Japan team develops micro-thin electric circuit

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A nurse checks a patient's blood pressure on July 10, 2012 in Los Angeles, California. A flexible electrical circuit one-fifth the thickness of food wrap and weighing less than a feather could give doctors the chance to implant sensors inside the body, its Japanese developers say.

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The team at the University of Tokyo said the device on an ultra-thin film is unique since it works even after it has been crumpled into a ball or stretched.

Researchers unveiling the circuit said it could be used to monitor all sorts of physical data, such as body temperature and blood pressure as well as electronic pulses from muscles or the heart.

For people who can only move their tongue, the sheet might be placed on the roof of the mouth and serve as a touch pad to operate a communications device, team members said.

"This can be attached to all sorts of surfaces and does not limit the movement of the person wearing it," said professor Takao Someya of his research, which was being published in the journal *Nature* on Wednesday.

Healthcare sensors often use silicon and other relatively rigid materials that can cause their users some discomfort.

The new flexible circuits should reduce or even eliminate the stress, he said.

The circuit is just 2 micrometres thick—food wrap used in kitchens is typically 10 micrometres—and weighs only 3 grams (0.1 ounce) per square metre, he said.

The product is so thin and light that, when dropped in the air, it slowly falls while gently rolling and rocking, much slower than a bird's feather.

Its creation became possible after the team succeeded in creating a high-quality, super-thin insulating layer, Someya said.

Even in a salty solution, like those found inside the human body, the device worked well for more than two weeks, raising the possibility that it could be placed inside human bodies for data collection in the future.

Someya said more research needed to be done before that could happen.

For example, while the film is nearly imperceptible, its effects on the skin with which it is in contact are not fully known and it is possible that rashes could develop.

And making a reliable power source that is small enough to run the device is also a challenge.

More information: *Nature* Doi: 10.1038/nature12314