

BRAIN-COMPUTER MUSIC INTERFACE FOR PROSTHETIC HAND

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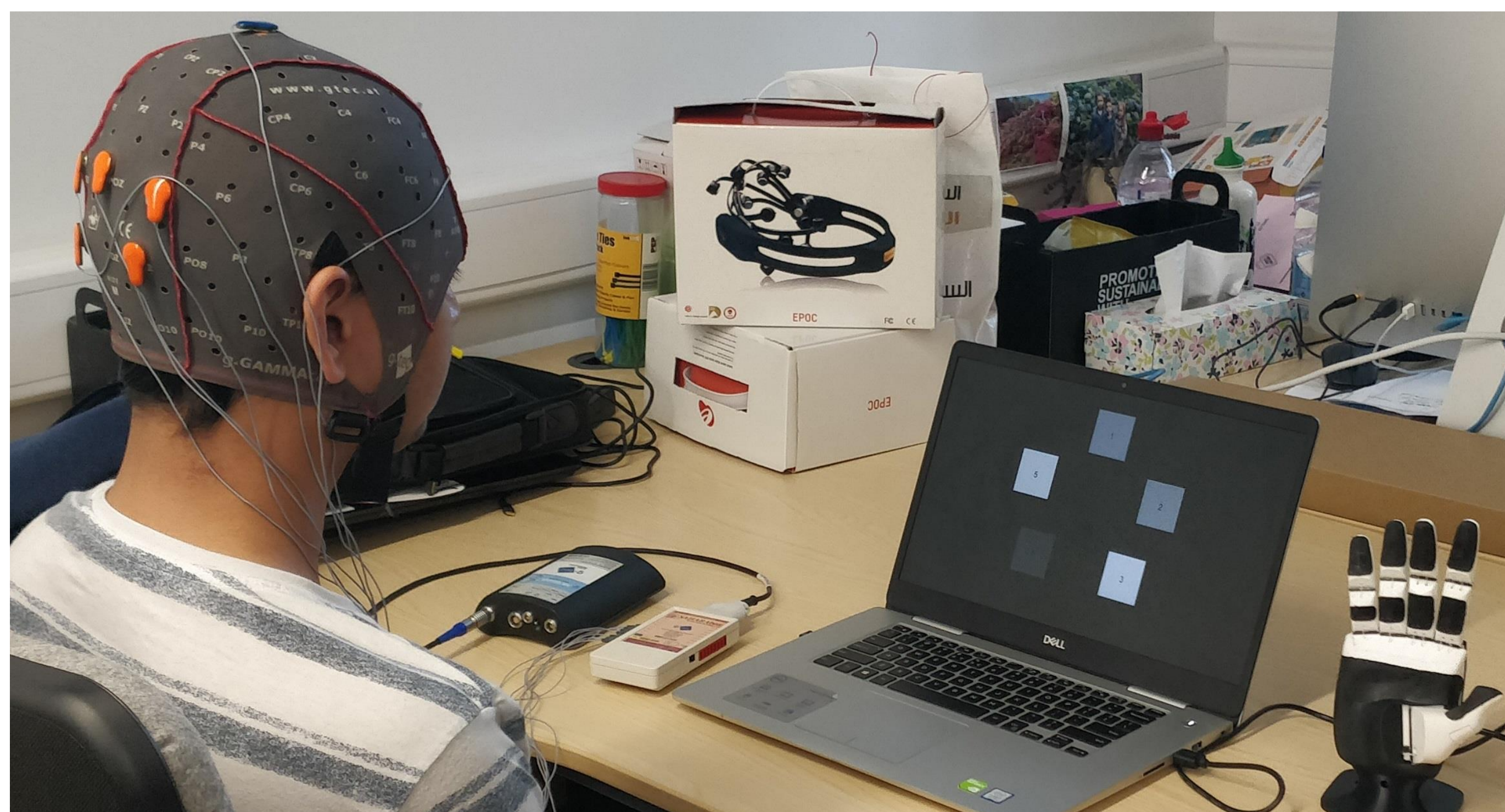
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The research focuses on the use of Brain Computer Interface (BCI) system for applications on prosthetic hand. BCI is a communication system that translates brain activity into commands for computer or other devices. My research helps patients suffering from severe motor impairment to make music.

1. Prosthetic hand controlled by eye-gazing at screen

The application of BCI is done by a technique, steady gazing at the flickering regions on the screen of different frequencies called Steady-State Visually Evoked Potential (SSVEP).



2. Acquisition of brain waves using portable device

The brain data is acquired through non-invasive method Electroencephalogram (EEG). By the use of equipment g.tec GAMMASys cap connected to electrodes, g.SAHARA box and g.MOBilab+ EEG signals are obtained.



3. Improving brain signals quality

The EEG signals acquired through hardware equipment are sent into computer through a platform called Openvibe and further the signal quality is improved by filtering the noise. Later it undergoes statistical analysis called Canonical Correlation Analysis (CCA) in MATLAB. CCA is the correlation between multiple frequencies and gives the maximized frequency as output.

4. Making the acquired EEG data to control the prosthetic hand

The output after CCA is the frequency recorded in brain from gazing at flickering regions on Computer screen. The prosthetic hand (Open Bionics Brunel hand) is Arduino based device and a communication network is established between hand and the system through Serial Communication.

The prosthetic hand is programmed to actuate the fingers corresponding to the acquired EEG data, which leads to play notes of keyboard when hand is kept on the keyboard, making music.

