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Project C: Shaded Planets and Their Moons

User's Guide

Goals: I mainly was just trying to fulfil the requirements this time around since that in itself was very challenging. I wanted to have more interesting jointed assemblies, but I ended up going with just one continually flexing joint on each assembly (all of which have solely spherical parts) to meet the requirements due to trouble with normals. In a way, they kind of look like planets and moons but otherwise they're not too interesting. Otherwise, I was able to meet my goals.

Instructions for interaction:
A and D to strafe left and right respectively, W and S to move forward and backward respectively, left and right arrow keys to turn the camera around the "glass cylinder," and up and down arrow keys to tilt the camera up and down. Of course, do use the toggles and buttons as well. The materials you are messing with are dull copper, pearl, and black rubber from left to right when you start up the program.

Results

From Figure 1, you can see that there is a ground grid where z is up, 3 separate, solid, jointed, continually-flexing assemblies at different 3D locations with 3 different Phong materials being used on different rigid parts, and complete, sensible on-screen user instructions. The single-viewport display fills the top 70% of the screen and scroll bars are prevented by using a margin (though it is unavoidable that scroll bars appear to allow you to scroll through the html region at smaller sizes). Gouraud shading with Phong lighting can also be seen. You can also see that the 3 big spheres all fulfil the "large slowly-spinning sphere requirement" of course, though for that you have to assume that all my shader buttons work, which I will show screenshots of in other images in this report.

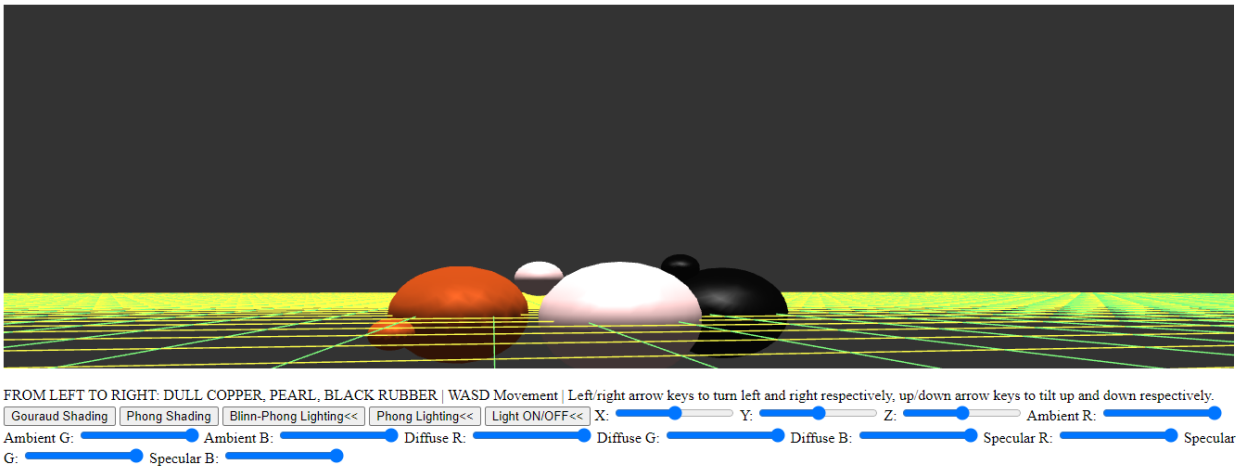

Figure 1: General UI and Gouraud Shading with Phong Lighting

In Figure 2, you can see that on resize, no distortions (stretching in any direction) occur. The camera's FOV remains where it was (30 degrees) and the aspect ratio is calculated dynamically to account for screen size. Note that the canvas still takes up the same percentage of the screen.

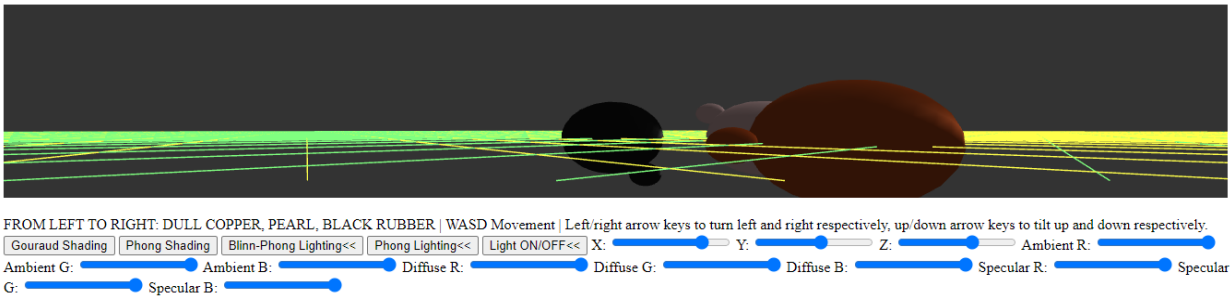

Figure 2: Program in a wide, short window

The following figures will display the ability to interactively toggle the available lighting/shading methods different shading (The light has been positioned using the toggles to make it easy to see the differences): Figure 3, Figure 4, Figure 5. The middle sphere is quite bright but the other two make the differences easily apparent.

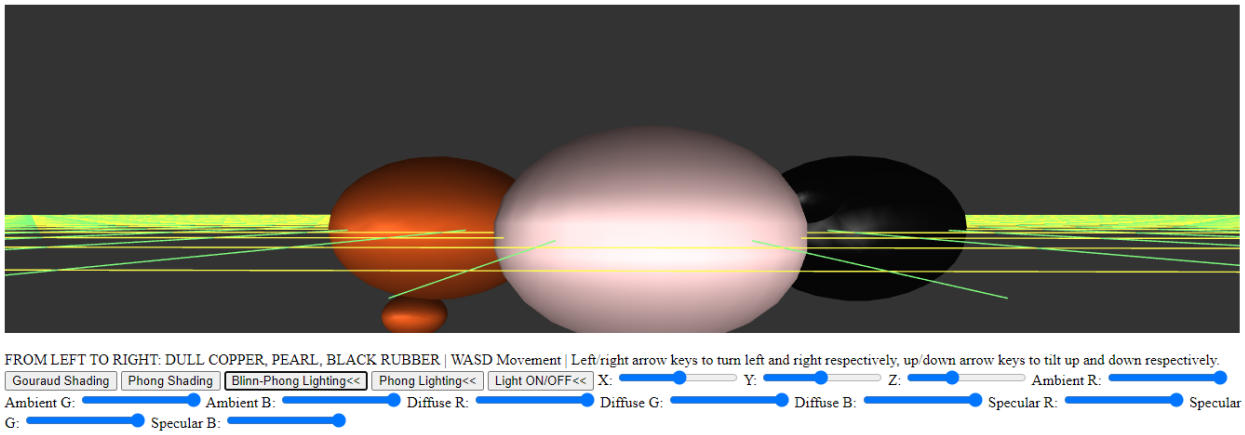

Figure 3: Gouraud Shading, Blinn-Phong Lighting

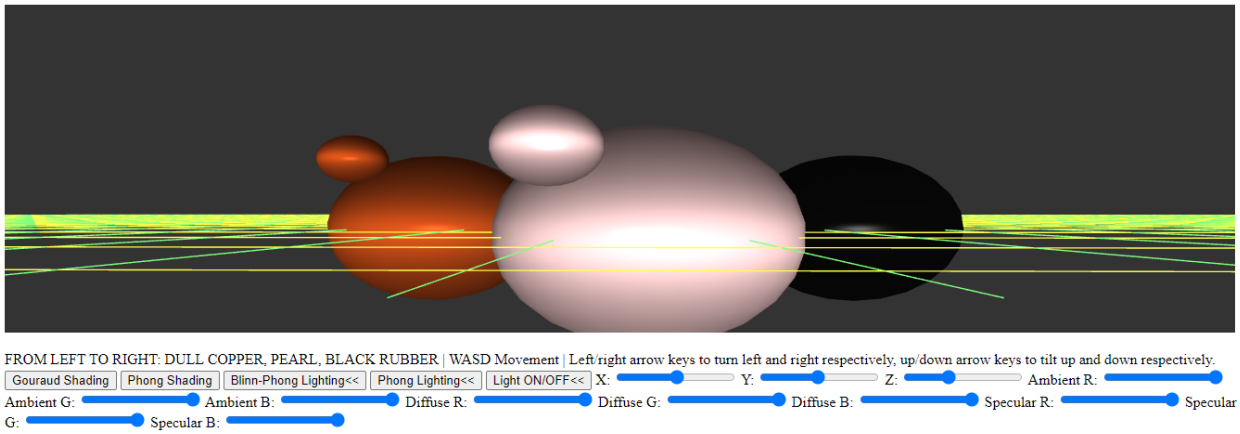

Figure 4: Phong Shading, Phong Lighting

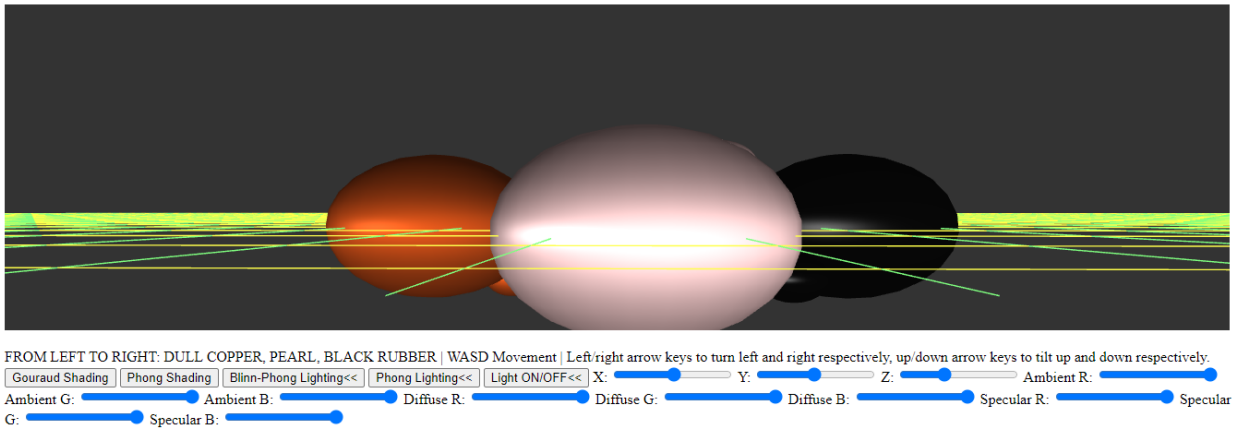

Figure 5: Phong Shading, Blinn-Phong Lighting

Just to show briefly that the lighting toggles work, and interact with each material in a noticeably different way, I'll mess with the ambient light in Figure 6, the diffuse light in Figure 7, and the specular light in Figure 8. Figure 9 will show my working light switch.

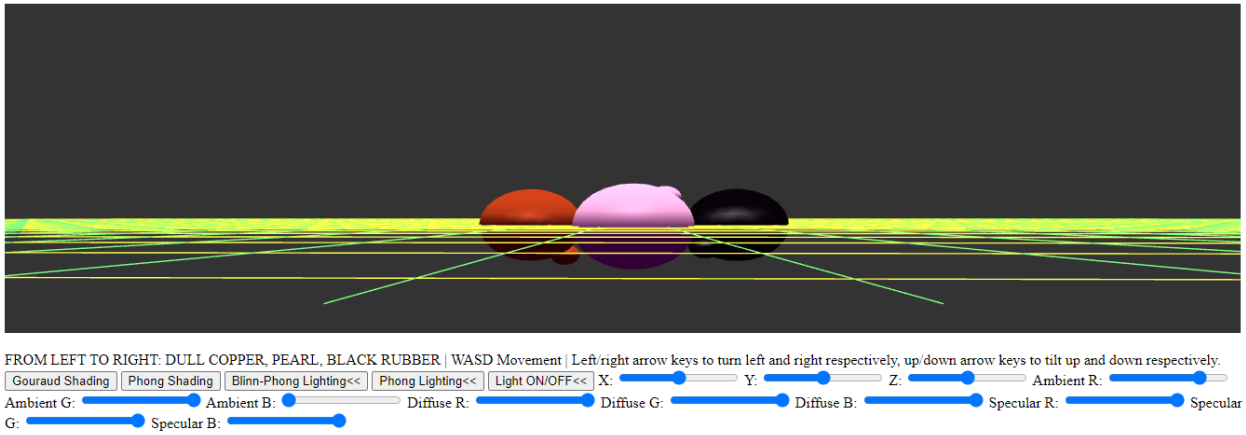

Figure 6: Modified ambient light

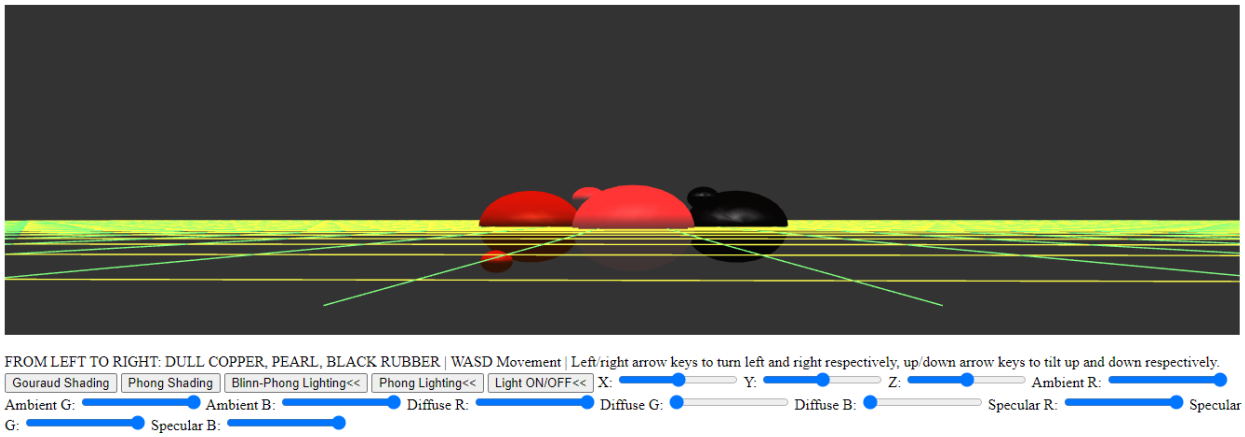

Figure 7: Modified diffuse light

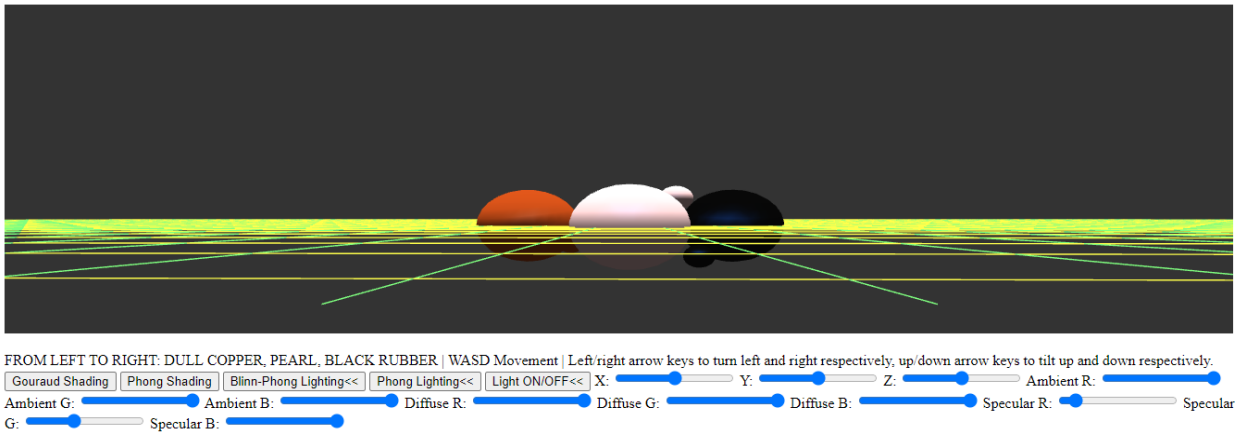

Figure 8: Modified specular light

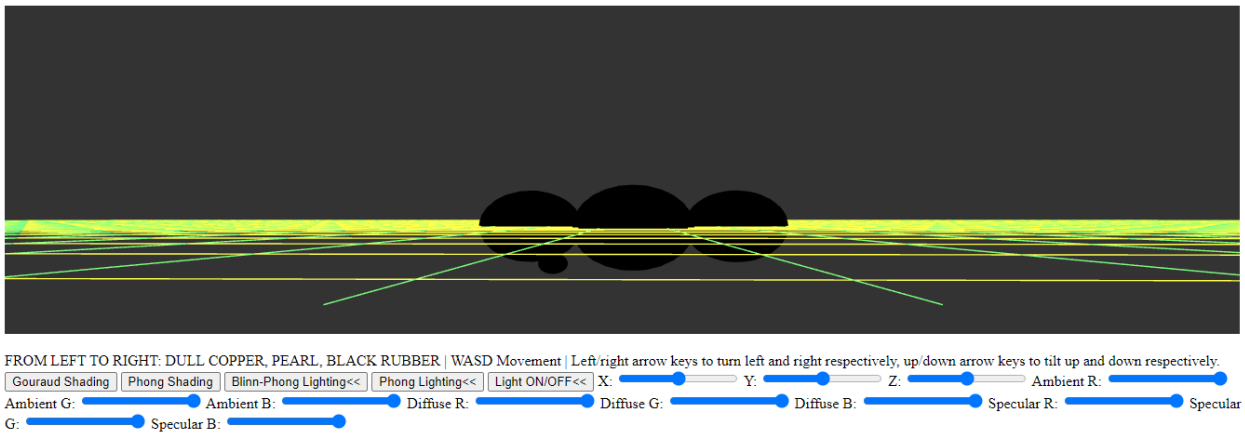

Figure 9: Light switched off

To see that my camera controls work as required, please refer to my program.