New Year Greeting Card Made By OpenGL

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1 Introduction

The 2-dimensional card is made to celebrate the coming new year of 2023. The background color is set to the color ‘Indigo’. It is composed of a pseudo 3D frame a welcome door and a middle picture of a castle with several fireworks exploding on its background. The pseudo-3D frame shapes a single-point perspective scene in 2D graphics to give the greeting card a somewhat 3D appearance. Additionally, by putting a curtain on the welcome door, a scene is constructed to create a theater-viewing scenes to render the atmosphere when celebrating the new year with the curtain open. Furtherly, the middle picture is inspired by Disney New Year's Eve. Thus, the castle in the picture is created by imitating Disney's classic architecture. The rising movement of the flags means ‘Keep rising up in the New Year’ and the dynamic effect of fireworks makes the New Year's atmosphere more intense. The movement of the pseudo-3D frame and the position of the viewport can be remoted by the input of the keyboard. Through adjusting the position and isometric scaling of the pseudo-3D borders, it is able to fake a sensory experience which is ‘getting closer to’ and ‘getting far from’ the single point perspective scene.

2The designs and features

2.1 The pseudo-3D frame

As described in the introduction, the new year greeting card contains three parts. The outermost one is the pseudo-3D frame. To draw the pseudo-3D frame, it is divided into three compositions as well: the floor, the ceiling and the object on the wall which is the arrows as shown. To make the frame has single perspective appearance, it is crucial that every object in the frame is ‘Nearby is big and far is small’. So, if we following this rule, then it is supposed to draw two lines, which are showing a certain angle and neither parallel nor perpendicular to each other to show the visual effect of parallel lines in single point perspective. Then colorizing the frame by setting the color of its corresponding polygon. Here, the gradient color from lawn-green to indigo is chosen as the fill color. Once the left part of ceiling is finished, the right part of it can be created with the same process because they are axially symmetrical. Likewise, the process of drawing the floor and

drawing the arrows is similar. After all those objects is drawn, a pseudo 3D-frame is finalized.

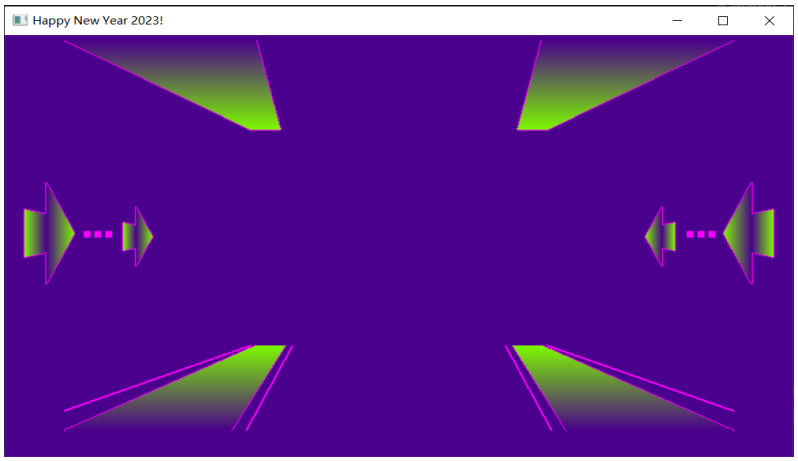


Figure [1]. Pseudo-3D frame

2.1 The welcome door

The welcome door is composed of two parts, one is the upper doorplate and the other is the left and right pillars with curtain on it top as mentioned in the introduction. The doorplate is a hollow rectangle, and the left and right pillars are a hollow pentagon. Then the curtain is drawn by lines, line strips and rectangles. Here, the gradient color from lawn-green to indigo is chosen as the fill color as well.

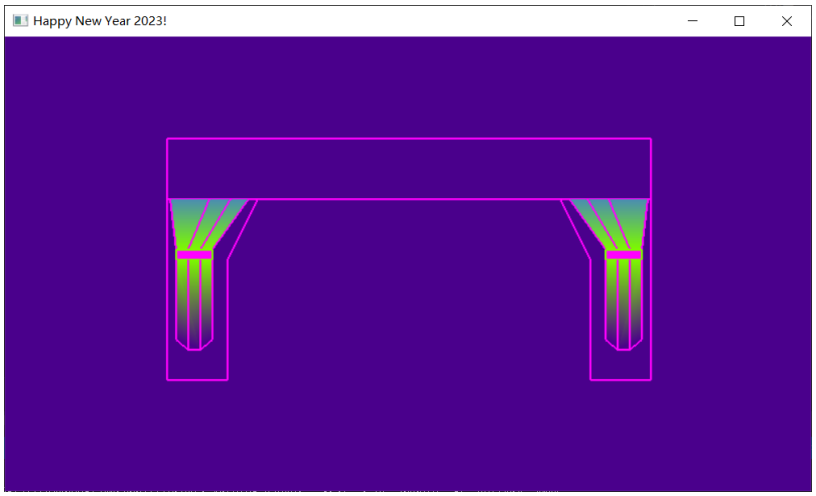


Figure [2]. The welcome door

2.3 The middle picture

The middle picture is consisted of the castle, the background, the castle and the firework. According to the previous operations, it is easy to obtain the values of the coordinates of the inner door frame and draw a polygon based on the obtained values to get a polygon that fills the inner door frame. The ‘dark orange’ color is selected for this area. Then a castle is drawn as a patchwork consisting of rectangles, triangles, polygons, circles, and line segments which is similar to what

have been done previously. In this step, the circle is used to draw the clock of the castle with lines and a half-circle is drawn as the door of the castle after being enlarged vertically and proportionally. The triangles is used to draw the spire of the tower and the rectangles and polygons are applied for the main body of the castle.

Then comes the dynamic part. The flags made up of line segments and triangles is drawn, and the flags moves along the flagpole in a certain range. After that, for the fireworks, a single firework flame is drawn first. Then using rotate and for-loop functions to get a complete firework, and then set the trajectory of the individual flames to get the effect of the firework exploding from the center. It is noticeable that the colors 'light blue' is applied to draw the frame of the castle and framework and 'light pink' is the main fill-color of these two stuffs.

Figure [3]. The Middle Picture

2.4 Font

The font 'Constantia' is applied to displayed the string 'Happy New Year' and the string displayed on the doorplate is using the font 'New Time Roma'. These two banners will show up after inputting certain three time 'w' in keyboards.

2.5 Interaction

The interaction is mostly controlled by the input of the key board. The operations that each key can perform are shown below:

q/Q ----- exit program

j/J ----- move the viewport to the left

i/I ----- move the viewport up

l/L ---- move the viewport to the right

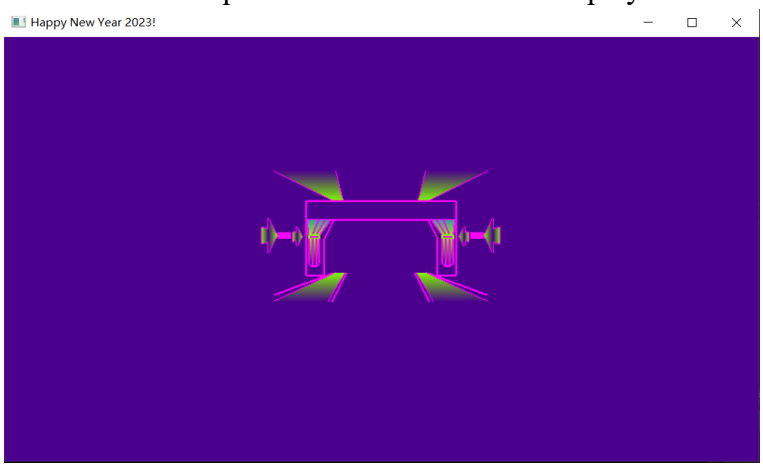
k/K ---- move the viewport down

w/W ---- the card gets 'near'

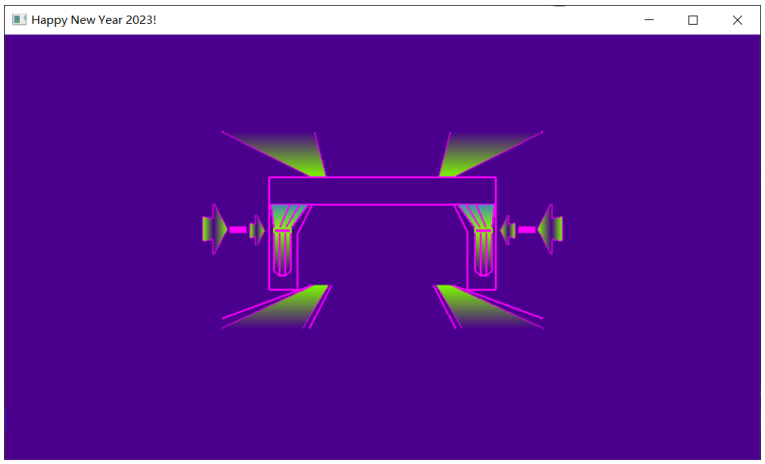
s/S ---- the card gets 'far'

2.6 Instruction about running the program effectively.

- Step1: run the program, you will see a tiny card in the middle of the window. Only the welcome door and the pseudo-3D frame will be displayed.



- Step2: press 'W' or 'w' to make the card come 'closer'



- Step3: press 'w' or 'W' one more time, the greetings and the words on the doorplate will pop up as the card comes more 'closer'. This is the final step.

(Please note that the middle picture will only pop up when the viewport size is maximum.)