ABSTRACT

The World Health Organization (WHO) reports that 76% of individuals aged 18 and above experience online gaming addiction. Online games are digital activities that can only be played when users are connected to the internet. While online gaming can provide positive impacts, such as reducing stress and enhancing teamwork, excessive gaming can lead to negative consequences, disrupting daily activities and routines. To diagnose such behavior, psychologists typically observe decision-making and inhibitory control processes. The accuracy of these methods can be improved with the aid of electroencephalography (EEG) signal measurements. EEG signals are processed to identify Event-Related Potential (ERP) components, particularly within the 200–500 ms time range after a stimulus is provided.

This capstone design project aims to develop a web-based system for recording stimuli to elicit brain responses and generate relevant EEG signals. Additionally, the project includes creating a classification system to identify ERP P300 components in problematic online gamers. The proposed solutions involve developing a web-based application named NEUROGO to administer Go/No Go Association Task stimuli and employing EEG signal classification algorithms based on machine learning, specifically Convolutional Neural Network (CNN).

The outcomes of this capstone design project consist of a website system and a classification system. The website system achieved an average score of 4.71 across all evaluations, indicating high user satisfaction. In the classification system, machine learning models demonstrated the best performance with features 2 and 3, using inputs processed with Fast Fourier Transformation (FFT) into 2D signal representations/images. The CNN model using FFT inputs outperformed other input formats, delivering the highest classification accuracy.

Keyword : ***classification,*** **CNN,** ***electroencephalogram, ERP, machine learning***.