Memorial Union: OSU Student Diversity Display

Concept Overview:

At Oregon State University, our campus is like a colorful collage, filled with students coming from diverse cultures, countries, ages, gender and majors. Yet, within this rich mosaic, countless remarkable stories often go untold or suppressed. Stories connect us and foster understanding and every student bears a story worth sharing. Picture a space where these stories take center stage – a spot where a student's journey is celebrated and shared. Such a platform would not only inspire but also foster a profound sense of connection within our community, allowing an individual to feel represented.

Virtual Reality (VR) steps in as a powerful tool to create these narrative spaces, breaking free from physical limitations and offering accessibility to all. Through VR, we can craft a virtual world that transcends distance, giving voice to every story and building stronger bonds within our diverse community.

Project Goals

The primary objective of the project is to enhance the Memorial Union at Oregon State University as a dynamic hub that truly celebrates diversity. I aim to achieve this by creating a virtual Main Lounge that showcases 8-10 personal objects belonging to students. The reason for selecting objects is that objects are silent storytellers. They offer a glimpse into our lives, our accomplishments and the struggles we've overcome. The chosen items can range from a favorite dish to a musical instrument, an award, or anything that holds sentimental value or connects them to their roots.

Within this virtual space, users will have the opportunity to tour and interact with these meaningful objects. Each object will be paired with a card featuring a photo of the student, along with essential details like their name, age, pronouns, country they are from and major. Additionally, a personalized audio narration from the object's owner will accompany each item, allowing users to hear firsthand the individual stories that make our community unique.

My vision is to create an engaging immersive experience where users can virtually hold these objects, establishing a connection with the diverse narratives within our student community.

Target Audience

This project is designed for a diverse audience, including current students at OSU, prospective students, and their parents or guardians visiting the OSU campus. The intended age range for the project is ideally 15 and above.

For current students, the goal is to help them connect with their peers, find community members, feel a sense of representation, draw inspiration from their peers' experiences, and share their own journeys.

Prospective students and their parents or guardians will benefit by seeing students from their communities represented, influencing their decision-making process when choosing a university. This first hand exposure to diverse narratives and the accomplishments of talented individuals involved in exciting projects can significantly impact their perception of OSU. It might help them to decide if OSU is the right place for them.

Design Elements and Functionality:

The virtual setting will replicate the well-lit atmosphere of the MU Lounge during daytime, which remains well illuminated around the clock. The scene starts from the entrance of the main lounge. Before users begin exploring the premises, they will encounter a screen presented in slide format. This screen will include navigation buttons on its left and right, enabling users to progress to the next slide or return to the previous one. The first slide extends a welcome, introducing the project's name, while the second provides insights into interaction techniques and the functionality of plinth buttons. The third slide instructs users on how to conclude the tour, and the final slide signals the initiation of navigation. Upon pressing the start button, the screen disappears, enabling users to explore.
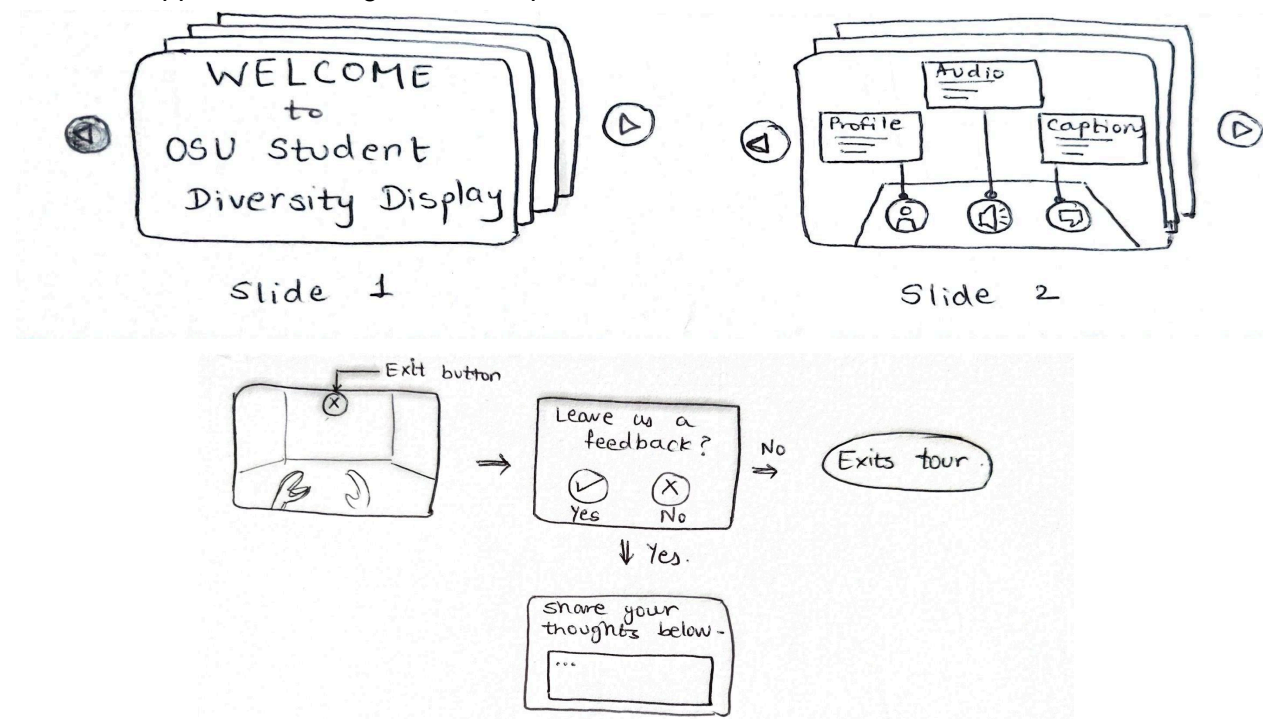

Fig: Navigation guide prototype

The objects will be placed on plinths across the main lounge. These plinths will be well spaced out giving enough space to navigate comfortably. The plinth will have a display tag which will have the name of the student and the object. Each plinth will have two interactive buttons: one to display the information of the student (photo, name, age, major and country) and the other to listen to the audio story. (Optional: a third button for captions which will be in sync with the

audio, which can be turned on/off). Each button can be turned on and off while the user interacts with the object. Each audio story will be of not more than 2 minutes. Users can physically hold the 3D objects and explore them in the virtual space.
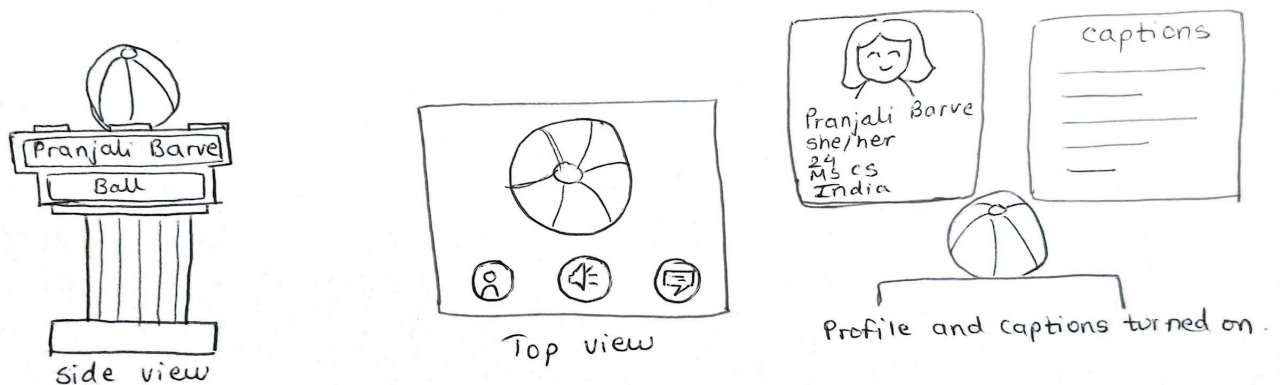

Fig: Plinth prototype

Once the user is done with the tour they can opt to exit it. This will prompt the user to a screen which will ask them to leave feedback. Clicking "no" concludes the tour, while clicking "yes" directs users to a feedback screen where they can share their thoughts.
With a maximum of 10 objects and concise audio stories, the entire tour is designed to be a 20-minute immersive experience.

Technology Stack

Hardware:
1. VR Headset: Oculus Quest 2
  - Justification: The Oculus Quest offers an excellent balance of affordability and performance. It provides a standalone VR experience, eliminating the need for external sensors or a connected PC. The Quest 2 is widely adopted, ensuring compatibility and a larger user base.

2. Motion Controllers: Oculus Touch Controllers
  - Justification: Oculus Touch Controllers are designed specifically for the Oculus Quest series, providing precise tracking and a natural interaction experience. They are essential for user interaction within the VR environment while grabbing objects.

3. PC for Development: High-end Windows PC from Batcheller Hall Lab
  - Justification: VR development requires a powerful windows PC to handle graphics rendering and processing. A high-end PC ensures smooth development and testing processes.

Software:
1. Unreal Engine

- Justification: Unreal Engine is a versatile and widely-used game development engine. It supports VR development and is compatible with the Oculus platform. Unity's Asset Store also provides various plugins and assets that can enhance the VR experience.

2. 3D Scanning Tools: Polycam / RealityScan
  - Justification: Polycam and RealityScan contribute to the project by enabling the scanning of real-world objects and environments, which can be seamlessly imported into Unreal Engine. This enhances the authenticity of the VR experience by incorporating real-world objects into the virtual space. These scans can be performed using a smartphone or tablet. This mobility makes it convenient for on-the-go scanning without the need for specialized equipment.

3. Quixel Megascans
  - Justification: Quixel Megascans offer an extensive library of high-quality 3D assets and materials. Integrating them with Unreal Engine will enhance the visual fidelity of the virtual environment by providing realistic textures and objects.

4. Music Audio Editor, MP3 Cutter
  - Justification: For audio editing and recording the personalized audio narrations that accompany each object. This is an android app that offers features for creating and editing audio files.

5. Blender (Optional)
  - Justification: Unreal Engine supports the modeling software Blender. I can leverage Blender to create and import 3D models into Unreal Engine for building the virtual environment and objects. Blender would only be used in case the 3D scanning tools don't work or an alternate similar asset is not available on Quixel.

6. Version Control: Github
  - Justification: For collaborative development, Git can be used for version control.

Development Roadmap

1. Week 5: Virtual Environment Design
   - Start building the virtual Main Lounge in Unreal Engine.
   - Capture individual photos for texture mapping.
   - Experiment with lighting and ambiance to replicate the MU Lounge atmosphere.
   - Import Quixel Megascans and other assets to enhance the environment.

2. Week 6 and 7: Object Selection and 3D Scanning
   - Create a list of potential students willing to share their stories.
   - Draft a storyboard outlining the user's journey through the virtual space.
   - Begin discussions with potential participants.
   - Finalize the selection of 8-10 personal objects and obtain permissions.
   - Utilize Polycam/RealityScan for 3D scanning of chosen objects.

- Integrate 3D scanned objects into Unreal Engine.
- Implement interactive features for each object.

3. Week 8: User Interface and Navigation
   - Design and implement the slide-format screen for user guidance.
   - Develop the interface for interactive buttons on plinths.

4. Week 9: Audio Narration and Feedback System
   - Record personalized audio narrations for each object.
   - Implement the audio playback functionality in Unreal Engine.
   - Design the feedback system, allowing users to provide input.

5. Week 10: Testing and Iterations
   - Conduct thorough testing of the entire VR experience.
   - Address any bugs, glitches, or user experience issues.
   - Gather feedback from a small group of test users for improvements.

6. Week 11: Finalization and Presentation Preparation
   - Finalize all elements, ensuring a cohesive and polished experience.
   - Create a presentation and demo outlining the project journey and features.
   - Prepare for the final presentation, including a demonstration of the VR experience.

Challenges and Solutions

1. Challenge - Feedback typing can be inconvenient with the controllers.
Possible solution - Alternative could be - we can use speech to text translation for collecting feedback. But this seems to be out of scope of the project.

2. Challenge - Objects not placed back to their original position by the user
Possible solution - The space will be single user and hence when a new user tries on the VR space a new session will be loaded with the objects at their default positions.

3. Challenge - Getting data (diverse cohort of students willing to share their stories)
Possible solution - Can request students from AR/VR lab to share their stories. Alternatively make more friends!

4. Challenge - Making exact replica of MU Lounge
Possible solution - Making an exact replica of MU Lounge can be tricky. I have seen videos where people have used photogrammetry techniques to scan rooms. However these are either not clean enough or require high end tools to capture clean scans. Additionally if I scan the MU Lounge just as it is, I would have to clean out the furniture manually using some software which would be time consuming. So to tackle this, I am planning to take individual photos of walls, floor, carpet etc so that I can map the texture in Unreal Engine. In future if I come across some better technique to handle this task, I'll consider it.