MAEG5710 Fundamentals of Computer-Aided Design
Project Description

Write a computer program using C++ (MFC recommended) and OpenGL for visualizing 3D objects represented as sets of triangles. The program should have the following features:

1. Read in text files containing triangle data in STL format. (https://en.wikipedia.org/wiki/STL_(file_format))
2. Detect the size of the object read in from file.
3. Display the object at the center of the display window right after read in from file so that the whole object appears within the window (i.e. a zoom extend operation).
4. Zoom in/out.
   - Move the viewer closer to the object, or change the view angle.
5. Pan left/right/up/down.
   - Move the viewer and the view target position with the same displacement.
6. Orbit camera around the displaying object.
   - Rotate the viewer around the view target point.
7. Wireframe display (i.e. display with lines and curves).
8. Shading display (i.e. display with light and material effects).

Your work has to be submitted through the course web page in two stages:

Stage 1 – Deadline 27 Sept 2024

Submit a basic framework of your program (i.e. project files) with menus options and dialogues. Actual implementation of the functions for the menu options and dialogues are not required.

Stage 2 – Deadline 15 Nov 2024

Submit a fully functioning project file and a brief report.
The brief report should include a description on how to use the program (i.e. use guide), and a description on the techniques used for implementing the required features.

Example STL Text file format (Triangle data)

```
facet normal 0.0000000e+000 0.0000000e+000 1.0000000e+000
  outer loop
     vertex 1.0000000e+000 1.0000000e+000 1.0000000e+000
     vertex 0.0000000e+000 1.0000000e+000 1.0000000e+000
     vertex 1.0000000e+000 0.0000000e+000 1.0000000e+000
  endloop
endfacet
facet normal 0.0000000e+000 0.0000000e+000 1.0000000e+000
  outer loop
     vertex 0.0000000e+000 1.0000000e+000 1.0000000e+000
     vertex 0.0000000e+000 0.0000000e+000 1.0000000e+000
     vertex 1.0000000e+000 0.0000000e+000 1.0000000e+000
  endloop
endfacet
......
......
......
```

Project Submission Format

1. Name your project strictly following the format as shown below,

   First letter of your name + Your student ID
   e.g. Name: Xxx Yyy Zzz , SID: 1155003235
   Project Name: XYZ1155003235
   There will be mark penalty if you do not follow this format.

2. Delete unnecessary files before you upload your file. Please refer to page 3 for details. If you delete the wrong files, your project can't be build. You have the responsibility to make sure your uploaded project can be built before the deadline.

3. Mark penalty will be given for late submission
   1Day late - 10% deduction
   2Days late - 25% deduction
   3Days late - 50% deduction
   No mark will be given if the submission is late for more than 3 days.

4. Remember to check whether your uploaded project works.

5. Remember to submit the report.

Marking Scheme

	Score
Phase 1 basic framework completed.	10
Read in STL file.	10
Display object at centre of display window after reading in model from file.	5
The whole object appears within the window right after reading in model from file.	10
All object lies within view volume when orbiting camera right after read in model from file.	5
Zoom function	5
Pan function	5
Camera orbit	5
Shading	15
Mouse input	5
Keyboard input	5
Report	20
Total	100

******** End ********