Project: BCI Speller

Motivation: I have closely seen the life of a locked-in patient with a good cognitive ability. When I came across the Speller project, I realized its importance to bring comfort in the lives of the patients by easing the communication to some extent. If the patient is able to convey the emotions along with some textual details, it would be beneficial for the caregivers as well as the relatives of the patient. My focus will be to increase the speed and accuracy of communication as well as to keep the cost low, for greater availability.

locked in syndrome communicate ...
fanaticalfuturist.com

A woman with locked-in syndrome
Image courtesy of Flickr

Goals: Speller project is divided into following three stages:

1. Demonstrate the function of P300 Speller, with Convolution Neural Network (CNN) classifier. It involves generating a large set of training data, training the CNN model and running the online experiments with the trained CNN model. This stage requires an understanding of Oddball Paradigm, Machine Learning libraries of Python and OpenViBE BCI platform. Consider this work as a base for the second and third stages. (**Timeline: 3 months**)
2. Modify the above speller project to predict the target character based on different potential features of oddball. It uses the same dataset generated in stage 1. This stage aims to identify different components of oddball (Shannon surprise), apart from p300. (**Timeline: 3 months**)
3. Design an experiment (may or may not be speller) which will detect "Surprise as a whole (Bayesian Surprise + Shannon Surprise)" and demonstrate its function. (**Need to fix a time**)

This project is well suited to students of electronics/computer science background.

Note: Stage - 1 and 2 of this project have already been done with EEG device “Muse-2”. However, we want to repeat all the experiments with the EEG device available in the university for better results.

Please contact Swati Shah (swati.matwankar@gmail.com) or Prof. Dr. Goetz for any further information.