

Game Design Roles

GAV4022-N

Pre-Production Documents

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1. Story / Level progression:

Year 2100. Alien forces are invading our space. Earth's technology is not yet advanced enough to defend itself with its own weapons. Instead, all countries around the world came together to build a strong spaceship that can absorb enemy's projectiles and repel them back. This is the only weapon available to humans. The closer the absorbed projectile to our spaceship the stronger the force repelled back to the enemies. But be careful. You can only absorb ONE projectile each time, so shoot back the one you have before trying to absorb a new one. As a talented pilot you are chosen to lead the operation "Peace in our time" successfully. Your mission is to strike back the enemies with their own projectiles while trying to avoid being hit.

Their space force is strong. Our radars detected a well-structured team of spacecrafts. They come in difference sizes and with different weapons. Be prepared. Some spacecrafts are small and some bigger. The enemy will not bother sending all their forces at once. Instead, the enemy will test your capabilities to protect the earth by sending spacecrafts to fight you, gradually. These waves of enemies will be more and more difficult. The bigger the size of the enemy the stronger and powerful he is. Destroy every wave of enemies' spacecrafts that will come towards you until you successfully destroy their master spacecraft.

When shooting, land the spinner on the green or the orange colour and shoot back to the enemies double or single power respectively. Be careful though, land the spinner on red and you will automatically hit yourself.

An orange spaceship will aid you with extra projectiles or even better shields for your spacecraft. You will have to take it down to earn any bonus. Absorb the enemy's projectile close enough to you and you will be firing an extra projectile towards the enemy. Our sensors can detect whether something vile or something good is approaching you. Your laser beam will turn red or green respectively.

You can be hit six times before your spaceship becomes destroyed and you die in the outer space having failed to save us.

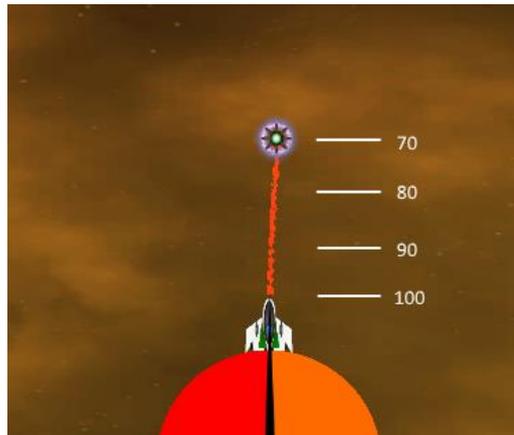
You are the chosen one. Humanity relies on you. Protect the human race!!!

2. Mechanic and opponent/objective matrices

2.1. Gameplay and mechanic iterations

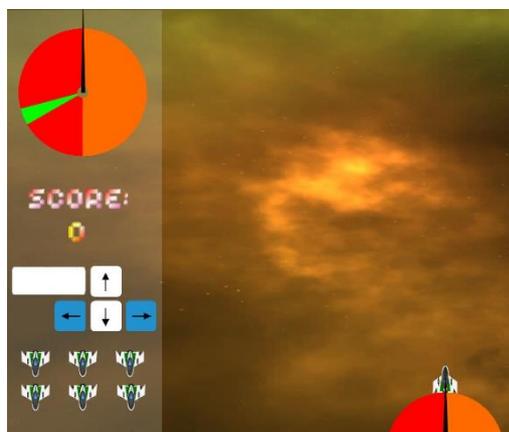
This game uses the “tap on time” mechanic. This means that you have to press a key at a specific time at a specific position at a certain speed. The mechanic iterations are as follows:

1. The player must press the (“Down Arrow” or “Space” or “S”) key when he sees a red laser beam, in order to absorb the enemy’s projectile. The projectile starts at 0 and can reach up to 100 (See Picture 1). The closer the projectile to the player the more damage the player will inflict. The player will use these damage points through the following iterations in order to shoot back to enemies.



Picture 1: If player would press button now, he would gain 70 power

2. When the player has absorbed the enemy’s projectile, a spinning wheel starts to spin. When (“Up Arrow” or “Space” or “W”) key is pressed, the wheel stops, and the player shoots automatically. The player must be at the correct position in order to successfully hit the enemy. If the arrow points at green, the absorbed projectile (from the 1st iteration) doubles the damage and hits an enemy without missing (“guaranteed hit”). If the arrow lands on orange, there is no extra power gained (e.g. If absorbed power is 78 it will remain 78). If it lands on red, the player takes the damage, which translates into losing a life (see Picture 2).



Picture 2: The wheels (top left & below player), both shows the same simultaneously.

Choose to see whichever suits you.

3. If the power absorbed is 85+ (see Picture 1), the player will shoot an extra projectile (“guaranteed hit”). This happens after wave 3 “when” and “if” the player manages to earn a new “skin” (spaceship) from the helping spacecraft (see Picture 2).



Picture 2: The helping spacecraft (orange/ top),
when hit, gives you bonuses

4. In combination with the other iterations, the 4th consists of the player’s movement (“Left Arrow” & “Right Arrow” or “A” & “D”) and his right position at the right time. Not only the right color on the wheel must be hit, the player must have the right position when he does so in order to hit an enemy otherwise his attack will miss.

2.2. Other Entities

As far all other entities are concerned, there are 5 different enemies, a spacecraft with bonuses, a clock that stops enemies, a side bar (spinning wheel, score counter, keys, lives). (See Picture 4).



Picture 3: Top: Enemies easy to Boss (left to right)
Bottom: Spacecraft with bonuses (left), clock (right)

The enemies appear gradually throughout the game and their difficulty increases too. Below is a table of the enemies that exist and at the table 2 is the order the enemies appear.

Enemies	Health	Speed	Projectile Speed	Shooting frequency (sec)
Easy	100	80	50	2
Normal	150	90	50	1.5
Medium	200	90	50	1
Hard	250	100	80	0.75
Boss	500	110	80	0.5

Table 1: Enemies characteristics

Waves	Enemies	Waves	Enemies
Wave 1	E	Wave 7	NNM
Wave 2	EE	Wave 8	NNMM
Wave 3	EEE	Wave 9	MMH
Wave 4	EEE	Wave 10	MHH
Wave 5	EEEN	Wave 11	HHH
Wave 6	ENN	Wave 12	B

Table 2: E= Easy, N= Normal, M= Medium, H= Hard, B= Boss

The spacecraft with the bonuses, will reward the player with a better spaceship (skin) on waves (stages/ levels) 3, 6 and 9. If the “skins” are acquired, the player will gain the following:

- a. On wave 3 onwards, the player will do extra damage to an enemy if the projectile absorbed is more than 85.
- b. On wave 6 onwards, the player will be able to “freeze” the enemies with the clock for an additional 5 seconds. (+ a).
- c. On wave 9 onwards, the player’s new spaceship will be able to destroy enemies’ projectiles whenever they hit the small spaceship that orbits around him (+ a & b).

2.3. Rational Design

2.3.1. Iteration: Absorb enemy’s projectile

1. Goal of gameplay = Destroy all enemies
2. Mechanic = Press key on time (to power up your attacks)
3. Needed skills = Reflexes, Precision, Timing
4. Inputs = “Down Arrow”, “S” or “Space”
5. Atomic Parameters = Accuracy, Window of opportunity

Atomic Parameters	No case	Easy	Medium	Hard
Accuracy	No projectile	Projectile towards you	Move to find projectile	2+ projectile towards you
Precision (points earned)	Failed to absorb	Absorb when projectile far	Projectile mid-way	Projectile close to player
WoO (gameplay)	No enemies	Slow speed projectile	Medium	Fast
WoO (enemies paused*)	No clock is hit	Paused for long time	For medium time	For little time

**When clock is hit (waves 1 – 5 => Clock = 5s, waves 6+ => Clock 10s)*

6. Level Design Patterns

- a. An easy precision with a WoO would be if the player hit the clock and enemies paused for 5 seconds and the player was below enemy to absorb his projectile.
- b. An easy precision with a non-WoO would be absorbing the projectile when it is far, and the enemy is moving fast.
- c. A single projectile with a slow or normal speed.

2.3.2. Iteration: Spinning wheel

1. Goal of gameplay = Destroy all enemies
2. Mechanic = Press key on time (to stop the wheel and shoot automatically)
3. Needed skills = Reflexes, Precision, Timing
4. Inputs = "Up Arrow", "W" or "Space"
5. Atomic Parameters = Accuracy, Window of opportunity, predictability

Atomic Parameters	No case	Easy	Medium	Hard
Accuracy	No ammo	Choose to hit the orange		Hit green
WoO (points earned)	No ammo	Orange (absorbed * 1)		Green (absorbed * 2)
WoO (shoot enemies)	No ammo	Hit orange & be under enemy	Orange & follow enemy	Green (guaranteed hit)
Predictability (spinning wheel)	No change	Repeating pattern & same colors	Repeating pattern & mixed colors	Random colors & spinning (left/right)

6. Level Design Patterns

- a. A repeating pattern with the same color on the spinning wheel accompanied by hitting the orange (which is the bigger size)
- b. Alternative same pattern of colors and hitting the green
- c. Hitting green for double points and "guaranteed" hit with same color pattern on the spinning wheel.

2.3.3. Iteration: Shoot in time

1. Goal of gameplay = Destroy all enemies
2. Mechanic = Press key on time (to shoot while moving, 2.3.2 combination)
3. Needed skills = Reflexes, Precision, Timing
4. Inputs = "Up Arrow", "W" or "Space"
5. Atomic Parameters = Accuracy, Window of opportunity, Predictability

Atomic Parameters	No case	Easy	Medium	Hard
Accuracy (wheel & enemy)	Ammo missed	Orange & big size enemy	Orange & medium size enemy	Green & any size enemy*
Predictability (enemy position)		Enemy moving left or right	Moving left/right and up/down	Random movement
WoO (shoot enemies)		Enemies paused	Slow enemies	Fast enemies

**because green is a guaranteed hit but small size*

6. Level Design Patterns
 - a. Easy accuracy with orange and bigger enemies who are paused.
 - b. Orange and only left or right movement
 - c. Orange and random movement
 - d. Orange and slow enemies

2.3.4. Iteration: Shoot extra projectile

1. Goal of gameplay = Destroy all enemies
2. Mechanic = Press key on time (to shoot an extra "guaranteed" projectile)
3. Needed skills = Reflexes, Precision, Timing
4. Inputs = "Up Arrow", "W" or "Space"
5. Atomic Parameters = Accuracy, Precision, Window of opportunity, Predictability

Atomic Parameters	No case	Easy	Medium	Hard
Accuracy (absorbing)	No projectile	Projectile slow speed	Medium speed	Normal/ fast speed
Precision (absorbing)	No projectile	-	-	Very close to player*

** because only when it is very close to the player you gain an extra projectile*

2.3.5. Opponents/ Objectives

Atomic Parameters	No case	Easy	Medium	Hard
Accuracy (enemies)		Big sized	Medium sized	Small sized
Measurements (enemies)		80% screen size	45% - 55%	15% - 20%
Shooting Frequency (enemies)		Shot / 2 sec	Shot / 1 sec	Shot / 0.5 sec
Speed (enemies)		Slow	Normal	Fast
Shooting/ Moving Anticipation*		Full life & easy or normal enemy	Little life & medium enemy	Little life & hard or boss enemy
Predictability (orange spaceship)		Appear every 15 sec & same position	Every 15 sec & different position	Random seconds & random position

**because when medium, hard and boss enemies have little life they move and shoot faster*

Level Design Patterns

- a. Slow speed enemies and 2 sec shooting frequency.
- b. Slow enemies and faster shooting frequency.
- c. Slow enemies and big sized.
- d. Slow enemies and small size.
- e. Little life enemy and late shooting frequency.
- f. Little life enemy and 0.5 sec shooting frequency.

2.4. Keyboard Keys

In order to not overwhelm the player with many keys, there was a continuous change of keyboard till the finished product. That's why those keys were selected (game is possible even with one hand):

- Left/Right Arrows (or A/D): Movement
- Down Arrow (or S): Absorb
- Up Arrow (or W): Shoot

If someone wants to, he can also use Space for Absorb and Shoot. The keys are also visible during gameplay on the left sidebar. Each key in the sidebar with change colour if you have to press it.

2.5. Rewards and Chances

There is “mixed” reward schedule in the game. There is a fixed reward, where the orange spaceship appears every 15 seconds and you gain bonus and points by shooting it. There is variable ratio reward, where the spaceship orbiting around player, is striking a random enemy when 85+ absorbed power achieved.

The game is a chained schedule reward because the player has to kill all the enemies in the wave in order to fight more enemies till the last one. Lastly, punishment can be seen in the game when the player’s arrow in the spinning wheel points at red or when he is touched by enemy’s projectile. In both ways, the player loses a life immediately.

Finally, randomness is part of the code to make the game more interesting in situations like whether the enemy will move up or down, left or right. Another example is whether the spinning wheel will spin clockwise or counter clockwise, or which enemy will be hit with “bonus” projectiles.

3. Production Plan and Development Schedule:

The flowchart below (Chart 1) shows the necessary steps from the beginning till the end of the game and on the table below is the development schedule. It starts with brainstorming ideas in order to find which mechanic will be used for three iterations. In this case, ‘press a key on time’ (fast and in position). For this project, “Space invaders” the arcade game will be used, and the mechanic will be implemented on top of that.

The most essential components in the game are the ones that show the mechanic. The player’s laser beam that shows that he is ready to absorb the enemy’s projectile and the power gained is determined on the distance of the enemy’s projectile from the player (smaller distance, more power). On top of that, when “risk it all”, player can earn an extra shot by choosing to absorb the projectile when it is really close to him. Moreover, the spinning wheel is crucial component too because it determines whether the player will double, single or get the hit.

During the creation process, a problem that may occur is getting the right colour from the spinning wheel since it is moving fast enough for the trigger to miss detection. Another problem may be the physics needed for enemy’s projectile when falling or some player’s projectiles that need to fire back quickly or even have a “guaranteed” hit that will follow the enemy till it hits him. In addition, the use of particles effects can be a problem since I have little knowledge on them. Finally, a “difficulty” problem may occur if player and enemies are treated differently in ways that enemies grow stronger, but player does not.

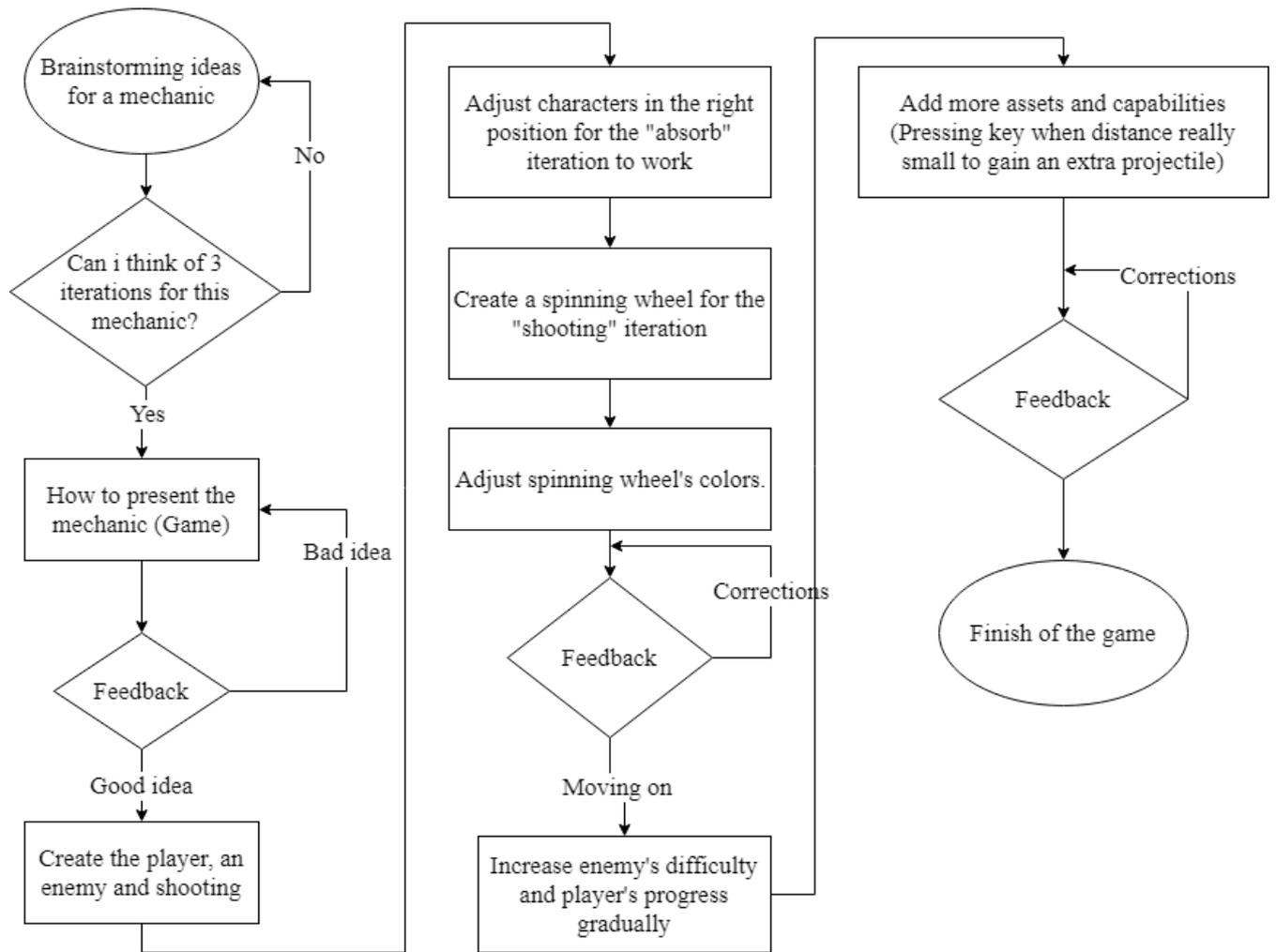


Chart 1: Project Flowchart

4. Comparison synopsis:

As we've seen in the various matrices in this document, there are a lot of different characteristics that can influence the gameplay. Based on the story so far, enemies appear gradually, and their skills become stronger over the player. By keeping enemy's projectile speed and shooting frequency throughout the game player will be bored easily because he will be stronger with easier enemies.

Enemy sizes change the "abnormal" way. They start small and grow bigger, which supposedly means that they will become easier but by changing their speeding and shooting values, an easy and interesting flow is maintained.

On the other hand, when the arrow in the spinning wheel lands on green then the player is awarded with a projectile that won't miss, compared to the orange where the player must be beneath the enemy when he shoots. If we demote that from the player, then he may will not be equally strong for the levels to come.

Enemy's random movement is implemented to make the game more unexpected and not follow a repeating pattern. Enemies, when reaching either end of screen, randomly choose to either go the other way or up and down.

Moreover, if the game was up for a full game and not just a sample, more atomic values could be altered in the future. The player's accuracy could be altered, as well as the spinning wheel. The spinning wheel, in the future, after passing some waves (levels), could have random allocation of colours or even different sizes, like the orange which could become smaller and smaller.

Finally, the player will be able to understand how the enemy's and player's characteristics are changing while playing the game, as stated in the game synopsis/ scenario. Alongside with this, the player will engage to the game as a combined form of reward schedules are used to reinforce, such as gaining extra spaceship, projectiles or even change of spaceship (different "skin") as well as the enemies will be properly difficult for player at any given time.