

Technical Solution Design

for Enhancite

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***Preface***

The purpose of this document is to outline the strategic approaches and methodologies we will employ to meet our project goals. Designed to serve as a fundamental guide for all stakeholders, it ensures clarity and alignment throughout the project's lifecycle.

Project Enhancite aims to leverage advanced technology to enhance our operational frameworks, improving efficiency and fostering innovation. This document, prepared with input from various departments, details the technical and functional requirements, system architecture, and integration strategies essential for seamless implementation.

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# Introduction

<Paragraph summary of the technical solution that was completed including:

1. Brief project description
2. Brief description of technical environment
3. Estimated level of complexity
4. Estimated benefits/Problems it solved (quantitative & qualitative)*.>*

*The project involved developing a web-based data visualisation system designed to aid in mental health therapy sessions. The system is intended to be used along Emotibit sensors, which track physical and chemical responses in patients, along with VR headsets to effectively apply stimuli to said patients.*

*The system was built using React and Node.js, with cloud hosting on AWS. The software provided by Emotibit, Oscilloscope, was built using C++ and is integrated with the system through a middleman Python script.*

*The project was moderately complex, involving intricate data processing logic, API integrations for cloud services, and design compatibility with Oscilloscope. Oscilloscope is an open-source project and was intended to be expanded upon and deeply integrated into the project infrastructure.*

Qualitatively, the solution improves clinicians’ medical diagnosis and therapeutic treatment of patients by providing an exact numeric translation of how a patient may physically or emotionally respond to stimuli.

The project also alerts clinicians when certain vitals of the patient spike, thus removing the subjectivity and bias from clinician to clinician when evaluating patient responses.

There have been no quantitative benefits recorded yet as the project has not undergone clinical trials or simulated testing.

# Technical Environment

<Detail the technical environment/technologies used to complete this project and reason for the choice of the specific technology that is used. For instance, if PHP is used, why it is chosen and if GITHUB etc is used for source control please specify those details as well..>

*The technical environment of the project included Github, Microsoft Teams, Trello, Miro, and Visual Studio Code. Github was used for source and version control as it was used by the past development team. Microsoft Teams was used to facilitate communication between the development team as it was mandated by RMIT University. The shared document management tools provided by Teams also proved to be useful for leadership in maintaining and updating project documents. Trello was used for project planning for its real time collaboration tools and free access. Miro boards were provided by the client and used by the product owner in rendering project requirements and user stories. Visual Studio Code was the IDE of choice amongst the development team for its compatibility across all required programming languages for the project, and the development team’s pre-existing familiarity with the IDE.*

# Overall Architecture

<Outline the overall architecture of the solution which details how the system will interact with the world or other systems etc. Explain it using a diagram.>

The solution is designed to be used in a clinic setting, with the patient and the clinician present in the same room. The operational process of using the project for its intended purpose is:

1. The clinician logs into Enhancite.
2. The clinician navigates to the clinic dashboard component, which starts the python server.
3. The clinician starts Oscilloscope.
4. The patient turns on the Emotibit sensor and puts it on.
5. The patient starts a virtual reality environment and immerses themselves in the game world.
6. The clinician connects the sensor to Oscilloscope and sets the program to transmit over UDP.
7. The patient’s biodata begins to show in the clinic dashboard

# System Architecture

<Detail the system that was built/completed. Explain each component thoroughly. A architecture diagram is essential. >

*The project environment includes React, Java Spring Boot, Python, and C++. The frontend was developed with React for its ability to render dynamically moving website components such as real time graphs. The backend was developed with Java Spring Boot for its ease of use in developing CRUD APIs. Both React and Spring Boot were chosen by the previous group. The intermediate server between Oscilloscope and the frontend was written in Python for its suitability for creating quick prototyping solutions and remained as Python due to its ease of use and integration capabilities with React. Oscilloscope is an open-source application provided by Emotibit written in C++. Oscilloscope is required for the project to function therefore it is included within the project technical environment.*

## Functionalities/features

<Detail the individual/specific functionalities that comprise the system.>

### Functionality 1

<explain each functionality using a flow chart>

### Functionality 2

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.

.

### .Functionality N

# Database Architecture

<Explain the database architecture/schema and why it is built in the way it is and how scalable it will be.>

# Implementation Instructions

< List the implementation instructions and the basic specs of the server needed. Also provide details regarding data migration or if its replacing or enhancing an existing system what are the steps needs to take to ensure there is no data loss.>

# Non-functional specifications

<Detail all the non-functional specification of the system.>

# Summary of test results

<Provide the summary of the test cases and results in tabular format.>

# Known Issues & Risks

<Outline any known issues and/or risks that are likely to impact or be caused by this initiative in any way.>

# Other Considerations

<Discuss any other considerations for this project proposal’s acceptance and delivery.>

*The project in its current state is deemed by the development team and leadership to be misrepresentative of the client’s project vision. The product owner presents an alternative project plan that more closely aligns with the requirements of the client and recommends further* ***professional*** *planning and consultation. The alternative project plan is detailed below:*

*Requirement: The clinician and patient should be able to send and receive connection requests to each other, so that the clinician can see the data coming from the patient on a different computer and see a livestream of the patient’s screen.*

*Problem: The project currently sits as a locally hosted React web application and has no ability to connect to other running instances. Both the clinician and patient must be in the same room for the project to achieve any practical functionality. The application also currently does not have any screen recording or sharing capabilities and is not technically suitable for such purposes as a React web application.*

*Solution: The project should instead be hosted on a Node.js server, which then serves separate React web pages to both the clinician and the patient. The server aspect can manage and enable the connection requests between the patient and the clinician and facilitate the transfer of sensor and video data.*

*Requirement: The patient should be able to interact with the application while they are immersed inside a virtual reality environment.*

*Problem: The project currently sits independently from the virtual reality applications on a user’s computer. A patient must run Enhancite, Oscilloscope, the python script, and their virtual reality environment all at the same time to achieve practical functionality, which cannot be expected of the patient. There is also the adjacent problem of the patient supplying their own computer powerful enough to run a virtual reality program.*

*Solution: There is potential for an oculus quest version of the Enhancite app that would have direct access to the vr screen output and be able to send that data directly to the clinician through the server. The quests also support bluetooth so the sensor could also transmit data that way to the quest. This all in one solution is more appealing than the current approach which requires the patient to supply their own computer strong enough to run a vr game and also run both Enhancite and Oscilloscope at the same time. The ease of use is currently not there for the patient*

# Appendix

<Refer the tool that is used to capture the functional requirement and if possible provide the references to the tool and also a summary of the functional requirement. It can be simply compilation or copy of the user stories from JIRA/Rally.>

<NOTE: These headings are guidelines only. Based on your project, you might require additional headings, so feel free to add headings as required.>