Software Requirements Specification
for
VR Anxiety Management App

Version 1.0 approved

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1. Introduction

1.1 Purpose

The purpose of this document is to detail the software requirements for AxeityVR, a virtual reality application designed to help users cope with anxiety through immersive, calming environments. The app provides guided meditation sessions and breathing exercises within 2–3 peaceful VR settings, developed using Unity and the Google Cardboard SDK.

1.2 Document Conventions

This SRS follows the IEEE Software Requirements Specification template. Requirements are uniquely identified (e.g., FR-1, FR-2) and are prioritized where applicable. Terminology, fonts, and formatting (such as bold for titles) are used consistently throughout the document.

1.3 Intended Audience and Reading Suggestions

This document is intended for:

- Developers: To understand functional, performance, and interface requirements.

- Project Managers: For project planning and progress tracking.

- Testers: To create test cases based on specified requirements.

- Stakeholders & Mental Health Professionals: For validating that the app meets the needs of users coping with anxiety.

- Documentation Writers: To develop user manuals and support materials.

Readers are encouraged to review the Overview sections first (Sections 1 and 2) and then proceed to the more detailed requirements in Sections 3–6.

1.4 Product Scope

AxeityVR is a mobile VR application aimed at reducing anxiety through immersive experiences. The app offers calming VR environments where users can engage in guided meditation and breathing exercises. Designed to run on smartphones using low-cost VR headsets (e.g., Google Cardboard), AxeityVR provides accessible mental health support, aligning with broader goals to integrate technology into personal well-being.

- Unity Documentation, [Unity Version details, URL if applicable]

1.5 References

- Google Cardboard SDK Documentation

- Research articles on VR-based anxiety management (to be referenced as needed)

- IEEE SRS Template Guidelines

1. Overall Description

2.1 Product Perspective

AxeityVR is a stand-alone mobile application developed with Unity and the Google Cardboard SDK. It forms part of a broader initiative to leverage virtual reality for mental health applications. The app is designed to run on Android and iOS devices, utilizing smartphone sensors for head tracking and simple user input methods.

2.2 Product Functions

Key functions of AxeityVR include:

- VR Environment Navigation: Allowing users to explore calming, immersive environments.

- Guided Meditation: Delivering audio-guided meditation sessions with synchronized visual cues.

- Breathing Exercises: Offering visual and audio instructions to help users regulate their breathing.

- User Settings: Customizable options for session duration, audio volume, and visual brightness.

- Session Logging (Optional): Recording user session data for feedback and future enhancements.

2.3 Operating Environment

- Hardware: Smartphones (Android/iOS) equipped with gyroscope, accelerometer, and sufficient processing power for smooth VR rendering.

- Software: Unity engine (specific version TBD) and Google Cardboard SDK.

- Environment: Designed for use with low-cost VR headsets (Google Cardboard) under typical indoor lighting conditions.

2.4 Design and Implementation Constraints

- Must comply with Google Cardboard hardware limitations and Unity performance guidelines.

- Requires real-time sensor data processing for head tracking and movement.

- Must be optimized for mobile devices with limited memory and processing power.

- Design must account for potential motion sickness by maintaining stable frame rates and providing user warnings.

2.5 User Documentation

User documentation will include:

- A comprehensive User Manual detailing setup, navigation, and session usage.

- Online help integrated into the application.

- Quick-start guides and video tutorials to assist new users.

2.6 Assumptions and Dependencies

- User Requirements: Users will have a compatible smartphone and access to a Google Cardboard VR headset.

- Software Dependencies: Development relies on the Unity engine and the Google Cardboard SDK. Specific versions should be documented.

- Environment Assumptions: Users are assumed to use the application in a safe, comfortable environment where they can focus on meditation.

- Research and Feedback: The app's design may evolve based on user feedback and evolving research in VR and anxiety management.

2.7 Functional Requirements Specification

Each functional requirement is uniquely identified:

FR-1: VR Environment Navigation

The system shall allow users to navigate within a VR environment using head tracking and simple input methods.

FR-2: Guided Meditation Module

The system shall provide a selection of guided meditation sessions that include audio instructions and synchronized visual cues.

FR-3: Breathing Exercise Module

The system shall offer breathing exercises with visual guidance to help regulate breathing patterns.

FR-4: Audio Playback

The system shall play high-quality, soothing background music and guided narration during sessions.

FR-5: User Settings and Customization

The system shall allow users to adjust session parameters such as volume, brightness, and duration.
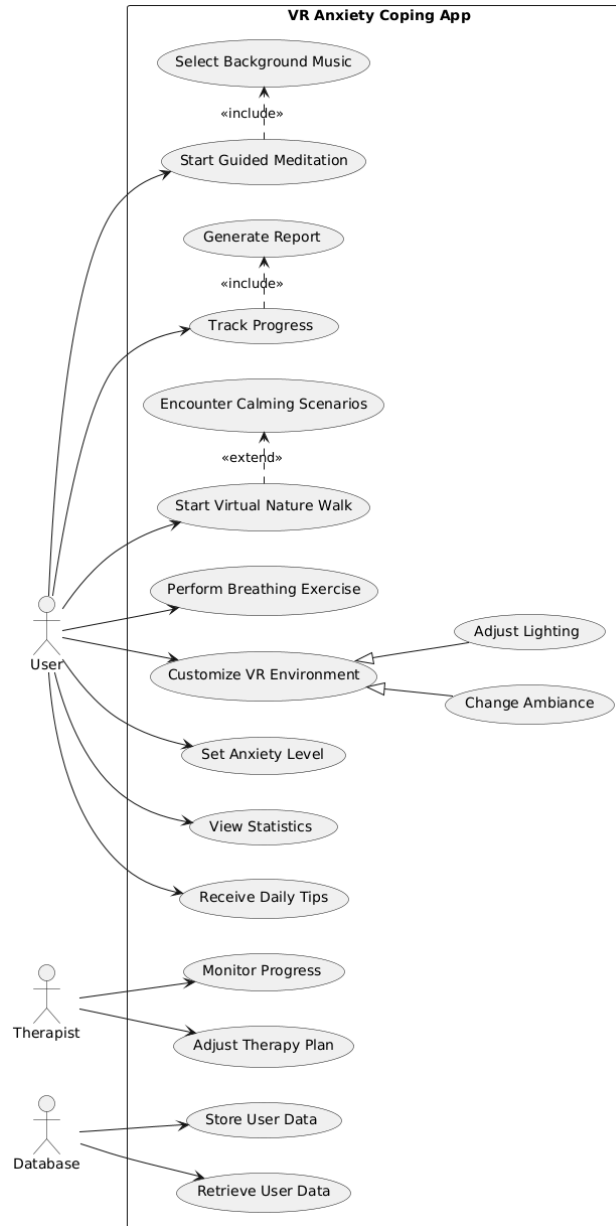
FR-6: Error Handling and Feedback

The system shall detect sensor or audio playback errors and provide appropriate error messages or instructions.

FR-7: (Optional) Session Logging

The system may record session data locally for user review and research purposes.

1. External Interface Requirements

Use Case: UML (example)

VR Anxiety Coping App

- Select Background Music
- Start Guided Meditation
- Generate Report
- Track Progress
- Encounter Calming Scenarios
- Start Virtual Nature Walk
- Perform Breathing Exercise
- Adjust Lighting
- Customize VR Environment
- Change Ambiance
- Set Anxiety Level
- View Statistics
- Receive Daily Tips
- Monitor Progress
- Adjust Therapy Plan
- Store User Data
- Retrieve User Data

User
Therapist
Database

3.1 User Interfaces

- Home Screen: Displays options for Guided Meditation, Breathing Exercises, and Settings.

- Environment Selection: Visual thumbnails for available VR environments (e.g., forest, beach, abstract calming space).

- Session Screen: During sessions, the screen shows a 360° immersive view, with unobtrusive controls for pausing or stopping.

- Settings Screen: Provides controls for volume, brightness, and session duration.
All interfaces follow VR design best practices to ensure readability and ease of use in immersive environments.

3.2 Hardware Interfaces

- Smartphone Sensors: Utilizes the gyroscope and accelerometer for head tracking.

- Touch Input: Supports touchscreen interactions for menu navigation.

- Google Cardboard Interaction: May use Cardboard's physical button (or tap input) as a selection mechanism.

3.3 Software Interfaces

- Unity Engine: The core development platform for rendering 3D environments and handling user interactions.

- Google Cardboard SDK: Provides VR functionalities and integrates with smartphone sensors.

- Local Database/Storage (Optional): For storing user session logs and settings.

3.4 Communications Interfaces

- Network Communication: If session data or content updates are provided remotely, the system shall use secure WiFi or mobile data connections.

- Data Synchronization: For any cloud-based features (e.g., session backups), secure protocols (HTTPS) will be used.

1. System Features

4.1 Use Case: Start Meditation Session

Use Case Name: Start Meditation Session

Trigger:

The user selects "Start Meditation" from the home screen menu.

Precondition:

- The application is launched.
- The smartphone is mounted in the Google Cardboard headset.

Basic Flow:

1. The Home Screen displays available session options.
2. The user selects the "Guided Meditation" option.
3. The system presents a list of available meditation sessions.
4. The user selects a session.
5. The system loads the corresponding calming VR environment.
6. Audio-guided instructions commence, and visual cues are synchronized with the meditation.

Alternative Paths:

- If the audio file fails to load, the system displays an error message and offers a retry option.
- If the user cancels the selection, the system returns to the Home Screen.

Postcondition:
The meditation session begins with the appropriate environment and guidance.

Exception Paths:

- If sensor data is unavailable or unreliable, the system prompts the user to recalibrate or adjust the headset.

Other:

- The session can be paused or terminated at any time via user input.

1. Other Nonfunctional Requirements

5.1 Performance Requirements

- The application shall maintain a minimum frame rate of 60 FPS on supported devices.

- Audio and visual components must remain synchronized throughout the session.

- Loading times between menu selections and environment transitions should be minimal.

5.2 Safety Requirements

- The system shall display a warning message regarding potential motion sickness and advise users to remove the headset if discomfort occurs.

- The app must include an easily accessible "Exit" or "Pause" function to ensure user safety at all times.

5.3 Security Requirements

- All locally stored user data (e.g., session logs) must be securely encrypted.

- If remote communication is implemented (for updates or backups), data transfers shall use secure, encrypted protocols (e.g., HTTPS).

5.4 Software Quality Attributes

- Usability: The interface shall be intuitive and accessible for users with varying levels of tech-savviness.

- Maintainability: Code should be modular to facilitate updates and debugging.

- Robustness: The system should gracefully handle errors, sensor failures, and unexpected user inputs.

- Portability: The application shall be compatible with a wide range of Android and iOS devices.

- Testability: Features and performance must be verifiable through automated tests and user trials.

1. Other Requirements

- Accessibility: Future iterations may include additional accessibility features (e.g., subtitles for audio instructions).

- Internationalization: Consideration for language localization based on target user demographics.

- Data Analysis: Optional integration of session logging for research and product improvement purposes.

- Future Expansion: Potential for adding new VR environments and additional guided sessions (e.g., stress relief, sleep aid).

Appendix A: Glossary

- VR (Virtual Reality): Technology that simulates a 3D environment for immersive user experiences.

- Unity: A cross-platform game engine used for developing interactive 3D applications.

- Google Cardboard: A low-cost VR platform that uses a smartphone inserted into a cardboard viewer.

- Guided Meditation: A meditation session where audio instructions and visual cues help direct the user's focus.

- Breathing Exercise: A session designed to help regulate breathing through timed visual and audio cues.

- Axeity: A stylized term representing anxiety, which this app aims to help manage.

Appendix B: Analysis Models

- Use Case Diagrams: Detailed diagrams illustrating user interactions (e.g., starting a session, navigating environments) will be provided in supplementary documentation.

- Sequence Diagrams: Diagrams outlining the flow of data between the user interface, Unity engine, and Google Cardboard SDK.

- Data Flow Diagrams: Diagrams that model how session data and settings are managed within the application.