Gestured Based UI

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Link to GitHub repo:

https://github.com/MateuszPawlowski/Vr-Game

Link to Video:

https://youtu.be/jT45uYMV8Ck

Introduction:

We were set a task to develop an application with a Natural User Interface. There was a lot of options that we could have picked, for example, myoband, voice recognition etc. I wanted to challenge myself with this project and decided to create a VR game using the Unity game engine. I purchased a VR headset not long before the project and I wanted to test it out. This is a document explaining the VR game fruit ninja. The document will be split to different parts each explaining something different within the project.

Purpose of the application:

The purpose of this application is to remake the popular game on phone called fruit ninja and make it in VR. I wanted to create something that would fit the entire family and be easy but challenging at the same time. To add more features, I created an open world where I show examples of the things you can create in unity when it comes to VR. I show off teleportation and normal movement for the player to roam freely in the main menu scene, picking up and throwing objects from far away and the ones that are close to you. I also show how you can interact with a UI inside a VR game and press buttons. When it comes to the levels you are placed somewhere in the terrain and fruits and bombs will start flying towards you. Your aim is to slice the fruit but avoid the bombs, just like in the original game. To make it different I decided not to do a high score but a level progression system.

Gestures identified as appropriate for this application:

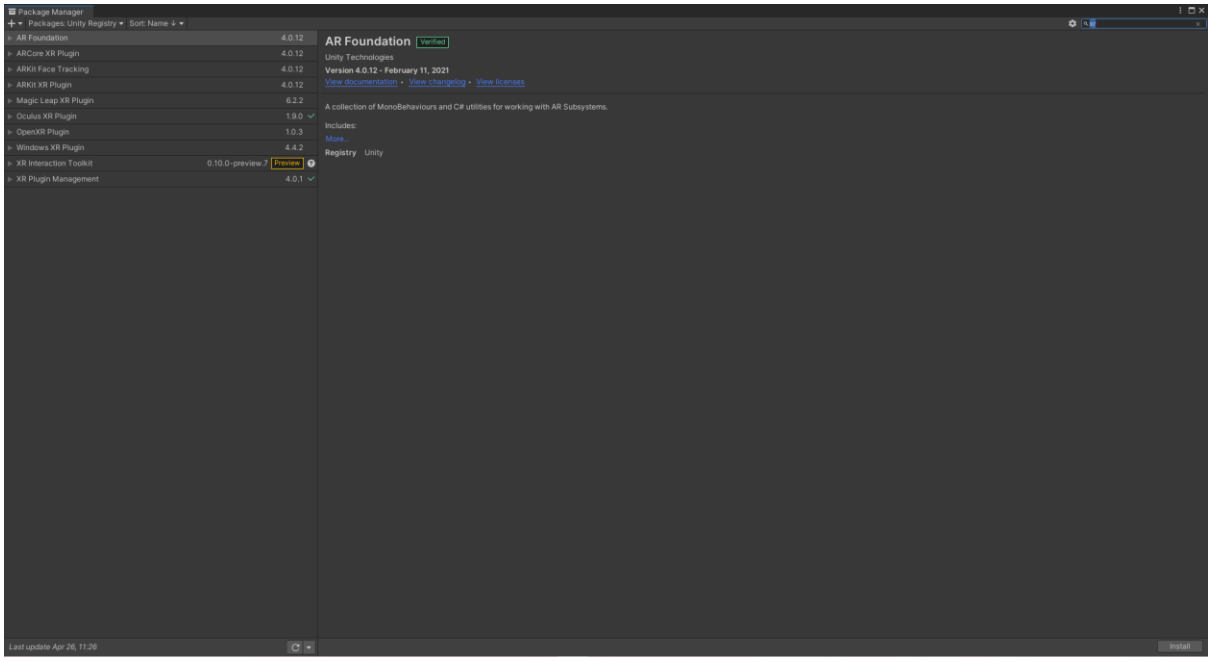
I wanted to create a proper feel for the person playing the game. I made sure the camera could not only move left or right but whenever you duck or jump the player in game would do the same. This makes everything even more realistic and allows for things like grabbing a fruit when in free play. When it comes to VR headsets there are two ways of controlling them. With the aid of the two controllers or hand gesture. I had to decide which one I want to pick for the game but after time I felt the controllers will be a much better experience. With the hand gestures you must constantly have your headset look at your hands and me making a game where you need to move around and be quick there was no point of adding this technology. I also felt that if the player is going to hold two katanas, the controllers could give them that grip like feeling of them holding them in real life.

Hardware used in creating the application:

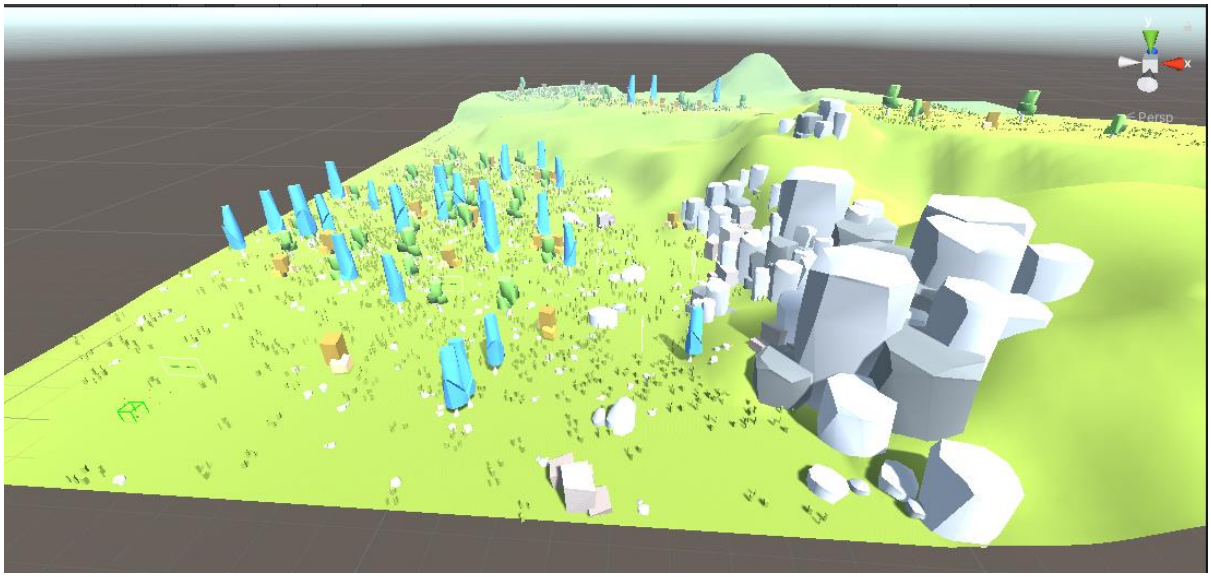
The hardware for this project is the Oculus Quest 2 VR headset. It is one of the newest and best VR headsets out in the market. It is compatible with PC's, which is a great advantage compared to headsets like PlayStation VR. I decided to go ahead with this hardware because it is quite new which means it gets a lot of software updates unlike myoband where last update was in 2013 or Kinect in 2018. Compared to hardware such as myobands I feel the Oculus allows the player to interact more with the game itself and give a better experience. The hardware comes with two controllers and the headset itself. As of right now, VR headsets are the only ones that bring the player to the game. The controllers act as your hands when inside the game. With my computer having a Nvidia 1080ti graphics card, 16gb ram and intel core i7-8700k processor, I had no issues when it comes for performance or frames which made the whole experience of building the game much smoother.

Architecture for the solution:

I started off by looking for some assets on the unity asset store in order to find a terrain that is pleasing to look at and very colourful. I quickly found low poly nature and decided it would suit perfectly to the theme of the game. Once having the terrain, I started looking into how to set up a VR headset with unity. I had some difficulties, and it took me several hours to configure. Firstly, I needed to decide which version of unity I am going to be using. Before 2019.3, unity has a few different steps in order to set up the VR compared to the unity after 2019.3. I personally went with the new version to have all the new functionality. I had to download specific jdk, sdk, ndk and gradle tools in order to allow unity to build the game on to my headset. With that set up, in order to allow VR into unity you need to download and import two XR plugin which you can find by going, Window ->Package Manager->Packages->Unity Registry->XR Interaction Toolkit/ Oculus XR Plugin (depends on your headset).



With all of the above set up I was able to create my VR game. I started by deleting the main camera and creating a XR rig in the hierarchy which gave me a main camera that follows the headset and two game objects for the left and right hand. In order for the two controllers to appear I imported a library that had models of all the newest controllers. I also imported a hands model. I created a script were depending on what VR headset the player uses it picks those specific controllers. However, if it does not detect I have a default controller for the user and also, he can switch to show a model of a hand instead of the controllers. I decided to make the main menu an open world where the player can roam around and teleport to have a look at the scenery. I added some boundaries to not allow the player to go too far away and an ambient forest sound for immersion.



Once that was finished, I searched for some samurai swords and fruits in the asset store. I created another scene called Level 1 and that is where the user is brought into the action. I placed the two katanas in the user's hands and created a script that would spawn fruits and shoot them at the players direction. In order for the fruit to slice I imported a library I found on GitHub called ezy-slice and used it in my ObjectSlicer class. I added force when the fruit is sliced, sounds and a score system,

where if the player slices some fruit, they get a point. 10 points are needed in order to get pass a certain level and I decided to create 5 levels, each getting more challenging. Last thing when it comes to levels was to make the player lose. I did this by making it so if 3 fruit falls to the ground without being sliced you are brought to main menu and by adding a bomb which I created myself and added a script if the player touches the bomb the game is over. If the player beats the last level, he is brought to the main menu scene.

Conclusions & Recommendations:

I have learned a lot from this project, not only about making a VR game but even about setting up unity for your specific project. I am now able to create simple VR games and learned new tips and tricks when it comes to unity. It was my favourite project to make as of right now. If I had to do this project again, I would add a shop system where the player can buy different katanas. The only issues I had with the oculus was the cable. When creating a game on unity I needed my oculus to be always plugged in to the computer. This made the cable all tangled when taking the headset off every time I finish a session.

As mentioned previously I was struggling in order to set up the whole environment but gradually I got it working. Below is a quick guide on how to set up the VR with a unity project (My settings):

Unity 2020.3 **|** Edit->Project Settings->Player->Android->Target API Level->29 **|** Jdk 1.8.0 **|** Sdk 29.0 **|** Ndk r19 **|** Gradle 6.8.2 -all

Code prof has a great tutorial and shows how to download all of the above and implement them into unity.

If you are not using an oculus machine the play mode in unity will work whenever you plug your headset to the computer as long as you enabled developer mode and unknown sources. However, if you use an oculus, you will additionally need to install Oculus Link app from the oculus website and enable developer mode and unknown sources.

References:

https://www.youtube.com/watch?v=rxdI3yr9cm8

https://github.com/DavidArayan/ezy-slice

Assets:

https://assetstore.unity.com/packages/3d/environments/landscapes/free-mobile-low-poly-tiny-trees-and-rocks-kit-130107

https://assetstore.unity.com/packages/3d/props/weapons/wakizashi-short-sword-144679

https://assetstore.unity.com/packages/3d/props/food/low-poly-fruit-pickups-98135