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CS 330-J7053

Module 7-1 – Final Project Design Decisions Document

**Justify development choices for your 3D scene:**

**Object Selection:**

* + I chose a pyramid for my main object. The choice of a pyramid is interesting as it's a simple geometric shape with distinct faces, making it suitable for demonstrating lighting effects.
  + The use of multiple point lights and a spotlight further enhances the visual appeal and allows for showcasing various lighting scenarios.

**Lighting and Shading:**

* + The scene includes directional lighting, point lights, and a spotlight. This choice allows for demonstrating different types of lighting and their impact on materials.
  + Specular and diffuse maps are utilized for realistic material representation, contributing to the overall visual quality.

**Camera Movement:**

* + The implementation of a camera class provides flexibility and ease of control. The camera allows users to navigate through the 3D scene using keyboard inputs for forward, backward, left, and right movements.
  + Mouse input controls the camera's orientation, enabling users to look around the scene freely.

**Modularity and Reusability:**

* + The use of shaders (lightingShader and lightPyramidShader) promotes modularity, separating concerns related to object rendering and lighting calculations.
  + A separate function (**loadTexture**) is employed for loading textures, promoting code organization and reusability.

**Explain how a user can navigate your 3D scene:**

**Keyboard Controls:**

* + W: Move the camera forward
  + A: Move the camera left
  + S: Move the camera backward
  + D: Move the camera right
  + Esc: Close the application

**Mouse Controls:**

* + Mouse movement controls the camera's orientation. Users can look around the scene by moving the mouse.
  + The first-person camera approach enhances the immersive experience.

**Mouse Scroll:**

* + The scroll wheel controls the zoom level of the camera.

**Explain the custom functions in your program:**

**processInput Function:**

* + Handles keyboard input for camera movement (W, A, S, D keys).
  + Promotes clean code by encapsulating input processing logic in a separate function.

**framebuffer\_size\_callback Function:**

* + Adjusts the viewport when the window is resized, ensuring the rendering remains consistent.
  + Enhances responsiveness to changes in the window size.

**mouse\_callback Function:**

* + Manages mouse movement to control the camera's orientation.
  + Improves code readability by encapsulating mouse input logic.

**scroll\_callback Function:**

* + Handles mouse scroll events to zoom in/out the camera.
  + Encapsulates scroll input logic, making the code more modular.

**loadTexture Function:**

* + Loads textures from image files and sets texture parameters.
  + Promotes code reuse by providing a modular way to handle texture loading.

In summary, the project reflects thoughtful choices in object selection, lighting configurations, and camera controls. The use of modular functions enhances code organization and reusability, contributing to a well-structured and interactive 3D scene.

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Reference

De Vries, J. (2020). *Learn OpenGL: Learn Modern OpenGL Graphics Programming in a Step-by-step Fashion.*

<https://learnopengl.com/Getting-started/OpenGL>.