VR Palliative Care

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UNIVERSITY OF TEXAS ARLINGTON | COLLEGE OF ENGINEERING

VR Nursing

Our Vision

Our vision is to help rising nursing students gain hands on experience with various, uncommon palliative care scenarios, using VR technology. We want to make a positive impact on the UTA nursing department, by providing a safe and comfortable way to gain experience in scary and uncommon situations.

Our Mission

Our mission is to create a realistic VR simulation of 4 different hospice care scenarios that will follow the life of a patient from beginning to end. These scenarios include taking care of the patient in the hospital, in their home, and after they have passed. This will help nursing students gain experience in these scenarios while minimizing trauma.

Key Requirements

The application must contain 4 scenarios. The first scenario includes providing normal palliative care in the hospital. This includes monitoring the patients heart rate and condition. The second and third scenario including coming to the patients home to take note of the patient condition. This includes taking the patients heart rate, temperature, and providing basic care like a change of clothes and anything else the patient might need. These scenarios also include testing the nurses ability to locate hazardous items that might need to be removed from the patients household. Finally the last scenario takes place in the patients house after the patient has passed. This includes tending the the patients wife, giving her advice on what to do next, confirming the patient has passed, and helping the family recover from their loss.

System Architecture

The User Interface Layer consists of all actions that are made by there user while using the VR hardware. This layer specifies any and all forms of potential input the user can give to the software. This includes the accelerometer, gyroscope, and cameras in the headset that help it determine the user's location and the direction the user's head is facing, the buttons on the hand controllers along with the controller's position, as well as many other sensors and controls. Visual text boxes, images, HUD information, amongst many other aspects of this project are all communicated to the user through this layer.

The VR Simulation Software Layer consists of all of the software tools needed to generate the virtual reality environment and process updates as the user interacts with the system. The Unity engine gathers the mapped data from OpenXR and asset data stored locally and inputs that into the current scene for processing. Scenes take the input data and transfers that to the affected entities. The entity handler processes all of the communication between the different entities and sends that data to the component manager. This data is then sent back to the entity handler which will then update the state of the affected entities, and finally update the scene.
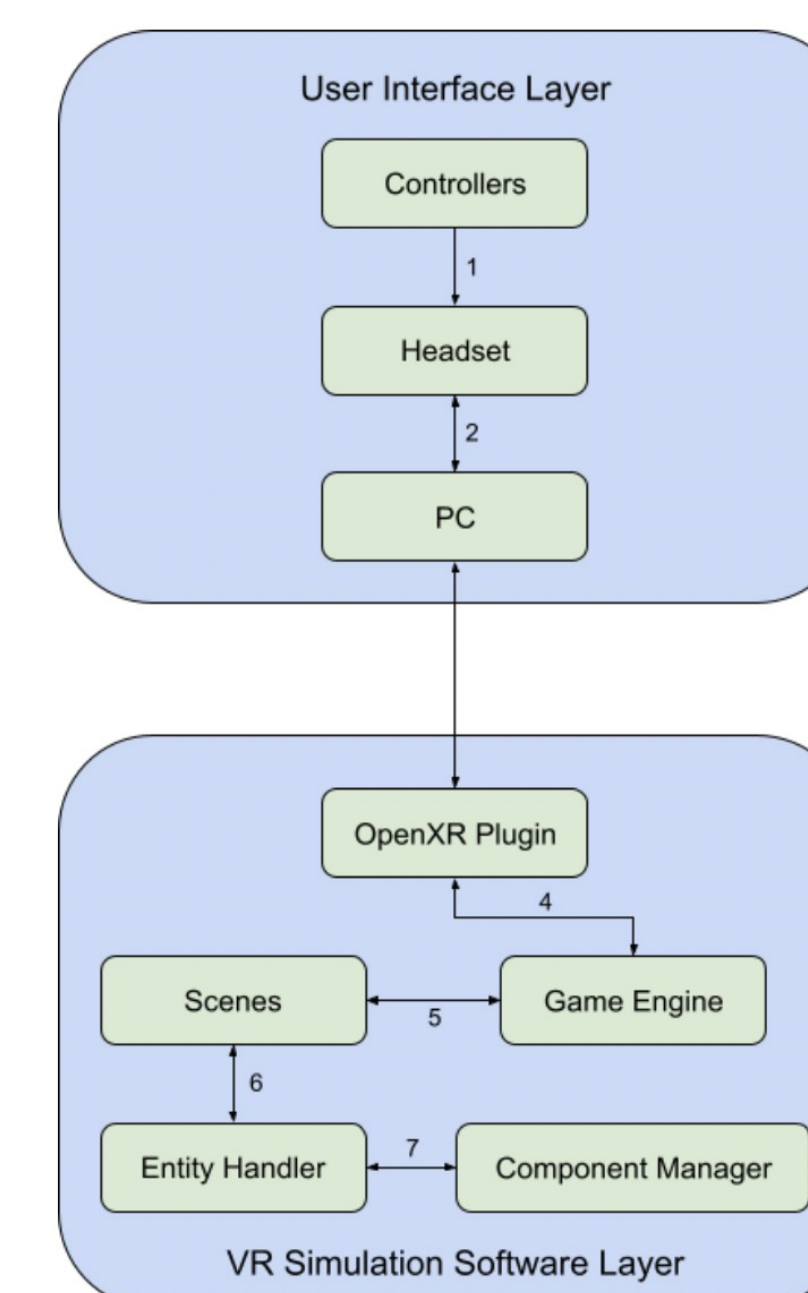
Figure 1: System Architecture

Design Details

OpenXR plugin is a subsystem that creates an interfacing layer between the VR hardware and code in Unity. The Unity game engine requires the full set of libraries included with each version of Unity along with OpenXR libraries. The structures that we used for this project include CreateAction, CreateActionSet and CreateActionSpace which tells OpenXr what to do when in a VR session.

Current Status and future work

The current status of the project is close to complete. All four hospice care scenarios are complete and we have resolved many of the bugs that we were encountering before. Future work will include: creating automated tests, adding popup guides as you go, optimizing memory, fixing smaller bugs, improving movement fluidity, and most importantly releasing it to deployment.

Demployment will include getting autorization to release it to the oculus store for not just UTA students to use, but anyone with an oculus VR.
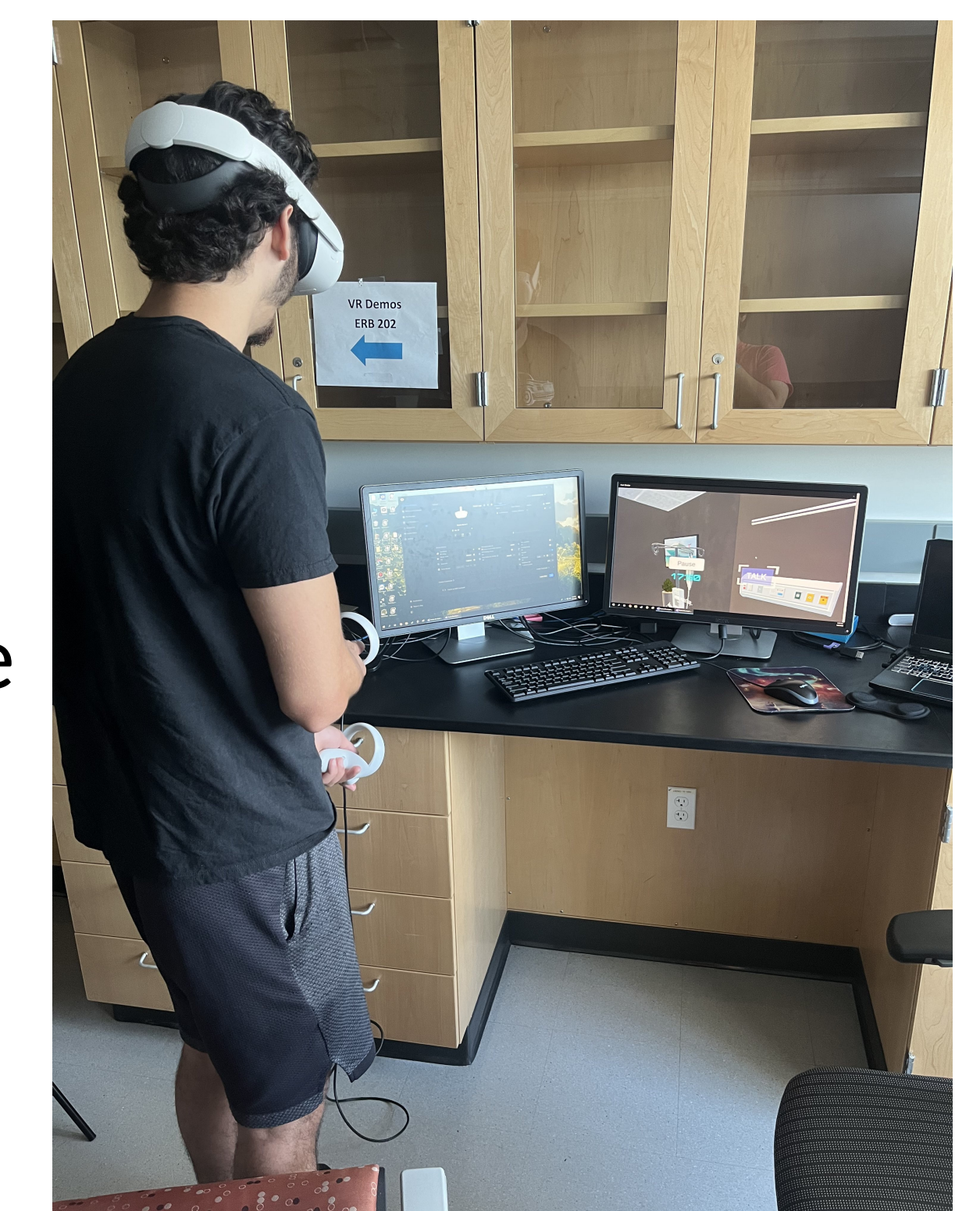
(Picture of Mahdy Joudeh testing the application)