American International University-Bangladesh (AIUB)

City and village view

COMPUTER GRAPHICS [N]

Group 4

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1. Introduction

The project we are working on is Village and City life. The goal was to show how village and city life works with animation, moving cars, a sea with moving ship on the sea and boat standing on village site, a rain mode with continues raining animation, key board controlling system to control all the animations, a beautiful moving clouds and sun, day and night mode as well. The scenario contains building, houses, roads, vehicles, sea, sky, birds, straw, tree, and windmill. Open Graphics Library is used to create different 2D object of the scenario.

2. Background

The project is developed using OpenGL. Open Graphics Library (OpenGL) is a cross-language (language independent), cross-platform (platform-independent) API for rendering 2D and 3D Vector Graphics (use of polygons to represent image). OpenGL API is designed mostly in hardware.

Design: This API is defined as a set of functions which may be called by the client program. Although functions are similar to those of **C** language but it is language independent.

Development: It is an evolving API and Khronos Group regularly releases its new version having some extended feature compare to previous one. GPU vendors may also provide some additional functionality in the form of extension.

Associated Libraries: The earliest version is released with a companion library called OpenGL utility library. But since OpenGL is quite a complex process. So, in order to make it easier other library such as OpenGL Utility Toolkit is added which is later superseded by free glut. Later included library were GLEE, GLEW, and gliding.

Implementation: Mesa 3D is an open-source implementation of OpenGL. It can do pure software rendering and it may also use hardware acceleration on BSD, Linux, and other platforms by taking advantage of Direct Rendering Infrastructure [1].

3. Objectives

Objectives are the goals what we must achieve through this project. The project has Six different objectives to achieve:

1. To implement all the knowledge all the knowledge what we have learned through the course.
2. To create a realistic beautiful village in city life view.
3. To apply animation for moving objects.
4. To include three different modes for the scenario:
    1. Day mode.
    2. Night mode.
    3. Rain mode.
5. To include keyboard controlling system.
6. To add music in the project.

4. Methodology

City and village view created using different 2D object such as lines, triangle, quads, and polygon. To create all these object different methods of (Open Graphic Library) OpenGL with C++ Programming language is used. OpenGL is a cross-language, cross-platform application programming interface (API) for rendering 2D and 3D vector graphics. The project is divided into three different sections considering the working sequence.

Section 1: Describes about the 2D City and village view,

Section 2: About Animation and

Section 3: Summarize about the different Modes.

4.1 2D City and Village View

To create city and village view, a road follows by a City and Village. The background of the scenario includes sky, clouds and sun. Road includes different vehicles and in sea there are different ships and boat. To create all those different shapes Lines, triangles, quads, polygons and circle are used.

- GL_TRIANGLES is used to create a triangle. A triangle is a primitive formed by 3 vertices. It is the 2D shape.
- GL_LINES is used to create lines. Vertices 0 and 1 are considered a line. If the user specifies a non-even number of vertices, then the extra vertex is ignored.
- GL_QUADS is used to create quads. A quad is a 4-vertex quadrilateral primitive. The four vertices are expected to be coplanar; failure to do so can lead to undefined results.
- GL_POLYGON is used to create polygons. A polygon is created by specifying a series of vertices.
- glColor3ub () is used to add color on different object. It takes 3 arguments: the red, green and blue.

4.2 Animation

Animation is added to moving objects which includes vehicles, cloud, rain, birds and ships. To create animation like effect glTranslatef() function is used. It has three parameters x, y, z, these Specify the *x*, *y*, and *z* coordinates of a translation vector. The object which needed to add animation, it should be inside glPushMatrix() and glPopMatrix().

4.3 Modes

The scenario has three different modes: day, night, rain. To switch different mode key controlling system is used.

- Day mode: To switch to day mode‘d’ key is used.
- Night mode: To switch to night mode ‘n’ key is used.
- Rain Mode: to start rain ‘r’ key is used. To stop rain ‘e’ key button is used.
- s for sound and t for off

5. Significant of the Project

The project was about creating different object by coding so it also helps to develop out imagination. To develop the project a group is formed. So, through this project we have learned about group work as well. The project helps us to enhance some advance knowledge about OpenGL. It is a cross-platform API, it can be used on various platforms such as- windows, Mac, and some handheld devices. It is more extensible as new hardware features are exposed quickly. It has a stable interface until some bigger changes are made. So, some advance knowledge on OpenGL will be helpful in future career.

6. Conclusion

The marine drive scenario is created with OpenGL in code blocks an open-source Integrated Development Environment (IDE). This is a beginner level project with 2d objects only. There are lots of ways to make the scenario more accurate and realistic. For future works, the rain mode cane be made more realistic using better animation effects. The houses cars and other object can be made more realistic by using 3D effect or projection. Overall, considering a beginner level project, it fulfilled all the goals and objectives. The group contains six members. All the group members are helpful and co-operative enough.

7. References

[1] Getting started with OpenGL <https://www.geeksforgeeks.org>

8. Screenshot of the system

Some screenshots of the scenario with different modes have attached.

8.1 Day mode

8.2 Night Mode

8.3 Rain Mode