

## EEG-based Mental Rehabilitation for War-Affected Armed Forces

K.G. Kuruppu<sup>1\*</sup>, and H.K.S. Amarakeerthi<sup>1</sup>

<sup>1</sup>*ITRC, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura, Sri Lanka*

<sup>2</sup>*Faculty of Technology, University of Sri Jayewardenepura, Sri Lanka*

\**kasun.itrc@sjp.ac.lk*

The understanding of human emotions for developing applications is a new avenue in human computer interface. In the Sri Lankan context, military troops and other individuals involved in war are generally suffering from post-war negative mental conditions. Although different types of rehabilitation programs are being conducted currently, brain Computer Interface technology, which was at first used for disabled people, is used for entertainment, memory capacity improvement, brain activity development of healthy people. Gaming is one such application of this concept. Thus, Brain Computer Interface technology could be effectively utilized in the process of mental rehabilitation for war-affected armed forces and individuals with emotional control disabilities. In this research, we separate one emotion and use it as a parameter which was represented in the game. This separated parameter is not merely a parameter but that logically connect with the real-life characteristics which will assist to the subjects to control emotions in critical situations. By practicing this game, subjects will be trained to eliminate negative emotions. Detection of emotions during gaming is the basic concept behind the mechanism. Using emotions for therapeutic aspects by training elimination of negative emotions through BCI game has never been done before. Therefore, previous literature available is relatively less in this area. In this research we focus on identifying human emotion, anger as the negative emotion with wireless 16 biosensor EEG head set and use anger driven game for monitoring the ability to self-control the emotion. Furthermore, statistically compare efficiency of detecting anger with relatively low electrode number and a few features. In this paper it is discussed how anger can be separated from the other closely coupled emotions like frustration and sadness. The results will conclude the best feature extraction method for emotion separation and the best combination of electrodes for the emotion, anger. Finally, we statistically analysed the effectiveness of real time EEG based Game which will help people to identify negative emotions as quickly as possible when it occurs, and train them to eliminate such blocking emotions and possibility to use this as a tool to help patients effectively.

**Keywords:** *Anger detection, Brain computer interface, EEG, Emotion classification, Feature selection.*