**CS 319 7-1 Submit Project Two**

Caleb Leavell

caleb.leavell@snhu.edu

Southern New Hampshire University

**Development Choices for a 3D Garage Scene**

Creating a 3D scene involves careful consideration of both the aesthetic and functional aspects of the environment. In this project, I developed a 3D garage scene, incorporating various objects, lighting, and camera controls to achieve a visually appealing and interactive environment. This paper will justify the development choices made for the scene, explain how users can navigate it, and describe the custom functions employed to maintain a modular and organized code structure.

**Object Selection and Scene Composition**

The objects chosen for the 3D garage scene were selected to convey a realistic and practical garage environment. These objects include a workbench, tools, a car, shelves, and storage boxes. Each of these elements contributes to the authenticity of the scene, creating an atmosphere that is both familiar and detailed. The placement of these objects was carefully planned to balance the scene visually while allowing enough space for user navigation. The choice of a garage as the setting was deliberate, as it provides a relatable and functional space that users can easily understand and explore.

Additionally, the lighting design was a critical aspect of the scene's development. The decision to introduce a light source emanating from a window was motivated by the need to create natural and realistic lighting conditions. This light source enhances the depth and realism of the scene by casting shadows and illuminating objects in a way that mimics real-world environments. The inclusion of ambient, diffuse, and specular lighting techniques further enhances the visual appeal, allowing for a nuanced depiction of materials and surfaces.

**User Navigation and Virtual Camera Control**

User navigation within the 3D garage scene was implemented to ensure an intuitive and immersive experience. The navigation system allows users to move through the scene using standard input devices such as a keyboard and mouse. The keyboard controls movement in the forward, backward, left, and right directions, while the mouse controls the camera's orientation, enabling users to look around the scene freely.

To control the virtual camera, I implemented a first-person camera system, where the camera is positioned at the user's eye level. This setup provides a natural perspective, making the user feel as though they are physically present in the garage. The camera control was designed to be responsive and smooth, with sensitivity settings that can be adjusted based on user preference. By allowing users to navigate and view the scene from different angles, the project achieves a higher level of interactivity and engagement.

**Custom Functions and Code Modularity**

To maintain a clean and organized codebase, I developed several custom functions that promote modularity and reusability. One such function is the loadObject() function, which is responsible for loading 3D models into the scene. This function abstracts the process of importing models, allowing for easy addition of new objects without duplicating code. By passing parameters such as file path, position, and scale to the function, I can efficiently manage multiple objects within the scene.

Another custom function is the setupLighting() function, which configures the different lighting components in the scene. This function handles the initialization of ambient, diffuse, and specular lighting, as well as the positioning of light sources. By centralizing the lighting setup in a single function, I can easily modify the lighting conditions without having to search through the entire codebase.

Finally, the updateCamera() function plays a crucial role in managing the camera's movement and orientation. This function updates the camera's position and rotation based on user input, ensuring that the navigation experience remains smooth and responsive. The modularity of this function allows for easy adjustments to the camera's behavior, such as altering the movement speed or sensitivity.

**Conclusion**

In conclusion, the development of the 3D garage scene required careful consideration of object selection, lighting, user navigation, and code structure. The choices made throughout the project were aimed at creating a realistic and immersive environment that users can explore intuitively. By employing custom functions and a modular approach to coding, I was able to maintain an organized and flexible codebase, ensuring the project's success and future expandability.