CSE 566 Virtual Reality
Spring 2020

Assignment 0: Unity 3D Warm-up
Prof. Arie Kaufman
Due date: February 11, 2020, 11:59pm, Stony Brook Time.

Overview

The goal of this assignment is to introduce you to Unity 3D, a game engine we will use in this course for designing virtual reality scenes. It is important that you start this assignment early on as the following assignments in this course will build up on this one. Certainly, as you become more familiar and confident with Unity and concepts in virtual reality, you may get as creative as you want and push the bounds of this assignment to add more impressive features - the sky is your limit! The theme we have chosen for this year's assignments is *outer-space.*

If you're excited and can't wait longer to start getting your hands on designing your (first) VR project, then read ahead for details, otherwise watch this video, this video, and this video to spark some excitement.

Getting started

Unity3D is a cross-platform game development engine for 3D games and 2D games, as well as for virtual reality and augmented reality. In this course, we will design and develop our projects in Unity.

1. If you are a beginner in Unity, it is strongly recommended to check out Unity manual (Chapter Working in Unity) to get started. (Must-read chapters: Getting Started, Asset Workflow, The Main Windows, Creating Gameplay, Editor Features)
2. Unity 5 and later offers built-in Rift support. We suggest that you install the latest Long Term Support version: LTS Release 2017.4.16f1. The Unity Integration provides additional prefabs, samples, and resources for VR development. Additionally, since Assignment 3 will focus on Augmented Reality (AR) and use Vuforia, please make sure that "Vuforia Augmented Reality Support" is checked as installation component during installation. Please note that you will be required to create an account for Unity.
3. If you are using the Oculus HMD, please go through the following tutorial: Oculus VR App Tutorial
   If you are using the HTC VIVE HMD, we recommend going through the following tutorial: HTC VIVE Tutorial for Unity

Working with Unity

Programming language: It is suggested that you work in Unity with C#. It is still possible that you develop your project with UnityScript (also known as JavaScript for Unity) or Boo, but you need instructor prior permission for that. Please specify your programming language when you submit your code for homework assignments or the final project. It is suggested that you update your

project in Unity Cloud Storage. This is helpful for both backup and project collaboration in the future.

Debug and Console Window

Console Window can display plenty of useful information (check this manual). It is worth noting that there are several buttons on the top of Console Window, as shown in Figure 3. Please try these buttons yourself in order to see how they can help you.

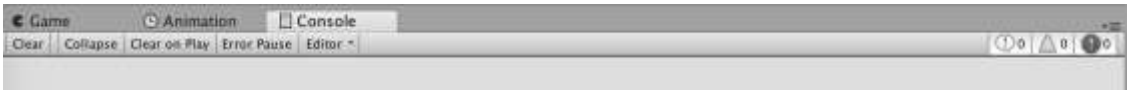

Figure 1

To aid with debugging, you can show your own messages in the Console using the Debug.Log, Debug.LogWarning, and Debug.LogError functions. To learn more about Unity log files, please check this manual.

Search assets for your projects

In each homework assignment and project instruction, we will provide you with recommendations of assets (including models, textures, materials, and external packages). Most of the time the recommended assets are available in Unity Asset Store for free. However, these assets are not mandatory yet we encourage you to use your favorite assets as long as your work achieves the requirement in the instructions and the assets are not copyrighted and you use these assets legally.

Setting up the virtual scene for the assignment

While designing your virtual scene, you do not have to create your own 3D models, you are free to download models from the Unity Asset Store, or any other source, provided you have permission to download them and cite each source properly in your assignment documentations. For our outer-space VR assignments, you will be required to set up the following basic scene:

Skybox: Let's begin with setting up a skybox that will create an immersive experience for your VR. Skybox wraps your scene with a large globe that gives you a universal background. There are several skybox textures included in Unity's Standard Assets: Assets -> Import Package -> Skyboxes. You may also create your own Skybox by following the steps outlined in this tutorial: How do I make a Skybox?

Objects: Add a spaceship, Sun, Moon, and stars to your scene (refer to Fig. 2 as a layout example). You may either download existing 3D objects online or use simple polygons to create your own objects. The size of the objects can vary and it is not important that their dimensions are proportional to their actual size. The spaceship should have an interior with some details (e.g., a cockpit, a cabin door) and should be big enough for a user to be able to walk inside it. The spaceship should have at least one transparent window that looks outside into space. For this assignment, all the objects can be stationary - we will add interactions and movements in the next assignments.

Lighting: Since outer space is dark in nature, to help us see the objects, make sure that the scene has ambient light (background light that exists in the scene).

Camera (View position): It is suggested that you test your scene in the VR device. When you wear a headset, you should be able to see inside the spaceship or standing in outer space.

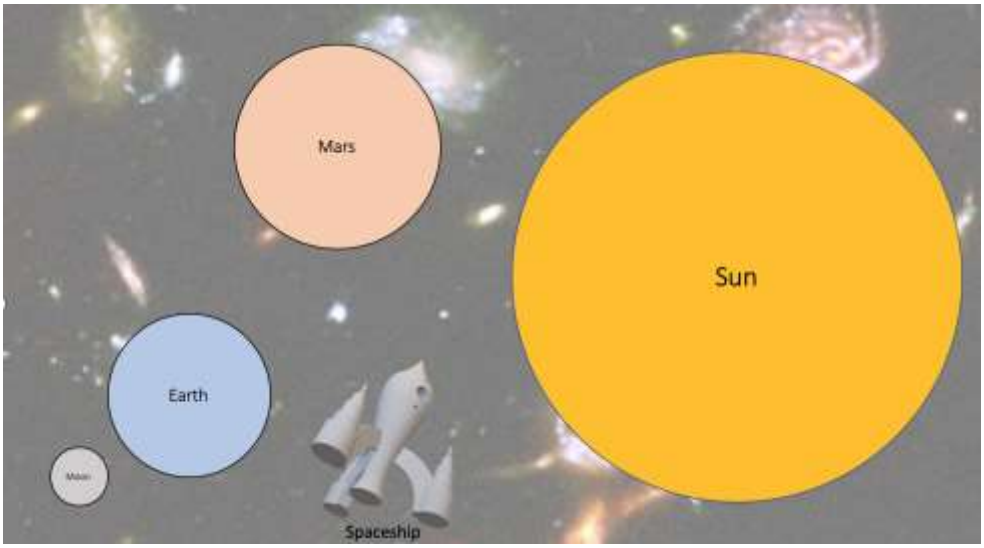

Figure 2.

Submission

It is strongly recommended that you test your application before submitting your work. Please save your Unity project in a folder named "CSE566 Assignments" in Google Drive and enabling the ***share of this folder*** rather than sharing the single project file. In Blackboard, please submit the link to your Google Drive folder.

For each assignment, you should include the following for full credit: your Unity project folder, a report, and a video. Your Unity project folder should contain your Unity saved scene and all your Scripts and Assets that will be required to re-build your project. Please do not include your project executable in the folder.

For your report, you should include *at least* the following:

- A title: "CSE 566 Virtual Reality, Spring 2020, Assignment 0: Warm-up"
- Your name and Stony Brook ID
- Unity version
- Hardware used
- Directory hierarchy
- Any extra functionalities/ features that you implemented for this assignment

- Details on implementation: programming language used; references to the downloaded 3D models or how did you design your own model; how did you design the spaceship; how the lights and shadows in your scene were implemented, to mention but a few.

The video should be the recording of the stereo view (example: https://drive.google.com/open?id=1rAlSyb07uAHQ7wN3S4Y7Jxui-9yjIpti). The video should demonstrate all the features of your assignments.