Durham University MeditateVR Requirements Specification

Group 1

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1 – Introduction:

1.1 – Overview and justification

We are working on developing a VR meditation environment that will enhance the adaptivity and immersion of users during meditation sessions. The project is being developed based on the requirements specified by Prof Alexandra Cristea, who will be referred to as 'the client'. According to the client, modern VR technology can increase the effectiveness of meditation sessions. The objective of the project is to create an immersive and abstract meditation environment for our client to use for research that utilises visualization-based meditation techniques. The primary project goals are as follows:

- Produce an immersive and customisable meditation environment.
- Track and log user telemetry data throughout meditation sessions.
- Enhance User meditation experience using VR.

This section discusses the project scope and system description. The second section outlines the functional requirements, non-functional requirements, and risks. The closing section discusses the development approach and project schedule.

1.1.1 Purpose

Our solution aims to merge the growing popularity of mobile-based meditation apps in the Western world with the increasing accessibility and affordability of VR technology. Our goal is to provide an immersive and adaptable meditation environment that can incorporate visualization-based meditation techniques that traditional mobile-based apps are not capable of offering.

1.2 – Project scope

Our project aims to create an immersive garden-based meditation environment that enables users to practice meditation with the objective of growing a plant. The plant's growth rate will depend on the time spent meditating. Session data, such as the user's heart rate, will be logged into an external file.

1.2.1 Goals

To create a system that fulfils our client's requirements, we have defined some key goals. The system must store user telemetry data in a format that is easy for researchers to analyse, such as JSON. The system will not require any intermediary accounts or APIs to function. The meditation environment will be adjustable to aid research so the client can track the effect of different environmental parameters.

1.2.2 Project Boundaries

To meet the project objectives set out by the client, our solution will create an immersive and adaptive visualisation-based VR meditation application. To fulfil research requirements, we will log the user's heart rate along with other metrics throughout the meditation session. Our implementation will be intuitive and easy to set up without being tied to specific API accounts or devices.

1.2.3 Product Vision

The product will store anonymous session data, such as the user's heart rate, in an external JSON file. This will allow our client to conduct research on the effectiveness of MeditateVR. The VR system will also need to be intuitive to use, meaning it does not require any extensive training to operate. Most importantly, the client requires the system to implement a VR-based meditation system effectively.

1.2.4 User base

MeditateVR will function for two stakeholders: the user participating in meditation research and the researcher conducting a trial on the effectiveness of VR meditation techniques. End users will be concerned with how intuitive the system is and how easy it is to follow our meditation techniques. The research will use the data logging and environmental customisation features of MeditateVR to determine the effects of different parameters on the user's heart rate during meditation.

1.2.5 Goals of the Client

As per our client's requirements, our implementation will look to record as many different user metrics as possible to facilitate research into the effectiveness of our implementation. We will also develop an immersive experience to further the VR-based meditation field.

1.2.6 Future Features

Different meditation environments could be implemented to test the response of the end user to other settings or climates. A multiplayer system would also be an exciting feature that would allow users to feel more connected to their meditation.

1.3 – System Description

1.3.1 Domain Area

A VR headset will work directly with a single device to provide a VR meditation experience to the end user. The VR world will be a low poly environment that will aim to remove the user from their day-to-day surroundings. The garden will feature a plant that grows based on the time the user spends meditating. Throughout the meditation, the user's heart rate will be logged and saved to a JSON file.

1.3.2 Overview of the system to be built

Below is a high-level overview of the system that we will build:

- VR-based meditation game aims to improve the user's meditation experience.
- The user will be placed inside a low poly environment that is purposefully simple with a basic colour palette.
- The user will have the ability to look around them to view the whole world. The world will also contain other buildings and structures such as a house and a bench. The world will be designed to be relaxing for the user.
- The foreground consists of a plant that grows larger the longer the user meditates. Along with the plant the user can see various meditation aids to help them follow meditation techniques.
- During meditation the user will be able to hear sound effects such as wind and rain to make them feel more connected and relaxed. Visual and audio prompts will also appear to let the user know they are doing well and keep them motivated.
- While the user is meditating their heart rate is being logged to a JSON file. The data will be anonymous but will be linked to a session ID to distinguish between users.

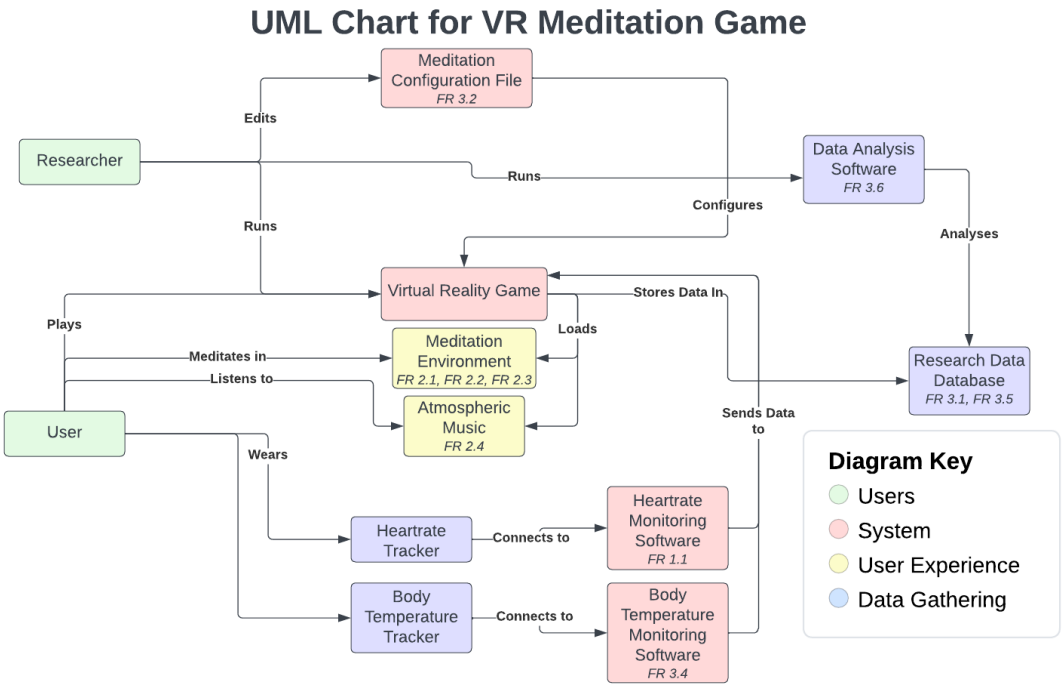
1.3.3 Research of Existing Meditation Systems

To research this project, we looked at existing meditation systems that were both mobile and VR-based, along with a similar plant-based concentration app. We have taken inspiration from these apps, and this has influenced our design decisions for MeditateVR.

Solution	Summary	Advantages	Disadvantages
Headspace [4]	A mobile-based meditation app that provides users with guided meditation exercises. Most exercises ask the user to close their eyes and visualise a scenario.	The app contains many different modes such as: meditate, sleep, move and music. This gives users a wide range of options to suit different meditation needs. Each mode provides the user with clear guidance making the app accessible for people new to meditation.	The app is phone-based so can lead the user to associate meditation with their phone which is an addictive device. Push notifications and the temptation to open other apps leads the user to be easily distracted when undertaking a meditation session. The app either displays a meditation scenario to the user or asks them to visualise it. This can be hard for users who are easily distracted or have a hard time visualising.
Forest [5]	A mobile-based focus app that tasks users to not touch their phone for a specified amount of time. The user gains a tree for every focus session they complete.	The user becomes motivated to complete more focus sessions as this unlocks more trees in their garden and earns them in game coins. These coins relate to trees being planted in the real world. The app is very simplistic in nature and the gamification features help to hook the user.	The user of a phone could lead the user to become tied to their phone. There is some debate surrounding the addictiveness of the app fuelling ties to the user's mobile phone.
CalmVR (Previous Project)	This VR meditation system was developed by a previous group and has been given to us to improve upon. The system implements multiple environments where the user is able to meditate in front of a growing plant or burning candle.	The different environments available allow the user to find a world that they feel most comfortable in. Different meditative focal points, such as the candle on a beach and plant in a forest, give variety to daily meditation sessions. The user interface is minimalist and makes it easy for the user to enter a meditation session.	The forest environment looks like something better suited to a horror game as opposed to meditation. This is due to the dark sky and colours used. There is no consistent theme to CalmVR, with the beach scene being a real-life video and the forest being a CGI world. To record heart rate data, the system must be connected to a hard-coded API account and must communicate via an iPhone.

2 - Solution Requirements:

This section contains a UML Diagram (section 2.1), the Functional (section 2.2), and Non-functional requirements (2.3), as well as risks associated with the VR Meditation Game (section 2.4). These sections explain the primary system functionalities with a UML diagram, the requirements and non-functional requirements for the system, and a risks section that identifies potential issues in development along with mitigation strategies.



2.1 Functional Requirements

Each requirement is assigned an importance level according to the MoShCu system; the importance of each requirement is summarised below.

Importance	Requirements
Must	**FR 1.1** Heart Rate Tracking System. **FR 1.3** Detailed Plant Growth System. **FR 2.2** Low Poly Meditation Environment. **FR 3.2** Secondary User Config. **FR 3.5** User Telemetry Stored in File.
Should	**FR 1.2** Single Script to run the software. **FR 2.1** Visual Meditation Guide. **FR 2.3** Multiple Poly Meditation Environments. **FR 2.4** Music and Atmospheric Sound. **FR 2.5** Audio Meditation Guidance. **FR 3.1** Detailed VR User Telemetry.
Could	**FR 2.6** Detailed User Movement Around Environment. **FR 3.3** User self-reflective Data. **FR 3.4** Secondary Biometrics Data. **FR 3.6** Data Analysis System.

2.1.1 System Requirements

This section is for requirements related to the system, how the system runs, and features to improve the system.

FR 1.1 Heart Rate Tracking System	**Ben**	**Must**
Description	The user's heart rate is tracked and sent directly to the computer that the VR program is running on.	
Dependencies	N/A	
Expected Results	The heart rate tracking system connects easily to the computer on which the VR program is running to remove proprietary systems in-between that are used to send data to the computer. The program should run without the need for specific accounts or software on any intermediary systems.	
Exception Handling	The software should handle errors when the heart rate tracker is not configured or is not being worn.	

FR 1.2 Single Script to start software	**Ben**	**Should**
Description	There is a single script that can be executed to run all software needed for the VR Meditation software to run.	
Dependencies	N/A	
Expected Results	A single script can be –which will start the VR game as well as any data gathering software or software needed to connect to the heart rate monitor for ease of use for the researcher.	
Exception Handling	In the event of any errors, it outputs an error message and will run all scripts that it can	

FR 1.3 Detailed Plant Growth System	**Enego**	**Must**
Description	A plant growth system with a plant that grows as the user meditates and changes depending on the user's meditation quality.	
Dependencies	**FR 1.**1 Heart Rate Tracking system **FR 3.2** Secondary user config **FR 3.4** Secondary Biometrics Data	
Expected Results	There is a plant that the user can see which changes and grows as the user meditates. The researcher can configure the parameters of the plant, such as the growth rate, colour, and plant type. This should align with the Progress section of the client's research on gamification [1].	
Exception Handling	There are some default configurations for the plant parameters so that if the researcher does not change them then it will still be shown. If the system cannot connect to the heart monitor, then the user will be asked if they want to continue without the heart monitor.	

2.1.2 User Experience Requirements

This section is related to requirements that will improve user experience and change how the user meditates and improve the quality of their meditation.

FR 2.1 Visual Meditation Guidance	**Tom**	**Should**
Description	There will be visual guidance for the user to help with their meditation.	
Dependencies	**FR 3.2** Secondary user config **FR 2.2** Low Poly Meditation Environment	
Expected Results	There will be visual guidance in the form of text popups and visual breathing aids within the environment. For example, wind flowing to the rhythm of breathing or a water fountain dripping.	
Exception Handling	If the researcher does not set a certain setting, then there is a default.	

FR 2.2 Low Poly Meditation Environment	**Adam**	**Must**
Description	At least one low poly simplistic meditation environment, based on a garden setting	
Dependencies	**FR 3.2** Secondary user config	
Expected Results	We will have a meditation environment for the VR user to meditate in, the setting will be based on a garden with a house in the foreground. The user will be able to sit down and watch a plant grow as they meditate, there will also be a small virtual water feature the user can listen to as they meditate.	
Exception Handling	Error message explaining the system could not load the world.	

FR 2.3 Additional Low Poly Meditation Environments	**Ben**	**Should**
Description	A low poly simplistic meditation environment based on a beach setting and another one based on a forest.	
Dependencies	**FR 3.2** Secondary user config **FR 2.2** Low Poly Meditation Environment	
Expected Results	We will have multiple meditation environments for the VR user to meditate in. Each environment will have a distinct theme to it, for example, a beach or a forest environment.	
Exception Handling	Notify the researcher that the selected environment is not available.	

FR 2.4 Music and Atmospheric Sound	**Tom**	**Should**
Description	Relaxing sounds and music for each environment to give a focal point for meditation.	
Dependencies	**FR 3.2** Secondary user config **FR 2.2** Low Poly meditation Environment	
Expected Results	There will be background sounds that match the theme of the currently selected environment. The sounds will aim to be relaxing and not distract from the visual environment.	
Exception Handling	If the music or sounds do not load, then the user/researcher will have the choice to reload or continue without.	

FR 2.5 Audio Meditation Guidance	Tom	Should
Description	There will be audio prompts played to the user to help guide them.	
Dependencies	**FR 3.2** Secondary user config	
Expected Results	There will be audio guidance to help the user, in the form of reassuring messages while they meditate.	
Exception Handling	If sound files don't load or are not available, then there will be an error message. The user/researcher will then choose whether to proceed without sound or restart.	

FR 2.6 Detailed User Movement Around Environment	Ben	Could
Description	The user will be able to move around the VR Meditation environment.	
Dependencies	**FR 2.2** Low Poly Garden Meditation Environment **FR 2.3** Additional Environments	
Expected Results	The User can move around within each VR environment to go to the part of the environment that they find most relaxing, where they can have a meditation experience more suited to them.	
Exception Handling	The user will be restricted to certain permitted areas.	

2.1.3 Data Gathering Requirements:

This section is related to the data gathering and data analysis requirements. These requirements will contribute to producing more data for researchers as well as producing more high-quality data and a greater range of data types.

FR 3.1 Detailed VR User Telemetry	Pad	Should
Description	Detailed user data is gathered from the VR user.	
Dependencies	**N/A**	
Expected Results	The System could gather data about: • What environment the researcher has selected • What the user is looking towards • The user's heart rate • User response times to stimuli • User movement • Length of meditation session	
Exception Handling	If the sensor cannot connect or the data is inaccurate due to the tracker not being worn properly then the system will tell the user to reconnect the sensor or make sure it is properly configured. The researcher can choose not to gather data.	

FR 3.2 Researcher Config	Enego	Must
Description	The researcher will be able to adjust certain parameters via a config file to test the effectiveness of the meditation.	
Dependencies	**N/A**	
Expected Results	The researcher can change parameters for meditation, including: • Meditation environment (which environment to select) • Meditation configuration (features of the meditation) • Environment parameters (specifics about the environment)	
Exception Handling	If no custom parameters are inputted, then the system will run with some default parameters.	

FR 3.3 User Self-reflective Data	Adam	Could
Description	After the meditation the user is presented with a popup to ask them to rate their meditation.	
Dependencies	**FR 3.2** Secondary user config	
Expected Results	The user is asked how they thought their meditation session went. They will be asked to answer a short questionnaire rating their overall experience based on stars from 0-5. The researcher can choose not to have the questionnaire.	
Exception Handling	If the user decides to not input any answer, then this will be noted in the data.	

FR 3.4 Secondary Biometrics Data	Pad	Could
Description	There is some other biometric data taken from the user which can be used for the research.	
Dependencies	**FR 1.3** Detailed Plant Growth **FR 3.2** Secondary user config	
Expected Results	The system will track other user telemetry data such as their breathing rate or body temperature.	
Exception Handling	If the sensor cannot connect or the data is inaccurate (reads heartrate that is not in a reasonable range [2], below 60 or above 110) due to the tracker not being worn properly then the system will tell the user to reconnect the sensor or make sure it is properly configured.	

FR 3.5 Session Telemetry Stored in File	Adam	Must
Description	The sessions user's telemetry is stored in the system as a JSON file.	
Dependencies	**FR 1.3** Detailed VR User Telemetry	
Expected Results	All meditation session data will be stored after each session in a JSON file.	
Exception Handling	The researcher will be notified if there is an issue writing to a session file.	

FR 3.6 Data Analysis System		Pad	Could
Description	A companion program will run alongside MeditateVR that will give some brief data analysis to the researcher. The companion will display statistics about the current meditation session.		
Dependencies	**FR 1.3** Detailed VR User Telemetry		
Expected Results	A companion program will allow the researcher to view graphs and summary statistics about the current meditation session.		
Exception Handling	If the companion software cannot access the current session data, then an error message is displayed. If there are errors in creating summary statistics, then the user is notified.		

2.2 - Non-functional requirements:

In this section we list Non-functional requirements for the system split into key sections: Performance requirements, Usability Requirements, Meditation Requirements and Security requirements. For each requirement we described the metrics by which we will measure their fulfilment as well as constraints on those metrics.

2.2.1 Performance Requirements:

This section is for requirements related to the system performance and how usable the system is.

NFR 1.1 System Does not Cause Nausea	
Description	The game must have a high enough framerate to not cause nausea.
Type	Speed requirement
Metrics	The framerate must be below 60 no more than 5% of the time.[3]
Constraints	This performance requirement will need to be met on a computer with sufficient hardware.

NFR 1.2 Minimal Loading Time	
Description	After the system has been configured the system should load within a specified load time.
Type	Speed requirement
Metrics	The system should load within 30 seconds after it has been configurated.
Constraints	This performance requirement will need to be met on a computer with sufficient hardware.

NFR 1.3 Low latency between the heart monitor and headset	
Description	There should be no noticeable delay between the heart monitoring system and the computer and then between the computer and the headset.
Type	Speed requirement
Metrics	There should be a delay of at most 1 second [6] between the heart rate monitor gathering data and sending it to the computer and then the flower changing in the headset at least 90% of the time.
Constraints	The heart rate monitor may not gather data very quickly. If the data is sent over the network, there can be lost packets or slow connection

2.2.2 Usability Requirements:

This section is for requirements related to how easily the user and researcher can navigate and control the functionality of the system.

NFR 2.1 Quick to set up	
Description	The user should be able to set the system up quickly.
Type	User Experience and Documentation Requirement
Metrics	A trained user should be able to set the system up in 5 minutes. An untrained user should be able to use documentation to set up the system in 10 minutes.
Constraints	This test must be run after first setting up the VR headset.

NFR 2.2 Researcher config file should be easy to use	
Description	The config file for the researcher should be clear concise and easy to use.
Type	User Experience Requirement
Metrics	The description labels for different parameters should be clear and there should be good documentation for how to configure various parts of the software.

2.2.3 Meditation Requirements:

This section is for requirements related to the quality of the virtual meditation environment in order to make it relaxing for the user.

NFR 3.1 A Cohesive Visual Style	
Description	The game should have a Cohesive visual style.
Type	Graphics and Visuals Requirement
Metrics	When, as part of a survey, users are asked “Does this game have a Cohesive visual style?” more than 70% should say yes.

NFR 3.2 Audio fits the setting	
Description	The Audio should fit the setting
Type	Audio Requirement
Metrics	When, as part of a survey, users are asked “Does this game audio fit the style and setting?” more than 80% should say yes.

NFR 3.3 Calming Audio	
Description	The audio should be calming
Type	Audio Requirement
Metrics	When, as part of a survey, users are asked “Does this game audio help to make you feel calm” more than 70% should say yes.

NFR 3.4 Visual and audio Guidance should be Intuitive and clear	
Description	The visual guidance should give clear and intuitive guidance on how to meditate best and use standard meditating practices
Type	Audio and visual requirement
Metrics	The visual guidance should be in line with standard UX design principles [7] and should follow standard meditation practices [8]

2.2.4 Security Requirements:

This section is for requirements related to the performance and how quickly and smoothly the system runs.

NFR 4.1 No Personal Information	
Description	To comply with GDPR and securely handle data without high security standards it is essential that we do not store any personally identifiable information.
Type	Security Requirement
Metrics	The only information stored that would allow a researcher or bad actor to attach a meditation session to a user should a session id which the researcher can record. No personal information as described by the ico [13] shall be stored by the system.

2.2.5 Code requirements:

This section is for requirements related to the code quality and how code readability.

NFR 5.1 Code should be of good quality	
Description	The code should be easily maintainable so that the researchers can still use the code as the last teams code was very poorly made. It should also be well documented so that future developers can easily build upon our work
Type	Code requirement
Metrics	Code should follow standard design principles for maintainability. [9]

NFR 5.2 All errors should be clear	
Description	All errors and error codes should be clear so that potential issues are easy to resolve.
Type	Code requirement
Metrics	Error messages should be structured according to standard error message metrics [10]

2.4 Risks and Issues

Each risk is assigned an Impact and Probability rating, as shown below

		Probability				
		Almost Impossible	Unlikely	Likely	Very Likely	Almost Certain
Impact	Insignificant				R10	
	Minor		R5	R9		
	Moderate		R12	R6, R8	R11	R3
	Major			R2	R7	R1
	Severe			R4		

2.4.1 Technical Risks

R1 Lack of Technical Knowledge	**Major Impact**	**Almost Certain**
Description	The development team currently lacks familiarity with Unity development and its associated tools and possesses limited prior experience with VR. This may result in the team overestimating our capabilities and set up goals that are potentially unachievable, leading to challenges in delivering a product that meets the client's specifications.	
Mitigation strategy	We will ensure that each team member has a level of interest on their relevant areas where feasible. Each member will also perform individual research on their assigned roles to build familiarity and proficiency for implementation during the development process.	

R2 Hardware limitations	**Major Impact**	**Likely**
Description	There is a concern that the target computer may struggle to maintain a consistent framerate in VR, leading to noticeable jittering or screen tearing that could adversely impact the user experience. Additionally, the client has expressed frustration with the device-based pairing system of the Fitbit Versa2, which poses usability challenges.	
Mitigation strategy	We will request a list of the available hardware from the client to allow us to design our software to the capabilities of the available hardware.	

R3 Poor quality of base Unity project	Moderate Impact	Almost Certain
Description	The client has provided a pre-existing Unity project for us to inherit. However, the project is largely non-functional, and the client has described its VR environments as being “creepy”.	
Mitigation strategy	We will aim to remake the environment for the project in a low-poly style and bring it to a functional state.	

R4 Limitations of external API	Severe Impact	Likely
Description	The client has proposed the use of a Fitbit Versa2 as a method of tracking user heart rate data. However, implementing this method poses additional challenges due to the restrictive nature of the Fitbit API when integrating it into a desktop application.	
Mitigation strategy	We will inquire the client on the possibility of using other methods to track the user’s heart rate data.	

R5 Shutdown of external API	Minor Impact	Unlikely
Description	As highlighted in R.4, the previous project is dependent on the Fitbit API. Google has announced that they plan to shut down Fitbit accounts by early 2025[11] and have disabled the SDK for the platform.[12]	
Mitigation strategy	We will move our system away from using the Fitbit API, but it is unlikely that the shutdown will occur during the scope of the project.	

2.4.2 Development Risks

R6 Budget Limitations	Moderate Impact	Likely
Description	As the project is being created in the Unity Game Engine, we anticipate that we may need to purchase plug-ins and assets from the Unity Asset Store to enable the completion of key functionality for the project.	
Mitigation strategy	We will establish a development budget and reduce spending by leveraging free assets whenever possible. Before making any purchases, the team will engage in discussions with the client to explore the availability of free alternatives and assess whether it would be worth the expenditure.	

R7 Lack of access to target hardware		Major Impact	Very Likely
Description	The client has specified specific target hardware for the project, namely the Fitbit Versa2 and Oculus Quest 2. However, most of our team members lack unrestricted access to the required hardware for development and debugging purposes. This also creates a risk where the product may encounter hardware-specific bugs on the target hardware.		
Mitigation strategy	We will engage with the client to secure access to the necessary hardware when needed. Additionally, we will utilize our own VR headsets for development.		

R8 Team Scheduling and Client Communication Issues		Moderate Impact	Likely
Description	Due to limited meeting time, it will be difficult to cover all points of discussion in our weekly meetings. Effective communication with our client will be needed to ensure that we meet their requirements and understand them correctly.		
Mitigation strategy	We will be using Trello to allocate and track tasks outside of meetings. This ensures accountability for individuals. When communicating with our client, we will ensure we clarify any points of confusion.		

R9 Documentation and Style Consistency Issues		Minor Impact	Likely
Description	The division of development responsibilities among team members may lead to the adoption of varying documentation and coding styles. Additionally, the documentation may not be complete, leading to functionality becoming undocumented. This variation could cause confusion for the client and pose challenges for other members if they need to interact with segments written by another project member.		
Mitigation strategy	We will implement a unified documentation and code linting style to ensure consistency and documentation completeness within the project.		

2.4.3 Product Risks

R10 Poor UI/UX design		Insignificant Impact	Very Likely
Description	The client has requested that the product be easy to use and set up. However, the team lacks prior experience in user interface and experience design, which may pose a challenge to achieving this goal.		
Mitigation strategy	We will study existing apps for inspiration for the interface and experience design. Additionally, we will extensively document the intended system operation and adhere to the KISS (Keep It Simple, Stupid) principle in our interface design to minimize complexity.		

R11 Unclear Project Scope		Moderate Impact	Very Likely
Description	There is a risk that the development team might misinterpret the project's scope and the client's requirements and use case, potentially leading to the incorporation of features that may not be useful or otherwise inconvenience the client.		
Mitigation strategy	To mitigate this risk, we have thoroughly reviewed the client's research paper [1] and will continuously communicate with the client for clarification. We will base the implementation of features on the clients explicitly stated goals and requirements.		

2.4.4 External Unpredictable Risks

R12 Team illness		Moderate Impact	Unlikely
Description	There is a potential risk of team members falling ill during the project or experiencing issues such as motion sickness in VR. This could lead to a reduction in available manpower for development, potentially introducing delays.		
Mitigation strategy	We will communicate outside of meetings, and as we are using the scrum approach, we can leave team members out of certain sprints if they can't work due to illness.		

3 Project Development:

3.1 Development Approach

Our development lifecycle will focus primarily on the Scrum approach. We would like to start off with 2:4-week sprints, and towards the end of our project, we will use 1-week sprints that align with our meetings. We plan to use Trello to plan and allocate tasks within sprints and to manage how much work is completed each week.

	Waterfall	**Scrum**
Methodology	**Waterfall-** plan driven approach, finish one part of the SDLC model before starting the next.	**Scrum-** agile approach, a series of sprint weeks until the project is finished.
Advantages	-This methodology would provide a clear structure for our software development. -Organisation would be easier as we would have one thing to focus on at a time. -Documentation would be made easier because we would not have to edit stages of the SDLC we had already completed.	-The project gets broken down into small, manageable chunks. This suits our weekly meeting as we can review the progress often. -Changing requirements do not halt our progress. -It is easier for us to show our client regular updates on progress.
Disadvantages	-We would not have software to show the client until very late on during the SDLC. It is important that we show our client our development early to see if she wants it changing. -This approach is risky because the client may change requirements, we have already had a slight change. -Not adaptable if something we develop starts to break other pieces of our code.	-There is a risk of over-updating, the client might get annoyed if we update them too regularly. -Our team might disagree about priorities for each cycle which could create a negative environment. -Bad planning may result in failing to meet a deadline as it may be harder to see progress when the task is broken into many stages.

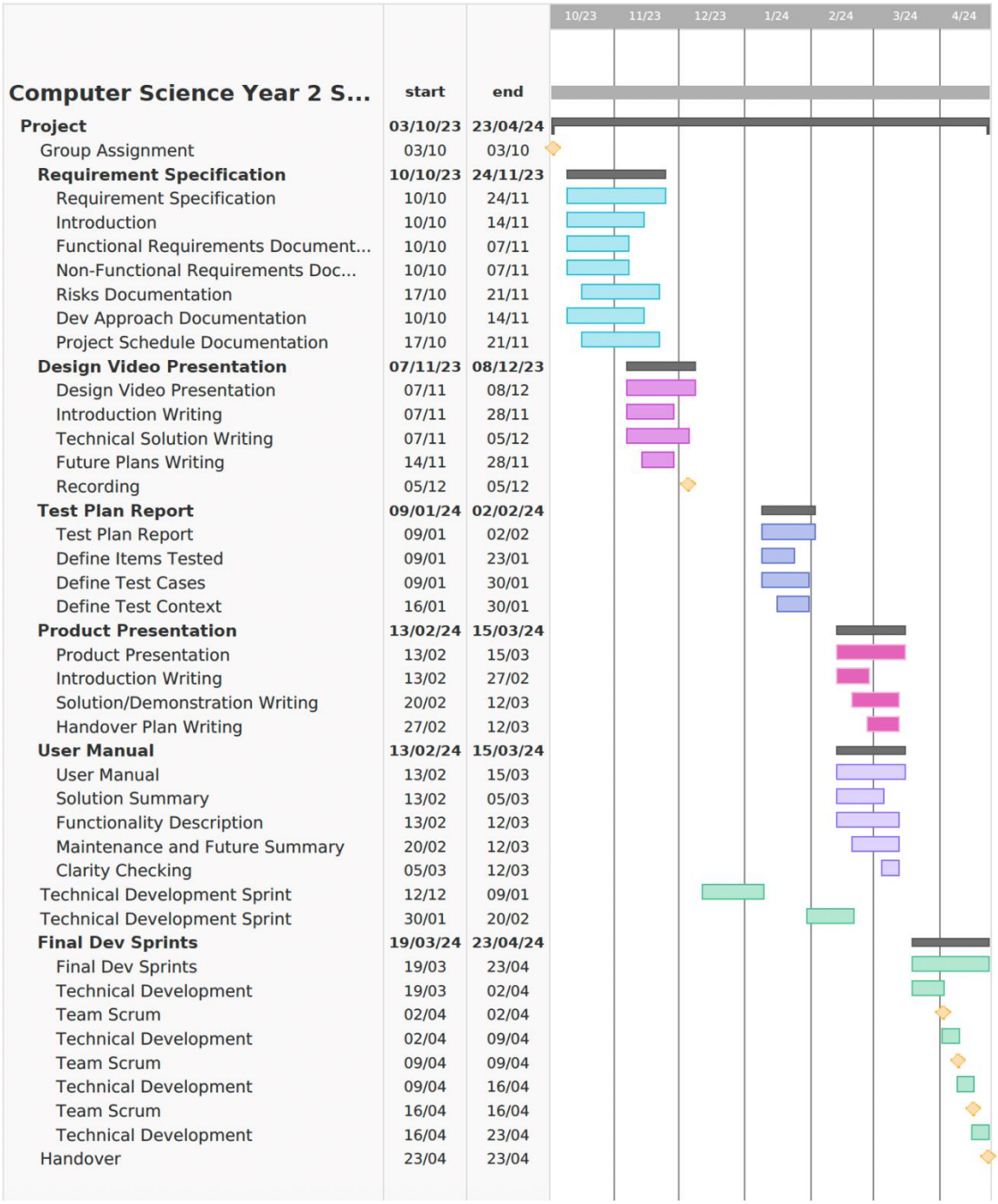
3.1.1 Reasons for choosing Scrum

We have decided to use a scrum approach for the project. The continuous weekly meetings mean that the sprints are very easy to organise as we have a natural cycle. As we know that the client may change requirements or request extra features, it is important that we use an agile approach so that we can adapt to these changes. Whereas with waterfall, we would have to carry our initial ideas through to the final development stages, which is not ideal. A waterfall development approach would increase our workload significantly without increasing the quality of our final piece of software.

3.2 Project Schedules

Our development lifecycle is outlined in the below Gantt chart. This breaks down the workload leading up to each deadline into manageable sections which can be assigned to one or multiple team members. As well as the progress on technical development of the final application. We

We have planned our sprints and outlined them below in a Gantt chart, using this structured timeline tool within the Scrum methodology allows for a useful visual representation of tasks, dependencies, and milestones, ensuring timely delivery and a well-structured product. We have selected to begin our first sprint on 12/12/2023 to ensure we have ample time to develop our product around when coursework deadlines are.



Computer Science Year 2 S...	start	end
Project	**03/10/23**	**23/04/24**
Group Assignment	03/10	03/10
Requirement Specification	**10/10/23**	**24/11/23**
Requirement Specification	10/10	24/11
Introduction	10/10	14/11
Functional Requirements Document...	10/10	07/11
Non-Functional Requirements Doc...	10/10	07/11
Risks Documentation	17/10	21/11
Dev Approach Documentation	10/10	14/11
Project Schedule Documentation	17/10	21/11
Design Video Presentation	**07/11/23**	**08/12/23**
Design Video Presentation	07/11	08/12
Introduction Writing	07/11	28/11
Technical Solution Writing	07/11	05/12
Future Plans Writing	14/11	28/11
Recording	05/12	05/12
Test Plan Report	**09/01/24**	**02/02/24**
Test Plan Report	09/01	02/02
Define Items Tested	09/01	23/01
Define Test Cases	09/01	30/01
Define Test Context	16/01	30/01
Product Presentation	**13/02/24**	**15/03/24**
Product Presentation	13/02	15/03
Introduction Writing	13/02	27/02
Solution/Demonstration Writing	20/02	12/03
Handover Plan Writing	27/02	12/03
User Manual	**13/02/24**	**15/03/24**
User Manual	13/02	15/03
Solution Summary	13/02	05/03
Functionality Description	13/02	12/03
Maintenance and Future Summary	20/02	12/03
Clarity Checking	05/03	12/03
Technical Development Sprint	12/12	09/01
Technical Development Sprint	30/01	20/02
Final Dev Sprints	**19/03/24**	**23/04/24**
Final Dev Sprints	19/03	23/04
Technical Development	19/03	02/04
Team Scrum	02/04	02/04
Technical Development	02/04	09/04
Team Scrum	09/04	09/04
Technical Development	09/04	16/04
Team Scrum	16/04	16/04
Technical Development	16/04	23/04
Handover	23/04	23/04

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