Members
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Project description

In this project, we wanted to explore the process of creating a mixed reality application that both extends reality with holograms and immerses the user in a VR environment. We wanted to create an application that utilized all the technologies provided by the HoloLens and delivered an experience that could not be enjoyed by AR/VR enthusiasts and normal people.

We originally wanted to start in augmented reality (AR) setup, anchoring a wormhole in the classroom. As user approaches the wormhole and enters its event horizon, she would be sucked into it, experiencing the hypothesized time warping effects and ultimately be transported to the other side of the wormhole--a VR galaxy environment. From the implementation stand point, it made sense to place the galaxy environment physically within the wormhole because the user would be forced to enter it to be immersed in the VR environment. This scenario is called mixed reality—leaning towards pure virtual reality; however, the HoloLens has limitations in this area because it is unable to display black. Black is the absence of light, but the HoloLens employs an additive display and so it can only add light, not take away. Without the ability to create the darkness of galactic space, we modified our original plan. Instead, we made use of the spatial mapping in HoloLens and blasted holes in the walls with a laser weapon. The spatial mapping capability determines the orientation of the object being blasted by the laser allowing a properly orientated blast hole to be rendered.

Since we still had Jess's implementation of the VR galaxy, we still wanted to test out the HoloLens ability to immerse the user in a dark environment. So we setup two scenes in our app. The first scene, Holes In Reality, provides the user the ability to blast a hole in any surface and examine the hidden world on the other side. In our case, the hidden world is an animated origami environment that we created by following a tutorial. With more time, we could create much more interesting environments like a live video feed from some other place. The second scene is the virtual reality galaxy environment created by Jess. We pushed the limits of the HoloLens to display this dark environment. Ultimately, the HoloLens will need handle dark environments better before this type of mixed reality application is further explored.

All source code for the project is located in the final_project folder
Source code John
Assets/Scripts directory:

- contains my pure code

Assets/Prefabs directory:

• contains a LaserBlast game object that I obtained from Unity asset store
Volumetric Lines by Johannes Unterguggenberger

Assets/Holograms directory:

• contains HoleInReality, and Underworld game objects that I modified from
https://developer.microsoft.com/en-us/windows/mixed-reality/holograms_101

Assets/Scene directory:

• contains HolesInReality scene that required substantial component wiring in
the Unity3d IDE. The Unity IDE provides developers drap- and-drop
capabilities to define component interactions and many other game
properties directory.

Source code Jessica
Jessica created the galaxy environment. A mix of basic 3D objects in Unity, modified
objects using resources from StarCluster Pack 2.0 and prefabricated object from
StarCluster Pack 2.0 were used. StarCluster Pack 2.0 was brought from the Unity
asset store.

Modified objects using resources from StarCluster Pack 2.0
- Sphere
- StarCluster_GrayNebulae
- StarCluster_GraySpace
- StarCluster_Wire 1
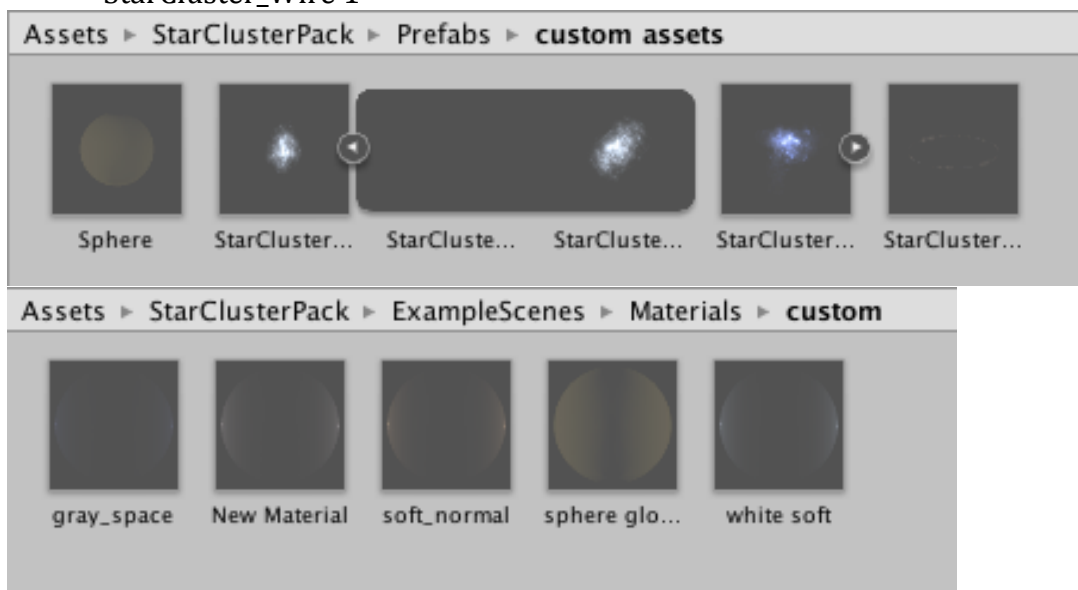
Using existing textures, new materials were created and saved. Existing material
from the StarCluster Pack 2.0, new materials, texture, shader, models, and unity 3D

objects were used to create new objects in the desired shape, color, and glow. Objects and that maybe reused were saved for reuse.

Prefabricated object from StarCluster Pack 2.0
- StarCluster_GoldNebulae
- StarCluster_ViolentSpace
- StarCluster_SoftStars
- StarCluster_RegularStars

GoogleVR SDK was used during testing to creating demos of the environment to view on Google cardboard. This is completely open sourced.

Camera script
Camera script was developed entirely by Jessica. Unity documentation was used for reference during coding. The documentation is completely open source and avalible for reference.
The documentation can be located below:
https://docs.unity3d.com/ScriptReference/

User manual
A running version of the executable is on the Hololens.
Demo videos contain clear instructions on the usage.

Links to demo videos

- Holes In Reality sceen: https://youtu.be/8h1gxNuAab0
- Interstaller Galaxy sceen: https://youtu.be/3ZPh9WIcgyA