Content

Intro

Space gravity 2D makes much easier to build custom 3d solar system scenes with realistic gravitational motion. It can be used for implementing various gameplay types.
Main features of this asset are: two different systems for simulating gravitational motion and tool for editing velocity vectors in unity scene window.

Two systems of gravitational simulation:

- Newtonian attraction calculation (N-body problem).
- Keplerian motion (2-body problem or 'RailMotion') is exactly predicted motion on static orbit, which behaviour is as if no outer gravitation exists. This method can be very useful for moving planets and moons whose orbits are not dynamically changing, as it has better performance and precision on long terms periods.

Every object with CelestialBody component can be setted to use one of this two types of motion.

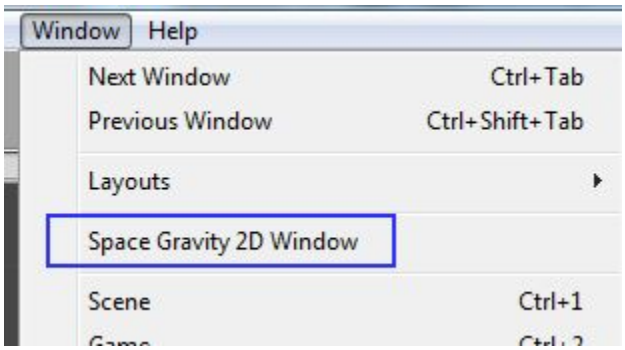
Every CelestialBody on scene will be shown with arrows which can be dragged by mouse. Its most usable with editor orbits drawing activated. Arrows can represent velocity relative to body's attractor or relative to global space.

Components overview

There are two main components: CelestialBody and SimulationControl.

CelestialBody contents body parameters and must be attached to all bodies that have to move on orbits.
It is functional only when object with SimulationControl component exists on same scene. Component icon will be visible in scene view, and you can disable it in "gizmo" menu of scene window by clicking on highlighted icon

SimulationControl holds all global properties and performs simulation for scene. To edit settings is better to use Space Gravity 2D window.



When this window is opened, new SimulationControl object will be created, if its not exists yet.

CelestialBodySingle component is designed to make simple keplerian orbiting motion for object and keep it independent from global parameters and SimulationControl.

PredicitonSystem allows to predict and display orbits for all bodies on scene. All orbits are displayed in global space.
Attach this component to, for example, simulation control gameobject and setup parameters for current scene scale.
PredictionSystemTarget is optional component that allows to change prediction orbits parameters and enable/disable orbits display for certain celestial bodies.

OrbitDisplay component is second way to display orbits with separated parameters for every celestial body which it is attached to.

SphereOfInfluence is component for making zones of interest for attractors.
It is better to attach this component to child of CelestialBody, as it will create its own circle collider. Make sure this collider is marked as trigger.

Step by step guide

1. Attach SimulationControl component to any gameobject on the scene or just open SpaceGravity2d window, it will be created automatically.
2. Attach CelestialBody component to gameobject.
3. Configure body parameters, scale of attached sprite or mesh object, add colliders.
4. Create second CelestialBody (it may be duplicate). Set mass lower than first body mass. Select motion type.
5. Use ‘find nearest attractor’ button in second’s body inspector or manually drag first body to Attractor property of second body to create planetary system. Button ‘make circle orbit’ may help to quick setup.
6. Configure distance between bodies, their velocities with help of editor scene arrows, Gravitational parameters and TimeScale in SpaceGravity2D window.
7. Add other bodies according to your wishes.

Note that attractor field in CelestialBody component is required only for keplerian motion and for displaying orbits. If you prefer to not use keplerian motion at all, you don't need to set attractor for bodies.

Contacts

For support and requests feel free to write on itanksp@gmail.com