# MM806 Project Proposal

# **Virtual Companions**: A VR-Based Social Interaction Platform for Seniors with Calming Environments


**Team members**

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# 1. Project Description

## 1.1 Motivation

Social isolation and loneliness remain significant concerns for older adults, especially those with limited mobility or reduced social networks. Emerging research suggests that Virtual Reality (VR) can enhance emotional well-being by enabling users to participate in immersive, relaxing, and socially supportive experiences (*Muslu et al., 2025*). VR has the potential to create comforting environments where seniors can explore, reflect, and engage in gentle interactions.

*Muslu et al. (2025)* reported that older participants experienced improved mood, reduced feelings of isolation, and greater emotional comfort when using VR environments designed specifically for calm reflection. Despite the benefits, many current VR systems are geared primarily toward entertainment or clinical therapy and often overlook accessibility and guided interaction for first-time or older VR users (*Sivan et al., 2020*).

This project aims to design a VR platform that fosters emotional connection, relaxation, and ease of use through serene visual environments paired with an AI-driven companion. The Virtual Companions project will create a welcoming and intuitive VR space suitable for seniors who may be unfamiliar with immersive technologies.

## 1.2 Project Objectives

- Develop a visually calming VR environment inspired by art and nature to encourage relaxation and stress reduction.
- Implement an AI companion that provides narration, dialogue, or gentle guidance during experiences such as storytelling or meditation.
- Design an accessible user interface with large buttons, readable text, and intuitive navigation for first-time VR users.
- Optimize performance to allow testing directly in Unity Play Mode without requiring a VR headset.

## 1.3. Expected Outcomes

- A functional VR prototype demonstrating a calm and accessible design.
- AI-driven companion module for narration and relaxation.
- A basic or simulated social component showing potential for future multiplayer interaction.
- Peer evaluation feedback on comfort, accessibility, and engagement.

# 2. Work Division and Roles

### Sushmita Bajgain | Role: AI & System Developer

- Develops the AI companion and core system logic.
- Implements scripted dialogues, pre-recorded audio narration, or text-based prompts.
- Manages any data handling features (such as simulated logs or event triggers).
- Contributes to documentation and technical explanations.

### Prabhjot Kaur | Role: UI Developer

- Designs and implements user interface components.
- Ensures accessibility through large readable fonts, clear layout, and strong visual contrast.
- Integrates interface elements seamlessly within the 3D VR environment.
- Prepares presentation materials and assists with the demo.

### Fariha Rahman | Role: UX Designer & Tester

- Focuses on user experience flow, comfort, and accessibility within the VR environment.
- Conducts peer testing sessions to evaluate usability and engagement.
- Collects and analyzes feedback to identify improvements in design and interaction.
- Supports layout design, environment setup, and report preparation.

### Collaborative Tasks

All members will contribute to documentation, slides, and demo recording. Version control and progress tracking will be managed through GitHub, with weekly meetings to review updates and assign new tasks.

# 3. Technical Architecture

## 3.1 Technical Architecture Diagram

The diagram outlines how users interact with the VR environment, UI elements, and AI companion, supported by Unity and external services.

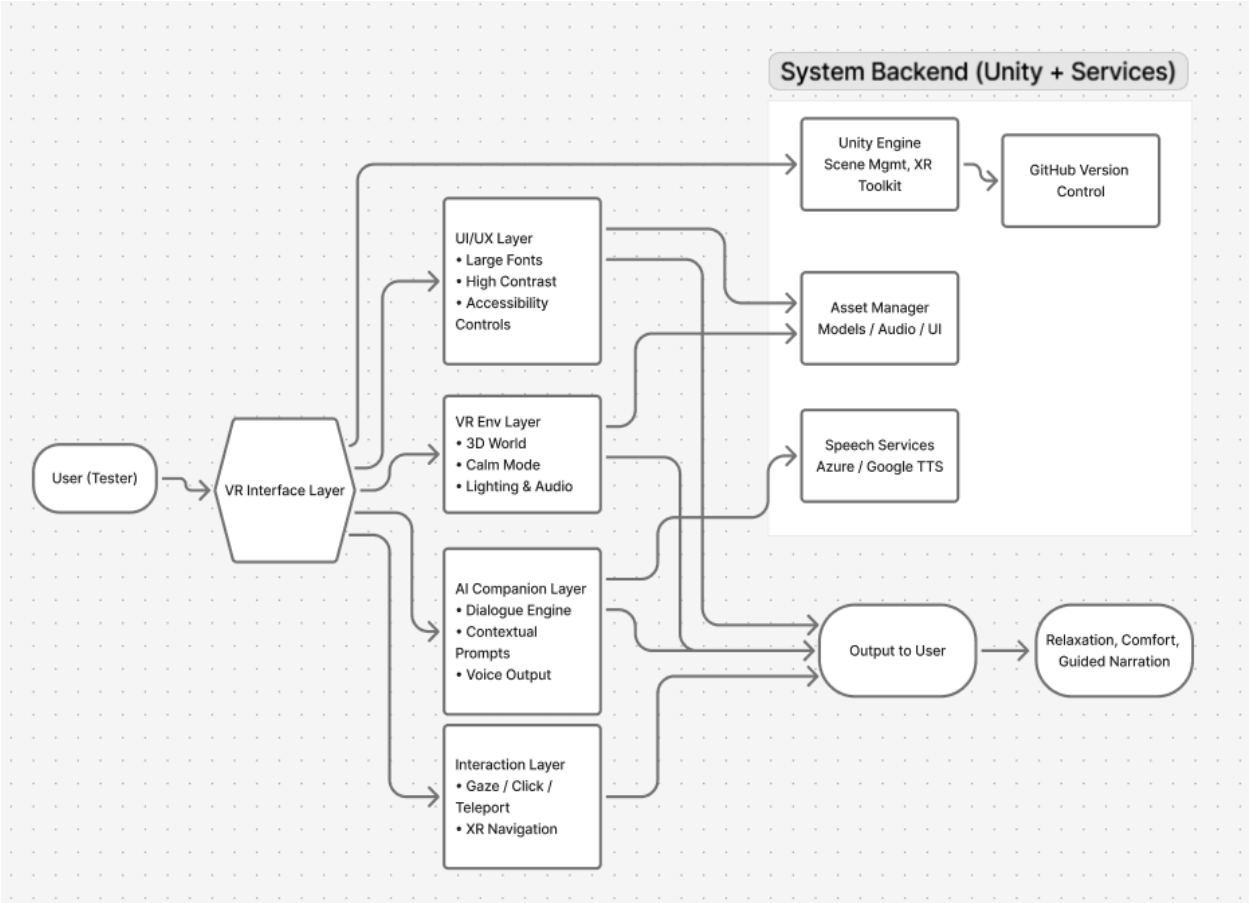


**Figure 1**: VR Emotional Support System Technical Architecture

# 4. Implementation Plan

## 4.1 Technology Stack

| **Component** | **Technology Used** |
|---|---|
| **VR Engine** | Unity 3D (LTS Version) |
| **AI / Voice** | Azure Speech or Google Text-to-Speech (for narration and dialogue) |

| | |
|---|---|
| **XR Framework** | Unity XR Interaction Toolkit |
| **Development IDE** | Visual Studio Code |
| **Version Control** | GitHub |
| **Hardware** | Standard PC or laptop (Intel i3+, 8GB RAM), optional Oculus Quest 2 headset for testing |

### 4.2 Development Approach

The project follows an agile, sprint-based development approach with weekly milestones to stay on track during the limited time period. Each sprint will focus on completing a functional module, followed by testing and feedback sessions.

- **Weekly Sprints:** Each week focuses on an independent module such as environment creation, AI integration, or UI refinement.
- **Peer Testing:** Classmates will act as test users to evaluate readability, comfort, and interaction flow, important considerations for senior-friendly VR (*Sivan et al., 2020*).
- **Accessibility-Centered Design:** Calm color palettes, simple controls, and minimal visual clutter will be prioritized.
- **Iterative Refinement:** Feedback from each sprint will inform improvements to narration, interface usability, and overall stability.

## 5. Project Timeline

#### Oct 28 – Nov 5: Environment Setup & Requirements

- Install Unity 3D and XR Toolkit.
- Define project scope, environment layout, and accessibility goals.
- Prepare low-poly 3D assets and ambient sound resources.

#### Nov 6 – Nov 13: Environment & Interface Design

- Build a calming VR lounge or garden-style environment.
- Design and implement UI elements such as menus, navigation panels, and readable text displays.
- Test movement and interaction using Unity Play Mode.

#### Nov 14 – Nov 20: AI Companion Integration

- Implement scripted dialogues, pre-recorded narration, or text-based prompts.
- Add triggers for guided relaxation or simple user interaction sequences.

**Nov 21 – Nov 29: Testing & Accessibility Review**

- Conduct peer testing to gather usability feedback.
- Refine interface readability, layout, and comfort features.
- Optimize lighting, textures, and performance for smooth playback.

**Dec 1 – Dec 12: Optimization & Documentation**

- Final debugging and performance tuning.
- Prepare technical documentation, diagrams, and the written proposal.
- Refine visuals, narration flow, and overall presentation quality.

**Dec 13 – Dec 15: Final Presentation & Submission**

- Record a demo video showcasing the main features.
- Prepare final presentation slides and submit all materials.
- Conduct the project demonstration and wrap-up session.

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# 6. Resource Requirements

## 6.1. Hardware

- Standard laptop or PC (Intel i3 or higher, 8 GB RAM) for development and testing.

## 6.2. Software

- **Unity 3D (LTS Version):** Main development platform for creating and testing the VR environment.
- **Unity XR Interaction Toolkit:** Handles input, teleportation, and interaction logic.
- **Visual Studio Code:** Code editor for scripting and debugging (C#).

## 6.3. Assets

- Low-poly 3D models, ambient audio loops, and accessibility-friendly UI prefabs sourced from free Unity Asset Store packages.

### 6.4. Version Control

- **GitHub:** For version tracking, backup, and collaborative development.

### 6.5. Documentation Tools

- **Google Docs:** For writing and editing the main proposal collaboratively.
- **Canva or PowerPoint:** For presentation design and final visuals.

## 7. Risk Assessment

The project involves a few manageable risks typical of short-term VR development. Key risks and their mitigation strategies are summarized below:

- **Limited Time**: Focus on essential features first, such as the core VR environment and AI companion.
- **Integration Errors**: Test individual components (AI logic, UI, narration) separately before combining them into the main scene.
- **Hardware Limits**: Optimize models and textures to ensure smooth performance even without a VR headset.
- **Usability Challenges**: Keep controls simple, use large fonts and clear visuals, and gather peer feedback to refine comfort and accessibility.
- **Team Coordination**: Use GitHub for collaboration and weekly check-ins to monitor progress and distribute work evenly.

## 8. Evaluation Metrics

The project's success will be evaluated through usability testing, functionality checks, and peer feedback once the prototype is completed.

- **Functionality:** Ensure all main features (navigation, AI, and interaction) work correctly.
- **Usability:** Assess the ease of interface is easy to use and understand, with readable text and clear controls.
- **Performance:** Ensure the VR scene runs smoothly in Unity Play Mode without major lag or crashes.
- **Engagement:** Observe user responses to the relaxing environment and interactive elements.
- **Accessibility:** Check that font sizes, color contrast, and layout meet usability standards.

# 9. Conclusion

The Virtual Companions project aims to create a calm, supportive VR environment that enhances emotional well-being for older adults. By integrating soothing visuals, guided narration, and highly accessible UI/UX design, the system demonstrates how VR can provide comfort and connection for individuals who may experience social isolation. The project will deliver a functional VR prototype supported by user feedback and grounded in established research on VR accessibility and mental well-being.

# 10. References


1. Muslu, L., et al. (2025). *Time travel of older people through virtual reality: a qualitative study.* BMC Geriatrics. https://pmc.ncbi.nlm.nih.gov/articles/PMC11745011/
2. Freeman, D., et al. (2017). *Virtual reality in mental health treatment: A review.* Psychological Medicine.
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