Software Requirements Specification

for

Coping with Anxiety using VR

Version 0.1

Prepared by VRNest

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Contents

Version	Primary Author(s)	Description of Version	Date Completed
0.1	VRNest	Initial draft of the Software Requirements	09-03-2025

		Specification (SRS) for Coping with anxiety using VR, outlining system functionalities, use	10-03-2025

Revisions

Version	Primary Author(s)	Description of Version	Date Completed
		cases, and constraints based on the project scope. say something similar to our projec	

1 Introduction

This project involves designing a VR experience where users can access calming environments, listen to soothing sounds, practice guided meditation, and engage in interactive activities. Using VR technology (Windows PC with Oculus Quest), the goal is to make mental health support more accessible.

Document Purpose

This **Software Requirements Specification (SRS)** describes the requirements for the **Coping with Anxiety Using VR** project. This SRS covers the features, design constraints, and user requirements for a mobile VR application that leverages **Oculus Quest** technology to deliver immersive, interactive environments aimed at helping users reduce and manage anxiety.
The content herein focuses on the **Windows PC VR application**—covering functional and nonfunctional requirements, including any key assumptions, limitations, and dependencies.

1.1 Product Scope

The Coping with Anxiety VR application aims to deliver immersive relaxation experiences on Windows PCs through Oculus Quest headsets (via Link or Air Link). Key features include:

- High-fidelity 3D environments (beach, forest, waterfall) rendered on PC GPUs

- Interactive exercises: guided meditation, paced breathing visuals, progressive muscle relaxation, and mini-games

- Local user preference storage and session tracking

- Optional online content downloads via secure connection

This product integrates into existing wellness routines, offering desktop VR support with better graphics and performance than mobile platforms.

1.2 Intended Audience and Document Overview

- **Developers & QA Team:** To understand and implement the functional, interface, and performance requirements.

- **Clients & Instructors:** To review and confirm project scope, goals, and constraints.

- **Testers & End Users:** To gain insight into system features and the rationale behind them.

Readers should begin with the **Overall Description** (Section 2) to understand the product at a high level. **Section 3** details the functional requirements, including the Use Case Model. **Section 4** covers non-functional requirements such as performance, security, and quality attributes, and **Section 5** outlines any additional requirements. Finally, the **Appendices** provide a data dictionary (Appendix A) and group logs (Appendix B).

1.3 Definitions, Acronyms and Abbreviations

- **VR:** Virtual Reality

- **SRS:** Software Requirements Specification

- **UI:** User Interface

- **XR Plugin:** Extended Reality Plugin (Oculus XR Plugin)

- **PMR:** Progressive Muscle Relaxation

- **PC VR**: VR application running on a desktop PC

1.4 Document Conventions

- This SRS follows **IEEE** standards and uses **Arial 11pt** text, single-spaced.

- **Headings** are in bold and numbered.

- **Use case references** are labeled as "U1", "U2", etc.

1.5 References and Acknowledgments

   Oculus XR Developer Documentation:
https://docs.unity3d.com/Packages/com.unity.xr.openxr@1.14/manual/index.html
- *Unity Documentation:* https://docs.unity3d.com/
- *Android Development Studio: https://developer.android.com/studio*
- *Use Case Templates (Reference):*
  - *Template Lab Use Case Templates : https://templatelab.com/use-case-templates/*
  - *Wikipedia: Use Case Diagram : https://en.wikipedia.org/wiki/Use_case_diagram*
  - *Visual Paradigm Guide: https://www.visual-paradigm.com/guide/uml-unified-modelinglanguage/what-is-use-case-diagram/*

- *Thanks to **Mahindra University** (Software Engineering Course) for providing guidance on project standards and scope.*

2 Overall Description

2.1 Product Overview

The system is a PC-based VR application developed in Unity (2021 or higher) that runs on Windows 10/11 and interfaces with an Oculus Quest headset via Link or Air Link. It presents immersive therapeutic environments and interactive exercises to help users manage anxiety.Below is a simplified **context diagram** illustrating the system:
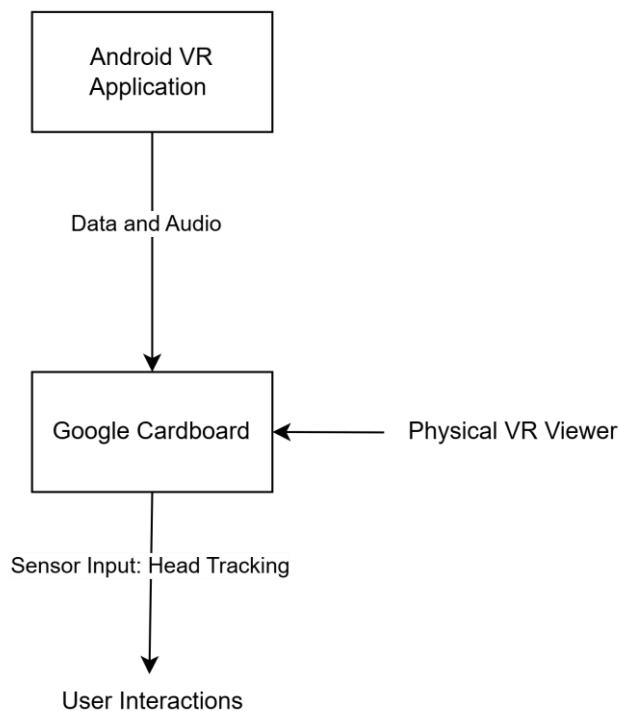
2.2 Product Functionality

At a high level, the system provides:

- **Guided Meditation Modules:** Audio-based instructions and ambient music.

- **Progressive Muscle Relaxation (PMR):** Interactive guidance for tensing and relaxing muscle groups.

- **Visualization Scenes:** Calming environments (beach, forest, waterfall) with dynamic graphics.

- **Binaural Beats & Soothing Audio:** Incorporating specialized frequencies to enhance relaxation.
- **Interactive Mini-Games:** Simple VR tasks (e.g., bubble catching) to reduce stress.

- **Paced Breathing Visuals:** On-screen shapes that expand/contract to guide breathing exercises.

2.3 Design and Implementation Constraints

☐ **Hardware Limitations:**

- PC with NVIDIA GTX 1060 or better, 8 GB RAM; Oculus Quest 2 headset

☐ **Tools & Frameworks:**
- The system must be developed with **Unity** (2021 or higher recommended).
- **Oculus XR Plugin** is required for VR support.

☐ **Software Design Methodology:**
- Use of **UML** for modeling use cases and class diagrams.
- COMET or a similar **component-based** method for software design.

☐ **Security & Privacy:**
- Minimal data collection, primarily storing user preferences and progress locally.

☐ **Performance:**
- VR requires consistent **frame rates** (~70-90 FPS recommended) to minimize motion sickness

2.4 Assumptions and Dependencies

- **User Device Compatibility:** Users have a Windows PC that meets minimum VR specifications
- **Internet Connectivity:** Assumes limited or optional network usage. Basic offline operation for core features.
- **Audio/Visual Resources:** Assumes all embedded audio tracks and 3D assets have valid licenses or open-source availability.
- **Future Expansion:** The next phase may add multi-user or metaverse components, but this SRS focuses on the single-user VR environment.

3 Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

- **VR View (Main):** The primary UI is the VR scene, viewed through the Oculus Quest headset.
- **Gaze-based Interaction:** Users can aim the reticle at options (e.g., buttons, settings) and "select" after a brief hover or via a Oculus Touch button press.
- **Menus & Overlays:** Minimal in-VR menus. A simplified main menu for environment selection, plus a "pause/return" UI.

3.1.2 Hardware Interfaces

- **Oculus Quest 2**: Head tracking (IMU), stereoscopic display, mic (optional)
- **Oculus Touch Controllers**: Button, trigger, and joystick input
- **PC I/O**: USB-C cable (Link) or Wi-Fi (Air Link)

3.1.3 Software Interfaces

- **Unity Engine:** Manages 3D rendering, physics, and user input.
- **Oculus XR Plugin:** Interprets sensor data for VR orientation, manages stereoscopic rendering.
- **Audio/Media Library:** Provides music, narration, or binaural beats.

3.2 Functional Requirements

*Below is a **representative sample** of functional requirements. Each will be refined during development.*

3.2.1 F1: Provide Guided Meditation ○ **Description:** *The system shall offer at least two guided meditation audio tracks with matching on-screen VR visuals.*

3.2.2 F2: Progressive Muscle Relaxation ○ **Description:** *The system shall enable PMR sessions, prompting users to tense/relax muscle groups in sync with audio and visual cues.*

3.2.3 F3: Customizable Environments ○ **Description:** *The system shall allow users to select from at least three VR scenes (e.g., beach, forest, waterfall).*

3.2.4 F4: Interactive Games ○ **Description:** *The system shall provide mini-games (e.g., bubble-popping) that encourage user engagement and distraction from anxiety.*

3.2.5 F5: Breathing Exercises ○ **Description:** *The system shall display interactive visuals that guide paced breathing cycles (inhale/exhale).*

3.2.6 F6: Basic Data Tracking ○ **Description:** *The system shall store user choices (scene preference, last used exercise) locally to allow for quick session resumption.*

3.3 Use Case Model
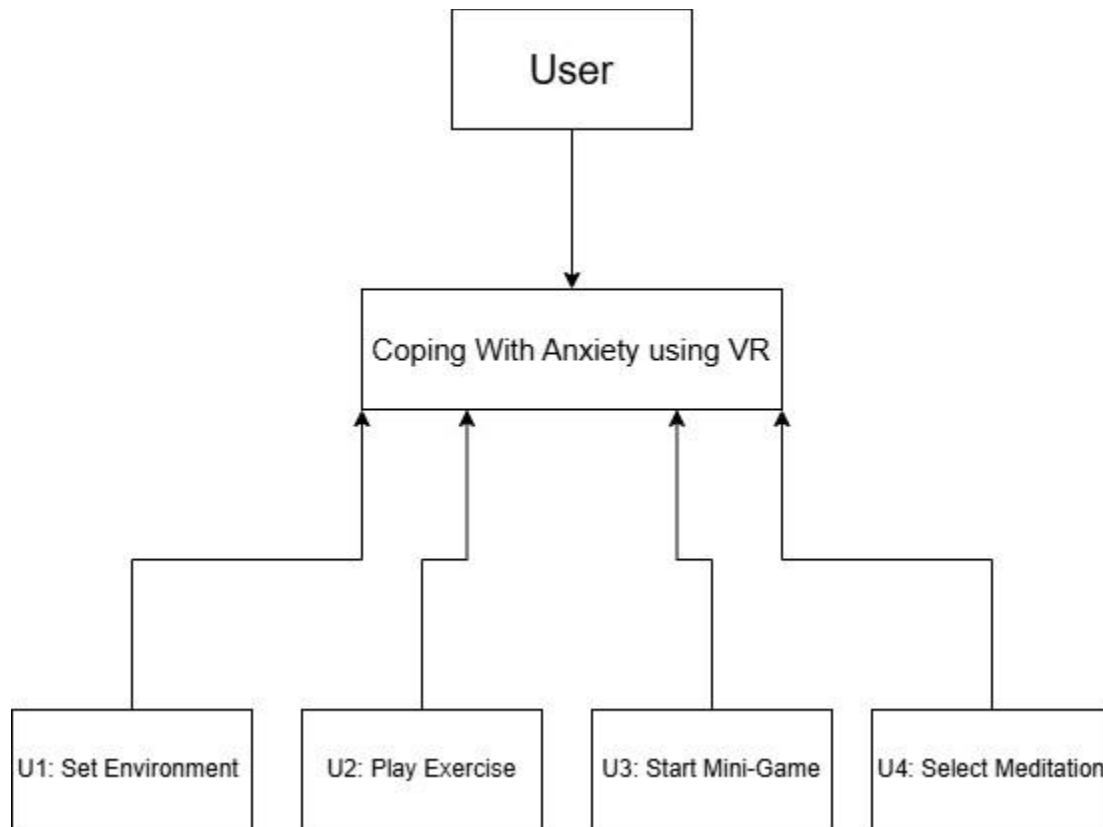
3.3.1 Use Case #1 Select Environment (U1)

☐ ***Author:*** *[Aditya Rachakonda]*
☐ ***Purpose:*** *Allows user to pick a VR scene (beach/forest/etc.) for the session.*
☐ ***Requirements Traceability:*** *F3*
☐***Priority:*** *High*
☐ ***Preconditions:*** *User has launched the VR app and is on the main menu.*
☐ ***Postconditions:*** *Selected environment loads successfully.*
☐ ***Actors:*** *User (primary), System.*
  Flow of Events (Basic):
    1. *User opens "Choose Environment" in the VR menu.*
    2. *The system displays available scenes.*
    3. *User gazes at desired scene; selection is confirmed.*
    4. *System transitions to the chosen environment's VR world.*
☐ ***Alternative Flows / Exceptions:***
    • *If environment data is not loaded, the system prompts with a fallback.*

3.3.2 Use Case #2 Play Exercise (U2)

- **Author:** [K. Revanth Reddy]
- **Purpose:** Enables user to start a guided exercise (e.g., PMR, breathing).
- **Requirements Traceability:** F1, F2, F5
- **Priority:** High
- **Preconditions:** User is within an environment or menu.
- **Postconditions:** Audio/visual exercise begins, and user can exit at any time.
- **Actors:** User (primary), System.
- **Flow of Events (Basic):**
  1. User selects "Start Exercise."
  2. System loads the chosen exercise with corresponding audio/visual cues.
  3. User interacts with on-screen prompts or simply follows instructions.
- **Alternative Flows / Exceptions:**
  - If audio file is missing, system displays an error message

4 Other Non-functional Requirements

4.1 Performance Requirements

- **P1:** The application **shall maintain at least 70 FPS** to reduce motion sickness and ensure a smooth VR experience.
- **P2:** Each environment **shall load within 5 seconds**.

4.2 Safety and Security Requirements

- **S1:** The application shall **minimize data collection** to protect user privacy.
- **S2:** If any **optional online component** is used for downloading additional content, a secure HTTPS connection is required.
- **S3:** Warnings or disclaimers shall be displayed to **remind users** of potential VR-induced motion sickness or anxiety triggers.

4.3 Software Quality Attributes

- *4.3.1 Reliability*
  *The system should **gracefully handle sensor or audio failure**, offering fallback messages or simplified visuals.*
- *4.3.2 Adaptability*
  *The design shall facilitate **future updates** to add more relaxation environments or new mini-games without major rewrites.*
- *4.3.3 Maintainability*
  *The project will use **modular scripts** in Unity (C#) so that future developers can quickly isolate and modify certain features.*

5 Other Requirements

- **Localization:** In future releases, audio guides or textual overlays might be translated into multiple languages.

- **Licensing:** All third-party audio or 3D assets included must be verified for commercial use to avoid infringement.

Appendix A – Data Dictionary

Name	Type	Possible Values	Description

environmentSelection	String	"Beach", "Forest", "Waterfall" , etc.	Tracks the user's current VR scene
userPreference	JSON Object	"musicVolume": 0100, "lastExercise": <string>	Stores local user settings and last used feature.
sessionProgress	Integer	0 - 100	Indicates how much of a guided meditation or mini-game is completed.
sensorData	Float	Varies by device (gyroscope, accelerometer)	Real-time orientation data used to adjust the VR perspective.
audioTrackID	Integer	1, 2, 3, …	References the audio files for exercises

Appendix B - Group Log

☐ *[February 4th] Project Kickoff Meeting*
  • *Discussed overall vision and roles.*
  • *Decided to use Unity with Google Cardboard XR Plugin.*

☐ *[February 20th] Design Brainstorm Session*
  • *Settled on 3 primary environments: Beach, Forest, and Waterfall.*
  • *Determined feature set: PMR, breathing visuals, mini-games.*

☐ *[April 4th] Mid-Development Checkpoint*
  • *Basic environment switching and partial audio integration completed.*
  • *Documented feedback from alpha testing with a small user group.*

☐ *[May 20th] SRS Completion*
  • *Finalized requirements in collaboration with instructor and QA feedback.*