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Brain Computer Interface

[Company name] | [Company address]

COMP3782 IT project

finn0066

[Year]

# 1.0 exexutive summary

In 2003, as a part of the Centre for Neuroscience and Medical Device Research Institute, a variety of specialists in the Neuroscience, Medicine, Computer Science, Engineering and Psychology fields came together to form the Brain Signal Lab (BSL). The primary objective for the BSL team is to investigate the behaviour of neurological diseases by using technology and machinery to analyse various signals generated from the brain. This process however involves an excessive amount of MATLAB coding and complex algorithms which, in most cases, can be very hard to explain to audiences with little knowledge in Computer Science.

The BSL team aims to create a simple yet interactive Brain Computer Interface (BCI) that utilizes electroencephalography technology to create an interesting model that will appeal to young children. In developing this program, the BSL team hopes to apply to a broader audience, mostly focussed on school aged children, to both engage students in neurological research and show the importance of this innovative technology.

In this project specification document, the selection and overview of an interactive, user friendly model will be explained in detail using a variety of project management techniques. These techniques are used to justify why the preferred option is chosen as well as the team management process and costs it would take to complete the project. Such techniques include conducting cost estimates, doing a stakeholder analysis and writing milestone lists which present information to be analysed about the proposed project in factual and numerical data.

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# 2.0 introduction

This report is the final report for the team working on the Brain computer interface project in COMP3782. This project’s main stakeholder is Trent Lewis, Trent wishes to have a solution that allows him to simulate brain signals using a RGB LED strip. This is to allow a way for Trent to offer a visual demonstration to children with the purpose of creating a fun and engaging demonstration.

This document will go into specifics on how the project went throughout the phases of development and how the project team achieved its goals. Project management tools and schedules shall be included to show any problems that team members may have encountered and solutions that were developed.

## 2.1 Project Overview

2.1.1 Title

Brain Computer Interface (BCI)

### 2.1.2 Vision

After speaking with the main stakeholder Trent Lewis the project aims were to develop a software solution to allow an EEG headset (Epoch+) to communicate with an addressable RGB LED strip to simulate brain activity, This LED strip will be placed in a hollowed out 3D printed brain and made available to show primary school age children. This is to provide a more engaging and visual representation to increase interest in Brain computer interface technology and the field of STEM amongst younger school aged students.

### 2.1.3 Objectives

As the topic of Brain EEG signals can be a complex subject the objective of this project is to provide a visual representation of signals being passed in a visual way that can be easily understood and presented to younger school age children. Through this it is hoped that the research currently being conducted by Trent Lewis will be more widely available to a larger audience thereby increasing the interest in the field of Brain computer interfaces.

### 2.1.4 Scope and Acceptance Criteria

Project scope was identified early on and with the approval of the primary stakeholder Trent Lewis. It was agreed upon by the development team and primary stakeholder that the project would not exceed the original need of Trent to have a way to show younger ages school children a fun and interactive visualization of brain activity.

Acceptance criteria would be the creation of appropriate user documentation of code (using Javadoc’s) and a user manual that would describe on how to use the software. Also, that a working prototype would be developed simulating brain activity on addressable LED lights that can be placed in a hollowed out 3D printed brain model.

This is to be delivered no later than the deadline of 6/11/2018.

# 3.0 Problem statement

It was discussed with Trent Lewis that he had found problems in trying to offer a visual way in describing how brain signals work and what areas of the brain are active in different moments of time. Work had been made by Trent to turn off a LED light using a modified We-Mo although was unsuccessful.

# 4.0 Project purpose

The purpose of the *BCI* project is to make the research of the Brain Signals Lab more accessible to a wider community, with a focus on school aged children. Thereby making the STEM more engaging and fun to a younger audience.

Currently projects have been developed that allow a LED to be turned on and off through changes in the brains Alpha rhythm (Lewis, 2018). Due to the simple nature of turning a LED on and off, more engaging outputs are required to fully engage school students in the STEM area. This project will address this issue by looking at creative way of display brain activity.

With the sponsorship of Trent Lewis, we are going to attempt to develop a more engaging way to interact with BCI technology in the hopes of garnering more interest in STEM among school-aged children. The majority of our work will be done at the Flinders University Tonsley campus with the end product being deployed into schools to reach our target audience.

# 5.0 assumptions

This section shall highlight assumed items that the project team may have though of during or after completed development;

* All team members in the project have programming experience in multiple languages and are willing to lear new skills.
* Drivers and libraries are available to the team to use and are open source increasing development time.
* All communication from the team to the stakeholder will be answered in reasonable fashion