Technology Studio 2

Basketball Game Built in Unity With Oculus Rift & Leap Motion

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Objective

Our objective for this project was to use the Leap Motion's capabilities to sync up with the Oculus Rift platform and build an interactive experience in a VR environment. Our vision was to use the new Orion build to allow us to interact with a basketball using hand recognition and collision detections. Ultimately, we would build a basketball court within Unity Game Engine and be able to throw the ball through a hoop.

Breakthroughs

Our first breakthrough was connect the leap motion to the oculus. However, there was some trouble syncing the leap motion sensor to the computer, so that it would be able to recognize hand gestures. From there, relatively simple to drop the leap motion module into unity for both devices to work together.

The next breakthrough we had was importing the game 'Blocks' through unity. This game allowed our group to see what was possible with both of these physical devices. Without many obstacles, the game was working seamlessly and provided some guidance to what game / program we wanted to create.

Another major step forward was being able to import 3d objects into unity. We easily found a downloadable .obj file of a basketball court and a ball. These files dropped easily into the game engine. From there all that was needed was to add textures to the basketball net, floors and walls.

Stumbles

A major stumble our team came across while developing was the basketball physics while using the pinch module. The scripts from the pinch module seemed to be overriding the base physics applied through unity. Through numerous adjustments of the physics parameters (mass, angular drag, etc) we were able to at least get the basketball to a "somewhat" realistic level of bounce, but it was not perfect.

Another stumble our group faced while testing was that our leap motion hands displayed were not synced properly with the rigidbody hands that allowed the hands to have proper collision detection. Therefore, we were not able to interact with the basketball until we discovered that was the reason behind our struggles.

Additionally, a minor stumble we came across was that our imported 3D objects did not come with textures. Therefore, I had to create/discover custom textures and apply them to the objects directly. However, not all textures we needed were available. (i.e. a proper basketball texture).

A continual difficulty while developing in Unity for Oculus & Leap Motion is that there is limited to no documentation available on the internet to help us when we ran into problems. This is most likely due to: (1) how new the technology combination is & (2) that developers do not want to necessarily share a lot of their code for complex games yet as it is a relatively untapped market and everyone wants to be the first to break into it with force.

Victories

A major victory for our group was when we were able to pick up the basketball with our hands using the leap motion. Also - through adding the pinch module to pick up the ball, it also allowed us to retrieve the basketball on the court when it rolled away. Therefore, solving two problems at once.

Another victory for our group was the addition of collision detectors to the ball, floor, & hoop that allowed the basketball to properly interact in a realistic way.

How it works

<u>Setup</u>

1. Ensure the leap motion device is connected to the computer via USB and then mounted on the front of the Oculus Rift. (Note: If you are using the

first developer version of the Oculus then there will not be a mount available for the leap motion. Our group used double sided velcro tape and it seemed to work great.)

2. Ensure the Oculus Rift is powered and connected to the computer via HDMI & USB.
3. Once all drivers have been installed on the computer then start up the Unity 3D program and run the Basketball Unity project in the assets folder.
4. Put on the Oculus Headset.

Unity

1. Through importing all VR modules from the Oculus and Leap Motion website, we are able to create a playable character within the Unity world.

Game Play

1. Pick up basketball by either: (1) Scooping with both hands or (2) Using the pinch mechanism with one hand
2. Resize the basketball by pinching the ball with both hands
3. If the ball rolls away, just pinch with one hand at a time and pull towards you.

Appendix

(A) Unity Setup
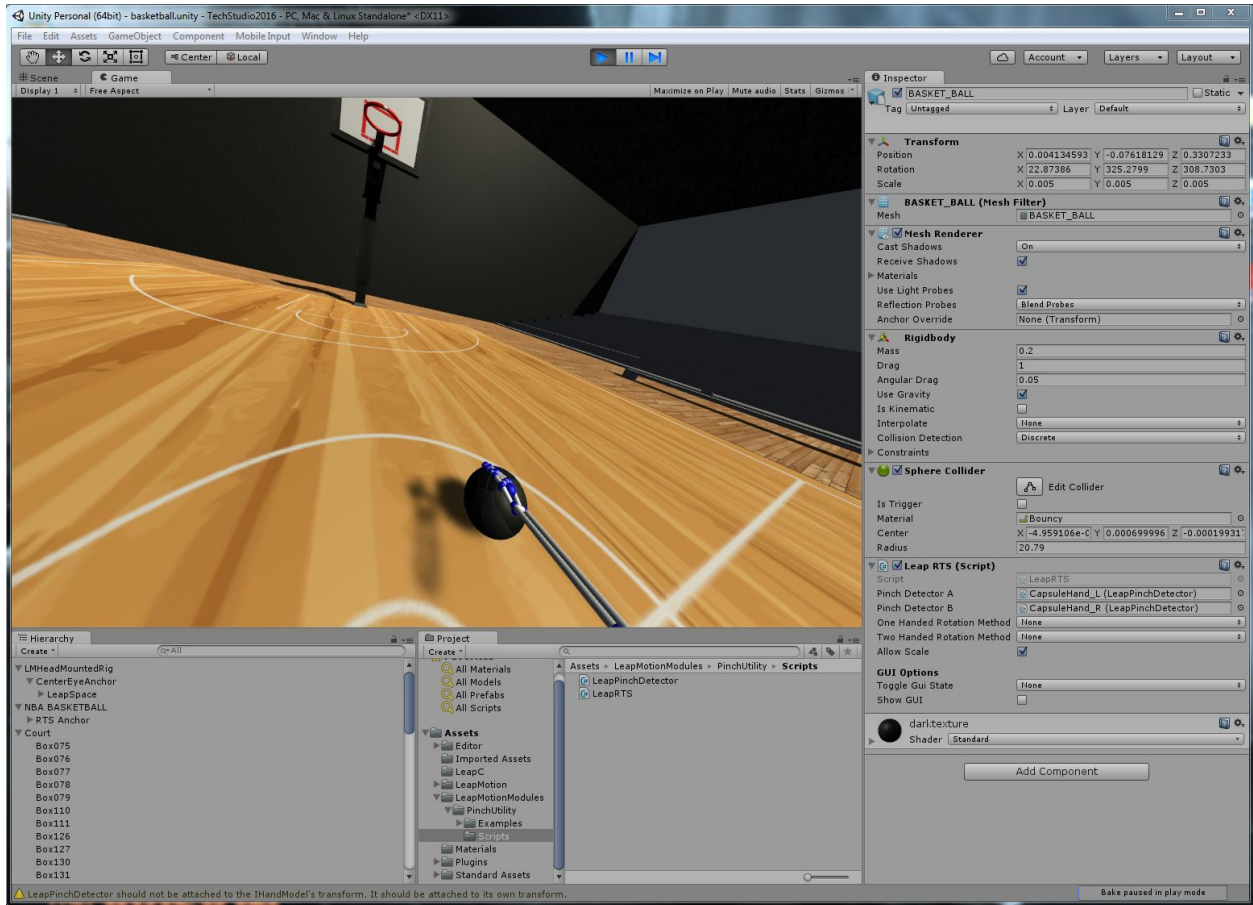
(B) View from VR Headset on Game Start-up