NUS team develops mini ECG device

It can be embedded into T-shirt to monitor those with heart problems

By Serene Luo

RESEARCHERS from the National University of Singapore (NUS) have come up with a new way to take an electrocardiogram (ECG) of the heart – with a T-shirt.

The garment, which has the technology sewn into it, will help doctors monitor those who have recently undergone heart surgery and patients with irregular heartbeats. It can also help monitor professional athletes or national servicemen to prevent them from getting sudden heart attacks while exercising.

A team of five from the Department of Electrical and Computer Engineering developed the NUS ECG chip, a tiny, all-in-one speck that requires very little power to operate.

Measuring just 25 sq mm – a quarter of the size of a woman's fingernail – it is perfect for embedding into a T-shirt.

The whole circuit board, which consists of the chip, a wireless transceiver and a slot for a micro storage card, is about the size of an adult's thumb.

The innovative device was funded by a $1.1 million grant from the Agency for Science, Technology and Research.

There are no clunky electrodes or pads to stick to a chest. A special "metal fabric" senses the heart's electrical impulses instead, and a thin fibre conducts these impulses onto the circuit board.

There are a few mobile devices for monitoring patients, but they use clunky electrodes which can get tangled up. Should these wires get detached from the chest, a patient must return to the hospital to get them replaced.

That also means no showers for the next few days, said Associate Professor Lian Yong, 40, the engineering team's leader and the department's deputy head of research.

Dr Abdul Razakjr, 39, consultant cardiologist at the National University Heart Centre Singapore, said he was looking for a small, robust and mobile device to help him keep an eye on patients with heart palpitations or sudden fainting spells.

When that happens, their hearts may stop for a few seconds, but by the time they reach the clinic, the elusive, erratic heart rhythm is gone, he said.

"We also don't have enough data on what goes on in the heart in the five to 10 minutes before a person dies," Dr Razakjr said, noting that such an easy-to-use system may point out warning signs in people who collapse and die suddenly.

Prof Lian said the team took the better part of the past three years to develop the ECG chip, and spent the past five months trying out ways of incorporating the monitoring system into a T-shirt.

The team has filed a patent on the chip, and is discussing with doctors and the defence sector on carrying out trials soon.

Next up for the team are steps to modify the circuit board so it is flexible enough to be put on an adhesive layer, just like a plaster. This can be stuck onto the body directly, without any need for a T-shirt.

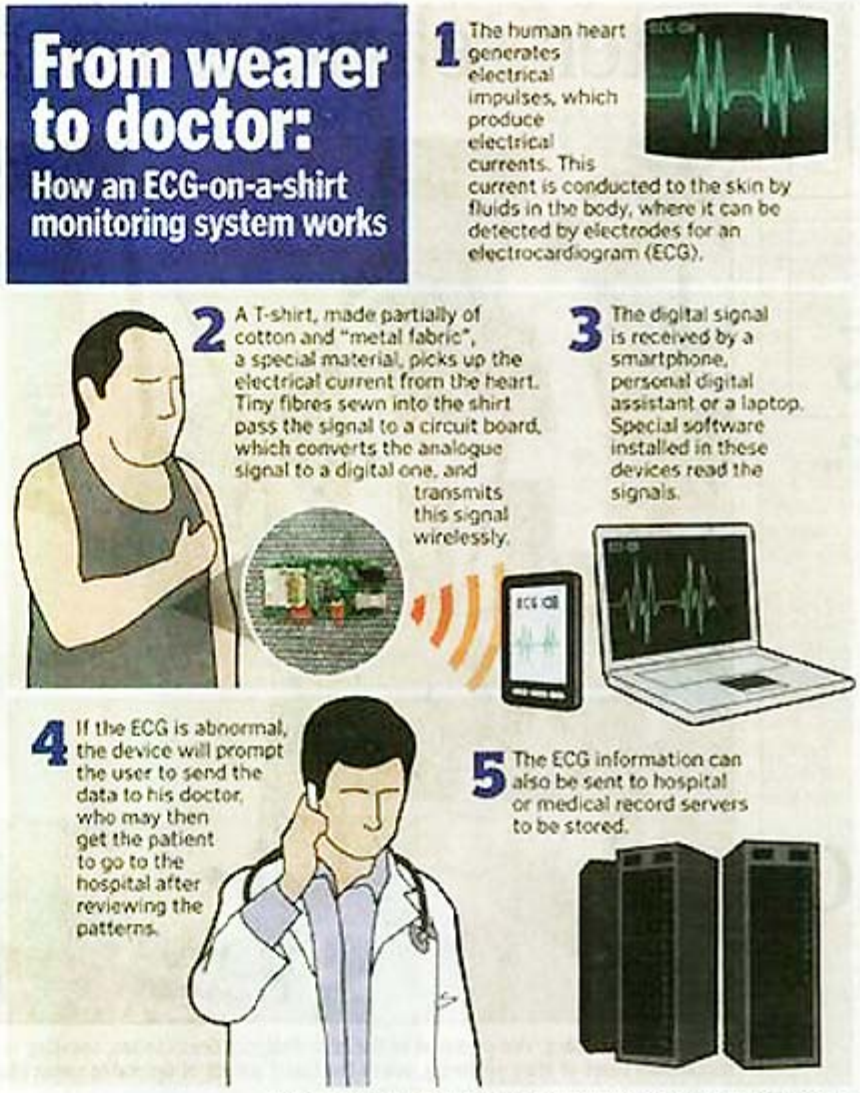
The team is also looking at modifying the T-shirt ECG monitoring system to help asthma patients.

A microphone may be embedded on the T-shirt to record a patient's wheezing sounds.

serl@sph.com.sg

From wearer to doctor:

How an ECG-on-a-shirt monitoring system works



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