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Engineering

Researchers hope to make second skin

A husband and wife team is working on a form of clothing containing microsensors that will be able to measure the wearer's vital signs noninvasively.

By Marc R. Barrera
The Shorthorn staff

Zeynep Celik-Butler, a new researcher at UTA, envisions a day when a T-shirt can show a person's vital signs.

She says "Smart Skin" may enable people to monitor their bodies in a less intrusive way.

That thinking led Celik-Butler and her husband, Donald Butler, to research technology that could change the way people diagnose health problems. "Smart Skin" is made up of flexible microsensors that report various sensory information of an object, such as temperature and pressure, which could, some day, combine to provide a complete sense of touch.

The couple brought "Smart Skin" to UTA, along with a $300,000, three-year National Science Foundation research grant, from Southern Methodist University to join the College of Engineering's Nanofab Center.

"Our long-term aim is to be able to make something that mimics the human skin," Celik-Butler said. "To be able to measure not only temperature, but to be able to measure pressure and to be able to measure flow."

Being a couple, Celik-Butler said, has made the research more thorough.

"It's been a great benefit because the work never ends," she said. "We just integrate it into our lives."

Resources at the Nanofab Center drew the team to UTA, they said.

"I knew a lot of the faculty here, and I decided this seemed like the better opportunity," said Butler.

Patty Wisian-Neilson, an SMU chemistry professor, is collaborating with the Butlers on the project. Neilson has worked with the couple prior to this research and said she was sad to see them go.

"They're topnotch researchers," she said. "It's a great loss for SMU."

Donald Butler,
a new researcher in the College of Engineering, said he came here for the opportunities.

Zeynep Celik-Butler
a new researcher, said smart skin could help diagnose illness in the future.

Wisian-Neilson's part of the research deals with creating a polymer, or plastic, for the sensors to be attached to, which can stand up to higher temperatures and still be flexible.

"When you get flexibility, you often sacrifice stability at high temperatures," Wisian-Neilson said. "We're hoping that the kinds of materials that we're looking at will be better at high temperatures while maintaining flexibility."

Celik-Butler said commercial polymers are being used until Wisian-Neilson is finished developing hers.

"We're actually using commercially available polymers," Celik-Butler said. "Patty Wisian-Neilson is making custom-made polymers for us that we are going to integrate our devices on, but we are not at that stage yet."

The sensors' ability to flex will allow it to be used in many future applications, Celik-Butler said.

One possibility the team is looking into is putting the sensors in gloves and on the gripping mechanisms of robotic machines. A person operating the robot could someday receive a sense of touch through the glove from whatever object the robot was holding, Celik-Butler said.

She said the sensors could be put in other clothing, such as T-shirts, to monitor vital signs of the person wearing it. This could help monitor and prevent sudden infant death syndrome without having to use irritating taped wired sensors, she said.

"That's the whole idea about distributed sensoring," Celik-Butler said. "They will not be individual devices. They will be integrated into clothing so that it would be nonintrusive."

Butler, whose research has just completed its first year, said the creation of such a device is still far off.

"Right now, the performance is not that high, and we're working to increase the performance of the sensors that we've prepared," he said. "The sensors that we're doing right now are basically thermal sensors."

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