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CS-330-15022-M01

Comp Graphic and Visualization
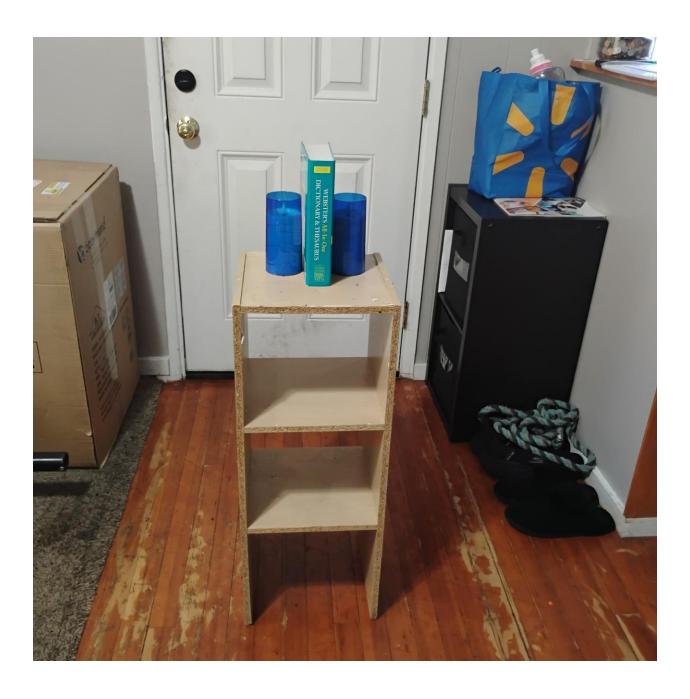
2-2 Assignment 3D Shape Transformation

Professor: Thomas Gerlach

Scene Proposal: CS-330: Computer Graphics and Visualization Date:

For this 3D scene proposal, I selected a photograph I took of a small table containing two blue candles and a stack of books. This compact and well-balanced tabletop arrangement is ideal for 3D modeling because it includes basic geometric forms and a grounded perspective. The setting also features consistent lighting and clear object outlines, making it well suited for OpenGL rendering, lighting application, and virtual camera navigation. I have taken additional reference photos to help reconstruct spatial relationships and object proportions from different viewpoints.

Objects to Be Replicated in 3D

The scene will include three key object groups: the tabletop itself, two standing blue candles, and a small book. These objects were selected because they each contain identifiable geometry, involve multiple basic 3D shapes, and allow me to demonstrate various OpenGL techniques. The **book** will serve as the composite object made of more than one primitive shape, satisfying the rubric criteria. The table provides grounding and context for the scene, while the verticality of the candles adds height variation and depth.

Basic 3D Shape Breakdown

Each element of the scene can be constructed from the following basic primitives:

- **Table**: Modeled using *boxes* for the tabletop and legs. A large *plane* will be used to simulate the surface/floor underneath.
- **Candles**: Each candle will use a *tapered cylinder* for the wax body and a *cylinder* or *torus* for the base holder.
- **Book** (Composite object): A box will represent the book, and a thin *plane* can optionally be added to simulate the front cover or open pages.

This composition uses at least four different 3D shape types: box, cylinder, tapered cylinder, and plane — ensuring both shape variety and modeling feasibility.

Justification and Scope

This scene is manageable in scope but rich enough to demonstrate 3D modeling and rendering fundamentals. It allows the application of OpenGL features such as vertex construction, transformation matrices, camera perspective, ambient/diffuse lighting, and texture application. I will model and assemble each object in C++, construct the scene with spatial precision, and use a virtual camera to match the photo's viewpoint. The balance of realism and simplicity in the scene makes it an exciting and achievable final project.

References

Placeholder image citation:

Alexander, K. (2025). *Tabletop photo: candles and book*. Personal collection.