A mobile magnifying glass for the brain

UDE engineers develop modular ExG system for classroom experiments

UNIVERSITÄT DUISBURG ESSEN

Open-Minded

Scientists at the University of Duisburg-Essen's Institute of Electronic Components and Circuits have been researching and developing solutions for recording biopotentials for diverse applications over many years. The concept they are currently presenting is for a modular ExG system (EEG, ECG and EMG) for classroom experiments. These types of systems are indispensable for group experiments in which the synchronous stimulus response of multiple subjects is to be compared simultaneously, as used in cognitive and clinical research and neurophysiology.

The very promising development engineers from the University of Duisburg-Essen (UDE) are presenting at MEDICA 2014 is both gentle on the patient and more convenient for the physician: a wireless mobile multi-ExG system which transmits signals from the brain, heart or muscles and can be fitted into a cap or a shirt.

EEG examinations today are unpleasant: patients lie in a treatment chair, with conductive gel smeared in their hair and a rubber cap on their head, wired up to bulky boxes. Yet it would be more effective – for example to monitor conditions such as epilepsy – if electrical brain signals could also be recorded with the patient moving around freely and over a longer period of time.

The UDE engineers Unmesh Ghoshdastider and Dr. Reinhard Viga from the Institute of Electronic Components and Circuits (EBS) have come up with a solution: working with a medtech company, they have devised an ExG system that measures electrical activity in the brain (EEG), heart (ECG) and muscles (EMG). The components and electrodes of this modular assembly can be connected flexibly according to the type and number of curves to be recorded.

Another advantage is that the system is light and slim enough to be worn in an item of clothing. It is battery powered and can run for hours, continuously transmitting biosignals to a standard computer by radio. „One of the key features of this system is that entire groups of people can be monitored simultaneously, which makes it possible to study their interactions and reactions to events," Viga remarks, citing a few fascinating examples: „What goes on in the minds of footballers and the goalkeeper during a penalty? How differently do viewers react to film scenes? Or how synchronous is the response of dance partners to their music?".

These are the kinds of questions concerning cognitive and clinical research and neurophysiology. The new system, which received funding from the federal government, would be of interest in all these areas, but also in regular neurological applications. „Regrettably," says Viga, „it only exists as a research platform so far. Nevertheless, the hardware and software technologies have been developed, and soon they should be available in telemonitoring devices, brain-computer interfaces and ExG products."

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