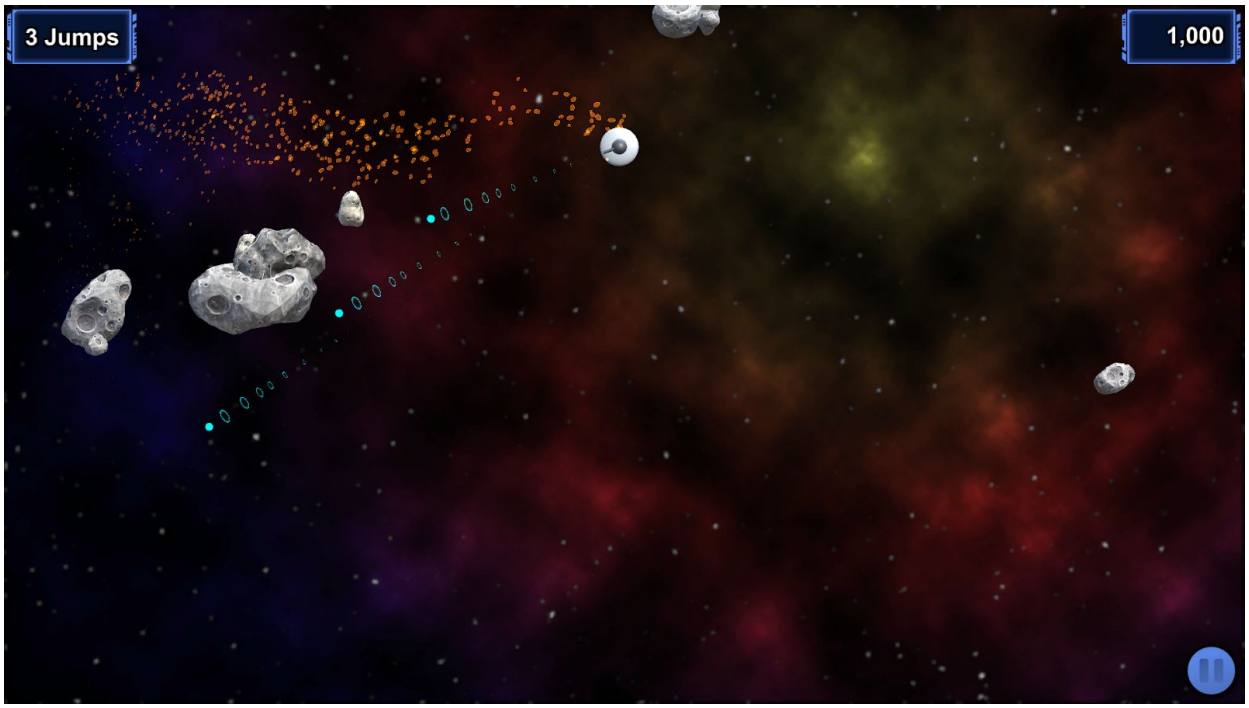
AsteraX — Requirements Doc

Executive Summary

Design Goal

AsteraX is a modern reimagining of the classic game Asteroids for WebGL and smartphone platforms (iOS and Android). In this game, the player's goal is to destroy all the asteroids on screen by shooting them while avoiding colliding with any asteroids in the process. AsteraX will be developed in Unity 2020.3 LTS and should be designed for 1920x1080 resolution.



Screenshot of AsteraX

Core Mechanics

Player Ship

Unlike the original Asteroids game, the player will directly move their ship up, down, left, and right (in the XY plane) using the WASD or arrow keys [Mobile Version: tilt will be used to move the ship via Unity's CrossPlatformInputManager class from Standard Assets]. The ship will not rotate and will not have any inertia beyond that provided by the Gravity and Sensitivity settings of 3 in the Unity Input Manager Horizontal and Vertical Axes specification.

PlayerShip maximum speed will be 10m/s, and the ship should tilt slightly in the direction of motion. The PlayerShip should leave an exhaust trail behind it.

The PlayerShip is composed of two models: the ship body and the turret. As players gain achievements, they will gain the ability to swap out the basic turret and body models with other ones. There are a total of 4 body and 4 turret models. (In this course, the body and turret differences are only cosmetic.)

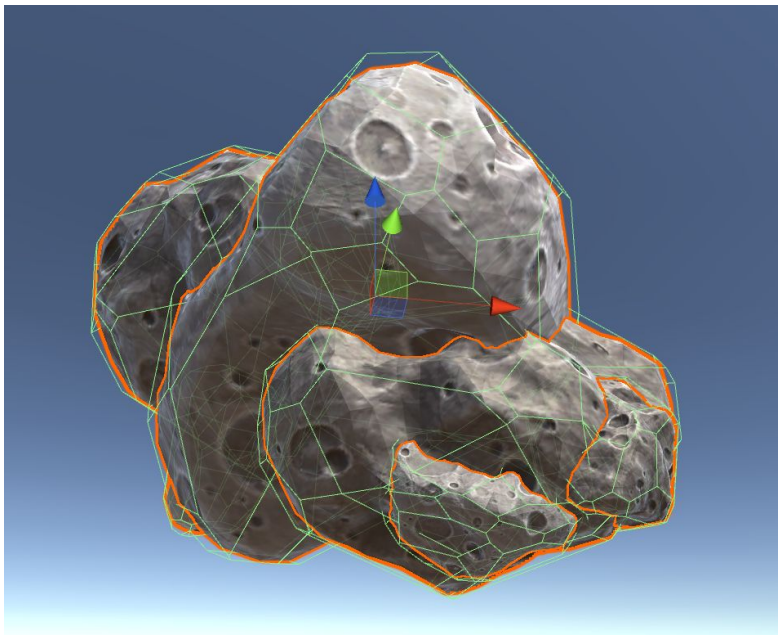
The PlayerShip begins with three Jumps. When the PlayerShip collides with an Asteroid, it will destroy the Asteroid and jump/teleport the PlayerShip to a safer location (consuming 1 Jump in the process).

Firing

The PlayerShip will fire a bullet every time the player clicks the left mouse button [Mobile Version: tapping the screen will fire]. The turret will constantly rotate to track the (visible) mouse pointer [Mobile Version: this isn't possible, so the turret will rotate to facing the tap whenever a player taps]. Bullets will move at a speed of 20m/s and will be spherical, though they should have a particle trail as well (Bullets will wrap screen, so a standard TrailRenderer won't work). After two seconds, Bullets will destroy themselves. Bullets will also be destroyed if they collide with an Asteroid.

Asteroids

There are three different sizes of Asteroids (3, 2, & 1). All Asteroid sizes pull a random model from the same set of models. Each Asteroid of size greater than 1 will spawn a few smaller, attached Asteroids (which then recursively spawn smaller, attached Asteroids; see image below). When an Asteroid is spawned, it is generated at a random rotation with a random velocity based on size (the velocity is chosen randomly in a range between 5 & 10m/s and then divided by the size of the Asteroid).



Three sizes of Asteroid with 2 children per recursion

When an Asteroid collides with a Bullet, both the Bullet and Asteroid are destroyed, and the Player gains points based on the size of the Asteroid hit with smaller Asteroids worth more (Size 3: 100, Size 2: 200, Size 1: 400). When an Asteroid is destroyed, any children (but not grandchildren) it has are snapped to the Z=0 plane and given a random velocity as outlined above.

Screen Wrapping

One of the key features of the AsteraX game is that everything wraps around the screen (i.e., if a GameObject exits the right side of the screen, it will enter at the same Y position on the left side of the screen). Take care to avoid naive wrapping where the GameObject wraps when its center exits the screen. The object should be completely off screen before it wraps. Take special care that any Asteroid children that are off screen when their parent is destroyed are taken care of (this took a surprising amount of effort to get right!).

Level Completion and Game Over

The level is completed when all Asteroids have been destroyed. The game is over when the PlayerShip hits an Asteroid but has zero Jumps remaining.

Game Features

Interstitial Screens

The game should have Main Menu, Level Load, and a Game Over screens. The Level Load and Game Over screens should have simple animation of the text boxes.

Achievements

The game has a few achievements that are used to unlock access to various body and turret models. These achievements are:

1. FIRST DUST – Shot Your First Asteroid – Unlocks Turret 2
2. LUCKY SHOT – Bullet Wrapped Screen & Hit Asteroid – Unlocks Body 2
3. TRIGGER HAPPY – 1,000 Shots Fired – Unlocks Turret 3
4. ROOKIE PILOT – Score Above 10,000 – Unlocks Body 3
5. EAGLE EYE – 100 Lucky Shots – Unlocks Turret 4
6. SKILLFUL DODGER – Reach Level 5 – Unlocks Body 4

Achievement Pop-Up

When the player attains an Achievement, a pop-up drops down from the top of the screen to inform them. If multiple Achievements are earned simultaneously, the pop-up will display the first, return to its hidden position, and then display the second, and so on.

Unity Analytics

Unity Analytics should track the following:

1. game_started (Custom)
2. player_changed_level (Custom)
3. achievement_unlocked (Custom)
4. appStop (Core)
5. appRunning (Core)

RemoteSettings

Using the RemoteSettings plugin for Unity (available from the Asset Store and built in to the Unity Analytics Dashboard), the LevelProgression of the game should be able to be set remotely post-release. This includes two numbers for each level: 1. The number of initial (size 3) Asteroids, and 2. The number

of sub-Asteroids to spawn at each level. For example, the numbers 3/2 would indicate 3 initial Asteroids at size 3 with 2 sub-Asteroids at each recursion for a total of 21 Asteroids in the level (3 at size 3, 6 at size 2, 12 at size 1).

Pause Button

A button in the bottom right corner of the screen will allow the player to pause and resume the game (see initial screenshot and image below for both states of the button).

Customization_Panel that appears when the game is paused

Customization Panel

Whenever the game is paused, the Customization_Panel appears showing a zoomed in image of the ship (from a Camera that is a child of the PlayerShip). The two basic models will always be available, and the Achievements listed above will unlock the additional three turret and body models. Clicking an active (blue) button swaps out the part.