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COMPUTER GRAPHICS

CPT205

ASSESSMENT 2

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BSC INFORMATION AND COMPUTING SCIENCE

1 Introduction

My 3D project draws a "galaxy observation", as I'm keen on observing a galaxy, which mainly consists of two parts, one is the star and planet, and the other is the observation including a stargazer, a telescope, and a drone. Initially, the stargazer is standing behind the telescope to observe the movement of the stars, and at the same time, the drone is also being used to fly into the sky to record the scene.

2 Design

2.1 Galaxy

Graphic features: The background is formed by applying texture mapping to a quad showing the galaxy. Additionally, there is a spinning star with five planets which is orbiting the central star. The central star is imitated by a black solid icosahedron, and uses material and lighting to make it more real. Moreover, more stars are available to be observed by using a menu to change the current one. For planets, they are all imitated by blue spheres that rotate in different planes and directions. On the left-hand side, there is a rotating blue planet. Besides, we are also able to control the camera position to view at different angles.

Graphic techniques: The star and planet systems are achieved by transformation functions, lighting and material-related functions, hierarchical modeling, texture mapping, animation and interactions, and viewing.



Figure 1: Galaxy

2.2 Observation

2.2.1 Stargazer

Graphic features: The stargazer is formed by six cubes with different scale and add a slight movement of the arms and legs to make it more vivid when using the keyboard to interact, such as turning around and walking straight. Besides, Stargazer can be controlled to find a suitable place to observe stars by keyboard interaction.

Graphic techniques: Stargazer and movements are achieved by the creation of geometry, transformation functions, lighting and material-related functions, hierarchical, texture mapping, modeling and keyboard interactions.

2.2.2 Telescope

Graphic features: The telescope is formed by a sphere as a connection and cylinders as racks and lens cones. To simulate a real telescope, it is designed to rotate at reasonable angles, both horizontal and vertical.

Graphic techniques: Telescope is achieved by the creation of geometry, transformation functions, lighting and material, hierarchical modeling, keyboard interactions.

2.2.3 Drone

Graphic features: The drone is constructed with a cube, cylinders as racks, and four propellers based on lines. During the observation of the galaxy, the drone is an extremely useful tool that can capture a wider view. Therefore, it is devised the all-around movement.

Graphic techniques: The drone is achieved by the creation of geometry, transformation functions, lighting and material, hierarchical modeling, keyboard interactions.

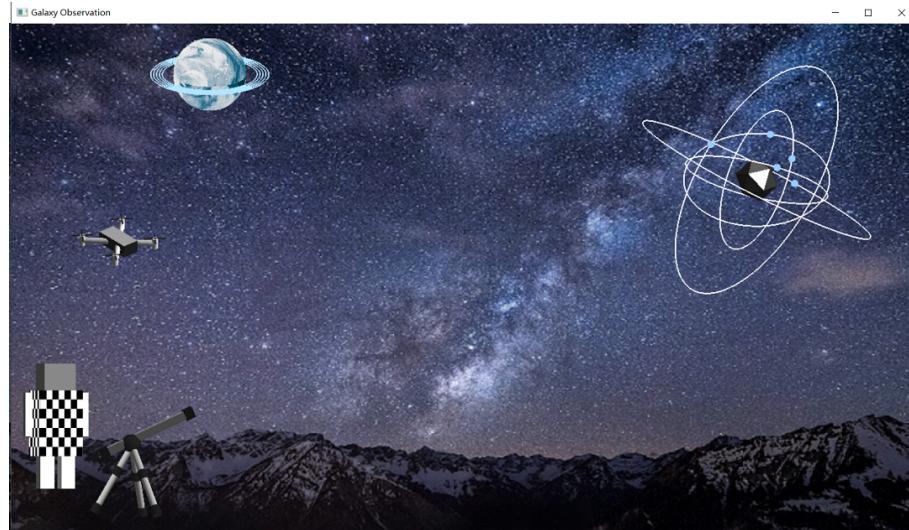


Figure 2: Observation

3 Instructions

Here is a brief instruction on how to run my program effectively. In addition to using direction keys to control the camera position, there are three features that can interact with the keyboard and one can be manipulated by the mouse.

Object	Keyboard	Illustrations
drone	'A' or 'a'	left
	'D' or 'd'	right
	'W' or 'w'	up
	'S' or 's'	down
	'E' or 'e'	rotate
	'Z' or 'z'	Lens down
telescope	'C' or 'c'	Lens up
	'X' or 'x'	translate telescope
	'V' or 'v'	Lens left
	'B' or 'b'	Lens right
stargazer	'I' or 'i'	body rotation
	'L' or 'l'	go forward
	'J' or 'j'	go backward
camera	'KEY UP'	view up
	'KEY DOWN'	view down
	'KEY LEFT'	view left
	'KEY RIGHT'	view right
window	'Q' or 'q'	quit the program

Table 1: Instruction of interaction of keyboard

Mouse	Illustrations
'RIGHT BUTTON'	Open the menu to change the star

Table 2: Instruction of interaction of mouse

4 Conclusion

In conclusion, I have drawn a 3D project about observing the galaxy which includes some interesting objects. At the same time, I implemented a range of graphic techniques, in order to simulate more real scenes.

5 Screen Shots

5.1 Menu

Applying a menu to change the central star, including icosahehedron, cube, dodecahedron, octahedron, tetrahedron, and sphere.

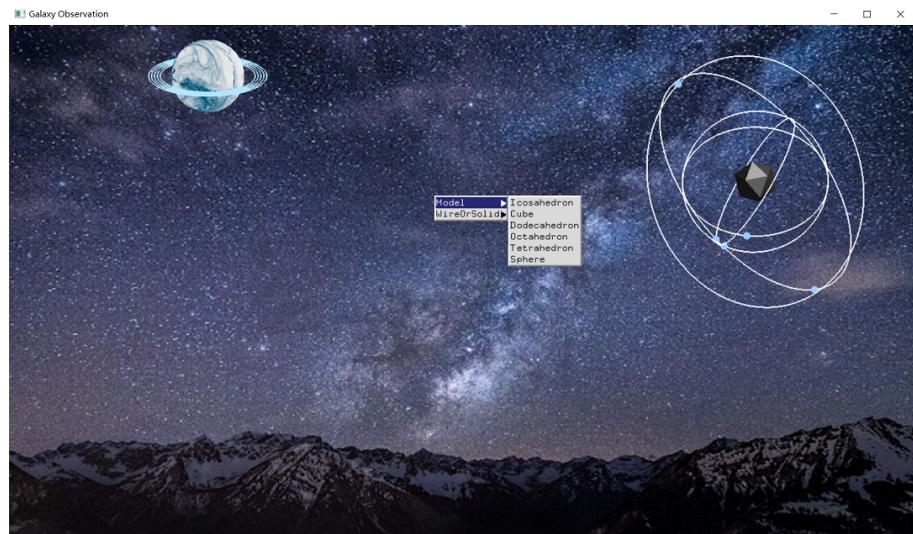


Figure 3: Menu

5.2 Operation

The drone, telescope, and stargazer's observing position as well as direction are all available to be adjusted.



Figure 4: Operation

5.3 Viewing

Tuning the camera position by direction keys.



Figure 5: Viewing