

A Prototype P300 BCI Communicator for Sinhala Language

U. K. D. N. Manisha^a, S.R. Liyanage^{b*}

^a *Department of Computer Systems Engineering, Faculty of Computing and Technology, University of Kelaniya, Sri Lanka*

^b *Department of Software Engineering, Faculty of Computing and Technology, University of Kelaniya, Sri Lanka.*

A Brain-Computer Interface (BCI) is a communication system which enables its users to send commands to a computer using only brain activities. These brain activities are generally measured by ElectroEncephaloGraphy (EEG), and processed by a system using machine learning algorithms to recognize the patterns in the EEG data. The P300-event related potential is an evoked response to an external stimulus that is observed in scalp-recorded electroencephalography (EEG). The P300 response has proven to be a reliable signal for controlling a BCI. P300 speller presents a selection of characters arranged in a matrix. The user focuses attention on one of the character cells of the matrix while each row and column of the matrix is intensified in a random sequence. The row and column intensifications that intersect at the attended cell represent the target stimuli. The rare presentation of the target stimuli in the random sequence of stimuli constitutes an Oddball Paradigm and will elicit a P300 response to the target stimuli. Emotive EPOC provides an affordable platform for BCI applications. In this study a speller application for Sinhala language characters was also developed for Emotiv users and tested. Classification of the P300 waveform was carried out using a dynamically weighted combination of classifiers. A mean letter classification accuracy of 84.53% and a mean P300 classification accuracy of 89.88% was achieved on a dataset collected from three users.

Keywords: Brain computer interfaces, EEG, P300 Speller