**Programming Project Report**

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**Problem Statement:**

The goal of this homework assignment was to understand how Gouraud shading worked. Inputs for this assignment was the XYZ keys to move either of the lights or the model itself and the RGB keys to change the color of the lights, the 0,1,2 keys to change whether you are controlling the model or either of the two lights, or the *i* key to randomly generate a model. The output is the square model and the two lights. No error handling was required.

**Design:**

The design of the assignment was a square made up of randomly generated curves with two lights shining in on it at random places. Instead of using the built in OpenGL methods to handle shading, which only uses Phong shading, the shading was done by “hand” by calculating the surface normal, picking a point in space for the light, and using the dot product on each vertex light up the whole model.

**Implementation:**

The sample code that was used was provided to us by the professor but that only got us so far in generating the model and surface normal. There was no sample code, that I was aware of, that used the Gouraud shading technique. Once I got that far, I assigned a random point in the scene that would be the light, subtracted that from the points in the array to get the unit lengths, calculated the dot product of the surface normal and the unit lengths, and then multiplied the dot product by the material color and light color. The development timeline took about 3 days, mainly because I held off on doing it for too long because of another assignment.

**Testing:**

Testing was handled very poorly by basically plugging stuff in and seeing how it worked. The normal inputs were the XYZ keys to control the movement of the model or the lights depending on which mode you’re in, the RGB keys to control color of the lights, the 0,1,2 keys to change whether you are controlling the lights or the model, and the *i* key to randomly generate a new model. No special cases were tested. Everything did work as expected.

**Conclusions:**

Overall, I’d say this assignment was a success. Next time I think I would use Phong shading instead of Gouraud shading. Development time took 3 days since I had an assignment in another class that took way too much time and effort to complete.