Report Of CPT205 Greeting Card

1. Basic Information

Module Title	Computer Graphics
Module Code	CPT205
Name	Juntuo Wang
Student ID	2036505
Degree Program	Information and Computing Science

2. Design

2.1 Suzhou Center

Graphical technique: The building is achieved by polygon function, line drawing function, trigonometric function, inverse trigonometric function, and scaling function together.

Building shape: The outermost shape of the building is composed of a polygon, while the middle part of the building is formed by superimposing two semi-ellipses of different sizes and colors (the length and width of the ellipse is controlled by the scaling function)

Building lights: The position of the building lights is controlled by the asin function

Further function: Building lights in different backgrounds will show different colors, in the daytime, the light is dark blue, while in the dark background lights are yellow, the function is controlled by the keyboard input

2.2 Tree

Graphics technique: The object is achieved by trigonometric functions, polygon functions, translation functions, scaling functions and rotation functions together

Graphical shape: The leaf part of the tree is formed by a number of triangles, while the coordinate positions of the triangles are controlled by trigonometric functions. The stump part is formed by the rectangle and the triangle together (the position of the triangle is determined by the trigonometric function). In addition, the light ball part is a circle of different colors, and the pentagram part is achieved by rotating different triangles of different colors.

Graphic color: The color of the leaves is composed of three different degrees of green, thus achieving a three-dimensional effect. In addition the color of tree stump is composed of brown

Further function: The light ball on the tree and the pentagram at the top of the tree will change color with time, this function is controlled by the time function

2.3 Clouds

Graphics technique: Clouds are achieved by trigonometric function; scaling function, translation function and polygon function together

Graphic shape: The shape of clouds are produced by drawing circles and ellipses of the same color at different locations

Graphic function: The graphic moves with time, which is controlled by the time function. In addition, the color of clouds will change in different backgrounds, which is controlled by keyboard input.

2.4 Suzhou Tower

Graphic technique: The building is achieved by trigonometric functions, scaling functions, translation functions and polygon functions.

Graphical shape: The graph consists of three parts, spire, the tower body, and the top of each floor.

Spire: The top part of the spire is achieved by a circle and an ellipse, while the bottom part is formed by a number of triangles whose coordinate positions are controlled by trigonometric functions.

Tower body: The tower is made by drawing polygons of different colors. The middle part is dark red, and the two sides are light red, thus achieving an approximately three-dimensional feeling. In addition, the "windows" in the tower are also made of polygons, which are white in the daytime background and yellow in the nighttime background.

The top of each floor: This part is composed of ellipses of different sizes and colors (the size and width of the ellipses are controlled by the translation and scaling functions)

Further functions: When the background changes, the spire, the top of each floor, and the window part will automatically appear in a different color, which is controlled by keyboard input

2.5 Fireworks

Graphics technology: The graphics are achieved by the trigonometric function, scaling function, translation function and polygon function together

Implementation method: There are two shapes of fireworks, namely teardrop and star.

Each single element in the fireworks is formed by many triangles drawn together, and the coordinate positions of the triangles are controlled by different combinations of trigonometric functions. After drawing a single element, the rotation function, translation function and time function are used to control the position and size of the element, thus creating the feeling of fireworks being launched in all directions.

Further functions: The fireworks bloom time is controlled by the time function, and the bloom of the fireworks will be linked with the snowman (only after the snowman fireworks to the corresponding location, the fireworks will begin to bloom)

2.6 Star

Graphical technique: The graph is achieved by a combination of trigonometric functions, scaling functions, translation functions, and polygon functions.

Graphical shape: The star is formed by many triangles drawn together, and the coordinate positions of the triangles are controlled by trigonometric functions.

Further function: The stars only appear in the night background, which is controlled by the keyboard input. In addition, the color of the stars will change with time, this function is controlled by the time function

2.7 Snowman

Graphics technique: The snowman is achieved by trigonometric functions, scaling functions, translation functions, and polygon functions together.

Graphic shape: The body part of the snowman and the five senses are mainly composed of circles of different sizes and colors. The hand of the snowman and the firework stick on the hand are made of polygons. In addition, the red part of the hat is formed by many triangles drawn together, and the

position of the coordinates of the triangles is controlled by the trigonometric functions, while the white part is composed of circles.

Further function: The hand will change color in different backgrounds, which is controlled by the keyboard input. The snowman can also interact with the keyboard, after pressing the F key it can release fireworks continuously, and after pressing the S key it will stop releasing fireworks.

2.8 Backgrounds and background colors

Graphical techniques: Polygon functions and color functions

Background color: The change of background color is controlled by keyboard input. The background is divided into two types: day and night, which are achieved by different colored rectangles. The background color is a gradient from yellow to blue during the day, while the background color is pure black at night.

In addition, the snowy background at the bottom of the card changes color between day and night, appearing white during the day and gray at night, which is controlled by keyboard input.

2.9 Greeting Words

Font: “Segoe UI”

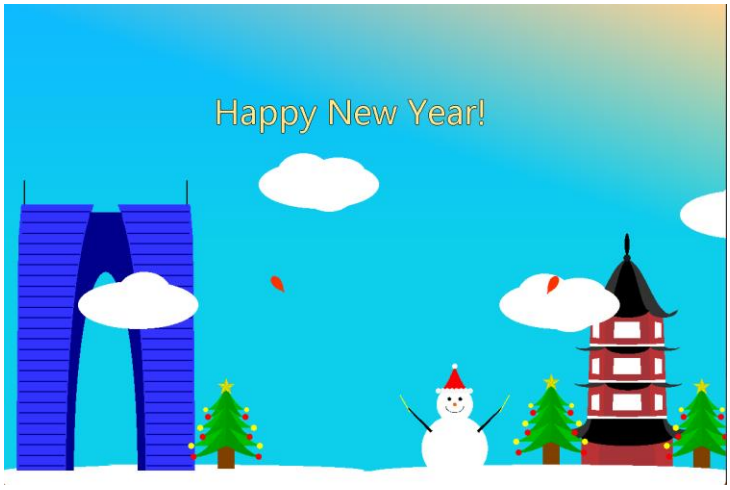
Further function: The words will change color in different backgrounds, this function is controlled by the keyboard input. In addition, during daytime, the color of the font will shift back and forth between light yellow and orange as the time goes on, which is controlled by the time function.

3. Instruction

1. At the beginning of the program, the snowman is continuously releasing fireworks by default
2. “Q” or “q”: Exit the program
3. “D” or “d”: Change to the dark mode
4. “B” or “b”: Change to the daytime mode
5. "S" or "s": Stops the snowman from continuously releasing fireworks (Note: fireworks that are still in the sky will not disappear when the button is pressed)
6. "F" or "f": Let the snowman start releasing fireworks continuously

4. Screenshots

4.1. The initial state of the greeting card



4.2 The status of the snowman not releasing fireworks under day and night

4.3 The state of fireworks in the process of launching under day and night

4.4 The state of fireworks blooming in the sky under day and night