

Arsi University
Department of Computer Science

Computer Graphics
Assignment

Instructor: Kedir E.

Maximum Mark = 20%

For this assignment you are required to develop either of the following listed projects. Most of them require a good understanding of animation, texture mapping and lighting. You can make a group 5 so that you can develop a habit of working as a team. For the first, second and fourth project, there are some prepared sample of codes that can be used as a good skeleton for your successful completion of the assignment. For some of the projects, there are executable applications. So please have a look at those executables when you feel that you are going in the wrong way.

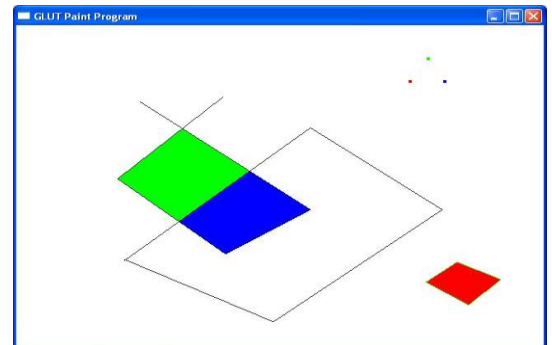
1. Rendering a house. → Group-1

For this project, you are required to model the internal part of a home with different house wares. Possible stuffs can be a table with some foods, a light bulb, and a photo frame. The photo frame should be hanging on one of the walls and it should keep swinging at some interval of time.



2. OpenGL paint program. ==> Group-2

You are required to write a C++/OpenGL 'paint' program. Users should be able to use the program to draw simple 2-D images containing points, lines and polygons in different colors. The interface to the program should be based on keyboard and mouse interactions. A sample screenshot of the program is shown below



Instructions

You should implement the following extra features:

- A feature to allow the user to choose a current drawing colour. In the skeleton code all drawing is done in black. You should modify the code so that if the keys 'r', 'g', 'b' or 'k' are pressed, the

- current drawing colour will be set to red, green, blue and black respectively. All subsequent drawing should then be performed in this new colour.
- *A polygon drawing feature.* You should add a facility for the program to draw simple outline polygons. The user should press 'y' to start drawing a polygon, and then click the left mouse button to specify the first $n-1$ polygon vertices (for a polygon with n vertices). The n^{th} vertex should be specified by clicking the right mouse button, at which point the entire polygon should be drawn. The polygon should not be filled.
 - *A flood-fill feature.* You should add a facility for filling enclosed areas. When the user presses the 'f' key the program should execute the *flood-fill* algorithm using the current mouse location as a *seed point*. The *interior colour* for the algorithm should be the current colour of the seed point. The fill colour should be the current drawing colour.

These are the basic requirements of the assignment. In addition, you may earn extra bonus marks by implementing any extra features that you think might be useful in the paint program.

3. Rendering a car. → Group-3

For this project you are required to write a C++/OpenGL program that renders a car. The following are the basic requirements for this project.

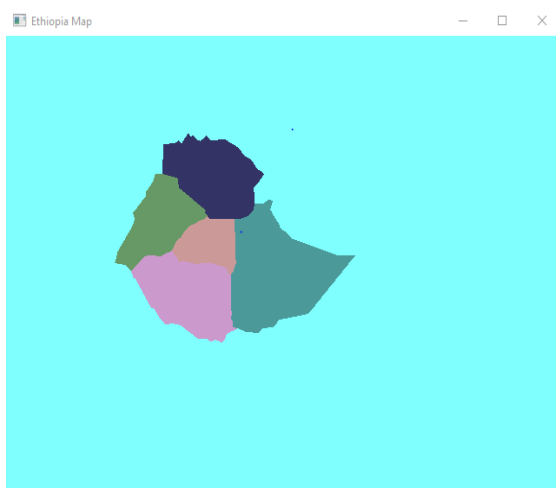
- A good model of the car is required.
- There should be four possible movements and the movement of the car interface to the program should be based on keyboard. You can use the arrow keys.
- A good model of the environment is required. A side way traffic light, buildings, etc...
- (Optional) you may add fogging for your program to have a better depth perception.

For this project, a helicopter model can be a good start up.

4. Meteorology Service. → Group-4

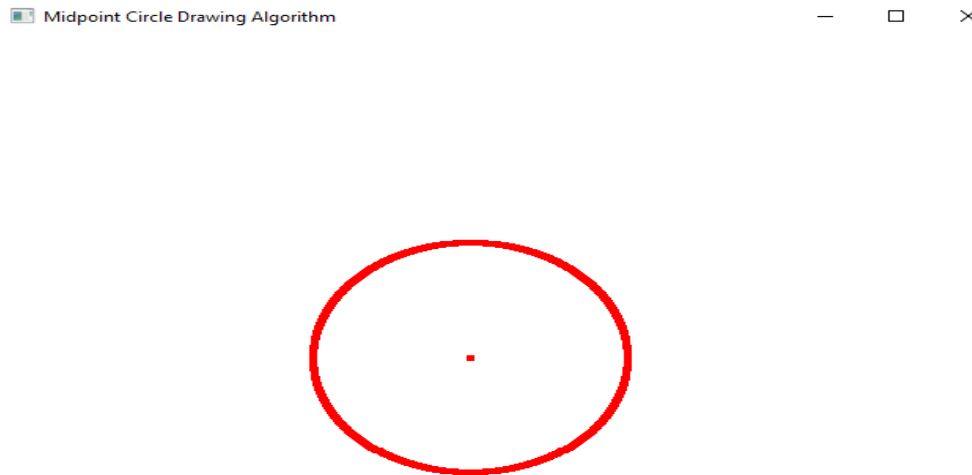
In this project you are required to develop a meteorology service for different regions of Ethiopia. The basic requirements for this project are as follows

- The overall map of Ethiopia with appropriate regions should be displayed and each should be colored differently.
- There is a data file that stores the climate of each region. The project should be able to read data from the file.
- The four possible climate types, sunny, semi sunny, cloudy and rainy, should be stored on the data file.
- At this point I can't tell you what the data file should look like but, you can design it on your own way. One possible design can be storing the overall regions (boundaries) on a single data file and storing the climate details of each region on another data file.



output

5. Midpoint circle drawing like the following output → Group-5



Written Report

You should write a short report explaining your program. The report should be 1-3 pages long and should describe:

- What parts of the requirements you successfully completed and what parts (if any) you did not complete.
- How you have used the features of OpenGL to meet the requirements of the assignment.
- What you have done to test your code.
- Any extra features you have added beyond the basic requirements of the assignment, together with instructions on how to use them.

When you have finished, you should submit the following files:

- All source code files
- The “.dev” project file
- Your written report (in a Word file)

You should combine all of the above files into a single ZIP (compressed) file, and then submit the ZIP file.

Useful OpenGL programs

You will be provided with useful Glut programs.

Important Academic Dishonesty

Any cheating or collaboration will be punished according to the measures outlined for this course. However, you are permitted to work in groups for this assignment (maximum size 7).

Good Luck