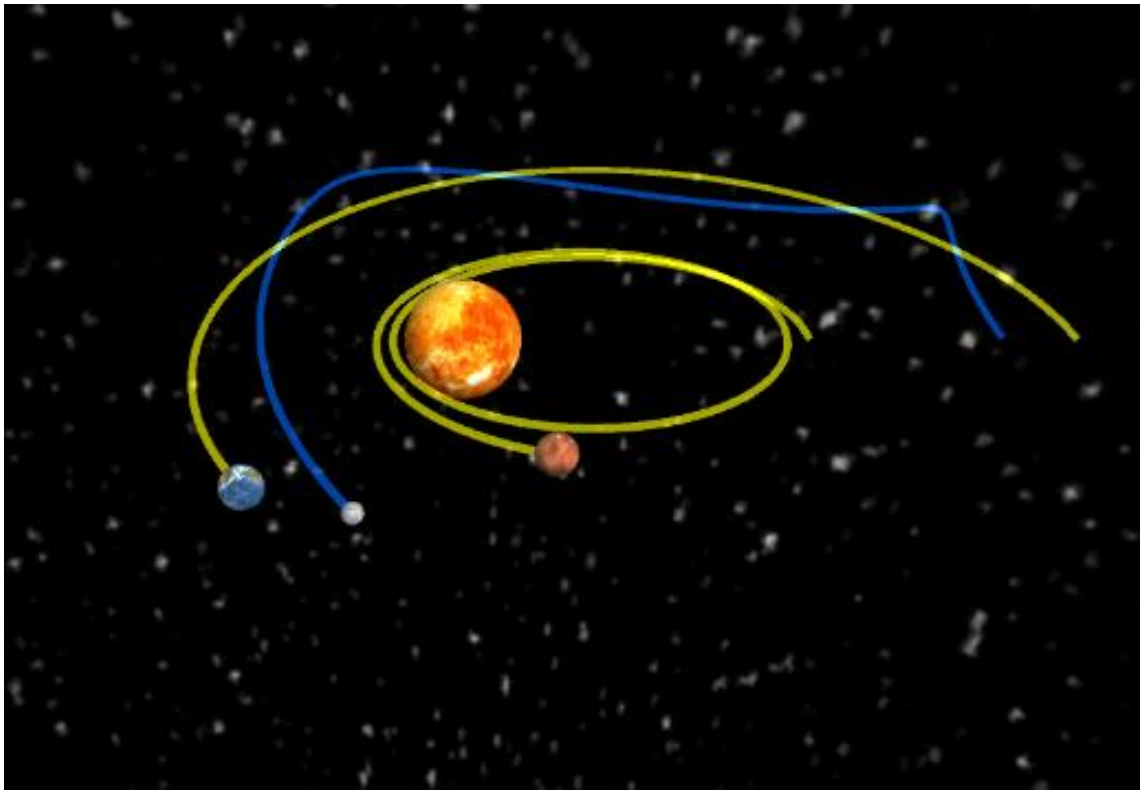
Gravity and Orbits



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1.Description of the package.

In this package you will find a tool that generates body gravity depending on the number of object in the scene. At the same time, it displays the orbits of the planets and satellites.

This package contains:

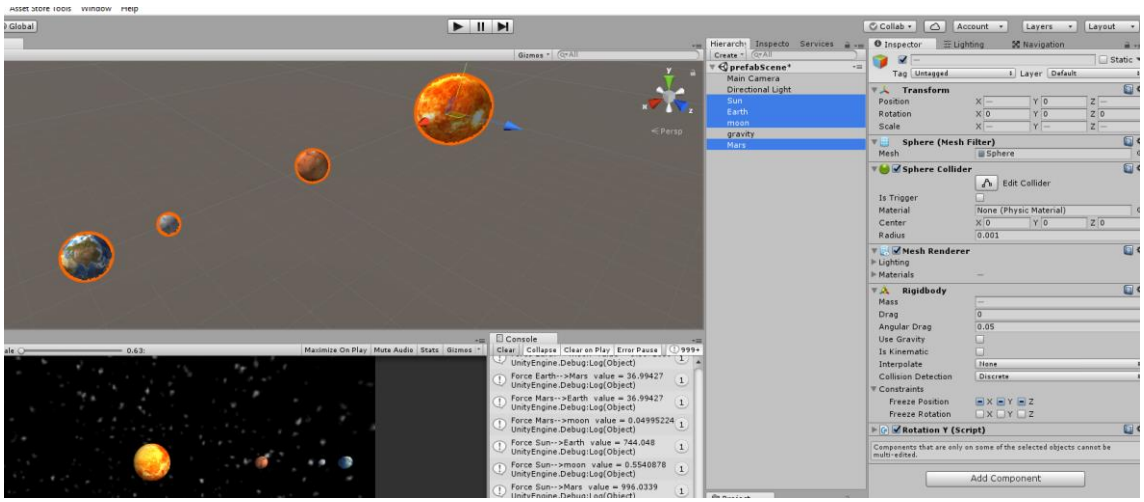
-The sample scene with two planets, a satellite and a star.

-The script that controls the gravity behaviour.

-Complete documentation and support (michael.soler.beatty@gmail.com).

2.Colliders and tags

All game-objects have sphere colliders:



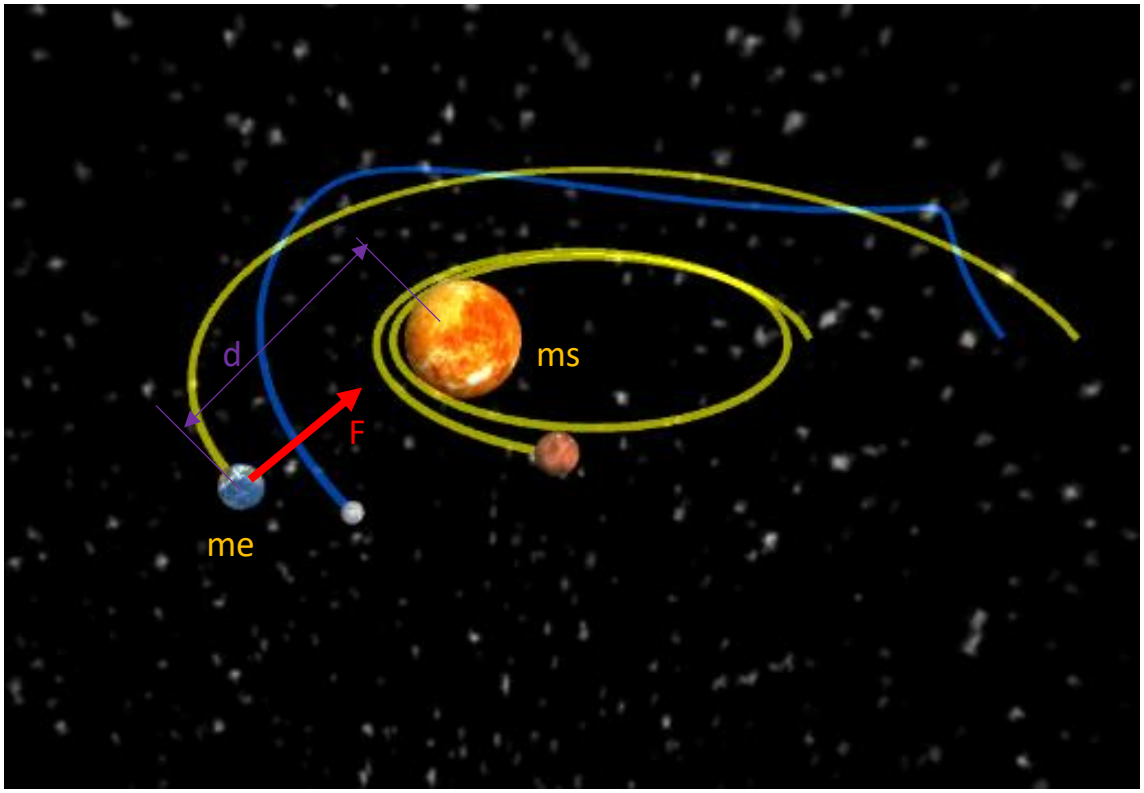
3.Scripting

The main script is the “GravityGenerator.cs” which is resumed in the following lines:

```
// for each of the generators we create a force
for (int ii=0; ii<generators.Length;ii++)
{
    // for each of the affected objects
    for (int jj=0; jj<affected.Length;jj++)
    {
        //check that is not the same object
        if(generators[ii].name!=affected[jj].name)
        {


            //we obtain the force value and it vector
            float distance= (generators[ii].position-
affected[jj].position).magnitude;
            Vector3 directionForce=(generators[ii].position-
affected[jj].position)/distance;
            float forceValue=(generators[ii].mass*affected[jj].mass)/Mathf.Pow(dist
ance,2);
```

```
            Debug.Log("Force "+generators[ii].name+"--
>"+affected[jj].name+"  value = "+forceValue);

            /*debug values for checking the force
            Debug.Log (distance);
            Debug.Log (directionForce);
            Debug.Log (forceValue);
            */
            forces [jj] += Gfactor * forceValue * directionForce;

        }
    }
}
```

The gravity forces are added for each pair of generators-affected gameobjects. To understand a bit how the scripts works we need to introduce some physics:



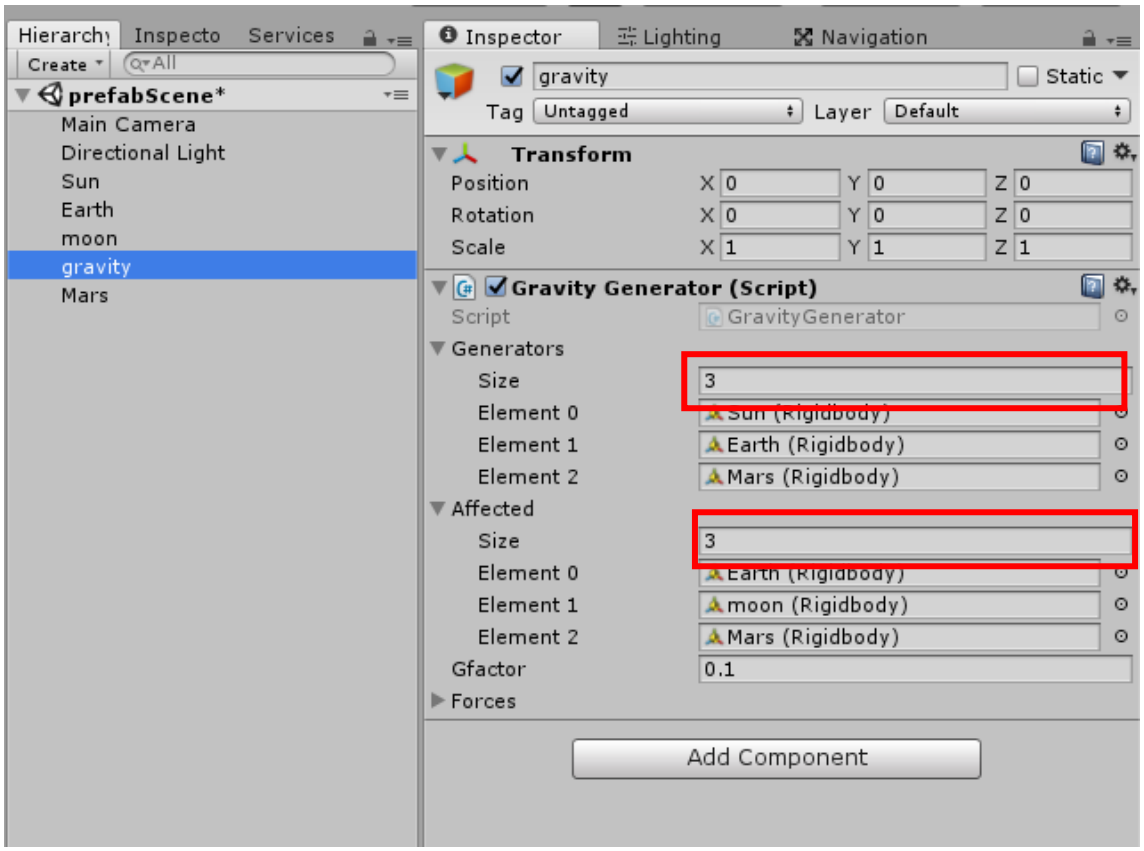
The module of the force is obtained as:

$$F = G\frac{me \cdot ms}{d^2}$$

The direction is a centripetal force going from the object to the center of the sun:

$$\overrightarrow{d_F} = \overrightarrow{sun} - \overrightarrow{earth}$$

To add more gravity interactions, it is necessary to go to the “GravityGenerator.cs” script and increase the number of generators and affected gameobjects.



Please check the video for further information.

4. Video tutorial

We have a video tutorial explaining how the scripts and game mechanics works.

https://www.youtube.com/watch?v=tWgTjl9zGaU