**IT6034 Game Development**

Project Assessment Task 2: Game Design Document

GitHub: https://github.com/jwri211/IT6034GameProject

John Wright, 20210556

## **Outline**

A picture containing outdoor, outdoor object, star, time

Description automatically generated

A picture containing text

Description automatically generatedThe game is a space shooter / asteroid destruction game. It is a left to right side scroller, where the player controls the ships position with the mouse and shoots the asteroids coming towards it. Asteroids vary in size, speed and strength, some being easier to destroy than others. When an asteroid is destroyed, it drops loot – stars, powerups, or negative effects. Levels are defined by different background locations and asteroid types. Asteroids coming towards the ship can damage the hull if not avoided

**Character**

A close-up of a flag

Description automatically generated with medium confidenceThe character flies a spaceship, pointed to the right of the screen. The ship follows the mouse, and the player has the freedom to move the ship around the whole screen. The ship carefully navigates through the flying asteroid, and lines up for shots. The player has a set amount of health that’s lost on collision with asteroid, and the ability to fire a laser weapon

**Gameplay**

****The gameplay loop is simple – The game starts with the character in flight and the player shoots asteroids coming towards it and picks up the loot they drop. Collect the stars to earn points towards the level goal. Collect green power ups to make the gun shoot faster and try to avoid the red power ups – they’ll jam the laser! Collecting enough stars to reach the level goal will move the player to the next level

**Game World**

The game is set in space, where a single pilot attempts to navigate through a dangerous asteroid field. The environment is made of a parallax background with a couple of different layers to mimic speed of the ship.

**Game experience:**

****Shoot rocks flying towards you at high speed before they hit your ship – or get out of the way! Collect the stars that drop to increase score and pick up powerups and dodge mines along the way

## **Mechanics**

**Gameplay Flow Diagram:**

This is a diagram of the how the whole game experience works for a player, explaining how the screens and levels work and transition between each other. Square boxes represent game screens, and the ovals describe actions that can be take, or results of gameplay, that lead to the other screens.

*Start here:* Main Menu

Instruction Screen

Level 1

Level 2

Game Won Screen

**Individual Mechanics:**

This section deals with the technical detail behind each feature – the individual mechanics that make up the game.

**Level design**

*Overview:* The levels are 2D Scenes that contain the interface nodes, a parallax background and one player ship node. The level code deals with spawning asteroids, the scoring system, and what happens when the ship is destroyed, or the player reaches the goal score. Level 2 inherits everything from the first level, with a few modifications to the properties that allow for different asteroids to spawn, and at an increased rate.

*Background:* Both levels use a parallax background. This is a collection of background images and textures that move left to right to simulate movement. In this way, we can generate the illusion of the ship moving quickly through space without having to use cameras or a larger playing field. The code sets speed differently for each separate background layer, with closer layers moving more quickly. The speed has been tweaked to be fast but not nauseatingly quick.

*UI:* Each level contains simple interface elements. The most obvious is the health bar at the top left of the screen. This is linked to player health, and when the player takes a hit and looses a health point, a section of health bar is removed. Created with labels, the goal score is displayed top and center, with the current score below it. The level number is displayed in the top right corner. The font was chosen to match the theme of the rest of the game.

*Floating text:* When a level is complete, or the game is over, some floating text appears on screen to notify the player of this. The floating text is a positional node, containing a label for the text and a tween. The tween scales the label text up then disappears after a moment. The effect is that the information appears from the middle of the screen as if it were being zoomed in on. Additional floating text is generated when the player picks up a power up, saying what effect the power is having.

*Scoring:* The player scores points every time they collect a star, dropped from a destroyed asteroid. There is a goal score for each level, written at the top. Collecting enough stars will cause the level to stop spawning asteroids and allow the player to move to the next level. If this goal is reached on level two, the scene changes to a ‘Game Won’ screen instead.

*Level Changes:* There are two conditions under which the levels can change. Either the player scores the goal number of points, or they lose all health. In either case, the change of level is done by calling change scene on the scene tree. The buttons on the main menu and game won screens work in the same way. The game can be quit at any time by using the escape key.

**Player Ship:**

*Overview*: The ship is a kinematic body 2d type that can physically collide with the asteroids but nothing else. One sprite is used to draw the ship on screen, additional sprites are layered on top when the ship is damaged.

*Movement:* The player node uses a tween that changes the position of the ship each frame depending on the position of the mouse. I chose to use a tween for the smooth animation style and easy code. Discovering during play testing that it was easy to move the ship out of the screen, additional margins have been implemented to stop the ship from

*Health:* The player has 5 health points at the start of each level. The only thing that can remove health is collision with an asteroid, each collision will remove 1 health point. When health is removed, the code checks the new value, and if it is 0 then the ship is rendered invisible, removed from the physics layers and the game ends.

*Shooting*: When the mouse button is clicked, the ship fires a single green laser. Holding down the mouse button will fire the laser repeatedly, and the interval for this is coded in as a recharge timer. The recharge rate is increased when the player runs in to a green pick-up, and the weapon is unable to fire for a few moments after collecting a red pick-up.

*Tractor Beam:* An area around the ship that detects loot dropped from asteroids and then triggers the loot to move towards the ship. This is to make collecting points easier for the player, and they can concentrate on outmanoeuvring the asteroids instead

**Asteroids:**

*Overview:*The asteroids are Rigid Body 2D nodes, that fly from outside the right side of the screen towards the left, giving the player the illusion of moving through an asteroid field. They follow gravity as it has been aligned to the left side of the screen, and so actually ‘fall’ to the left.

*Spawning:* The level code deals with spawning in asteroids, each has modifiable properties of speed, scale and spin. When an asteroid is created its properties are randomly decided based on a range of values. For example, the scale may be between 0.5 and 2 times the standard size. The effect is that several asteroids spawning on the screen will look different and behave different to each other.

*Health:* The brown asteroids have a health value of three, the grey ones have a value of 5. This is the amount of hits they take before destruction. Grey asteroids only appear in level 2.

*Destruction:* On destruction of an asteroid some loot will drop. There is a 20% chance for a negative effect to drop, a 30% chance of a positive drop and a 50% chance to drop a normal star that awards the player points.

*Collision:* The asteroids can collide with the player, which damages the player ship Because the player is a kinematic body, the result of the impact is that the asteroid rebounds off the player much like a bouncy ball. While this isn’t realistic, it’s kind of funny and so it will not be changed.

**Loot**

*Overview:* Loot is a small Area2D node that drops from a destroyed asteroid. It interacts with a collision shape on the tractor beam node of the player. Loot has three types as described below.

*Movement:* The loot will stay where the asteroid exploded, until it is detected in tractor beam range. When it is in range, it uses a tween to smoothly move towards the player ship, and once it collides with the ship itself it disappears and applies its effect to the player.

*Stars for points:* This is the most common loot type. Upon being collected, the player scores 1 point towards the goal for that level.

*Green power:* Common drop from asteroids, this loot makes the lasers fire rapidly, players take advantage of this by easily destroying asteroids in front of them.

*Red power:* Less common drop from asteroids, this will jam the guns causing the player to stop firing for a moment. This forces the player to just dodge the incoming rocks, can result in many collisions!