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Project C: 3-D City Of Chicago with lighting

Intro:

The goal of this project is to implements different types of shading and lighting methods on top of the 3-D world navigations from last project. Besides the ground plane and moving camera, this project added two light sources, one coming from the camera position called headlight, and the other is called world light whose position and lighting attributes can be adjusted. The objects we draw this time are with different materials which means the effect of lighting will appear to be different, and the middle big spinning sphere can be switching its modes according to user interaction.

Instruction:

This project is using webGL to draw 3D world on the canvas in a HTML browser(Google Chrome is preferred). We draw two 3D worlds, left screen is drawn with perspective view, and the right screen is orthogonal view, but both have the same camera view as we move and rotate the camera position. Open up the html file called:

HuangZhen_HongLei_ProjC.htm , and you will see a basic instructions of how to control and interact with the 3D world, including keyboard inputs, user input as shown below:

Instructions:

- use "W,A,S,D" to move around in the space
- arrow keys to turn your head around
- use "I,J,K,L" to adjust the world light position"
- press "Space Bar" to turn on/off the world light
- press "Enter" to turn on/ff the head light
- press "B" to change the material of the spinning sphere
- press "N" to switch between Gouraud Shading and Phong Shading
- press "M" to switch between Blinn-Phong lighting and Phong lighting
- use the inputs below to customize the lighting attributes of world lights

“W,A,S,D” for moving the camera, arrow keys for turning the camera around.
“I,J,K,L” for moving the position of world light. “B” for switching material of the spinning sphere. “N” for switching between “Phong Shading” and “Gouraud Shading”
“M” for switching between “Blinn-Phong Lighting” and “Phong Light”.

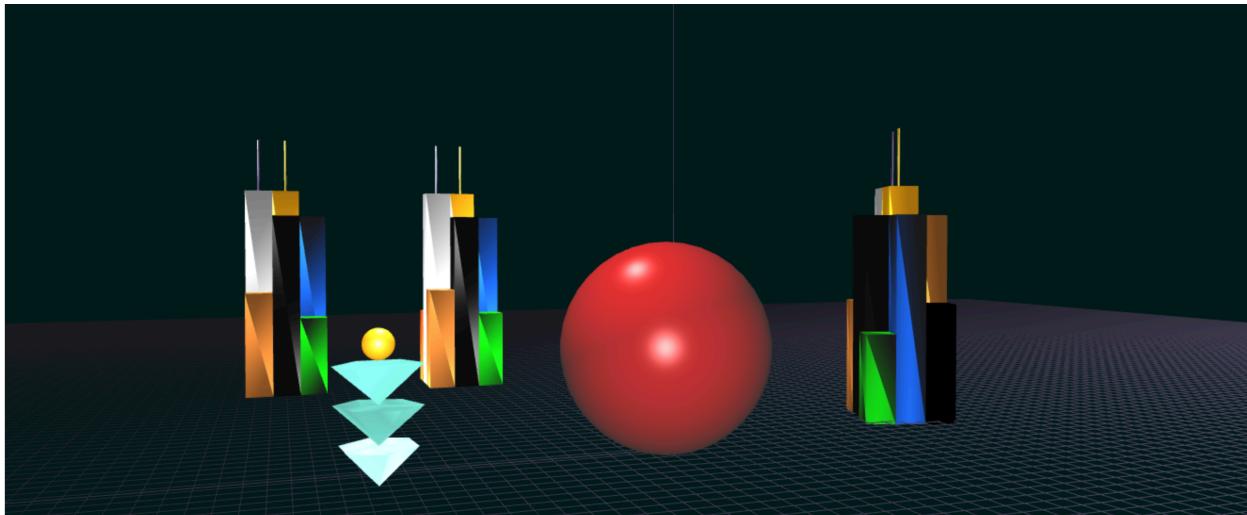
worldLight-AmbiR: worldLight-AmbiG: worldLight-AmbiB: worldLight-DiffR: worldLight-DiffG: worldLight-DiffB:
worldLight-SpecR: worldLight-SpecG: worldLight-SpecB:

Current Shading & Lighting Method: Phong Shading + Blinn-Phong Lighting

type value between 0 and 1 in the blank to adjust the light attributes for world light.

Results:

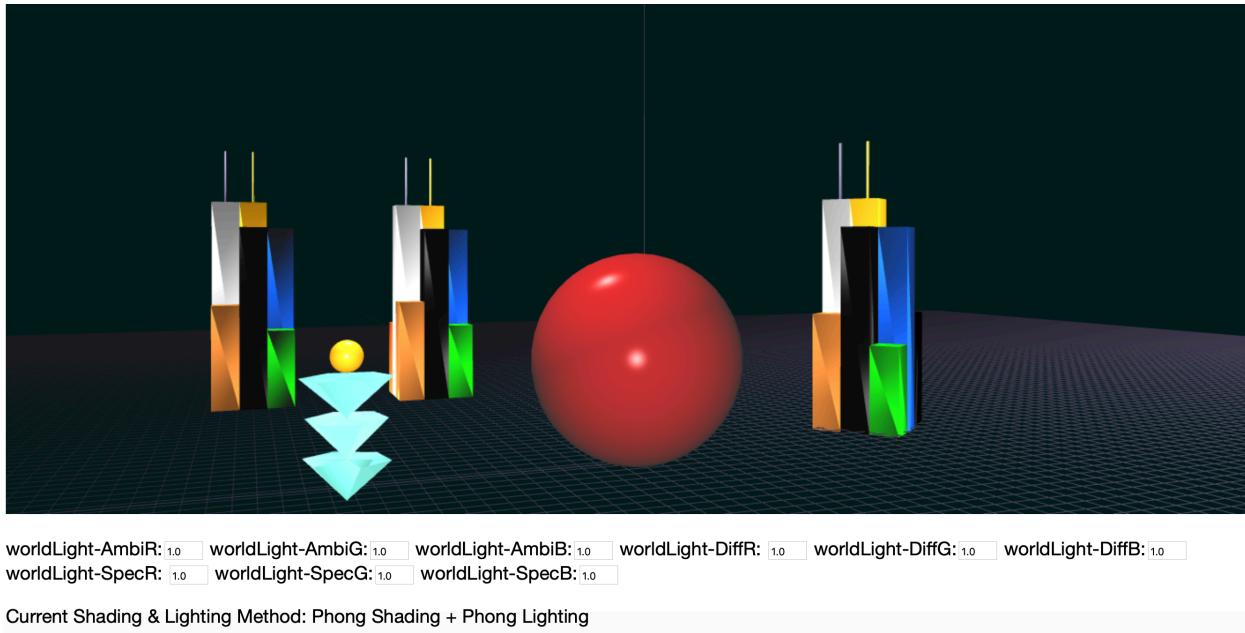
Different Shading & Lighting
Phong Shading + Blinn-Phong Lighting



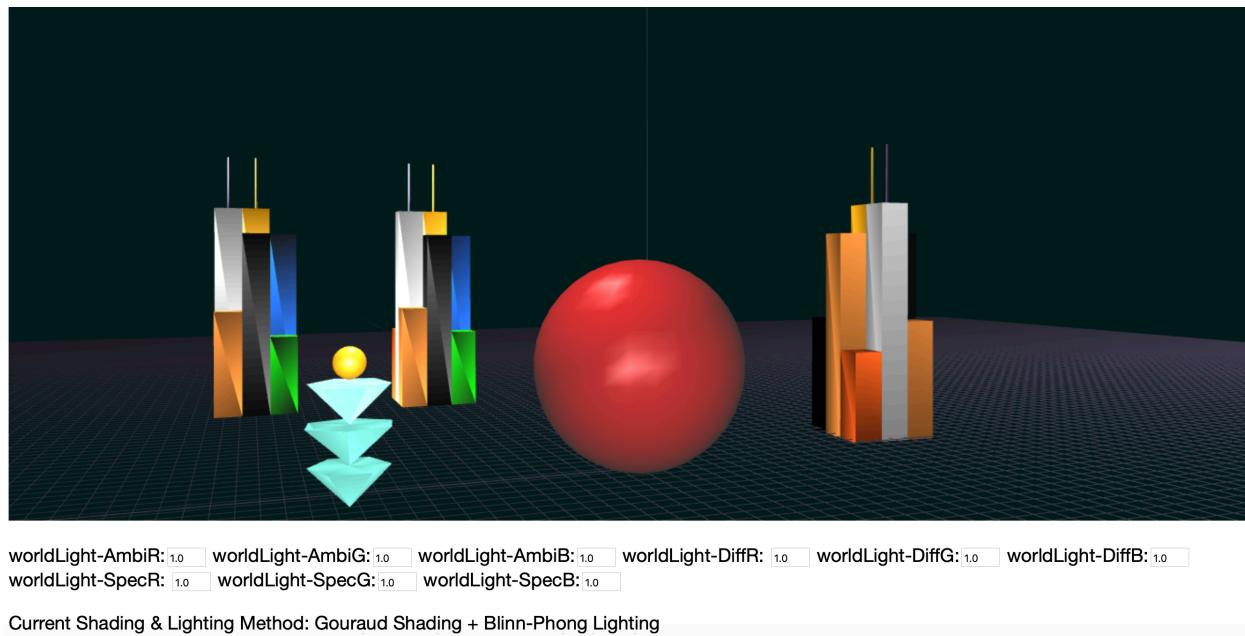
worldLight-AmbiR: worldLight-AmbiG: worldLight-AmbiB: worldLight-DiffR: worldLight-DiffG: worldLight-DiffB:
worldLight-SpecR: worldLight-SpecG: worldLight-SpecB:

Current Shading & Lighting Method: Phong Shading + Blinn-Phong Lighting

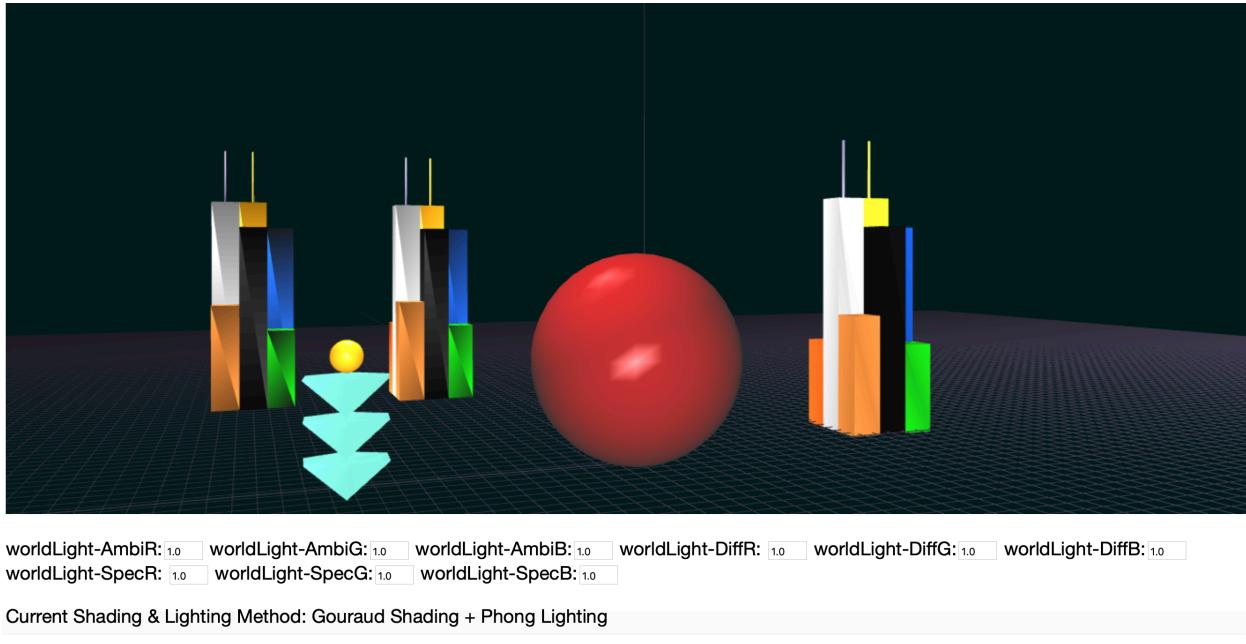
Phong Shading + Phong Lighting



Gouraud Shading + Blinn-Phong Lighting

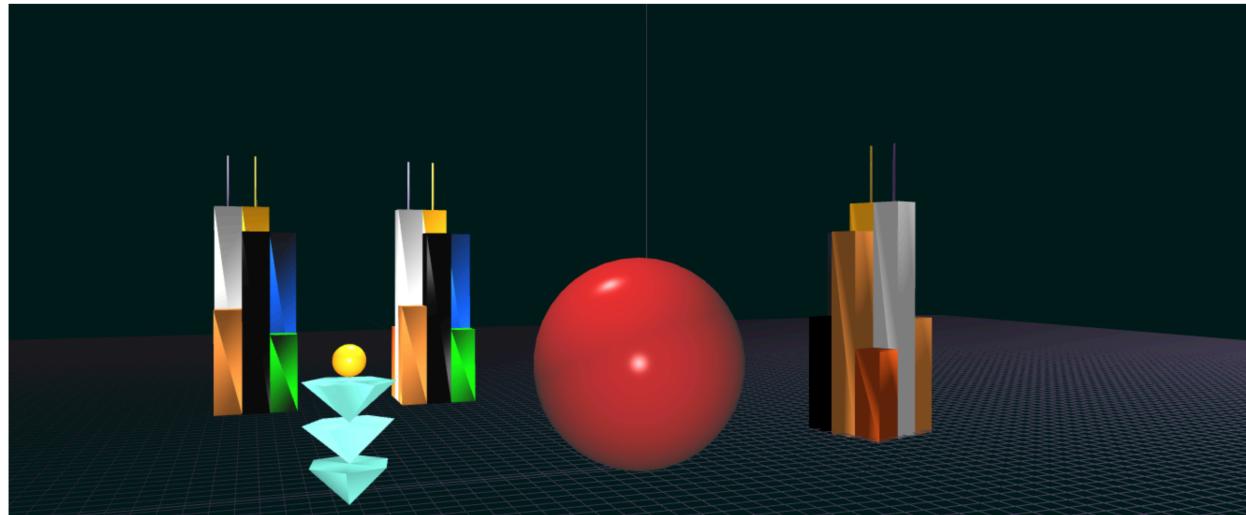


Gouraud Shading + Phong Lighting

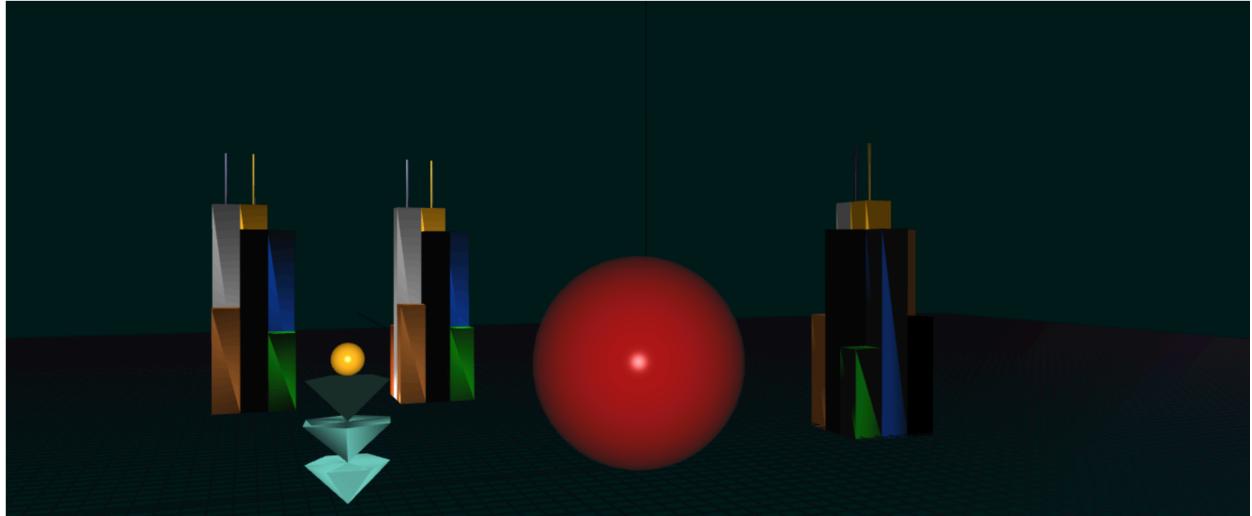


Changing Lights combo:

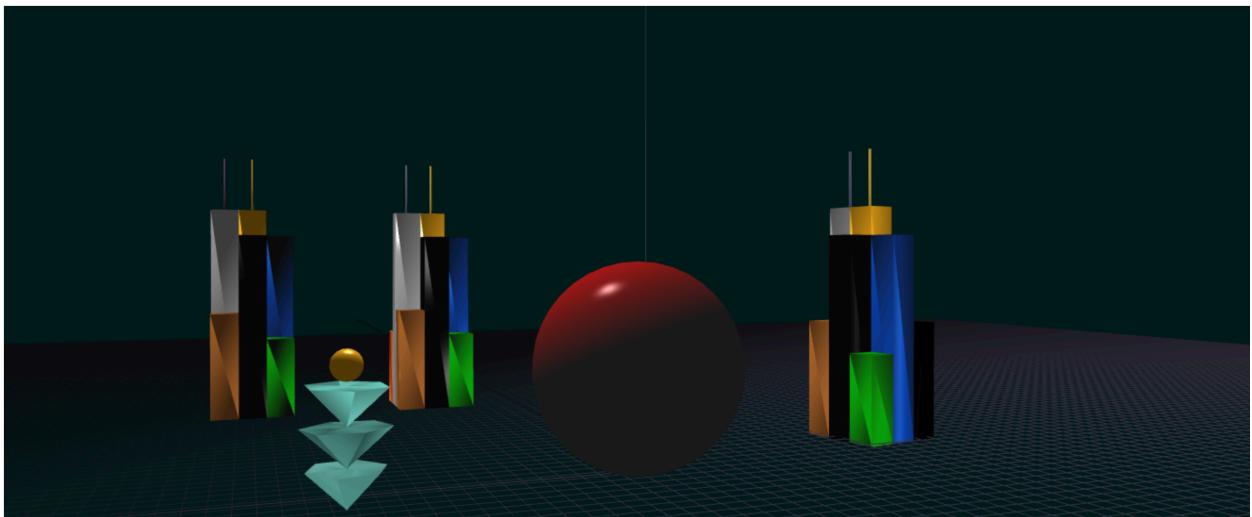
Both head light and world light on:



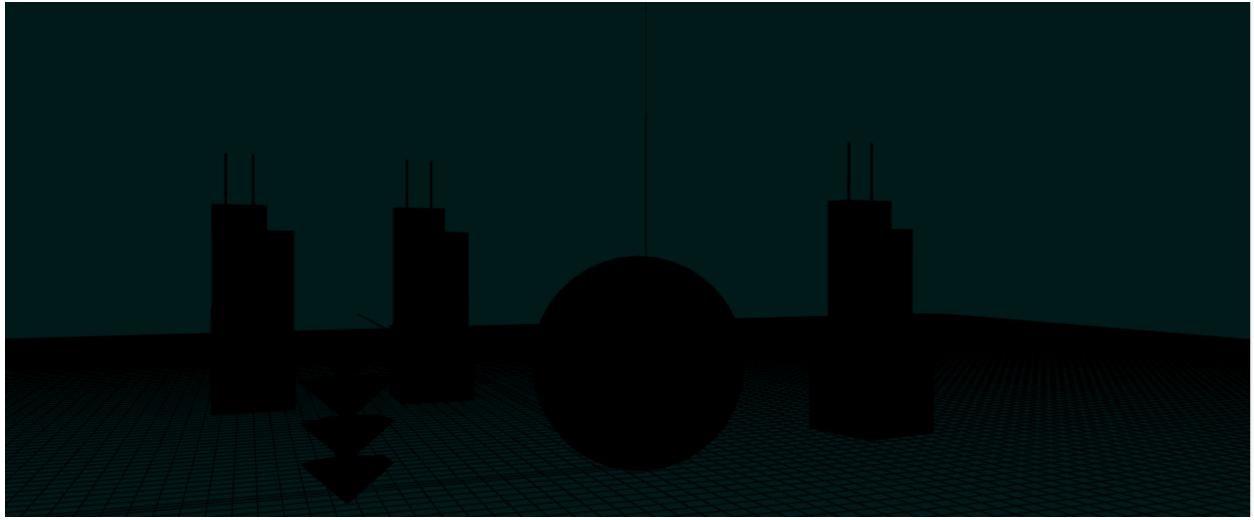
Head light on and world light off:



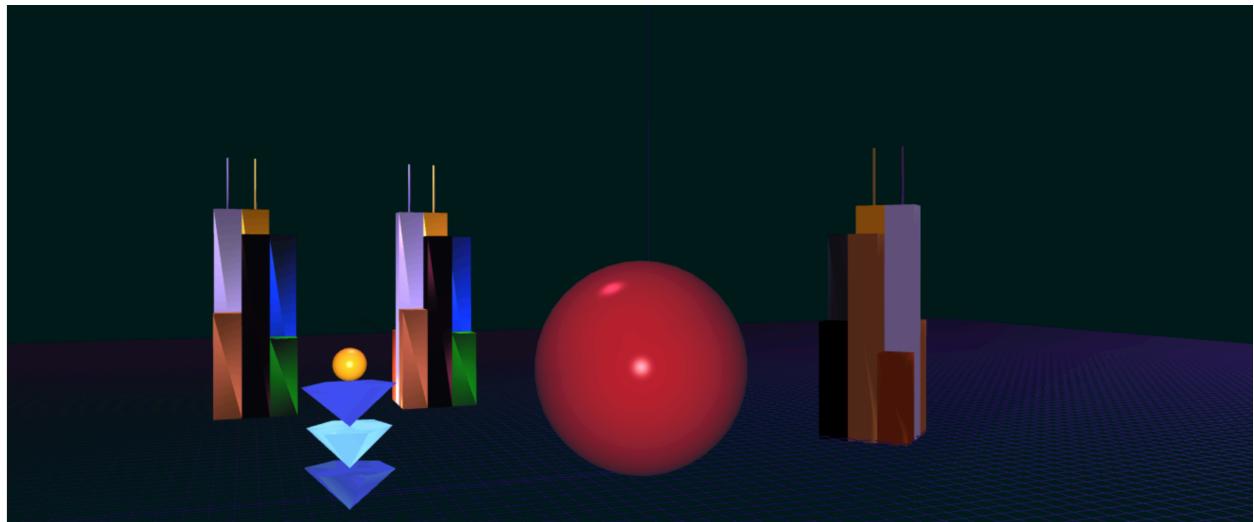
Head light off and world light on:



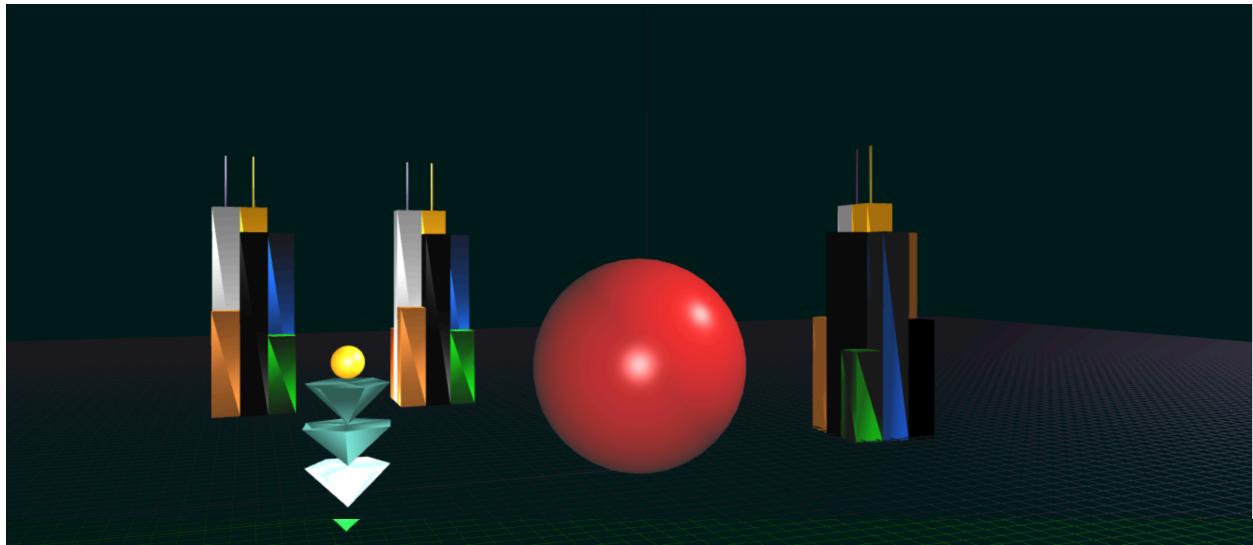
Head light and world light both off:



Different head light attributes:

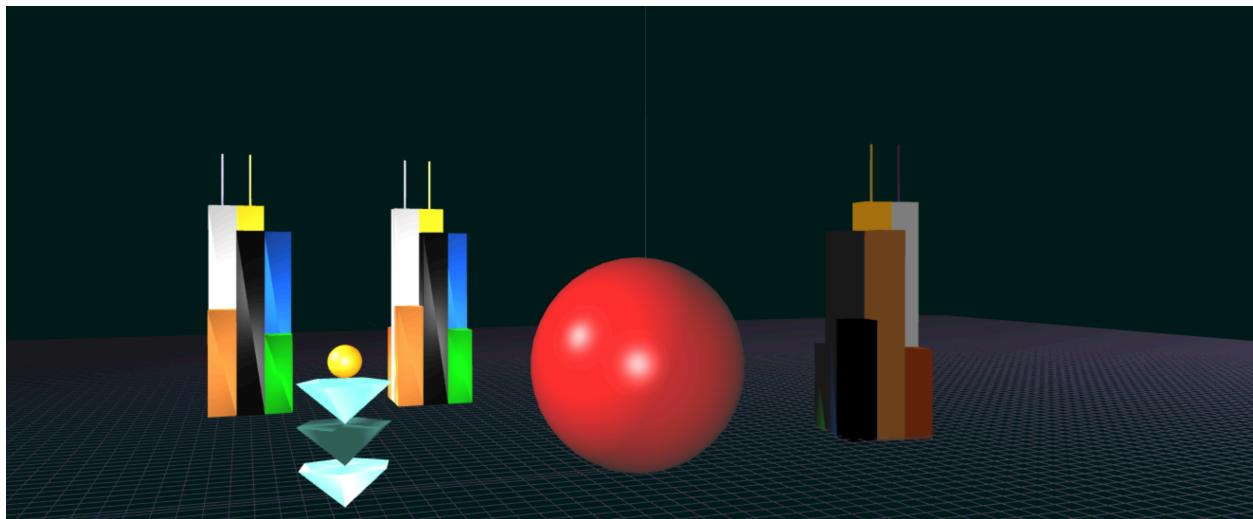


worldLight-AmbiR: 0.5 worldLight-AmbiG: 0.3 worldLight-AmbiB: 0.9 worldLight-DiffR: 0.3 worldLight-DiffG: 0.1 worldLight-DiffB: 1.0
worldLight-SpecR: 1.0 worldLight-SpecG: 0.3 worldLight-SpecB: 0.5

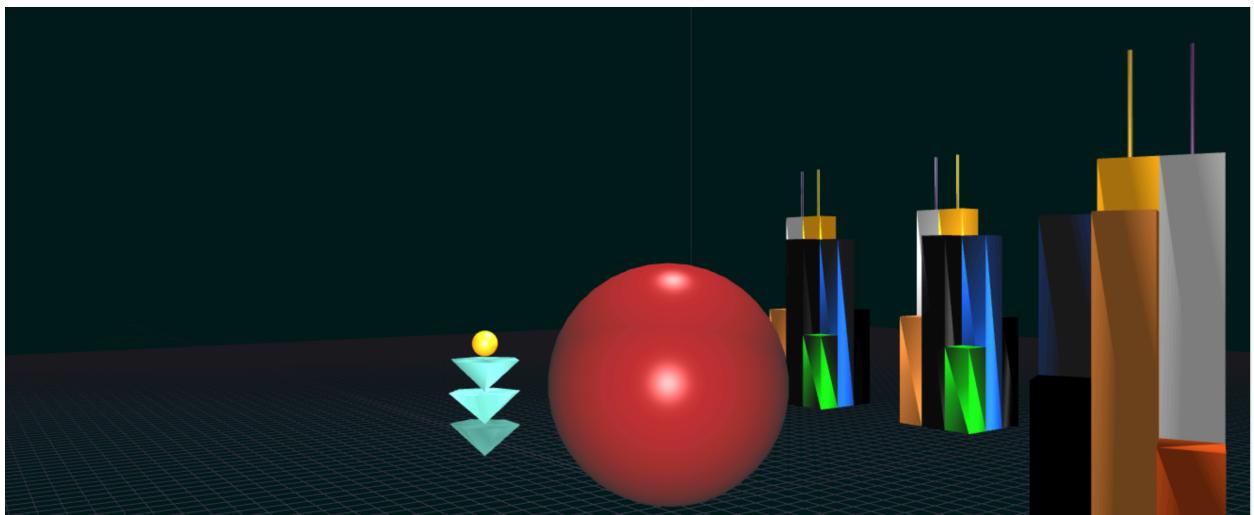
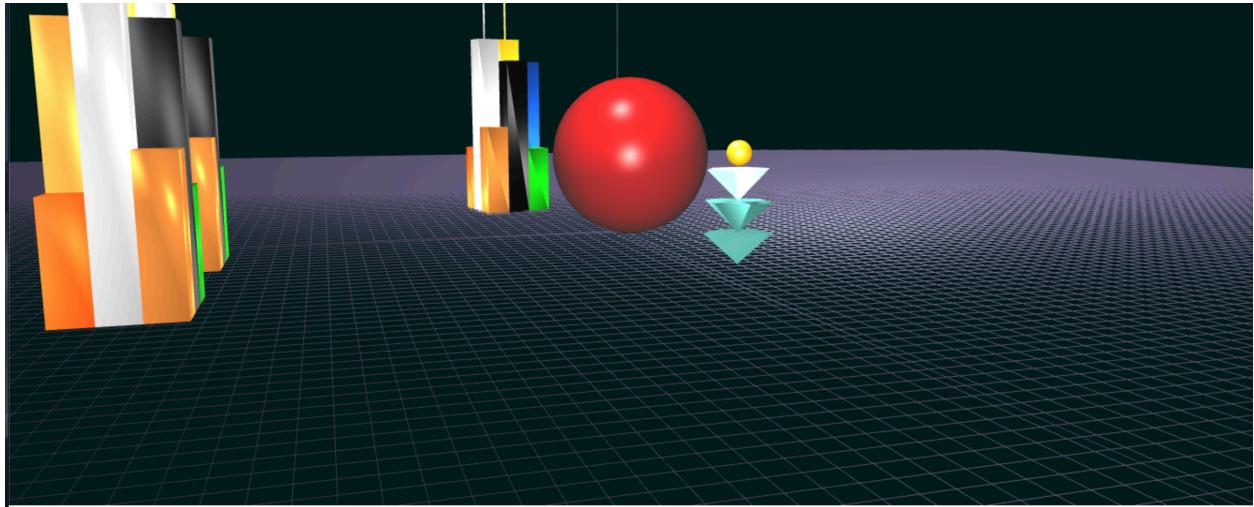


worldLight-AmbiR: 0 worldLight-AmbiG: 1 worldLight-AmbiB: 0 worldLight-DiffR: 0 worldLight-DiffG: 1.0 worldLight-DiffB: 0
worldLight-SpecR: 0 worldLight-SpecG: 1.0 worldLight-SpecB: 0

Changing head light position:



Moving camera around the world:



Scene Graph:

