CMT107 : Visual Computing - Lab Sheet 4

Lighting and Shading

Download the file Lab4.7z from the Learning Central and extract it. Create a new project on the Intellij IDEA and copy the extracted files to the proper folders in the project. You may also need the Basic and the Objects packages used in Lab 3, but please replace the old SSphere.java with the new one, which is the solution to Lab 3.

Vertex shader Gouraud.vert and fragment shader Gouraud.frag implemented Gouraud shading, and VC04.java used the two shaders to render a teapot. Run the program to see the rendering result, and then do the following:

- Examine the init() function of VC04.java; check how the vertices, normals, and triangle indices are sent to the vertex shader.
- Go over the init() function again; identify the lines responsible for defining the lighting parameters and the material properties. Change the material properties with different colours. You can refer to the file "Common 3D Material Parameters" from the Learning Central to generate some common material effects. Also change the lighting parameters to see the effects.
- Change the object to SSphere, and run the program to see the result. Examine SSphere.java to see how the normals are defined. Uncomment lines 62~64 in SSphere.java to redefine the normals as [0,0,1]. Run the program again to see the new picture. Can you explain why the sphere looks flat in the new picture?
- Now, examine Gouraud.vert and Gouraud.frag to see how Gouraud shading is implemented in the shaders. What type of light source is used in Gouraud.vert?
- Try to implement Phong shading. Hints: The vertex shader is used to pass normals to the fragment shader, and the fragment shader will receive interpolated normals, and use them to compute colours.