Docket #: S06-190

Flexible Pressure Sensors

Researchers in Professor Zhenan Bao's group at Stanford University have created a thin-film pressure sensor device structure so sensitive it can detect the slightest touch. This ultrasensitive, highly flexible electronic sensor can detect something as light as a small fly of 20mg landing on it. The underlying architecture of the new sensor is a thin film of rubber molded into a grid of tiny pyramids and placed between two electrodes. The researchers have already produced a sheet of sensors that exhibited a great deal of flexibility, indicating the technology should perform well when wrapped around a surface mimicking the curvature of the human hand or the sharp angles of a robotic arm. This is a simple, cost effective technology for producing large arrays of tiny, high-resolution pixels; potential applications include electronic skin, prosthetics, biomedical applications, automobile industry, robotics, and touch sensors for displays and toys. A closely-related technology is Stanford Docket No. S10-252, “Three-dimensional Touch Technology for Intuitive Human-Computer Interaction,” invented by Zhenan Bao and Benjamin Tee.

Researchers can measure the pressure from a butterfly registered by the sensors.

NPR "All Tech Considered" Feature
"Just Like Human Skin, This Plastic Sheet Can Sense And Heal", April 11, 2016

Applications

- Pressure sensors
- Liquid or gas flow sensors
- Weight measuring device
- Tactile sensors
- Artificial skin for use on prosthetic limbs or robots
- Biomedical (”feel” the cancer cells vs. healthy cells, for example)

- Pressure sensors for biomedical devices
- Can be used on a transistor/semiconductor to get current read-out
- Touch sensors for displays and toys

Advantages

- Highly sensitive
- Quick rebound time
- Can be used on flexible substrates
- Can be made stretchable
- Easily integrated into existing technologies that make touchscreens

Publications

- Stefan C. B. Mannsfeld, Benjamin C-K. Tee, Randall M. Stoltenberg, Christopher V. H-H. Chen, Soumendra Barman, Beinn V. O. Muir, Anatoliy N. Sokolov, Colin Reese, Zhenan Bao, Highly sensitive flexible pressure sensors with microstructured rubber dielectric layers, Nature Materials, published online September 12, 2010.
- Bergeron, Louis, Stanford researchers' new high-sensitivity electronic skin can feel a fly's footsteps, Stanford University News Services, published online 12 September 2010.

Patents

- Published Application: 20120062245
- Published Application: WO2012034121
- Published Application: 20160187209
- Issued: 9,281,415 (USA)
- Issued: 10,545,058 (USA)

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