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CS 180

Assignment 4

1. *Calculate the Blinn-Phong reflection*

For ambient lighting simpling multiply **ambient color * ambient light intensity**

For diffuse lighting we use the formula $\mathbf{L_d = k_d (I/r^2) \max(0, n \cdot l)}$

- We are given $\boldsymbol{k_d}$ = *diffuse_color,* ***I*** *= light_intensity,* ***n*** *= world_normal*
- We calculate ***r*** = *length(world_position - light position)*

Now fill all values into our equation to get the diffuse lighting

For specular lighting we use the formula $\mathbf{L_s = k_s (I/r^2) \max(0, n \cdot h)^p}$

- We are given $\boldsymbol{k_s}$ = *specular_color*
- We also have the variables **I, n,** and **r** from before
- **v** = normalized vector (camera_position - world_position)
- **l** = normalized vector (camera_position - light_position)
- **h** = bisector (v,l) = normalized vector (v + l)

Now fill in these values into our equation to get the specular lighting

Now for all points in the image(x, y): lighting = ambient + diffuse + specular

2. *Map the texture to the image*

For each part of the model we find the UV coordinates by mapping the (x, y) position to the corresponding positon on the UV map. Making sure it is in the bounds of the image

uv.x = uv_coords.x * (diffuse_color_image.width - 1)
uv.y = uv_coords.y * (diffuse_color_image.height - 1)

Now that we have position on the UV map, we copy the values (R, G, B) to our **texture_color** vector

If we wanted just the texture, we could map it to image(x, y)

Instead we will use the **texture_color** as our new **diffuse_color** coefficient

Calculate the lighting the same as in part 1. This time using the texture color for the diffuse lighting color coefficient

Again we map the lighting for all points (x,y) to the image = ambient + diffuse + specular
Now we have the correct lighting along with the texture