

Smartphone detects atrial fibrillation with existing hardware

August 27 2016

Smartphones can be used to detect atrial fibrillation with existing hardware, according to research presented at ESC Congress 2016 today. A low-cost application (app) has been developed that uses the phone's own accelerometer and gyroscope to check for atrial fibrillation.

"Atrial fibrillation is a dangerous medical condition present in 2% of the global population and accounting for up to seven million strokes per year," said lead author Tero Koivisto, a vice-director of the Technology Research Centre (TRC), University of Turku, Finland. "In the European Union alone this heart rhythm disorder costs approximately USD \$19 billion every year."

Around 70% of strokes due to [atrial fibrillation](#) could be avoided with pre-emptive medication. However, atrial fibrillation often occurs randomly on/off and is difficult to detect by visiting a doctor. There are relatively large and costly electrocardiogram (ECG) devices that patients can take home for long-term monitoring but they require a patch or wires that are clumsy to use and continuous contact with electrodes tends to irritate the skin.

Due to the above constraints, current methods for detection of atrial fibrillation are infeasible for wide-scale screening of populations or higher risk age groups (60 years and above).

The current study tested the ability of a [smartphone](#) to detect atrial fibrillation without any add-on [hardware](#). The study included 16 patients

with atrial fibrillation from the Turku Heart Centre. In addition, 20 recordings from healthy people were used as control group data to validate the developed algorithm.

To detect atrial fibrillation, a smartphone was placed on the chest of the patient, and accelerometer and [gyroscope](#) recordings were taken. Patients were advised to lie in a prone or supine position during the measurements.

Mr Koivisto said: "We use the accelerometer and gyroscope of the smartphone to acquire a heart signal from the patient. A measurement recording is taken, and the acquired data is pre-processed by signal processing methods. Multiple features such as autocorrelation and spectral entropy are then extracted from the pre-processed data. Finally, a machine learning algorithm (KSVM) is used to determine if the patient suffers from atrial fibrillation."

Using this technology the investigators detected atrial fibrillation with a sensitivity and specificity of more than 95%.

"We measure the actual motion of the heart via miniature accelerometers and gyroscopes that are already installed in today's smartphones," said Mr Koivisto. "No additional hardware is needed and people just need to install an app with the algorithm we developed."

He continued: "If people feel odd and want to check their cardiac status, they can simply lie down, place the phone on their chest, take an [accelerometer](#) and gyroscope measurement, then use the app to analyse the result. They will get a simple yes/no answer as to whether they have atrial fibrillation or not."

Mr Koivisto concluded: "This is a low cost, non-invasive way to detect atrial fibrillation that people can do themselves without any help from

medical staff. Given the widespread use of smartphones, it has the potential to be used by large populations worldwide. In future, a secure cloud service could be created to store and analyse larger masses of data."

More information: "Detecting atrial fibrillation via existing smartphones without any add-ons" ESC Congress 2016.

Provided by European Society of Cardiology

Citation: Smartphone detects atrial fibrillation with existing hardware (2016, August 27)
retrieved 23 April 2024 from

<https://medicalxpress.com/news/2016-08-smartphone-atrial-fibrillation-hardware.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.