VR

Assignment 5: Flight Simulator - Refine

Released: April 4
Due: April 19 @ 12:30PM

Overview

Welcome to Assignment 5! In this assignment, you are going to refine your Assignment 4: the flight simulator. When creating and perfecting your game, make sure to consult the Oculus Best Practice Guide.
Tasks to do for Oculus & Gear VR

//If (your_point < 0): your_point = 0
//If (your_point > 100): your_point = 100

Part 1: UI & Tutorial
- Have start menu: 5pts
- Have tutorials/Instructions: 5pts
- Displaying Score: 5pts

Part 2: Lighting
- Lightmap: 5pts
- Sound: 5pts

Part 3: Overall Design
- Graphics: 25pts
- Controls: 25pts
- UI/Instructions: 25pts
- “Extra” credits: ?pts

Part 4: Optimization
- FPS seldom drops below 60: ( -50pts~0pts)
Part 1: UI & Tutorial

Interface is an important part of a program. Before implementing, think carefully: should the UI/Tutorial follow head movement? Should the UI/Tutorial stay on the ground? How to present your UI/Tutorial so that people can see it in the Rift and don’t feel interrupted? Remember to consult the Oculus Best Practice Guide and share ideas with your teammates. If you are still confused, think about the games you have played before, and check This.

1. You should have a start menu, so that players can start by selecting that option or press a specific button.
2. Your Tutorial should explain to your players how to play the game. It can be either in game or in the sub menu, or both.
3. Your UI should show the score to players. After hitting a ball in your scene, your score should increase. There are multiple ways of displaying the score.

It is easy to implement a UI/Tutorial (some simple words), but in order to receive high points for the Instruction part in Overall Design, your UI/Tutorial needs to be clear and self-explanatory. If your user doesn’t know what to do when looking at your UI/Tutorial, then it is probably not a good design. Ask other people to try your design if possible. If you think words are insufficient to express your ideas, you can choose to display images to your users instead. (Is audio a good choice?)

You should assume that the user doesn’t know anything about Xbox controller.
You should assume that it is user’s first time to use Oculus/Gear VR to play the game.
You can assume that the user knows something about shooting game.

Please devote some effort into the UI and menus, as you can easily transfer them to your final project.
Part 2: Lighting & Sound

Now we come to the lighting part. Please read Lighting and Lighting in-depth to gain a general idea of what a lightmap is and the type of lights available in Unity. Also make sure that you understand what is real time lighting and what is static lights, and the difference between them.

Here is one workflow that you can refer to when creating lights. It is perfectly fine to have your own way of implementing lights, as long as the final results are good.

Natural lighting -> secondary lighting 1,2,3...->Atmosphere .etc

Natural light: the light that can cover most of the scene. (sun light)
Secondary light: please Google.
Atmosphere: for instance, the fog in your scene.

You do not need to implement all of these lights. We will only evaluate the overall graphic quality of your scene, not how many lights you are using.
If you are not sure how it should look, always consult a reference image and the image posted on Piazza.

Unity 5 uses an advanced lighting engine called Enlighten. Adjust your lighting in the scene until you are satisfied with it, and bake the lightmap. It is an extremely important way to improve the performance (Why? Think about the relations between lightmap, real time light, static light, etc.). Please note that it is not uncommon for Unity to take hours to finish this step, depending on how complex your scene is.

Sound is essential to a simulation. Add a sound file to your simulator. It can be anything, such as ambient sound or background music. However, it should not decrease player’s overall experience. (For instance, you probably would not like to hear tiger moaning during your flight simulator)
Part 3: Overall Design

“Overall Design” is a vague definition, but we are going to evaluate it along the following dimensions:

1. The detail of your scene. A generic terrain with very few trees and low quality textures will lose you points (unless it is your art style). Check Piazza if you are still confused. Please also note that sometimes screenshots cannot reflect the quality of your scene.
2. Your interface/instruction system works as expected: a first time player without any knowledge of your simulator should be able to know how to play the game.
3. The overall experience of the flight: How is the rotation? What is the limit of the speed? Is collision implemented? Is my plane acting like a real plane (not a car, a box, etc.) (hint: it is difficult for a plane to perform one kind of rotation.)?

“Extra” credit opportunity:
It is not real “extra” credit, but a chance to earn your points back if they are lost in other parts (not including the Optimization).

You can earn at most 10 pts back. For instance, if you get 95 pts from other parts and 8 pts here, you will get 100pts (not 103 pts). If you get 60 pts from other parts and 10 pts here, you will get 70 pts in total.

Remember the ray cast in Assignment 4? Now, you are going to replace the ray cast with real missiles. When pressing the fire button, your missile will be fired from your plane to the target, and when they hit, the ball will disappear.

These factors will be considered when giving you the extra credits, but generally, the more realistic the better:

1. The speed of the missile: It should not be linear.
2. The shape of the missile. You can use a box, but be careful about the size of the box.
3. It is not necessary to implement the explosion effect, but you will rock if you do it!
4. Add trails to your missile?
Part 4: **Optimization (Same as Assignment 4)**

We have a Titan Black graphic card, but it is still not good enough. In fact, nearly all graphic cards have to work hard to satisfy Oculus Rift.

The first objective is to increase the FPS (frames per second) so that it rarely drops below 60. According to *Oculus Best Practice*, we need stable FPS to maximize our experience. If your simulator has overall FPS above 60, then you are probably fine for the first part of this section. Note that if your FPS is only around 30 and has produced obvious lag, you will lose at most 50 pts for this part, depending on whether your game is playable or not.

You will need to consider the following strategies:

1. Delete some of your assets or lighting in the simulator.
2. Lower the effect (shadow, fog) of your scene
3. Check pixel error of terrain (see terrain settings)
4. Are there some assets in your scene that have too many polygons?
5. How many realtime lights are in your scene? If realtime lighting is not necessary, change it to static, and bake them into a lightmap.
6. [Here](#)

Some work that has been removed from this assignment, but can be helpful for your final project:

1. Three points lighting. It was planned in this Assignment, but we have removed it to give you more time for your final project. You can always use 3 points lighting when designing indoor light environment.
2. Modeling: It was planned in this Assignment too, but for the same reason we have removed it. However, you can always use Blender (choose the zip file to download on its website) to do 3D modeling. If you are an experienced 3D modeler, it would be even better since you can use whatever software you like on your own computer.
Submission:
As usual, but please show your README file in your game (in your sub-menu or somewhere), if you have any.

This will be your final assignment, so good luck to your final project! We expect it to be a lot better than this flight simulator Assignment!