

Interactive 3D Illumination

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12/14/2015

Course: *cs459*

Final Project

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I. Introduction

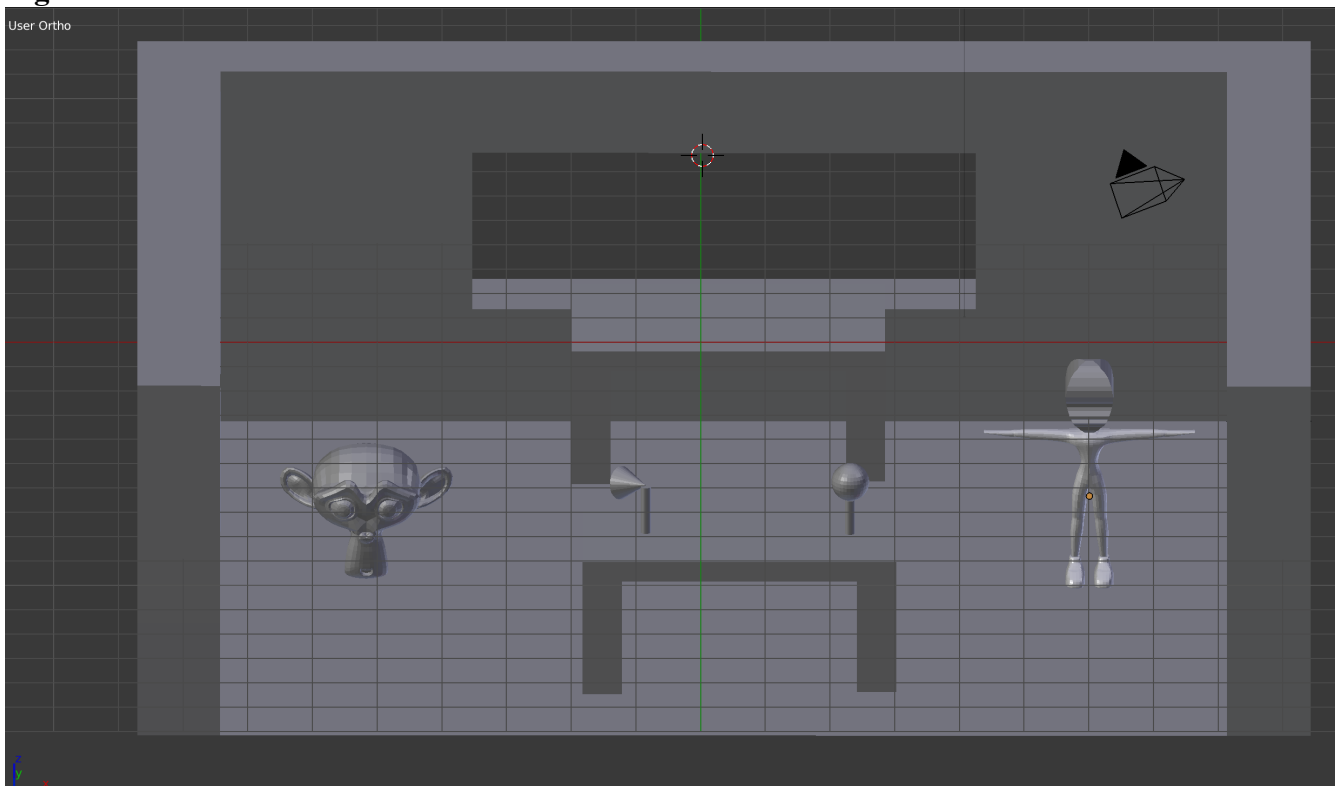
This manual serves as a brief description of our final project in cs459 entitled Interactive 3D Illumination. The goal is to facilitate general understanding of the project's main ideas, design and implementation. We provide an overview of the scene description and lighting. Details on how to initiate transformations, change surface properties of objects and lighting sources are enumerated in the source file *poly_interactive.cpp*. For brevity we leave each section as bulleted highlights.

II. Scene Description

1. Overview

- a. 3D Animation Software: *Blender*
- b. File Formats: *RAW, OFF*
- c. Blender Add-On: *Import-Export raw mesh (.raw)*
- d. # of Mesh Triangles: *2nd line*
- a. Raw Export: *As Triangle mesh*

Figure 1. Scene in Blender



2. Brother Blender

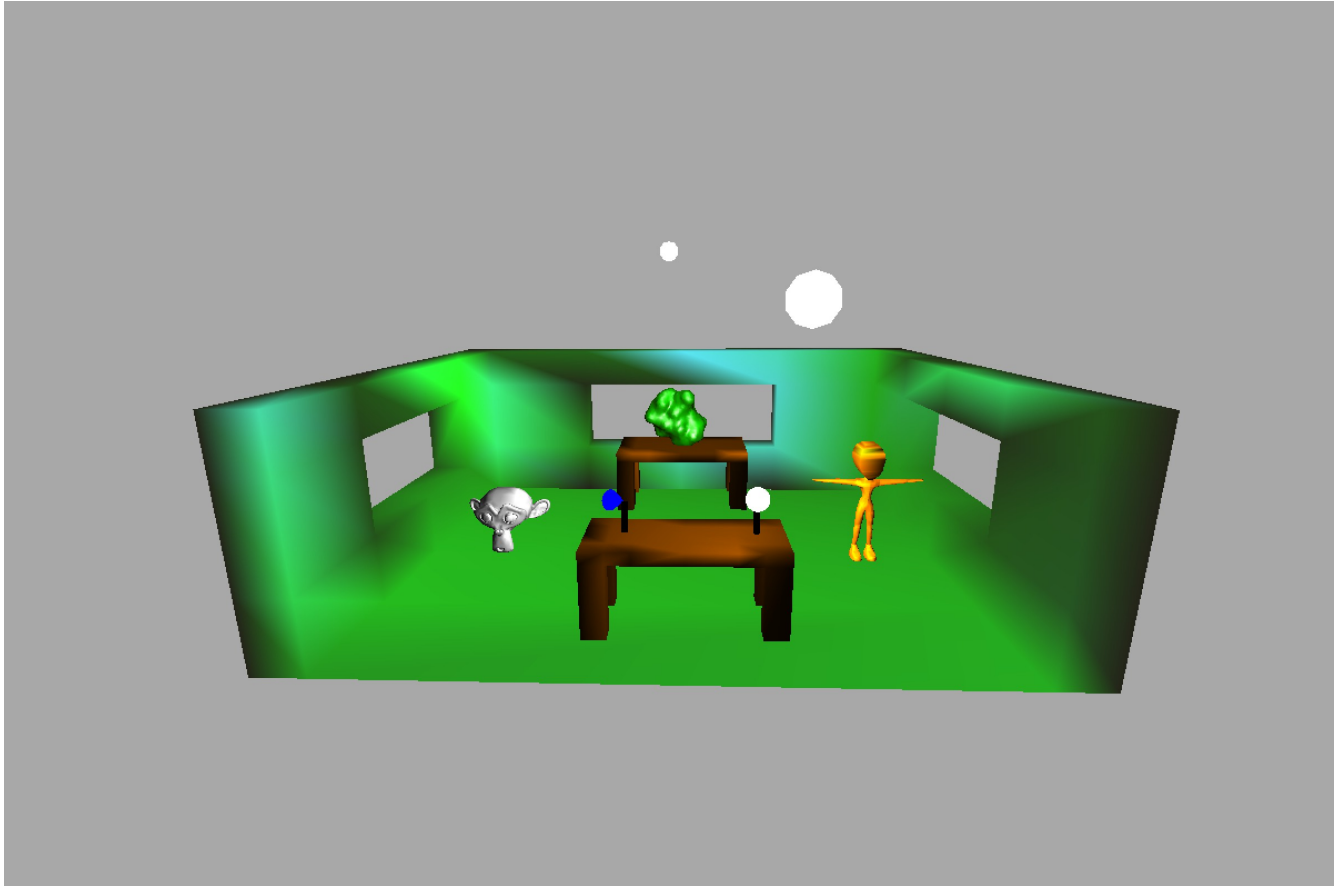
- a. Subdivision Surface Algorithm: *Catmull-Clark*
- b. Skin Color: *Black, White*

3. Blender Monkey
 - a. Model: *Blender default mesh*
 - b. Skin Color: *White, Red*
4. Tables
 - a. Model: *Manual, using quads*
 - b. Type: *Wood*
5. Lamps
 - a. Model: *Cylinders, cone and sphere*
 - b. Color: *Brown, blue, white*
6. Walls & Windows
 - a. Model: *Manual, using quads*
 - b. Surface types: *Stucco, dry wall, brick (via colors)*
7. Sample Mesh
 - a. Model: *From class (project 3)*
 - b. File format: *OFF*
 - c. Surface Types: *Metal, glass, fabric (via colors)*

III. Lighting

1. Spotlight Lamp
 - a. Light Direction: *Blender monkey*
 - b. Interactivity: *ON/FF*
 - c. Color: *Blue*
 - d. Light Color: *White*
 - e. Movement: *Moves with scene*
2. Desk Lamp
 - a. Target: *Non-directional*
 - b. Color: *White*
 - c. Light Color: *White*
 - d. Interactivity: *ON/OFF*
 - e. Movement: *Moves with scene*
3. Front Light
 - a. Default Position: *40 units in front*
 - b. Color: *White, Turquoise*
 - c. Movement: *Left mouse drag*
 - d. Light Direction: *Non-directional*
4. Upper Directional Light
 - a. Default Position: *20 units above scene*
 - b. Color: *White, Orange*
 - c. Movement: *Left mouse drag*
 - d. Light Direction: *Down*

Figure 2. Scene Rendered in OpenGL



IV. Implementation Details

1. Object meshes stored in different files
 - a. Facilitates individual color
2. Polygon and vertex normals computed during mesh read
 - a. Supports both Smooth (Gouraud) and flat shading
3. Geometric transformations along all 3 axes
4. Lamp positions are transformed with the scene
5. Upper and front lights are placed globally

V. Conclusion

We have created a room scene with tables, lamps, walls, windows, a sample mesh blob and a monkey head. There are four light sources in total. Two stationary lights on the front table, a globally positioned upper light and a globally position front light. We also have a video demo ready.