

How To Make The Orbital Solutions Simulation

Part 1: Creating The Orbital Solution Simulation

1. Step One: Creating the Unity Project

- 1.1. Go to Unity Hub and create a 3D URP project.
- 1.2. Rename this project to Orbital Solutions Simulation.

2. Step Two: Importing Packages And Scripts

- 2.1. Click this link [Scripts](#) to download the scripts needed for this project.
- 2.2. Next, go back to the Unity project and import the scripts you downloaded.
- 2.3. Click this link [PackagesForOrbSim](#) to download the packages needed for this project.
- 2.4. Lastly, those packages should be imported into the unity project.

3. Step Three: Creating The Simulation Scene

- 3.1. Go to the project window and create a Scene titled “SimulationScene”
- 3.2. Create three canvases in the hierarchy window and name one “Options Canvas”, name another one “Slider Canvas”, and name the last one “Icon Canvas”.
- 3.3. Add the OrbitControlUI script and the TrueAnomaly script to the inspector window of the Sliders Canvas.
- 3.4. Hide the Options Canvas using the checkbox in the Options Canvas inspector window that is on the top left.
- 3.5. Create a game object called SolarSystemManager.
- 3.6. Copy the SkyboxManager from the Main Menu Scene and paste it into the hierarchy of the Simulation Scene.
- 3.7. Go to Assets > DeepSpaceSkyboxPack > DiverseSpace > Material.
- 3.8. Drag and drop the material into the Scene View and the Skybox should appear space-like.
- 3.9. Create a Sphere Gameobject and rename it to “Sun”.
- 3.10. Go to Assets > Planet Earth Free > Prefabs.
- 3.11. Click and drag the EarthHigh Prefab into the hierarchy window.

4. Step Four: Setting Up The Earth Orbit

- 4.1. Find the EarthOrbit Script and the Orbit script in the scripts folder.
- 4.2. Drag and click both of them and drop them in the inspector window of EarthHigh.
- 4.3. Set the Distance Scale of the Earth Orbit Script component to 0.12.
- 4.4. Create a Line renderer component in EarthHigh's inspector window.
- 4.5. In the Line Renderer space in the Earth Orbit script drag the EarthHigh in the hierarchy and drop it there.
- 4.6. Set the segments in the Earth Orbit script component to a very high number, over 10000, to get a smooth orbit line of the Earth.
- 4.7. Create a material and name it “Line Color”.
- 4.8. Change the Shader type to Unlit/Color.
- 4.9. Change the Main Color to a color easily seen on an outer space background.

5. Step Five: Setting Up The Sun

- 5.1. Drag and drop the Sun script from the scripts folder into the inspector window of the Sun Gameobject.
- 5.2. After that, there is nothing that has to be changed in the Sun Script component.

6. Step Six: Setting Up The Solar System Manager

- 6.1. Drag and drop the SolarSystemManager Script from the scripts folder into the SolarSystemManager Gameobject.
- 6.2. Drag and drop the Sun Gameobject from the hierarchy window to the Sun space in the SolarSystemManager script component in the SolarSystemManager inspector window.

6.3. Do 4.2 except put the EarthHigh into the Earth space.

7. Step Seven: Setting Up The Sliders Canvas

- 7.1. Under the slider canvas create six child Gameobjects that are called sliders.
- 7.2. Name each slider Gameobject in the hierarchy to an orbital element (Semi-Major Axis, Eccentricity, Inclination, Argument of Perigee, Right Ascension of the Ascending Node, and True Anomaly).
- 7.3. Create six child Gameobjects under the Sliders Canvas called Text with the Text Mesh Pro Component.
- 7.4. Name each Text Gameobject in the hierarchy to an orbital element and after that put “Text” beside it.
- 7.5. Change the Text input of each text under the Sliders Canvas and retype it to the orbital element that the text Gameobject is named (If the text Gameobject is named “Semi-Major Axis Text” then the Text Input should say “Semi-Major Axis”).
- 7.6. Go to the Semi-Major Axis slider and click the “+” in the inspector window to add the On Value Change (Single) component.
- 7.7. Click and drag the EarthHigh Gameobject into the place in the On Value Change (Single) component where it says None (Object).
- 7.8. Click the No function to get a dropdown of the functions, and then click the EarthOrbit function then click size.
- 7.9. Do steps 5.6 to 5.7 and instead do it for the Eccentricity slider and instead of clicking size click shapeA.
- 7.10. In the inspector window of the Sliders Canvas drag the TrueAnomaly slider to the space where it says Year T Slider on the Orbit Control UI and the Year T Slider Controller script component.
- 7.11. Drag the rest of the sliders to the space with the same name as the slider.
- 7.12. Drag the SolarSystemManager gameObject from the hierarchy window to the space where it says SolarSystemManager in the Orbit Control UI and the Year T slider Controller script component.
- 7.13. Arrange the Text and sliders according to Image #1.

8. Step Eight: Setting Up the Options Canvas

- 8.1. Hide the Sliders Canvas using the checkbox in the top left of the Sliders Canvas inspector window.
- 8.2. Unhide the Options Canvas using the checkbox in the top left of the Options Canvas inspector window.
- 8.3. Add four child Gameobjects under the Options Canvas, two should be buttons and the other two should be a Text Gameobject with the Text Mesh Pro component and an Image Gameobject.
- 8.4. Name one button “Continue Button” and the other button should be named “Quit Button”.
- 8.5. Name the Image Gameobject “Background” and name the Text Gameobject “Title”.
- 8.6. Change the color of the Background in the image component of the Background inspector window to black and change the value of the Alpha channel to 221.
- 8.7. Change the Text Input of the Title Gameobject in the inspector window of the Title Gameobject to “Options”.
- 8.8. Change the Text Input of the Text Gameobject under the Continue Button to “Continue”.
- 8.9. Do the same thing for the Text under the Quit Button except that the Text Input should say “Quit”
- 8.10. Change the color of the Quit Button to red in the inspector window of the Quit Button.
- 8.11. Arrange the Buttons, Text, and Background according to Image #2 at the bottom of the document.

9. Step Nine: Implementing The Functionality Of The Continue Button

- 9.1. Go to the Continue Button under the Options Canvas Gameobject.
- 9.2. Find the On Click () component in the inspector window of the Continue Button.
- 9.3. Click the “+” to create a function.
- 9.4. Click and drag the Options Canvas Gameobject in the hierarchy into the place where it says None (Object) on the On Click () component.
- 9.5. Click “No Function” to get a dropdown of different functions.
- 9.6. Click the Gameobject function and then click the SetActive(bool) function.
- 9.7. In the component, there will now be a checkbox, make sure that it doesn’t have a check in it.

- 9.8. Repeat steps 7.1 to 7.6 except do it with the Sliders Canvas and make sure that the checkbox has a check in it.

10. Step Ten: Implementing The Functionality Of The Quit Button

- 10.1. Go to your scripts and find the Change Scenes script.
- 10.2. Drag and drop this into the inspector window of the Quit Button.
- 10.3. Go to the On Click () component in the Quit Button Inspector window.
- 10.4. Click the "+" to add a function.
- 10.5. Click and drag the Quit Button Gameobject and put it where it says None (Object) on the On Click () component.
- 10.6. Click the "No function" to get a dropdown of the functions.
- 10.7. Click the ChangesScenes function and then QuitGame.

11. Step Eleven: Setting Up the Icon Canvas

- 11.1. Get an image of a settings icon from online and import it into the project.
- 11.2. Drag a drop that settings icon on the Icon Canvas to make it a child object.
- 11.3. Rename the icon in the hierarchy to "SettingsIcon"
- 11.4. Add a button component to the SettingsIcon in the inspector window.
- 11.5. Click the "+" to create a function in the On Click () function.
- 11.6. Click and drag the Options Canvas Gameobject in the hierarchy into the place where it says None (Object) on the On Click () component.
- 11.7. Click "No Function" to get a dropdown of different functions.
- 11.8. Click the Gameobject function and then click the SetActive(bool) function.
- 11.9. In the component, there will now be a checkbox, make sure that it does have a check in it.
- 11.10. Repeat steps 9.5 to 9.8 except do it with the Sliders Canvas and make sure that the checkbox does not have a check in it.
- 11.11. Put the Icon in the top right corner of the canvas.

Part 2: Creating The Main Menu

1. Step Three: Creating The Main Menu Scene

- 1.1. Go to the Unity project and create a scene.
- 1.2. Rename this scene to "Main Menu".
- 1.3. Go to the hierarchy window and create two Canvas Gameobjects.
- 1.4. Rename one to "Main Menu Canvas" and the other to "Instructions Canvas".
- 1.5. Hide the Instructions Canvas using the checkbox that is on the top left of the inspector window of the Instructions Canvas.
- 1.6. Lastly, create an empty Gameobject and rename it "SkyboxManager".

2. Step Four: Setting Up The Start Screen User Interface

- 2.1. Under the Main Menu Canvas create a child Gameobject called Text - TextMeshPro.
- 2.2. Rename that Text Gameobject to "Title Text".
 - 2.2.1. Change the Input Text of the Title Text in the inspector window to "Orbital Solutions Simulation".
- 2.3. Next, create two Button Gameobjects and name one "Enter" and the other "Quit".
 - 2.3.1. Rename the child Text Gameobject under the Enter Gameobject to "Enter Text".
 - 2.3.1.1. Change the Text Input of Enter Text to "Enter Simulation".
 - 2.3.2. Rename the child Text Gameobject under the Quit Gameobject to "Quit Text". Also, change the image color of the Quit Gameobject to red.
 - 2.3.2.1. Change the Input Text of Quit Text to "Quit".
- 2.4. Arrange the Title Text and the two buttons to make it look like Image #3 at the bottom of this document.

3. Step Five: Setting up the Instructions User Interface

- 3.1. Hide the Main Menu Canvas using the checkbox in the top left corner of the inspector window of the Main Menu Canvas and unhide the Instructions Canvas.
- 3.2. Create two Text child Gameobjects under the Gameobject Instruction Canvas.
- 3.3. Name one "Title" and the other "Instructions".
- 3.4. Change the Text Input of Title to Instructions or copy the text as displayed in Image #4.
- 3.5. Create a Button child Gameobject under Instruction Canvas and rename it "Play".
- 3.6. Rename the child Text Gameobject under the "Play" Gameobject to "Play Text".
- 3.7. Change the Text Input of Play Text to "Play".
- 3.8. Hide the Instructions Canvas and unhide the Main Menu Canvas.

4. Step Six: Implementing Functionality To The Enter Button

- 4.1. Go to the Enter Button under the Main Menu Canvas Gameobject.
- 4.2. Find the On Click () component in the inspector window of the Enter Button.
- 4.3. Click the "+" to create a function.
- 4.4. Click and drag the Main Menu Canvas Gameobject in the hierarchy into the place where it says None (Object) on the On Click () component.
- 4.5. Click "No Function" to get a dropdown of different functions.
- 4.6. Click the Gameobject function and then click the SetActive(bool) function.
- 4.7. In the component, there will now be a checkbox, make sure that it doesn't have a check in it.
- 4.8. Repeat steps 6.1 to 6.6 except do it with the Instructions Canvas instead of the Main Menu Canvas and make sure that the checkbox has a check in it.

5. Step Seven: Implementing the Functionality Of The Quit Button

- 5.1. Go to your scripts and find the Change Scenes script.
- 5.2. Drag and drop this into the inspector window of the Quit Button.
- 5.3. Go to the On Click () component in the Quit Button Inspector window.
- 5.4. Click the "+" to add a function.
- 5.5. Click and drag the Quit Button Gameobject and put it where it says None (Object) on the On Click () component.
- 5.6. Click the "No function" to get a dropdown of the functions.
- 5.7. Click the ChangesScenes function and then QuitGame.

6. Step Eight: Implementing the Functionality Of The Play Button

- 6.1. Drag and drop the Change Scenes script to the Inspector window of the Play Button Gameobject.
- 6.2. Go to the On Click () component and click "+" to add a function.
- 6.3. Drag and drop the Play Button Gameobject in the hierarchy to the place where it says None (Object) in the On Click () component.
- 6.4. Click the "No function" and in the dropdown select the ChangeScenes function and then the onstartbutton function.

7. Step Nine: Creating and Rotating the Skybox

- 7.1. Go to Assets > DeepSpaceSkyboxPack > DiverseSpace > Material.
- 7.2. Drag and drop the material into the Scene View and the Skybox should appear space-like.
- 7.3. Go to the drag and drop the Skybox Rotate script in the inspector window of the Gameobject SkyboxManager.
- 7.4. Set the speed in the Skybox Rotate script component to 1.

8. Step Ten: Setting Up The Build Settings

- 8.1. Go to File at the top of Unity then click build settings.
- 8.2. Drag the Main Menu Scene and the Simulation Scene into the Scenes In Build Space.
- 8.3. Make sure they both have checks in the checkboxes and make sure that the Main Menu Scene comes before the Simulation Scene.
- 8.4. Now you can build it or build and run it.

Links And Images

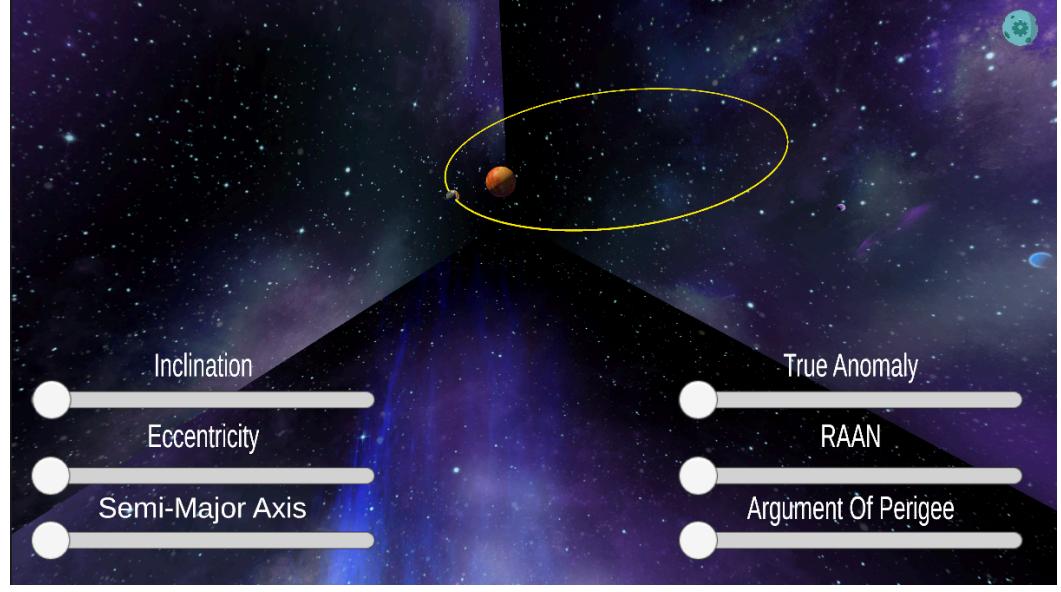
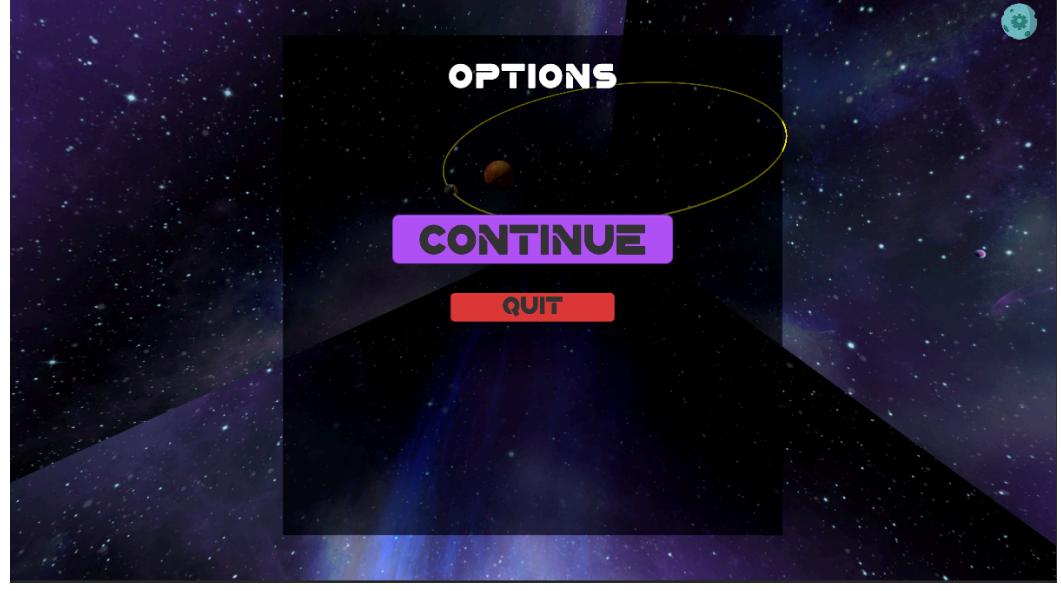
Image #	Image Of Project
Image #1	 <p>A screenshot from a space simulation project titled "Image Of Project". The interface features a dark background with a starry field and a yellow elliptical orbit. A small orange planet is at one focus of the ellipse. On the left side, there are four sliders with labels: "Inclination", "Eccentricity", "Semi-Major Axis", and "Argument Of Perigee". On the right side, there are two more sliders with labels: "True Anomaly" and "RAAN".</p>
Image #2	 <p>A screenshot from a space simulation project titled "Image Of Project". The interface features a dark background with a starry field and a yellow elliptical orbit. A small orange planet is at one focus of the ellipse. In the center, there is a large purple button labeled "CONTINUE". Above it, a smaller red button labeled "QUIT". Above the "CONTINUE" button, the word "OPTIONS" is displayed in white text.</p>

Image #3

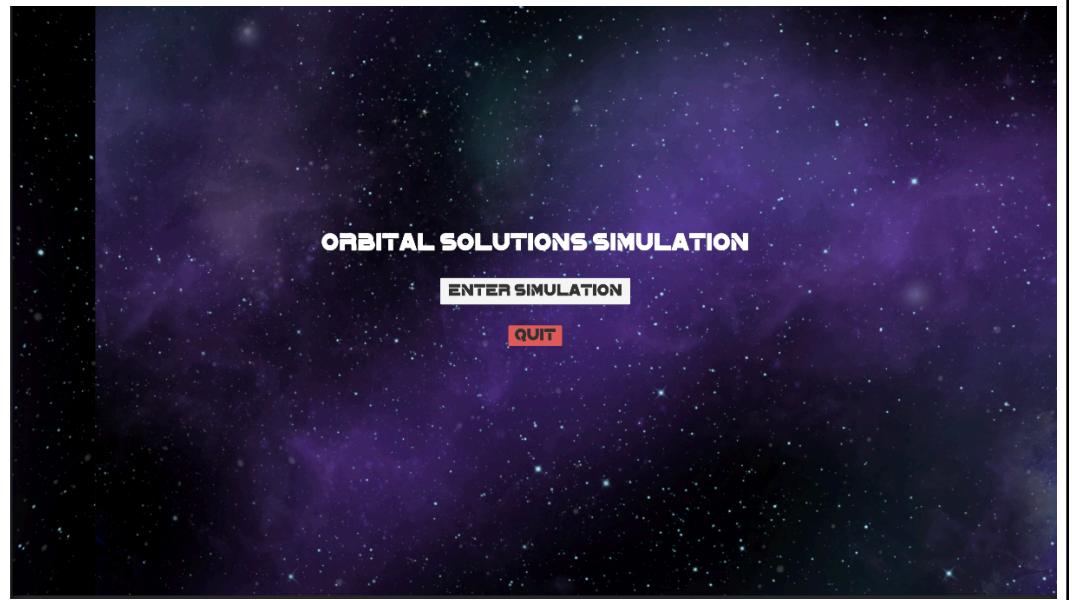


Image #4

