

Final Report

Computer Graphics I

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1. Introduction

This project is about computer graphics which I need to create a 3D model then add some features on it. The model I choose is a house.

All the features are including but not limited to modeling, transforming object, viewing, transforming camera/ viewer/light sources, generating different projections, editing vanishing points, creating texture.

2. Third party plugins

In this project, the most important two plugins are jQuery and Three.js.

jQuery can be used to simplify the JavaScript code. Three.js is a 3D JavaScript library that can be used to create the 3D model.

The other plugins are BokehShader2.js, CanvasRenderer.js, CinematicCamera.js, DDSLoader.js, Detector.js, OrbitControls.js, Projector.js, dat.gui.min.js, stats.min.js that all can be found in the pack of the Three.js library.

3. Final project file structure

In the final project, I create a house as the object.

"main.html" is the only main page, so you can go into other different pages through it

All the children web-pages are in the folder named subHtml.

All the css-files are in the "css" folder.

All the images are in the "img" folder.

All the javascript files are in the "js" folder.

4. Weekly progress

Week1:

In the first week, I draw three 2D elevations(front, top, side) of my house.

I choose to use SVG(Scalable Vector Graphics) instead of Canvas, mainly because they do not lose quality if they are zoomed or resized. So in the future, when I edit the object on different features, the images of 3 sides will be remained.

I also create a control table on the left hand side which contains the multiple sliders to edit the features on 2D images, such as "translate", "rotate", "scale", "shear".

A primitive 3D model is located on the bottom right side of the image. It is just a red box, but I will work on it in the next week.

Week2:

In this week, I work on the 3D model. Using Three.js creates a box in the scene and put the images on the surface of the box. At beginning, console always reports a error "Access to Image at 'xx.svg' from origin 'null' has been blocked by CORS policy: Invalid response." But I could not fix for a couple days. I tried so many ways to load the image, updating the plugins, using other plugins, trying other function I can find. None of them works, until I read a article about I need to use a server, so I build a local server and solve it.

Then I create the second half of the control table on the main page that can control the 3D model. You can do the rotation, translation, scale and shear on the 3D model. You can use the button named "Ani-rotation" to start and end the automatic rotation on the house.

Week3:

I do not want to put every features in the one main page. So this time, I build a new child page named "projection.html". A button named "projections" also adds on the main page. After you click it, you can get into the projection page.

In the projections page, there are 8 buttons can guide you into the different view. I use Three.js to draw the 3D object in each sub-page(Isometric, Diametric, Trimetric, Orthogonal, Oblique, and also one point vanishing view, two points vanishing view, three points vanishing view). Because of the different portions of each views, I spend a lot of time to learn those differences and how to use code to show them up.

I also try to do a little bit light controlling practice on the views in this week.

Week4:

This week, it is getting hard to achieve what I want without the more third party plugins. So I use Projector, CanvasRenderer, and state.min to help me finish my camera page.

After I finish this page, I realize that without any other objects, it is hard to tell whether I rotate the camera around the object or I just rotate the object. So I do more research on the tutorial, and I find out the "gridhelper" can generate a land object in the scene automatically. Now it is

much easier to see the rotation.

Beside that, I build another page, in this week, named “light”, and a new button, adding on the main page. This new page, I use OrbitControl and dat.gui.min as my plugin helper. With their help, you can use the mouse to drag the image, to rotate, to zoom in and zoom out the object.

On the right top, there is a control table, you can use it to change the color of the light and the angle, distance, intensity, decay, penumbra.

Week5:

This is the final week to finish and refine the project.

At the beginning, I choose to use grey to be the basic color of the house, but It seems way to dull. So, I changed the color into bright yellow.

Moreover, I keep adding on 3 button to the main page, Camera2, Vanishing Points and Texture to finish all the features.

Because not only I feel I don't provide any controls on camera.html, but also I don't want to touch the page that I write on the last week, so I write a new page, named “Camera2”, to let user control the distance between object and camera.

Vanishing Points is a new page to edit the vanishing points. You can separately control the 3 different vanishing point page by “rotate”, “translate”, “scale”.

Texture is the very last feature I add on. I use DDSLoader and Detector to help me mapping the several textures onto the surface of the object. There are 4 box in this page. Each of them has the same geometry as the house. All the texture images are from internet.

5. Manual

Please Check in the link: <http://www.cs.uml.edu/~rliu/427546s2018/finalProject/Final/>