COLLEGE OF ENGINEERING | **Electrical Engineering and Computer Science** | **CS.064**

Ball Quest: AR

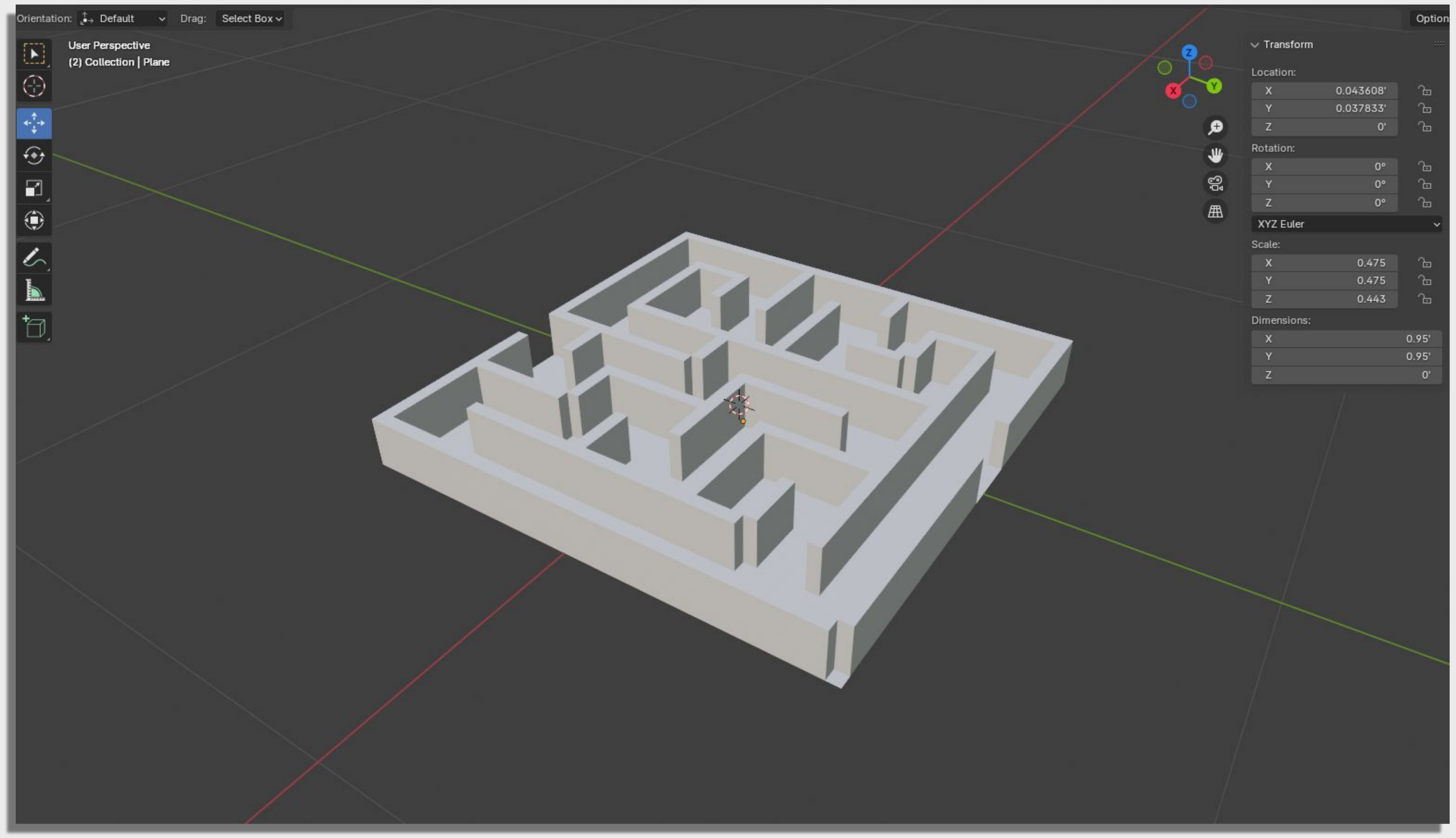
Navigate through narrow networks of mazes using augmented reality and physics to reach the goal!

Showcasing the Potential of Augmented Reality

- Many people still don't know the capabilities of Augmented Reality. AR is an underutilized technology despite its many possibilities. It is hard to access and confusing to new users. Because of this, there has not been much interest among the general public. As such, we wanted to create a game simulation that could introduce augmented reality to more people to provide entertainment and interest in the technology.
- The scope of this project was to develop an experience that blends a virtual simulation environment with real-world physics. We have created an environment that simulates virtual balls that the player will be able to interact with by using physics. The user will manipulate a physical real-world object (e.g., a plastic box) and see the effect that has on the virtual balls. We also have some gamifying features like mazes for an even more entertaining experience.

Figure 1: The Quest 3, the device we use to play the game

Oregon State University



Orientation: Default
Drag: Select Box
User Perspective
(2) Collection | Plane
Transform
Location:
X 0.043608'
Y 0.037833'
Z 0'
Rotation:
X 0°
Y 0°
Z 0°
XYZ Euler
Scale:
X 0.475
Y 0.475
Z 0.443
Dimensions:
X 0.95'
Y 0.95'
Z 0'

Figure 2: Maze development in Blender

What We Utilized

Meta Quest 3:

The Quest 3 supports high-quality Passthrough vision. This feature allows the user to see the real world around them along with the virtual environment that we want to provide.

Unreal Engine 5:

We utilized the Unreal Engine 5 game engine. It has excellent physics simulation, visual quality, and has numerous plugins for Virtual and Augmented Reality development available. This made it a good choice for our project. Though the Unity game engine was also heavily considered as we could have likely achieved similar results.

Development Challenges

- In our simulation we use many balls which bounce around inside the box that the user holds. The balls would sometimes clip or teleport out of the box. The way we tried to solve this problem was to make the balls bigger, use shapes other than spheres, and change how they bounce. We found making the balls larger decreased this significantly.
- There were many tools that we needed that did not work together in the way we had hoped. We ended up needing to recreate some things from scratch on our own for use in our project.

Sources

Contact Information

- Jameson Yee - yeeja@oregonstate.edu
  - Major: Computer Science - Simulation and Game Programming Focus
- Jackson Anglin - anglinj@oregonstate.edu
  - Major: Computer Science - Simulation and Game Programming Focus
- Thomas Wagner - wagnerth@oregonstate.edu
  - Major: Computer Science - Simulation and Game Programming Focus
- Jamie Parker - parkjami@oregonstate.edu
  - Major: Computer Science - Simulation and Game Programming Focus
- Project Partner: Mike Bailey
  - Professor at Oregon State University mjb@oregonstate.edu

Documentation

- https://docs.google.com/document/d/1ocyPYbjAD_2U7VIjxB_b-pgXDTKVgOuVwT2Km9ATBXM/edit?usp=sharing

Repository

- https://github.com/jamesonyee/AR-physics-game

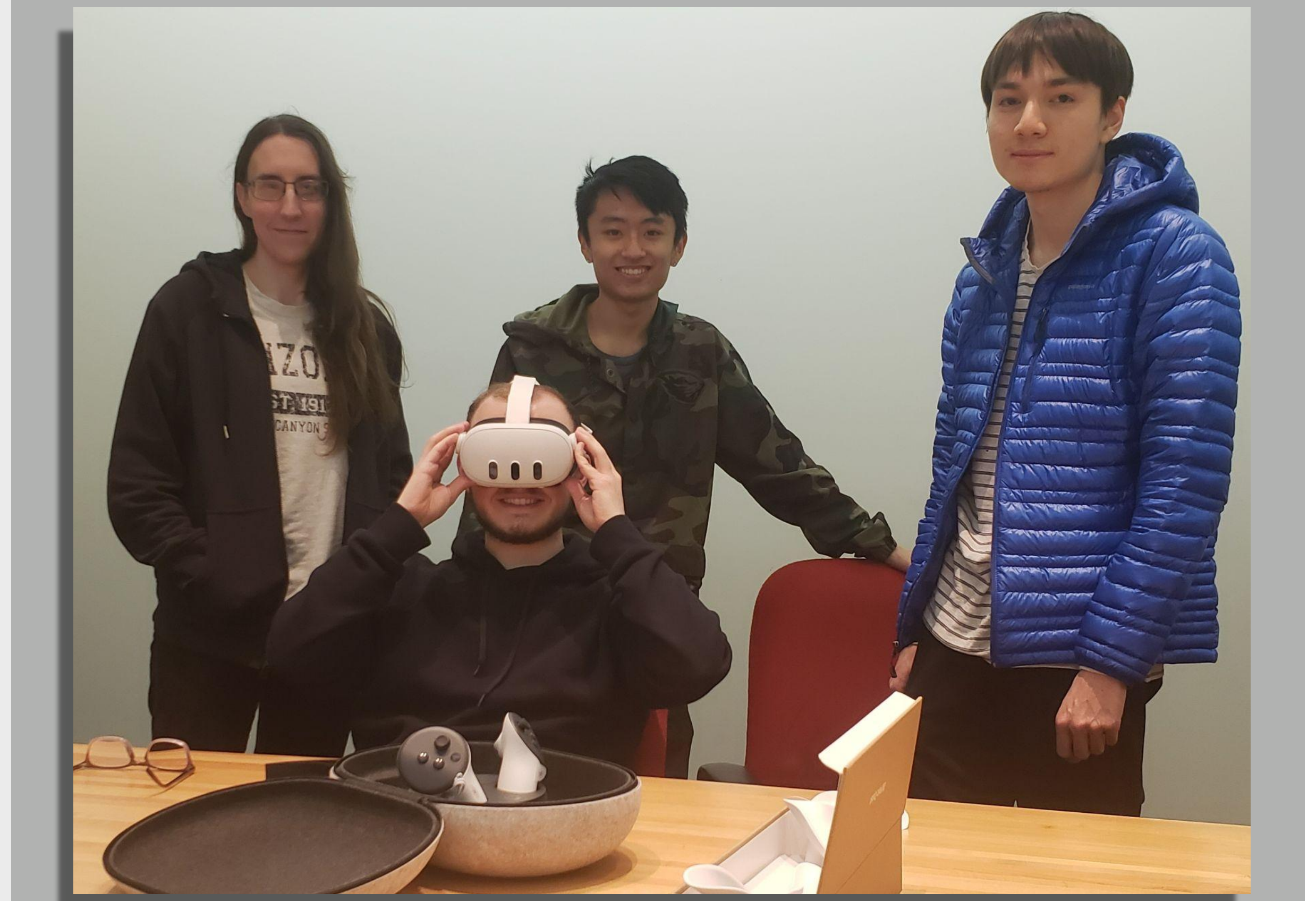


Figure 3: The team