In this project you will be programming a different application which includes also the simulation of specific object behavior (in this case the movement of planets around the sun). The task here is to include all the features from your last projects (except of the OpenScenegraph Database) to simulate a solar system in 3D.

Each planet needs to be displayed in the correct size (in relation to the other planets) and it needs to be textures (moons are not a must but will earn you extra points). You need to provide also a ‘Top View’ of the whole solar system as displayed above. In the Top View you need to scale distances and the size of the planet so that they can be displayed in this view. By selecting a planet in this Top View (keyboard or mouse selection) your viewer will move towards the selected planet and will set you on its surface (a smooth approach to the planets would be appreciated). On the surface of each planet you will define two portals (close to your position on the surface). The portals (Stargates) will allow you to jump from one planet to the next. Use a textured 3D ring model for the portal geometry (see Image 2). You will be able to find an image of this Stargate on the web to use it as a texture.

**Portal Navigation**

If you move your viewing position through these portals you will ‘jump’ to the surface of the next planet in the row (in both directions). The last planets (Mercury and Pluto) will have just one portal.
At any time in your simulation you need to be able to jump back to the Top View for a new planet selection (can be a key on the keyboard, see also device navigation). Since the sun will be the far biggest object in your scene you can scale her as appropriate.

![Image 2: Stargate Model (Texture)](image)

**Device Navigation**

For the device navigation part you will include the device classes from each other. You will exchange the documentation and source code for your device classes from the last project. Therefore you will have two navigation devices which you will have to map onto the two dynamic transformation matrixes (SIET, RIWT). From the Top View you need to be able to move with one of the devices toward a planet and you need to be able to surround the planets. To reset your view back to the top View you can use a keyboard key or one of the buttons of your device.

**Remember:** You would need to be able to display the application in mono and in the two stereo modes (Anaglyph and Page Flipping)

**General tips.** The two dynamic transformation matrixes can also be understood as two different coordinate systems. Use them wisely and decide in which coordinate system you want to navigate with which device (activating and deactivating device controls will maybe help too). Sometimes it is better to move the model instead of the viewer ☺.

The following link will help you to define planet size and rotation speeds. [http://nssdc.gsfc.nasa.gov/planetary/planetary_home.html](http://nssdc.gsfc.nasa.gov/planetary/planetary_home.html).

The needed textures can be found on the web (use the low resolution images) for example: [http://www.celestiamotherlode.net/](http://www.celestiamotherlode.net/)