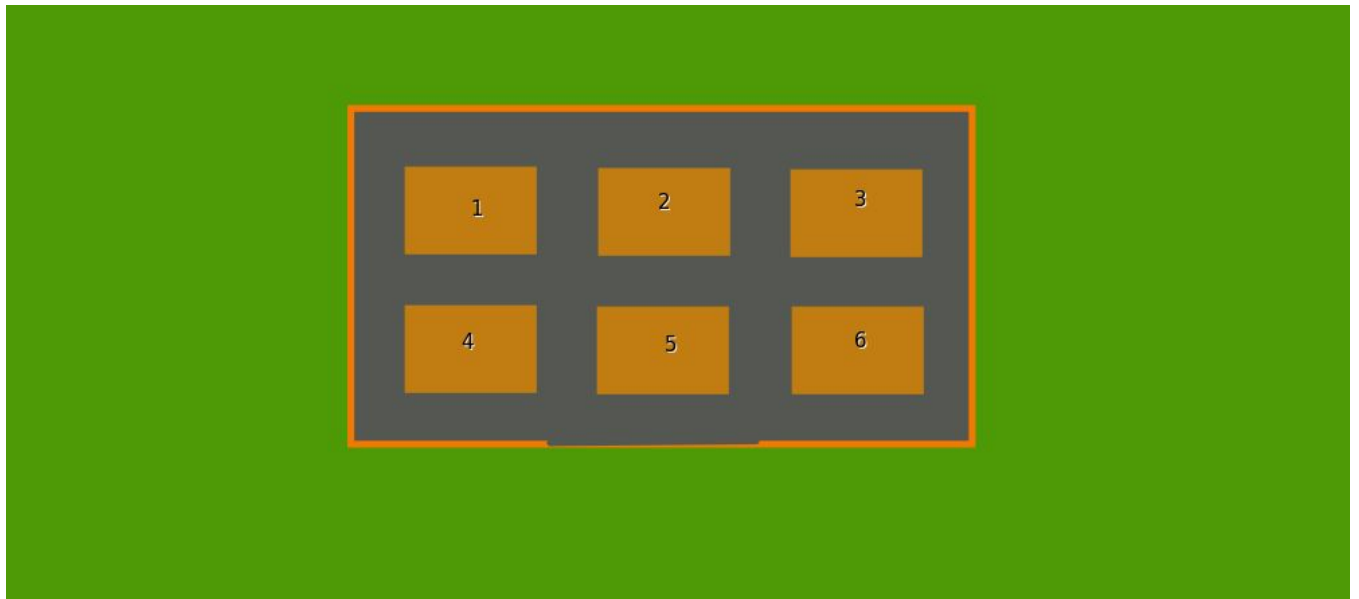


Name: Edwin Dixon
Student ID : 76241975

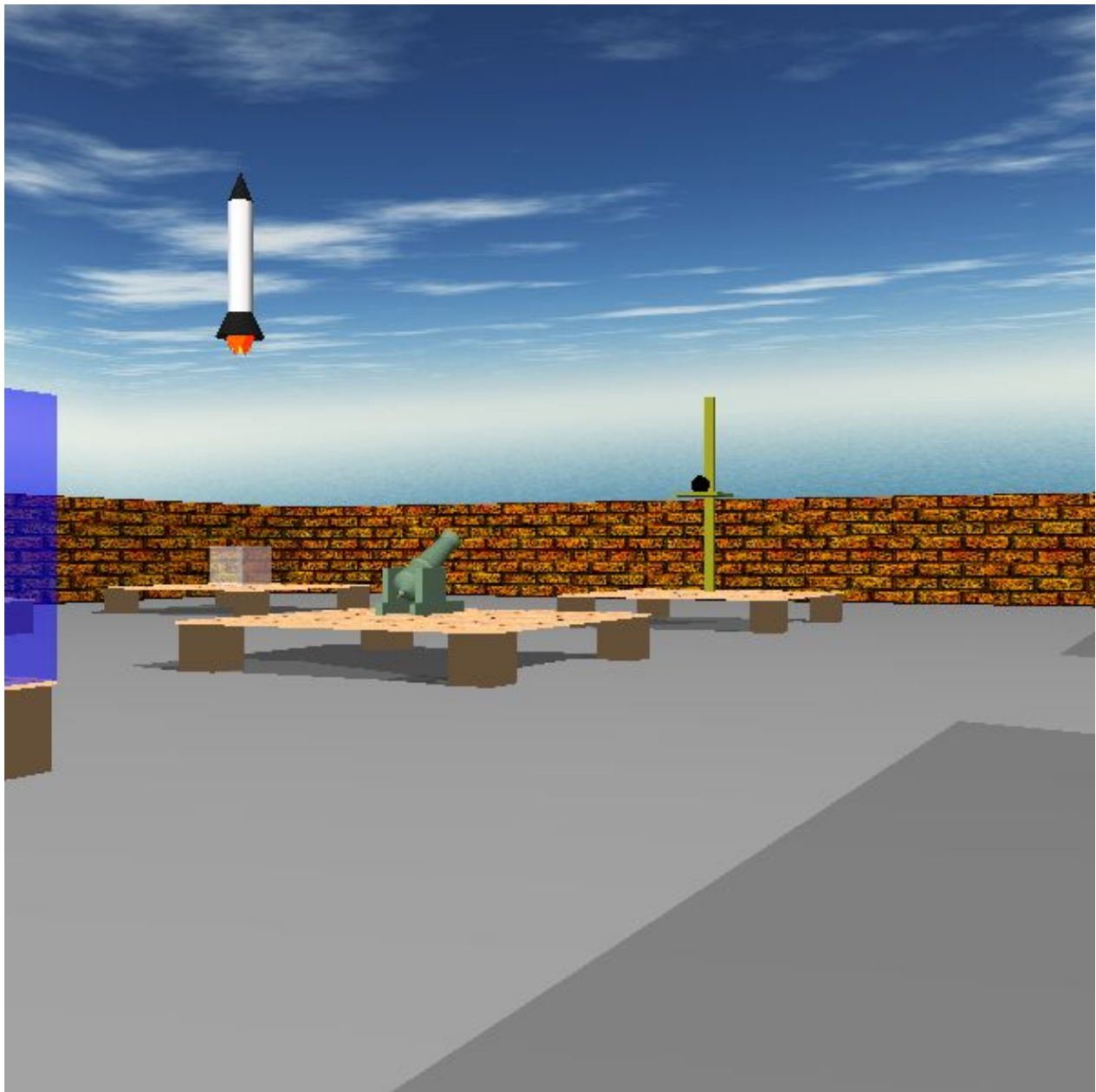
Assignment 1

The museum is the building located in the middle of the scene. There are six different models exhibited on a table each. Two models are stationary and four have animation. The roof of the museum was excluded for lighting reasons. The figure below shows the layout as well as a label for each exhibit.

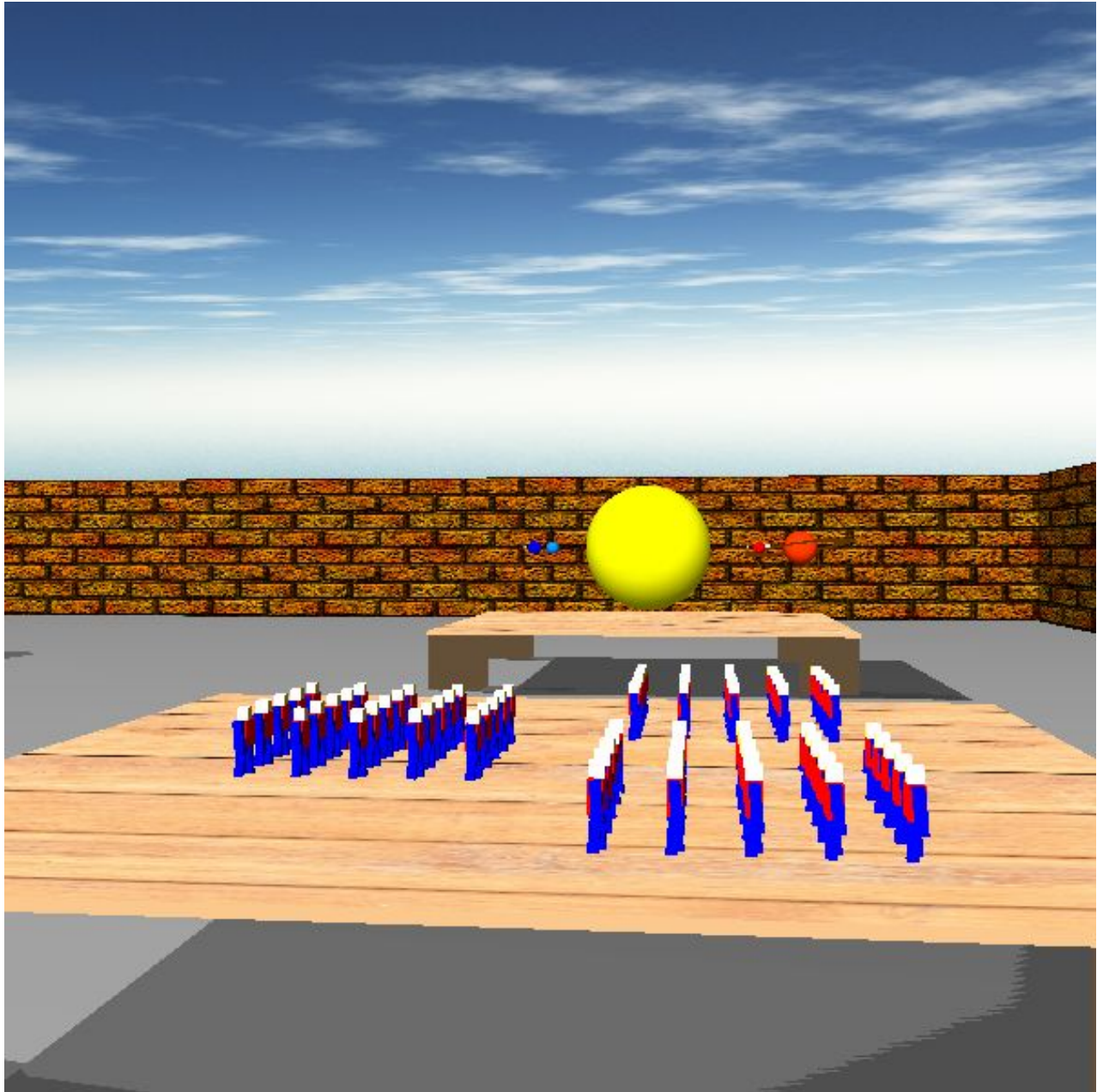


1. The exhibit at the back left is a Solar system model showing 5 planets revolving around the sun as well as moons revolving around some planets. This was made just using several different scaled sphere objects. The animation is the planets rotating about the y axis at different speeds.
2. The exhibit in the middle back is an army of humanoids. The humanoid is the one used in a previous lab. The number of them is increased and scaled down to create a small marching army exhibit. The animation shows the humanoids rotating their arms and legs as well as moving along the z axis back and forth.
3. The exhibit in the back right is a rocket. It is made using 2 cylinder objects forming the nozzle and body, 2 disk objects and a cone object modelling the guidance. When the 'w' key is pressed the rocket moves in the positive y direction and flames appear from the bottom of the rocket. The flames are made up of 5 cones that change colors from red to orange and orange to yellow.

4. Fish tank at the front left containing 3 fish. These fish are made using 3 cylinders put together and two disks at each end. They are inside a tank which is made up of 4 quads that have an alpha value of 0.5 to make it look transparent.
5. The exhibit in the middle front is a cannon. It is a mesh object that was used in a previous lab.
6. At the front right is a bowling ball dropping exhibit where a sphere is elevated by a lift platform then dropped at the top and repeated. The movement of the ball dropping is non-constant made to resemble gravity. The ball has a spotlight on it which points in the negative x direction (towards the cannon). This spotlight can be turned on and off using the key 'e'.



Screenshot of scene showing tables 3, 5 and 6



Screenshot of scene showing tables 1 and 2

Features implemented within the museum scene:

There is a sky box present made up of 5 textured quads. The sky box also moves with the user camera to give the illusion it cannot be reached.

Planar shadows are cast by the walls of the museum and the tables inside. This was done using the shadow transformation matrix given in the notes.

The dropping ball is a gravity based animation as the ball is accelerating towards the ground. When it is dropped its initial velocity is zero and every iteration in the timer it increases its velocity by one unit in the -y direction. When the ball reaches the table it has a velocity of 13.

There is a spotlight that is attached to a moving object that being the bowling ball of exhibit 6. It is turned on with the 'e' key.

Controls:

- Up arrow key: move forward
- Down arrow key: move backwards
- Right arrow key: rotate point of view by 5 degrees
- Left arrow key: rotate point of view by -5 degrees
- W key: moves rocket in positive y direction
- S key: moves rocket in negative y direction
- E key: toggles the spotlight attached to the bowling ball on and off

The program uses a Makefile to display the scene. In the terminal of the directory run the command "make run". The scene should then be displayed.

References

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https://doc.babylonjs.com/resources/playground_textures#cubetextures

<https://free-3dtextureshd.com/download/classic-old-wood-texture-plank-bpr-material-background-wooden-desk-table-or-floor-old-striped-timber-board-download-seamless-free-texture-high-resolution-4k/?>