# Development of an environmental narrative in a video game made in Unreal Engine

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Final Degree Work

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To my family, for always been there when I needed them

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# ABSTRACT

This document represents the memory of Eva María Garzón Hernández's Final Degree Project in Video Game Design and Development.

This work consists of a video game that shows a story that takes place in a house. During the video game, the player will be able to explore the house, investigate and collect objects that will lead to unlocking new areas, which will change as time goes by. With simple graphic adventure mechanics, which any video game enthusiast or not is familiar with and can handle, the video game focuses on a journey where the environmental narrative is the key point. The story can have different interpretations, depending on the person and the amount of exploration and details to be taken into account.

The development has been carried out in Unreal Engine and has been handled as well as possible within the initial unfamiliarity with the engine and the continuous learning from the beginning of the project to the end.

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# 1

# INTRODUCTION

## Contents

## 1.1 Work Motivation

After playing several novels and adventure games, there have been many video games that have given me a new perspective on the concept of what a video game is. When people think of a video game, it is common to imagine an online, multiplayer video game that is currently trending, and that provides a lot of gameplay, has surprisingly realistic graphics, has a highly polished artificial intelligence, or is simply fun for the general public. I also like and have played these types of games, but they were not the ones that motivated me to decide to dedicate myself professionally to making video games. They were the ones that, after playing them, leave me thinking about them and thinking about an idea, or those that surprise you in the way they tell you about something.

To put it another way, video games that leave a mark on you because of the originality of their story or the way they tell it.

During my stay in the Design and Development of video games degree, I always thought that my final project would be about something related to the conceptual art of video games, and I thought I would make a video game with a striking, colourful and peculiar 2D artwork, since it's what I'm most skillful at. And although this was an idea

that stayed with me until almost the beginning of this project, it was only two months before the start of the project, in November 2021, that I had the pleasure of playing *Unpacking* (Witch Beam, 2021). This video game fascinated me in many ways.

I could say that I loved that it was so artistically beautiful, or that its gameplay was very satisfying and calm, and all of that would be true, but what really surprised me was how much it told the player without saying a single word. *Unpacking* (Witch Beam, 2021) used the environmental narrative of the main character's moving and personal space to tell us about her, about her life and its changes, and about her evolution and growth from a child to an adult. It also made me think about the idea of what home means to people, and how a person's personality and state affects the appearance of their home.

This kind of narrative really caught my attention, and although I had already been aware of the environmental narrative that several of the games that have had the biggest impact on me, such as *What Remains of Edith Finch* (Giant Sparrow, 2017) and the walk through the Finch family home and its tragic stories, it certainly gave me a lot to think about for my Final Degree Project.

So, I finally decided to leave behind my initial idea of a 2D art-centric video game, and decided to focus on something that I probably wouldn't have as many opportunities to experience and learn in the future. With environmental storytelling as a key point, I started to develop this new idea that gradually took shape.

## 1.2 Objectives

The main objective was, from the beginning, to create a demo of a video game as polished as possible within the time and resources I had for the project. Thus, the objectives to be taken into account during the development of the video game were the following:

- Development of a conclusive video game of short duration (around 15 minutes) of the "walking simulator" genre.

- Implement simple first-person movement mechanics and the use of an inventory for key items.

- Design and be able to implement in an effective and clear way for the player an environmental and visual narrative told while walking through a house

- Be able to convey the ideas and a certain mood through the atmosphere and objects in each of the rooms.

- Leave an open and free interpretation to the player of the story.

- Learn to use Unreal Engine and be able to develop the video game in this engine, knowing how to make the most of its advantages and obtaining a better result compared to another engine.

## 1.3 Environment and Initial State

After deciding on the idea around which the work would revolve, I had to do a lot of research on the subject. In video games, the best way to get new ideas and concepts is undoubtedly by analysing the games related to the subject and, of course, by playing. And so, I took advantage of my days off to play several narrative video games that I had pending, among them "12 Minutes" and *Her story* (Sam Barlow, 2015).

With the first one, I had the pleasure of playing it with my family, who are also interested in the subject. In *12 Minutes* (Luis Antonio and Annapurna Interactive, 2021), the player takes the role of a man who returns to his flat, where he lives with his wife. After having several mundane conversations, they start having dinner and his wife gives him a surprise: they are going to become parents. Shortly afterwards, a policeman bursts into the flat and arrests the woman, claiming she is guilty of murdering her own father. The protagonist tries to prevent this, but ends up being knocked out by the police and waking up again 12 minutes before, just at the moment when he was about to enter the flat. With this synopsis, the game allows us to explore the house, try new dialogue actions, get new objects and information, and then again get the protagonist knocked out unconscious after 12 minutes to restart the loop.

This game concept caught my attention. Initially I had already had the idea that the gameplay would work by a looping scenario, but with changes in objects, scenery and setting, similar to *PT* (Kojima Productions, 2014), another reference game that I will mention later. However, *12 Minutes* (Luis Antonio and Annapurna Interactive, 2021) made me think about loops from a different perspective.

The second game I played, *Her story* (Sam Barlow, 2015) was one of the ones that, narrative speaking, left me most surprised. Its quest system, its internal structure, the different interpretations of what was happening,... it was undoubtedly a game with a much higher level than I could reach with this work. Although I didn't get any ideas from *Her story* (Sam Barlow, 2015), I was very interested to know how such a well-structured game was conceived. I started watching videos of narrative designers and reading articles about narrative in video games. And then, talking to Marta Martín, my supervisor, she recommended me *l'Atalante, Número 31*, [1] a magazine where she had worked and where they interviewed Sam Barlow, which really fascinated me.

In short, the beginning of the project was based mainly on getting information from articles, videos and games, while picking up concepts of video games with outstanding narrative. And although the project started with more or less clear ideas and objectives, as I developed and wrote it, many of the ideas changed and were adapted.

One important last minute decision I made about the project was to develop it in Unreal Engine. I knew nothing about this engine and I had not been taught anything about it in the video game degree, but that was precisely the reason why I ventured to develop it there. My intention was to learn how to use the engine as I was making the project, since the video game I intended to make would not programming centered. My desire to learn, together with the videos where they compared the final graphic result of Unreal Engine and Unity, [2] made me finally decide to use this engine.

## 1.4   Related Subjects

- VJ1207 Visual Culture and Mass Media

- VJ1218 Hypermedia narrative and video game analysis

- VJ1223 Video game Art

- VJ1227 Game engines

- VJ1233 Contemporary Audiovisual Models

CHAPTER

# 2

# PLANNING AND RESOURCES EVALUATION

## Contents

This chapter is the most technical part of the work. All engineering work must be understandable and assessed from objective information that should follow a given pattern. Such information should appear in this chapter.

## 2.1 Planning

The initial planning that was proposed in the technical proposal and in the game design document (GDD) had a different distribution of hours and organization than the one I ended up doing. Initially, I was planning to model a base scenario and draw most of the assets, since I wanted to give it a "2D touch". However, after realizing that the programming part would probably take much longer, there was a change of plans. Seeing it infeasible to do both tasks due to the excessive amount of work involved, I finally opted to use free asset packs that assured me quality and variety for the setting of the scene, which was really the main point.

The new distribution of hours and the one I ended up doing is the following: (see Figure 2.1)

Throughout the project I tried to distribute the amount of hours according to the most important points of the project.

- Initial Concepts and Narrative Design: the narrative design was what I spent the most time on, as it is the key point of the work.
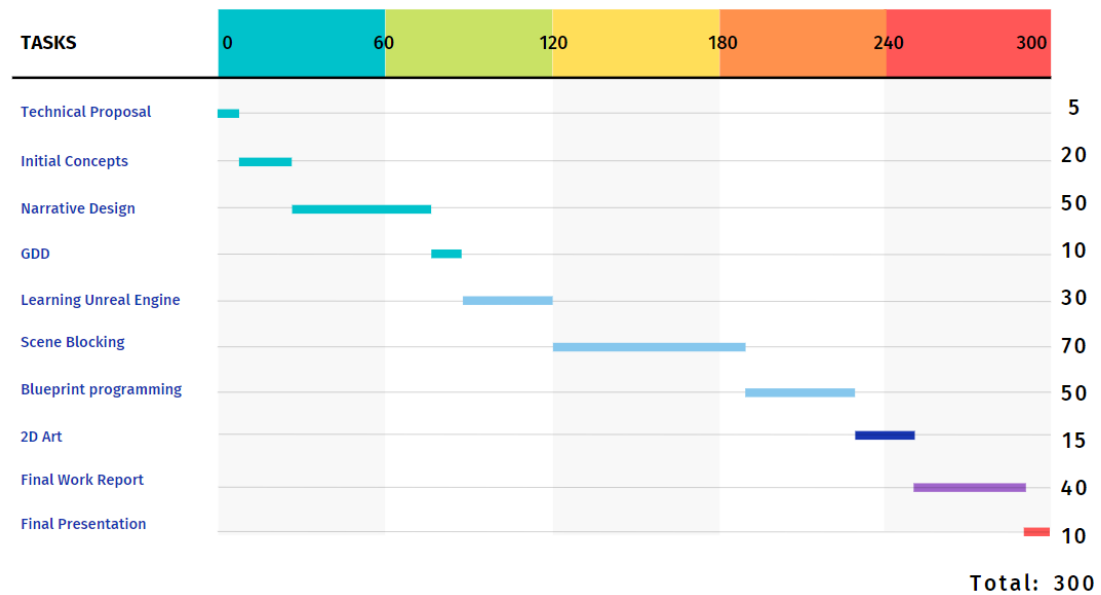
5

Figure 2.1: Distribution of hours (made with Canva)

- Learning Unreal Engine and Blueprint programming: Unreal Engine was an engine I had never used before, so I started completely blind. The only thing I knew about it was that it was capable of rendering more visually realistic scenarios, which was the reason that made me venture into learning how to use it and blueprint programming, a block language completely different from what I was used to. Although it is a simple and intuitive engine, it had many possibilities that ended up changing some of the plans and being incorporated into the project as I got to learn them.

- Scene Blocking: The construction of the scenery ended up taking more work and time than it seemed, as I was trying to build a house as realistic as possible and that implied using a great variety of objects that, thanks to the assets found, could be possible. Even if the 3D assets weren't made by myself, I think using already made assets was the right choice since it helped me develop more complex and filled scenes.

- 2D art: Although I wanted to spend more time making 2D sprites for certain objects and HUD, as it is the part I like the most and one of my strongest points, I saw the need to spend more time on other aspects of the project that I thought would be more important for what I wanted to achieve. Therefore, I limited myself to making the essential images, that is, the pictures, the textures of the objects I needed and the HUD.

Initially these tasks were to be completed in the order in which they are written, but as it was said before, some things have changed from the initial days until now. The following is a Gantt chart showing the beginning and end of each of the tasks during the five months dedicated to the final degree project. (see Figure 2.2)

## 2.2 Resource Evaluation

In this point is listed the software and hardware used throughout this project and the cost of each products.

Software

- Google Drive: provided by the Universitat Jaume I, the unlimited google drive space will be used to store the story, narrative documents and backups of the project.

  Cost: Free

- Trello: To help the organization of the tasks, this web tool will be used, where each task will be broken down into more detailed sub tasks. Specifically, the things I have been monitoring in Trello have been: the dates of document deliveries, the pending tasks that I had to do (must), the more secondary pending tasks that I wanted to do to have a better game experience (should), the tasks that were done but still needed to be revised a bit, and finally, the completed tasks.

  Cost: Free

- Gantt Project: used to do the Gantt charts presented in this work report.

  Cost: Free

- Canva: used to do the chart for the distribution of the hours and the presentation of the project.

  Cost: Free

- DeelL: a website used to help me translate and correct the text in the work report in English.

  Cost: Free

- Overleaf: This online LaTeX editor is the one that has been used to write this report, using the template that was provided in the Aula Virtual made by Sergio Barrachina Mir and José Vte. Martí Avilés using LaTeX.

  Cost: Free

- Short URL: An online website to simplify URLs.
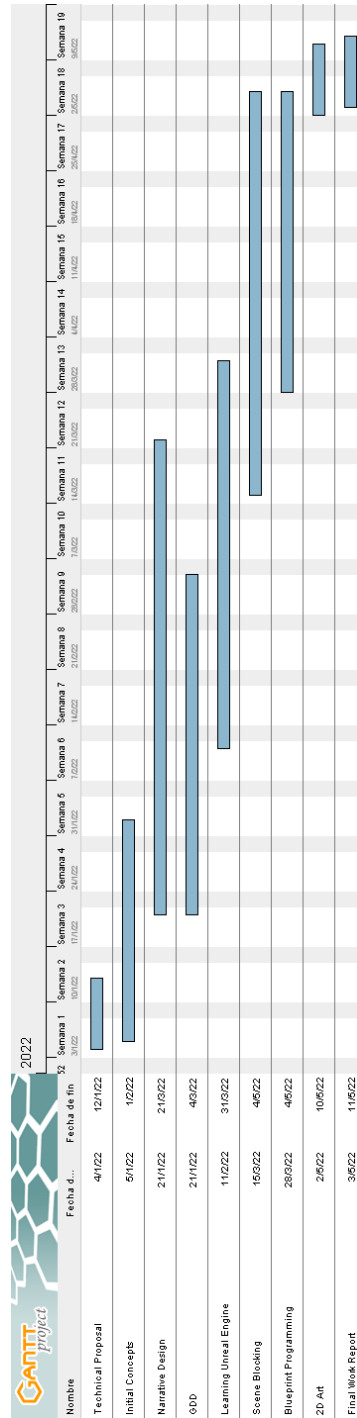
  Cost: Free

Figure 2.2: Gantt chart of the tasks (made with Gantt Project)

- Unreal Engine 4: The game engine chosen for the project was Unreal instead of Unity. The reason for this is because Unreal offers more tools for developing stylised environmental illumination in 3D spaces in order to create a complex and more realistic atmosphere. On the other side, there's the personal wish to learn how to use this engine through the degree, since it is not taught in any subject. To learn, I viewed a lot of video tutorials quoted at the end of the report, but it was especially useful the online course in udemy by Carlos Coronado, also cited in the bibliography.

  Cost: Free

- Clip Studio Paint and Procreate: Two art oriented programs that will be used to create the 2D assets for the game. Procreate is a simple art program available for IPads, and it will be used specially for sketches and schemes. On the other hand, Clip Studio Paint is more professional and has a wider range of useful tools for this project, so the final illustrations and assets will be finished here.

  Cost: 42.00€ and 10.99€ respectively

Hardware:

- OMEN by HP Laptop 15-dh0018ns:

  NVIDIA® GeForce RTX™ 2060

  Intel® Core™ i7 of 9.ª gen

  RAM DDR4 of 16GB

  Cost: around 1300€.

- Wacom Cintiq 13HD: a graphic tablet with screen used to draw in Clip Studio Paint.

  Cost: around 500€.

- Apple Ipad plus Apple Pen: not essential but used to draw in Procreate, especially the sketches and concept art.

  Cost: around 500€ + 80€.

Total: 2432.99

# Research and References

## Contents

References have been a very important part of the development of the narrative. As I mentioned at the beginning, the first part of this project was based on playing and analyzing video games with an outstanding and complex level of narrative, as well as, of course, reading articles and reviews found online.

This chapter lists the references that influenced the final product, explaining their implication and importance in the project.

## 3.1   Narrative design references

When I started the project, I knew several games that were considered the best in terms of narrative in video games. Therefore, I decided to replay and remember them in order to analyze them from the perspective of a designer rather than the perspective of a gamer.

- *Unpacking* **(Witch Beam, 2021):** A game about moving that brilliantly deals with the evolution of a person throughout her stages in life represented by the rooms she has had. This game, recently published, was the one that inspired and motivated me to do this kind of project, and of course guided me when designing the environmental narrative. In Unpacking, the narrative designers manage to communicate the development and changes of a character without any dialogue and

just by showing the objects that the protagonist has in her room. Like that, the player can know things like how much she likes to draw because of the illustration books and brushes she always carries with her, or that because the player has no space to put her personal and important things while unpacking her things during the game, such as her university diploma, the player understand that she has an unhealthy relationship with her partner.



Figure 3.1: Unpacking (2021)

- *Gone Home* (**Fullbright, BlitWorks, 2013**): develops the narrative through a tour of the family home, as if it were a museum of the internal conflicts of a family and the memories of the characters. I played this game a few years ago and I remembered, thanks to my degree subjects on narrative, that the storytelling in Gone Home is very good. Honestly, the project I developed unintentionally ended up having some similarities to Gone Home, such as the letter that the player finds at the entrance of the house at the beginning. This letter is particularly important since it sets the player up before giving them the freedom to explore the house.

- *What Remains of Edith Finch* (**Giant Sparrow, 2017**): Characterizes the personality and history of each character in the family through their rooms in a house. Like in Gone Home, the main character returns to the family house and through an interactive narrative, the player gets to know each of the family members and their stories. I find this game particularly outstanding, especially in the design of each room and how it reflects the personality of all the characters. All the rooms are also very filled and have a lot of objects, leaving the feeling that in that place genuinely lives people, and that was something I wanted to achieve in my project.

Figure 3.2: Gone Home (2013)



Figure 3.3: What Remains of Edith Finch (2017)

- *PT* **(Kojima Productions, 2014):** Although the intention of this project is not to create a horror video game, PT uses storytelling resources similar to those I want to apply. To begin with, PT is set in a corridor of a house that, as you advance, is repeated with slight changes, these being touches of terror. In the project, the corridor will change slightly depending on what we know, and will add elements that will make the atmosphere more creepy, without reaching the terror, such as footprints, photos, blood stains,... I also took as reference the shape of the flat of PT, a simple 'L' corridor with a few rooms.



Figure 3.4: PT (2014)

## 3.2   Game design and mechanics references

Although the basis of the design of the game mechanics are those typically used in the graphic adventure genre in video games, as in the case of the reference video games previously mentioned, it is true that certain aspects resulted of these:

- *12 Minutes* **(Luis Antonio and Annapurna Interactive, 2021):** Through a loop that lasts 12 minutes, a mystery must be solved by investigating the same scenario over and over again. In this game, I really liked how the scene was designed and how the collectible objects were scattered in the house. For my game, I decided to do something similar and took reference in the inventory and the objects to collect. The obtainment of each object unlocked something new, in 12 Minutes being something like a new conversation and in this project being a new room.

- *Gone Home* **(Fullbright, BlitWorks, 2013):** As previously said, Gone Home is a journey through the family house, where the main character finds objects that

Figure 3.5: 12 Minutes (2021)

make her remember and tell us, as players, what happened. This is how I wanted to design the game, so it can be played in such a way, and of course, always taking into account the important elements of the environmental narrative.

## 3.3   Artistic design references

The artistic part of the project initially was meant to be 2D assets in a 3D scene, making all of this by myself. In the end, I ended up using assets from the marketplace for Unreal Engine since it was going to take a lot more time than I thought and it wouldn't achieve the atmosphere I wanted.

- ***What Remains of Edith Finch* (Giant Sparrow, 2017):** Like mentioned before, in the narrative design references, this game has complex rooms and scenes. The amount of different assets for objects from couches and tables to little objects like forks, stickers and even corned guards for the table corners, really contributes to create the atmosphere I was also looking for.

  By coincidence, at the beginning of the development of the project, while looking for information to learn Unreal Engine, I came across a notice in an Unreal Engine forum where it was announced that the developers of What Remains of Edith Finch, Giant Sparrow, had published only in the Epic Store marketplace (Unreal's platform) all the assets of the game for free. At the time, I felt very lucky, as the assets of this game were a great reference for my game and it was something I wanted to achieve by modeling, even though I knew that I wouldn't be able to imitate due to, as mentioned, the large amount of objects and their complexity. So, finding them for free was a little success at the beginning.
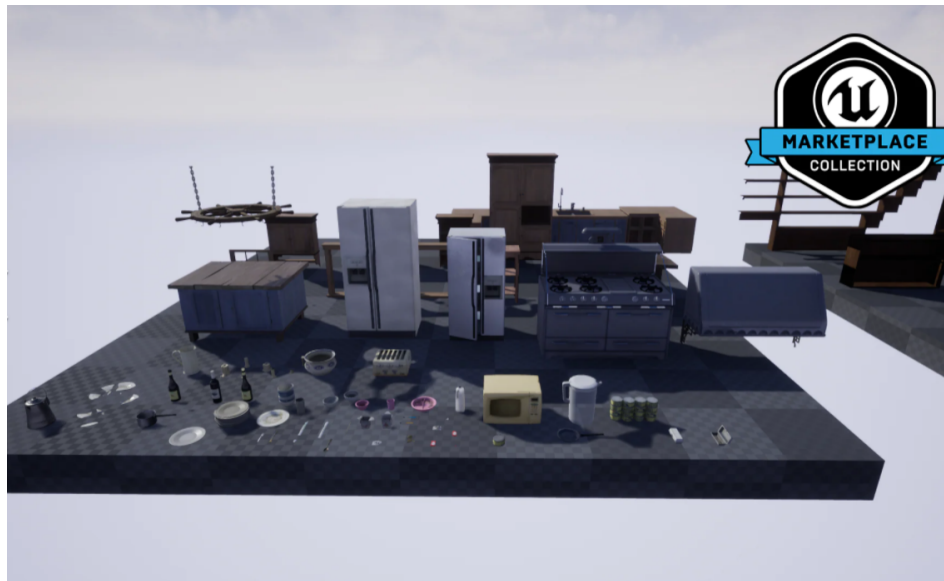
Figure 3.6: Preview of some of the assets of What Remains of Edith Finch (Giant Sparrow, 2017) in the Epic Store



Figure 3.7: Preview of some of the assets of What Remains of Edith Finch (Giant Sparrow, 2017) in the Epic Store

# System Analysis and Design

## Contents

This chapter presents the requirements analysis, design, gameplay and architecture of the proposed work, as well as its interface design. In the next section it will be explained how each part has been developed with more detail.

## 4.1 Overview

To carry out a job, it is necessary to perform a preliminary analysis of its requirements, so to first get an idea of how the video game works, this section will give an overview of it.

The game starts with a main menu consisting of two buttons. The first one, "Play", is to start the game, and once pressed, it will run the beginning of the game. The second button, "Exit", will close the game. (see Figure 4.1)

Once the first button is pressed and the game begins, the player will be able to take control. As this is a first-person walking simulator game, the mechanics will be basic intuitive controls. You will start outside the house and will be able to move around using the 'W', 'A', 'S', 'D' keys to move around and the mouse to move the camera. After observing the environment, the player will eventually find a key and a letter of introduction. Both can be picked up as collectibles using the left mouse click, and thus

Figure 4.1: Main menu of the game

added to the inventory. The inventory can be opened using the tab key or the 'E' key, bringing up a menu in the centre of the screen where the different miniature items collected so far are displayed in boxes.

In addition to the basic movement controls, the player can make the character crouch by pressing the 'CTRL Left' key. This action lowers both the camera and the character's collider box and allows the character to pass through spaces that are lower in height, as well as giving the player the ability to observe the scene from a lower viewpoint, which is useful for finding objects in some of the rooms.

At any point in the game, if the player presses the 'Esc' key, they will be able to access the pause menu where three options will be displayed. The first of these is "Resume", which will continue the game. The second option is the "Options", which, as in the main menu, will show various options for sound and graphics. And finally, "Exit", a button to exit the game and close it or to return to the main menu.

Once the player gets the previously mentioned key, they will be able to open the front door of the house, which was previously locked. Entering the house, they will be able to explore the corridor of the house, but the doors will be locked. It will only be possible to access one of the rooms, the child's room, which will be slightly open.

As mentioned above, the player will be able to interact with the objects in the environment using the 'left mouse click'. Thus, by clicking on the doors, they will open and allow the player to pass through if the player fulfils the necessary conditions. These conditions are based on key objects, which are objects that the player collects and has in his inventory. A key item can be found in almost every room that is unlocked in the

house, and this is what advances the story.



Figure 4.2: Overview of the house

The house consists of a total of six rooms, all accessible from the hallway: the living room, the kitchen, the child's room, the parents' room, the bathroom and the basement. Initially, the rooms are locked, but by obtaining key items, the player can unlock a room that was previously locked, or have an already unlocked room change its interior. The last room to be unlocked is the basement, which is a hidden room hidden behind the piece of furniture at the end of the corridor, revealing a hole in the wall that can be passed through by crouching down.

For a guide to the various rooms and key items in the game, along with the important objects in each of the rooms, see the level guide linked in the appendix below at the end of this document.

The atmosphere and lighting of each of the rooms are intended to play a significant role in conveying a certain type of feeling. [3] The child's initial room radiates tenderness and childhood, while the basement will have a gloomy and macabre aura that will convey uneasiness to the player.

Despite being a game with basic mechanics and accessible to any player with whatever level and experience, the intention and message of the video game is more targeted to a specific audience that looks for something more than entertainment in video games. Specifically, this game has been created with the intention of experimenting with the narrative and the player's perception, so a possible audience would be those who are interested in more reflexive and experimental video games.

## 4.2   Requirement Analysis

After the explanation of the overview is clear, this section will explain the requirement analysis.

### 4.2.1   Functional Requirements

The functional requirements are the features that the game must have to enable users to accomplish their tasks.  [4]

- **R1:** the player can start the game.

- **R2:** the player can pause the game.

- **R3:** the player can change the volume of the sound and music.

- **R4:** the player can change the quality and resolution of the graphics.

- **R5:** The player can quit the game.

- **R6:** The player can move around the 3D environment.

- **R7:** The player can move his camera view.

- **R8:** The player can crouch.

- **R9:** The player can jump.

- **R10:** The player can open or close doors.

- **R11:** the player can collect items.

- **R12:** The player can open an inventory.

- **R13:**  The player can close the inventory.

- **R14:**  The player can return to the main menu.

### 4.2.2   Non-functional Requirements

The non-functional requirements  [5] are the conditions that the design must have in order to reach the expected level of quality, rather than specific behaviours.

- **R15:** The game will be playable on PC.

- **R16:** The setting and graphics of the game will be realistic.

- **R17:** The mechanics and controls will be simple and easy to learn.

- **R18:** The pace of the game will be clear and understandable to the player.

- **R19:** The game will perform well.

## 4.3 System Design

This section presents the logical and operational design of the system to be carried out. In the following pages are defined the cases of use (taken from the functional requirements) and a case of use diagram.

| | |
|---|---|
| Requirement: | R1 |
| Actor: | Player |
| Description: | The player can start the game by clicking the button "Play" in the main menu. |
| Preconditions: | 1. The player must be in the main menu. |
| Normal sequence: | 1. The player click the button "Play" in the main menu. 2. The system loads the game. |
| Alternative sequence: | None |

Table 4.1: Case of use «Start game»

| | |
|---|---|
| Requirement: | R2 |
| Actor: | Player |
| Description: | The player can pause the game by pressing the button 'Esc' during the game. |
| Preconditions: | 1. The player must be in the game. |
| Normal sequence: | 1. The player must press the button 'Esc' in the game. 2. The system stops the game and shows the pause menu. |
| Alternative sequence: | None |

Table 4.2: Case of use «Pause game»

| Requirement: | R3 |
|---|---|
| Actor: | Player |
| Description: | The player can change the volume of the sounds in the options menu. |
| Preconditions: | 1. The player must be in the pause menu. |
| Normal sequence: | 1. The player must click the button "Options".<br>2. The system takes the player to the options menu.<br>3. The player modify the bar of the volume.<br>4. The system changes the volume depending on the player's input. |
| Alternative sequence: | None |

Table 4.3: Case of use «Control sound»

| Requirement: | R4 |
|---|---|
| Actor: | Player |
| Description: | The player can change the graphics quality in the options menu. |
| Preconditions: | 1. The player must be in the pause menu. |
| Normal sequence: | 1. The player must click the button "Options".<br>2. The system takes the player to the options menu.<br>3. The player modify the resolution and other graphics options.<br>4. The system changes the resolution and other graphics options depending on the player's input. |
| Alternative sequence: | None |

Table 4.4: Case of use «Change graphics resolution»

| Requirement: | R5 |
|---|---|
| Actor: | Player |
| Description: | The player can quit the game. |
| Preconditions: | 1. The player must be in the main menu<br>2. The player must be in the pause menu. |
| Normal sequence: | 1. The player press the button "Quit"<br>2. The system quit the game. |
| Alternative sequence: | None |

Table 4.5: Case of use «Quit game»

| Requirement: | R6 |
|---|---|
| Actor: | Player |
| Description: | The player can move in the level |
| Preconditions: | 1. The player has to be out of the main menu.<br>2. The player must be in the game.<br>3. The player has to be out of the pause menu.<br>4. The player has to be out of the inventory menu. |
| Normal sequence: | 1. The player press 'W', 'A', 'S' or 'D' keys.<br>2. The character moves in the direction assigned to that key. |
| Alternative sequence: | 1. The character can't move through the walls or through the objects. |

Table 4.6: Case of use «Move player»

| | |
|---|---|
| Requirement: | R7 |
| Actor: | Player |
| Description: | The player can move the camera vision using the mouse. |
| Preconditions: | 1. The player has to be out of the main menu.<br>2. The player must be in the game.<br>3. The player has to be out of the pause menu.<br>4. The player has to be out of the inventory menu. |
| Normal sequence: | 1. The player moves the mouse.<br>2. The camera vision moves in the according direction. |
| Alternative sequence: | None |

Table 4.7: Case of use «Move camera vision»

| | |
|---|---|
| Requirement: | R8 |
| Actor: | Player |
| Description: | The player can pause the game by pressing the button 'Esc' during the game. |
| Preconditions: | 1. The player has to be out of the main menu.<br>2. The player must be in the game.<br>3. The player has to be out of the pause menu.<br>4. The player has to be out of the inventory menu.<br>5. The player mustn't be already crouching. |
| Normal sequence: | 1. The player must press the button 'CTRL Left' in the game.<br>2. The character crouch in the direction of the movement.<br>3. A sound plays one time when the character crouches |
| Alternative sequence: | None |

Table 4.8: Case of use «Crouch»

| Requirement: | R9 |
|---|---|
| Actor: | Player |
| Description: | The player can jump in a certain direction pressing "Space" button. |
| Preconditions: | 1. The player has to be out of the main menu.<br>2. The player must be in the game.<br>3. The player has to be out of the pause menu.<br>4. The player has to be out of the inventory menu.<br>5. The player mustn't be already jumping or in the air. |
| Normal sequence: | 1. The player must press the button 'Space' in the game.<br>2. The character jumps in the direction of the movement.<br>3. A sound plays one time when the character crouches |
| Alternative sequence: | None |

Table 4.9: Case of use «Jump»

| Requirement: | R10 |
|---|---|
| Actor: | Player |
| Description: | The player can open or close the door by clicking on it near it. |
| Preconditions: | 1. The player has to be out of the main menu.<br>2. The player must be in the game.<br>3. The player has to be out of the pause menu.<br>4. The player has to be out of the inventory menu. |
| Normal sequence: | 1. The player must click on the door being near it.<br>2. The door rotates 100 grades with an animation.<br>2.1 The door rotates -100 grades with an animation. |
| Alternative sequence: | None |

Table 4.10: Case of use «Open/close doors»

| Requirement: | R11 |
|---|---|
| Actor: | Player |
| Description: | The player can collect some items by clicking on them near them. |
| Preconditions: | 1. The player has to be out of the main menu.<br>2. The player must be in the game.<br>3. The player has to be out of the pause menu.<br>4. The player has to be out of the inventory menu.<br>5. The object must be collectable. |
| Normal sequence: | 1. The player must click on it being near it.<br>2. The object disappear.<br>3. The system reproduce a sound effect.<br>4. The system add an icon of the object to the inventory. |
| Alternative sequence: | None |

Table 4.11: Case of use «Collect items»

| Requirement: | R12 |
|---|---|
| Actor: | Player |
| Description: | The player can open the inventory. |
| Preconditions: | 1. The player has to be out of the main menu.<br>2. The player must be in the game.<br>3. The player has to be out of the pause menu.<br>4. The player has to be out of the inventory menu. |
| Normal sequence: | 1. The player must press the button 'E' in the game.<br>2. The system stops the game and shows the inventory menu. |
| Alternative sequence: | None |

Table 4.12: Case of use «Open inventory»

| Requirement: | R13 |
|---|---|
| Actor: | Player |
| Description: | The player can close the inventory. |
| Preconditions: | 1. The player must be on the inventory menu. |
| Normal sequence: | 1. The player must click the button 'X' in corner of the menu. 2. The system close the inventory. 3. The system resume the game. |
| Alternative sequence: | None |

Table 4.13: Case of use «Close inventory»

| Requirement: | R14 |
|---|---|
| Actor: | Player |
| Description: | The player can return to the main menu. |
| Preconditions: | 1. The player must be in the pause menu. |
| Normal sequence: | 1. The player must press the button 'Exit' in the pause menu. 2. The player must press the button 'Main Menu' in the pause menu. 3. The system load the main menu. |
| Alternative sequence: | None |

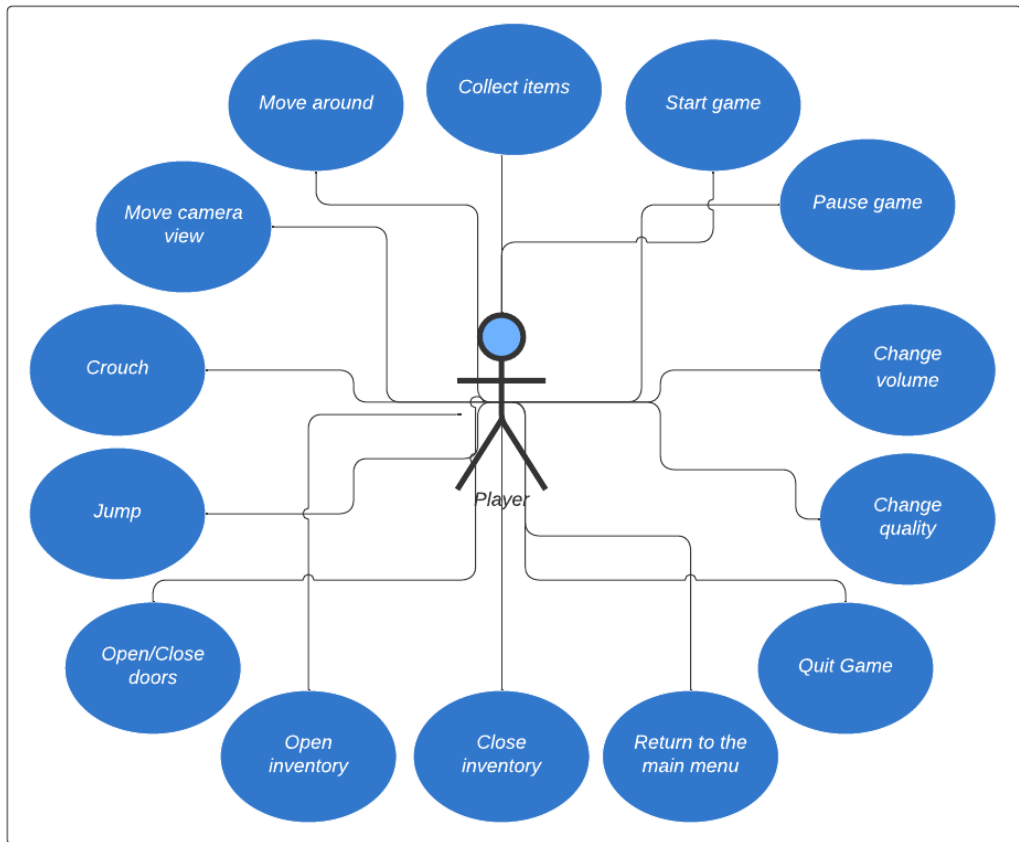Table 4.14: Case of use «Return to main menu»

Figure 4.3: Case of uses diagram (made with Lucid Chart)

## 4.4 System Architecture

The video game was developed using Unreal Engine, specifically with the 4.27.2 version [6]. For running games made with this engine the recommended system requirements are:

- Operating System: Windows 10 64-bit.

- Processor: Quad-core Intel or AMD, 2.5 GHz or faster.

- Memory: 8 GB RAM.

- Video Card/DirectX Version: DirectX 11 or DirectX 12 compatible graphics card

The game has been developed and tested on a computer with these hardware and software features:

- NVIDIA® GeForce RTX™ 2060

- Intel® Core™ i7 de 9.ª gen

- RAM DDR4 of 16GB

It is recommended, for comfort and a better game experience, to play with a mouse.

## 4.5 Interface Design

The interface of the game was intended to be clean and uncluttered in order to feel immersive and to be able to see all parts of the screen on every moment.

The only indication given to the player is when the player sees in the direction and is in close proximity with a collectable object (key objects). When both of this conditions are valid, the object will be outline with a bright yellow color.

Even so, there is an attempt to always keep the screen clear and the most realistic experience through the house.

# NARRATIVE DESIGN

**Contents**

After meditating and thinking about the ideas previously mentioned and explained, the development of the video game was set in motion. This chapter will explain in detail the process it went through and its changes chronologically.

## 5.1   Narrative evolution

Before starting the video game, I decided to write a script to structure the narrative that the video game will have. It was a task that took me longer than planned to finish due to my concerns about the story and the constant feeling that it could always be improved and more elaborate. However, at a certain point I realized that it was better not to over complicate the narrative and the story, for fear of proposing too many things and not having enough time to do them all or not do them well enough, with the possibility that the project would be incomplete.

The starting point was the one I already had initially, meaning that the video game would take place in a house and the story would be told through the different objects in the house. After consulting with my work tutor, Marta Martín, and after listening to the opinions of many people, I decided to let go of the idea of the loops and make it a fixed but changing scenario. To explain it in a clearer way, the player could explore a house in

which, after activating some event by picking up an item or discovering something, the objects in certain areas of the map are modified. Later on, however, this idea turned out to be impractical due to the limitations and knowledge I had of the Unreal Engine and was eventually modified, despite having been considered for a large part of the project.

I started sketching the floor plans of the house and the layout of the objects in the rooms. Wanting it to be a contemplative game, coupled with the fact that I wanted to be able to draw 2D assets even though the game was going to be in 3D resulted in a concrete design. This was already contemplated for the previously submitted documents (Technical Proposal and GDD). The idea was to make the player look at the rooms from the outside, that is, to have only the view from the door. This concept would make it possible to work more on scene composition and specific lighting. In addition, the objects instead of being 3D models, could be 2D drawings on a three-dimensional stage, placed in a way that gives the feeling of a "theatre stage".

In addition to this, I also thought that instead of changing the objects in each of the rooms as the story progresses, I would make a room for each "memory" and each moment. That is to say, that everything would be on the same map from the beginning. I thought about making the atmosphere of the corridor like the on in 'P.T', the game referenced in the chapter 3. (see Figure 5.1)
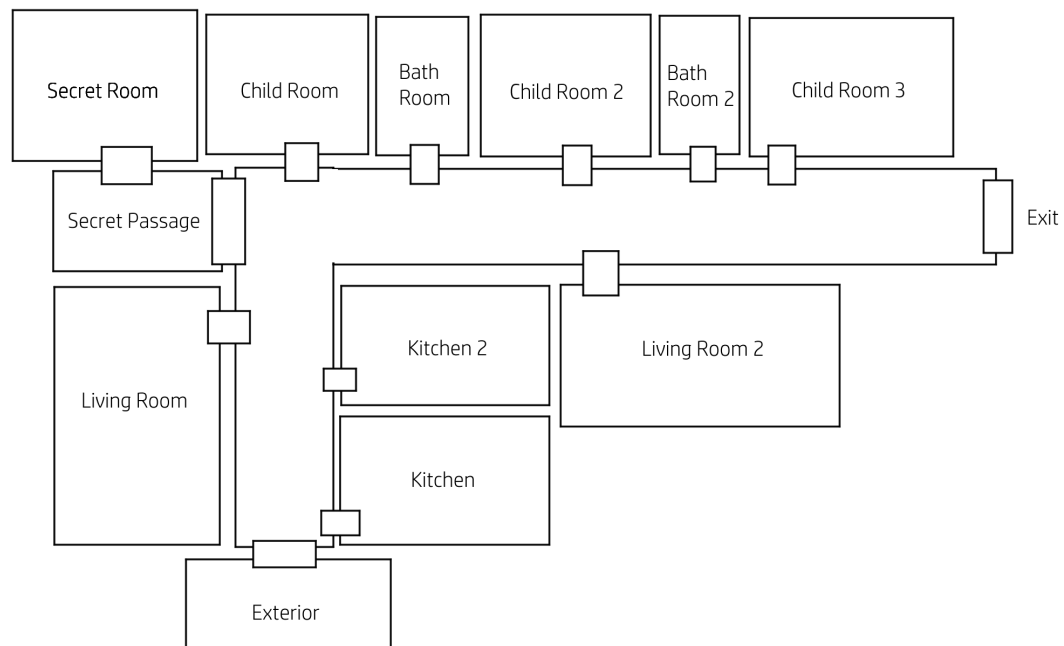


Figure 5.1: First sketch of the initial version of the map

I realised that this kind of gameplay could leave a lot of potential possibilities unexploited, as well as it may end up being boring for the player. Just like the idea of loops,

after consulting with other people and looking at other possibilities, it became one more discarded idea. In the end, the art style of the game would end up being completely 3D, except for specific screens like the menu, and the rooms would change instead of being duplicated.

At this point I already had some of the most important points of the game, but I was missing something essential: what was going to be the story about? What was going to happen in the game?

From the beginning I was interested in telling a mystery and detective story about a case that would be solved by the player. I made a couple of drafts where I wrote different ideas for stories about murder or kidnapping cases, indicating what would be key events and possible objects to represent them. However, I always felt that something was missing in these stories. They were written with the intention of being complex, with plot twists and revelations, but when they were translated into the form of communication they would have for the player, in other words, the environmental narrative, I felt that they would lose intrigue and become ambiguous and unclear.

So I decided to adapt one of the stories I wrote and simplify it. This meant taking away complexity and discarding many ideas that I liked in order to make the whole story more effective and clearer in the final game format.

## 5.2 Storyline

The resulting story is about the passing of a family through the house where the events take place. A family formed by the parents and a child that have just moved into the house. The three of them are happily starting this new stage of their lives. At first, in the atmosphere of the house you can feel the happiness of the family and how the girl's childhood is developing as she grows up. However, small details such as wrinkled letters from an unknown sender, or antidepressant pills in the bathroom indicate that not everything is going as well as it seems.

Finally, the girl notices that something strange is happening to her parents and one day she receives a letter addressed to her from someone she doesn't know. Innocently, she decides to open it without consulting her parents and discovers that a distant relative, the brother of one of her parents, is trying to contact them. The uncle, about whom nothing is really known, not even if he is telling the truth about his family relationship with them, manages to trick the girl into giving him her current home address.

Knowing nothing about the man's real identity and his relationship to her parents, the girl returns home one day to find her parents' room on fire, having been trapped inside. After the death of her parents, custody of her parents passed to what was apparently her only relative, her uncle with whom she exchanged letters.

Here begins a new phase for both the girl and the house. The uncle moves into the house and the atmosphere changes completely. Now everything is colder, sadder and full of dirt and wine bottles.

The girl continues to grow up, and one day by chance, she discovers her uncle entering through a secret passage in the corridor of her house that leads to a basement. What

she finds in the basement makes her realise that the uncle is really responsible for the death of her parents and, filled with hatred, she decides to end his life with her own hands. She takes a knife and goes down to the sinister basement, where the uncle kept videotapes spying on her family and performed satanic rituals.

After these events, the girl leaves the house.

## 5.3   Characters

The characters of the story do not appear on screen at any point, but we know about them from the scene and the atmosphere of the house. In total, we can distinguish four characters:

- The girl: the story revolves around the passage of this character through the house. The character goes through two main phases: from her happy childhood to her gloomy young adulthood, when she leaves the house. This character represents the eyes of the player, since at the beginning of the game, the player sees a letter written by the girl just before she leaves the house at the end. The letter says the following:

  *"To my future self: I'm leaving this house. I don't want to get involved with this place anymore, it carries too many memories of my childhood. But just before I leave, just before I forget about everything forever, I want to remember it all just one more time."*
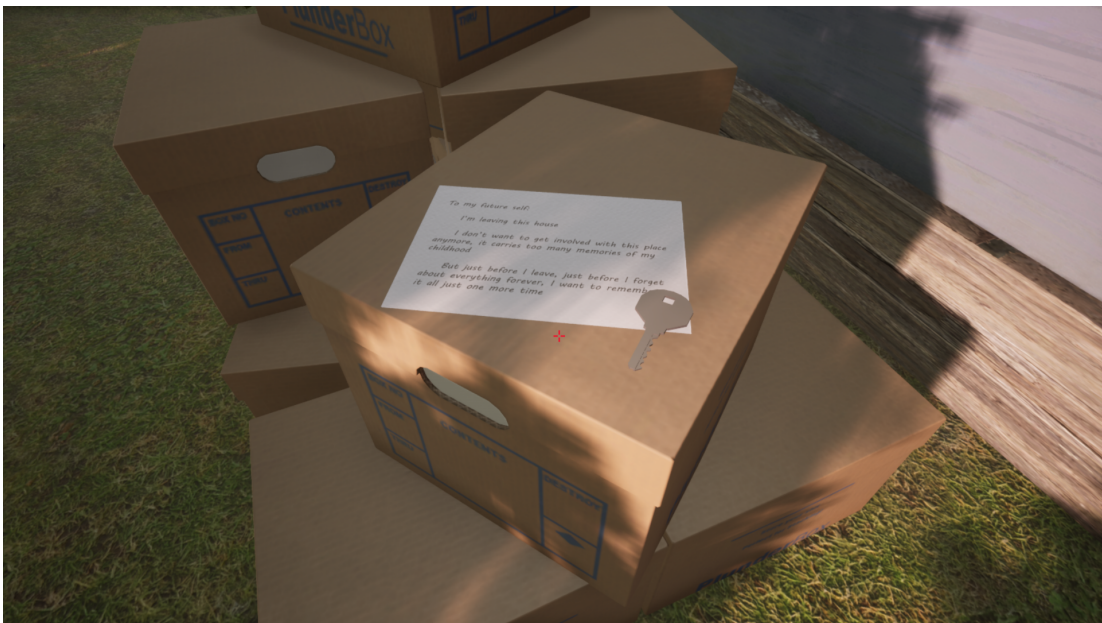


Figure 5.2: Future self letter left at the entrance of the house

With this letter, the player gets hinted that they represent the person that wrote the letter and that wants to revisit and remember the events occurred on the house one last time.

- The mother and the father: although nothing is known about their personalities, it is understood though the depression pills item, the unpaid bills and the letters that both had psychological problems derived from their financial shortcomings and toxic relationship with the uncle. Still, they try to take care of and make the best of their daughter's life and be a happy family, as shown in the portraits around the house.



Figure 5.3: Portrait of the family with the house behind

- The uncle: the antagonist of the story, about whom we do not know much information as the conclusion is left open. He hated the parents and decides to trick the girl in order to get to them, kill them and later take the house and the girl. This character intentions are meant to not be clear and open to the player's interpretations.

In general, the narrative of the game is designed so that it is not entirely clear to the player's eyes, but that the player can interpret and come to their own conclusions, the only guide being the key objects that are kept in the inventory.

## 5.4 Environmental storytelling and game world

After developing and writing the narrative and the key objects (see Table 5.1) that will guide the player, I started with scene blocking, which means building the level and setting up all the objects. As I placed all the objects, I improvised on some of the environmental storytelling decisions.

First, I started with the most important room in the house: the child's room  [2]. The first version of the room I made was by taking objects that I thought would look good and placing them in the room. However, after this first version, I made a different one in another project, which I liked more and kept it, and later I improved it and added details until I got the final and current version. From this room, the rest of the house began to take form.



Figure 5.4: First version of the child's room



Figure 5.5: Final version of the child's room

| Order | Room | Place | Key Object |
|:---:|:---:|:---:|:---:|
| 1 | Exterior | Above the cardboard boxes | Key |
| 2 | Child's room | Desk | Paper deer |
| 3 | Kitchen | Fridge | Child's drawing |
| 4 | Living room | Under the table | Trash paper |
| 5 | Bathroom | Small shelf | Depression pills |
| 6 | Parents' room | Over the dresser | Unpaid bill |
| 7 | Child's room | Bedside table | Uncle's letter |
| 8 | Parents' room | Over the dresser | Family photo |
| 9 | Living room | Wall | Family photo crossed |
| 10 | Child's room | Under the pillow | Axe |

Table 5.1: Table of key objects

### 5.4.1 Key objects

The narrative of the game is guided by key objects, which the player will find as they explore the house and which will unlock new rooms and advance the story. (see Table 5.1)

It can be said that the first key object that the player will find is the literal key to the house. Although this object is not a key object by itself and only serves to be able to start exploring the house, right next to it there will be a note that starts the narrative of the game and to enter. (see Figure 5.2). Now, it will be possible to open the front door and access the corridor. (see Figure 5.6)

The key object of this first room was not completely decided. I wanted it to be something associated with the child's childhood and happiness, and I thought that the best option would be a toy. But later I saw that there were paper animal models in the assets, which I found cute and I thought it would be a good idea to have them all around the house, as if the child was making them and leaving them around. But later I saw that there were paper animals in the assets, which I found cute and I though it would be a good idea for them to be all around the house, as if the child was making them and leaving them around. So finally, the key object ended up being a paper deer that the child made during the move. (see Figure 5.7)

This paper deer will connect with the kitchen and will be related to another place of calm and happiness for the family, so the key object in this room is the drawing of the girl stuck to the fridge (see Figure 5.8). Due to the family's financial problems, the plates of food on the table show that they are eating rice, which is the first clue to the player about the money problems. Also, there's not much food around and a lot of cans.

The key object of the drawing will unlock the living room, where a child birthday is being celebrated and the player is told that time has passed and the girl is now

Figure 5.6: Corridor and entry of the house



Figure 5.7: Child's room and second key object

Figure 5.8: Kitchen and third key object

older. This is where the player will find the first strange key object, a wrinkled paper of unknown origins (see Figure 5.9).

This way, the player will be able to access the bathroom, where he will find some antidepressant pills (see Figure 5.10) belonging to the parents and which will unlock the parents' room, where they confirm that these pills were theirs and where we will find a letter from the bank for unpaid debts (see Figure 5.11), confirming that they indeed have financial problems.

With the object of the bank letter, the girl's room will be updated and the objects will change over time. In the new room, the player will notice that the girl has now grown up and has more stuff like a laptop, new toys and homework books. In this updated room there will be another key object, a letter from her presumed uncle (see Figure 5.12).

After getting these items, the player will fall unconscious and wake up back in the house, where he will only be able to access the parents' room, which is on fire. From this room, the only thing that can be recovered is a picture with a family photo (see Figure 5.13), which will be the key item.

Is after this event that the uncle will move into the house and the house will have a more gloomy and dark atmosphere. The rooms will now be colder and sadder.

First, the player will have to go to the living room, where everything is dark, withered and messy. There are wine bottles and stains on the sofa and floor, indicating that the uncle now lives in the house. The key object in this room is the framed family photo in the wall near the window (see Figure 5.14), which will be different from the one seen

Figure 5.9: Living room and fourth key object



Figure 5.10: Bathroom and fifth key object

Figure 5.11: Parents' room and sixth key object



Figure 5.12: Updated child's room and seventh key object

Figure 5.13: Updated parents' room and eighth key object

in the previous version of the living room since the parents are now gone, and so their faces are crossed out, as the game simulates the child's memories and recollections.

In addition, another indicator that the uncle and the child now live alone in the house are the coats and shoes in the entrance hall. Previously, there were three pairs of shoes, men's, women's, and small child's, respectively, as well as coats. At this point in the game, there will only be a large dark coat and men's shoes, along with the child's and a children's coat.

After picking up the key item in the living room, three rooms will be unlocked to get the last key object in the game, having an increase in the difficulty curve near the end since the player will now have to look in more places. The rooms that will be unlocked are the kitchen, the bathroom and the child's room.

In the kitchen more changes can be seen in the environment and lighting. There is leftover fast food and the contents of the plates are rotten and dirty. In the bathroom it will be similar, everything will be dirtier and there will be only two toothbrushes instead of the initial three. It will be in the child's room where you will find the key item, an axe hidden under the pillow (see Figure 5.17).

After getting the last key item (see Figure 5.18), the character will become unconscious again and time will pass. When the player wakes up, they will find themselves in a gloomy, blood-stained hallway, indicating that the girl has already discovered the secrets of the house and killed the uncle. All the doors in the hallway will be closed and there will be a secret passageway behind the hallway furniture. (see Figure 5.19 and Figure 5.20)

Figure 5.14: Updated living room and ninth key object



Figure 5.15: Updated kitchen

Figure 5.16: Updated child's room



Figure 5.17: Updated child's room and tenth key object
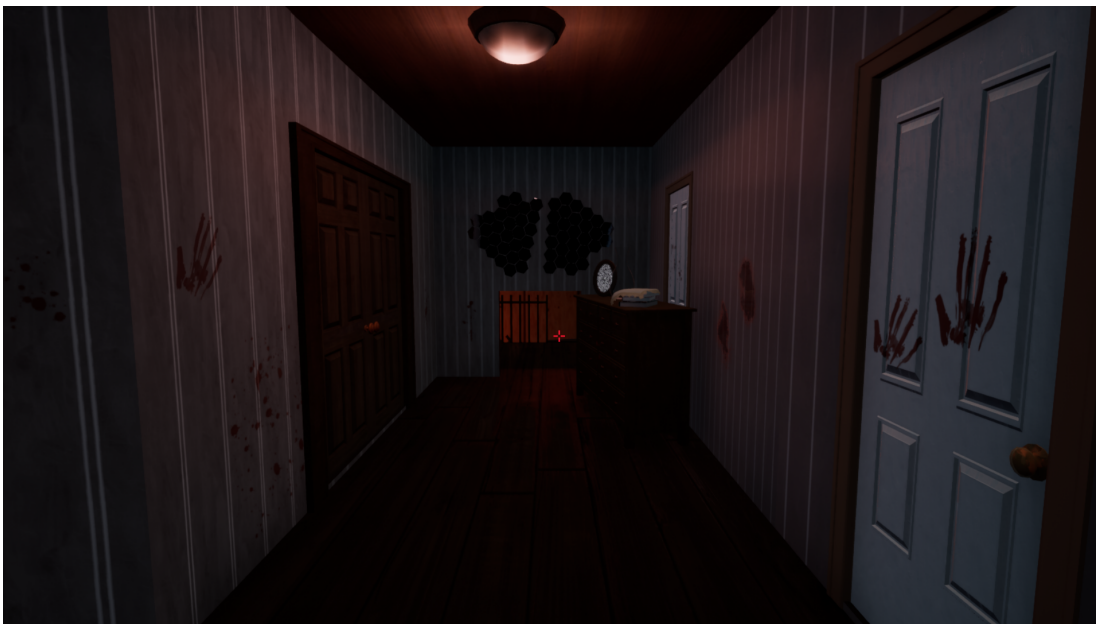
Figure 5.18: Inventory with all key objects



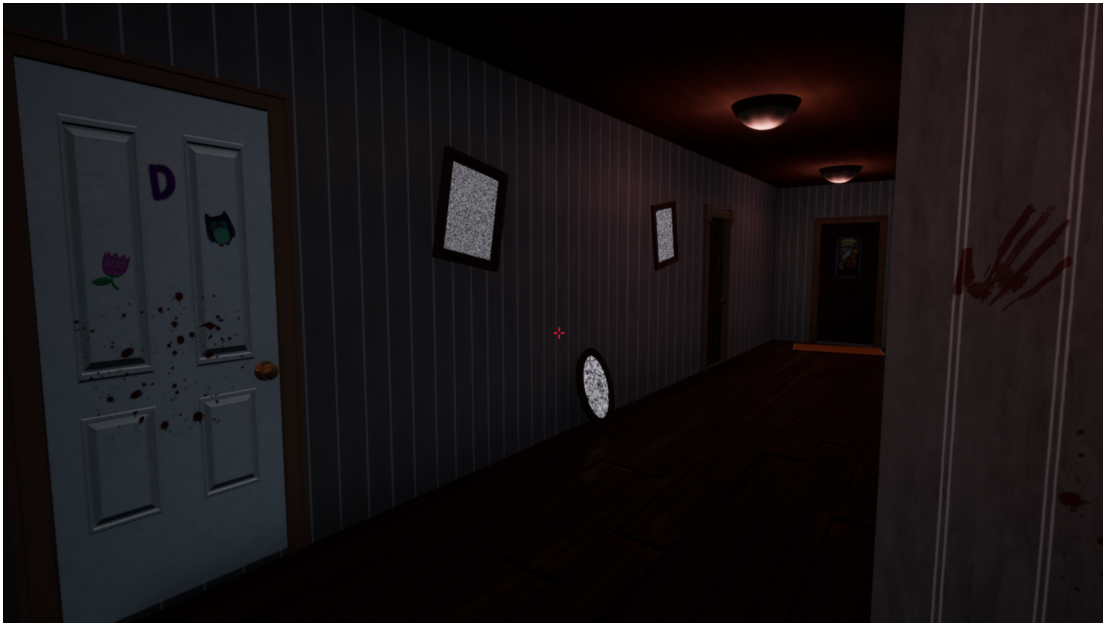Figure 5.19: Updated corridor and secret passage

Figure 5.20: Updated corridor and hanging pictures

The place to which the secret passage leads is the basement, ending in the last room, the basement, a place with a macabre atmosphere and where the secrets of the uncle, the person behind everything, are revealed. (see Figure 5.21 and Figure 5.22)

Figure 5.21: Secret basement



Figure 5.22: Secret basement

In summary, the main differences in the scenes and rooms throughout the game are as follows, organised according to the room:

- Hall and corridor:

  - Coats and shoes at the entrance: In the beginning, there are three pairs of shoes, men's, women's and toddler's, respectively, as well as coats for them. Later, there is only a large dark coat and men's shoes, together with a child's coat and a child's coat.

  - Pictures corridor: when the parents' room is on fire, one of the pictures is slightly rotated. When the secret passageway appears, the paintings have fallen and are fuzzy.

- Child's room:

  - Moving boxes: At the beginning, the family is moving into the house.

  - New objects and toys: Time has passed and the child has different objects in her room, such as new toys, a different chair, a laptop and more books for school. Yet she still maintains her origami hobby.

- Kitchen:

  - Food: The family's plates are neatly arranged and have food on them, while later, when the uncle moves in, they are dirty, messy and with rotten food. In addition, the biscuit packets are open and there are fast food leftovers all around.

  - Fridge's sticker: At the beginning, there are childish stickers put on the fridge, but they aren't there later.

  - Calendar: The calendar shows the time that has passed since the events of the first version of the kitchen and the events of the second version of the kitchen. At the beginning, it indicates that the date is November 2010, while later it says November 2015. Therefore, 5 years have elapsed during the events.

- Living room:

  - Family photo: The family photo hanging near the window shows the happy family arriving home, but later both parents will be crossed out.

  - Television and sofa area: After the fire, the area will be filled with wine bottles and stains.

- General:

  - Day and Night: The first rooms, which represent the calm and happiness in the house, take place during the day, while the rooms after the fire are during the night.

– Ambient sound: During the day, there is background music with ambient sounds of nature, while during the night, only silence and the fire can be heard, giving a more gloomy feeling to the house.

– Secret basement: Throughout the game, a furniture in the corridor hides the secret passage to the basement, which is revealed only at the end.

# 6

# FUNCTIONAL AND TECHNICAL SPECIFICATIONS

The programming of the game was done using blueprints in Unreal Engine. The game was not a complex level of programming and I had already programmed most of the mechanics in other engines and other programming languages, but even so I had to spend more time learning it than I thought because of how different it was from what I was used to.

During the development of the game I have been learning how to use Unreal Engine with Carlos Coronado's Udemy course [7]. In addition, I have learned from several guides and YouTube videos for the realisation of other mechanics, which are mentioned in the bibliography.

In chronological order, the main elements I have programmed have been the following:

- Character movement: The Unreal Engine template already comes with the basic character movement built in, but I wanted to add the ability to crouch to increase the feeling of game exploration. To do this, I modified the character's blueprint and changed the camera position when a certain input was received. (see Figure 6.1)

- Doors: Making the doors open when the player clicks on them was a task that seemed very easy at first, but as soon as I started to do it I noticed that it needed some previous knowledge that I didn't have of Unreal Engine blueprints [8]. So, you could say that this was the first thing I actually programmed something on Unreal Engine.

    For the programming of the doors, first it checks if the player is in the trigger area of the door with an event overlap and enable the interaction with the door, as well
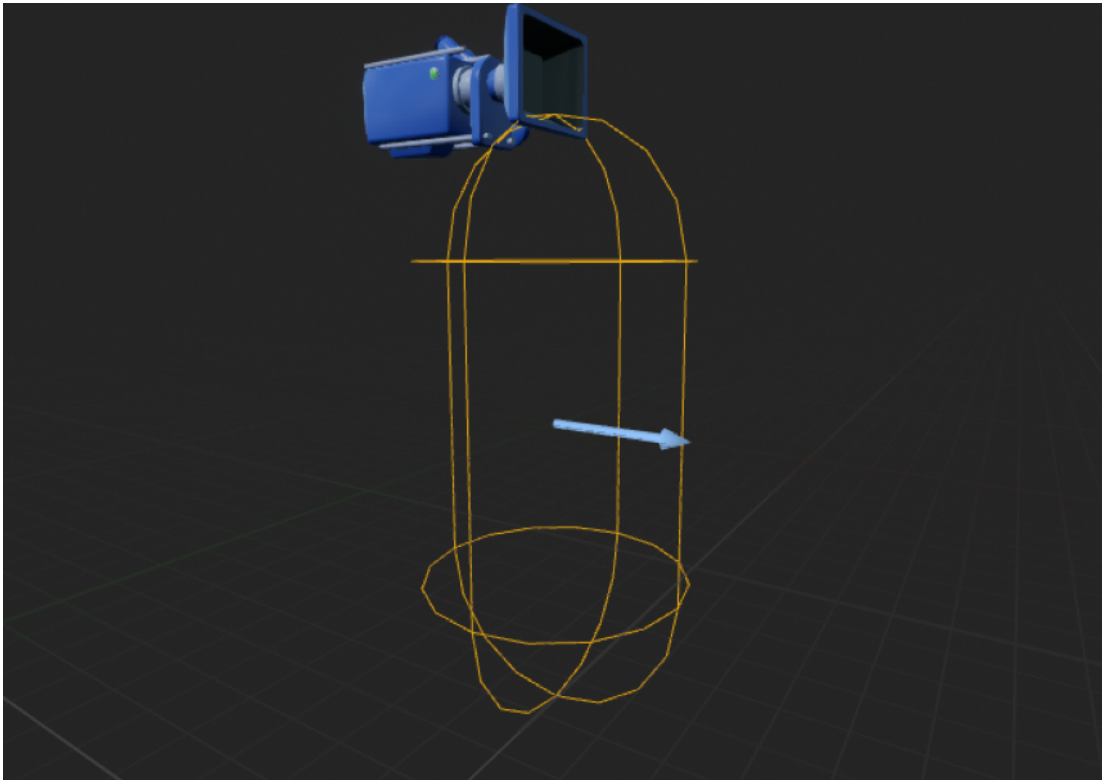
Figure 6.1: Player's character viewport

as if they has the required object in the inventory to enter the corresponding room. (see Figure 6.2)

I also added an animation to the doors so that they didn't open with a uniform speed, but had acceleration and deceleration (see Figure 6.3), as well as a crack random sound.

- Inventory: The inventory was the first contact I had with HUD and menu programming in Unreal Engine. This knowledge I would later use in the main menu and in the pause menu. Here I learned how to use structures and widget blueprints, which are blueprints specific to the HUD [9].

  Briefly, the inventory consists of the following components:

    - Parent actor that identifies the collectible object and that all inventory items inherit from it (Object-ACT). (see Figure 6.4)

    - Structures that identify the properties of the object and of the space occupied by the object in the inventory window using a stack (Object-EST and Space-EST).
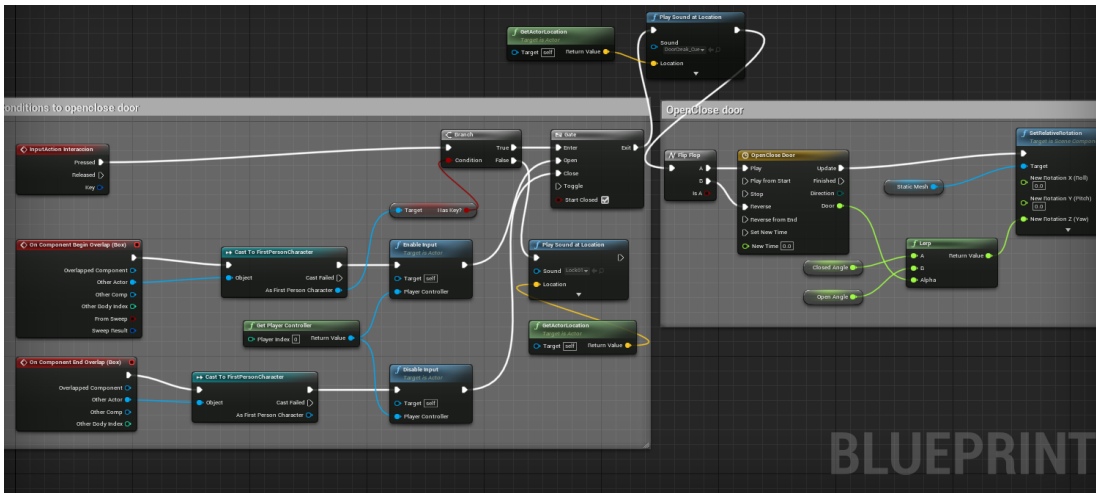
Figure 6.2: Door's blueprint
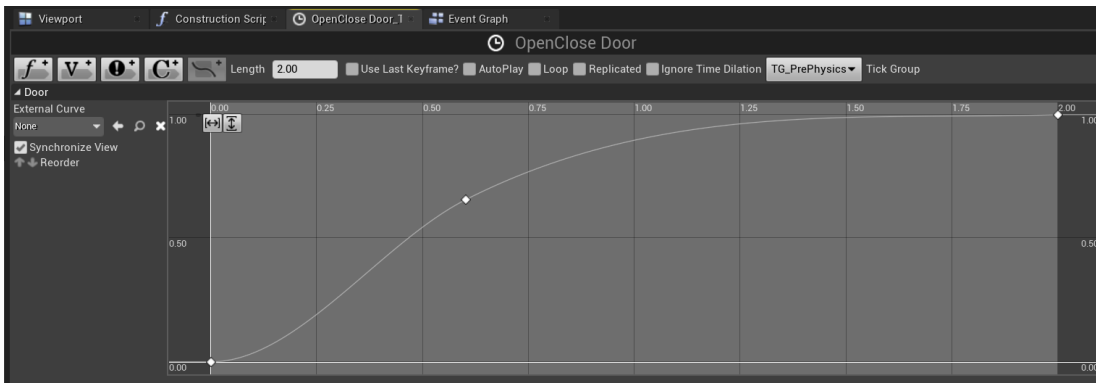


Figure 6.3: Animation of the doors

    – A component that is in charge of the operations with the inventory such as starting it, opening or closing it, adding, ... (Inventory-COM).

    – Graphic interface widgets, for the management of the screen HUD that are in charge of showing the inventory and the elements contained in it (Spaces, HUD and InventoryWindows).

- Level changes: Since it wasn't affordable for my level of Unreal Engine knowledge, I saw that the best way to change the look of the rooms was to split it into different levels. [10]

  The first part of the game and the first level is from the moment when the uncle's letter is discovered in the child's room. After this, along with an animation of falling unconscious, the level is changed to the second part, where the house is darker and gloomier. (see Figure 6.5)
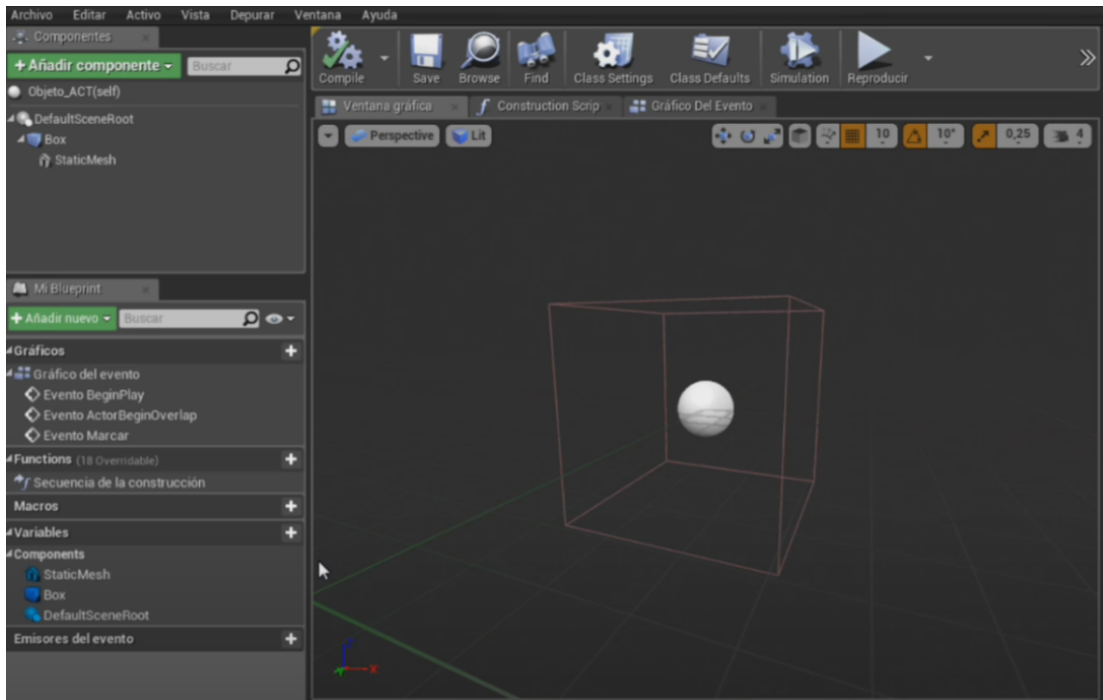
Figure 6.4: Components of the Object-ACT
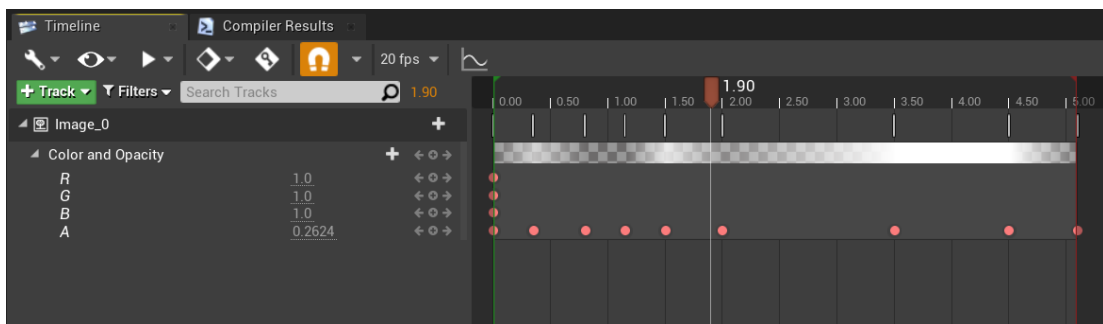


Figure 6.5: Fade animation for the level change

To make this change I used a trigger box that is activated when you get the key object of the letter and a fade animation made in the same way as the doors.

- Menus: As in the inventory, the menus were made with widget blueprint. For the main menu I created a new scene where the house appeared with a sunset illumination. For the pause menu, I simply added a blur effect for the background and the pause menu appearing on top [11] (see Figure 6.6 and Figure 6.8).

The buttons used in both menus work with an "On Clicked" event and proceed to execute the corresponding actions (see Figure 6.7 and Figure 6.9).
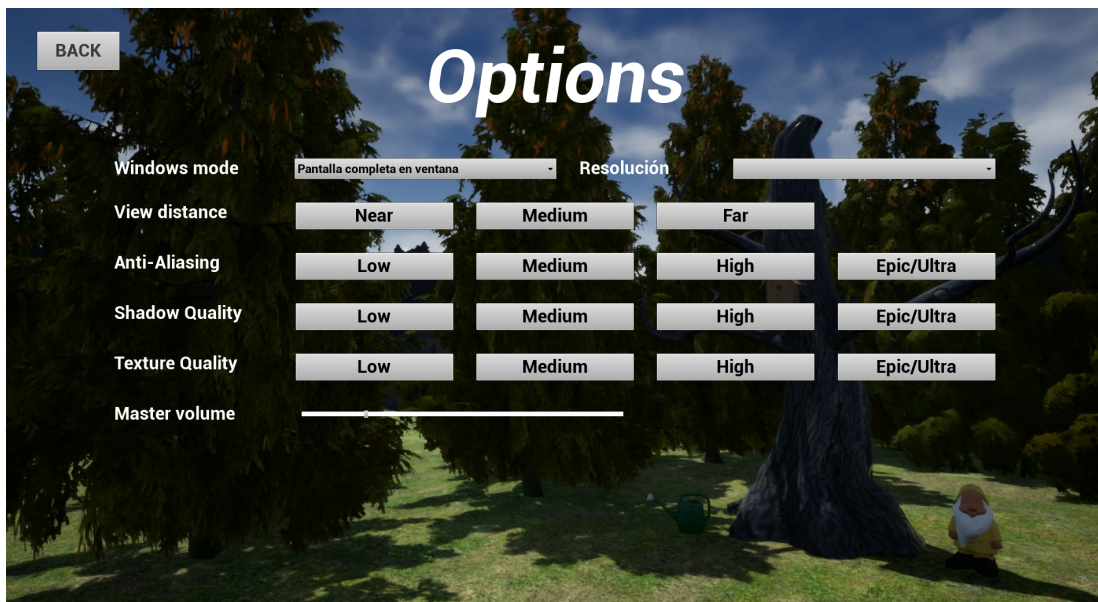


Figure 6.6: Options menu

- Outline objects:

The last thing left to do related to the programming part was to make the key objects stand out when the player was close and pointing the camera view at one of them [12].

I downloaded some materials [13] that, when applied to the PostProcessVolume, made the object highlight in a yellowish colour, making it more noticeable to the player's eye.

For this, I used a LaneTraceByChannel, which is similar to a line that points in a straight line in the direction the player is looking and collides with other objects. I decided to make this line slightly longer so that the objects could be seen from further away and stand out as a way of making it easier to pick up objects and avoid confusing the player.
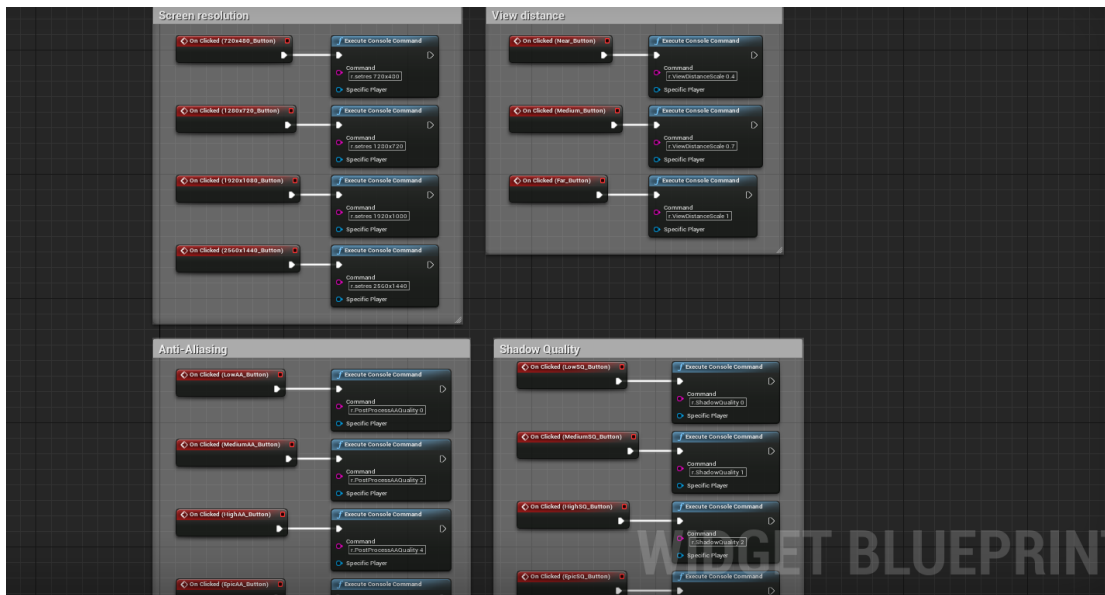
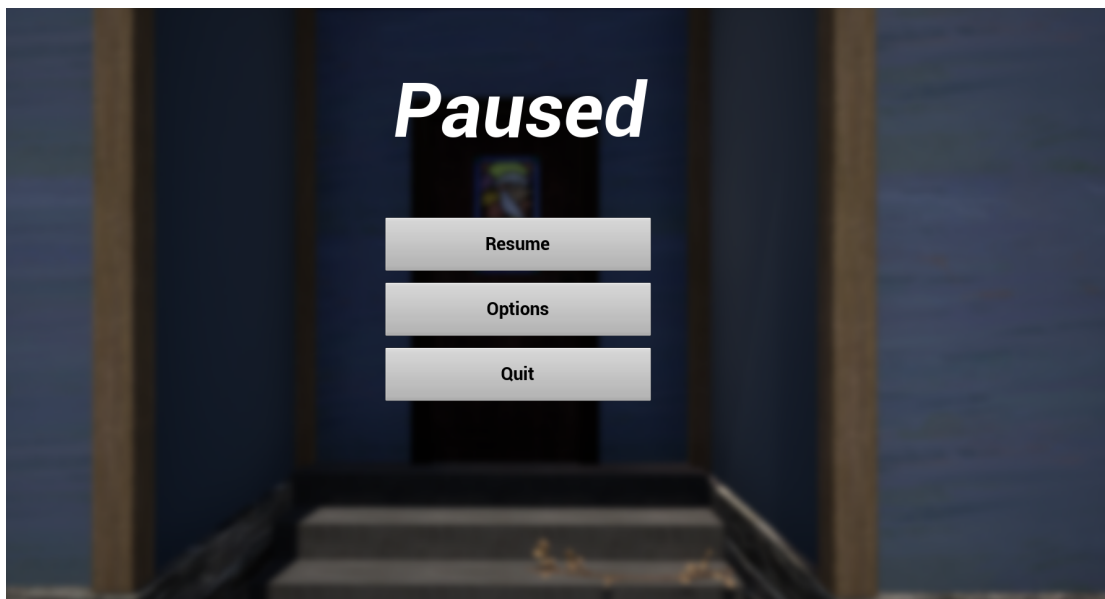Figure 6.7: Options blueprint that shows how the change of the resolution works
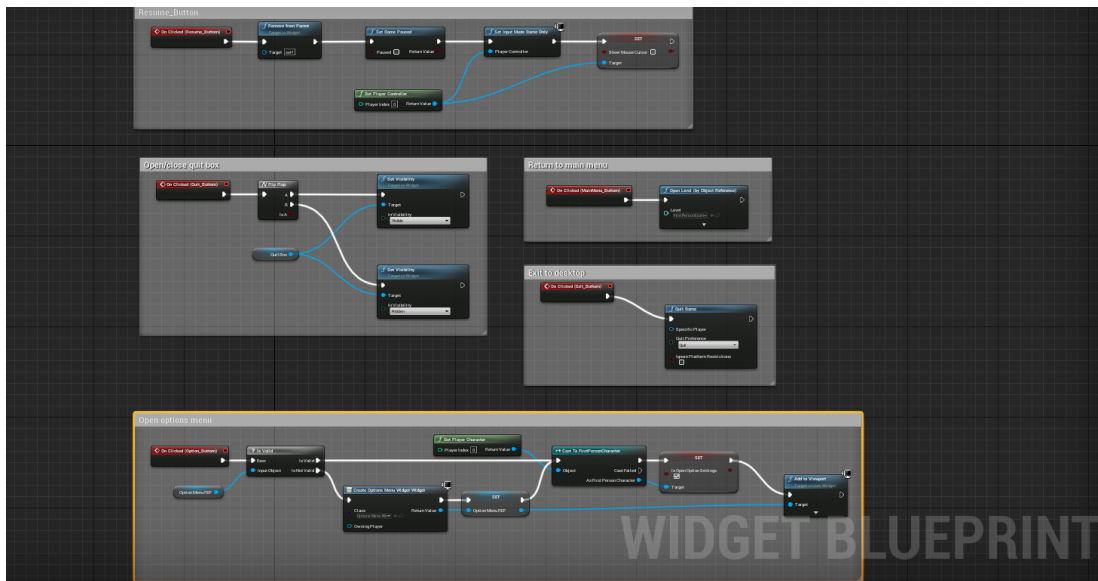


Figure 6.8: Pause menu

Figure 6.9: Pause menu blueprint

The object checks if the object that the line intersects with is an "Object-ACT", specifically, a child from a collectible object. Since some static meshes were not detected with this line, I ended up putting a trigger box around the object, which is what actually intersects with the line. (see Figure 6.10)

Figure 6.10: Outline Blueprint

# 7

# ARTISTIC DESIGN AND MUSIC

**Contents**

## 7.1  3D Assets

It was important that the scene looked as realistic as possible and that the house was filled with objects, so that it looked like people actually lived there.

To do this, I used the assets from *What Remains of Edith Finch* (Giant Sparrow, 2017) [14], published on the Epic Store for Unreal Engine. Since the game is set in a peculiar house full of objects, it was useful for the kind of scenario I wanted to make. I also used some assets, especially meshes and sound effects from Horror Engine [15], a free project published on the Epic Store for Unreal Engine too that contains assets to make a horror game. To supplement this, I also made use of another asset pack with bloodstain textures [16]. Lastly, I used a pack of animated tree models [17] also from the Epic Store. These semi-realistic trees help the scene to have movement and especially outdoors, a sense of breeze.

## 7.2  2D Art

Regarding the 2D art, I've hand-drawn several things:

- The inventory, which is shaped as a cardboard box. I designed it this way because the beginning of the story is the family moving, and the first thing the player sees at the beginning of the game is a pile of cardboard boxes at the entrance of the house, so I consider it a representative element. In addition, the inventory, or its representation as a cardboard box, is named "Memories", which are the key objects of the game. (see Figure 7.1)



Figure 7.1: Cardboard inventory

- The key objects will be displayed with small recognisable icons. (see Figure 5.18)

- Some of the pictures in the house, namely the pictures where the family is together. With these pictures, the player will be able to see who are the people living there, even if they are not in the game. When the uncle moves to the house, this photos will be crossed out. (see Figure 7.2) and Figure 7.3)



Figure 7.2: Family photo

## 7.3   Sound and music

As for the sound effects, I have used the ones that came free of copyright in the "Horror Engine" [15] project mentioned above. These sounds include some like key sound, door opening sound, locked door sound, paper sound,...

I have used as well, the audio from a YouTube video [18] for the background nature music in the menu and at the beginning of the game.

The sounds displayed are the following:

Figure 7.3: Family photo crossed out

- Locked door

- Door cracks

- Jump sound

- Crouch sound

- Picking up key sound

- Picking up object sound

- Fire

CHAPTER **8**

# RESULTS

Finally, the result of these months of work has resulted in a demo video game of approximately 15 minutes, with an interactive 3D scenario, with the necessary elements for the game to work and that tells the story of what has happened in the house and with its characters through an environmental narrative.

I managed to complete all the tasks I designed in the Game Design Document with slight variations.

The following links refers to the end result of the video game:

1) Gameplay video: `https://drive.google.com/file/d/1Xg8XpvRGi9z_OxOymXmJsX2rc8a5AX-M/view?usp=sharing`

2) Build of the game: `https://drive.google.com/file/d/1Ks5nIZESmlX6jh8ci_PjoVv0lXMjQ6AO/view?usp=sharing`

3) Github with the project: `https://github.com/al385745/TFG`

# CONCLUSIONS AND FUTURE WORK

**Contents**

In this chapter, the conclusions of the work, as well as its future extensions are shown.

## 9.1 Conclusions

After four years spent on the Video Game Design and Development degree, I have undoubtedly created a lot of video games. However, none has been like the experience I have ended up creating for this final degree project.

It could be said that throughout my time in the degree, I have made more than a dozen video games in total, most of them working in groups. Working in a group is efficient, but also gives us less freedom since there are more opinions to take into account, not to mention the limitations of the type of game that had to be developed. So I never really felt that I had made my own video game in any of the cases, until now. But with this project, I could choose everything about it and develop it how I wanted it, since I was by myself. The only thing that limited me was the deadlines, but that was something that I could easily adapt to.

Regarding the results of the video game and the project, I can say I'm satisfied with it and that I was able to achieve the goal I wanted to. Even if it's just a demo, I think I was capable of making a close story with a beginning and ending with the available time, since the game was meant to be short, around 15 minutes, from the initial state and ideas.

I believe that I have been able to apply the knowledge learned in class, but applying it to my ideas and to the type of game I wanted to develop.

## 9.2   Future work

I really like how the project looks at the end and I'm happy with it. However, there's always room for improvement, and I intend to continue detailing this game even after finishing the subject and the degree.

I'd like to implement some ideas I had during the development of the game, since I think they can give a more valuable experience to the player, such as a greater variety of sound effects, better transitions and animations, giving the player a body in first person and give the possibility to interact more with the scene, like opening drawers, inspecting closely some items,...

In addition, thanks to this work I have learned to use Unreal Engine, a video game engine that I really enjoyed using and that certainly, although I still have a lot to learn, I will continue to use in future projects.

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