Computer Graphics

by Ruen-Rone Lee

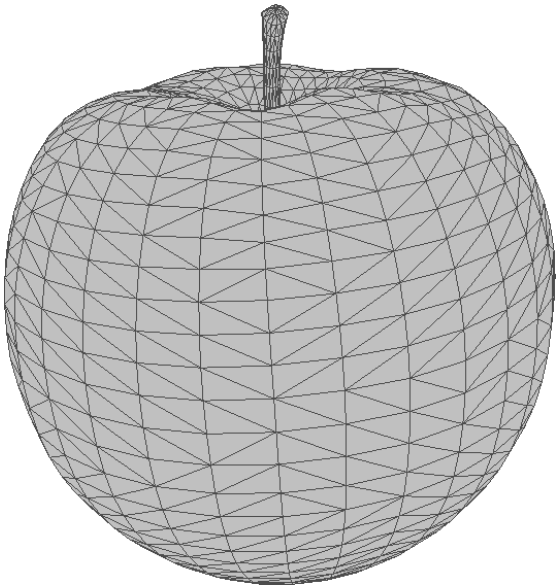
ICL/ITRI

Assignment #3

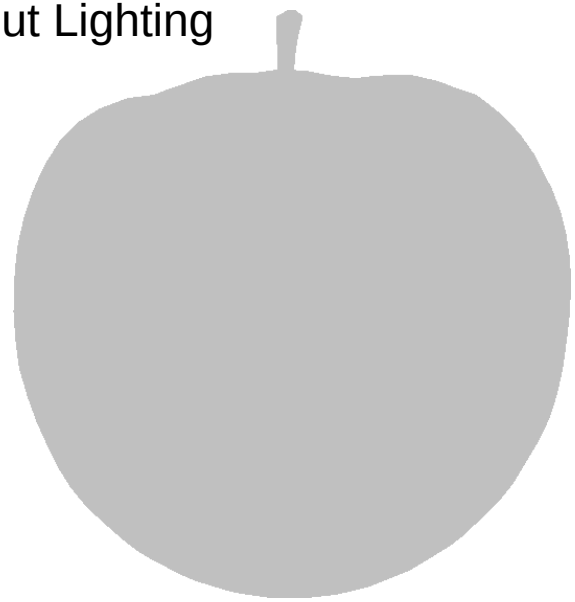
Vertex Lighting

Lighting 3D Models

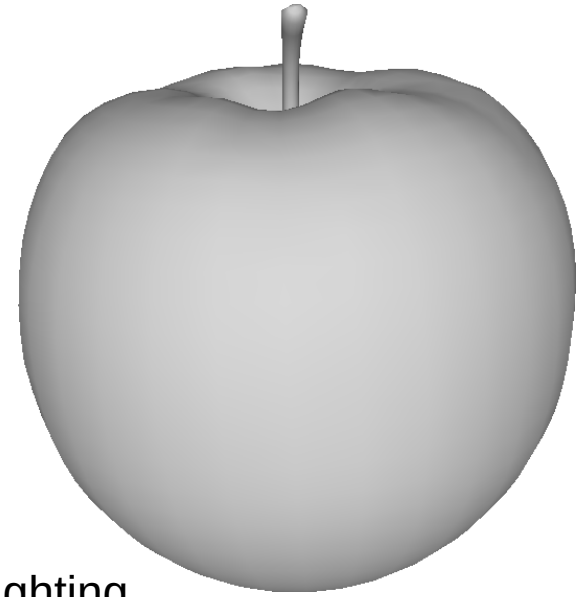
Original 3D Model



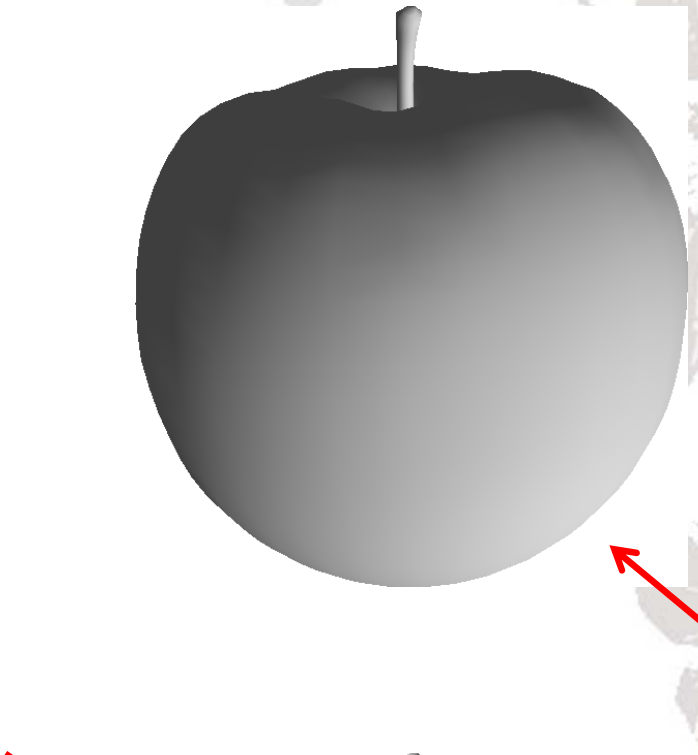
Without Lighting

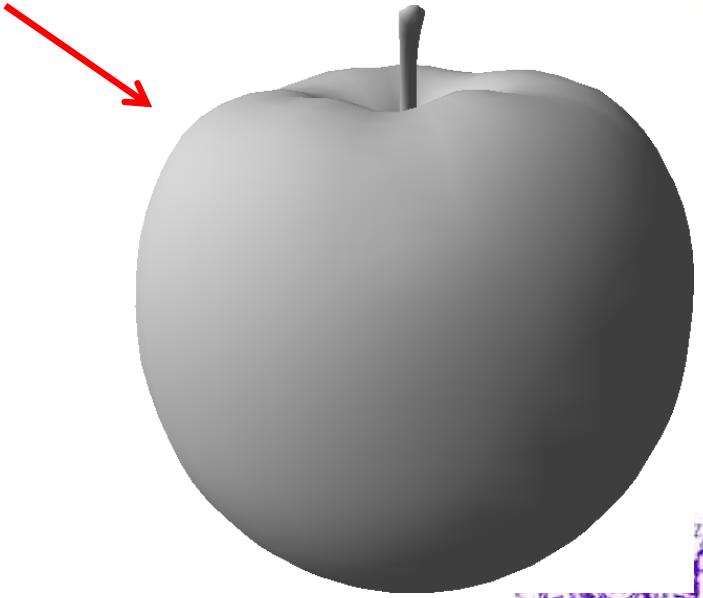


With Lighting



Changing light source position





Requirement

- You are required to write a program that can accept 3D test models as in assignment #1 and #2
- The models should be rendered with provided light sources
- Multiple light sources (at least 2) are required and can be turned on or off individually
- Each light source can be either directional light, positional light, or spotlight

Requirement

- **Viewing position can be altered to see the lighting result from different viewing direction**
- **Light source position should be able to change manually**
- **Vertex lighting, not per pixel lighting, is required. That is, all the lighting calculations should be implemented in vertex shader.**

Requirement

- Run time modification to the light sources attributes and material attributes
- Smooth shading not flat shading
- Use keyboard or mouse to control the parameters of lights sources and objects
- Display help file, e.g., pressing key ‘h’, for how to control the actions of your program (display on console window)

Input Model Format

- **Wavefront 3D Graphics model description file with extension .obj**
- **Models without vertex normal**
  - **The input model contains no vertex normal information**
  - **Generate the vertex normal by yourself**
- **Models with vertex normal**
  - **The input model contains not only the vertex position information but also the normal information for lighting calculation**

Hints

- Test models with vertex normals are provided for test.
- For those models without vertex normal provided, the vertex normals can be generated by summing up the face normals of triangles that are incident to the vertex
  - Don’t forget to normalize the vertex normal after summation

Hints

- Normal transformation is required to derive correct lighting result
- Normalization to the normals is also required to derive correct lighting result
- Don’t implement per pixel lighting in this assignment. It will be introduced as another assignment (texture bump mapping)

Due Date

- Two weeks after announcement. Should be 5/10.
- Submit your assignment, including source codes, executable binary on PC, and documents, to course webpage at NTHU iLMS system.
- Contact with TA if you don’t know how to submit your work.
- Late submission is allowed with less score
- No score if you don’t submit you assignment
- If you copy from others, your score will be down-graded or become zero.

Q&A