

# CS351: Intro to Computer Graphics – Report of Project C:

## Petting a dog while you can control the light in the room.

### User's Guide:

#### 1. Goals:

- ✧ The first goal of this project is to realize 5 kinds of shaders including Cartoonish shader, Phong shader with Blinn-Phong lighting, Phong shader with Phong lighting, Gouraud shader with Blinn-Phong lighting, and Gouraud shader with Phong lighting. Then, make it possible that the program can switch to each other without pausing or reloading. I need to finish them in 5 different shaders.
- ✧ The second goal is to draw a nice sphere (actually I draw two) to feel the different effects of lights.
- ✧ I also want to finish 2 lights which both can be controlled to change their position and 3 kinds of reflection colors.
- ✧ Meanwhile, I need to make sure everything I have done in ProjA and ProjB can still work.

#### 2. User's Instructions:

Table 1 Function Summary

Interaction	Reaction
Cartoonish shader “ON/OFF” button	You can switch different shader immediately to the most original cartoonish shader.
Shading method select list	Select one shading method from “ <b>Gouraud</b> ” and “ <b>Phong</b> ”.
Lighting method select list	Select one shading method from “ <b>Blinn-Phong</b> ” and “ <b>Phong</b> ”.
Material section	Use <b>select lists</b> to choose different materials for different objects including “ <b>Spheres</b> ”, “ <b>Ring</b> ”, “ <b>Bone</b> ”, “ <b>Cloud</b> ”, and “ <b>Dog</b> ”. (Materials including <b>default</b> , <b>red plastic</b> , <b>turquoise</b> , <b>jade</b> , <b>silver shiny</b> )
Light section	Use the <b>slider bar</b> to change the light1's /light2's <b>position</b> .
	Use the <b>slider bar</b> to change the light1's /light2's the <b>RGB</b> (color) of <b>ambient</b> light, the <b>RGB</b> (color)of <b>diffuse</b> light, and the <b>RGB</b> (color)of <b>specular</b> light.
	Use the select list to decide the composition of each light. Users can <b>turn off</b> or <b>turn on</b> any kind of reflect light or any light source separately.
“b/B” key	Press “ <b>b/B</b> ” to show the bone. Press again to remove it
“WASD” keys	Control bone's position, bone's position can influence Peanut's (the dog) running speed. Making bone close to Peanut to let him run. Making bone far away to make Peanut walk. “ <b>W/S</b> ” move the bone up/down. “ <b>A/D</b> ” turns the bone left/right.

“Sit/Run” button	Press this button to pet the dog. Tell him to sit or run
“IJKL” keys	Control the view angle without moving the standing point. “I/K” rotate view up/down. “J/L” rotate view left/right.
“←↑→↓” keys	Control the audience’s position. (“↑” Go forward, “↓” go backward, “←” strafe left, “→” strafe right).
“c/C” key	Press “c/C” to change the left viewport to the cloud’s view. Press again to return. The cloud in the scene always moving randomly.
Mouse drag	Drag the mouse on the screen to rotate the bone (rotation direction based on your view direction).
“Clear” button	Press “Clear” to clear the accumulation degree for bone (reset the bone).
“Submit” button	Type in your wanted degree to change the whole object from a different angle (inherit from project A).

### 3. Results

#### 3.1. Cartoonish shader “ON/OFF”

Users can press the button “ON/OFF” beside of script “*Cartoonish Shader*” to change the shader between the cartoonish one to the one you select now.

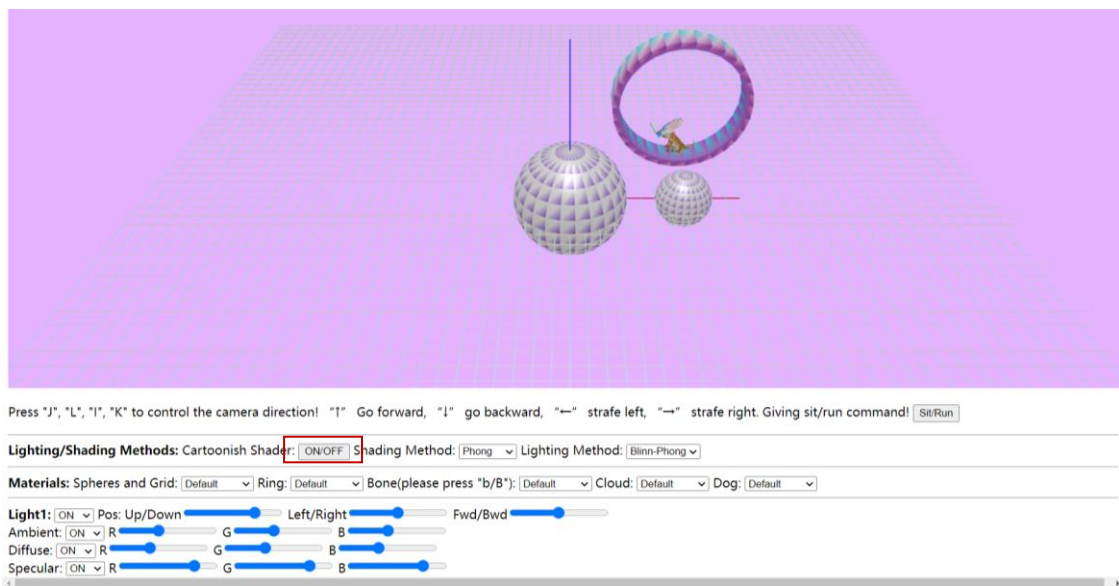


Figure 1 Cartoonish Off

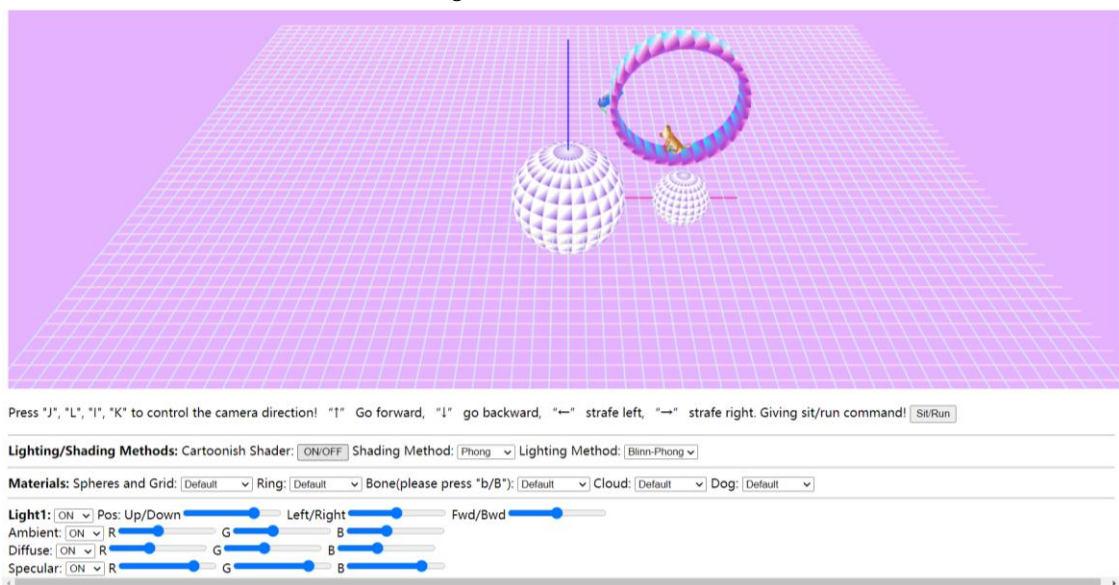


Figure 2 Cartoonish On

### 3.2. Different shader selects beside the cartoonish one

Users can choose the method of shading and lighting from the select list beside the script “*Shading Method*” and “*Lighting Method*”. The shaders include “Phong Shading with Blinn-Phong Lighting”, “Gouraud Shading with Blinn-Phong Lighting”, “Phong Shading with Phong Lighting”, and “Gouraud Shading with Phong Lighting”. Different shaders infect as below:

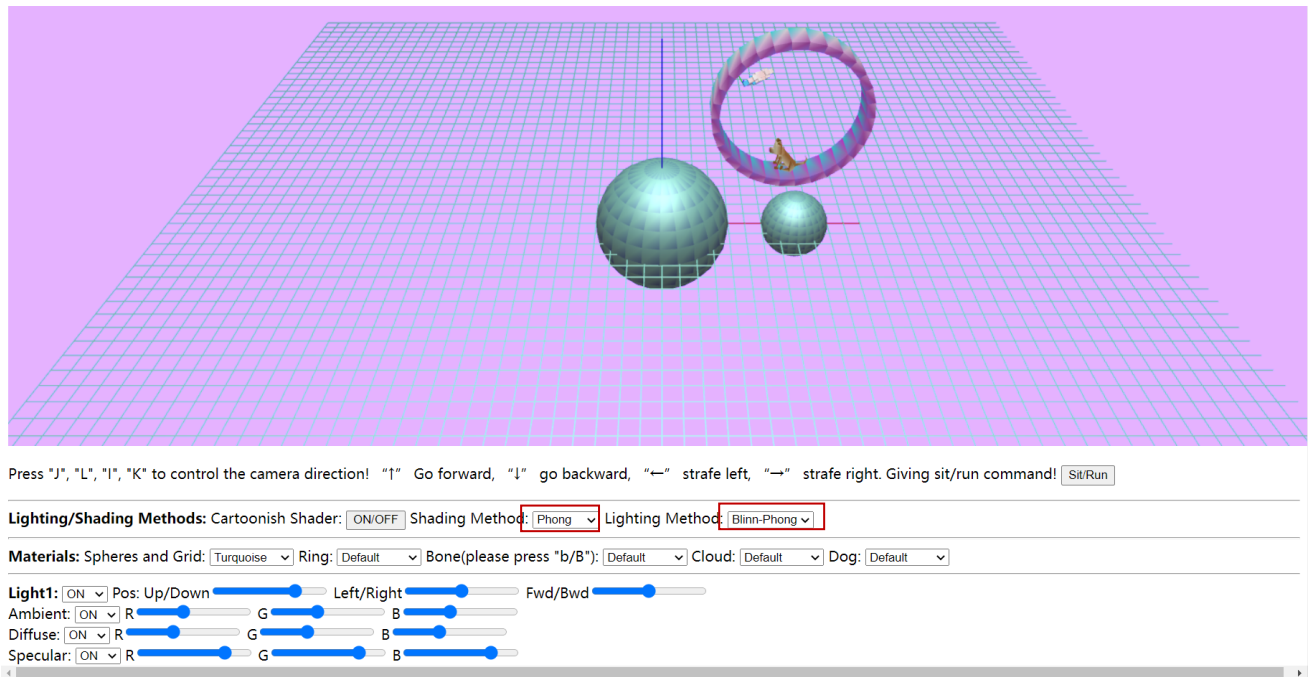


Figure 3 Phong shading with Blinn-Phong lighting

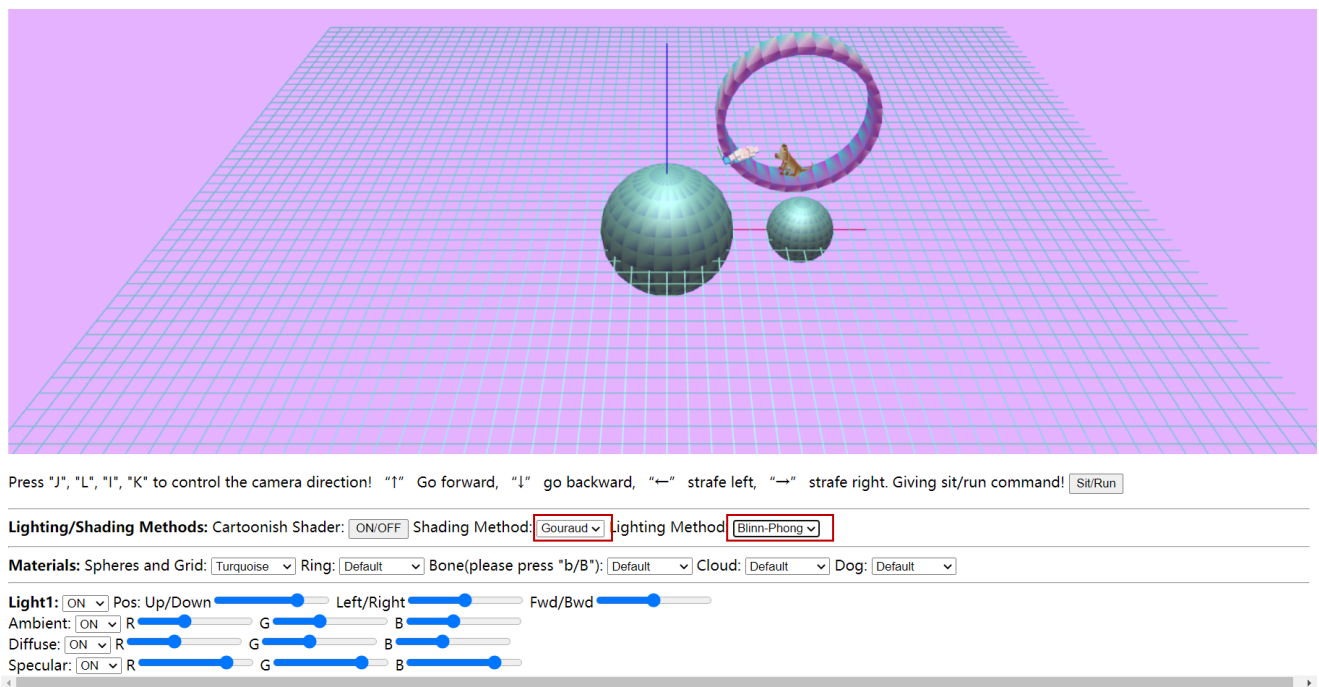


Figure 4 Gouraud shading with Blinn-Phong lighting



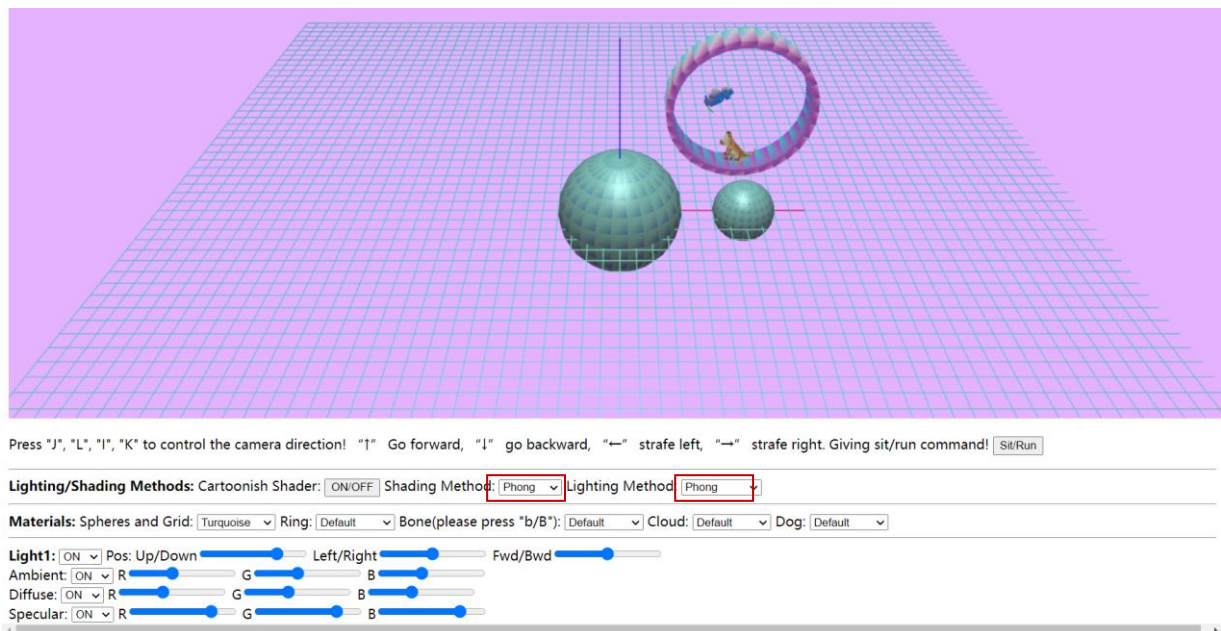


Figure 5 Phong shading with Phong lighting

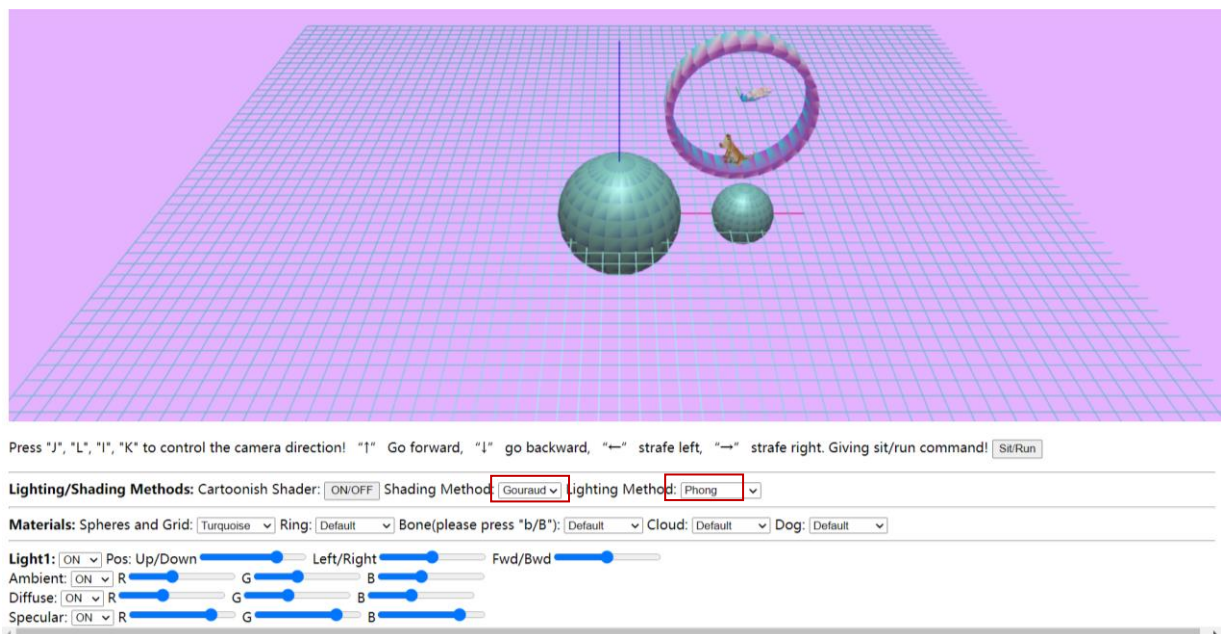
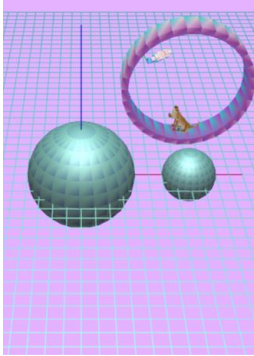
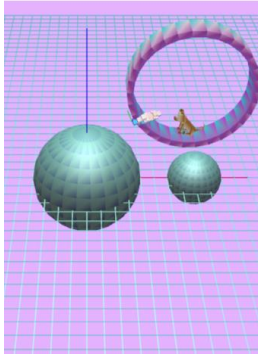
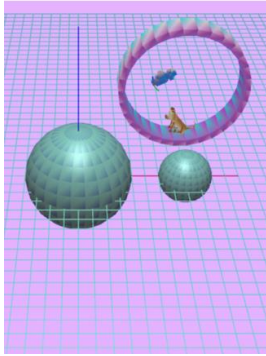
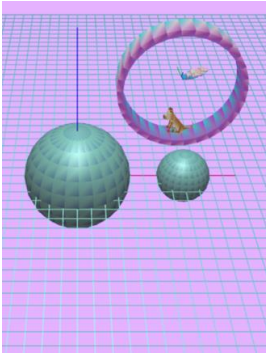


Figure 6 Gouraud shading with Phong lighting

Comparison of the sphere's light:

			
Phong shading with Blinn-Phong lighting.	Gouraud shading with Blinn-Phong lighting	Phong shading with Phong lighting	Gouraud shading with Phong lighting

### 3.3. Use the select list to select different materials for different objects:

Figure7 below shows the result of selecting different materials for different objects.

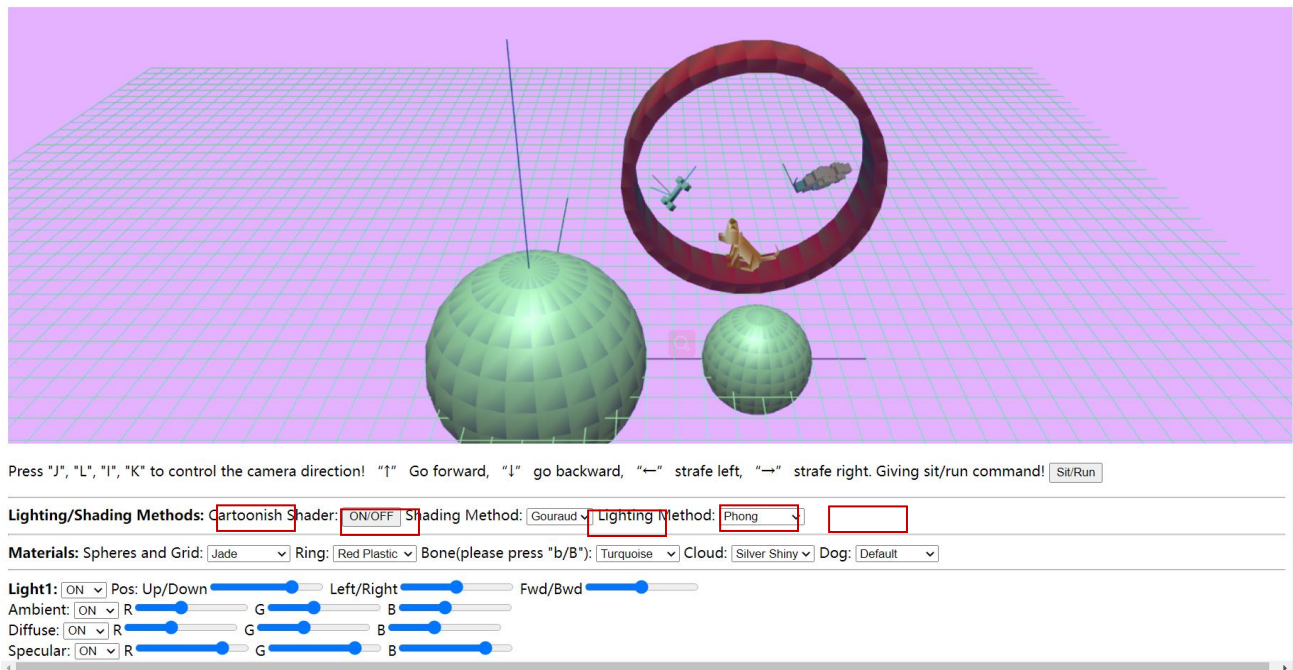


Figure 7 Different materials for different objects

### 3.4. Light Control:

There are two lights in the project. Users can turn on any of them separately. Also, they can turn on ambient reflection, diffuse reflection, and specular reflection of any light source separately. Finally, you can also change the color of any kind of component reflection.

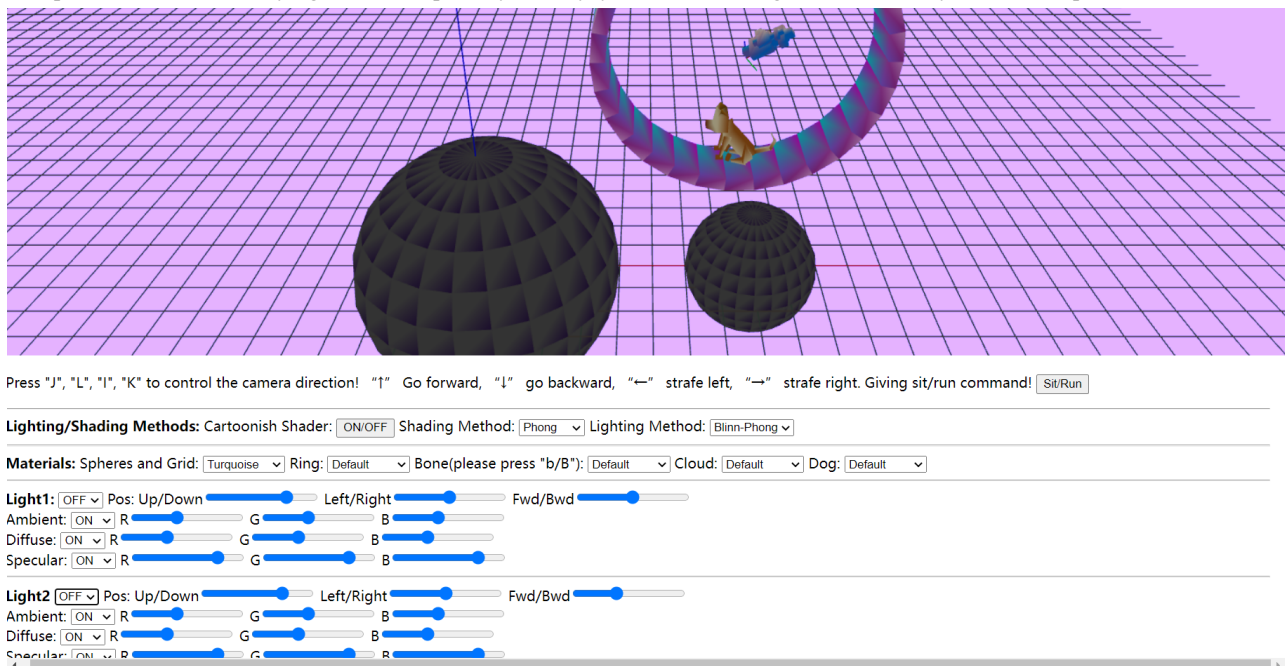


Figure 8 Turn off 2 light sources



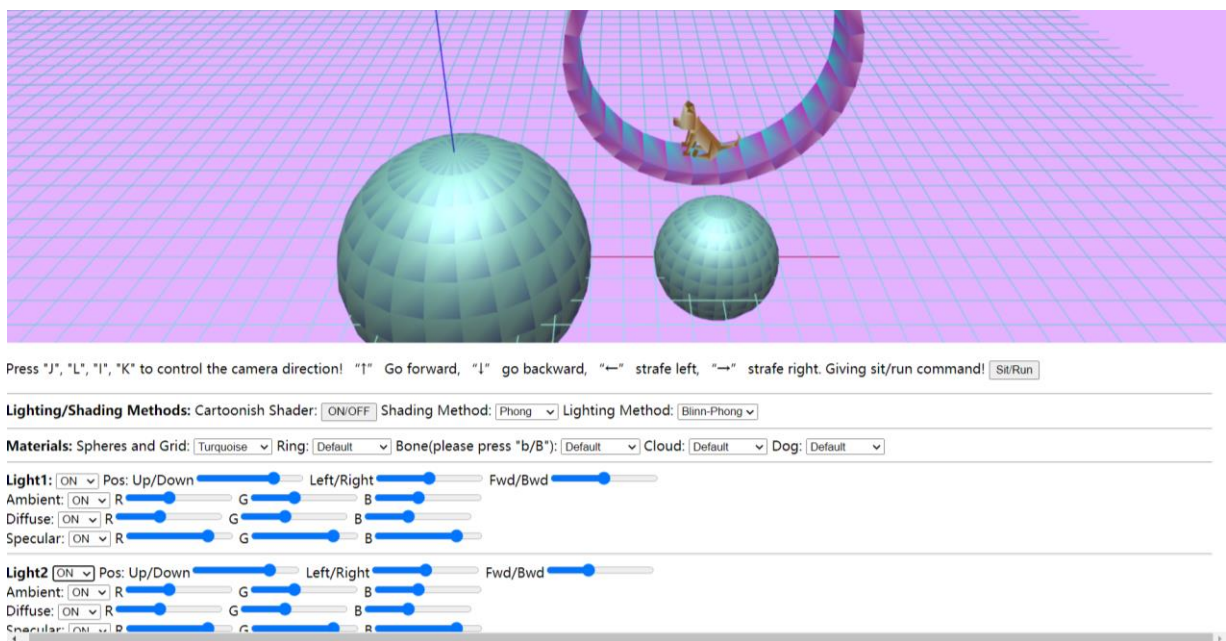


Figure 9 Turn on two lights

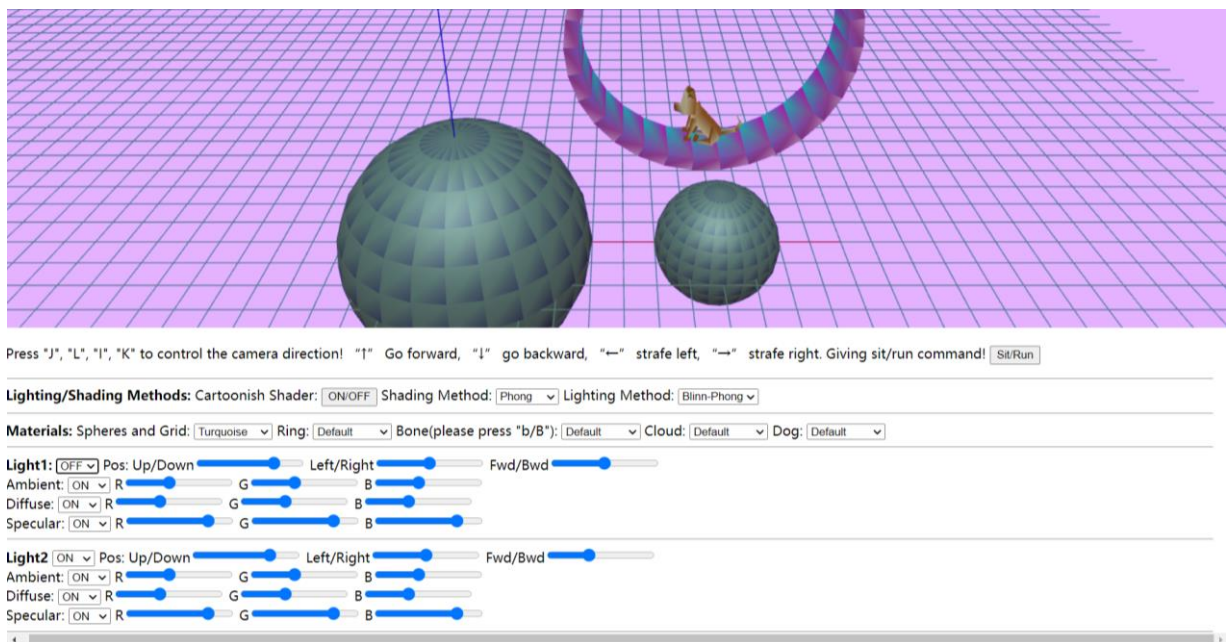


Figure 10 Turn on 1 light

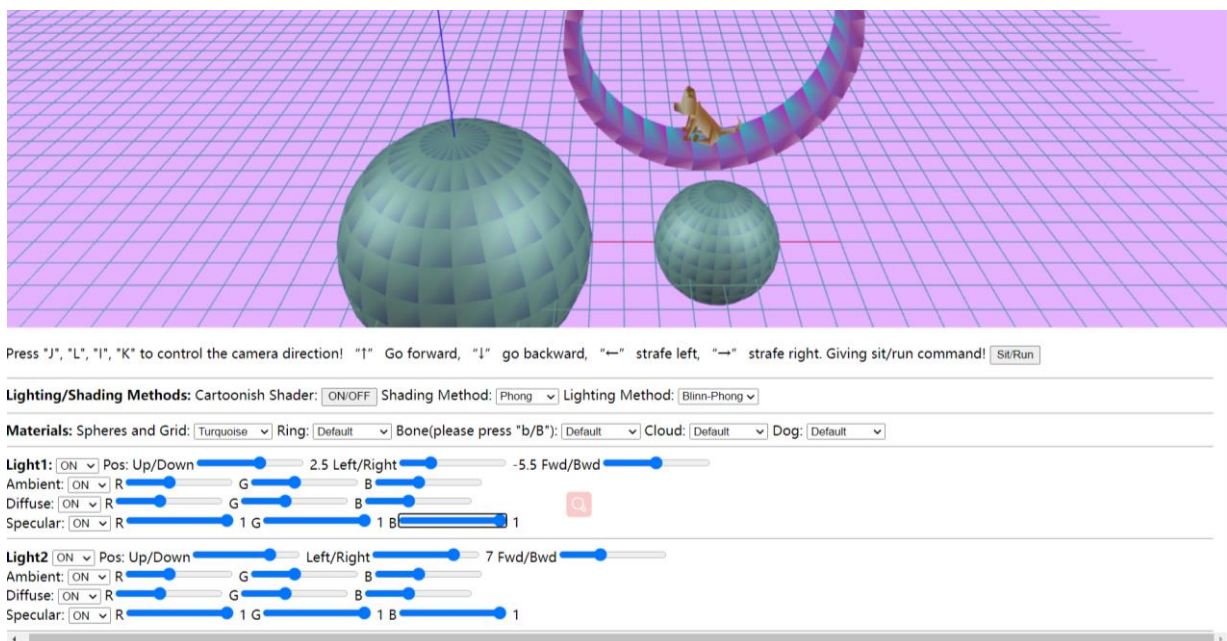


Figure 11 Change light position

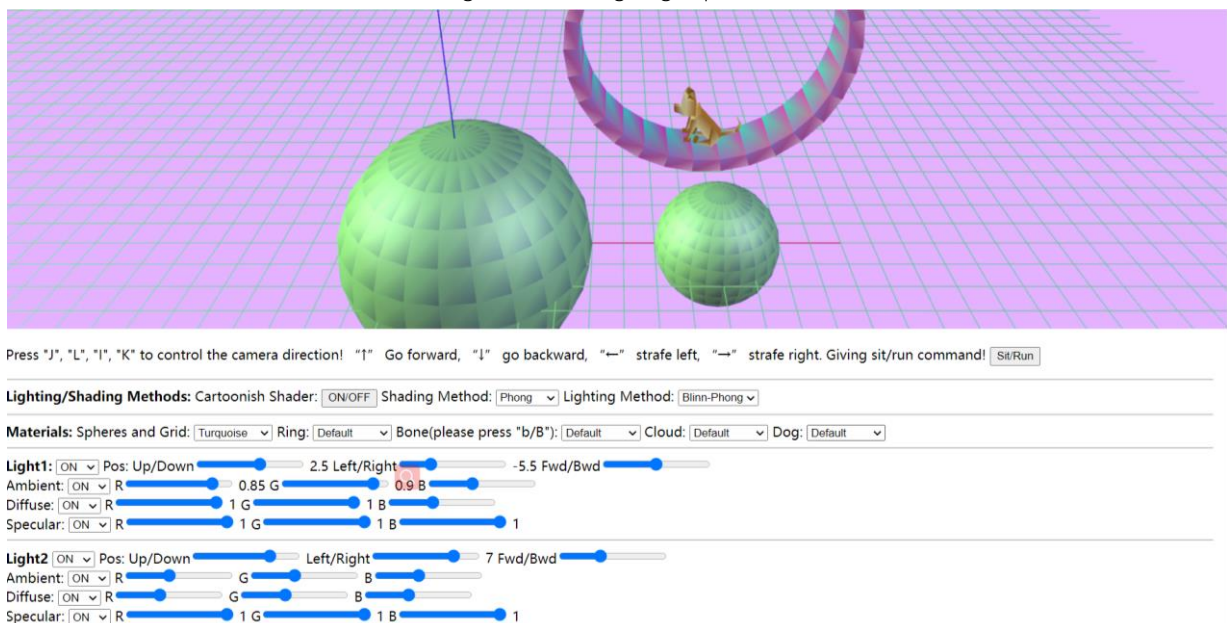
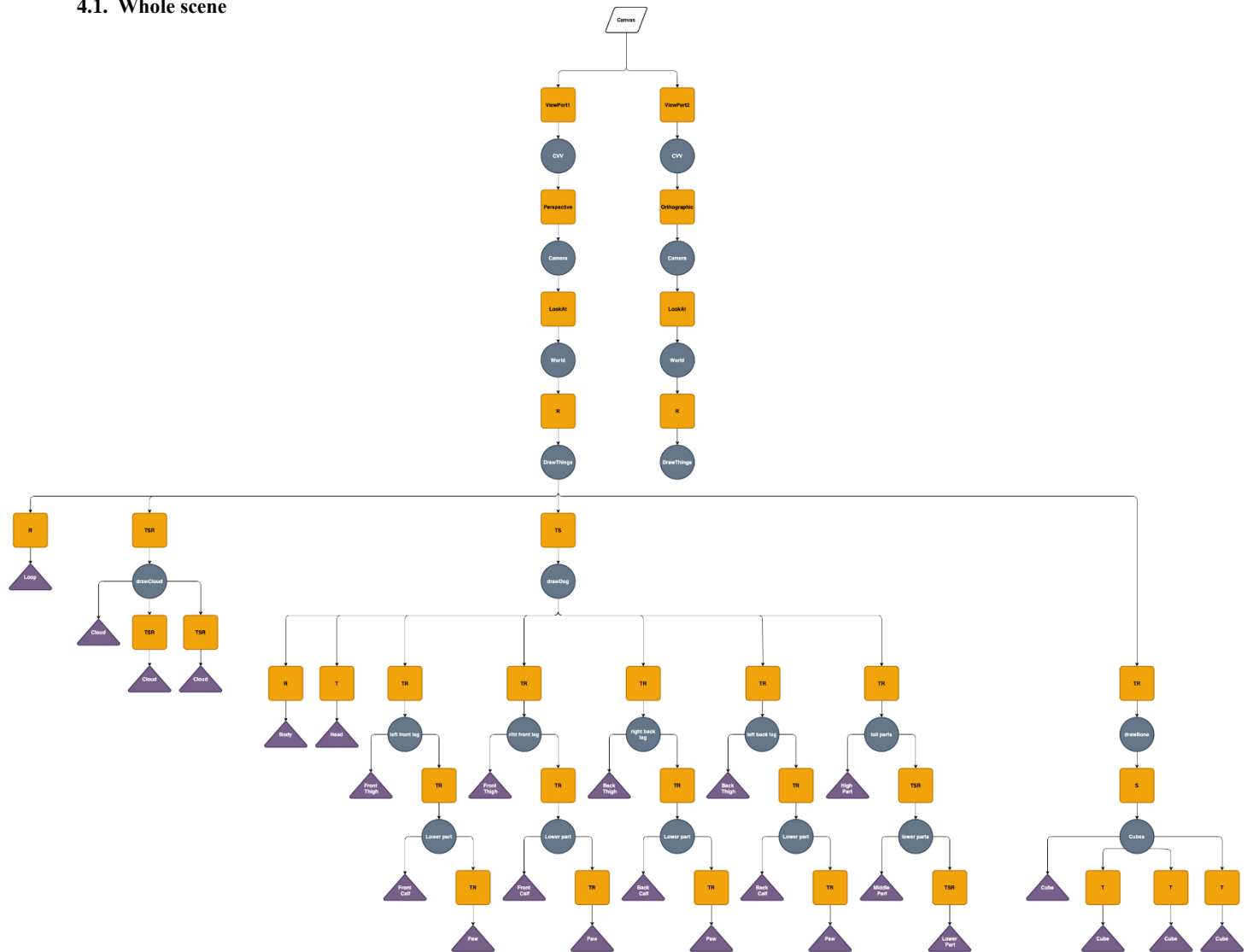


Figure 12 Change light1 color

## 4. Scene Graph

### 4.1. Whole scene





## 4.2. Zoom in:

