World Academy of Science, Engineering and Technology
International Journal of Bioengineering and Life Sciences
Vol:16, No:08, 2022

Design and Development of Ssvep-Based Brain-Computer Interface for Limb Disabled Patients

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Abstract : Brain-Computer Interfaces (BCIs) give the possibility for disabled people to communicate and control devices. This work aims at developing steady-state visual evoked potential (SSVEP)-based BCI for patients with limb disabilities. In hospitals, devices like nurse emergency call devices, lights, and TV sets are what patients use most frequently, but these devices are operated manually or using the remote control. Thus, disabled patients are not able to operate these devices by themselves. Hence, SSVEP-based BCI system that can allow disabled patients to control nurse calling device and other devices is proposed in this work. Portable LED visual stimulator that flickers at specific frequencies of 7Hz, 8Hz, 9Hz and 10Hz were developed as part of this project. Disabled patients can stare at specific flickering LED of visual stimulator and Emotiv EPOC used to acquire EEG signal in a non-invasive way. The acquired EEG signal can be processed to generate various control signals depending upon the amplitude and duration of signal components. MATLAB software is used for signal processing and analysis and also for command generation. Arduino is used as a hardware interface device to receive and transmit command signals to the experimental setup. Therefore, this study is focused on the design and development of Steady-state visually evoked potential (SSVEP)-based BCI for limb disabled patients, which helps them to operate and control devices in the hospital room/wards.

Keywords : SSVEP-BCI, Limb Disabled Patients, LED Visual Stimulator, EEG signal, control devices, hospital room/wards
Conference Title : ICABERD 2022 : International Conference on Advances in Biomedical Engineering, Robotics and Devices
Conference Location : Montreal, Canada
Conference Dates : August 08-09, 2022