CSE462/562 – Augmented Reality (Fall 2022)
Homework #4 Report
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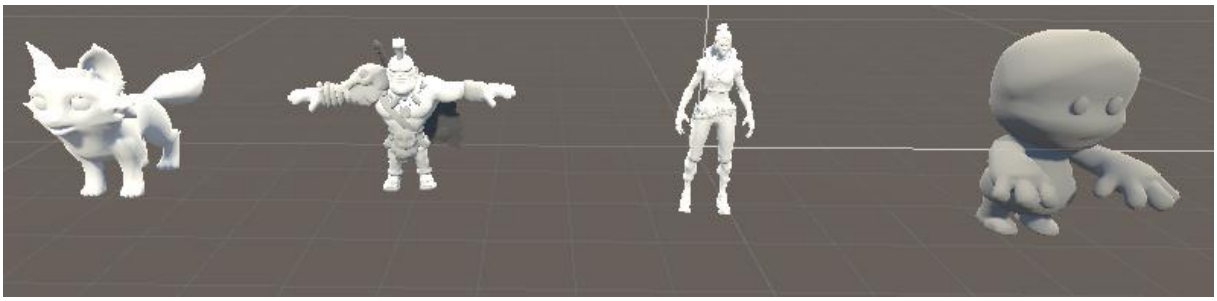
In this assignment, we were asked to develop a simple renderer using ray casting. There are 4 steps of it which are;

- Build a 3D world in Unity with at least 4 separate objects (total # of triangles to be at least 10,000) with adjustable pose and Lambertian materials Add at least three different light sources (intensity and position should be adjustable).
- Assume that there is only one type of material for objects (i.e Lambertian).
- Your camera is a pinhole camera with adjustable FoV, center and viewing directions.
- The physics of the ray casting is a bit different than the visible world we live in. A ray goes on a straight line when there are no black holes. When there is a black hole, any ray starting from a position ends at the black hole. The photon for the ray goes through a degree 2 curve.

In this Project, I implemented first three which are building 3D world in Unity with at least 4 separate object which all have at least 10,000 triangles in total, adding one of them Custom created Lambertian material and pinhole camera with adjustable FoV, center and viewing directions.

I have 4 different objects as shown below which are a Fox, a Barbar, a Jett figure and a Mummy.

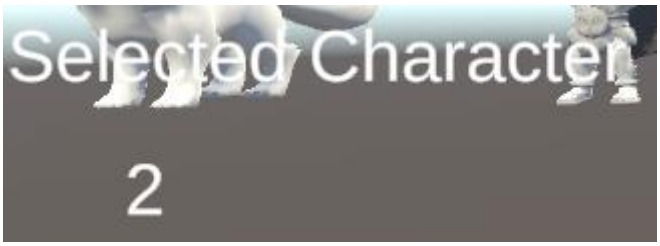


We can change intensity of lights selected using buttons below

and we can see which light id is selected from here

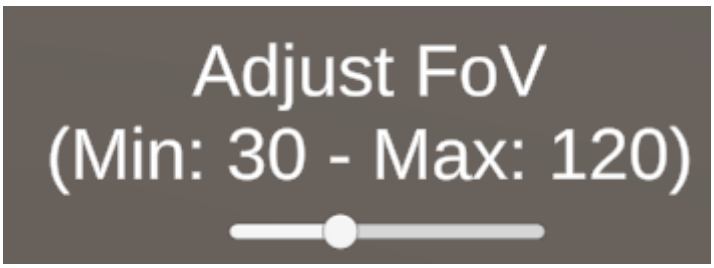
We can switch between light sources using ‘Home’ button and control selected light source using arrow keys for rotate them.

We can switch between characters by using 1,2,3 or 4 keys, we can see which character is selected as seen below.



and move selected character around by using W, A, S, D, Space and Left Control keys in keyboard. W is for moving them back, A is for moving them left, S is for moving them front and D is for moving them right, Space is for moving them in Y Up direction and Left Control is for moving them Y Down.

We can rotate our camera using U, H, J and K keys for seeing around and changing camera FoV using Slicer as we can see below,



simply by sliding this right or left so that FoV will be increased or decreased.

Scripts are under Assets>Scripts folder which are CameraController, RotateWithArrowKeys and SelectGameObject.