Computer Graphics

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ICL/ITRI

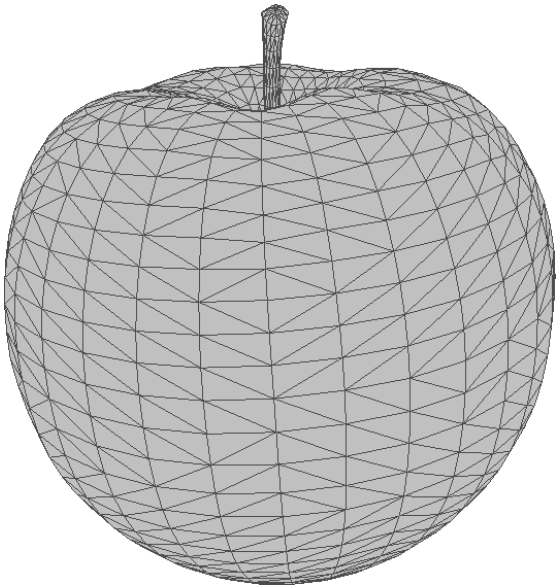
Assignment #2

Per Vertex Lighting

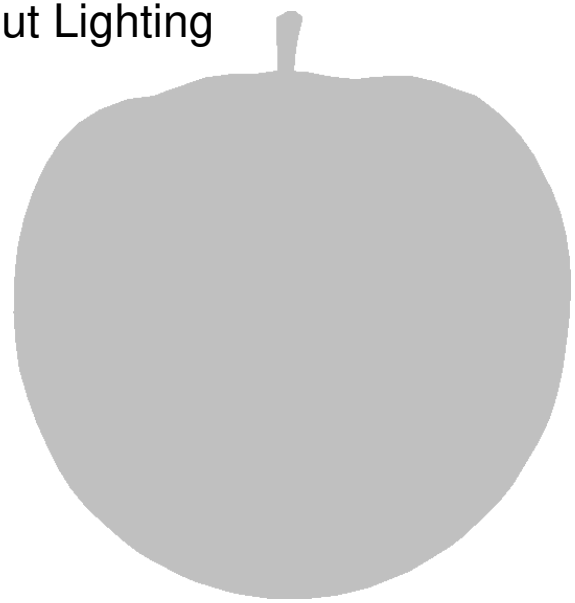
Per Pixel Lighting

Lighting 3D Models

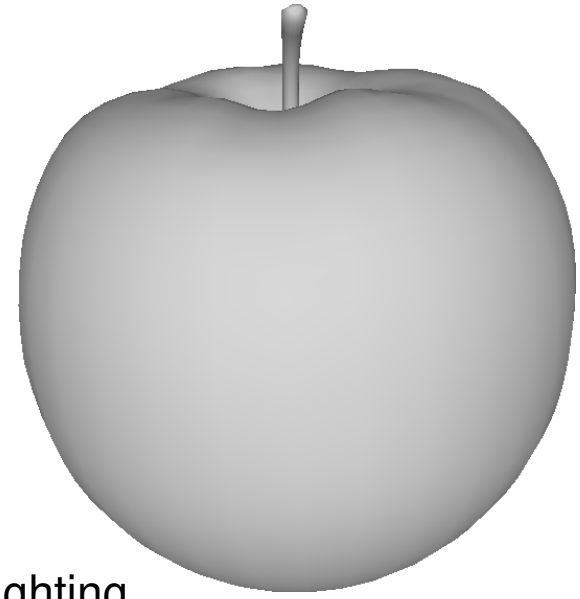
Original 3D Model



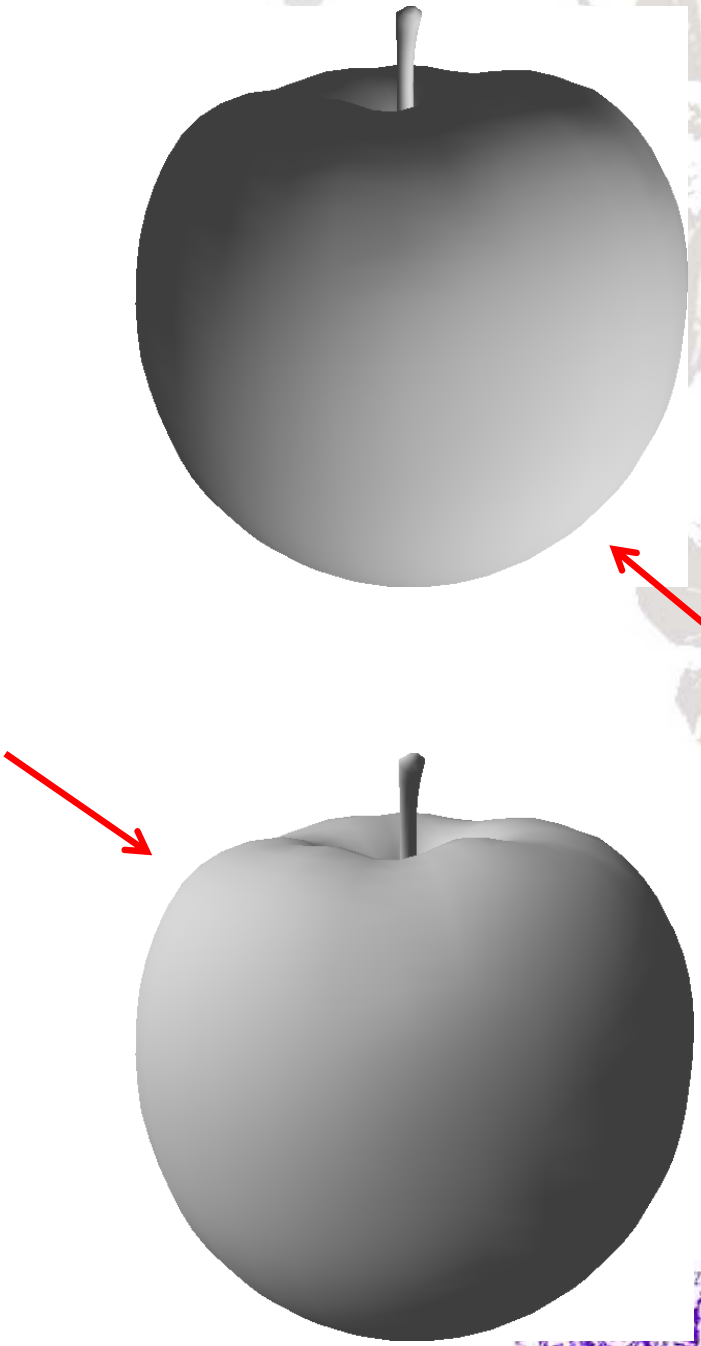
Without Lighting



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 render the 3D models with smooth shading
- The models should be rendered with given light sources
- Three light sources, a directional light, a positional light, and a spotlight are required and can be turned on or off individually

Requirement

- Viewing position can be altered to see the lighting result from different viewing direction
- Light source position should be able to change manually
  - E.g., rotating around the 3D model
- Vertex lighting is required
  - All the lighting calculations are performed in vertex shader.
- Per pixel lighting is also required
  - All the lighting calculations are preformed in fragment shader.

Requirement

- Use keyboard and mouse to control the objects transformation as implemented in assignment #1
- Use some keys and/or mouse to control lights sources such as on/off and movement
- Use a key to switch between vertex lighting and per-pixel lighting
- 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

- Normal transformation is necessary to derive correct lighting result
- Normalization to the normals is also necessary to obtain correct lighting result
- Per pixel lighting can be achieved by passing the transformed vertex normals to rasterizer for generating per-pixel normals and then do the lighting calculations in fragment shader
  - Replace the vertex colors in assignment #1 by vertex normals

Hints

- Validation 3D models with vertex normals are provided for verifying your design during program development.
- Test 3D models will be used to test your codes during evaluation by TAs

Due Date

- Two weeks after announcement (should be 5/23)
- Late submission is allowed with less score
- No score if you did not submit you assignment
- Plagiary is strictly forbidden
  - If you copy from others, your score will become zero
  - The score to the one who provide the original copy will also be downgraded

Submission Guide

- Please submit to the course webpage at NTHU iLMS system
  - *Notice: E-mail submission will not be accepted*
- Submission should include
  - Source codes (including solution and project files)
  - Executable binary (can be run on PC/windows)
  - Documentation (explain how you did it and how to operate it)
  - *Notice: please do not submit any 3D models to save the disk space*
- Contact with TAs if you have problem in submission

Q&A