

CSC 631-01

Ilmi Yoon

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Beatsabers

Final Individual Progress Report

By

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Objective:

The objective of the game is for a single player to use hand and body coordination to successfully anticipate cognitive improvement of the player based on rhythm. Our goal is to also make a fun and energetic game that transports the player to a digital environment and get them immersed into the activity that uses visual, audio and movement senses. Our team as a whole have done good job in setting up the basic foundations of the game that includes VR support, lightsaber movements, spawning orbs, reaction area, music development and response to action.

Overview of the game client:

BeatSabers is an action-oriented rhythm-based game played using Virtual Reality (VR) headsets that includes movement of the player's whole body. We are teaming up with University of California San Francisco's (UCSF) Neuroscape department, to design a game that makes players more rhythmic. Neuroscape is a neuroscience center at UCSF which combines technology with scientific research to better improve brain function for all. Their hypothesis is that rhythms will make the player better at anticipating which links to cognitive improvements. Physical exercise is the key component to this virtual reality experience. With the combination of both physical aspect and cognitive training the results would yield better improvements than just cognitive training alone.

The player will swing VR-simulated lightsabers to slice orbs in sync with the rhythm of music with varying levels of difficulty that the player can choose in the menu. The game results are primarily going to be used by scientists to check certain parts of improved brain

functionality. Our game will simulate a fun and re-playable environment because the movement will be straightforward that includes swaying arms, stomping feet, and maneuvering your body to evade laser beams. We made sure the orbs are being sliced exactly if there are movement from the lightsabers. Only pointing lightsabers at the orbs will not cut it. Therefore, need to put some effort into slicing the orbs. Although there are no intense moves, this will give you a decent workout with an enjoyable time playing the game. Our team with the help of UCSF is well-rounded and excited to be part of this virtual reality game. We were well determined and motivated to make this game happen.

BeatSabers is a time based and rhythm-based game. There will be a tune playing in the background and while you are breaking the objects, there will be beats that are properly incorporated with the tune. Therefore, as you break the objects, the tune will be in perfect sync. This includes the appearance of the robot as it will not be out place and is in-tuned with the music. For the time aspect, you will have a certain amount of time to get through the game with the best of your ability. In the end, there will be statistics and analyses on your perfect hit, early hit, miss, lasered, robots destroyed in the database. There will also be specifics of the hit rate and miss rate based on the length of time of the three difficulty variations that the scientist can use throughout the game.

Our Progress:

For our progress so far, we have completed the main aspect of the game with the look and feel of exactly how we wanted it to be. These include setting up a good-looking scene, couple of stages, spawning objects towards the player, movement of lightsabers, adding in assets such as robots and lasers, login, functional main menu of game and documentation. There are some aspects that we wished we had more time to add but we are very happy with our game

completion so far. I have participated and contributed in many parts of this game that includes some of the aspects stated above. We as a team have put a lot of effort into this game with our abilities and it would be great to further the progress of the game in the future as I believe this is a pretty good concept.

My contribution:

In the beginning, while we were talking about creating a game, I was the one who thought of the initial concept of using lightsabers in terms of rhythm while breaking objects. My teammates and I did further build this idea to create a full concept of the game. I was responsible in documenting this game concept in our documentation in further detail and adding a storyline to it. I even created the artwork and added pictures of our models. I even helped out in other sections of the documentation. In Unity, I was responsible for creating the main plane or structure of the game. Basically, I started creating the architecture of how the game should look based on the player's perspective. I even did the spawning gameobject that can be set though the dimension of x, y, z axis in order to get the areas of where exactly the objects can be spawned. The gameobject even contains setting that can change the speed, wait time, the least and at most wait time. I even did the reaction area where in the beginning of the game, the reaction area is drawn to show the player that the game is about to start.

As the Art person in the group I was responsible in creating the design for the game. I had to create the stages in which the game is being played. The initial plane I created was good in terms of playing the game through computer alone. But once we started working with VR, the plane seemed too short and the dimensions were not appealing. So, I had to widen and stretch the dimensions appropriately so that the orbs being spawned are at a good distance from the player and is wide enough so that the player can at least have to take one step to slice the orbs in the

corners. The plane itself is by far not enough to enhance the VR experience properly so I had to create environments in the stage. Since Carmen had initially put those rune statues during the mid-semester, I decided to build on that and create a whole forest setting.

I used the forest assets from the Unity Asset Store and took time to figure out how to pluck only individual assets from the forest assets, so I can plant my own trees and rocks the way I want to. I had to learn how terrain function works because after I initially created the forest environment, the game itself started to lag due to the system putting too much effort to render the game and the environment together. Therefore, I had to search and consult with Ruejay on how to minimize this. I had to put the environment in the terrain function and make it statics. This took some time as I had to deconstruct some of the assets I had placed and do it all over again. Once this was mostly done, I decided to create another stage so that the player can have the ability to choose which environment he wants to play the game. This will help in the replaying the game.

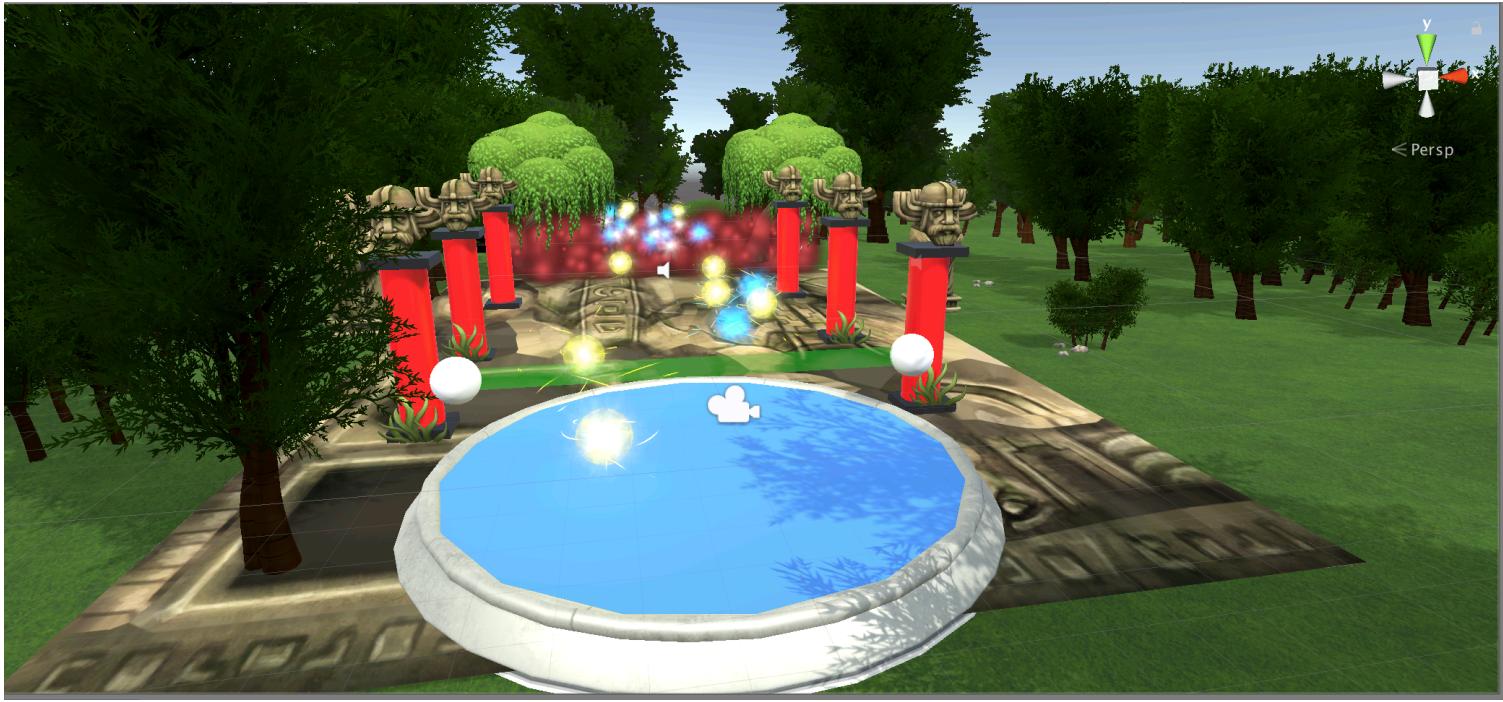
Since this game was inspired by Star Wars and contains lightsabers, I decided that the best fitted stage would be space. I wanted this space stage to be ecstatically pleasing with the vastness of space and have a sci-fi-esque feeling while playing the game. I built this stage from scratch, from the basic plane to all environment using a large variety of different assets from the Unity Asset Store. I wanted the game to look a little like Star Wars, so I included a spaceship and space station with planets, asteroid belts, suns and supernovas in the background. Moreover, we also needed a player's area to indicate the section of space the players will have in order to move around through the game. Hence, I created different looking player's area that match with the two stages for our game.

I made sure I was available through every team meeting and gave my inputs on the progress of the game. I made sure everyone knew their parts on working on the game and checked with my other teammates about our progress with comparison to milestones. Due to the time constraints of having the VR equipment only during certain days and having only Hung's desktop that supports it, we made a decision that only people who live close to school and Hung's place will work on the integration of VR to the game. Unfortunately, I live near Fremont and so it was not possible for me to get too involved on the VR integration. That being said, I completed all my task that was the requirement of me for the team and provided any support and inputs regarding the game process. And in the end, I created the main framework for the final presentation and designated task for my teammates to add on the slides.

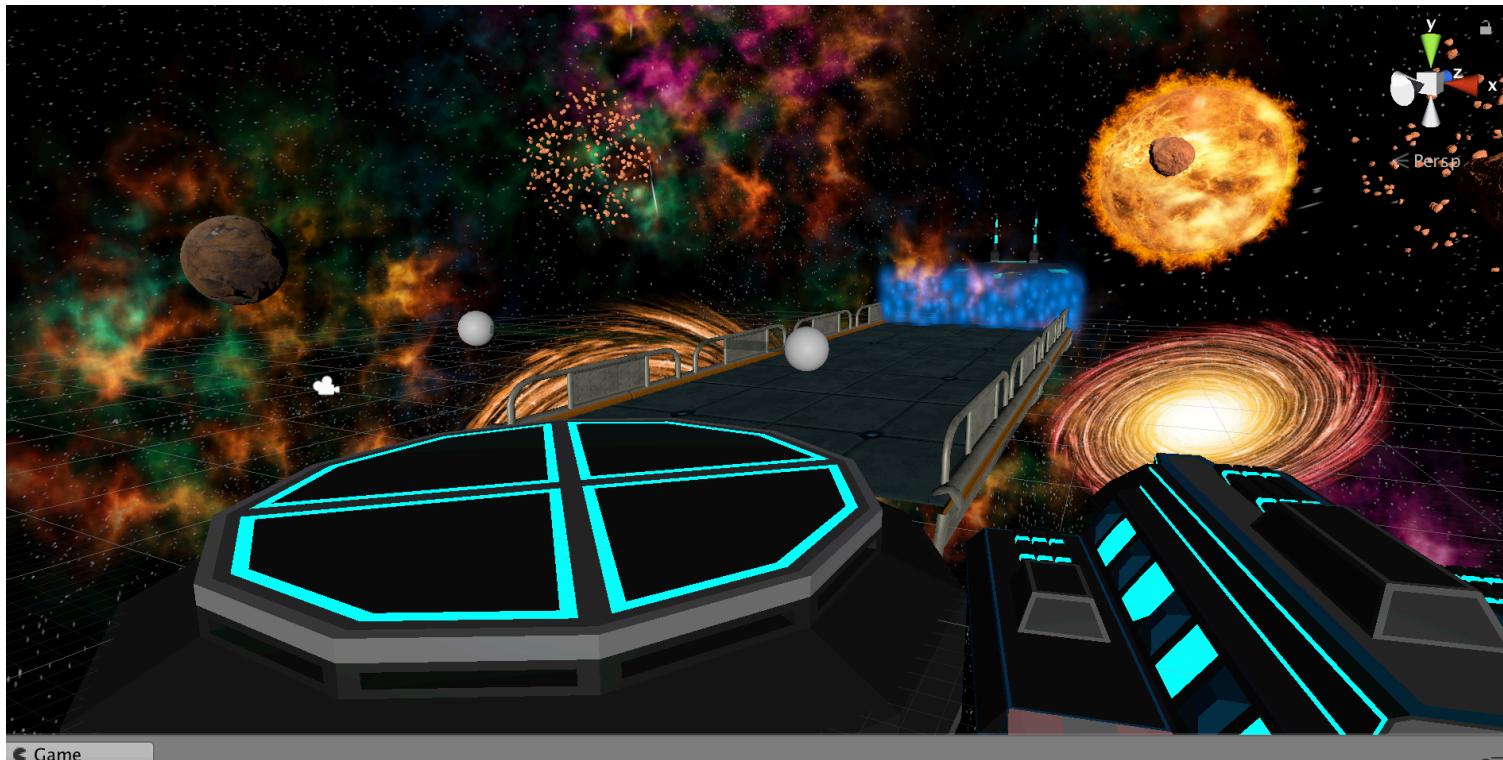
Finally, it was great working on this project as it helped me grow as a student of computer science. I really enjoyed the freedom on creating my own concepts to bring to life and working with teammates who also shared the same goals. Although there were bumps and struggles on the way of completing this project, it was overall a very good learning experience.

Stages:

Forest

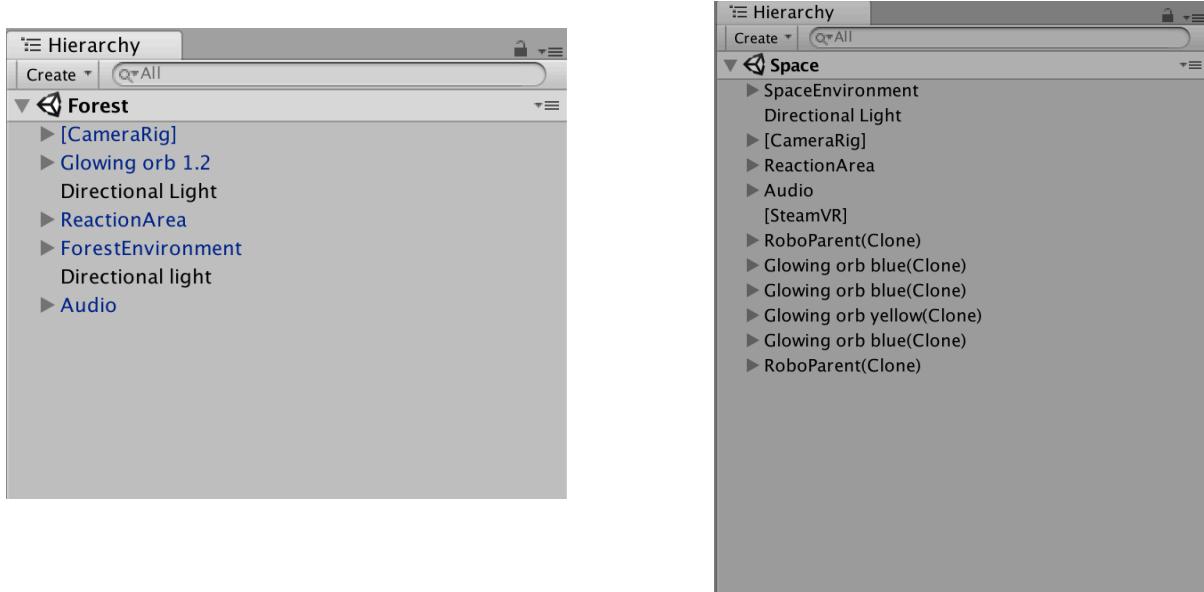


Space



Hierarchy:

These are the assets that we currently have in the actual game of Beatsabers that are fully functional.



[CameraRig]: At the very beginning, I initialized the placement of the main camera to set a good view for the player to see the object. Justice then took the placement of the camera and added in the lightsabers that ignites during the start of the game. The lightsabers moved by mouse in the laptops and uses click to strike the object. Now, the game objects hold the action for the VR settings for the left and right controller and VR headset. This includes color of lightsabers and script movements and controller features such as pause.

Glowing orb 1.2: it was done just to check and see the effects of the orbs and how it would look.

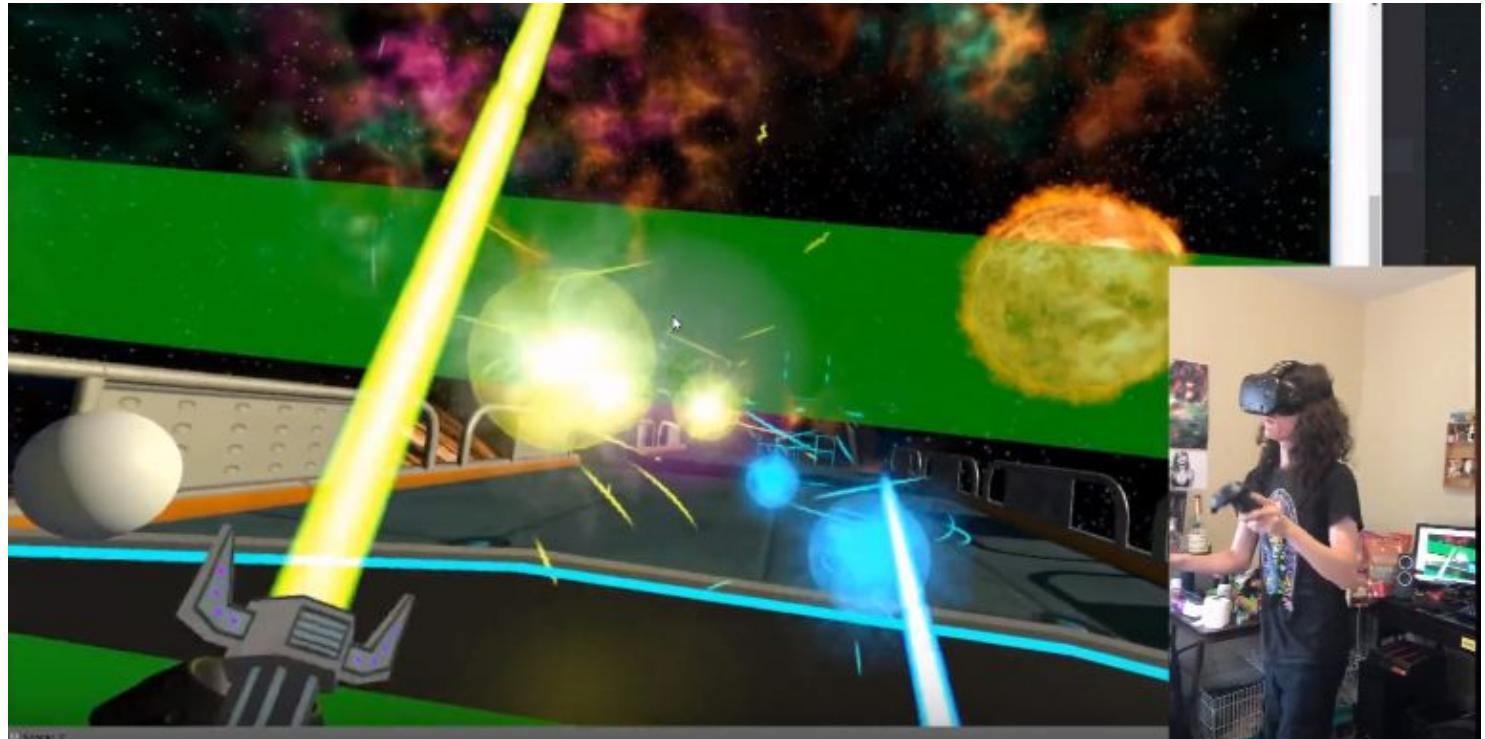
Directional Light: This is just light placement to better light up the scene

ReactionArea: The reaction area is the green ray surrounding the two white spheres. I created this in order to require a region of space where the orbs can be hit based on the requirement of UCSF. This was further developed to have three reaction area in order to show the level of range the orbs will come towards us.

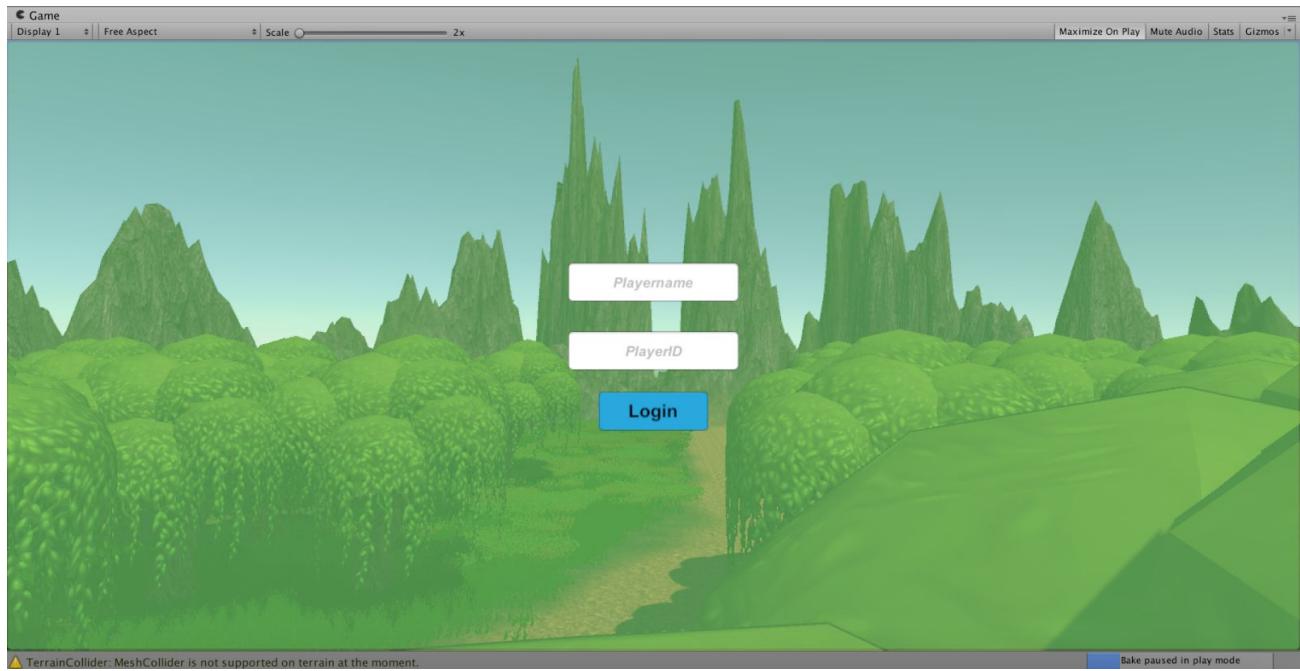
ForestEnvironment and SpaceEnvironment: I first started by setting up the plane and added columns to bring out the astatic of the game. Carmen then utilized this platform and included the jungle theme statues which I further built on and made the whole scene was the jungle. Space I started from scratch and build it from the ground up. These folders contain all the assets I have used to create the scene. This includes the terrain, plane, spawner, particle systems etc. The spawners is a game object I created that spawns the orbs that move towards the players once it is spawned. It can be manipulated to spread across coordinates of x, y and z axis. The gameobject even contains setting that can change the speed, wait time, the least and at most wait time.

Audio: This folder contains all the songs from AudioHelm and Robot spawning and disappearing and shooting lasers. It also contains all the audio for game such as laser beams, music etc. The game objects hold the action of the robot and the laser animation. For now, the robot appears in the beginning of the game, shoots the laser straight and disappears.

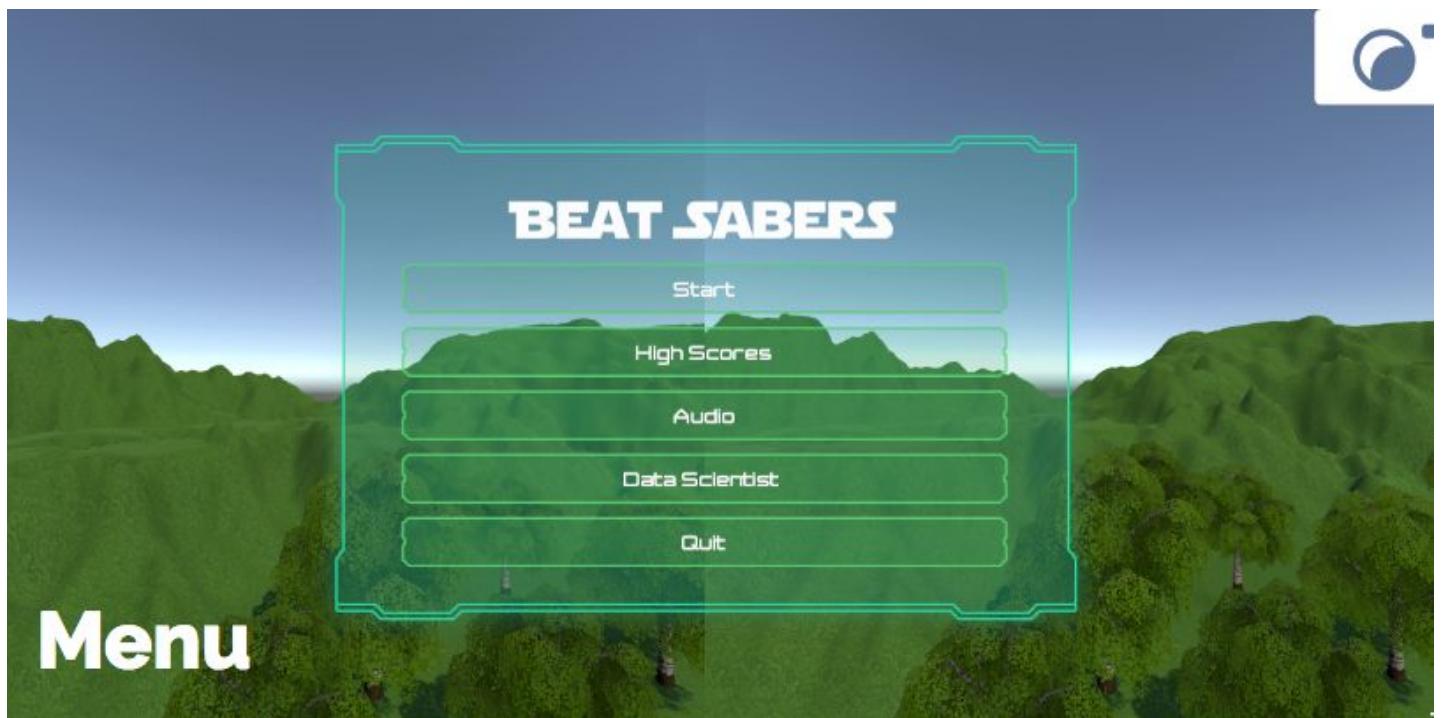
Gameplay:



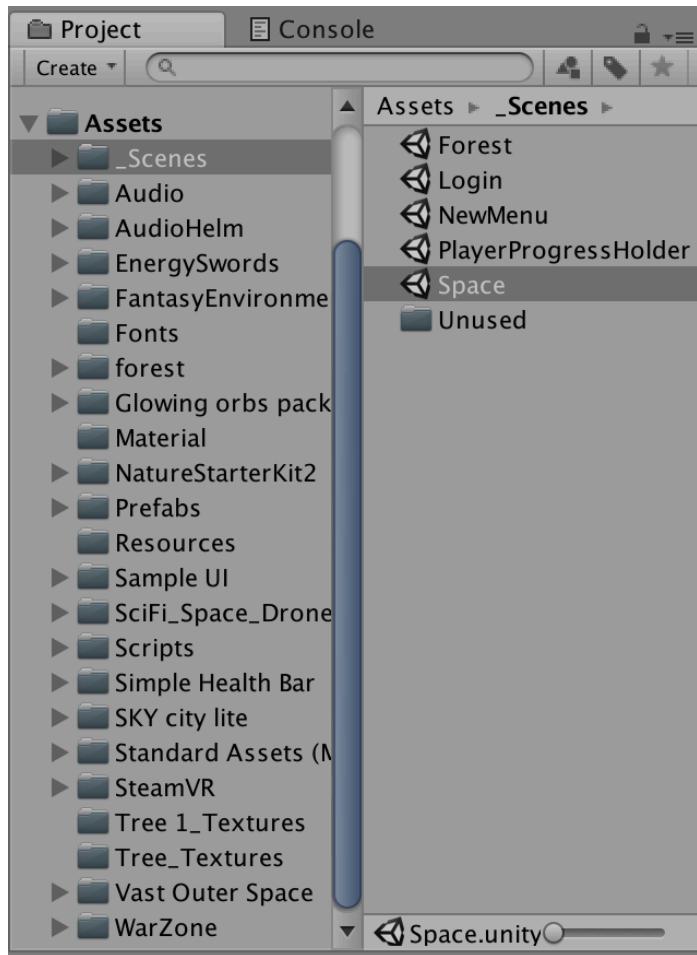
Login:



Menu:



Assets:



Here is the list of the main assets we have in the folders that can be used for the game.

All the materials and prefab that includes lightsabers, colors, columns, texture, scripts, SteamVR for VR integration developed by Hung etc. are in here. The main scenes are Login, NewMenu, Forest and Space, here are the parts that make up the full game. Based on the scenes, Carmen included the basic Menu features and Em did database.

Future development:

- Stomp feature that destroys all the orbs in its path. As you gain points, there will also be power up bars getting filled. Once filled, the player can stomp his foot and majority of the objects that is facing the corresponding side of the foot will disappear. So if the player stomps his left foot, majority of the objects from the left side will disappear. The stomp action can also be used to destroy the robot immediately. This is will provide extra points to the player. The music need not be intuned with the foot stomp as it depends on the player's ability and other power ups.
- In order to bring the longevity for the game, there is going a story that is told in three chapters. Each chapter is set in different stages and have different tunes through the game. We initially started with a storyline but did not have enough time to go through it and add it to the game. This is what we had for the possible storyline:

“In a place far far away Azurlia a virtual reality haven has been corrupted by three sinister villains, they call themselves Vorbax. They used brute force to infiltrate Azurlia’s main source of power which are based in the temple of Melodi. Ever since that fateful day, the virtual realm has never been the same stricken with misery, turmoil and strife. The Lightsabers are an ancient counsel that protects all from mischievous beings. Seeing this horrific distress, they have chosen a hidden champion and that champion is you. Since you are given this arduous task you must save Azurlia and restore the balance before it is too late, and all is lost. Enter Azurlia the virtual realm and defeat the three evils, they will try to break you down, but you must persist onwards for the sake of the people. You are the last hope for Azurlia.”
- Have an adaptivity aspect were player will not exactly know when the transition happens, it will change automatically based on progress of the player. The adaptivity of the music shall be by the increase and decrease of the number of beats that works on one tune. For Example, If the player hits 25 perfect hits the beats increase to the same tune. If the player starts missing, the beats decreases and go back to easy.
- Add more stages and enemies
- Game unlockable and maybe a possible double-edge lightsaber.
- Create scoreboard to show the player's stats.
- Create leaderboard

Links:

Space - https://www.youtube.com/watch?v=0jYTe11B0_E

Jungle - <https://www.youtube.com/watch?v=0c9BNUFJsG0>

Github: <https://github.com/JusticeC/beatsabers>

Conclusion:

Finally, this is a special game for the development team and audio team as all of us were very excited to create BeatSabers even though the majority of us had never worked on creating a game before. BeatSabers was done for players to have fun, embrace the Star Wars fandom and create an impact for the scientific community in order to collect data for cognitive brain function. All of us are very proud of what we were able to accomplish with this game because we were able to complete nearly everything we wanted to before the end of the semester. We hope you enjoy the game as much as we did in creating it and MAY THE FORCE BE WITH YOU.