A HYBRID APPROACH FOR EMERGENCY FEEDBACK SYSTEM USING BRAIN COMPUTING INTERFACE

By

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Abstract

In the advancement of the technology, humans have been used as a part in brain computing interface field. BCI provides a communication pathway between wired brain and extraneous devices using electroencephalography (EEG) signals. EEG is the signal technique in BCI field which is used to track and record brain patterns from surface of the scalp using different electrode locations which sends the signal to computer to record results. In the BCI research field, Neuro-prosthetics applications are focused primarily, which purposes is to restoring discredited hearing, visual perception and apparent movement of organs. Brain Machine Interface has turned to a great research field that consists of many challenges in neurobiology. Patients in a locked in syndrome (LIS) on account of wicked neurological disorders involve unseamed emergency care by their caregivers or guardians. Nevertheless, it is a very hard job for the guardians to endlessly monitor the patients' state, particularly when there is no possibility of direct communication. There have been existing research studies to enforce P300, Steady State Visual Evoked Potential (SSVEP) and Hybrid speller applications which have not been validated on patients with LIS diseases. Hence, their clinical value has not been validated. They worked on spelling the characters, words, cursor movement, and spelling of numerical values.

In the present study, an Emergency Feedback System has been developed for such patients using Hybrid approach which consists of combination of Steady State Visual Evoked Potential (SSVEP) and P300 Event Related Potentials (ERPs). In order to affirm the usability of System interface, three Healthy participants have been invited for experimentations. Further, three LIS Patients have been invited to check the clinical feasibility of Emergency Feedback System. All the Healthy participants and LIS Patients have succeeded in providing commands to our Emergency Feedback System precisely. The average accuracy to perform a single session has been reported 88.32% for all Healthy participants while the average accuracy to perform a single session has been measured 85.66% for all LIS Patients. Beside these, the average time required to execute a command has been measured 14 bpm for all Healthy participants while for the LIS Patients, it has been reported 6 bpm per command.

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