate surroundings.

"We were watching all the work being done to build transistors and light-emitting diodes on flexible substrates," says Donald Butler, "and we thought, 'Why not put sensors on a flexible substrate as well?'"

They call their project Smart Skin, and they've already demonstrated a prototype that monitors infrared radiation, which means it's also capable of tracking changes in body temperature. In the near future, they hope to build devices that respond to all sorts of other stimuli. "We plan to duplicate another sensing ability of the skin," says Zeynep Celik-Butler, "creating devices that detect touch and pressure." Her husband envisions sensors that monitor changes in air flow, alerting you to, say, an open window or a gas leak.

Their prototype begins with a flexible polymer substrate that can withstand temperatures as high as 752° Fahrenheit. The higher the temperature, the easier it is to deposit the sensing materials on the substrate. In this case, the microsensors are made of yttrium barium copper oxide, a material that responds to infrared radiation.

The project, funded by the National Science Foundation, still has another five years to run, so we may be well into the next decade before such devices are commercialized. There are any number of places these sensors

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could reside, and any number of things they could monitor.

Woven into the uniform of a combat soldier, the sensors might detect toxic chemicals or bacterial agents floating through the air. Worn by a diabetic—just under the skin—they could track insulin and glucose levels. Donald Butler suggests they might soon find a home in the world of robotics. A NASA machine, for instance, could carefully track its surroundings as it moves across Mars or the moon. And then, of course, there's the baby monitor—with a capital M.

Our contributors: Alan Cohen is a freelance writer. Jeremy A. Kaplan is an associate editor, Cade Metz is a senior writer, and Sebastian Rupley is a senior editor of PC Magazine. Lance Ulanoff is executive editor of PC Magazine Online. Executive editor Carol Levin was in charge of this story.

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