Project C: A Forest in Orbit

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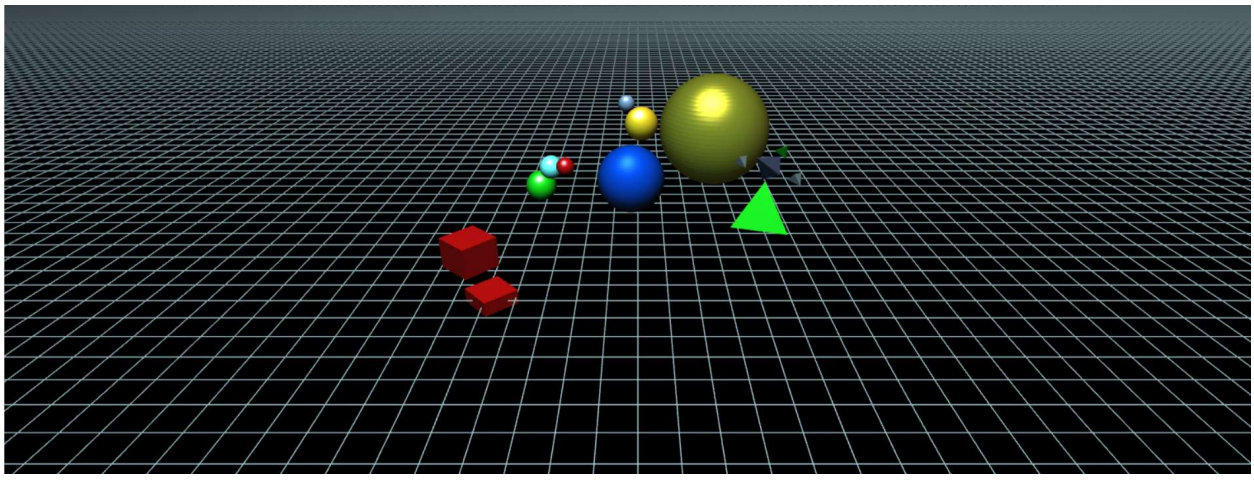
This report outlines the goals, usage and outcomes of my project and includes images and scene graphs of the created objects.

Section 1: User's Guide

The goal of this project was to create a world the user can explore with different lighting/shading methods illuminating the shapes. The objects of the world would rest on a ground plane surface and each have individual normal that reflected the light from both a user-adjustable light source and a headlight attached to the camera. The world itself is similar to a moving forest but also has large planetary spheres.

Upon opening the html file in the browser, there will be a set of basic instructions on how to alter objects on the screen and move the camera around the world space. The user has complete freedom of movement around the world space and can alter the light sources through keyboard interaction and input boxes. Before discussing the results of the project, I will introduce the interactions available to the user. Below is a starting image of the project for reference.



By using the arrow keys "w,a,s,d", the user can move the camera's position. Using "i,j,k,l" will alter the camera angle. Pressing the key "h" will turn the headlight source on/off while pressing the spacebar will turn the world light on/off. The results of this will be shown in the next section. In addition, pressing the "m" key will switch between the four available lighting modes. The number of the current mode is shown above the canvas. The first mode is regular Phong shading, the second is Blinn-Phong, and the last two are interesting methods that I developed after playing around with the lighting vectors.

Section 2: Results

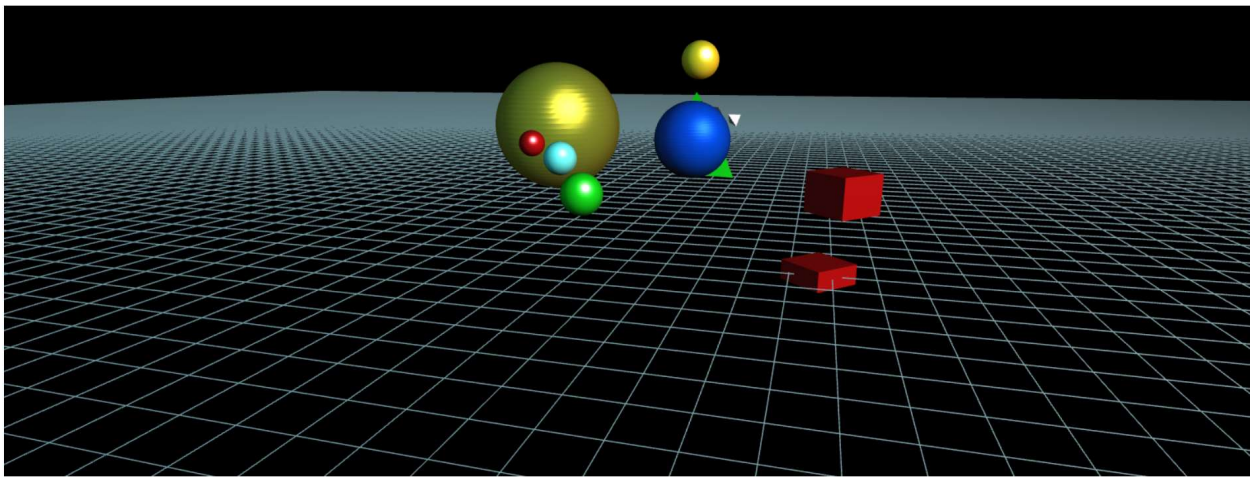
The below pictures illustrate the program results. The top is a screenshot of the Instructions available when opening the html file. The others demonstrate different aspects of the program. Below the instructions, there are two images to illustrate the freedom of movement. The next set show the different lighting methods with both lights on, only the headlight, and only the world light. Another set of images shows the adjustable light with different rbg values and positions. In addition to these aspects of the project, in all of the below images, you can see that each object, particularly the spheres, have different materials. The jointed objects continually move and change angles as well. A scene graph is at the end of this report.

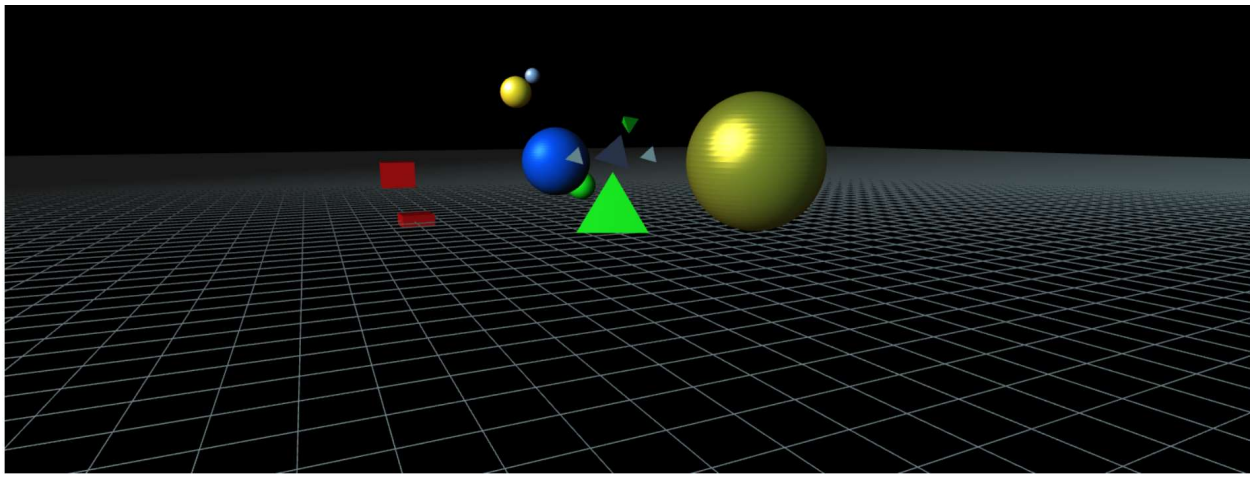
To move the camera around the canvas, use w,a,s,d. To change the direction of the camera, use i,j,k,l. To turn your headlight on and off, press h. You can turn the world light off by pressing the space bar. Switch lighting modes by pressing m.

Edit the light using the input fields below!

Ambient:	R:	0.5	G:	0.5	B: 0.5
Diffuse:	R:	0.2	G:	0.6	B: 0.7
Specular:	R:	1.0	G:	0.8	B: 1.0
Position:	X:	-2.0	Y:	2.0	Z: 5.0

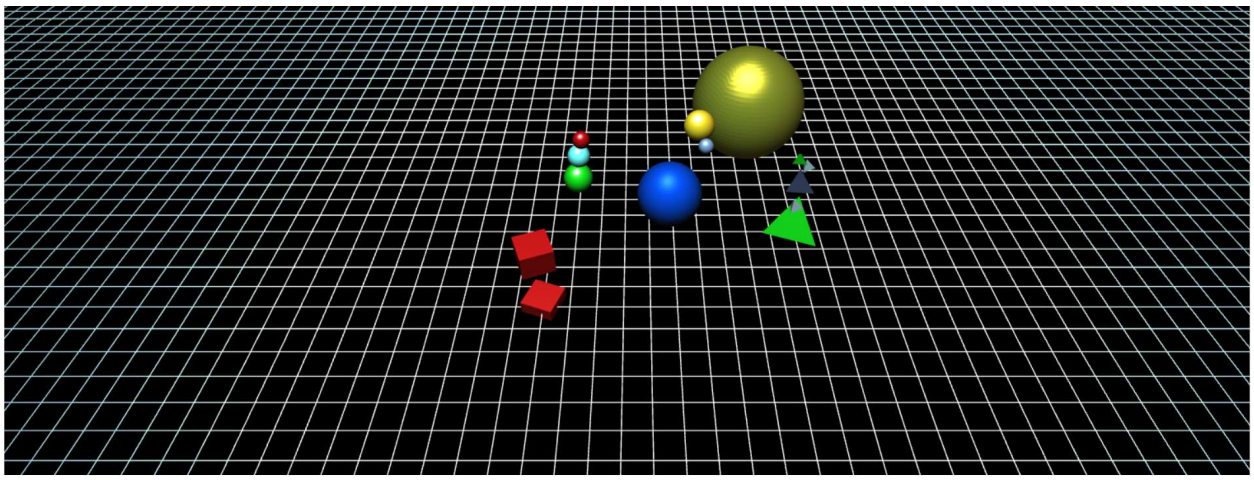
Light Mode: 1



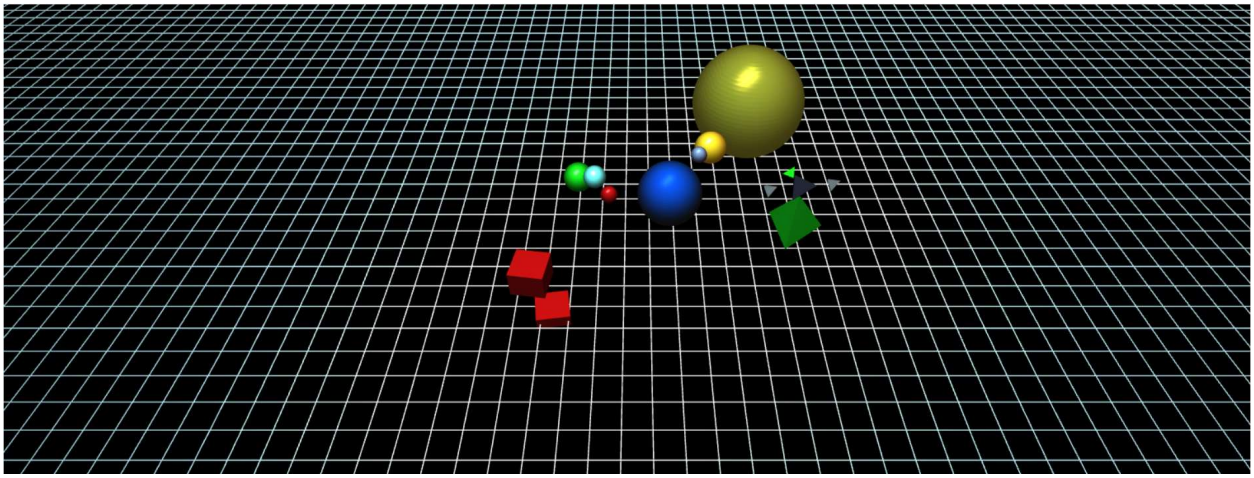


Both Lights On:

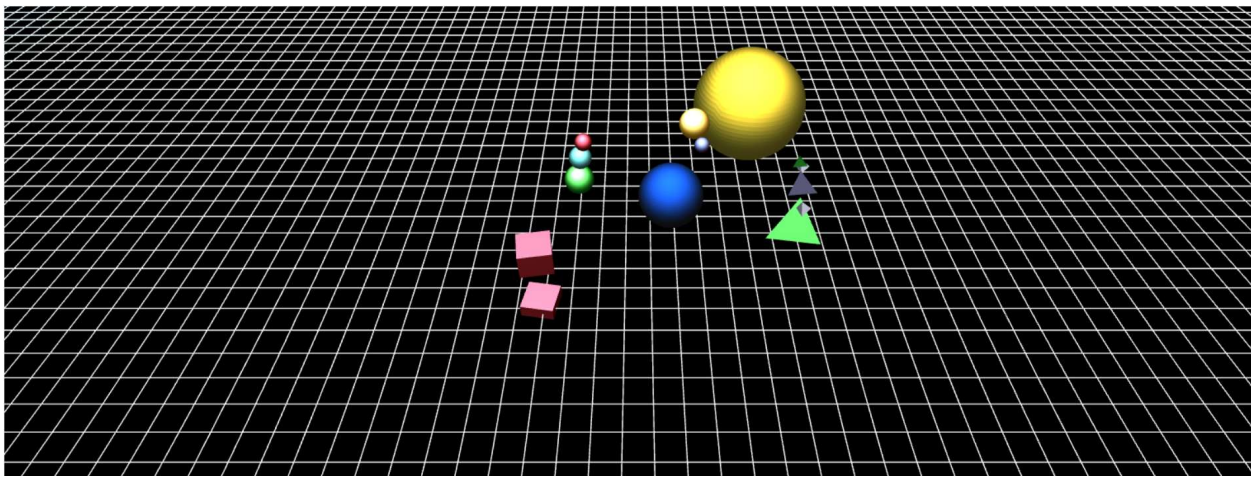
Light Mode 1



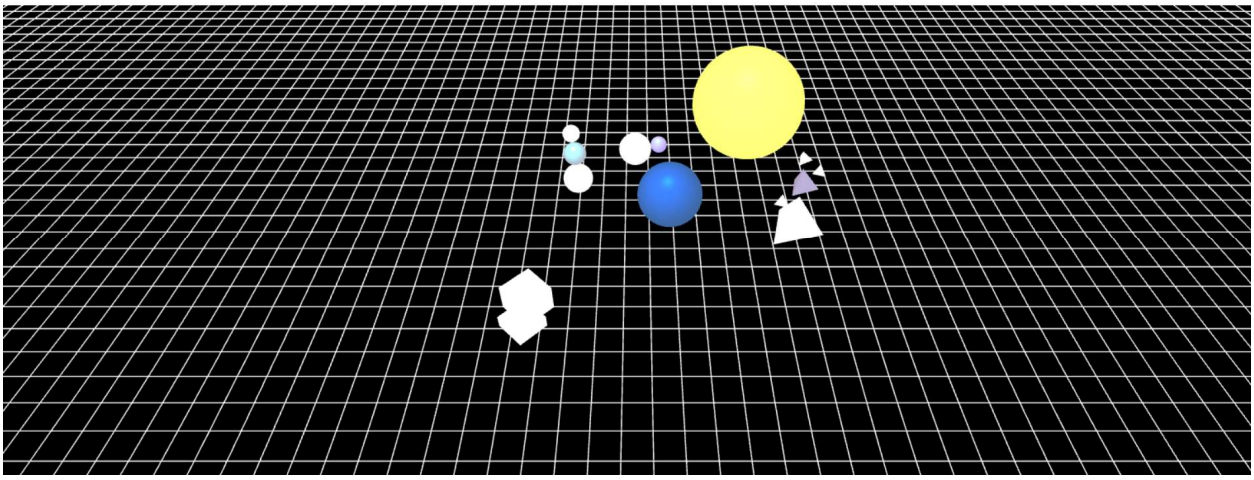
Light Mode 2



Light Mode 3

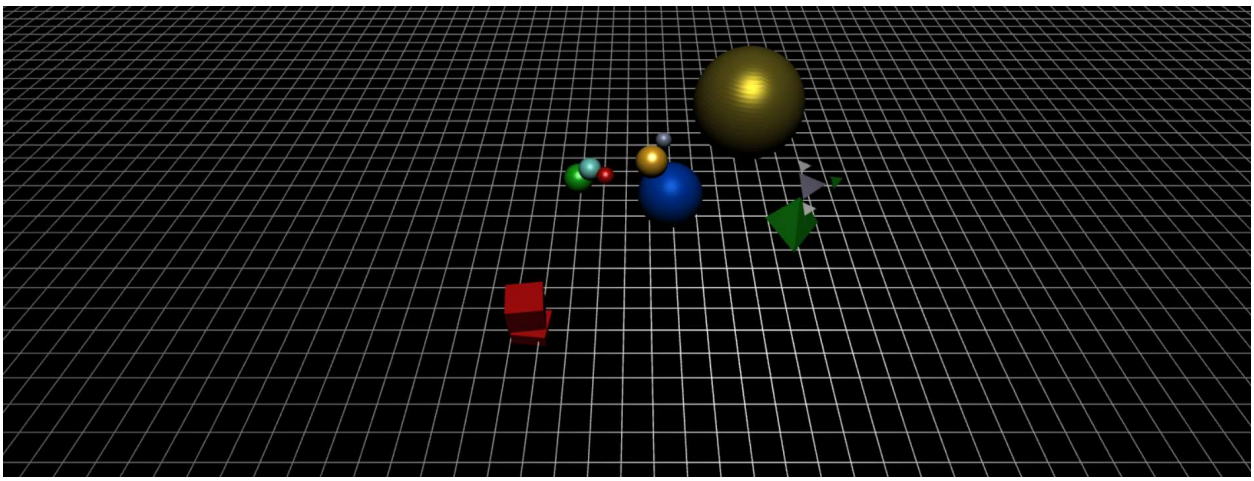


Light Mode 4

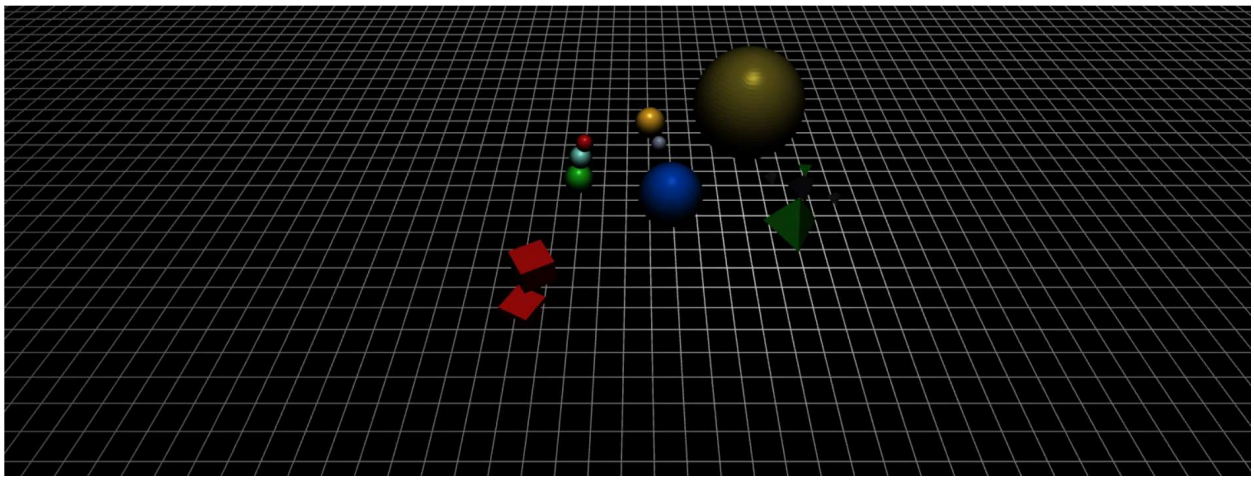


Headlight Only

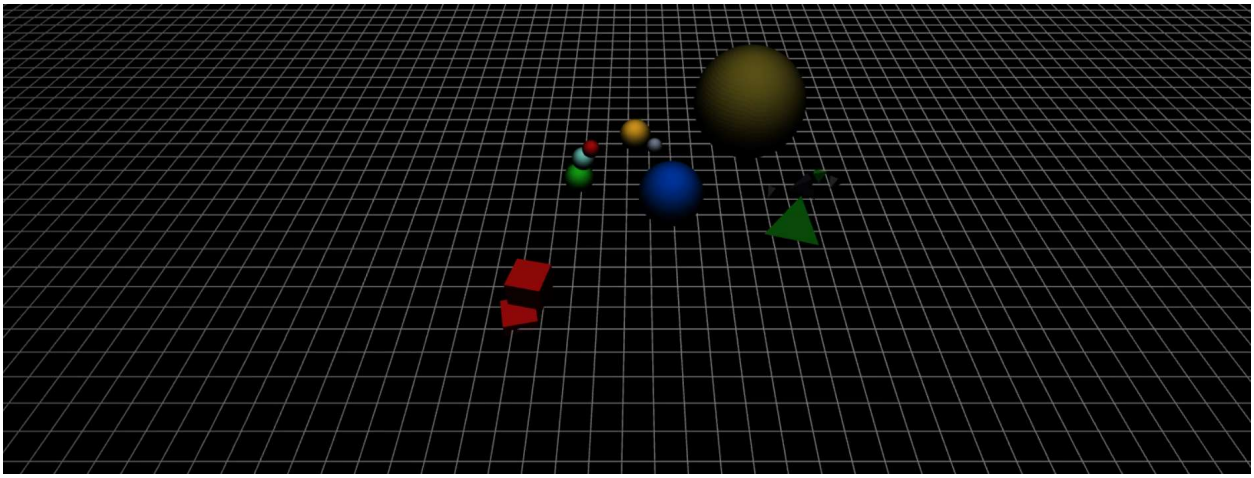
Light Mode 1



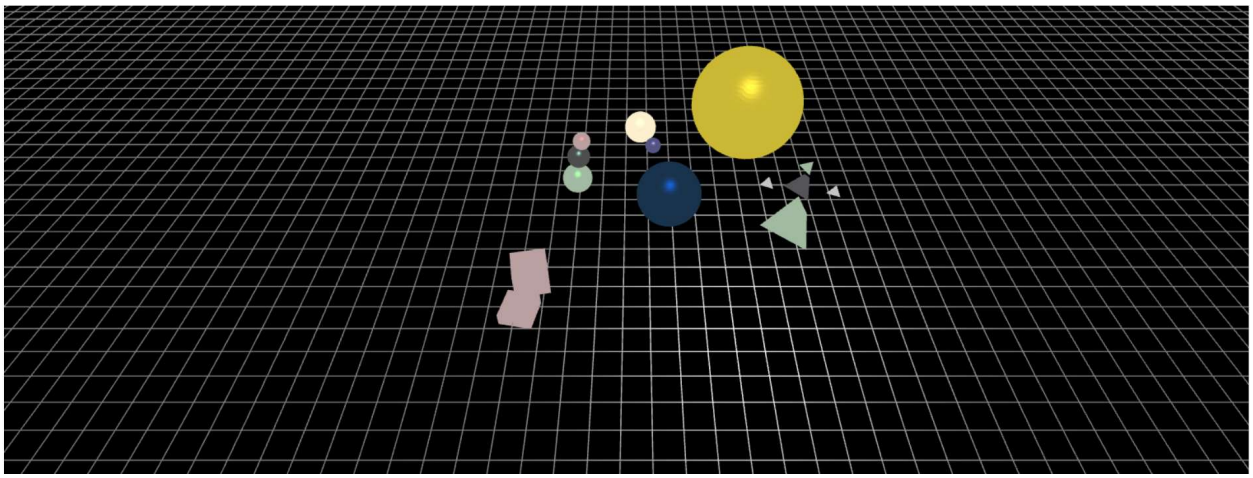
Light Mode 2



Light Mode 3

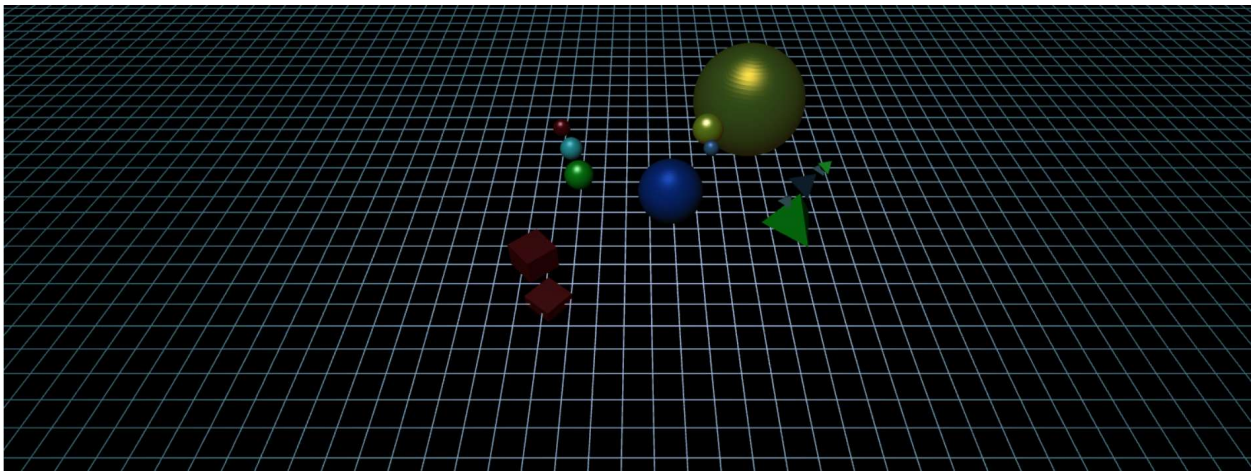


Light Mode 4

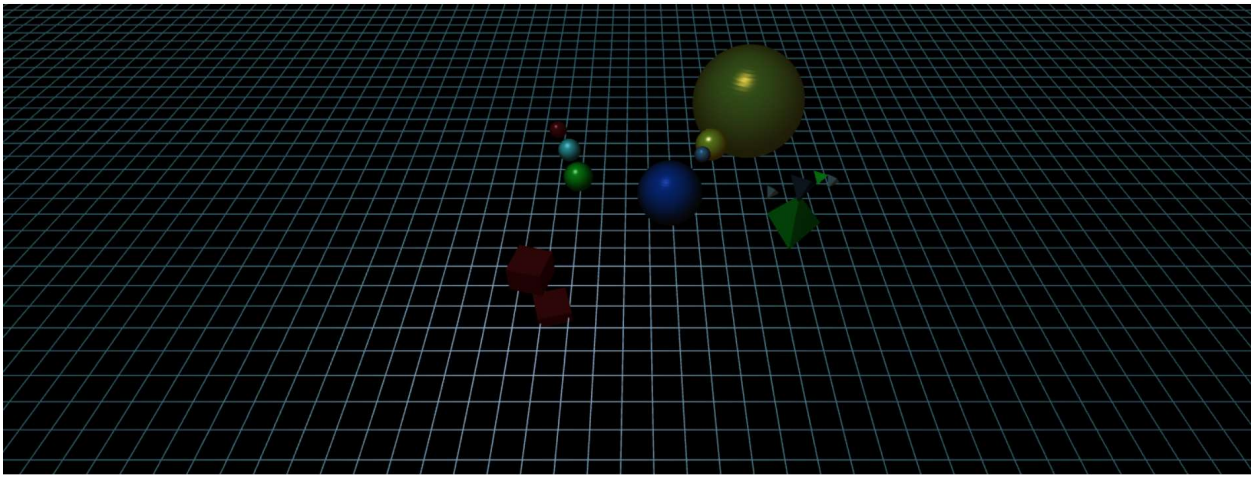


World Light Only (default rgb, position values)

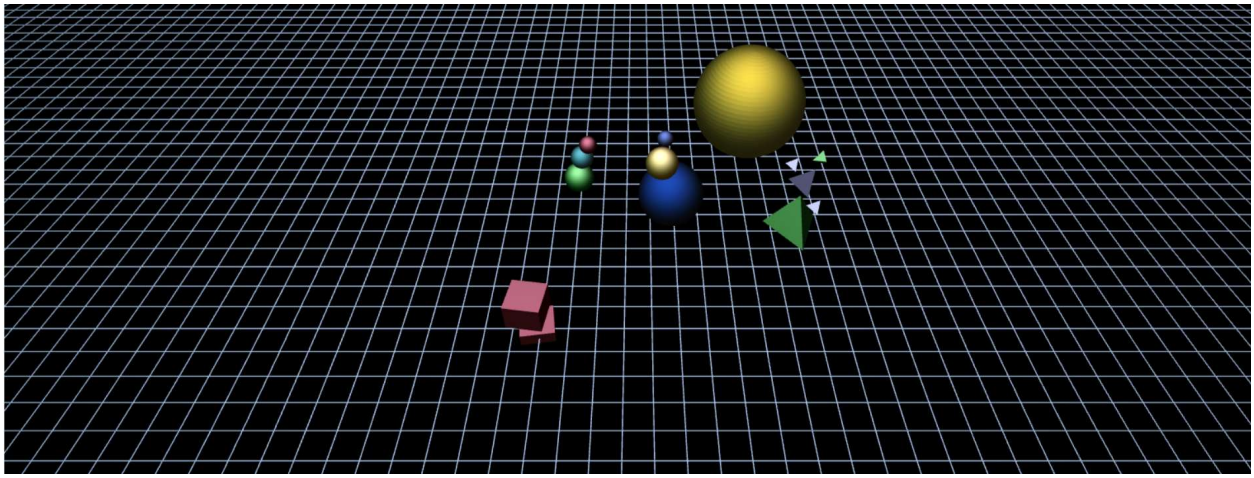
Light Mode 1



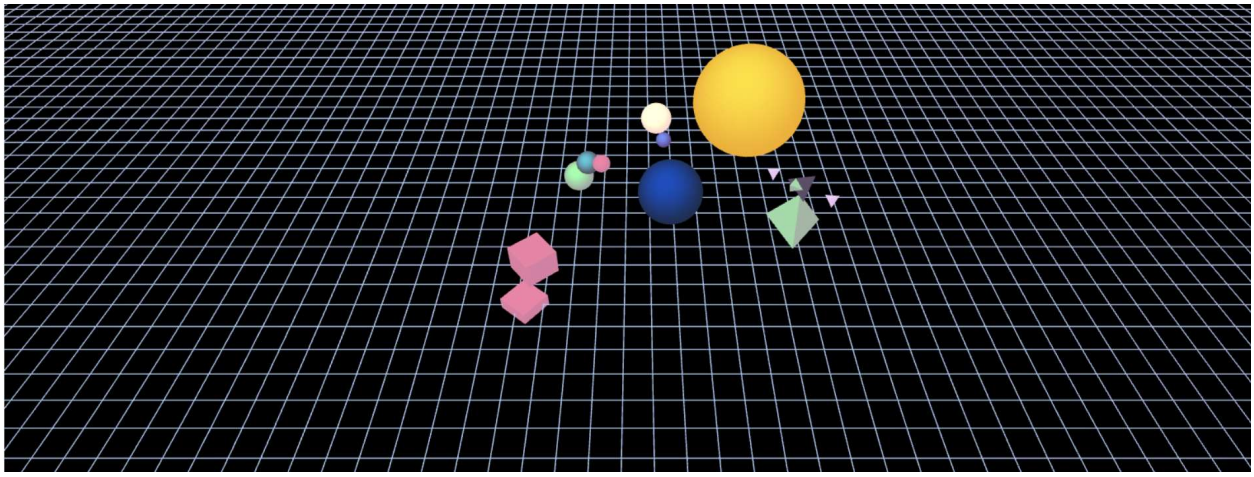
Light Mode 2



Light Mode 3



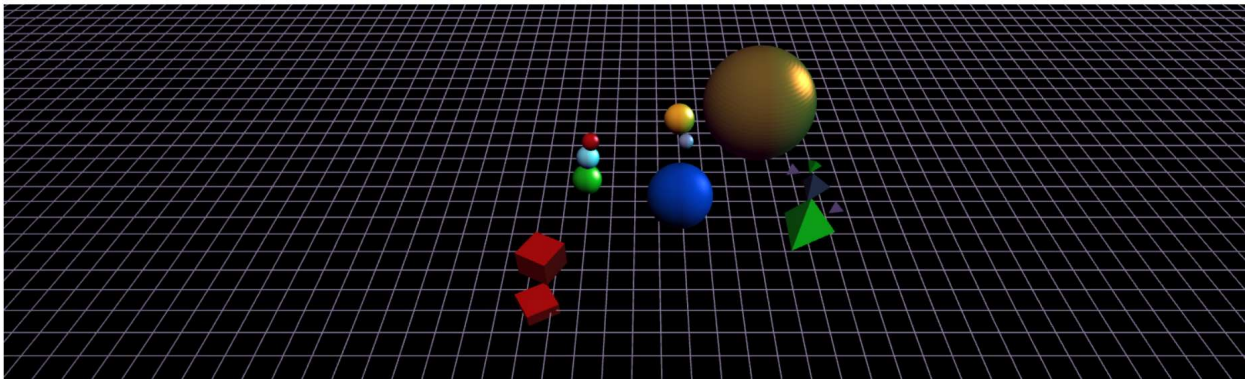
Light Mode 4



Adjusted values in Light Mode 1 (camera is fixed, headlight is on)

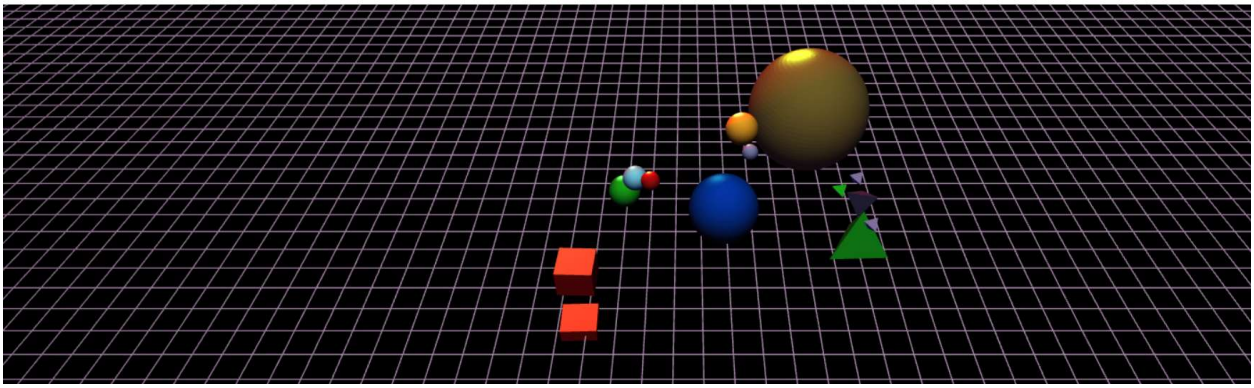
Ambient:	R:	0.3	G:	0	B: 0.7
Diffuse:	R:	0.1	G:	0.9	B: 0.9
Specular:	R:	1	G:	0	B: 0.5
Position:	X:	200.0	Y:	2.0	Z: 5.0

Light Mode: 1

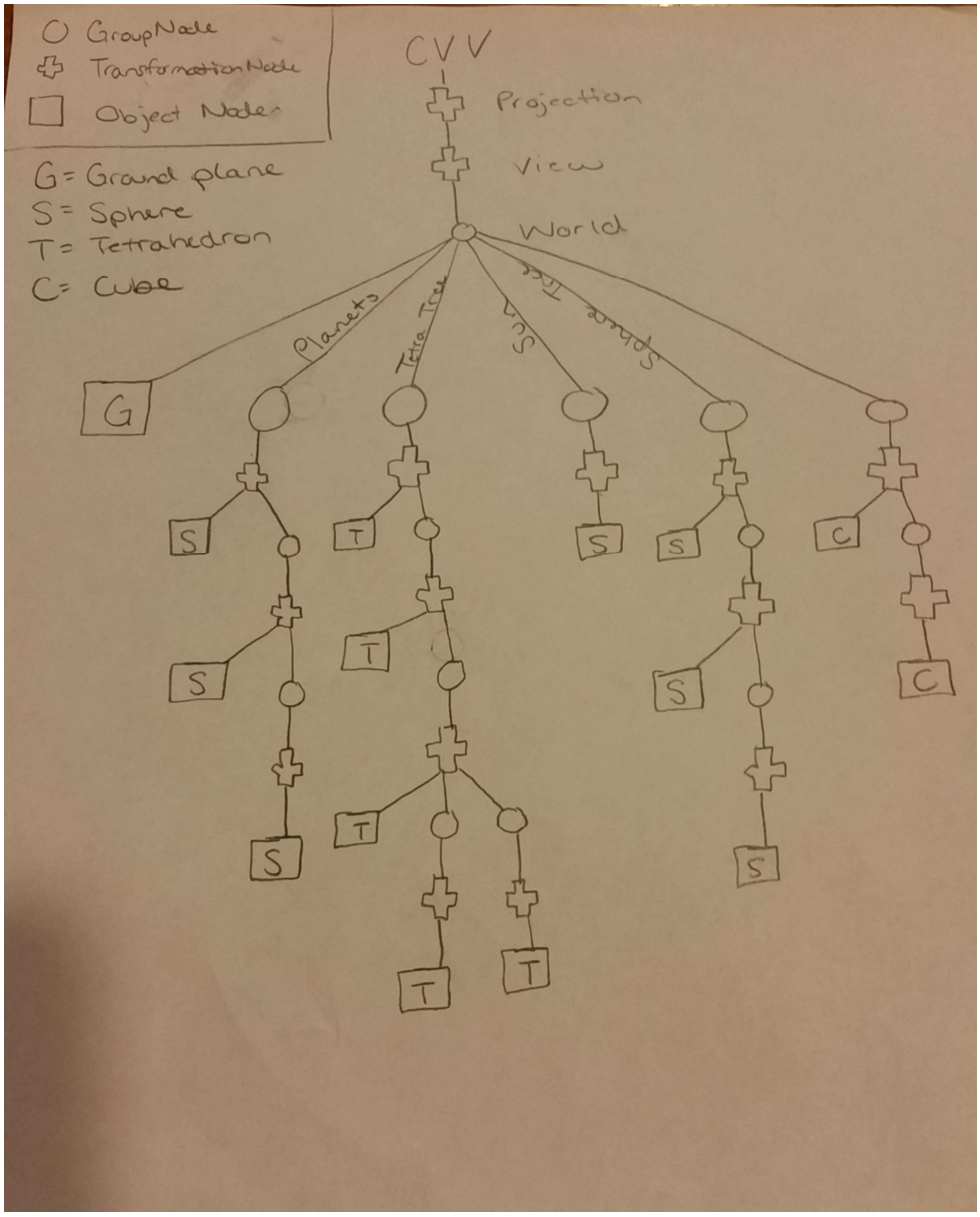


Ambient:	R:	0.3	G:	0.2	B: 0.9
Diffuse:	R:	1	G:	0	B: 0
Specular:	R:	0	G:	1	B: 0
Position:	X:	-200.0	Y:	600	Z: -100

Light Mode: 1



Scene Graph


GroupNode
TransformationNode
Object Node
G = Grand plane
S = Sphere
T = Tetrahedron
C = Cube
CVV
Projection
View
World
Planets
Tetra Tree
Sun
Cube
G
S
T
C