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[Medicine] NCKU Brain Mind Welfare Group Presents Seizure Detection and Suppression System

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NCKU News Center (2010/07/14) The interdisciplinary research team “Brain Mind Welfare” (BMW) at National Cheng Kung University, consisting of experts from fields such as information engineering, medical information, social science, etc., has succeeded in developing a seizure detection and suppression system after its three-year effort, and the system has passed tests on mice. The result has been accepted by IEEE Instrumentation and Measurement.

NCKU-BMW's seizure detection and suppression system combines modules of brain-wave sensor, electro-stimulator, computing unit and wireless transmitter; it can detect and suppress absence and drug-induced epilepsy, with the detection rate of 92 to 99 % both in patient's conscious state or sleep, and it can give electro-stimulus within 0.6 second after the detection of seizure.

According to the team, seizure is one of the most common neurological disorders, but only 25% of the patents can be treated with present drug or surgery treatments. Closed-loop deep brain stimulation is an innovating and efficient alternative treatment, which suppresses epilepsy by realtime monitoring and giving instant electro-stimuli. However, breakthroughs regarding its stability under the interference from mental state variations, its detection efficiency and the computing ability on a mobile device, have been waited for for a long time.

The team BMW began to develop the system since 2007. The design concept is based on closed-loop deep brain stimulation, while the system puts together multiple functions including brain wave detection and analysis, brain wave amplifying and digitalization, realtime wireless signal transmission, brain stimulation control, testing platform for epilepsy patients, etc. The accomplishment of the system is the result of the cross-field cooperation among information technology, micro-electronic engineering, wireless transmission technology, signal analysis, bio-modelling and psychological behavior analysis of epilepsy patients.

The system's wired prototype has passed detection and suppression test on mice. In the future, the team will try to shrink the system into a single SoC. Besides, the system is going to receive clinical experiments in Hualien Buddhist Tzu Chi General Hospital.

Further Information:
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