AR Collaboration Suite

Augmented Reality Collaboration Application for PCB Analysis Using HTC Vive and ZED Mini.

Project Motivation

- Kevin McGrath, a CS/ECE professor here at OSU realized the need for a better way to work with his colleagues in Texas and other states.
- Our objective was to create an AR application enabling them to share a live visual stream from one of the locations. Both members with headsets should be able to markup and annotation the video stream as desired in a shared environment.

Project Requirements

- Our client requested that we use an HTC Vive or Oculus Rift as our VR headset, and that we used the ZED Mini as our stereo camera

- The software should allow multiple users (2+) to view and make notes on the live video stream recorded by the other headset in an almost real time experience.

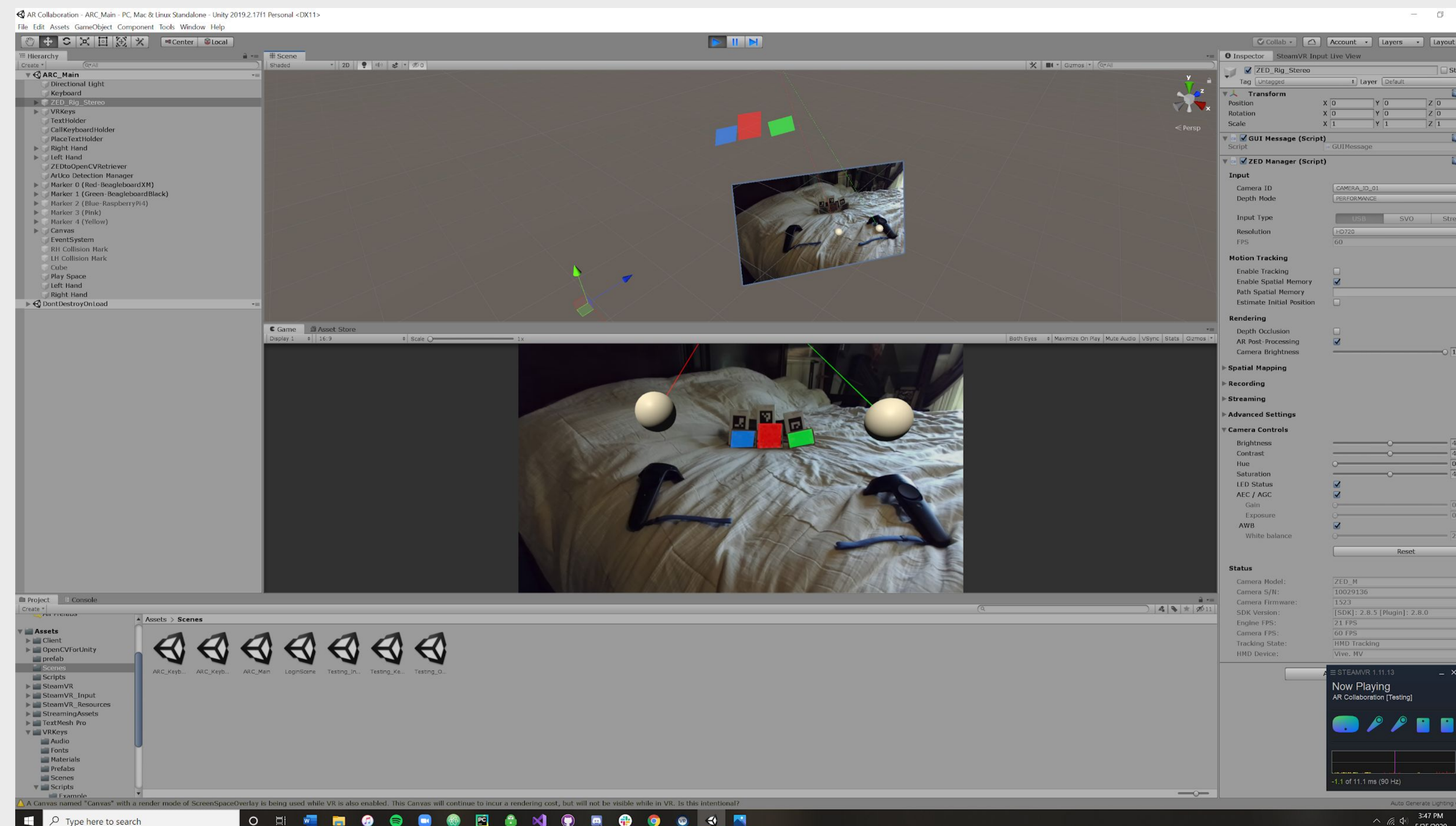Fig 1. Attaching ZED Mini to an HTC Vive.

Fig. 2 Unity Project Screenshot

Unity Project Development Process:
There was a curve for all of the member as we had very little experience with Unity prior to this project, and there was many hours dedicated to reading different SDK documentation and understanding existing code. We began with basic AR features and integrated the more complex ones with time. Login/Registration uses password salt and hashing. User input is received through control input and a virtual keyboard. Audio is captured the HTC Vive and Video is captured via the ZED Mini. There is still work to be done, but the two year project is near completion.

Implementation

AR Hardware Design:
The camera was preselected for us to use, so we based our VR headset around the ZED Mini. We chose the HTC Vive due to connectivity and availability. The two pieces of hardware attach easily due to a mount from Stereolabs.

Software Design:
We chose to use Unity for the development of our project for many reasons. Unity is free, relatively easy to learn, and Stereolabs has an SDK plugin for Unity. We downloaded many packages from the Unity asset store including Steam VR 2.0, OpenCV, and VR Keys.

Outcome

Due to the global Covid-19 pandemic our project was impacted greatly by the shutdown of the OSU campus and separation of our team and hardware.

The outcome of this project was that our client, Kevin D McGrath has a great start towards the AR collaboration suite. With this application, users are able to annotate in the virtual world, track boards with ArUco images, identify key components with laser pointers and more. Networking development was slowed due to the inability to have in-person testing with the hardware, but still this project will be a large improvement to their previous remote collaboration, of Skype.

Our Team

This team is a collection of senior CS students who all had the desire to work with VR technology and advance the forefront of the AR industry

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Thank You

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Kevin McGrath for letting us start this project.
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Fig 3. HTC Vive

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