Dallas-Fort Worth TechBiz

Qualify for a free print subscription Go!>>

HOME | SUBSCRIPTIONS | ADVERTISING | ARCHIVE SEARCH | CONTACT US

THE NEWS SOURCE FOR METROPLEX TECHNOLOGY LEADERS

SMU peels back layers of ‘smart skin’ project

9/3/2001

By Pavan Lall

Professors at Southern Methodist University have started work on a technology platform that will be used to develop “smart skin.”

The technology is expected to be ready for transfer to commercial use in about three years, which, depending on the timing, could mark the second commercial association for the university.

Called Micromachined Infrared Sensors on Flexible Substrates, or Misfs, the project’s applications are diverse.

“The markets we want to tap into include the physiological monitoring of infants, elderly and injured; smart suits for robots, astronauts, firefighters and soldiers, and for manufacturing, defense and surveillance applications,” said Zeynep Celik-Butler, an electrical engineering professor at SMU.

The project officially began early August, she said, adding that the team received a three-year, $300,000 grant from the National Science Foundation to develop the technology. A team of three professors and three doctorate students work on the project, she said.

While existing polymers cannot withstand temperatures warmer than 300 degrees Celsius, SMU’s research team estimates that their polymers can be used in temperatures as hot as 350 degrees Celsius. The smart-skin material being used is infrared-sensitive.

The sensors embedded in the substrate are about 40 microns square — one and a half times the width of a human hair, Celik-Butler said. A substrate is a kind of polymer based on phosphorus and is the substance on which the smart skin is built. The research team at SMU is examining different substrate alternatives, Celik-Butler said.

The team is conducting its research at the nano-photonics facilities at SMU, commonly referred to as the “clean room” for fabrication, and SMU’s solid-state device characterization laboratories. It also uses the chemistry labs for synthesis of the polymers, she said.

OPINION
MONEY
CALENDAR
PERSONNEL FILES
INNOVATORS
TECH KNOWLEDGE

Other technology news

Mass High Tech
(news from the New England Area)

Potomac Tech Journal
(news from Washington D.C., Northern Virginia, and Maryland)

Front Range TechBiz
(news from Colorado)

American City Business Journals
(news from 41 Business publications around the country)

For defense applications, the development of a “flexible skin” will include the distribution of sensor arrays capable of measuring various pressure levels, temperature and radiant energy, Celik-Butler said. Because the micromachined sensors are developed on the surface of a polymer substrate, it will be possible for robots with the skin to track the motion of thermal objects such as people.

“In addition, chemical analysis is possible. The substrates would allow people to monitor physiological parameters such as glucose and insulin levels, and scan for bacteriological agents and toxic gases,” Celik-Butler said.

Challenges for the technology include developing a pliable substrate.

“Current device fabrication technology is based on silicon, which is rigid,” she said. “Developing an integrated flexible substrate is one of the challenges. Developing interconnects and distributed infrared sensors that can function after repeated bending and flexing is a big challenge.”

However, the team already has a prototype that is ready for demonstration.

“We have a 1x10 array of microbolometers of different sizes,” Celik-Butler said. “These have shown a high response to infrared light in the range of 0.6 to 15-micrometer wavelength with low noise. They seem to survive flexing with a minimal change in characteristics.”

Sensatex/Lifelink Inc. is a Dallas company that has developed a shirt which incorporates washable interconnects between sensors.

“I think (the Smart Skin) is a technology that would be greatly complementary to Sensatex’s substrate fabric,” said Sundaresan Jayaraman, chairman of Sensatex’s scientific advisory board. “Research that gets into the small device level will have future widespread applications.”

EMAIL ARTICLE TO A FRIEND...

Home | Subscriptions| Contact Us | Advertising

Privacy Policy | User Agreement