MedicalXpress

Hearing brainwaves: Epilepsy EEG sonified

July 16 2013

A simple method of converting the brain wave signals of people living with epilepsy into sound has been developed by a team of researchers at the University of Sydney.

The method, known as sonification, is an auditory display technique for representing a sequence of data values as sound, says Dr Alistair McEwan, who coordinated the team's work.

"An electroencephalogram (EEG) records and measures the electrical activity of the brain. The key brain wave signals associated with epilepsy repeat about five times per second. But this frequency is too low for the human ear to hear, so using sonification we speed up the signal by 60 times.

"At that speed, normal brain activity becomes audible and sounds like normal background noise, for example, a murmur of voices and a squeaky computer or air conditioning fan.

"Seizures are easily identified as they are associated with a rapid increase in pitch. They sound like a whoopee cushion," says Dr McEwan.

EEG, or monitoring of brain waves, is the best diagnostic tool and most common test used to diagnose epilepsy. However, learning how to diagnose epilepsy is difficult, labour intensive and takes years to master. The sonification team's method has been tested on a group of non-experts.

Dr Heba Khamis says: "What is great is that participants in our study at the University of Sydney's Faculty of Engineering and Information Technologies spent two hours in a training session where they learned how to audibly distinguish between seizures and some common sounds.

They were asked to perform unaided audio detection of 644 hours of EEG data that contained 46 seizures.

"We found the participants' accuracy in audio detection was very similar to the accuracy of visual detection. And training for visual detection requires a full year of training," says Dr Khamis.

In Australia alone there are as many as 800,000 individuals living with the condition.

Because this audio detection method only requires a few hours of training, it offers an exciting possibility for a person living with epilepsy or their carer to collect information about their condition.

Working in conjunction with the medical specialists, this information would be valuable for assessment and determination of medication regimes.

A patient faced with the frightening unpredictability of epileptic seizures would know that they are in some sense taking charge of their condition.

The researchers hope to take their pioneering research to the next phase of clinical trials and develop a portable EEG system.

Provided by University of Sydney