Design Decisions Reflection

The development choices for my 3D scene were carefully made to replicate a specific beer marketing photo that showcases an outdoor setting with a beer glass, beer bottle, lemons, and various associated tools and snacks. The primary motivation behind selecting these objects was to create a visually appealing and realistic scene that captures the essence of summer refreshment and leisure, as depicted in the reference photo. The beer glass and bottle were central to the scene, as they are the focal points of the marketing photo. To achieve a realistic look, the beer glass and bottle were rendered with transparency to simulate the appearance of glass. This required careful programming to handle the transparency and blending of textures for the beer liquid inside the glass. The lemons were chosen to add a fresh and summery feel to the scene, enhancing the overall visual appeal. Whole lemons and slices were rendered using sphere and cylinder meshes, respectively. The lemon slices were carefully positioned to avoid intersections and were rotated to lay flat on the plate as well as vertically attached to the beer glass, contributing to the scene's realism.

The plate served as a base for the lemon slices, adding to the overall composition of the scene. It was scaled to fit proportionately and positioned in the foreground to create a balanced layout. The knife was included to add a practical element, suggesting the preparation of lemons, and was rendered using box and pyramid meshes for the handle and blade, respectively. Different materials and textures were applied to simulate wood and metal, further enhancing the realism. The scene was set on a wood textured box object, simulating a table, and a plane backdrop object with a photo of a sunny, summer field to add to the feel of being outside in the summertime.

User navigation in the 3D scene was set up to be intuitive and interactive, allowing users to explore the scene from different angles. The camera setup and controls were implemented using a combination of mouse and keyboard inputs. Mouse movement controls the camera rotation, enabling the user to look around the scene. This functionality was achieved through the `Mouse\_Position\_Callback` function, which processes mouse movements and updates the camera's orientation accordingly. The mouse scroll wheel adjusts the camera's movement speed, implemented through the `Mouse\_Scroll\_Wheel\_Callback` function that processes scroll events and updates the camera's speed. Keyboard controls were implemented to provide additional navigation capabilities. The W, A, S, and D keys move the camera forward, left, backward, and right, respectively, while the Q and E keys move the camera up and down. Additionally, the O and P keys switch between orthographic and perspective projections, providing different viewing experiences and enhancing the user's ability to explore the scene.

To ensure the code was modular and organized, several custom functions were developed and other existing functions were utilized extensively. These functions encapsulate specific tasks, making the code more maintainable and reusable. The existing `SetTransformations` function is a prime example, as it sets the transformation matrices for scaling, rotation, and translation. This function is called for each object to apply the necessary transformations without duplicating code, streamlining the rendering process. The `SetShaderMaterial` function sets the material properties in the shader, such as color, texture, and reflectivity. By defining materials separately, it becomes easy to adjust properties for different objects, enhancing the scene's visual consistency. Custom render functions, such as `RenderBeerGlass` and `RenderPlate`, encapsulate the drawing logic for each object, keeping the main render loop clean and focused. These functions facilitate debugging and extension, allowing new objects to be added to the scene with minimal disruption to existing code. The `SetupSceneLights` function configures the lighting setup for the scene, defining light sources in one place. This centralized approach allows for easy adjustments to the lighting, enhancing the scene's realism and ensuring consistent illumination across different objects. A specific custom variable, `brightnessModifier`, was introduced to allow easy adjustment of the scene's overall brightness. This variable is used to scale the intensity of the diffuse and specular components of each light source, providing a simple way to modify the lighting conditions without needing to change each light's individual properties.

In conclusion, the development choices for the 3D scene were driven by the goal of creating a realistic and visually appealing representation of the beer marketing photo. The careful selection of objects and the implementation of user navigation controls provide an intuitive and immersive experience. The use of custom functions ensures the code remains modular, organized, and easy to maintain, allowing for future enhancements and additions to the scene. The introduction of the `brightnessModifier` variable provides a flexible way to control the scene's lighting, ensuring the final scene successfully captures the essence of the reference photo and provides a compelling visual experience suitable for marketing purposes.