Assignment 1: Shiny Gloomy Bunny

In this assignment you will simulate a single spot light around the model of a bunny using Blinn-Phong shading model. As the light position will be constantly updated, sometimes the bunny will be well lit, sometimes it will look dark as shown in the figure.

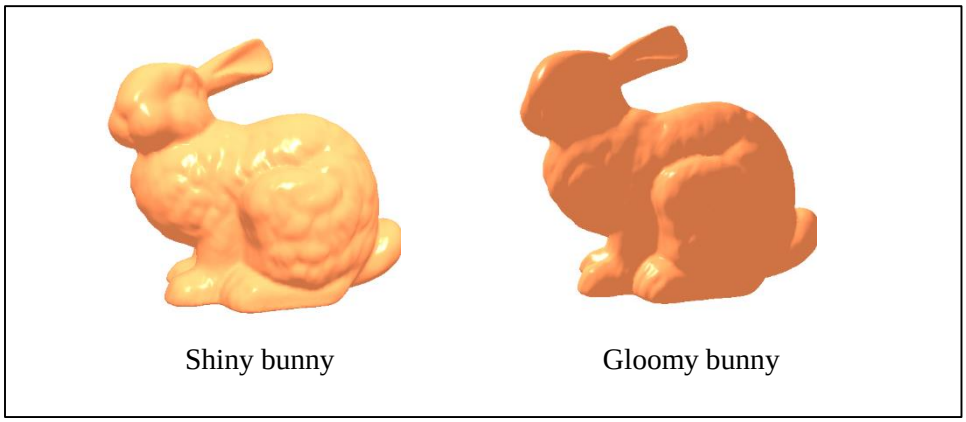

Figure 1: Shiny Gloomy Bunny

Spot light is considered to emit light within a restricted cone as shown in Figure 2. Dot product of the spot light's focus direction and the light direction (negated) is computed (shown as angle 'β' in figure) and compared to a precomputed cosine cutoff value (15 degree in our case) to determine whether the position of the surface is inside or outside the spotlight. If 'β' is less than the cutoff value, that part of the surface is within the cone, otherwise surface will be lit only using the ambient component of the light.

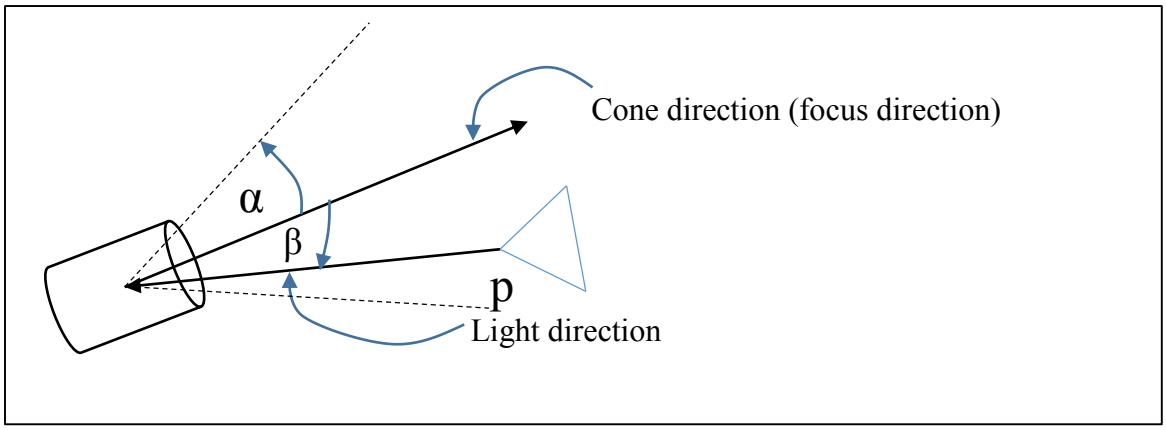

Figure 2: Spot light computation.

If ‘β’ is less than the cutoff value, the attenuation factor is computed as $\cos^{Spot.expo}(\beta)$. This attenuation factor is multiplied by the intensity of the spot light. Finally, along with ambient component, diffuse and specular terms are added to calculate the final light intensity of the surface located inside the cone.

Implementation:

Download the zipped file. In ‘ObjLoader.cpp’, you need to implement the following function: ‘computeNormals’ in order to calculate per vertex normal.

In main.cpp, you need to compute the direction of the spot light and relate it to the uniform variable “Spot.direction” defined in the fragment shader.

Lastly, in fragment shader, you need to calculate the angle ‘β’ and compare it with the given cutoff value to compute the light intensity within the cone of the spot light.

Submission:

Submit the assignment in a zipped file via canvas. Name the file as Firstname_Lastname_1_CSCD471.zip. Deadline is Friday, January 15, 11:59 pm.

This assignment carries a weightage of 15% of this course.