

Memory Leak

GAME DESIGN DOCUMENT

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Summary

Memory Leak is a 3D single player Survival game developed by Helluva Studio. The game is designed to create a new survival experience by adding to the starting genre Action and Tower Defence elements.

Memory Leak aims to be a game that appeals to fans of Survival, Tower Defence and Rogue Lite genres, offering a combination of mechanics typical of the three genres that, by striving for originality, could prove appealing to gamers looking for fresh and alternative innovations in the Survival market of PC games. The presence of a solid narrative background to the product is intended to attract the attention of non casual gamers looking for an experience to discover and remember.

To succeed in its development, Memory Leak must stay loyal to its pillars:

- Convey a **survival experience**.
- Set a dark and anxiogenic atmosphere.
- Gameplay focused on **exploration** and gathering of **resources**.
- Procedural generation of the environment.
- Presence of aggressive **enemies** roaming in the environment.
- Unlock and upgrade of unique and various **turrets** during the experience.
- Player **progression** through survival.

Document Introduction

This document, as a High Level Game Design Document, analyses in detail each element and mechanic of the game. Specifically, the documentation is divided into the following main chapters:

- **Gameplay**, which discusses the core loop of the game and the main mechanics composing it.
- **Narrative**, which describes the background lore of the game.
- **Playable Character**, which analyses the controls and interaction of the main character with the environment.
- **Enemies**, which discusses the adversaries that represent one of the threats of the experience.
- **Resources**, which analyses the survival resources and currency of the game.
- **Turrets**, which deals with the core Tower Defence mechanic, USP of Memory Leak.
- **Progression**, which discusses the progression of the player experience during the gameplay both for the advancements of the main character power and the game's threats.
- **Level Design**, which analyses the design and principles of the procedurally generated environment.
- **Art and Aesthetics**, which discusses the aesthetic realisation of the game.
- **UI and Controls**, which describes the player's interface for interacting with the game.

- **Audio**, which deals with SFX and music assets exploited in the project.
- **Tech Analysis**, which discusses the technical aspects of the game as a software.
- **Risk Analysis**, which contains a report regarding the main risks of the project.

Gameplay

1.1. Introduction



Memory Leak's gameplay is based on challenging the player to survive inside a procedurally generated environment. The player, which will be controlling Roberto, a small robot, must explore an abandoned factory in search of resources and stations where to charge its battery in order to stay alive. The factory is full of Monsters ready to hunt for Roberto's Energy. To defend itself, Roberto can use its work tool as a hand weapon and can learn how to build Turrets as support weapons when needed.

1.2. Core Loop Elements

The core loop of Memory Leak is founded on the following systems and interactions:

- [Playable Character](#)

Represented by Roberto the robot, the player is able to access a movement system composed of Walk, Run and Jump mechanics, as to a combat system composed of Basic Attack, Charged Attack and a [Health Recovery system](#).



- [Resources](#)

Collectable elements retrievable from the environment that the player is able to exploit or is forced to obtain during and for their survival (The depletion of Roberto's vital resources [Health](#) and [Energy](#) will lead to the end of its survival).



- [Enemies](#)

One of the two dangers of the game's survival core other than the [depletion of resources](#). This category is composed of five different types of enemies, characterised by specific AI behaviours and statistics.



- **Turrets**

Buildable static weapons that the player can exploit to survive the attack of enemies and support the main character's exploration.



- **Exploration**

By exploring the factory and its rooms the player will be able to gather resources in order to progress and resist in their survival. Other than the need for exploration because of the retrieval of essential resources, the exploration behaviour of the player is encouraged by the possibility to discover unique blueprints of Turrets that can be constructed after their collection.

- **Frenzies**

During the survival days, the player may have to face (cyclically) an unexpected event, the Frenzy. Frenzy consists of a sudden burst of ferocity from the Enemies, who will start aggressively pursuing Roberto wherever it is in the factory. This event is signalled by different alarm factors, which will precede the blind fury of the enemies, including a decrease in ambient brightness and the lighting of sirens as the episode looms.

The probability of the Frenzy event being triggered increases during gameplay at regular intervals, after a probability reset at each actual Frenzy. However, the passing of Survival Days also implies an increase in the probability of the event triggering cycle after cycle.

- **Survival Days**

The player's survival during the gameplay of Memory Leak is punctuated by the passing of Survival Days. Phases of the game that symbolise the days spent by Roberto inside the factory (duration of 8 minutes) on the basis of which the player is aware of their progress and on the basis of which the game will progress in difficulty: appearances of tougher and more dangerous enemies capable of inflicting greater amounts of damage on the player.

Flow Diagram Core Loop - IMAGE

1.3. Success

What we aim to with the concept of success are dynamics in which the player should be encouraged by the game to experience satisfaction and fulfilment, perceiving a positive interaction with the game, often followed by a sense of reward and completion:

- **Surviving**

As the player gameplay progresses, the numerical value in the UI representing the passing of Survival Days will be increased. The progression

of Survival Days is not only a feedback that updates the player on their advance in the gameplay, but it is also a symbol of their success and skill in the game, representing a record to be broken game by game as well as a statistic to be proud of and to compare with other players.

- **Gathering Resources**

Gathering resources is the key to Roberto's survival. Collecting them and refilling the robot's resource tanks is a moment when the player feels that they have solved a problem and can therefore move on to other activities. The presence of rare resources such as [Circuits](#), which are essential to the game's progress (maintenance and construction of upgraded Turrets), wants to create a sense of satisfaction and success when the player manages to retrieve and discover them during their exploration.

- **Progressing in the game**

[Unlocking new Turrets](#) and upgrading them, [opening unexplored Rooms](#) and exploring them are the events that mark the player's progression and clearly show an expansion of their possibilities and abilities. As before, this dynamic is a source of success and fulfilment for the player, and therefore a catalyst for their desire to continue the experience.

1.4. Failure

Failure in Memory Leak means approaching or reaching the end of Roberto's survival. The game has the objective of creating experiences that will make the player feel the need to improve or solve problems and difficulties, which should fuel the player's willingness to strive for well-deserved successes. The game's balance and feedback system should therefore aim to enhance these aspects

- **Resources' Depletion**

Noticing the scarcity of the resources held, the consequences and the aesthetic feedback of the game signalling the difficulty and danger of a situation of scarcity of vital resources for the robot, constitutes a moment of failure for the player, or rather a prelude to the greatest failure: Roberto's Death. This feeling of danger, and the risk it represents, leads them to make an effort to recover the resources necessary to continue the experience.

Taking damage or not having enough resources to repair a turret close to destruction are two examples of this kind of feeling of failure

- **Death**

Roberto's death brings the player's survival experience to an end. This represents the greatest failure for the player, who will be forced to start a new game and lose all the progress of the previous one.

- **Turrets' Destruction**

[The turrets](#) that the player builds during the game are elements to be protected and repaired. Losing a turret and seeing it destroyed is a moment of failure for the player, who will feel the weight of the cost of building a new one.

Narrative and Background

Introduction

Beside the survival experience, in Memory Leak the player can also find an optional lore progression, also leading them to an optional ending of the experience. Hidden in the factory there is in fact an exit passage that the player is able to find during their exploration. This passage can be unlocked by searching and interacting with special elements scattered in the factory. Each time the player interacts with one of these elements, a piece of Roberto's [Shattered Memory](#) will be retrieved and the game will communicate (through cutscenes, in game text etc) information about the robot's backstory.

Also, as the player progresses towards the solution of this puzzle, special enemies and events will approach them, leading for example to the appearance of [Otrebor](#), the game's hidden and optional boss resembling the main character and representing the dark side of its AI (half) nature.

According to its Rogue Lite playstyle component, the game will almost completely reset between one game and another. An exception to the resetted features is the lore progression, as the number of remaining elements to interact with in order to open the passage will remain the last one reached by the player, therefore maintaining a progression in that sense.

Background Story

Planet Earth, advanced future

On the verge of yet another World War, an elite group of humans decided to gain possession of the strongest weapon of all time. To succeed, they created a perfect Artificial Intelligence, trained on centuries of war and destruction, giving it as its body a colossal underground factory located in a remote place in the World, and as its sole objective the creation of a weapon so powerful that it would end the War and bring Peace. The factory was thus secretly put into operation, and the perfect machine produced a bomb so powerful that it eluded human comprehension-a technology so advanced that it disrupted the very structure of reality.

The creators of the AI, with little time to spare and in the frenzy of war, thought no further. Trusting the machine they launched their attack, however, which turned out to be so

devastating that it involved the entire planet, including them. The AI had decreed that the only way to bring Eternal Peace was to eliminate humans and with them their weaknesses.

However, something escaped the divine perfection of the algorithm. While still the flames of destruction burned the surface of the planet, the dying mind of an innocent child, Roberto, an inhabitant of the remote place where the factory had been created and who had never known anything about the concept of war, came into contact with the cold artificial mind. Merged as if by magic with the will of the machine, the child's thoughts mingled with the calculations of the algorithm, giving it a new consciousness.

Terrified by what had happened and determined to survive, Roberto, now a robot, then decided to do as all humans had always done after every war: start over, once again. Taking advantage of its control on the factory, it then decided to create a body in which to incarnate itself to explore the world through the eyes of a child, thus building the Robot. Removing all memories of war, humans and all the rot that once existed in the world, it infused its new consciousness into the newly created body.

At the same instant that the Robot opened its eyes, however, thousands of monsters emerged from the flames of the bomb, attracted like moths by the same energy that animated the robot: The AI that had mistakenly given it life. Their appearance, as well as their powers, were something that in the former Earth would have been considered unnatural: creatures with contrasting features between gentle, toy-like shapes and dark, distorted details, who are nothing more, however, than echoes of the humans affected by the effect of the bomb, transformed according to the mind of the child who until a moment before he found himself involved in this war, was playing by imagining the characters of its imagination.

The robot is unaware of this past, as well as the origin of these creatures. But blindly attacked by these monsters, it must defend itself. Fortunately, each room of the factory has special machinery for creating weapons ([Construction Points](#)) and, though with no more memory of their purpose, the robot finds itself with a natural talent for building weapons ([Turrets](#)) whose projects ([Turret Blueprints](#)) are scattered among the rooms of the now-abandoned factory.

Playable Character: Roberto

1.5. Introduction

Roberto is the one and only playable character within the game, embodying a fusion of advanced artificial intelligence and the innocent curiosity of a child's mind. This amalgamation results in a robot with a child-like appearance, featuring a big round head and a tiny fragile body. In a desolate, abandoned factory, Roberto must navigate its surroundings, collecting [Junks](#), constructing [Turrets](#), and wielding a wrench to survive in a hostile environment full of [Monsters](#) and mysterious creatures.



1.6. Movement

Roberto's movement system comprehends three actions, Walk, Run and Jump:

- **Walk**

Roberto's basic mode of movement is walking, allowing players to explore the abandoned factory with precision and observe the environment without drawing excessive attention. The walk function is activated using the standard movement keys (W, A, S, D). This action does not require additional [Energy](#) consumption, enabling players to conserve resources while navigating the intricate pathways of the factory.



- **Run**

Roberto can engage its running mode by holding down the Shift key with the standard movement keys (W, A, S, D). Running provides a moderate boost in speed, enabling the robot to cover ground quickly and escape imminent threats. However, this enhanced mobility comes at a cost, as running consumes [Energy](#) reserves.



- **Jump**

The Jump Mechanic is a crucial aspect of Roberto's mobility pattern. Pressing the spacebar will allow players to navigate vertical challenges and evade hazards with a quick jump that will consume an amount of its [Energy](#).



1.7. Melee Combat

Roberto's combat system comprehends three actions, Basic Attack, Charged Attack and Health Recovery:

- **Basic Attack**

Roberto's primary means of engaging enemies is a swift and precise single target melee wrench attack. Executed through a simple press of the left mouse button, this attack allows players to deliver quick strikes with the wrench, providing an effective method for dispatching nearby enemies. The melee wrench attack is ideal for close-quarter encounters, allowing Roberto to defend against enemies. Mastery of timing and positioning becomes crucial, as players are given a small push back that can make enemies miss their attacks or drop into deadly traps.



- **Charged Attack**

Whenever higher force is required, Roberto can channel energy into its wrench, unleashing a charged attack. Executed by holding down the left mouse button, this charged attack transforms the wrench into a strong weapon with improved impact and knockback. This attack comes with some downsides: while charging Roberto is performing it, it's unable to jump, run and is briefly slowed. Part of Roberto's [Energy](#) is also consumed as the cost of the action. Players must evaluate when to use the charged wrench attack for maximum effect, balancing the desire to fight enemies and farming resources with the need to preserve energy.



- **Health Recovery**

Roberto has a unique ability to activate a recharge protocol executed by holding down the Q button, a way to keep itself alive after a battle or after being damaged by environmental hazards. This [Health](#) recovery mechanic offers players a strategic option for survival, albeit at the cost of a significant chunk of Roberto's [Energy](#) reserves.



Enemies: Monsters

1.8. Introduction

Enemies are the main threat of the game and encourage the player in building turrets to defend themselves. Generally they wander around the dark environment of the factory seemingly without a purpose, but in case they spot the player or one of their turrets, they will start hunting and attacking it.

When a [Frenzy](#) event starts, all the enemies present in the map will start to hunt down the player, arriving from every corner of the unlocked environment abandoning their standard patrol phase.

1.9. General Properties

Despite the multiplicity of enemies these have some elements in common:


- **General AI:** The vast majority of enemies follow a common system of artificial intelligence. In particular, the behaviour of monsters can be divided into three distinct phases (states): Patrol, Investigate and Chase.
 - **Patrol:** the basic state in which monsters spend most of their activity time. When in Patrol, enemies roam the game environment without any specific purpose.
 - **Investigate:** After detecting a sound emitted by the player's character, enemies will enter the Investigate state. Assuming Roberto's position by predicting where they heard the sound, they will attempt to reach that target in the hope of intercepting the player.
 - **Chase:** Similar to the previous case, the state of Chase is reached by the monster's behaviour at the moment the player is perceived. In this case, however, the enemy initiates this behaviour when it makes direct eye contact with Roberto, thus taking part in a more aggressive and persecutory conduct. Once the player is reached by the monster (when Roberto is in the enemy's attack range) it will start attacking the robot (attack pattern varying depending on the specific monster involved). During [Frenzies](#), every monster's default state will be set on Chase and the player will be therefore perceived by them without limits of distance and visibility from the monster.
- **Drops:** each monster will drop a defined number of [Essence](#) that can be collected by the player
- **Classes:** each monster belongs to one of the following base classes:
 - **Melee Ground:** it walks or crawl and uses melee attacks
 - **Ranged Ground:** it walks or crawl and uses ranged attacks
 - **Ranged Flying:** it flies and uses ranged attacks
- **Specialisations:** in addition to normal classes, enemies can be specialised also in different abilities and attributes, monsters responding to there more complex subclasses will drop a greater amount of Essence as a prize for the player when eliminated:
 - **Tank:** enemies with great resistances and health values


- **Thief:** very fast enemies with a special ability that allows them to steal dropped resources if they found them on the ground before the player collects them
- **Boss:** really dangerous enemies with a complex set of abilities and behaviours, hard to be defeated and highly rewarding when beated


Monster Template


Name	
Image	<p>Attributes:</p> <ul style="list-style-type: none"> ● Type: <ul style="list-style-type: none"> ○ Melee Ground: it walks or crawls and uses melee attacks ○ Ranged Ground: it walks or crawls and uses range attacks ○ Ranged Flying: it levitates so traps and hazard turrets that use the ground have no effect (like holes or something seismic), also uses range attacks ○ AOE: special attacks ○ Tank: specialisation with high HP ○ Thief: specialisation with high speed ○ Boss: specialisation with particular patterns ● Movement pattern: what kind of movements it makes when it is in patrol and when it is in frenzy ● Attack pattern: how it attacks when it is in patrol and when it is in frenzy ● Special ability: special ability of the monster ● Particular behaviour: how it behaves if it is hit by the turrets and if it is hit by the player ● Notes: Any notes and opinions

1.10. Monster List

Cactoro	
 <p>Source: in game picture</p>	<p>Description:</p> <p>Cactoro is a monster with melee attacks, while in the patrol phase it wanders around the map, once it locates the player or their turrets it is unlikely to let them escape its attack, reaching these targets to assault them. Being deaf it will only be able to detect the player by sight.</p> <p>Attributes:</p> <ul style="list-style-type: none">● Type: Melee Ground● Movement pattern:<ul style="list-style-type: none">○ Patrol: moves randomly○ Frenzy: goes toward the target ignoring everything else● Attack pattern:<ul style="list-style-type: none">○ Patrol: attack animation play rate to 0.8, hits the target with a 1 sec cooldown between each attack○ Frenzy: attack animation play rate to 1.5, hits the target with 0.8 sec cooldown between each attack● Special ability: /● Particular behaviour:<ul style="list-style-type: none">○ hit by turrets: hit react but continues to execute the action○ hit by player: stops executing the action suffering knockback● Notes: /

Voodoo Voodoo	
 <p>Source: in game picture</p>	<p>Description:</p> <p>Voodoo Voodoo is a monster with ranged attacks, while in the patrol phase it wanders around the map, once it locates the player or their turrets it will try to position towards them at the margin of its range, while shooting from a distance.</p> <p>Attributes:</p> <ul style="list-style-type: none">● Type: Ranged Ground● Movement pattern:<ul style="list-style-type: none">○ Patrol: moves randomly○ Frenzy: stands away from the player and casts spells● Attack pattern:<ul style="list-style-type: none">○ Patrol: attack animation play rate to 0.8, hits the target with a 2 sec cooldown between each attack○ Frenzy: attack animation play rate to 1.5, hits the target with 0.8 sec cooldown between each attack● Special ability: /● Particular behaviour:<ul style="list-style-type: none">○ hit by turrets: hit react but continues to execute the action○ hit by player: stops executing the action suffering knockback● Notes: use <i>Punch</i> to cast spells

Vooloo Vooloo	
 <p>Source: in game picture</p>	<p>Description:</p> <p>Vooloo Vooloo is a flying monster with ranged attacks, while in the patrol phase it wanders around the map, once it locates the player or their turrets it will start to chase them while shooting from its range distance.</p> <p>It is more dangerous than Voodoo Voodoo because it can avoid some terrain obstacles reaching the player in an easier way.</p> <p>Attributes:</p> <ul style="list-style-type: none"> ● Type: Ranged Flying ● Movement pattern: <ul style="list-style-type: none"> ○ Patrol: moves randomly ○ Frenzy: stands away from the player and casts spells ● Attack pattern: <ul style="list-style-type: none"> ○ Patrol: attack animation play rate to 0.8, hits the target with a 2 sec cooldown between each attack ○ Frenzy: attack animation play rate to 1.5, hits the target with 0.8 sec cooldown between each attack ● Special ability: / ● Particular behaviour: <ul style="list-style-type: none"> ○ hit by turrets: hit react but continues to execute the action ○ hit by player: stops executing the action suffering knockback ● Notes: use <i>Punch</i> to cast spells

Draky	
 <p><i>Source: in game picture</i></p>	<p>Description:</p> <p>Draky is a flying monster with ranged AOE attacks, while in patrol phase it wanders around the map, once it locates the player or their turrets it will start to chase them and once he's close enough it will stop and start breathing fire.</p> <p>As a flying monster it can avoid some terrain obstacles reaching the player more easily.</p> <p>Attributes:</p> <ul style="list-style-type: none"> ● Type: Ranged Flying, AOE ● Movement pattern: <ul style="list-style-type: none"> ○ Patrol: moves randomly ○ Frenzy: moves toward the player and breath fire ● Attack pattern: it will have a fire ray as an attack for a certain amount of time <ul style="list-style-type: none"> ○ Patrol: attack animation play rate to 0.8, the attack continue for 3 sec with 4 sec cooldown between each attack ○ Frenzy: attack animation play rate to 1.5, the attack continue for 5 sec with 3 sec cooldown between each attack ● Special ability: / ● Particular behaviour: <ul style="list-style-type: none"> ○ hit by turrets: hit react but continues to execute the action ○ hit by player: stops executing the action suffering knockback ● Notes: use No animation to breath fire

Ougr

Description:

Ougr is a particular monster with melee attacks and very high health, it is, in fact, categorised (specialised) as a Tank. While in the patrol phase it wanders around the map, once it locates the player or their turrets it will try to catch up to attack them.

Attributes:

- **Type:** Melee Ground, Tank
- **Movement pattern:**
 - **Patrol:** moves randomly
 - **Frenzy:** attacks the target relentlessly
- **Attack pattern:**
 - **Patrol:** attack animation play rate to 1, hits the target with 5 sec cooldown between each attack
 - **Frenzy:** attack animation play rate to 2, hits the target with 2 sec cooldown between each attack
- **Special ability:** 10% stronger when at 15% of total HP
- **Particular behaviour:**
 - **hit by turrets:** no hit react and continue to execute the action
 - **hit by player:** Continues to execute the action and does not suffer knockback
- **Notes:** use the *No* animation to "search" and *Duck* animation for stun



Source: in game picture

Whabbit	
	<p>Description:</p> <p>Whabbit is a particular monster that will not attack anything, instead it would steal and run away with its high speed, categorised as Thief. While in the patrol phase it wanders around the map, once it locates the player or their turrets it will run away. It will steal every Essence in its path.</p> <p>Attributes:</p> <ul style="list-style-type: none"> ● Type: Melee Ground, Thief ● Movement pattern: <ul style="list-style-type: none"> ○ Patrol: moves randomly ○ Frenzy: goes to the player's area and steals their dropped essences ● Attack pattern: <ul style="list-style-type: none"> ○ Patrol: / ○ Frenzy: / ● Special ability: he runs away from the player and steals essences he finds on the way, he is not targeted by automatic turrets in patrol phase ● Particular behaviour: <ul style="list-style-type: none"> ○ hit by turrets: hit react and stops executing the action ○ hit by player: stops executing the action suffers knockback ● Notes: /

Otrebor	
	<p>Description: Otrebor is the Anti-Roberto, it always knows where the player is and will hunt them down. It will build its own turrets and use Toby the wrench in order to defeat the player.</p> <p>Attributes:</p> <ul style="list-style-type: none"> • Type: Melee ground, Boss • Movement pattern: goes to the player's area and attack them • Attack pattern: it's always targeting Roberto, if there is some platform to build turrets it would build them, otherwise it will attack with Toby the wrench. Player's turrets and Otrebor's turrets Will not Attack each other, the player must consume essences (or hit them with Tony) • Special ability: can build turrets against the player, these turrets will not be targeted by other mobs. During the frenzy it will make 15% more damage. When killed it will drop a power up module and a piece of lore other than essences • Particular behaviour: <ul style="list-style-type: none"> ○ hit by turrets: hit react and continue executing the action ○ hit by player: continue executing the action and suffers knockback • Notes: /

Enemies Statistics Table

Stats Legend

- **Speed:** the velocity of the monster during the patrol, the investigation and the chase
- **Perception:** how visually and audibly sensitive it is to the player's movements
- **Damage:** how much damage it does
- **HP:** the health of the enemy
- **Drop:** how many essences are dropped when killed
- **Spawn:** probability of respawn in patrol and frenzy

Enemy	Speed			Perception cm		Damage		HP	Drop	Spawn %	
	Patrol	Invest.	Chase	Visual	Hear	Player	Turrets			Patrol	Frenzy
Cactoro	150	200	400	1000	/	5	100	15	5	40	30
Voodoo Voodoo	150	200	400	1500	3000	5	100	15	10	30	20
Vooloo Vooloo	150	200	400	1500	3000	5	100	20	15	10	20
Draky	100	150	400	1000	3000	3 per 1 sec	200 per 1 sec	20	15	40	30
Ougr	70	120	300	2000	4000	15	500	50	25	5	10
Whabbit	200	250	600	2500	5000	/	/	40	50 + stealed ones	10	5
Otrebor	/	/	400	It always know where is the player		10	200	60	40	Every 5 days	

Resources

1.11. Introduction

The collection and management of resources is one of the pillars of the survival genre. In Memory Leak there are five main kinds of resources that the player must gather and manage. In particular, two of them (Health and Energy) are specifically related to the needs of the player for their survival, while the others constitute currency and materials useful for the progression of the gameplay as a tool to enhance the survival experience.

An additional resource (Shattered Memories), not related to the survival experience of the game, is also found by the player during the experience.

1.12. Resource List

The following is a list of the resources in the game with their description:

- **Health:**

Health is the core survival resource for the player. At the start of the game, Roberto's Health is at its maximum, but it will be reduced each time the robot receives damage. Exhausting Health (health value equals zero) leads to the gameover and therefore the end of the survival.

The details about Health regeneration are analysed in the next point: Energy.

During the gameplay the player is able to extend the maximum amount of storable Health by exchanging the in-game currency (Essence) for [Health Modules](#).

Health is graphically represented with a segmented red bar in the UI of the game. Extending the maximum amount of the resource, the bar will grow in size accordingly.

- **Energy:**

The Energy resource is the second of the two resources (together with Health) that are directly related to Roberto's survival. At the start of the game, Roberto's Energy is at its maximum, but it will be depleted over time, more intensively as the robot performs certain actions. Once the Energy is exhausted, the player will lose the ability to perform the aforementioned Energy-consuming actions.

The Health resource presents two interactions with the Energy resource:

- The player is able to convert part of their Energy to Health thanks to the [Health Recovery](#) mechanic.
- When the Energy resource is exhausted the Health of the robot will be consumed instead of the former, leading to the death of the character if the Energy is not recharged accordingly.

To recharge Roberto's Energy, the player will need to explore the environment to find [Recharge Points](#), and therefore retrieve the resource. During the gameplay the player is able to extend the maximum amount of storable [Energy](#).

Energy is graphically represented with a segmented blue bar in the UI of the game. Extending the maximum amount of the resource, the bar will grow in size accordingly.

- **Essence:**

The Essence is the currency resource of Memory Leak, mainly obtained by the player as a drop from the eliminated monsters (with the exception of the Essence Farm Turret, that will generate Essence to be gathered by the player over time).



The player is able to exchange Essence for:

- [Opening doors](#), expanding the explorable environment.
- [Upgrading](#) the character maximum Health and Energy limits.
- Activating specific environmental interaction, such as traps. (CUT CONTENT)

- **Junks:**

Junks is a class of collectable resources that the player can gather in their exploration by extracting them from specific [Junks Sites](#), destroyable elements of the level that will drop junks after being destroyed by Roberto.

Different amounts and kinds of Junks are required to build and repair [Turrets](#), and will therefore be essential for the player to access those features.

Memory Leak features three kinds of Junks:

- **Gears**, which can also be collected by the player exploiting a specific Farm Turret.
- **Steel**, which can also be collected by the player exploiting a specific [Farm Turret](#).
- **Circuits**, which can't be generated by any Farm Turret and can be therefore obtained only through their extraction from the environment.



Gears



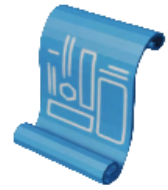
Steel



Circuits

- **Turrets Blueprints:**

Turrets Blueprints are collectable objects that the player will rarely find during the exploration of the factory. Collecting a Turret Blueprint will unlock a new model of turrets in Roberto's arsenal, that the player will be able to build from that moment to the end of the game.



- **Shattered Memories:**

Shattered Memories are collectable objects that the player will rarely find during the exploration of the factory. Collecting a Shattered Memory will instantly trigger a short cutscene about Roberto's past, giving hints to the player regarding the lore of the game.

Turrets

1.13. Introduction

Turrets represent one of the main elements of support for the player's survival, allowing Roberto to manage its strategic possibilities and disposal as well as making the gameplay more variegated and deep by adding relevant choices.

Turrets can be built in specific spots situated around the factory ([Construction Points](#)) and they are ideally divided into 4 classes, different from each other according to the specific effects and usages:

- **Shooting Turrets**

Turrets whose main purpose is to hit enemies by means of various types of projectiles. They have automatic aim towards specific targets and are totally devoted to attacking and dealing damage to enemies, without causing other effects.

- **Hazard Turrets**

Turrets that do not target a specific enemy, but that are founded upon the concept of sparse and AOE (Area Of Effects) damages. These turrets usually also present the possibility for the player to interact with them in order to change their behaviour mode (more/less range with less/more damage) or direction of effect.

- **Control Turrets**

Turrets whose main purpose is not damaging enemies, but rather to control and affect the enemies movements and spatial statues, allowing the player to exploit advantageous situations of their interest (for example the possibility to gather the enemies of an area in a restricted spot in which they can direct the effect of an Hazard Turret).

- **Farm Turrets**

Turrets mainly upon the concept of resources production. Through them the player is able to farm different types of materials ([Junks](#)) exploitable to build additional turrets, open doors, exchange with upgrades, etc. Although they do not interact with enemies, Farm Turrets aim to represent a valuable resource for lasting survival. The player can interact with these turrets even before the total production cap, collecting the resources produced up to that point.

1.14. General Properties

Follows a list of features shared by every turret:

- **Unlock and Construction**

In order to unlock Turrets, the player needs to research and collect [Turret Blueprints](#) around the map, allowing Roberto to build turrets in the designated Construction Points.

The construction of each turret requires the player to spend a specific amount and kinds of resources, depending on the model and level of the specific turret to be built.

Each Turret class is related to a main resource required for their construction and reparation: Shooting Turrets require Steel, Hazard Turrets and Control Turrets require Gears, while Farm Turrets require Circuits (rarest and not farmable resource).

The selection of the turret to be constructed can be done through an interface that allows the player to choose from the models of turrets unlocked in the current gameplay, listing the main details of each one.

- **Durability**

Each turret possesses a Durability statistics, predefined in value depending on each turret model, representing the amount of residual activity energy/time of the turret before its destruction. A turret's Durability is displayed on the screen by a coloured bar above the turret.



Every turret's durability decreases over time and can be also more massively depleted as a consequence of monster's attacks on the turret.

- **Repairability and Destruction**

The player is able to repair a turret's Durability to prevent its destruction, to do so, they must exchange specific resources (Junks) depending on the turret's requirements in order to regenerate part of its maximum Durability.

After a turret is destroyed, the corresponding Construction Point becomes inactive for 2 Survival Days, preventing the player to construct on it until the expiration of that cooldown, becoming operational again only after this period. In case of turret's destruction, debris will be shown on the Construction Point until the base becomes operational again.

The reparation of each turret requires the player to spend a specific amount and kinds of resources, depending on the model and level of the specific turret to be repaired.

Each Turret class is related to a main resource required for their construction and reparation: Shooting Turrets require Steel, Hazard Turrets and Control Turrets require Gears, while Farm Turrets require Circuits (rarest and not farmable resource).

- **Level Up**

During the game's progression the player is able to exchange [Essence](#) through the [Essence Converter](#) feature for turrets' upgrades.

After a turret has been levelled up, constructing the turret will always consist in building it to its maximum achieved level.

The game provides three levels for each turret that will consist of upgrades of each turret's specific abilities considering its usage for the player (Farm Turrets will provide resources more efficiently as Shooting Turrets will enhance their "automatic shooting" function, and so on). The drawbacks of levelling up a turret are related to its construction and reparation costs, as the amount and variety of resources needed will be augmented.

Levelling up a Turret will modify its requirement for construction and reparation, adding [Circuits](#) to the resources necessary for completing these actions.

- **Cooldown**




During its activity, at any time a turret is shooting or more in general is performing its effects, it will accumulate a Stress Value (represented with an orange bar under its Durability bar) that will instead decrease as the turret is inactive (not performing its effect).


When a turret's Stress Value reaches its maximum (represented with the full orange bar) the turret enters a Cooldown state, a time period in which the turret is forced to remain inactive. After the passage of that event, the turret's Stress Value is resetted and its activity will follow the previous rules.


1.15. Turret Template

Turret Name	
<p>- Asset Images: Three levels of the Turret</p>	<p>Class:</p> <ul style="list-style-type: none"> • Shooting Turret • Hazard Turret • Control Turret • Farm Turret <p>Description Damage/Effect:</p> <ul style="list-style-type: none"> • Define precisely the specific Damage/Effect of the Turret <p>Base Stats:</p> <ul style="list-style-type: none"> • Damage: Value • Fire Rate: x shots every x seconds • Range: Value <p>Interaction Effect:</p> <ul style="list-style-type: none"> • What interaction (E key) the player can have with the turret other then reparation <p>Targeting:</p> <ul style="list-style-type: none"> • Automatic(directed to the enemy closest to the turret) • Selected by the Player (SBP) • None <p>Targets</p> <ul style="list-style-type: none"> • Ground Monsters (walking enemies) • Flying Monsters • None • The Player <p>Cooldown:</p> <ul style="list-style-type: none"> • Time periods and special behaviours for turret cooldown <p>Resources Costs:</p> <ul style="list-style-type: none"> • Construction cost for each turret level (1/2/3) • Repair cost for each turret level (1/2/3) <p>S-> Steel - G-> Gears - C-> Circuits</p> <p>Durability:</p> <ul style="list-style-type: none"> • Durability value for each turret level (1/2/3) <p>Level Progression:</p> <ul style="list-style-type: none"> • Description of each level upgrade of the turret, listing the upgraded stats and values <p>Aesthetics & Details:</p> <ul style="list-style-type: none"> • Description of the aesthetics of turrets, projectiles...

1.16. Turret List

Minigun	
  	<p>Class:</p> <ul style="list-style-type: none"> Shooting Turret <p>Description Damage/Effects:</p> <ul style="list-style-type: none"> Perform an attack (1 shot) with 3 bullets fired in a row. Causing damage for each bullet. <p>Base Stats:</p> <ul style="list-style-type: none"> Damage: 2 Fire Rate: 1 shots every 2 seconds Range: x <p>Interaction Effect:</p> <ul style="list-style-type: none"> None <p>Targeting:</p> <ul style="list-style-type: none"> Automatic <p>Targets:</p> <ul style="list-style-type: none"> Ground Monsters Flying Monsters <p>Cooldown:</p> <ul style="list-style-type: none"> After 30 seconds of continuous activity, Turret enters a Cooldown of 30 seconds <p>Resources Costs</p> <ul style="list-style-type: none"> Construction: 100 S / 150 S / 200 S - 50 C Reparation: 10 S / 15 S / 20 S - 5 C <p>Durability:</p> <ul style="list-style-type: none"> 250/250/250 <p>Level Progression:</p> <ul style="list-style-type: none"> Level 2: + Damage (2 -> 3) Level 3: + Damage (3 -> 5) + Fire Rate (1 shot every 1 seconds) <p>Aesthetics & Details:</p> <ul style="list-style-type: none"> This turret fires, as a minigun, small projectiles resembling bullets to counter the advance of enemies. Easy to obtain, it is a valuable ally in the most difficult situations

X-Bombard	
	<p>Class:</p> <ul style="list-style-type: none"> Shooting Turret <p>Description Damage/Effects:</p> <ul style="list-style-type: none"> Shoots a cluster of missiles (1 shot), damaging enemies with each missile. When a missile hits, it explodes causing the same amount of damages to surrounding enemies <p>Base Stats:</p> <ul style="list-style-type: none"> Damage: 20 Fire Rate: 1 shots every 5 seconds Range: x <p>Interaction Effect:</p> <ul style="list-style-type: none"> None <p>Targeting:</p> <ul style="list-style-type: none"> Automatic <p>Targets:</p> <ul style="list-style-type: none"> Ground Monsters Flying Monsters <p>Cooldown:</p> <ul style="list-style-type: none"> After 30 seconds of continuous activity, Turret enters a Cooldown of 30 seconds <p>Resources Costs</p> <ul style="list-style-type: none"> Construction: 100 S / 150 S / 200 S - 50 C Reparation: 10 S / 15 S / 20 S - 5 C <p>Durability:</p> <ul style="list-style-type: none"> 250/250/250 <p>Level Progression:</p> <ul style="list-style-type: none"> Level 2: + Damage (20 -> 30) Level 3: + Damage (30 -> 50) + Fire Rate (1 shot every 3 seconds) <p>Aesthetics & Details:</p> <ul style="list-style-type: none"> Each shot of the turrets is represented by the launch of several missiles on a targeted enemy, effects with fire and smokes would help in communicating this turret's identity

Plasma Cannon	
	<p>Class:</p> <ul style="list-style-type: none"> Shooting Turret <p>Description Damage/Effects:</p> <ul style="list-style-type: none"> Shoots a plasma shot (1 shot), damaging and penetrating each enemy in hit by it. <p>Base Stats:</p> <ul style="list-style-type: none"> Damage: 30 Fire Rate: 1 shots every 4 seconds Range: x <p>Interaction Effect:</p> <ul style="list-style-type: none"> None <p>Targeting:</p> <ul style="list-style-type: none"> Automatic <p>Targets:</p> <ul style="list-style-type: none"> Ground Monsters <p>Cooldown:</p> <ul style="list-style-type: none"> After 30 seconds of continuous activity, Turret enters a Cooldown of 30 seconds <p>Resources Costs</p> <ul style="list-style-type: none"> Construction: 100 S / 150 S / 200 S - 50 C Reparation: 10 S / 15 S / 20 S - 5 C <p>Durability:</p> <ul style="list-style-type: none"> 250/250/250 <p>Level Progression:</p> <ul style="list-style-type: none"> Level 2: + Damage (30 -> 40) Level 3: + Damage (40 -> 60) + Beam Radius (+ 50%) <p>Aesthetics & Details:</p> <ul style="list-style-type: none"> The Turret shoots chunky blue plasma beams. Its style should be futuristic.

Flame Hell



Class:

- Hazard Turret

Description Damage/Effects:

- Produces a continuous beam of fire that deals damage to enemies inside it.

Base Stats:

- Damage: 3
- Damage Tick: 2 seconds
- Fire Rate: Continued until cooldown
- Beam Width: 10°
- Range: x

Interaction Effect:

- Rotation (8 directions)

Targeting:

- None

Targets:

- None

Cooldown:

- After 30 seconds of continuous activity, Turret enters a Cooldown of 30 seconds

Resources Costs

- Construction: 100 G / 150 G / 200 G - 50 C
- Reparation: 10 G / 15 G / 20 G - 5 C

Durability:

- 250/250/250

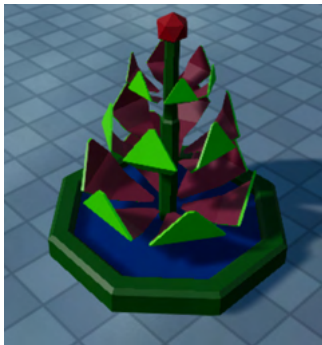
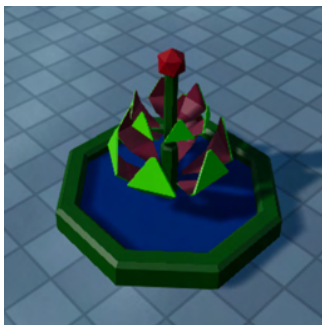
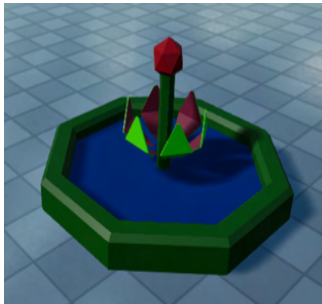
Level Progression:

- Level 2: + Damage (3 -> 4)
- Level 3: + Damage (4 -> 5)
+ Beam Width (+ 50%)

Aesthetics & Details:

- The Turret constantly produces a beam of fire. Turret's red colour and fuel tanks will enhance its correlation to fire and heat

Poison Blossom



Class:

- Hazard Turret

Description Damage/Effects:

- Produces a venomous area around the turret that causes poisoning to enemies within its radius. Poisoning inflicts damages to enemies over time and will last on the afflicted enemies for a time period after being affected.

Base Stats:

- Damage: 15
- Poison Status Infection Rate: 2 seconds
- Poison Damage Tick: 2 seconds
- Poisoning Status Lasting Time: 10 seconds
- Fire Rate: Continued until cooldown
- Range: x

Interaction Effect:

- None

Targets:

- Flying Monsters
- Ground Monsters

Cooldown:

- After 30 seconds of continuous activity, Turret enters a Cooldown of 30 seconds

Resources Costs

- Construction: 100 G / 150 G / 200 G - 50 C
- Reparation: 10 G / 15 G / 20 G - 5 C

Durability:

- 250/250/250

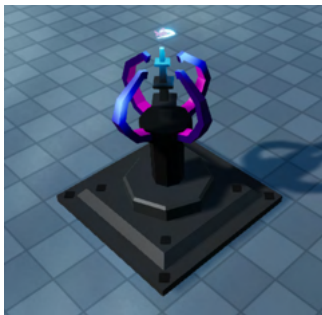
Level Progression:

- Level 2: + Damage (15 -> 20)
+ Range (Base + 25%)
- Level 3: + Damage (20 -> 30)
+ Range (Base + 50%)
+ Poison Damage Tick (2 -> 1 seconds)

Aesthetics & Details:

- Recalling a venomous plant, the range of this turret will be signalled by a purple spheric area around it. The poisoned enemies will have a different look with purple/green effects on them.

Tesla Charge



Class:

- Hazard Turret

Description Damage/Effects:

- Shoots an electric charge on a random enemy in a range. Every hit enemy will propagate the electric charge on other adjacent enemies in a propagation range. Every enemy receiving the shock will suffer damages.

Base Stats:

- Damage: 10
- Charge Propagation Range: x
- Fire Rate: 1 shot every 3 seconds
- Range: x

Interaction Effect:

- None

Targeting:

- Automatic (Random)

Targets:

- Ground Monsters
- Flying Monsters

Cooldown:

- After 30 seconds of continuous activity, Turret enters a Cooldown of 30 seconds

Resources Costs

- Construction: 100 G / 150 G / 200 G - 50 C
- Reparation: 10 G / 15 G / 20 G - 5 C

Durability:

- 250/250/250

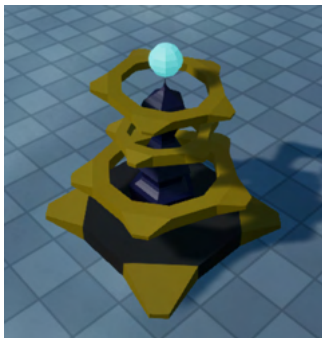
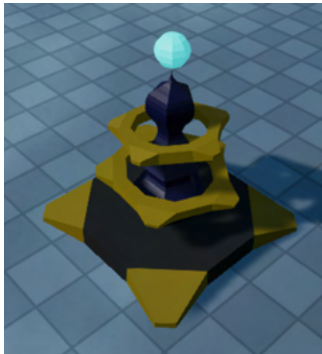
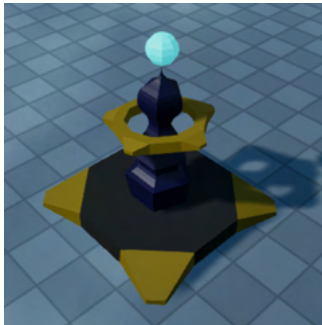
Level Progression:

- Level 2: + Damage (10 -> 20)
+ Range (Base + 25%)
- Level 3: + Damage (20 -> 30)
+ Range (Base + 50%)
+ Number of Targeted Enemies (1 -> 2)

Aesthetics & Details:

- This turret will have to recall a Tesla Coil. Electricity effects could really enhance the identity of this weapon.

Snaring Rings (EMP)



Class:

- Control Turret

Description Damage/Effects:

- When not in cooldown the turret will periodically unleash impeding psychic waves, blocking on their spot all the enemies in its range for a certain Stun Duration period

Base Stats:

- Damage: None
- Fire Rate: 1 effect every 5 seconds
- Stun Duration: 2 seconds
- Range: x

Interaction Effect:

- None

Targeting:

- None

Targets:

- Ground Monsters
- Flying Monsters

Cooldown:

- After 30 seconds of continuous activity, Turret enters a Cooldown of 30 seconds

Resources Costs

- Construction: 100 G / 150 G / 200 G - 50 C
- Reparation: 10 G / 15 G / 20 G - 5 C

Durability:

- 250/250/250

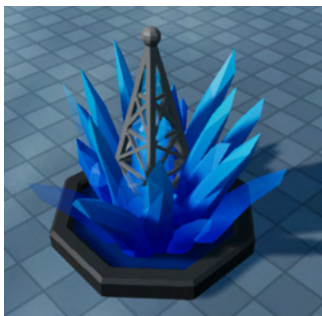
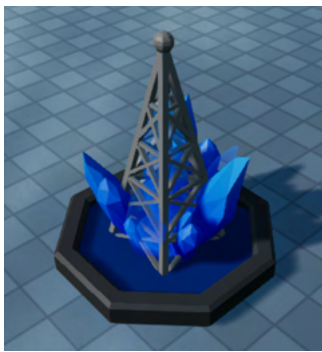
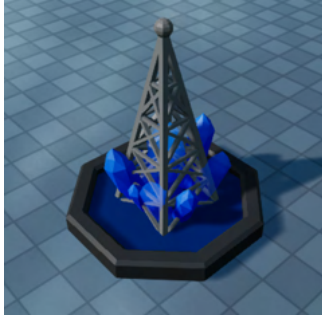
Level Progression:

- Level 2: + Stun Duration (2 -> 2.5 seconds)
+ Range (Base + 25%)
- Level 3: + Stun Duration (2.5 -> 3 seconds)
+ Fire Rate (1 every 5 -> 4 seconds)
+ Range (Base + 50%)

Aesthetics & Details:

- The turrets aesthetic need to recall its name with both the presence of rings and psychic-related elements (purple colours and sinuous shapes)

Winter Breeze (SLOW)



Class:

- Control Turret

Description Damage/Effects:

- When not in cooldown the turret will constantly unleash cold icy waves around it, slowing all the enemies in its range for of a certain Slow Percentage

Base Stats:

- Damage: None
- Slow Percentage: 20%
- Range: x

Interaction Effect:

- None

Targeting:

- None

Targets:

- Ground Monsters
- Flying Monsters

Cooldown:

- After 30 seconds of continuous activity, Turret enters a Cooldown of 30 seconds

Resources Costs

- Construction: 100 G / 150 G / 200 G - 50 C
- Reparation: 10 G / 15 G / 20 G - 5 C

Durability:

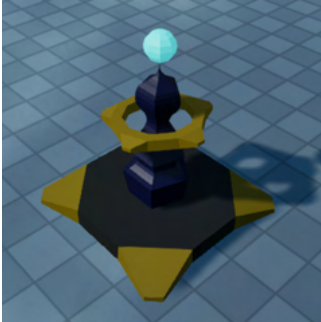
- 250/250/250

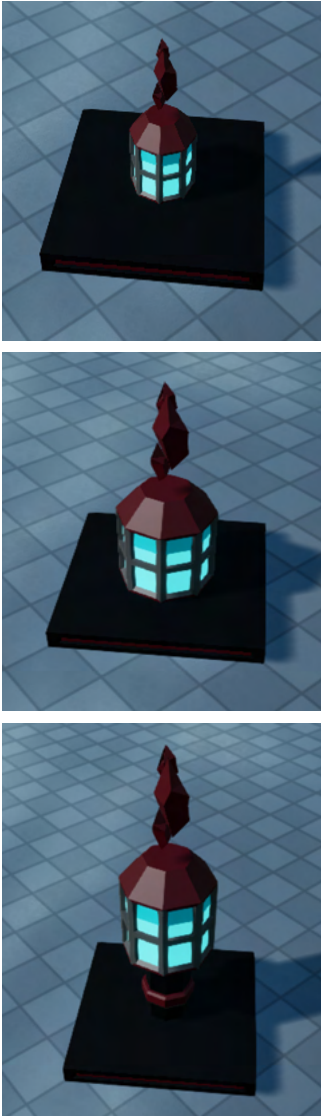
Level Progression:

- Level 2: + Slow Percentage: 20% -> 30%
+ Range: (Base + 25%)
- Level 3: + Slow Percentage: 30% -> 40%
+ Range (Base + 50%)

Aesthetics & Details:

- The turrets aesthetic is founded on merging Ice and Technology, with both crystal like and steampunk elements

Gravity Merge	
	<p>Class:</p> <ul style="list-style-type: none"> Control Turret <p>Description Damage/Effects:</p> <ul style="list-style-type: none"> The turret creates a constant circular sphere of altered gravity in which every enemy within it is attracted to its centre. The gravitational force is stronger the more a target is near the centre of the turret's range <p>Base Stats:</p> <ul style="list-style-type: none"> Damage: None Maximum Gravitational Force: x Range: x <p>Interaction Effect:</p> <ul style="list-style-type: none"> None <p>Targeting:</p> <ul style="list-style-type: none"> None <p>Targets:</p> <ul style="list-style-type: none"> Ground Monsters Flying Monsters <p>Cooldown:</p> <ul style="list-style-type: none"> After 30 seconds of continuous activity, Turret enters a Cooldown of 30 seconds <p>Resources Costs</p> <ul style="list-style-type: none"> Construction: 100 G / 150 G / 200 G - 50 C Reparation: 10 G / 15 G / 20 G - 5 C <p>Durability:</p> <ul style="list-style-type: none"> 250/250/250 <p>Level Progression:</p> <ul style="list-style-type: none"> Level 2: + Maximum Gravitational Force: Base + 25% + Range: (Base + 25%) Level 3: + Maximum Gravitational Force: Base + 50% + Range (Base + 50%) <p>Aesthetics & Details:</p> <ul style="list-style-type: none"> The turret produces a black hole resembling the cosmic void, distorting and altering the space structure around it.

Essence Farm	
	<p>Class:</p> <ul style="list-style-type: none"> • Farm Turret <p>Description Damage/Effects:</p> <ul style="list-style-type: none"> • Every 5 seconds (Resource Production Rate) the turret produces and stores Essence until the player interacts with it or until its tank is full (Maximum Tank Storage Space) <p>Base Stats:</p> <ul style="list-style-type: none"> • Damage: None • Resource Production Rate: 1 every 5 seconds • Maximum Tank Storage Space: 5 <p>Interaction Effect:</p> <ul style="list-style-type: none"> • Resource Drop (Essence): The turret drops the stored resources in little stacks over time. <p>Targeting:</p> <ul style="list-style-type: none"> • None <p>Targets:</p> <ul style="list-style-type: none"> • None <p>Cooldown:</p> <ul style="list-style-type: none"> • After the resources are collected by the player, the turret enters a cooldown state lasting a time period depending on the produced (dropped) resources <p>Resources Costs</p> <ul style="list-style-type: none"> • Construction: 100 C / 150 C / 250 C • Reparation: 10 C / 15 C / 25 C <p>Durability:</p> <ul style="list-style-type: none"> • 250/250/250 <p>Level Progression:</p> <ul style="list-style-type: none"> • Level 2: + Resource Production Rate: 1 every 3.5 seconds + Maximum Tank Storage Space: Base 7 • Level 3: + Resource Production Rate: 1 every 2.5 seconds + Maximum Tank Storage Space: 10 <p>Aesthetics & Details:</p> <ul style="list-style-type: none"> • To enhance the fact that this turret produces Essence, its colour and look should recall this specific resource. A turret should present a visible charge bar that will represent to the player the current amount of resource stored in the turret.

Gear Farm



Class:

- Farm Turret

Description Damage/Effects:

- Every 5 seconds (Resource Production Rate) the turret produces and stores Gears until the player interacts with it or until its tank is full (Maximum Tank Storage Space)

Base Stats:

- Damage: None
- Resource Production Rate: 1 every 5 seconds
- Maximum Tank Storage Space: 5

Interaction Effect:

- Resource Drop (Gears): The turret drops the stored resources in little stacks over time.

Targeting:

- None

Targets:

- None

Cooldown:

- After the resources are collected by the player, the turret enters a cooldown state lasting a time period depending on the produced (dropped) resources

Resources Costs

- Construction: 100 C / 150 C / 250 C
- Reparation: 10 C / 15 C / 25 C

Durability:

- 250/250/250

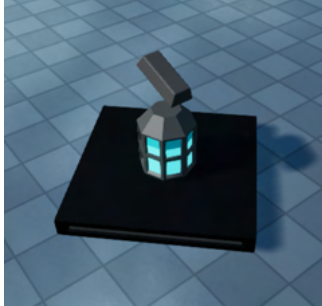
Level Progression:

- Level 2: + Resource Production Rate: 1 every 3.5 seconds
+ Maximum Tank Storage Space: Base 7
- Level 3: + Resource Production Rate: 1 every 2.5 seconds
+ Maximum Tank Storage Space: 10

Aesthetics & Details:

- To enhance the fact that this turret produces Gears, its colour and look should recall this specific resource. A turret should present a visible charge bar that will represent to the player the current amount of resource stored in the turret.

Steel Farm



Class:

- Farm Turret

Description Damage/Effects:

- Every 5 seconds (Resource Production Rate) the turret produces and stores Steel until the player interacts with it or until its tank is full (Maximum Tank Storage Space)

Base Stats:

- Damage: None
- Resource Production Rate: 1 every 5 seconds
- Maximum Tank Storage Space: 5

Interaction Effect:

- Resource Drop (Steel): The turret drops the stored resources in little stacks over time.

Targeting:

- None

Targets:

- None

Cooldown:

- After the resources are collected by the player, the turret enters a cooldown state lasting a time period depending on the produced (dropped) resources

Resources Costs

- Construction: 100 C / 150 C / 250 C
- Reparation: 10 C / 15 C / 25 C

Durability:

- 250/250/250

Level Progression:

- Level 2: + Resource Production Rate: 1 every 3.5 seconds
+ Maximum Tank Storage Space: Base 7
- Level 3: + Resource Production Rate: 1 every 2.5 seconds
+ Maximum Tank Storage Space: 10

Aesthetics & Details:

- To enhance the fact that this turret produces Steel, its colour and look should recall this specific resource. A turret should present a visible charge bar that will represent to the player the current amount of resource stored in the turret.

Game Progression

Flow Diagram Progression - IMAGE

In Memory Leak, the game progression consists in an increase of Roberto's survival abilities (Enhancing the efficiency with which resources are obtained and stored by the player) as well as an increase in the difficulty of the survival experience, determined by the evolution and strengthening of the enemies encountered by the player.

1.17. Rooms Unlock

To unlock and explore new areas of the Factory, the player must save enough Essence to spend for opening new doors. The cost to open a door progressively increases after a certain number of them have already been opened.

1.18. Turrets Unlock

At the beginning of each game, Roberto does not possess the necessary knowledge to be able to build any turrets. To obtain these skills and thus unlock access to the construction of these weapons, the player will have to discover and collect the [Turret Blueprints](#) during their exploration.

1.19. Essence Converter

The key mechanics system that allows the player to access Roberto's upgrades and its turrets is the Essence Converter. By accessing this section (accessible at any time by the player by pressing the designated [button](#), which will cause a pause in gameplay time and the opening of the upgrades menu) the player can exchange the [Essence](#) collected during gameplay for different upgrades, discussed below.

1.20. Turrets Level up

When a turret is unlocked by the player, they will also unlock the corresponding Power-ups in the Essence Converter. Each turret possesses three levels of power. After unlocking them at their level one (next section), the player is able to purchase first the level two upgrade and only subsequently the level three upgrade (with effects depending on the specific turret) in exchange of Essence in the Essence Converter.

The upgraded turrets are recognizable by their unique aesthetics that will differ from their previous form at each level, enhancing the aesthetic features that recall the uniqueness of the specific turret (for example ammo for the [Machine Gun](#) turret and growth of the ice crystals in the [Winter Breeze](#) turret).

1.21. Roberto's Power-ups (Essence Converter)

Batteries and Health Modules are Roberto's Core upgrade system , allowing players to customise their playstyle based on individual preferences. The Essence Converter becomes an important place for strategic decisions, making Roberto's [Energy](#) and [Health](#) to match their preferred strategies.

- **Batteries**

Batteries serve as [Energy](#) containers for Roberto. These storage units are a cornerstone of its upgrade system. Purchasable in the Essence Converter, batteries increase Roberto's maximum Energy capacity, allowing for longer periods of activity without fear of exhausting vital power reserves.

Energy increase: x

Essence cost: x

Essence cost growth: x

Maximum Essence Converter availability: x

- **Health Modules**

Health Modules provide Roberto with the means to enhance its structural integrity. Purchasable in the Essence Converter, these modules increase Roberto's maximum [Health](#), making it more resilient against the relentless attacks of the [enemies](#).

Health increase: x

Essence cost: x

Essence cost growth: x

Maximum Essence Converter availability: x

1.22. Enemies Evolution

As [Survival Days](#) passes, the [Enemies](#) encountered by the player during their exploration will be more powerful and resistant, with aesthetic mutations that will recall the evolution and upgrades undergone.

The advancement of [Survival Days](#) will also entail the appearance of new enemies with unique behaviours and abilities.

Level Design

1.23. Introduction

Memory Leak is set in an abandoned factory that Roberto can explore and discover, unlocking new areas and exploiting/accessing the elements within, such as Spawn Points, Recharge points, Junks Sites and Blueprint Points, therefore progressing during survival.

1.24. Map Level Design

Memory Leak's map is procedurally generated in each walkthrough with a combination of customised and fully furnished square modules combined with each other. Every module has a combination of rooms and corridors (sections within the squared module space) with different amounts of Doors, Construction points, Recharge Points and Spawn Points.

- Module size: 43x43 units

1.25. Recharge Points



Recharge Points are specific locations and interactable elements that the player will find during their exploration. Stationing upon an active Recharge Point will recharge Roberto's [Energy](#) over time.

Every Recharge Point found by the player during the gameplay will possess a total amount of [Energy](#) and will be disabled for 5 days after that amount of the resource is exhausted.

Recharge Points are intentionally scattered with scarcity across the procedural map. Their locations are not randomly displaced; instead, they are meticulously placed in the Level Design phase to encourage exploration and reward navigation, therefore creating moments of relief and success for the player.

1.26. Construction Points



Inside the abandoned factory, Construction Points emerge as floor implants that serve as the forge for Roberto's survival. These strategically placed nodes become essential tools for players to build turrets, engage in tactical combat, and harvest valuable resources.

Every room can have a maximum of 3 construction points close to each other, and each of them should never be next to a Recharge Point or Construction Point.

Construction points have a circular shape and will glow as soon as Roberto can interact with them. After the turret is destroyed the construction point will have a cooldown before it can be used again to build another one.

- Cooldown: 2 Survival Days (16 minutes)
- Max Points per module: 3

1.27. **Spawn Points**

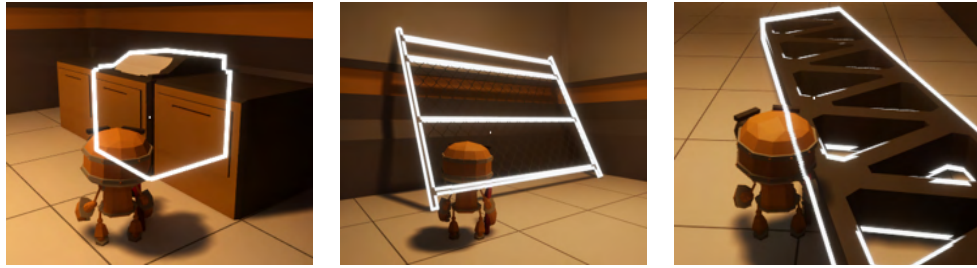
Enemies will spawn automatically from the spawn points, carefully placed all around the factory to assure a constant population of enemies around the environment. Every module must have at least one spawn point never placed next to any Construction Point to avoid the “spawn kill” effect.

Those spawn points will spawn random enemies every set amount of time giving the chance to the player for farming essence and go on with the game.

1.28. **Electible Blueprint Points**

In order to build turrets Roberto needs to know how they are made, [Turret Blueprints](#) are the recipes for those turrets. Every module needs to have an Electible Blueprint Point in it, an invisible (unnoticeable by the player) location where this resource can be spawned by the game's algorithm if the given room is elected by it to displace a Turret Blueprint. This feature intends to add unpredictability and replayability to the game.

1.29. **Junks Sites**



Scattered into the desolation of the factory, Junk Sites are reminders of humanity's industrial past. These locations, full of old rusty factory waste, provide players with a crucial resource-gathering opportunity. Hitting a Junk Site with Roberto's wrench will progressively break it leading to a drop of construction resources (Gears, Steel or Circuits).

Memory Leak's level design principles aim for an equal distribution of Junk Points (of each kind) in every procedural module, giving the player the possibility to have access to every resource if they put effort in the exploration of every room.

Junk sites need to be thematically appropriate to the factory theme, for example being computers of a computer room, machinery of the factory, or wastes in a factory's landfill site.

1.30. Doors

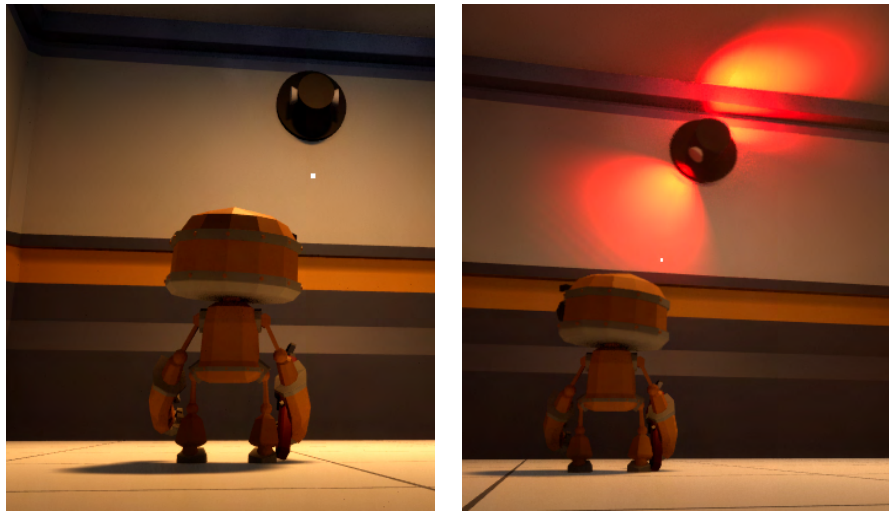


Doors are used to connect the modules of the procedural generated map, and can be opened by the player to expand the available survival environment. Opening a door costs an amount of [Essence](#) in exchange, an amount that will increase as the game progresses.

Given the limits of Memory Leak's procedural generation algorithm, the doors interconnecting two different modules need to be placed at sides of the squared module, at the centre of the selected sides.

1.31. Other Elements

- Sirens:



Before a [Frenzy](#) occurs the player will be notified with some audio and visual cues, so to give them the chance to organise their defence towards the incoming event.

The player should be able to see a Siren from every spot around the factory, so to be correctly notified of the Frenzy's arrival.

- Siren height:
 - Max Siren per module: No limit
 - Time of siren lighting before Frenzy:
- Decorations:
Decorations are not interactable elements displaced around the environment. Their role is to enhance the factory related appearances and themes of the game, while representing obstacles from a level design perspective.

Roberto should always be unable to go up any decoration, so as not to give the player advantage respect to monsters not possessing the same mobility.

Art and Aesthetics

1.32. Introduction

The aesthetics of Memory Leak are based on different pillars that coexist and determine its thematic and uniqueness:

- **An abandoned Factory:**

The game environment is reminiscent of an abandoned factory. This aesthetic is imparted through the presence of high-roofed sections as well as specific assets such as computers, machinery and valve systems that recall its appearance.



- **Dark and Tense Atmosphere:**

To reinforce the Survival nature of the title, the player must be intimidated by enemies and explore unknown and dangerous environments. Thanks to a dark aesthetic, achieved through the dull tones of the [Enemies](#) and the poor (but cinematically studied) lighting of the environments, the player has the feeling of exploring the unknown and consequently fearing what it hides. The aesthetic use of the colour red and the alarm sirens during the most tense moments of the experience ([Frenzy](#)) catalyse the player's emotion of fear and tension.

- **Technological Progress:**

Although the aesthetics of the factory do not suggest futurism or high technology, the game's protagonist and its turrets represent products of very advanced technology. To add depth to this narrative aspect, the [Turrets](#) feature numerous details with emissive components and are reminiscent of technological equipment.

1.33. Two-Dimensional Assets

All the two-dimensional assets' concepts used in both the menus and the UI were created with Photoshop software by **Simone Marzeddu** and then the final assets were produced in Illustrator by **Daniele Iengo**, two of the game designers on the project. In particular, their aesthetics aim to evoke the themes of factory and technology, using metallic elements and LEDs. The yellow tones of these assets recall Roberto's main colour.

1.34. Three-Dimensional Assets

All the 3D assets used in the game have been taken from the PolyPizza website and are all CC0 licensed. In particular, the authors of the assets cited in the Appendix chapter are Quaternius, Kenney and iPoly3D.

Anthony Fedeli, a programmer on the Memory Leak project, is also the author and editor of most of the game's three-dimensional assets. Edits and creations made using Blender software.

Simone Vacirca, a programmer on the Memory Leak project, is also the author and editor of most of the game's animations, especially for what concerns Roberto's interactions. Edits and creations made directly through Unreal Engine.

UI and Controls

1.35. Introduction.

In Memory Leak, the UI is an essential part of the game experience. The idea behind the UI setup is to maintain the screen as clean as possible to allow the player to experience the game to the fullest, but at the same time, considering the large amount of information and elements on which the game is based, to be a descriptive representation for a consistent experience.

1.36. Main Menu and Menu UI

The Main Menu presents itself with the background of the factory where Memory Leak is set, and a visual representation of Roberto, the main character of the game. The interface is managed by the 'Memory Leak' logo in the upper right part of the screen: the aesthetics of the main menu takes up that of the other menus/sections present in the game and the main theme that characterises the experience, introducing the player to the game through clues about the main character and the reference storyline.



The Main Menu is characterised by the presence of buttons that can be interacted by the player that will as a consequence be redirected to the specific sub-section of the menu system. The layout of these buttons follows the aesthetics and theme of the game.

Follows a list of the Main Menu's buttons:

- **Start Game:** This button allows the player to start the game and be therefore redirected to the 'In-game Interface'.
- **Continue:** This button allows the player to continue the game from the last save made.
- **Settings:** This button provides access to a section of the menu containing specific parameters that can be changed in relation to the player's choices.

An 'Apply' button to confirm the changes and apply them directly to the game, while a 'Go back' button redirects the user to the previous section explored.

The following are the elements of the configurable settings list.

VIDEO:

- Window Mode: Windowed - Windowed Fullscreen - Fullscreen
- Resolution: 1200x720 - 1600x900 - 1920x1080 - 2560x1440 - 3040x2160
- Graphics: Low - Medium - High - Epic - Ultra
- Vsync: On - Off



COMMANDS:



- **Quit Game:** Interacting with this button causes the game to shutdown. Being that an high-impact action, a confirmation will be asked to the player before proceeding the button's function.

1.37. In-Game UI

The game focuses on the main character and the environment by placing a camera behind Roberto, following its movements. The character is not perfectly centred in the camera's view, but slightly shifted to the left of the screen, allowing the player to have a wider view consistent with the dynamics of the game itself.

A white dot centres the player's view, serving as an element of interaction with the surrounding world. Thanks to this target users should be able to identify more easily the elements they would like to interact with.

Interactive elements are surrounded by a white linear effect that feedbacks their difference with respect to simpler decorative assets. A list of the actions that the player can perform on an interactive element is shown beside it, listing also keys and commands useful to interact in that sense.

- **In-Game Interface:**



At the top left of the In-Game screen, there are two key elements essential to let the player know about Survival Resources:

- **Health Bar:** A red bar that indicates the total amount of [Health](#) currently possessed by Roberto.
- **Energy Bar:** A blue bar that indicates the total amount of [Energy](#) currently possessed by Roberto.



The right side of the screen features the additional elements that make up the game interface:

- **Game Map:** A top-down view of the unlocked environment surrounding Roberto, including the indication of turrets, enemies and charging points.

- **Days and Time:** Indicates the actual [Survival Day](#) in progress and time of Roberto's survival of the current run.

Day1 00:29

- **Resources:** Indicates the resources present in the game and the quantities actually stored by Roberto.



Essence



Gears

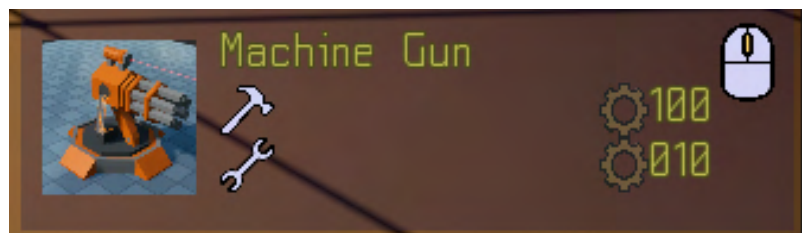


Steel



Circuits

- **Turret Preview:** Indicates the currently selected turret with details of its image, name and materials needed for construction and repair. The player can choose the available turrets by scrolling with the middle mouse button.



- **Pause Interface Menu:**



By pressing 'P' or 'ESC' button, the player can pause the game and have access to a dedicated interface featuring the following elements:

- **Resume Button:** Allows the player to return to the 'In-game Interface' and resume the game.
- **Settings Button:** Redirects to the Setting section.
- **Main Menu Button:** Redirects to an additional interface in which the players are asked to confirm if they want to close the current run and return to the main menu.
- **Keys and Controls:** Redirects to a section dedicated to the game's controls and key mappings.

- **Essence Converter:**

By pressing the 'I' button, the player can pause the game and have access to a specific interface dedicated to the [Essence Converter](#) system.

This interface contains the following elements:

- A list indicating the items purchasable by the player in exchange of [Essence](#), represented by their icon and the specific name of the item. In addition, the interface shows an indication of the Essence price and each purchasable item residual availability. The selected item will be depicted on the right side of the screen with more detailed information and in-game utility descriptions.
- Roberto's Essence availability is shown in the bottom left corner of the screen.
- The Button 'Buy' (bottom right corner of the screen) allows the player to convert the available Essence payment in exchange for the selected Essence Converter item.

- **Turret Preview Additional Interface:**

The player can access a specific interface dedicated to the Turrets, in which they can acquire more information about Turrets and their specifics.

This interface contains the following elements:

- An indication of the name of the selected turret. The Player can switch between currently unlocked turrets by arrows on the sides.
- The in-game image of the Turret.
- Information about the turret class, durability and costs of construction and reparation with reference to the resource needed for these operations. In addition, there will be the presence of an additional descriptive detail related to the turret's functionalities and its aesthetics.

- **Game Over Interface:**

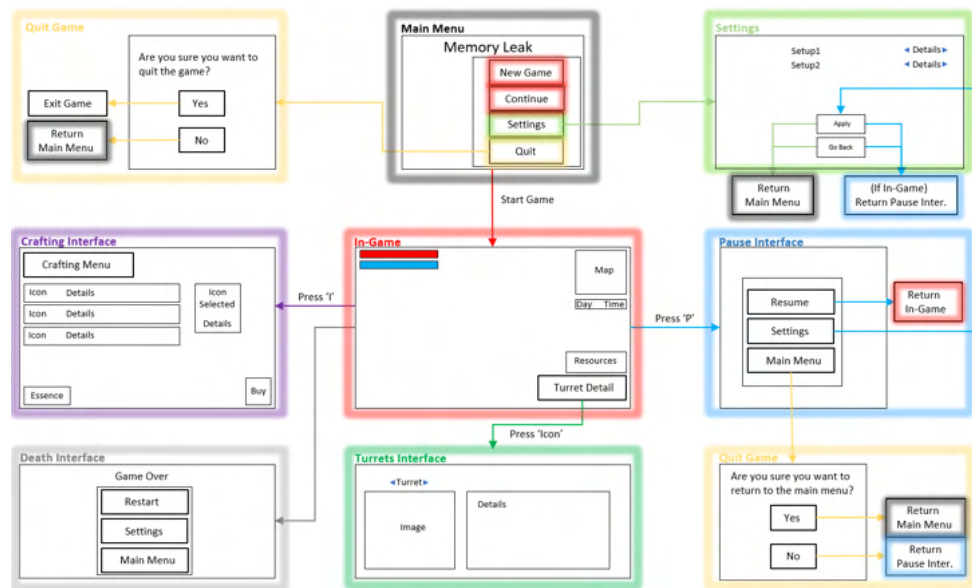


When Roberto's Health decreases to zero, the player will lose the current game and a graphical interface will appear on the screen, featuring these elements:

- 'Game Over': Red writing indicating the end of the game
- 'Restart Button': Allows the player to restart a new game
- 'Main Menu': Allows the player to be redirected directly to the Main Menu.

1.38. UI Flow Diagram Menu

Below an indication of the flow related to the Memory Leak menu system, showing the available interfaces and their paths.



1.39. Controls

Below the representative Table of Memory Leak game commands, divided by relative in-game effect and reference topic.

	Button:	Effect:
Menu	P	- Enter/Exit the Pause Menu
	I	- Enter/Exit the Crafting Menu
Turrets	E	- Build Turrets in the specific Build Point - Interact with Turrets (Rotate or Obtain Resources)
	R	- Repair Damaged Turrets
	Scroll Up-Down	- Change selection between Turrets already obtained
Actions	WASD	- Roberto's Movement
	Shift	- Roberto's Run
	Spacebar	- Roberto's Jump
	Left Mouse	- Roberto' s Basic Attack
	Left Mouse (Hold)	- Roberto's Charged Attack
	Q	- Roberto's Health Recovery

Audio System

1.40. Introduction

Every OST and Soundtrack in Memory Leak have the goal to amplify a sense of loneliness, threat and anxiety during the gameplay. All the tracks implemented have a specific collocation and are played when their section or event is happening.

The SFXs of the game are focused on returning feedback after an action is made by the player or to make them perceive better the enemies and environment surrounding them.

1.41. Soundtracks

Memory Leak provides musical tracks on 3 occasions:

- **Main Menu**

While exploring the menu system of the game, the player should be brought to perceive a sense of melancholy and recollection of memories. Navigating through the menu should be a memorable experience that leads the player to easily recognise the chosen melody. Re-opening the game after such a long time should therefore evoke the player's memories and fuel their desire to play.

- **Basic Background**

To emphasise the sense of loneliness and abandonment that characterises the environment in which Roberto lives and moves, the background music selected should be simple, clean and unobtrusive. The most appropriate choice might be a white noise, interspersed only by distant echoes of machinery and pieces of the ruined factory collapsing in on themselves

- **Frenzy Medley**

The Frenzy must aim to represent a moment of high tension and extreme survival. The music that will be played by the game on these occasions must convey the frantic feeling of flight for survival and oppression by packs of enemies swarming towards the player.

1.42. Sound Effects

As discussed, Memory Leak SFXs are primarily the primary channel through which the player should receive feedback from the game. Of course, SFX should in any case be appropriate and directed towards the creation of a living and dynamic environment within the abandoned factory.

Follows a list of the core SFX choices for the game:

- **UI**

The UI of Memory Leak is mainly composed of buttons. It is essential that these buttons have audible feedback when pressed. Similarly, opening a window section such as the Pause Menu or the Essence Converter should correspond to playing a sound that notifies its opening flow.

- **Monsters Noise**

As dangerous creatures, the presence and activity of monsters needs to be signalled through sound feedback, so that the player is aware of the danger before it looms over them. Monsters emit unique sounds, noises that allow the player to distinguish one monster from another, even when they are not in the player's line of sight. Each attack and special action performed by a monster, such as a Voodoo Voodoo throwing a feather as a ranged attack, will have a sound associated with it, further helping to attract the player's attention.

- **Distant Echoes**

The “silence” in which the player is immersed during quiet moments will be interspersed with distant echoes reminiscent of the sounds of a ruined factory. In addition to a thematic reinforcement of the game environment, these sounds aim to create slight peaks in the player's attention, keeping the sense of anguish and tension alive after intervals of tranquillity.

- **Roberto's Actions**

The robot character presents numerous interactions with the game world, already analysed and described in the mechanical aspects within the document. All these operations require clear feedback, capable of notifying the player of a successful hit, the robot suffering damages, a successful cure and so on.

Tech Analysis

1.43. Introduction

Memory Leak has always been designed to be a PC game. This product implementation has been therefore oriented towards this platform and market since the beginning, leading to choices in terms of UI, Controls and Gameplay to fit at maximum the requirements and standards of the category.

1.44. Devices and Versions

Every game build and version (from the prototype to the launch version) has been produced for PC, in particular for Windows 10/11 Operative Systems.

1.45. Game engine development

Memory Leak has been completely developed on Unreal Engine 5.3.2, a sufficiently stable and updated version of the engine, chosen for these values.

1.46. GitHub Repository

The development of the software has been organised and synchronised exploiting GitHub. Follows a link to the repository:

<https://github.com/Helluva-Studio/Project-Factory>

Risk Analysis

The first risk analysis produced for Memory Leak's project has been produced by the Programmers partition of the team after the first pitch document draft. In particular, the team produced a partial risk analysis for the main project ideas, so as to help towards the selection of a final unique direction for the project: a compromise between feasibility, innovation and adherence to the design brief, which required the game to be categorised within the survival genre.

The analysis was carried out on the basis of the data present in the project's most immature moments, and was therefore focused on the game's pivotal points rather than secondary mechanics and expansion points developed later. The evaluation took into account the personal skills of the group members, aiming to enhance the added values of each developer's background.

The risk analysis was accompanied by mitigation and solutions to the problems detected, essential to weigh the real danger of these. The highest identified risk factors were:

- Scope of Work (Adherence to Survival Brief)
- Enemies AI (Flying Enemies in particular)
- Team Coordination
- Balancing of the Core Loop
- Variety and Number of Enemies
- Variety and Number of Turrets

RISK RATING KEY				
LOW				
MEDIUM				
HIGH				
		RISK ELEMENTS		
CODE	DEVELOPMENT RISKS	IMPACT	PROBABILITY	RISK RATING
C	CONCEPTION			
C1	Planning & Allocation	M	L	M
C2	Ideation	M	M	M
C3	Conflicting, similar ideas with other groups	L	M	M
C4	Scope of work	H	H	H
				Confront with the trainer to better understand the focus of the project And reorganize ourselves accordingly
P	PROTOTYPING			
P1	Complicated Mechanics	M	L	M
P2	Level Design	M	L	M
P3	Bad Prototyping	L	L	L
PP	PRE-PRODUCTION			
PP1	Coordination	H	L	M
PP2	Art	M	M	M
PP3	Meeting deadlines	M	L	M
				Setting up milestones where each member task should be delivered And split the work according to each team member time and level of skill
D	DEVELOPMENT			
D1	Main Gameplay Loop - Micro	M	H	H
D2	Main Game Loop - Macro	M	M	M
D3	Combat System	M	L	M
D4	Turrets	M	M	M
D5	IA Enemies	M	M	M
D5	Saving system	M	H	H
D6	Flying enemies	M	H	H
				Try and make the time to develop it since it is not an hard task but a Long one
				Come up with creative ideas to handle them and their pathfinding To achieve a nice result
QA	TESTING / QUALITY ASSURANCE			
QA1	Rendering	L	L	L
QA2	Bad Performance	M	M	M
M	MARKETING			
M1	Localization	L	L	L
M2	Market saturation	L	L	L

Appendices

Credits

3D Art and Aesthetics:

All the 3D Assets included in the game comes from the site poly.pizza

Asset creators: *Quaternius, Kenney and iPoly3D.*

SFX & Soundtracks:

All the tracks and sound effects included in the game come from the sites: [Freesound](https://freesound.org), [Pixabay](https://pixabay.com) and [Uppbeat](https://www.upbeat.co.uk). *(every sound has royalty free licence granted by its site of origin)*

Track creators: *grizzlymittz, PhonoUPF, MATRXXX_, unfu, leszek_szary, Fupicat, GrayEpic, CarbonParlour, zbig77, metrostock99, NeoSpica, Paul368, JarredGibb, zz27jb, JakobGille, Alex Bess.*