

BCI Assignment - 02

Name: Rahul Katinni

Roll: S20200010091

P300 EEG Paradigm :

The P300 paradigm is an Event Related Potential (ERP) in BCI which is a positive spike observed about 300ms after a periodic or infrequent stimuli is presented. This paradigm is used as a control signal to operate BCI devices. The P300 paradigm response is used in BCI in many aspects like communication, motor control and cognitive assessment. The P300 response has applications in cognitive assessment research and medical diagnosis. It is show that the P300 response is sensitive to a range of mental resources demand on working memory, attention span and also to the information processing speed of different users. The P300 response is used by many researchers to establish a concrete relation between the EEG signals and cognitive workload. In the medical field the P300 response is used associate the mental condition of the user with a range of neurological and psychiatric conditions, such as Attention Deficit Hyperactive Disorder (ADHD), Schizophrenia and Alzheimer's disease. Another BCI application

associated with the P300 paradigm is its application in the motor control BCI devices. In these devices the P300 is used by measuring the response of the user when presented by a stimuli corresponding to a range of movements, such as turning right, going backward... Etc. Here the P300 response is used to control external devices such as prosthetic limbs and wheelchairs. The most popular use of the P300 response in BCI is the P300 BCI Speller which user with motor disabilities to spell words and communicate with the outside world. In the P300 speller the words are spelled by recording the P300 response of the user to the blinking of letters. This is effective because there is no response for the random blinking of non-target letters, the P300 is only observed when the letter that the user is thinking about or is concentrating on blinks. This makes the P300 speller an efficient tool that can help people with motor disabilities type with a relatively good speed. In the end, we can say that the P300 has many application not only is BCI but also in the medical field for diagnosis of different cognitive deficits and is an effective measure for designing and building BCI tools for people with motor disabilities and for the analysis of various cognitive processes.