Portable low-cost device for examination of visual evoked potentials (VEPs)

Development status

Phase 3

Technology validation and implementing it in real environment. Testing the technology outside of the laboratory and its adjustment to external conditions.

IP protection status

patent granted

Partnering strategy

Collaboration, licensing, spin-off

Institution

UNIVERZITA KARLOVA
Centrum pro přenos poznatků a technologií

Charles University

Challenge

The new portable device for visual evoked potentials (VEPs) examination (registration of the electrical activity of the human brain during a visual stimulation) was developed to enable using of this method outside standard electrophysiological labs (including self-examination/long-term monitoring of VEPs at home). So far existing bulky and expensive devices for VEPs examination has been usable only in specialised labs. This significantly limits applications of this method. On the contrary, the new portable device is about 20 times cheaper compared to the standard VEP equipment and can be simply used in almost any conditions.

Description

The Electrophysiological Laboratory at Charles University - Faculty of Medicine in Hradec Králové (Czech Republic) has developed a novel low-cost 4-channel portable device for examination of VEPs and visual cognitive potentials, built into the ergonomic headset (carrier enabling positioning of the visual stimuli in various parts of the visual field). The portable VEP device consists of a visual stimulator (a matrix of light-emitting diodes with adjustable luminance and colour), producing a large spectrum of monocular or binocular stimuli (including those with a cognitive task) and a recording part (based on a 4-channel EEG amplifiers). Two dry electrodes placed in a fixating belt of the headset record signal from the forehead and two additional recording electrodes can be freely located over an activated part of the brain cortex (according to the used variant of visual stimuli). The recorded cortical reactions are transmitted via an USB port to a PC for on-line processing, VEP display and their off-line evaluation. The device is equipped with a sensor of the background luminance (allowing an autonomic regulation of the stimulation luminance) and with a 3D accelerometer enabling rejection of the signal contaminated with artefacts caused by examinee’s movements during examination.

Commercial opportunity

This is currently the only mobile VEP device, thus it is usable at all patients bed-sides (without a need to transport patients to a standard electrophysiological lab). The possibility of a long term monitoring (at home or during working activities) can be useful for some patients in whom a recognition of functional changes of the central nervous system is important. It can be used not only in the medical sector but also for a needed early detection of fatigue and sleepiness in various professions or for a demonstration of brain functions at bio-medical schools. So far the device diagnostic applications are mainly for neuro-ophthalmological and psychiatric diseases e.g. Multiple Sclerosis, Optic Neuritis, Amblyopia, age related visual disorders, encephalopathies but it could be enlarged.