7-1 Submit Your Project

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CS 330

Graphics And Visualizations

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

The image I chose for the project consisted of different 2D objects that were transformed into 3D scenes. The image consisted of a carton box represented, a coffee mug, and shoe polish. A cube, a cylinder, a pyramid, and a torus were the four 3D shapes used. The carton box was represented by a cube. A plane served as a representation of the floor and the wall. A cylindrical shape was used to represent the shoe polish. The coffee cup, which was the final object to be shown, was portrayed utilizing two alternative shapes. A cylinder was used to depict the top of the coffee cup, which was separated into three separate 3D objects. A sliced pyramid was used to symbolize the center section, and a cylinder was used to represent the bottom section. A torus was used to depict the coffee cup's topmost top. A cube served as a representation of the hazy green object on the left. The blue-black box's top was depicted as a pyramid.

Each of the objects in the photograph was best represented by the shapes that were chosen for them. Because they are all discernible as cuboids, I decided to use a cube to symbolize the carton box and the green object. Although the cuboid isn't one of the provided 3D shapes, it resembles a cube with a few small differences in side lengths. The plane is a good representation of the floor and the wall in 3D designs because they are both flat surfaces. The best 3D depiction of the shoe polish object is a sphere because of how similar it is to one. Only the coffee cup was challenging to depict in the image above. Because the coffee cup object consisted of a variety of 3D shapes, the instructions called for various primitive shapes. A torus was used to symbolize the coffee cup's top since it had a round ridge that resembled one. The top portion was also depicted as a cylinder in three dimensions since it appeared to be cylindrical in shape. The coffee cup's center was shaped like a cone with a cutout at the top. I selected a pyramid because there wasn't a cone in the 3D shapes that were offered. A cylinder shape was the most appropriate because the coffee cup's final portion appeared to be highly cylindrical.

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

The 3D scene modeled from the image uses different techniques to maneuver through it. I used the keyboard as the input device with different keys to move the object in different directions and zoom in and out. I created a function to facilitate the movements in all 4 directions. The WASD keys are used for the movement. The W key and the A key allow the user to move forward and backward. The S and D keys allow the user to move the object right and left. The WA keys achieve the zoom-in and out technique. Apart from the 4 keys, I also used two other keys to enable upward and downward movement. The Q and E are used for the upward and downward movement. The Q key moves the object upwards while the E moves the object downwards.

A user can also navigate through the 3D scene using the mouse controller as an input. The mouse movement is used to pitch and yaw the object at different angles. The object is thus able to be viewed from a different angle using camera movement. The mouse cursor changes the orientation of the camera to look upside, downside, left, or right at the 3D object. Mouse scroll is used to control the speed of the object movement which is the speed used by the camera to traverse around the object.

**Functions used to make the code modular**

Functions were used in the code to achieve modularity. Different functions were created to perform different actions on the 3D object. The UmouseScrollBack function was used to control the speed of the camera movement while UMousePositionCallback was used to get the position of the image and pitch and yaw it based on mouse movements. The UcreateTexture was used to define the texture of the 3D objects while the UShaderProgram was used to implement the lighting of the 3D objects. I used the Urender to render the object on the screen based on the given vertices and colors from the UCreateMesh functions. Those were some of the functions used in the project to achieve modularity and make them reusable.