I Basic information

Module Code: CPT205

Assessment 1 – 2D Modelling Project

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Degree Programme: Bachelor of Computer Science

II Design overview and features

I mainly used OpenGL's freeglut library to create this 2D animated birthday card. The card was designed to evoke a happy birthday celebration atmosphere by combining various graphic elements and animation features. The main content is the scene when you finally return home at night, your parents celebrate your birthday at home, and the greeting card is dedicated to all those who are wandering outside. Here is a list of the features and the technologies used to implement them:

1.Window Settings: A orthogonal projection is used to ensure that the graphics content is orthogonal to the new window size

2.Methods:I have written a lot of graphics production methods, so that it is more convenient to check and call.

3.Anti-aliasing: Use Multisampling and color mixing techniques to enable the anti-aliasing of lines and polygons, making the edges of the graphics smoother and more natural

4.Menu: I also enabled the menu function to control the switching of scenes from the second scene back to the first scene

5.Background elements: The background includes the house, lawn, sky, and other landscape elements. These are made using basic geometric shapes such as rectangles and polygons, spliced one by one, combined with appropriate colors to simulate natural elements such as grass, flowers, and the sky.Since the first scene is not directly facing the house from the first-person perspective, the roads, houses and eaves are all placed diagonally and need to be spliced with diagonally shaped quadrangles or triangles.I also changed the background color to make it more like a birthday card.

6.Sky:For the sky, clouds are composed of three circles, the moon is composed of two circles, a circle of the same color as the sky covers half of the other circle to form a crescent, and the stars are drawn in order to draw ten vertices to draw a five-pointed star.

7.Heart: The heart calculates the position of each vertex through the parametric equation of the heart, and controls its size by updating the scaling factor

8.Other Static decorative elements: Each of these elements is combined by basic elements such as circles and lines. For example, trees, flowers and characters are composed of various ovals, circles or rectangles, and each uses a corresponding color, including the color of candles and gift boxes. I also used different colors for several vertices at the same time to achieve a gradual effect

9.Dynamic objects: Birthday cards feature animated elements such as floating balloons and meteors. These animations are implemented using basic transformations in OpenGL, such as moving parts of the screen to give them a natural floating or falling effect. I also used random numbers to make meteors, which can be generated at random locations

10.Interactive elements: Character movements, control hand interactions, and opening gift boxes are all implemented using event handlers with keyboard and mouse input.

11.Text elements: The text is rendered using GLUT bitmap characters, which are integrated into different locations on the card to convey a celebratory message.

12.Screen switch: I set the global variable scene, use the if judgment, and call glutPostRedisplay() to draw the second scene

13.Overall picture: The double cache technology is used to eliminate flickering during rendering by swapping buffers to ensure smoother animation effects.Almost all of the graphics are stitched together from the base graphics, and some of the graphics use some functions from the Math library, while also paying attention to the depth of the graphics, so that they are displayed in the correct order

14.Details: The characters, houses, and roads are all drawn to a specific scale, and the distances between the figures are all calculated to ensure that the cards maintain a reasonable look.

III Instructions for running the program

Open the project in Microsoft Visual Studio and make sure the freeglut library is properly linked or click on the ”.exe” file to open it.

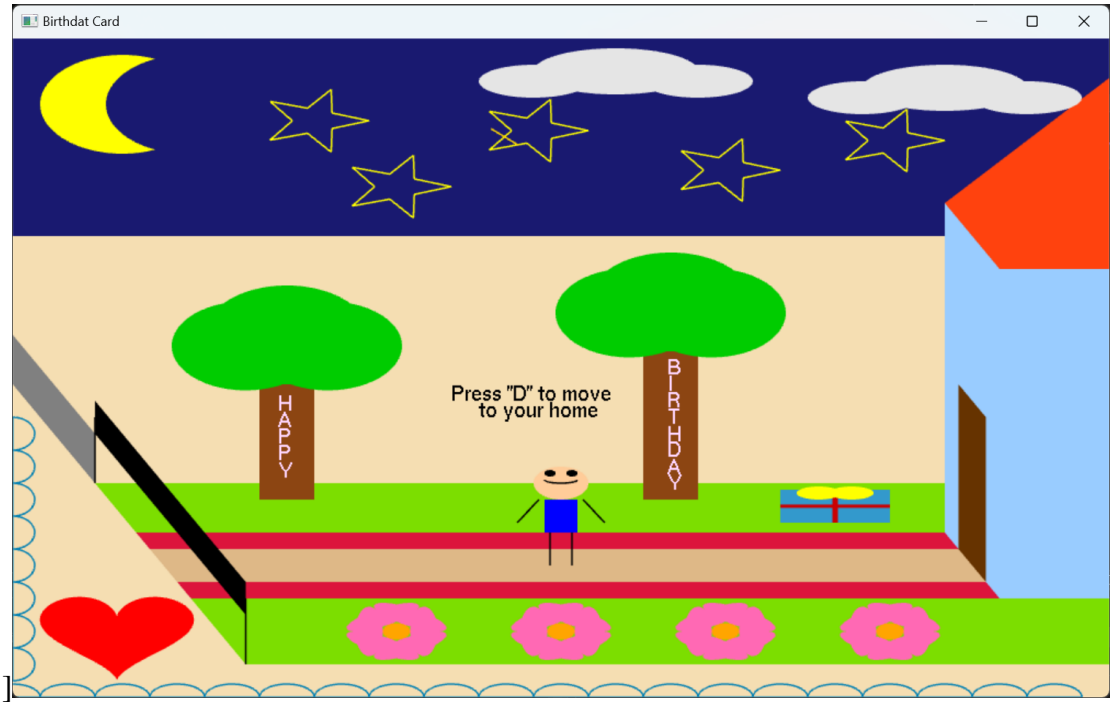
Menu: The menu can be opened by clicking the right mouse button, but the menu can only switch between scene 1 and Scene 2.

The first picture: Press the ”D” key to move the character towards the house to move to the second screen.

The second picture: Click the left mouse button, the parents’ arms will switch positions, click again will reverse their positions, can be repeated.Press Q and R to open the gift box on the left and right respectively and get the gift.

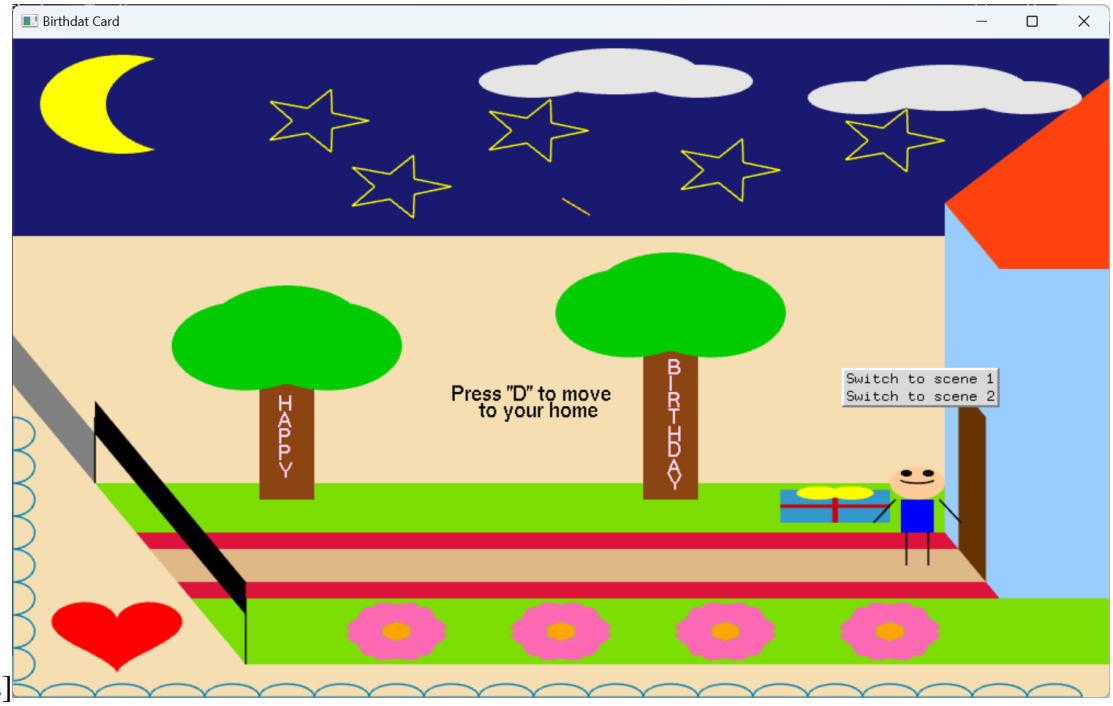
IV Screenshot of birthday card

Screenshot 1: Initial scene



[1]

Screenshot 2: The character moves to the door, and the hearts and shooting stars constantly change dynamically And the menu is displayed



[2]

Screenshot 3: The scene after entering the door

[3] 

Screenshot 4: The parents' arms change after clicking the mouse, and the position of the balloon is constantly changing,The gift box is also opened to reveal the gift inside.

[4]