**Module 5 Portfolio Project Milestone Update**

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In computer graphics, viewing functions are crucial in mapping objects from 3D world coordinates to 2D screen coordinates for rendering. These functions determine how objects are projected onto the screen, which affects their appearance and position. One of the most important viewing functions is perspective projection, which simulates how objects appear smaller as they move farther from the viewer. This projection is defined by a field of view angle, aspect ratio, and near and far clipping planes, enabling realistic depth perception.

**Orthographic Projection (Ortho)**

Orthographic projection is a parallel projection where objects are projected onto the image plane without any foreshortening or perspective. In the context of viewing functions, gl.ortho() is a function commonly used in WebGL and OpenGL to define an orthographic projection matrix. The gl.ortho(left, right, bottom, top, near, far) function defines a viewing volume where objects outside this volume are clipped.

**Parameters:**

left, right: The coordinates of the left and right vertical clipping planes.

bottom, top: The coordinates of the bottom and top horizontal clipping planes.

near, far: The distances to the near and far depth clipping planes.

Orthographic projection is often used in architectural and engineering applications, as well as for 2D games or GUI elements.

**LookAt Function**

The glLookAt() function (or similar functions) sets the camera's position, orientation, and target in the scene. This function generates a view matrix that transforms world coordinates into camera space.

**Parameters**

eye: The position of the camera in world coordinates.

center: The position the camera is looking at, also in world coordinates.

up: The direction considered 'up' in the scene, typically the positive y-axis.

The function constructs a view matrix that positions the camera at the eye position, pointing towards the center position, and is oriented according to the up vector. The resulting view matrix is often used with the projection matrix to transform vertices from world space to screen space. LookAt is crucial for setting up the camera's position and orientation in a scene, allowing the viewer to navigate and observe objects from different perspectives.

Perspective and orthographic projections are fundamental tools in computer graphics. Depending on the desired rendering outcome, each offers unique visual effects and applications.