



Students: Bar Uliel, Moran Nisan ,Sapir Mordoch

Supervisors: Yaron Honen ,Boaz Sternfeld



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Background

We developed a VR game that based on the new game “Beat Saber”

The game includes several songs, each with different difficult.

In each song the game presents the player with a stream of approaching blocks in sync with the song's beats.

The player uses VR motion controllers to wield a pair of lightsabers to slash the blocks. Each block is colored red or blue to indicate whether the red or blue saber should be used to slash it (red for left and blue for right). When a block is slashed by the suitable saber, the block is cut and the player get a point, otherwise if the player slashes the block with a saber with the opposite saber the score is reset.

The main goal is to cut blocks in a row and earn as much points as you can.



Development Environment and system

- We developed the game using
 - Unity 2017.4 – a cross-platform game engine that can be used to create both three-dimensional and two-dimensional games as well as simulations for desktops and laptops, home consoles, smart TVs, and mobile devices, Unity scripted with C# in visual studio
 - SteamVR– has to be installed for the HTC VIVE to operate.
 - Equipment required:
 - HTC vive - The HTC Vive is a virtual reality headset, The headset uses "room scale" tracking technology, allowing the user to move in 3D space and use motion-tracked handheld controllers to interact with the environment.



HTC vive headset



HTC vive controllers

Each controller has the following inputs, The touchpad acts as a button and an analog "joystick". The controller also has a velocity and rotational velocity as you move and rotate it; this will prove especially handy when interacting with physics objects.





Application Overview

The game consists of 5 scenes to Navigate.

1. Main Scene
2. Play Scenes: practice, classic, advanced.
3. Game Over scene

Main Scene:

The main screen allows the player first to adjust to the environment of the game.

Using the HTC VIVE right/left controller's trigger and touchpad, the player can choose the level of the game that he wants to start.

The various levels the user can choose are practice, classic and advanced.

The difference between these levels are the frequency and speed that the cubes are coming towards the player, the number of points the cubes are coming from, the songs in the background of each scene are adjusted to the difficulty of the level .

Play Scene:

There are 3 level for the game:

Practice

The practice scene takes 40 seconds, the player is getting to know the environments of the game and using the controllers. There is a slow song in the background. There is one board that the cubes (red and blue) are coming from, two cubes cannot come toward the player together ,the speed of the cubes is slowly and don't change during the game, each hit with the suitable saber in the cube is adding a point.

Classic

The classic scene takes 45 seconds, red and blue cubes are coming towards the player, we choose randomly the number of cubes that will come, the maximum is 2 cubes at the same time, the color of cube (red or blue), and the point (3 options).

During the scene and accordingly to the background song, the speed of the cubes increases gradually, the player get a point each time a block is slashed by the suitable saber, otherwise the points are reset to 0 and the maximum score is kept.



Advanced

The advanced scene takes 45 seconds, this level is similar to the classic level.

The difference between these levels is that in the advanced level, the cubes are coming from 2 different boards, the player must be synchronized between the two plates and cut the cubes/

Game over scene

When times up, the user get to this scene, the user can see the maximum score that he got in the game and has an option to get back to the menu scene.



Challenges

Unity

We were not familiar with this engine. Before starting the project, we did the tutorials for beginners, learned how to use the software, create models, animations and the environments.

We downloaded many assets until we found the suitable environment for our game and also we needed to combine in the game the vive controllers and the headset.

Moving the camera according to the headset movement, handling random movement and speed of the cubes and define the cutting of the swords were our big challenges.

Due to the largest community of unity and large number of tutorials in the internet, we found solutions for all our problems.

Vive Equipment

This was the first time we used the HTC Vive Equipment. In the beginning we encountered some problems with connecting the vive to our game, after we succeeded to connect and calibrate the vive, we downloaded virtual reality tool kit (VRTKS).

VRTK is a collection of useful scripts and concepts to aid building VR solutions.

Using these scripts we learned about the various events, Interactions like touching, grabbing and using objects



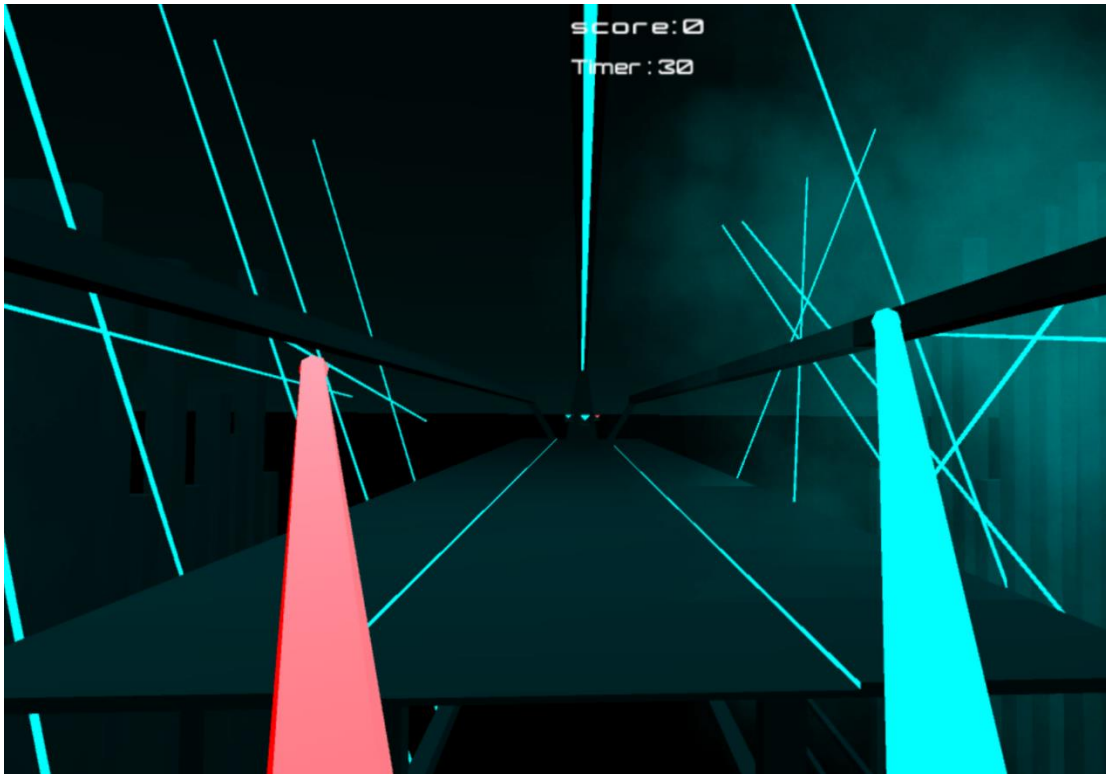
Screen Shots

The menu scene:

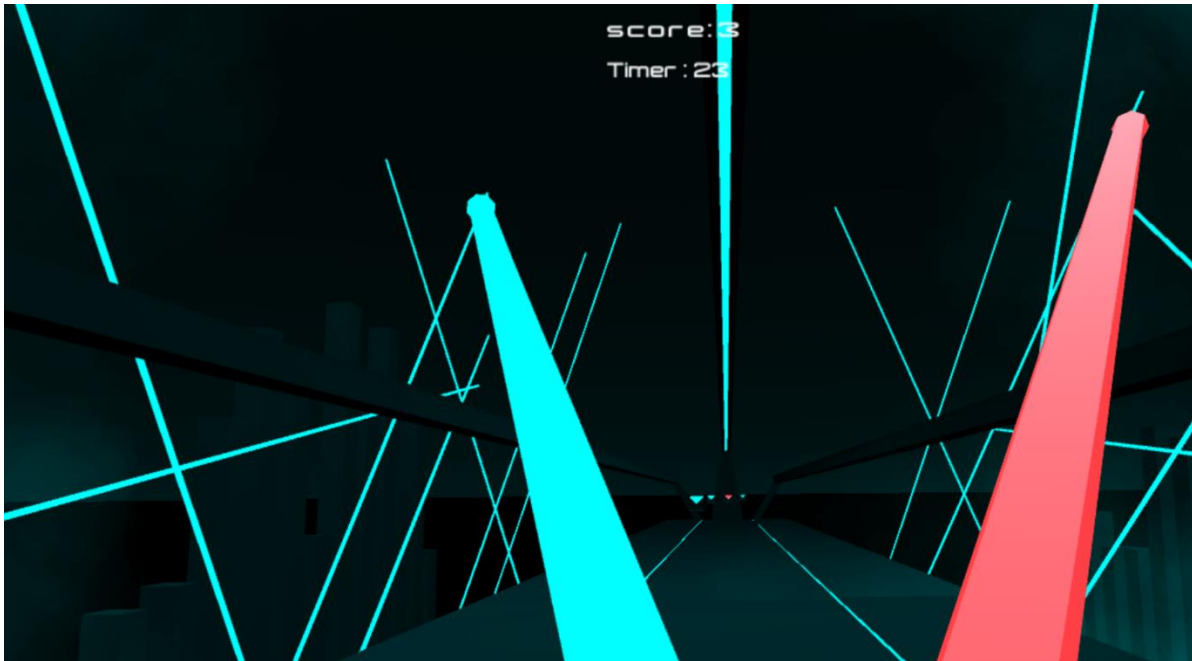




The practice scene:

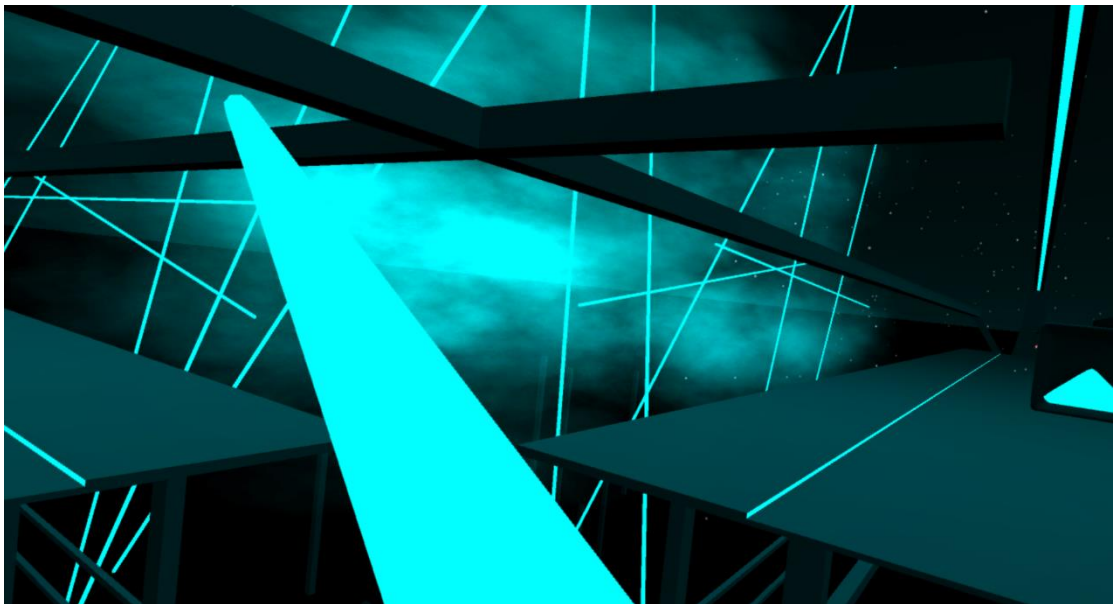
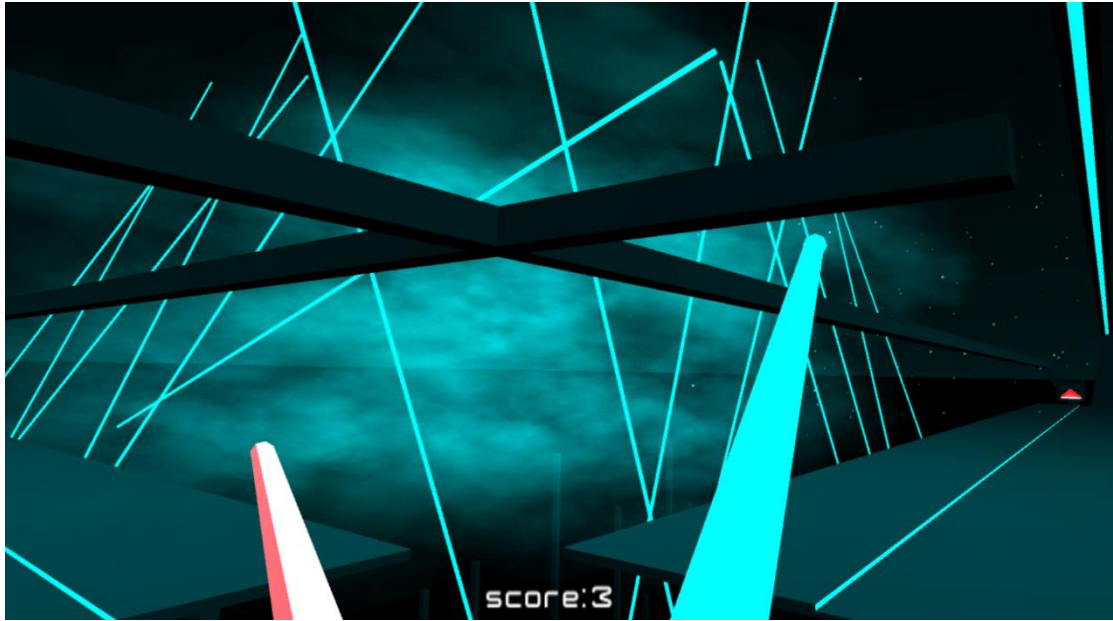


The classic scene:





The advanced scene:





The end scene:

