Brian Computer Interfacing for Game Controlling

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Declaration

I declare that this dissertation does not incorporate, without acknowledgment of any material previously submitted for a Degree or a Diploma in any University and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organization.

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Dedication

Many decades' efforts of many talented individuals have resulted in the techniques of Artificial Intelligence occupying a central place throughout the discipline of computing. The capacity for intelligent behavior is now a central part of people's understanding of and experience with computer technology. Thus, this thesis work is dedicated to all the exceptional men and women who contributed to the growth of Artificial Intelligence.

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Abstract

The way human interacts with electronic games has changed in a dramatic manner in the past decade. Many individuals utilize mouse, keyboards, joysticks and even motion sensors in order to provide input commands to various computer gaming applications. Nonetheless, above mentioned modes of interaction has its confines when it comes to individuals with physical limitations such as handicapped and paralyzed. Thus, addressing this problem Neurogaming has become a hot topic in the past few years where brain wave signals namely electroencephalogram signals are used to control different aspects of an electronic gaming application, this approach eliminates the traditional hand coordinated interacting mechanisms allowing even a handicap to interact with a gaming interface with ease.

The main objective of the research has been to implement a system which enables usage of an available electroencephalogram device for instance NeuroSky mind wave mobile, in order to aid the individuals with physical limitations and also to provide near real time attention input, incorporating all parts of a functioning brain computer interface system. These parts are 1) acquiring the electroencephalogram signal 2) process and classify the electroencephalogram signal to extract the attention level and 3) use the attention to control a feature in a multi agent game.

This thesis report outlines the step-by-step design of the attention racer system which incorporate module level design and interactions among various components of the system. Furthermore, the implementation details of the attention racer system covers the core code segments and the flow of the system. The implemented system was evaluated using 15 participants. Initially they had to undergo through an attention span test and individual who scored more than 75% was selected for the second phase of the evaluation which was training data acquisition and attention racer valuation. After the attention span test 10 individuals were selected for final evaluation where they were evaluated for attention in different environments. The evaluation results asserted that system worked with 70% accuracy in detecting human attention level and using it to control the speed of the car.

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