NUS team develops mini ECG device

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

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 spec 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,” said associate professor Lian Yong, 49, the engineering team’s leader.

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.

The team made no showers for the next few days, said associate professor Lian Yong, 49, the engineering team’s leader.

Dr Abdul Rashid, consultant cardiologist at the National University Heart Centre Singapore, said he was looking for a small, robust and mobile device to help 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 Rashid 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.

Registry to help combat heart attacks

ABOUT 1,000 people here collapse from sudden cardiac arrest away from medical care every year. Less than 30 survive.

To lower this mortality rate, a new online registry has been established by the Singapore Heart Foundation to let people know where the nearest automated external defibrillators (AEDs) are located in public areas like shopping malls, hotels and country clubs.

Cardiac arrests occur when the electrical signal that keeps the heart beating is disrupted, causing the heart to stop.

An AED, which can be used by a person without any training, applies an electric shock to get the heart going again.

It is useful for heart patients and their family members to know where these life-saving devices are located, said Prof Chua, chairman of the foundation and the National Heart Centre’s deputy medical director.

The list currently has 70 establishments and the number is expected to grow as more organisations come on board.

AED use here is still low because the devices have started to spring up only in the last two years. There are also not enough people here trained in cardiopulmonary resuscitation, said Prof Chua.

He hopes these figures will go up with greater awareness. Cities like Seattle in the United States and Gothenburg in Sweden boast cardiac arrest survival rates in excess of 40 per cent. The registry was launched in conjunction with World Heart Day and the annual Heart Fair, which will be held this weekend at the open field beside Causeway Point mall in Woodlands.

A “heart age” calculator has also been launched online for users to assess their risk of cardiovascular disease, which continues to be the top killer here – claiming 15 lives daily. More details can be found on www.myheart.org.sg