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CMPE 460 Project 3

In this project, an OpenGL rendering program is implemented. Basically, in this program, user can design and render a bezier patch constituted by 16 control points in an interactive way.

1- Compilation

There is only one code file, namely *bezier_surface.cpp.* User can compile this file with following commands.

1.1- For Ubuntu:

- *sudo apt-get install mesa-common-dev libgl1-mesa-dev libglu1-mesa-dev freeglut3-dev*
- *g++ bezier.cpp -lGL -lglut*

1.2- For MacOS:

- *g++ bezier_surface.cpp -framework OpenGL -framework GLUT -Wno-deprecated*

2- Running Program

Running the program is quite easy. Running the following command is enough.
- *./a.out*

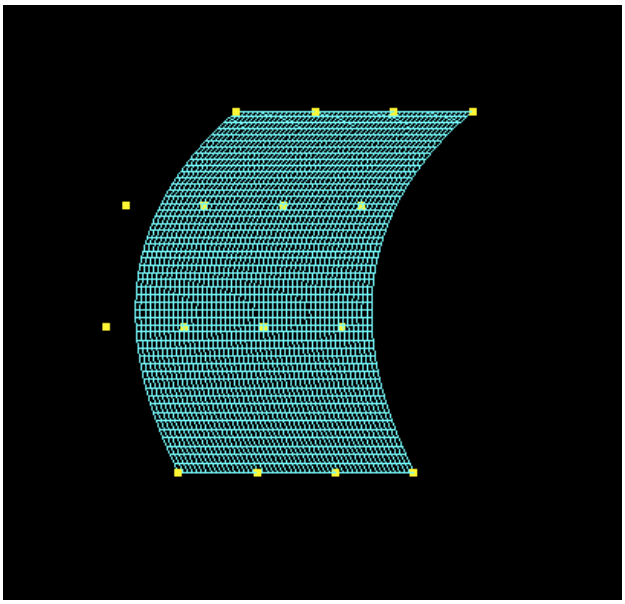
3- Documentation

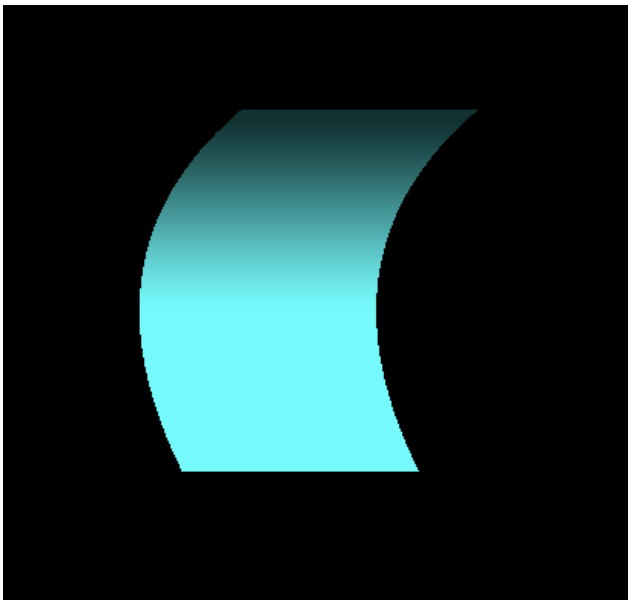
3.1- Initial Bezier Patch

When the program is started, a predefined bezier patch is rendered. The control points of this initial patch are as follows.

1st Curve: {-1.5, -1.5, 1.0}, {-0.5, -1.5, 1.0}, {0.5, -1.5, 1.0}, {1.5, -1.5, 1.0}
2nd Curve: {-1.5, -0.5, 0.0}, {-0.5, -0.5, 0.0}, {0.5, -0.5, 0.0}, {1.5, -0.5, 0.0}
3rd Curve: {-1.5, 0.5, 0.0}, {-0.5, 0.5, 0.0}, {0.5, 0.5, 0.0}, {1.5, 0.5, 0.0}
4th Curve: {-1.5, 1.5, 1.0}, {-0.5, 1.5, 1.0}, {0.5, 1.5, 1.0}, {1.5, 1.5, 1.0}

Editing Mode **Viewing Mode**

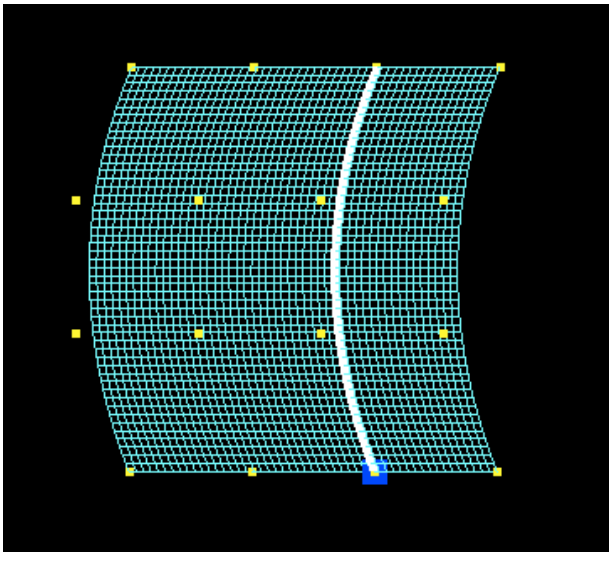


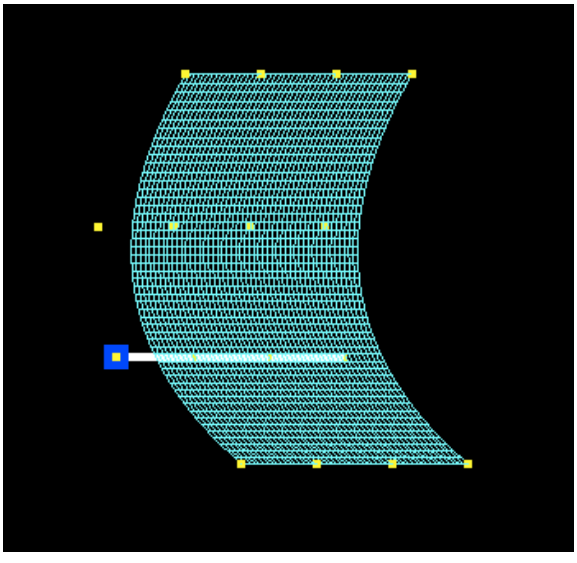


3.2- Editing Mode

User can enter the editing mode by pressing **E**. In this mode, each control point can be selected and modified using special keys.

User can select a curve with **WASD** buttons. Selected curve is highlighted as below.

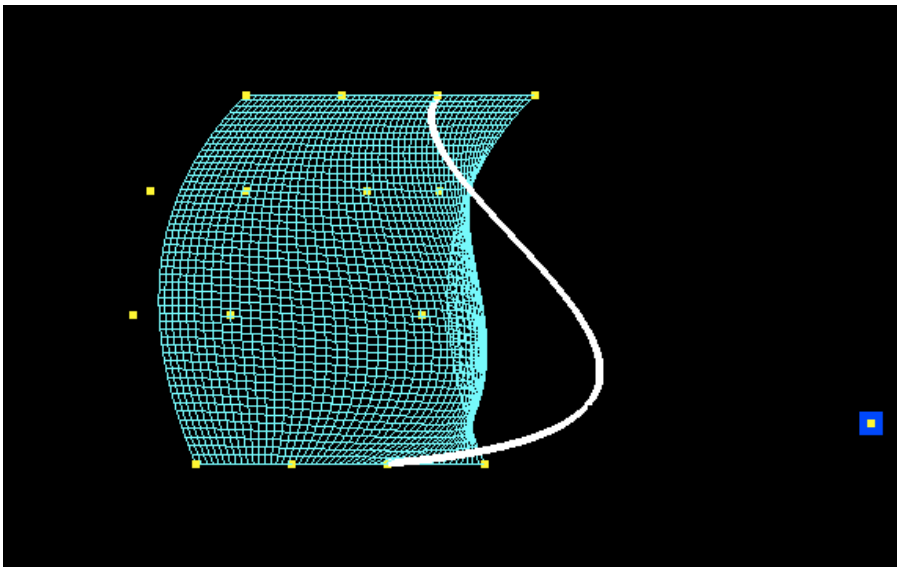


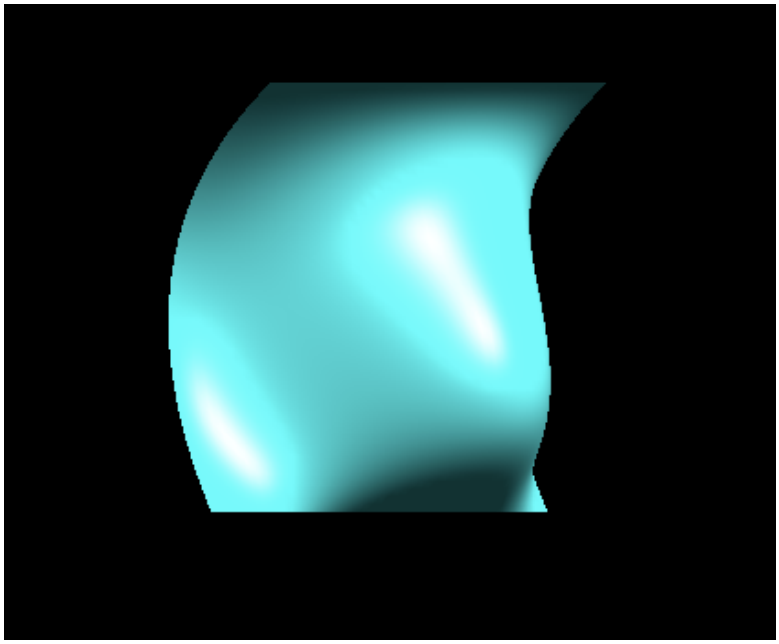


After a curve is selected, user can select a control points using **1,2,3,4** buttons. Control points that build the patch are highlighted with yellow color. Control point becomes blue when selected.

Selected control point can be moved using **arrow keys** and **F1, F2** buttons.

Left Arrow Key	**X-coordinate -= 0.25**
Right Arrow Key	**X-coordinate += 0.25**
Down Arrow Key	**Y-coordinate -= 0.25**
Up Arrow Key	**Y-coordinate += 0.25**
F1	**Z-coordinate -= 0.25**
F2	**Z-coordinate += 0.25**

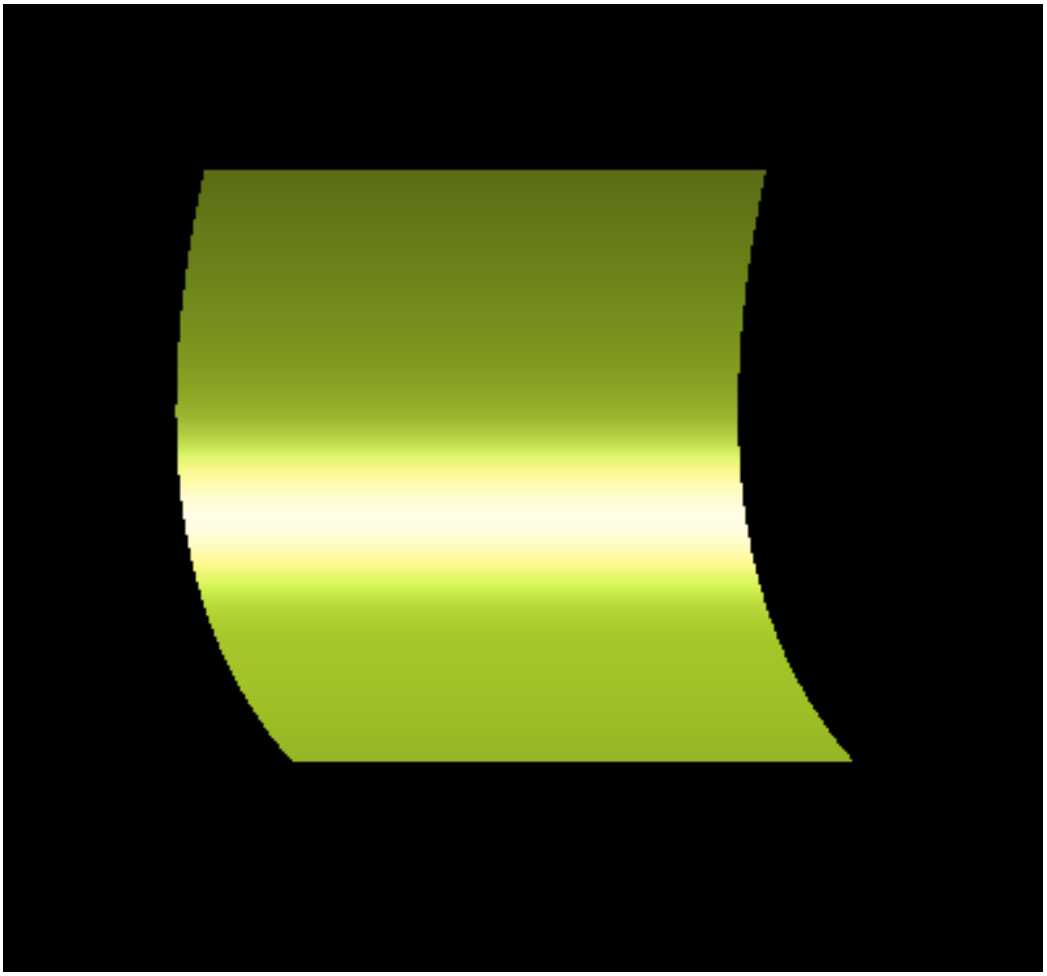




3.3- Changing Color

Initial surface color is **RGB = (0,1,1).** However, user can enter a surface color in RGB format after pressing **C.**

Example:
- Press **C**
- **Enter color in RGB format**
- 0.5 0.7 0.1



3.4- Changing Resolution

Changing the resolution is also very similar. In this case, user should press **R** and enter an integer value bigger than 1.

Example:

- Press **R**
- **Enter resolution as integer (1 is minimum)**
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