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Course title: Computer Graphics

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Transformation in OpenGL

1. Implementing revolution and rotation

1.1 Rotation

Rotation effect needs only one step of rotation.

```
1 glRotatef(rotation, 0.0f, 1.0f, 0.0f);//rotation
```

1.2 Revolution

```
1     glRotatef(revolution, 0.0f, 1.0f, 0.0f);

2     glTranslated(2, 0, 0);//revolution
```

Firstly, rotate the sphere around axis y. Secondly, translate the sphere for 2 units along its axis x. These two steps result in the effect like revolution.

2. Additional work: revolving and rotating automatically

Besides requested function “d”, “D”, “y” and “Y”, I add a function “a”. By inputting character “a”, the planet will automatically revolve once (360 degrees) and rotate once (360 degrees) simultaneously.

To implement this function, I use a loop to call the display function for 36 times. And before each call to display function, I call function “Sleep( )” to have the program wait for 100ms.

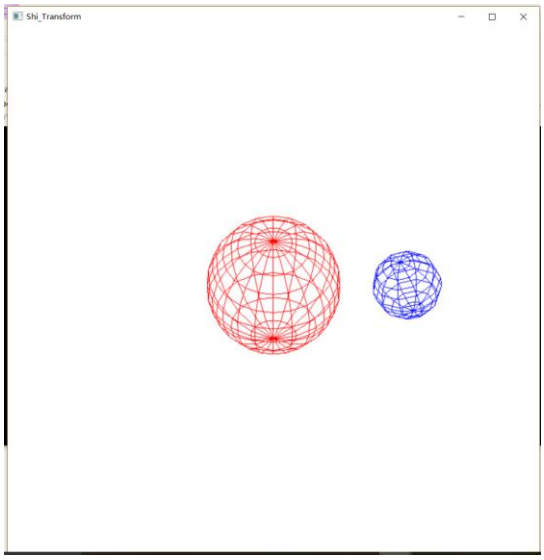
```
    case 'a':
        while (i--)
            idle();
        break;
```

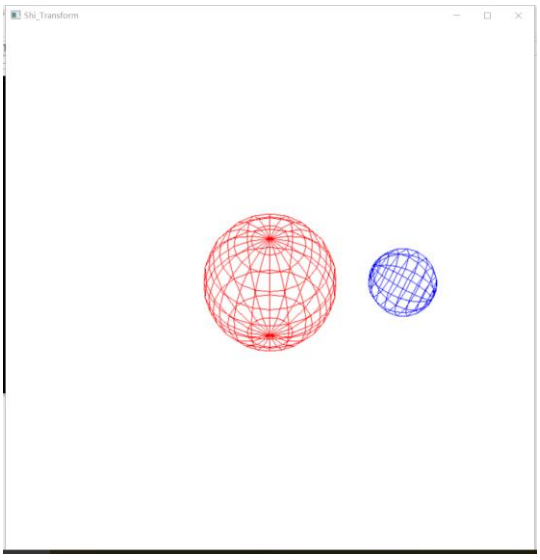
```
void idle() {
    Sleep(100);
    revolution = (revolution+10)%360;
    rotation = (rotation + 10) % 360;
    display();
}
```

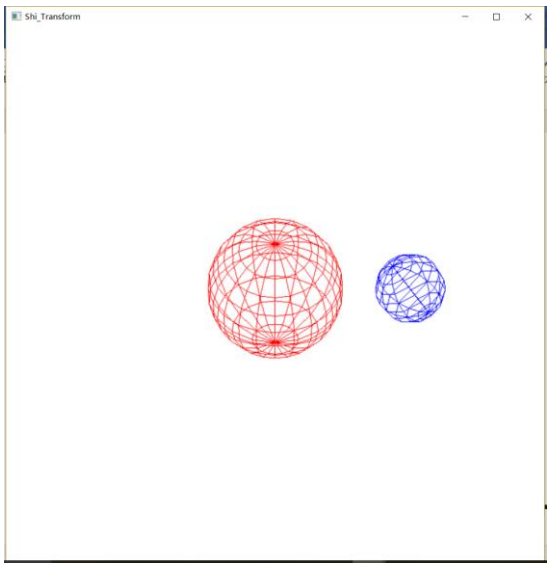
3. Running result

3.1 Rotation

The blue sphere first rotates to plus direction 5 times, and then to the minus direction 3 times.

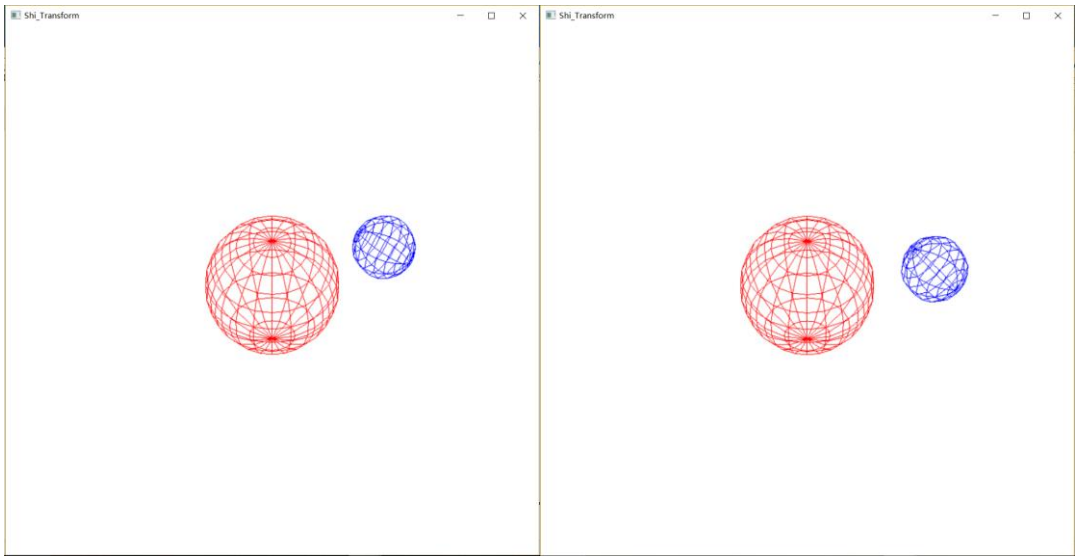






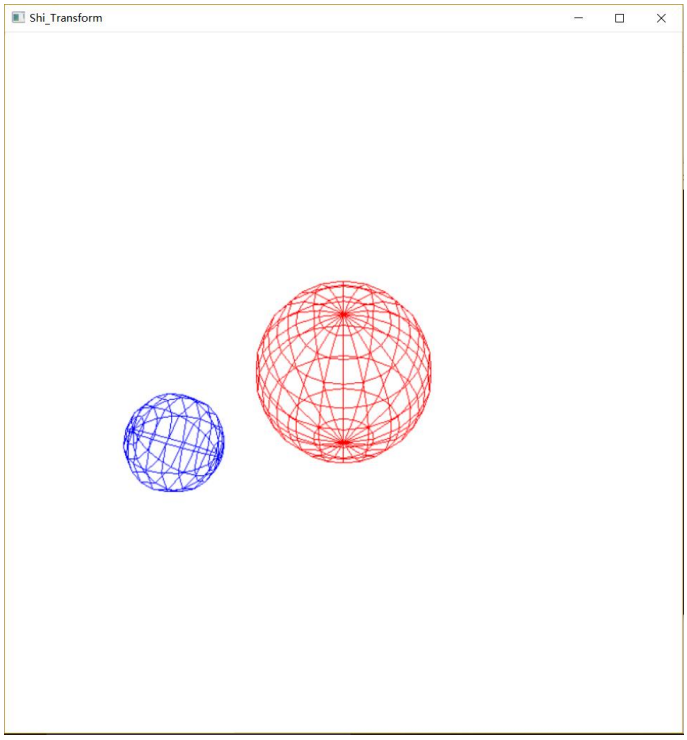
3.2 Revolution

The blue sphere first revolves to plus direction 5 times, and then to the minus direction 3 times.



3.3 Automatic revolution and rotation (Additional work)

The blue sphere rotates and revolves once each, dynamic effect can be seen in demo video.



4. Version 2 – glutTimerFunc（）

In version 2, I ty using a new function, namely glutTimerFunc(). With help of this function, I implement an animation where the blue sphere can rotate and revolve automatically with the constant keyboard inputs (like version 1). The blue sphere rotates and revolves initially to the positive direction, by inputting “D”/”Y” changing to the negative direction. Its direction can be changed any time by inputting “D”/”Y” /“d”/”y”.

dynamic effect can be seen in demo video(demo_ver2).