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Project Name: Airport Simulation

Original Proposal

The final project proposal is to simulate an airport and animate an airplane landing on the ground. The proposal contains some usage of computer graphics, such as finding a obj file and put it in the scene, adding blades on the airplane and make it rotate correctly, texture objects, and accomplish spot light and point light. Below is the original proposal that I wrote:

Main idea:

Try to simulate airplanes land and departure in the airport in the morning and at night.

Obj.file:

Find an airplane obj.file as a model.

Basic transformation:

Add blades on the plane correctly and calculate the rotating speed of the blades.

Texture:

Texturing some graph on the airplane body.

Lighting:

Adding many spotlight on the lane and shining at night, and will add a point light when it is in the morning.

Other objects: (optional)

1. I will create an airport control tower to make the whole scene more like the airport. This building will also contain light and spotlight.
2. I plan to add dynamic wheels when the airplane is landing on the floor.

In my final project, I fulfill all the requirements, and for the optional objects, I add a wood control tower near the lane. Nonetheless, I add a warehouse and place some airplanes inside it. When an airplane is landing on the lane, there is another airplane still flying in the sky, both of the airplanes have their own light. Hence, users can decide whether you want to turn the light on and can see the reflection from the ground and from the warehouse.



Figure 1 Morning

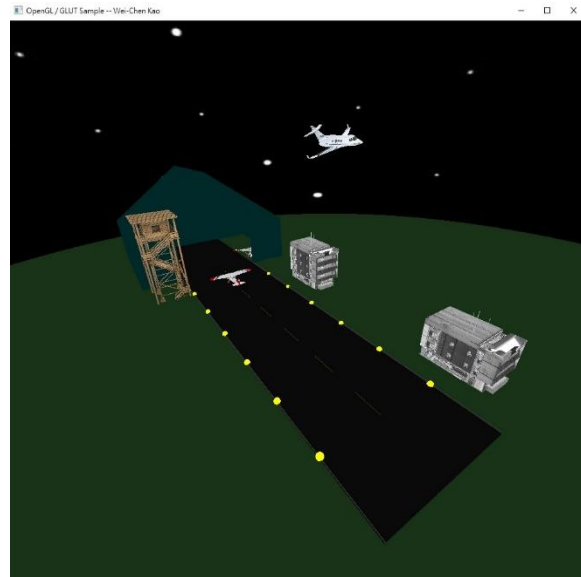


Figure 2 Night

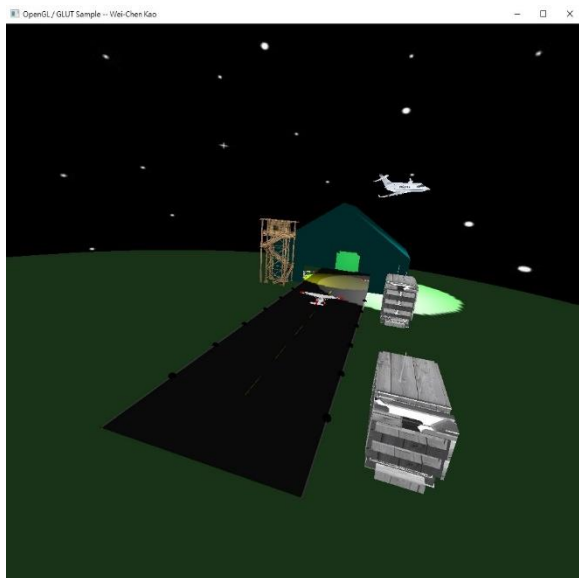


Figure 3 Three Spotlights on

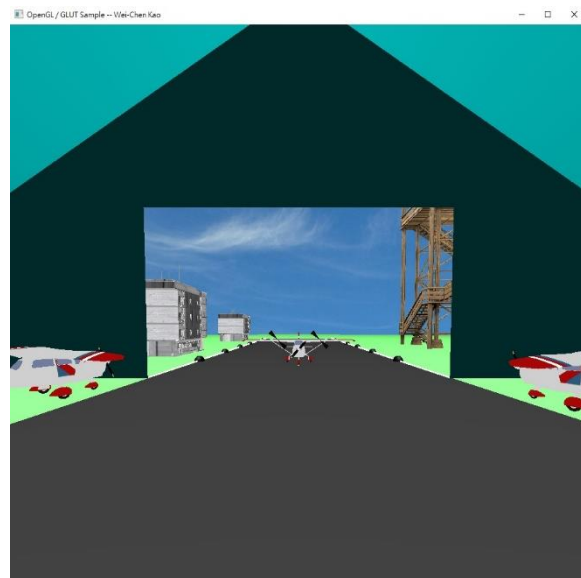


Figure 4 Inside View Morning

Difference to the proposal:

The difference I made from my proposal is that I didn't add the spotlight on the lane because adding it is not that obvious to identify whether I actually set the spotlight right there, so I put the spotlight in other place. As what I mentioned, I add three spotlights. First one is a yellow light in the warehouse, second one is also a yellow light on the landing airplane, and the third one is the white light on the flying airplane. Also, I add an inside view in the warehouse so users can see the airplane landing clearly.

Press button on the keyboard to turn on/off these spotlights:

Press '1' = Yellow light in warehouse

Press '2' = Yellow light on the landing airplane

Press '3' = White light on the flying airplane

Press 'I' or 'i' = Inside View in the warehouse

In addition, my another optional thing is to add dynamic wheels on the airplane, however, obj file has already put the wheels on the airplane, so I didn't add it on the airplane.

Learned from doing project

In this project, I've finally understood the concept of texture. Since I want to simulate the morning and night, I want to use two different pictures to texture my background. I tried to add "If" and "Else" condition to switch the background. However, putting these condition in InitGraphic function is unavailable, and the correct way is to load those pictures and determine the binding texture in the Display function. I also learned how to control the mouse motion so the whole scene can maintain in the correct place.

Some representative images

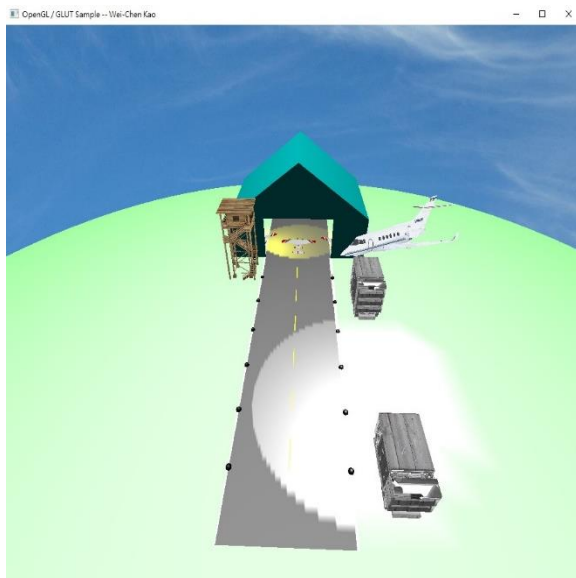


Figure 5 Morning Turn spotlights on

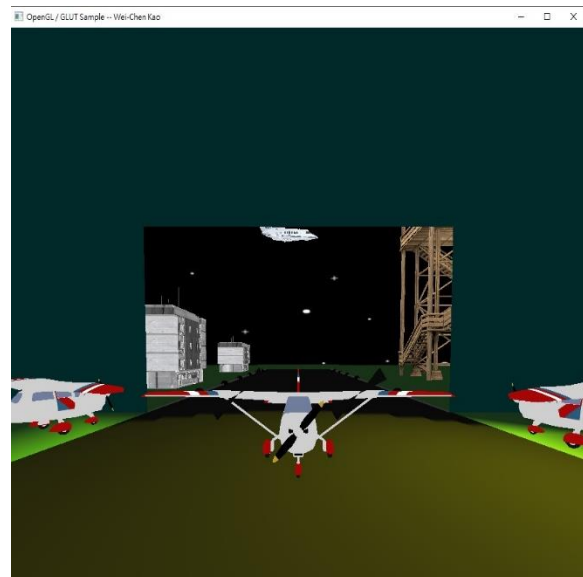


Figure 6 Inside View Night

Figure 7 and Figure 8 can identify when the landing airplane get closer to the warehouse, the light on the wall will become more intensive but smaller which is realistic in the real world.

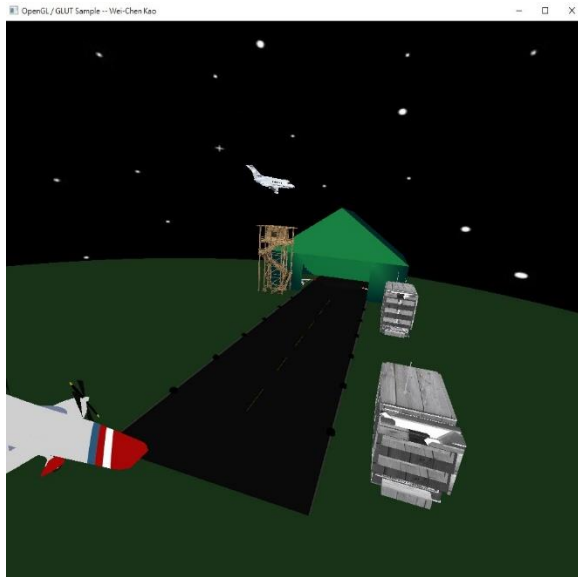


Figure 7

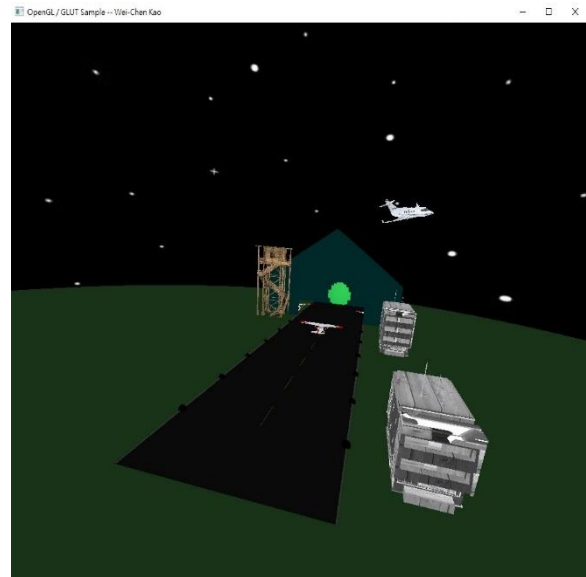


Figure 8

Figure 9 can identify when the lane is lighted by the flying airplane, we can see that the lane and the yellow middle line are brighter. We can also see that the green ground is brighter, too. The reason why the bright part is no a circle is because the green surface is generated by many grids. To save the executing time, I didn't generate it by too many grids, so the bright part is shaper. You can also notice that the white line of the boundary on the lane and the yellow line on the middle lane can reflect their color when the airplane light on them, and the rest of the part without the light is darker.

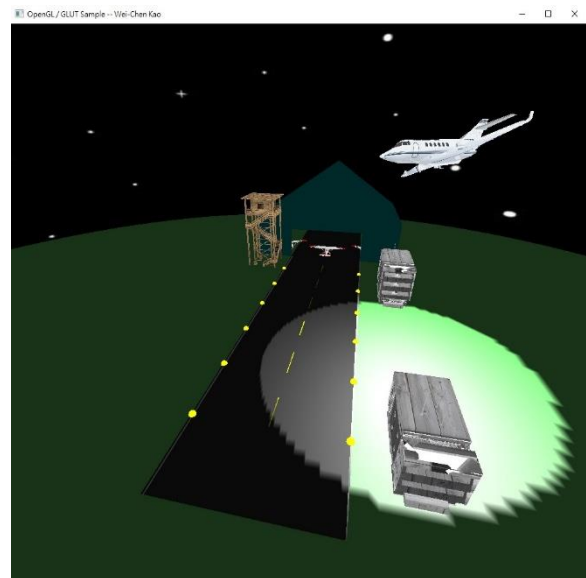


Figure 9

I add a submenu to control whether the time is in the morning or at night. When it is in the morning, there is a point light at the top, so the whole scene can be bright. In contrast, viewing the scene at night can easily see how spotlights affect to the objects.

Some animations are difficult to present it by images, such as the rotating blades on the airplane, so click the following link to see the animation.

Here is the link of the Kaltura video:

https://media.oregonstate.edu/media/t/1_o4n4klgr