

Assignment 1

CMSC 427, Fall 2003

Due: 11:00am Thursday, September 25, 2003

This assignment involves using OpenGL programming API with the GLUT toolkit. The assignment web-page is at www.cs.umd.edu/class/fall2003/cmssc427/assg1/. There you can find details about using OpenGL and GLUT on various platforms, links to download OpenGL and GLUT on your PC or UNIX workstation, and Assignment 1 startup source code. Given the various possible platforms and their configurations as well as our limited resources we would not be able to help you install OpenGL and GLUT on your personal systems. Please make sure that your final program works on machines in one of the WAM labs in the AV Williams Bldg or the CSD Junkfood Lab (AVW 3457). Before submitting your assignment you should create a README file that gives details about which location your program works.

Compile and run the startup code after linking with OpenGL and GLUT. The sample program that we are giving you does the following:

- It opens up a GLUT window of size 640×480 .
- It displays a background image of a crater.
- It displays a red line in the center of the window that you can use as a starting point for your 2D stick figure.

(a) Use OpenGL primitives to draw a human stick figure with at least 5 lines and a rectangle for the head. Display the center of the two feet with a black pixel. (5)

(b) Implement the motion of the human figure to the left or to the right based on dragging the left or the right mouse button, respectively. If the mouse moves to the right with the left button pressed (or to the left with right button pressed) the figure should not move. The same functionality should also be implemented on the left and the right arrow keys. The figure should move by one pixel for one pixel of mouse movement and by 4 pixels for one keystroke (assuming motion is valid). When the figure exits the right end of the window, it should reappear from the left. You can assume that the polygon will always be convex and non-self-intersecting. Make sure that the 2D stick figure doesn't fall apart in this movement! (7)

(c) Read the foreground height map from the file `foreground.txt` in the following format:

$$\begin{array}{l} n \\ x_1 \quad y_1 \\ x_2 \quad y_2 \\ \vdots \\ x_n \quad y_n \end{array}$$

Draw a green polygon with the vertices (x_i, y_i) , $1 \leq i \leq n$. *Don't change the function `init()`*. You can use `glVertex2i()` command for sending the vertices to OpenGL. With the current settings in the function `init()` the x -coordinates of the green polygon are in the range $-320 \leq x_i \leq 320$ and they map to exactly the window width. Place the human figure in the center of the window above the green polygon such that the black pixel at the center of the human figure is on the upper edge of the polygon. Implement the left and the right movements of the figure such that the black pixel traces the upper edge of the polygon. The person should appear to move on the green polygon. (8)