

Project Definition

Fish Tank Demo

Principal of Computer Graphics

Creator

Mohamad Chamanmotlagh

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Summary

The project, titled "Fish Tank Demo," is a practical project of the computer graphics course aimed at simulating a realistic fish tank environment using OpenGL. The tank features dynamically animated fish, water, and textured objects such as rocks and plants, demonstrating core concepts such as transformations, lighting, and rendering. The implementation uses C++ alongside OpenGL 4.0, employing shaders for realistic effects.

Introduction

The purpose of this project is to create a scene of a small aquarium using OpenGL. The view consists of two main scenes, one from inside the tank, and the other from outside the tank. These scenes can be switched using a key instruction, and the description of these scenes are as follows.

Scene 1: The Aquarium on the Table

The first scene shows the outside view of the aquarium placed on a table. The environment is illuminated by a nearby lamp, which casts a light on the table and the surrounding space. The table has a textured wooden surface, and the lamp exhibits a metallic texture. This scene sets the stage for the transition into the fish tank. The camera starts from a static position, showcasing the overall arrangement, and then can be switched to the view inside the tank.

Key Features:

- **3D Objects:** The aquarium, table, and lamp, each modeled with unique polygonal structures and textures.
- **Lighting:** A combination of a point light from the lamp and ambient light from the environment, showing some shadows and reflections.
- **Camera Animation:** Motion of camera around the room, showing the environment and the fish tank.

Scene 2: Inside the Aquarium

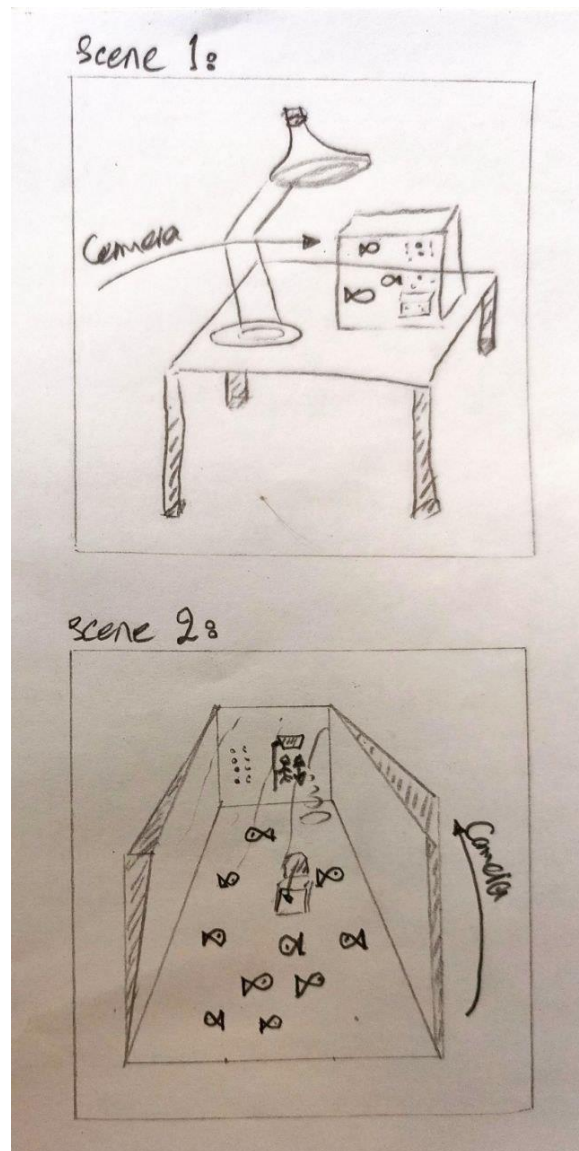
The second scene shows the inside of the aquarium. The camera transitions into the water, revealing the underwater environment. The sand floor serves as the base, scattered with stones, underwater plants, shells, and a dynamic chest that opens and closes periodically. Air bubbles rise from a pump in an oscillating motion, while a small diver animates by diving from a surface boat to the aquarium floor and back.

Live fish of various colors and sizes swim, with the simulated water currents. The camera moves between points of interest, pausing briefly to highlight the intricate details of the chest, the diver, and the bubbling pump.

Key Features:

- **3D Objects:** Fish, plants, shells, stones, the pump, and the diver, each modeled with unique polygonal structures and textures.
- **Animation:** Procedural and keyframe animations for fish swimming, the diver's motion, bubble oscillation, and the opening chest.
- **Particle System:** Air bubbles that are generated with dynamic motion.
- **Lighting:** Multiple light sources simulate underwater effects, including ambient lighting.
- **Camera Animation:** The camera flies through the aquarium, stopping at points of interest, using non-linear interpolation for smooth transitions.
- **Post-Processing:** A bloom effect enhances the light scattering underwater, adding realism to the scene.

Story





Appendix

A very nice example of this work can be found at:

<https://webglsamples.org/aquarium/aquarium.html>