3D Campus Event Hall Visualizer - Neha Kolambe (CSCI-5229)

I will create a project that allows the user to design and arrange a realistic 3D campus event hall. The user will be able to place and organize objects such as chairs, tables, podiums, and projector screens inside a textured and well-lit 3D environment. The project will focus on rendering detailed objects with lighting, materials, and smooth interactive controls. The goal is to simulate the setup process of an event or conference hall while demonstrating concepts such as 3D modeling, lighting, shading, and user interaction.

I will create the hall and furniture models in code by combining 3D primitives into more complex shapes and applying textures to simulate materials like wood, fabric, and metal. The lighting will include ambient, diffuse, and spotlight components to represent various ceiling lights and stage illumination modes.

The program will allow users to move the camera around the hall, select objects with the mouse, and move or rotate them within the 3D scene. It will also include a first-person walkthrough mode with collision detection to prevent the camera from passing through objects or walls, creating a realistic navigation experience. In addition, I will implement mesh-to-mesh collision so that placed objects such as chairs and tables cannot intersect or overlap with each other. I will also allow the user to view the scene from different preset angles such as the door view, stage view, or a bird's eye view for better visualization of the layout. A scene graph or similar data structure will be used to manage object placement, transformations, and rendering efficiently. Implementing accurate object selection, manipulation, and collision handling in 3D space will be among the most challenging parts of the project.

By the progress report, I plan to have the hall modeled, lighting and camera movement implemented, and one or two furniture types that can be placed and moved. After that, I will add more furniture, rotation controls, and improve lighting and material effects. By the project review, I expect to have a functional system that allows full layout creation, object manipulation, and immersive walkthrough capability.

Stretch goals:

1. Implement a save/load feature for layouts using JSON or XML;
2. Add snap-to-grid alignment for arranging chairs and tables precisely;
3. Add decorative or functional props like banners, plants, and AV equipment;

Super stretch goal:
Add GPU-based shadow mapping or reflection mapping to enhance realism and demonstrate advanced shader techniques.