Starship Mercenary

Game Summary

Starship Mercenary is a first person spaceship fighting game with a linear level unlock progression system and random loot, dual currency upgrade shop system. It features a light-hearted humorous plot line with each level containing it's own plot and one overarching theme of hostile rogue drone ships wreaking havoc in the galaxy with the player as a hired mercenary to destroy them.

Game Summary Re-cap:

- First Person
- Sci-fi
- spaceship dogfighting (Tie-Fighter, X-Wing, etc.)
- Linear level progression (level 1, level 2, level 3, etc.)
- Upgrade system using shop system that generates random loot of varying rarity and value
- Dual currency used to discover and buy upgrades from shops
- Cloud saving with scoreboards and achievements

Narrative

Rogue AI military drones are wreaking havoc in the galaxy. These drones are slowly being eradicated by the galactic military, but most of the drones are spread out in small groups, leaving leftover and forgotten groups of drones that mercenaries like the player are hired to eradicate.

Each level has its own reason as to why the drones are there and why they need to be destroyed by the player.

Core Gameplay Loop

1. Attempt to beat level
   a. Earns credits, missiles and energy boosters
2. Use credits earned to buy upgrades
   a. Spend missiles to find new and better upgrades available to buy
3. Go to 1

Player Mechanics

Summary:

The player must hit the enemy with their guns and block incoming enemy fire. Correctly managing the resources of Energy, Energy Boosters, Missiles and Thruster cooldown will result in better efficiency, enabling the player to destroy the enemies in the alloted time.

- Flying
    - How the player travels
    - Is an autopilot (player does not manually fly the ship)
    - Mimics actual flying
    - Starts automatically at the start of a level
    - Parameters:
        - Turn Speed
            - Single float that fluctuates up and down by a series of modifiers
            - Increases to Thruster boost amount while Thrusters are active
            - Decreases when in Lock-On range (eases flight to feel more natural)
            - Increases to normal turn speed if lower than normal turn speed and NOT in Lock-On range of the enemy
            - Decreases to normal turn speed if above normal turn speed and Thrusters inactive
        - Flight Speed:
            - Is an Int that never changes, flight speed is fixed
    - Independant player head turn:
        - Player camera inside cockpit independently turns to look at current target
        - Rotation Lerps to look at target as long as target is within a specific radius of the front of the ship
        - While target not in angle range to be looked at, player camera Lerps toward front facing position
- Shooting
    - Button at the bottom right side of the screen to shoot

- ○ Button can be held down to shoot guns automatically
- ○ Button lights up when pressed
- ○ Button can NOT be used while Shield button is being used
- Shield
  - ○ Button at right side of screen just above fire button
  - ○ Shield is active while shield button is being held
  - ○ Can NOT shoot while shield button is being held
- Missile
  - ○ Missile button at top right of screen
  - ○ Button changes color to red while missile lock-on is true
  - ○ Button changes to grey while missile lock-on is false
  - ○ Button can be pressed while missile lock-on is true
  - ○ Button can NOT be pressed while a missile is actively flying
  - ○ While missile is active, small window in top right shows camera view of missile flying through space until the missile is destroyed
- Hull (Health Points)
  - ○ Bar at bottom center-right of the screen
  - ○ Hull always starts as an Int of 10
  - ○ Each hit from an enemy takes away 1 Hull (if successfully hit w/o shield)
  - ○ When Hull reaches 0, game over
- Energy
  - ○ Bar at bottom center-left of the screen
  - ○ Total Energy is indicated by equipped Power Core
  - ○ Guns consume energy per shot
  - ○ Shield consumes energy over time while Shield is active
  - ○ Energy regenerates over time at the speed indicated by the equipped Power Core
- Thruster
  - ○ Button at bottom left of the screen
  - ○ Can be pressed when cooldown is complete
  - ○ Increases Turn Speed for X time and Y amount determined by equipped Thrusters
  - ○ Used for being Locked-On more often
- Energy Booster
  - ○ Button on the left side just above Thruster button
  - ○ Button can be pressed when the player has blocked 2 enemy shots with the Shield
 - ○ When pressed, consumes Energy Booster consumable and regenerates player Energy

- ○ When pressed, the button requires the player to block 2 more shots with their Shield in order to use the Energy Booster button again
- Lock-On System
  - ○ Guns:
    - ■ In order for the guns to lock-on to the enemy, the enemy must be within X angle of the front of the player ship
    - ■ If not lock-on is false, guns shoot the direction the player ship is facing
  - ○ Missiles
    - ■ Missiles lock-on radius is similar, with a larger degree to which it can lock on
    - ■ Missiles takes X time to lock-on, while the missiles are in Missile lock range
    - ■ If enemy is out of Missile lock range while channeling lock-on time, Missile lock-on is false and button can not be pressed
- On Receive Damage (No Shield)
  - ○ Player takes damage when colliding with Enemy Projectile
  - ○ Subtract Hull by 1 per Enemy Projectile collided with
  - ○ Play fire effect on screen when hit
  - ○ Shake Camera when hit
  - ○ Play sound effect when hit
- On Hit With Shield Up
  - ○ If Shield Energy Absorb is not on cooldown, add energy to total energy.
  - ○ Play Shield hit effect
  - ○ Play Shield hit sound
- Fuel
  - ○ Fuel is a timer counting down, represented by Fuel amount.
  - ○ If Fuel runs out (reaches zero) the mission is a failure and the mission ends immediately

Player HUD

Summary:

Player HUD is designed to have buttons reachable by left and right thumbs in the landscape orientation, similar to PSP layout.

- Landscape orientation
- Use left and right thumbs
- All buttons oriented to the left and right side
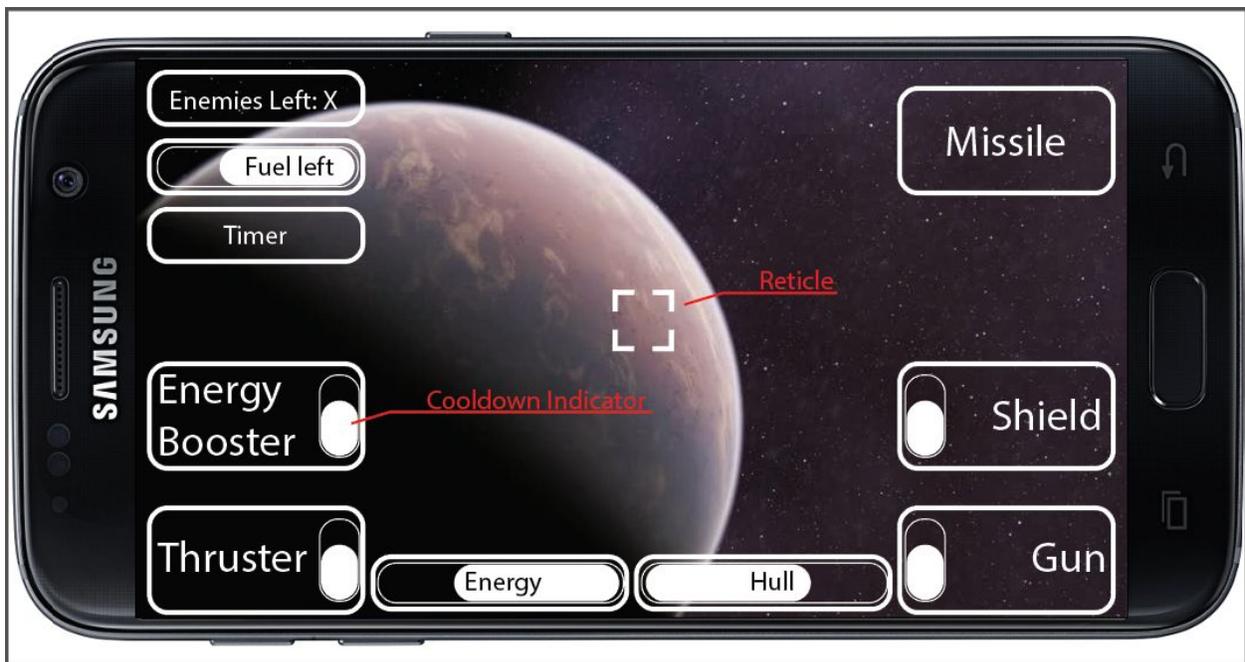
HUD includes:
- Missile
  - Changes from white to red when locked on
- Shield
  - Has cooldown bar to represent Absorb Cooldown of Shield equipped
- Gun
  - Has cooldown bar to represent the rate of fire cooldown of guns equipped
- Hull
  - Has moving bar to represent remaining Hull
- Energy
  - Has moving bar to represent current energy from total energy

- Thruster
  - Has cooldown bar to represent Thruster cooldown and how long the Thrusters are active for
  - Bar goes down while Thrusters are active
  - Bar goes up to represent cooldown status
- Energy Booster
  - Has moving bar to represent how many hits needed to use Energy Booster
  - Bar Moves down for duration Booster is active
  - Bar moves up per hit to represent amount filled
- Timer
  - Timer number down to hundreths of a second, counts up
  - Activates after initial cut scene
- Fuel
  - Moving bar that goes down over time
- Enemies Left
  - Indicates the remaining enemies left to kill before the game ends
- Lock on reticle for guns
  - Follows current enemy target while in Gun lock on radius range
  - Spins while not locked on
  - Changes color to red when locked on
- Lock on reticle for missiles
  - Only appears if in lock-on radius
  - Starts large and gets smaller to indicate lock on time lapsing
  - Changes from yellow to red when locked on
- Missile Camera
  - Only visible while missile is flying through space
  - Shows camera attached to missile
  - Sees what the missile sees

Enemy Mechanics

Summary:

Enemies fly to random points in space within a confined area. Each time they reach their destination they choose a new destination and immediately start pathing toward it. Enemies only shoot at the player if that enemy is the player's current target. Enemies get more difficult by flying faster, turning faster, shooting more often and getting more health, per level.

Enemy Stats
- Health
  - All enemies have the same Health per level.
  - Increases per level
- Turn Speed
  - Increases per level
- New Destination Turn Speed
  - Modifies Turn Speed (higher) X amount when enemy reaches their destination
  - Lowers Turn Speed over time until it reaches default Turn Speed
  - Increases per level
- New Destination Turn Speed Decay
  - The rate at which the Turn Speed lowers over time
  - Lowered per level
- Shoot Frequency
  - Random between two floats
  - Lowered per level
- Shoot Amount
  - Amount of bullets to fire when firing at the player
  - Increased per level
- Shoot Amount Time
  - The time it takes to fire all the bullets in Shoot Amount
  - Increases per level

Enemy Projectile Logic

- Update
  - Move forward
  - LookAt() Player
  - If the projectile hits the player, projectile is destroyed

Enemy Gameplay Loop

1. Set Vector3 destination
2. Path toward destination
3. When enemy is within X distance of destination, or the amount of time has elapsed that it would take for the enemy to arrive at the destination, go to 1.
   - If the enemy is the players target, the enemy will start shooting at the player until it is destroyed or the game is over.

```
┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│  Enemy AI    │   │    Start     │   │   Update     │
│    Loop      │   │              │   │              │
└──────────────┘   └──────┬───────┘   └──────┬───────┘
                          │                  │
              ┌─Yes─────→ ┌──────────────┐   ┌──────────────┐
              │           │    Set       │   │ Is Player's  │
┌─────────────┤           │ Destination  │   │   current    │
│ Destination │           │              │   │   target?    │
│  reached?   │─No─┐      └──────┬───────┘   └──────┬───────┘
└─────────────┘    │             │                  │
        ↑          └──→ ┌──────────────┐           Yes
        │               │ Fly Toward   │            ↓
        └───────────────│ Destination  │   ┌──────────────┐
                        │              │   │  Shoot at    │
                        └──────────────┘   │   player     │
                                           └──────────────┘
```
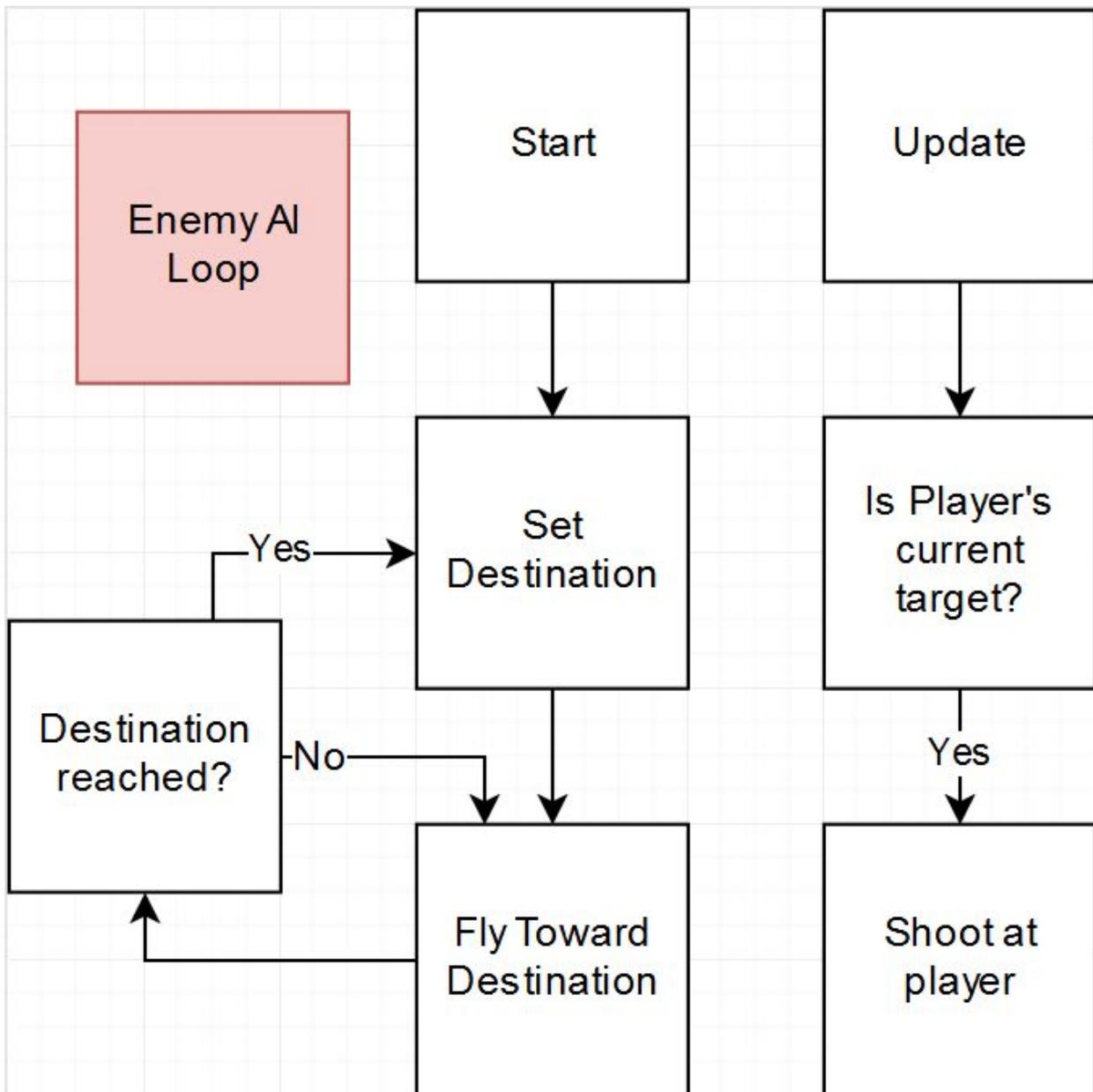
Enemy Shooting Loop
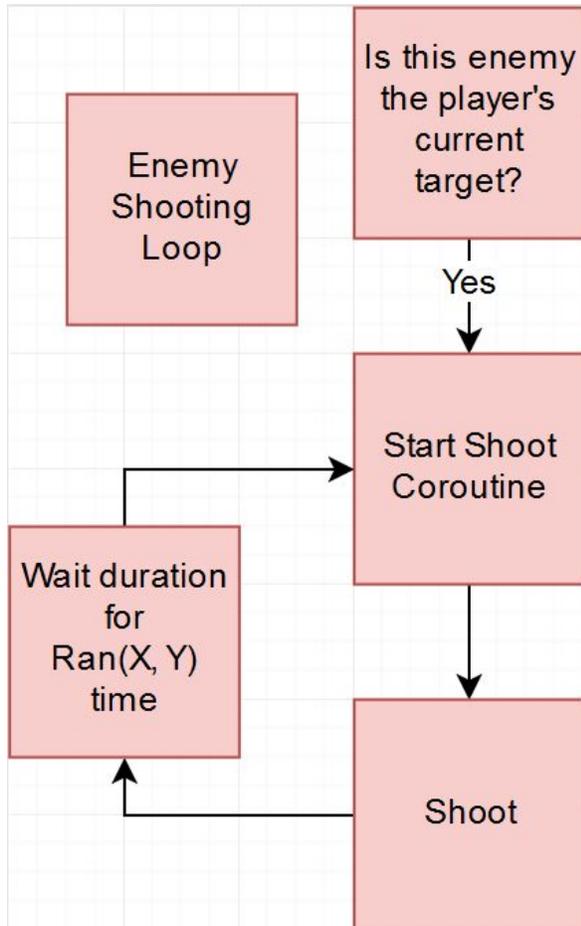
Player Item Mechanics

Player Items include Upgrades and Consumables.

Tiered Item System

- All items are of the tier of the level unlocked
  - I.e. level 8 = highest level unlocked, tier 8 items available to purchase
- Each tier has predetermined range of stats
  - Tier 1: 10-20 dmg, Tier 2: 20-30 dmg, etc.

Gun Mechanics

- Primary form of destroying enemy.
- All guns are automatic as long as the button is held down.
- Guns consume energy per shot.
- Guns can not shoot without the required energy available from the Power Core.
- Guns shoot directly at the enemy as long as the player is locked on.
- Guns shoot forward direction of the player ship if not locked on.
- Guns lead the enemy the amount necessary for the bullet to hit while locked on

Stats:
- Damage
  - Random Int set between the two numbers in that tier
  - Increases per tier
- Energy Consumption
  - Uses X Energy per shot fired
  - Increases per tier
- Rate of Fire
  - How fast a gun shoots in Rounds Per Minute
  - Decreases per tier

Power Core Mechanics

The main resource consumed by Guns and Shield.

Stats:
- Capacity
  - How much max Energy it holds
  - Increases per tier
- Energy Regeneration
  - The rate at which the Power Core passively regenerates Energy.
  - Increases per tier

Shield Mechanics

- The Shield is active as long as the Shield button is held.
- The Shield consumes energy over time as long as it is active.
- The Shield mitigates all incoming damage.
- The Shield gives energy back to the player when enemy shots are blocked, but only works one time before going on cooldown before it can absorb energy again.

Stats:
- Energy Consumption
  - Rate at which energy is used while the Shield is active
  - Increases per tier
- Energy Absorption
  - The amount of energy to gain when successfully blocking incoming fire while the Shield is active
  - Increases per tier
- Energy Absorb Cooldown
  - The time it takes before the shield can Absorb energy again
  - Decreases per tier

Thruster Mechanics

- Press the Thruster button one time to activate
- While active, Player's Turn Speed is increased by Boost Amount for the Duration
- When Duration ends, Cooldown is started
- Thruster can not be activated again until Cooldown has finished

Stats:
- Duration
  - The amount of time to increase the Turn Speed
- Boost Amount
  - The amount to increase the Turn Speed
  - Float that increases the Turn Speed by Boost Amount percentage of base Turn Speed
- Cooldown
  - The amount of time before Thrusters can be activated again
  - Cooldown starts after Duration has finished

Missiles

- Can only fire one missile at a time
- Missile instantly kills enemy on collision no matter what
- Player can only carry a maximum amount of missiles in a mission
- Player can have as many missiles as they can in their inventory
- Missile capacity can be upgraded +1 per upgrade in the upgrade menu

Energy Boosters

- Consumable item
- Gained as random loot from playing missions
- Purchasable with cash in the Store
- When active, adds 50% of total Energy Capacity to current Energy over time, very quickly for a short duration
- Can go over 100% Energy Capacity
- Cannot use while current Booster is already active
- Requires blocking 2 enemy shots to use
  - Indicated by the fill bar by the Energy Boost button

Upgrade/Shop Mechanic

- Items eligible for Upgrade:
    - Guns
    - Thrusters
    - Power Core
    - Shield
    - MIssile capacity
- Each item has its own store
    - Each store contains 3 random items of that category (3 guns, etc.)
- All items available in Upgrades is the tier of the current level unlocked
    - Level 1 = Tier 1, Level 2 = Tier 2, etc.
- Each time a new level is unlocked, all items in Upgrades are refreshed to new random items of the new current tier available
- Items under Upgrades can be purchased with Credits(soft currency)
- Once an Item has been purchased, that slot of the shop is empty until the shop gets new items
- Shops get new items one time per hour, on the hour
- Player can spend 1 missile to reset the specific Upgrade shop at any time
    - Player will be prompted with an offer to spend an additional missile to increase new shop items stats by 25% of their initial stat gap between their actual stat and maximum stat (see monetization)
    - Play can watch an ad to reset shop items
        - Will also see 25% better stats for an additional missile offer (see above)
- Items purchased from the Upgrades directly replace the equipped item of that category

Item Price System

- Price is determined by the overall stats of an item
- Each tier has a maximum price for the items

1. Find where the items current stats are compared to the lowest and highest that stat can be for the tier it is in
2. Normalize that number between 0 and 1
3. Do this for all stats and find the average
4. Multiply the tier max price by the average

$$((x1 + x2 + x3 + …) / y) * z = p$$

X = normalized average of each stat within its own tier
Y = number of stats item possesses
Z = the maximum price of the current tier
P = price of the item (goal)

Example (assuming higher is better):

Where z is 1000

$$((0.5 + 0.7 + 0.2)/3) * 1000 = 460$$

Stat 1: 5 of 1-10 = 0.5
Stat 2: 70 of 1-100 = 0.7
Stat 3: 20 of 1-100 = 0.2
(0.5 + 0.7 + 0.2) / 3 = 0.46
0.46 * 1000
Price: 460 (in soft currency)

Item Rarity System

- There are 4 tiers of rarity represented by color in the Upgrade shop
  - Starting from least to most rare:
    - White
    - Blue
    - Purple
    - Red
- Uses the stat average from the pricing formula to determine rarity
- Rarity is represented as an Int 0-4, 4 being most rare
- Item stats are determined based on a percentage randomly created between 1-100

Item Stat System

- Percent chance of selecting a specific range of the total stat range
- A number within that range is randomly selected as the stat
- Numbers used in this example are meant to be replaced with desired values with the exception of the random range for Ran

Target Stat

Ran = Random (1-100)

Total Stat Range 1-100 (of current tier)

33% Random(1-33)	33% Random(33-66)	33% Random(66-100)

Ran=1-50	Ran=50-80	Ran=80-100

Total Chance Range
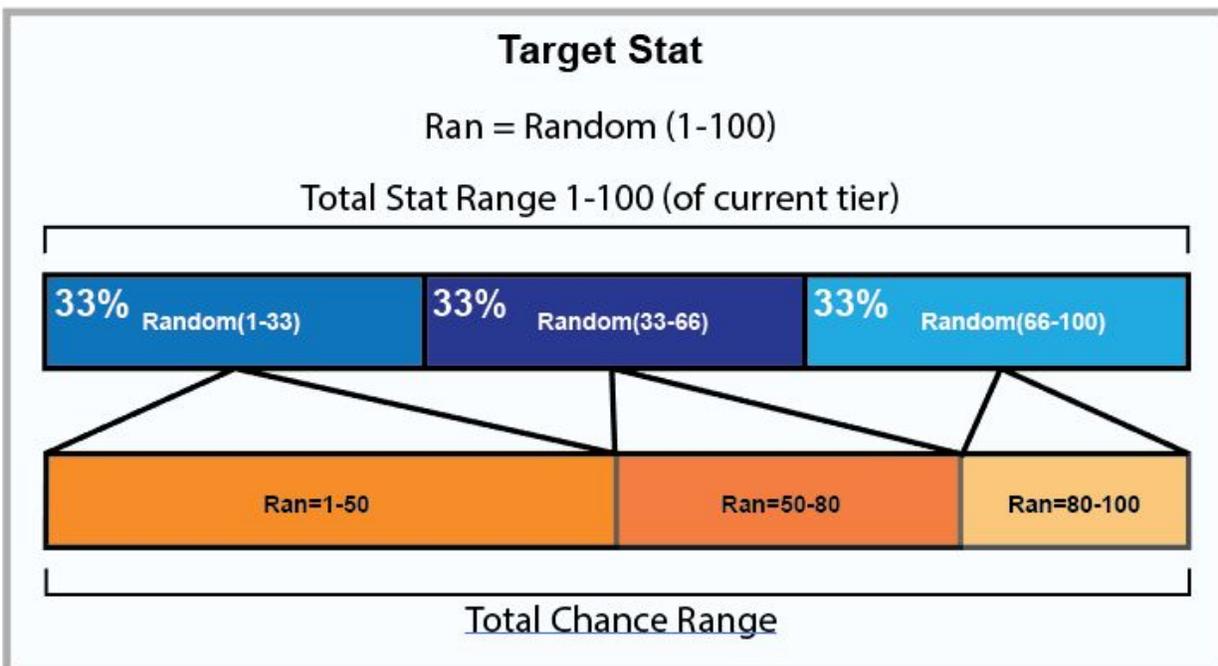
- Example shows:
  - 50% chance of randomly selecting bottom 33% of stat range
  - 30% chance of randomly selecting mid 33% of stat range
  - 20% chance of randomly selecting top 33% of stat range

Item Stat Scaling

	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4
Gun (min, max)					
Damage	5, 5	5, 10	5, 12	8, 28	12, 60
Drain	5, 5	3.5, 6	5, 15	15, 30	20, 40
Rate of Fire (RPM)	175, 175	175, 220	175, 275	200, 305	200, 335
Power Core (min, max)					
Capacity	90, 90	90, 100	100, 200	150, 300	200, 400
Regeneration	7, 7	7, 8	12, 20	14, 25	16, 30
Shield (min, max)					
Drain	18, 18	10, 18	30, 40	40, 80	50, 105
Absorb	30, 30	30, 40	40, 60	42, 85	44, 110
Absorb Cooldown	7, 7	6, 7	5, 7	4, 7	3, 7
Thruster (min, max)					
Duration	2, 2	2, 3	2, 3.5	2.5, 4	2.5, 4.5
Boost Amount	10, 10	9, 10	5, 12	4.5, 12	4, 12
Cooldown	90, 90	90, 110	90, 120	90, 130	90, 140

Tier 5	Tier 6	Tier 7	Tier 8	Tier 9	Tier 10
16, 110	23, 230	45, 460	85, 880	175, 1750	350, 3490
25, 50	30, 60	35, 70	40, 80	45, 90	50, 100
200, 365	200, 400	200, 430	200, 460	200, 500	200, 600
250, 500	300, 600	350, 700	400, 800	450, 900	500, 1000
18, 35	20, 40	22, 45	24, 50	26, 55	32, 65
60, 135	70, 180	80, 210	90, 240	100, 270	110, 300
46, 135	38, 160	50, 185	52, 210	54, 240	56, 275
2, 6	1, 6	0.4, 5	0.3, 5	0.2, 5	0.1, 4
2.5, 5	2.5, 5.5	2.5, 6	2.5, 6.5	2.5, 7	2.5, 8
3.5, 12	3, 12	2.5, 12	2, 12	1.5, 12	1, 12
90, 150	90, 160	90, 170	90, 180	90, 190	100, 210

Enemy Scaling

A	Level 1	Level 2	Level 3	Level 4	Level 5
Rotation Speed	0.5	0.68	0.76	0.84	0.92
Rot Speed Tight	1	1.3	1.4	1.5	1.6
Rot Speed Ease	0.8	0.35	0.4	0.45	0.5
Fly Area Min	-1800	-1690	-1680	-1670	-1660
Fly Area Max	1800	1690	1680	1670	1660
Speed	800	820	840	860	880
Health	25	75	150	300	600
Min Shoot Freq	5	3	3	2	2
Max Shoot Freq	7	5	4	4	3
Shoot Burst Amount	1	1	1	1	1
Shoot Burst Time	1	1	1	1	1
Credits Worth	50	100	120	145	175

Level 6	Level 7	Level 8	Level 9	Level 10	Tutorial
1	1.08	1.16	1.24	1.32	0.55
1.7	1.8	1.9	2	2.1	1.1
0.55	0.6	0.65	0.7	0.75	0.2
-1650	-1640	-1630	-1620	-1600	-1700
1650	1640	1630	1620	1600	1700
900	920	940	960	980	800
1200	2400	4800	9600	18800	15
1	0.5	1	1	1	5
3	2	4	3	3	7
1	1	2	2	3	1
1	1	0.5	0.5	0.5	1
205	240	265	295	350	20

Level Reward Scaling

Random(min, max)	Level 1	Level 2	Level 3	Level 4	Level 5
Missile (win)	(0, 1)	(0, 2)	(0, 2)	(0, 2)	(0, 2)
Missile (lose)	(0, 1)	(0, 1)	(0, 1)	(0, 1)	(0, 1)
Missile (First Win)	3	3	3	3	4
Booster (win)	(0, 1)	(0, 2)	(0, 2)	(0, 2)	(0, 2)
Booster (lose)	(0, 1)	(0, 1)	(0, 1)	(0, 1)	(0, 1)
Booser (First Win)	3	3	4	4	4
Credits (win)	200	425	675	950	1575
Credits (lose)	0	0	0	0	0
Credits (First Win)	400	800	1200	1700	2420

Level 6	Level 7	Level 8	Level 9	Level 10	Tutorial
(0, 2)	(0, 2)	(0, 2)	(0, 2)	(0, 5)	0
(0, 1)	(0, 1)	(0, 1)	(0, 1)	(0, 1)	0
4	5	5	5	5	1
(0, 2)	(0, 2)	(0, 2)	(0, 2)	(0, 5)	0
(0, 1)	(0, 1)	(0, 1)	(0, 1)	(0, 1)	0
5	5	5	5	5	1
2000	2520	2980	3540	4000	50
0	0	0	0	0	0
3360	4420	5600	6450	7500	50

Enemies Per Level

	Level 1	Level 2	Level 3	Level 4
Enemies Per Wave	2/2/2/2	2/2/2/2/1	2/2/2/2/2	2/2/2/2/2/1
Waves	4	5	5	6
Total	8	9	10	11

Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
2/2/2/2/2/2	2/2/2/2/2/2/1	2/2/2/2/2/2/2	2/2/2/2/2/2/2/1	2/2/2/2/2/2/2/2	2/2/2/2/2/2/2/2
6	7	7	8	8	8
12	13	14	15	16	16

- Enemies are spawned in waves
- A new wave is spawned once all the enemies in the current wave have been destroyed
- Can set specific amount of enemies per wave, represented in the chart by the numbers separated by slashes

Monetization

- Ads
  - Play an ad to reset a specific Upgrade shop
    - After watching the ad, the shop will replace all 3 items of that category with new random items
    - Player will be prompted an offer to spend 1 missile to make the new shop items stronger by 25%
      - 25% is based on the amount of the stat between the actual stat and the maximum stat
      - Example: Actual stat 50 (from 1-100) - Maximum Stat 100 - 25% of (100-50) 50 is 12.5 - actual stat = (50 + 12.5) = 62.5
  - Watch an ad post mission to receive double credits
    - If no credits were earned, ad option will be unavailable
- In-App Purchases
  - Missiles
    - 10 for 0.99 USD
    - 25 for 1.99 USD
    - 45 for 2.99 USD
  - Energy Boosters
    - 10 for 0.99 USD
    - 25 for 1.99 USD
    - 45 for 2.99 USD
  - Double Credits post-mission without ads
    - Player automatically gains double Credit income when finishing missions without watching ads
    - Watching ads to double income will no longer be an option
    - 0.99 USD
  - Package
    - 20 missiles
    - 20 energy boosters
    - Double Credits without ads
    - 1.99 USD

Save System

```
                        ┌──────────────┐
                        │  Game Start  │
                        └──────┬───────┘
                               │
                        ┌──────▼───────┐
                        │   Sign In    │
                        └──────┬───────┘
                               │
                        ┌──────▼───────┐
                        │Succeed or Fail│
                        └──┬────────┬──┘
                           │        │
           ┌───────────────┘        └───────────────┐
    ┌──────▼───────┐                          ┌──────▼───────┐
    │  Play Online │                          │ Play Offline │
    └──────┬───────┘                          └──────┬───────┘
           │                                         │
    ┌──────▼───────┐                          ┌──────▼───────┐
 Yes│  Signed In?  │No                        │Pick Save File│
    └──────┬───────┘                          └──────┬───────┘
           │                                         │
    ┌──────▼───────┐   ┌──────────────┐       ┌──────▼───────┐
    │Pick Save File│   │Access Denied,│       │ Save exist?  │
    └──────┬───────┘   │Sign in Warning│      └──┬────────┬──┘
           │           └──────────────┘          │        │
    ┌──────▼───────┐                      ┌───────▼──┐  ┌──▼────────┐
  No│Cloud save    │Yes                   │Start fresh│  │Load local │
    │  exist?      │                      │  game     │  │  file     │
    └──┬────────┬──┘                      └──────────┘  └───────────┘
       │        │
┌──────▼──┐  ┌──▼────────┐
│Start    │  │Load Cloud │
│fresh game│ │  Save     │
└─────────┘  └───────────┘
```