



The Eagle's Shadow
Development of a narrative First Person
Adventure video game
Final Degree Work Report

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To Emilia

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ABSTRACT

This document presents the project report of the Video Games Design and Development Degree Final Project conducted by Pascual Sanchis Torrego. The Eagle's Shadow is a First-Person Adventure(FPA) game that adapts a few chapters of the book with the same name written by the author Arturo Pérez-Reverte, which tells the story of a group of Spanish soldiers forced to fight under Napoleon's army, who tired of this situation, decided to desert in the middle of a battle, doing so in a quite peculiar way. The work consists in the implementation of game mechanics and the creation of 3D assets where players will have to explore the battlefield searching for key objects related to the story in order to advance through different levels.

KEY WORDS

This section provides the key words associated with the project discussed in this thesis. These key words are the main ideas and concepts.

- **Video Games Design and Development**
- **First Person Adventure**
- **Narrative**
- **3D Modeling**
- **Unreal Engine 5 Blueprints**

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INTRODUCTION

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In this chapter there is the explanation of how this project went from a silly idea to an actual game, what inspired me to adapt an Arturo Pérez-Reverte book and why it was going to be developed that way.

1.1 Work Motivation

My motivation for this project was to develop a narrative game in Unreal Engine 5 because I wasn't familiar with the software and it could be a fine challenge for me to start from scratch in that game engine. Also in Unreal there is a code language called blueprints that allow users to create everything they want without having to actually write code. Simplifying the code for the game would give me the opportunity to focus more on the visual aspect of the game and creating my own 3D assets with Blender.

Another aspect that motivated me to create this game was the story I was about to adapt from a Pérez-Reverte novel I read a while ago. Reading that book was a blast for me because the story is quite light-hearted despite the fact that everything going on is terrible and I thought that it could be fun for a game adaptation.

1.2 Objectives

The main objective for this project was to develop a game that was as good looking and polished as possible given the time and resources we had available. In order to achieve the stated goal, the following partial objectives can be highlighted:

- Learn the basic ideas of using blueprints in Unreal Engine 5
- Develop a narrative video game with different levels of complexity, representing selected moments from the book "La Sombra del Águila" [15] through texts that provide clues and key objects that must be found by the players.
- Create 3D Assets based on the time period in which the book takes places making them as historically accurate as possible

A personal goal I had for this project was to get better in 3D modeling, because I like that part of the video game development and I hope in the near future I'll be working as a 3D artist somewhere.

1.3 Environment and Initial State

The idea for this game started in the kitchen of my old students' flat while I was talking with one of my roommates and friend Fernando Gramage about the future of our degree and the ideas we had back then for the Final Degree Project, since I have an artist background I didn't wanted to develop a complex game with a lot of code so he advised me to make a narrative driven game and it was in that exact moment that came to my mind a nice book I had read a few months ago, 'La sombra del Águila' by Arturo Pérez-Reverte. I had a good time reading that book so a game based on it could be a good idea.

Once I had the idea for the game it was time to shape it and after putting a lot of thought into it, I decided that the best option would be a First Person Adventure (FPA) video game for two reasons, the first being that this a narrative driven genre and the second is that allowed me to develop the game in a 3D environment that I could fill with 3D assets made by me, since modeling is one of my favorite things I have learned in this degree and the one thing I would like to be doing in the future for a living.

PLANNING AND RESOURCES EVALUATION

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This chapter is the most technical part of the work, here will be explained all the planning that has been followed to complete the game and the resources that had been used to accomplish this.

2.1 Planning

Having a well thought out planning is essential for the success of any project and it is a key element when it comes to something as complex as developing a video game, so here it is an analysis of all the tasks that have been done in order to finish the game with a Gantt chart at the end of the section to put all this information in a much more visual way (see Figure 2.1).

- **Project preparation (10 hours):** Reading the book again to refresh the story and research in articles, blogs and history books to find how uniforms, weapons and flags looked during that age in order to make the game as historically accurate as possible. Also look for other games from the same genre for inspiration on how to design the game.
- **Asset modeling (80 hours):** This part has a huge importance in the development of the game. Apart from some environmental elements, all the assets for

this game have to be created from scratch, textured and the characters have to be rigged so they could have different poses.

- **Game Design and Development (190 hours):** Designing all the different levels and menus for the game, adding the assets for each one of them, looking for errors in the assets and correcting them if needed and most importantly programming the game flow and mechanics.
 - Creating the levels (60 hours): the first level will be the one that takes the most time to complete due to the fact that after this one is finished the rest will be like a copy of this one.
 - Coding and blueprints (110 hours): programming all the different mechanics of the game, making sure that the game flow worked correctly and that there are no bugs or errors in the game.
 - Creating the menus and clues (20 hours): designing and coding the different menus like the main menu or the options menu.
- **Documentation (20 hours):** Doing all the different documents like the GDD, the Final Degree Report or the presentation materials that are necessary for the overall project.

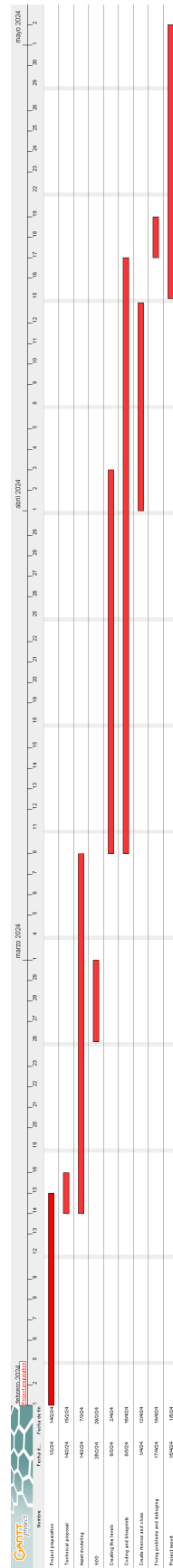


Figure 2.1: Project's Gantt chart)

2.2 Resource Evaluation

Here it is a list of the different resources used to develop the project divided into hardware and software.

- **Hardware:**
 - CPU: AMD Ryzen 7 5800H. Cost: 219,90 €
 - GPU: NVIDIA GeForce RTX 3050 Ti. Cost: 219,99 €
 - RAM: 16 GB. Cost: 36,99 €
- **Software (free):**
 - Audacity[2]: Free Audio Edition Software
 - Blender[3]: 3D modeling software used for creating the assets needed in the project.
 - Canva[4]: Desktop design application used for some 2D designs.
 - Gantt project[14]: Desktop application used for the Gantt chart.
 - Google Docs[6]: Text editor used for other documents.
 - Krita[8]: Illustration software used for some 2D designs.
 - Overleaf[13]: Online LaTeX editor used to write this report.
 - Sketchfab[17]: 3D modeling platform website to buy and shell 3D assets.
 - Unreal Engine 5.3.2[1]: game engine used for the project.
 - Unreal Engine Bazar[10]: The Epic Games Store for Unreal Engine.
- **Personal Work:** According to different websites such as CEV Madrid [9] a Junior Game Developer earns 18000-26000 € per year in 14 payments. This has been a 4 months project so the personal cost of it should be something between 5140 and 7428 €.

Taking all this into account the total cost for the project will be something between 5616€ in the cheapest scenario and 7904€ in the most expensive case.

SYSTEM ANALYSIS AND DESIGN

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In this chapter will be explored the requirements of the game separating them into functional and non-functional requirements: Here also will be explained the design, architecture and graphics of the project as well as its interface design.

3.1 Requirement Analysis

To commence with this part it's important to establish the game flow in order to clarify the requirements. The first thing that players will see once they run the game is the main menu, which has 3 buttons. The first one is Start game and it does so, taking the players to the beginning of the game. The second button is an options button where players can choose between different graphics quality options and change the sound volume. The last button in the main menu is Quit, which allows players to exit the game (see Figure 3.1).

Once players start playing, two texts will appear to put them into context and give them clues for their objective, below each text there is a continue button, after clicking the second continue button the first level will start. This flow will be the same during all the game, before each level there will be a text that gives clues to the players and then the level starts.



Figure 3.1: Main Menu buttons

In each level there will be an open area where players can explore looking for the key elements, once they have collected all these key objects they will go to the next clue and the next level. To navigate these areas players have to use the W, A, S, D keys. To interact with the key objects players have to be close to them and then press E on their keyboard.

At any time during the game players can press the Escape key to pause the game. When the game is paused, three buttons will appear, one to resume the gameplay, one to go back to the main menu and another to quit the game.

3.1.1 Functional Requirements

Now that it is clear how the game works, it is time to identify the functional requirements.

- **R1:** the player can start the game.
- **R2:** the player can go to the options menu.
- **R3:** the player can choose different graphic quality options.
- **R4:** the player can change the sound volume.
- **R5:** the player can quit the game.
- **R6:** the player can go to the next level by pressing the Continue button.
- **R7:** the player can navigate through the levels.
- **R8:** the player can interact with key objects.
- **R9:** the player can pause the game.

- **R10:** the player can resume the game.
- **R11:** the player can go back to the main menu.
- **R12:** the player can quit the game from the pause menu.

3.1.2 Non-functional Requirements

Non-functional requirements impose conditions on the design or implementation. Here are the ones for this project:

- **R13:** the game will be playable on PC.
- **R14:** the game will be optimized to avoid FPS drops.
- **R15:** the game will use efficiently the system resources like CPU, GPU and RAM.
- **R16:** the game will use low poly models.
- **R17:** the elements of the game will be historically accurate according to the source.
- **R18:** the mechanics will be easy to learn.

3.2 System Design

This section must present the (logical or operational) design of the system to be carried out. Different cases of use are defined (taken from the functional requirements) and a case of use diagram (see Figure 3.2):

Requirement:	R1
Actor:	Player
Description:	The player starts the game by pressing the button <i>Start game</i>
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in the main menu
Normal sequence:	<ol style="list-style-type: none"> 1. The player presses the <i>Start game</i> button 2. The system loads the Intro level
Alternative sequence:	None

Table 3.1: Case of use «Start Game»

Requirement:	R2
Actor:	Player
Description:	The player goes to the options menu by pressing the <i>Options</i> button
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in the main menu
Normal sequence:	<ol style="list-style-type: none"> 1. The player presses the <i>Options</i> button 2. The system loads the Options menu
Alternative sequence:	None

Table 3.2: Case of use «Options»

Requirement:	R3
Actor:	Player
Description:	The player can choose between different graphic quality
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in the Options menu
Normal sequence:	<ol style="list-style-type: none"> 1. The player chooses game resolution 2. The player chooses graphic quality 3. The system applies these changes
Alternative sequence:	None

Table 3.3: Case of use «Game options»

Requirement:	R4
Actor:	Player
Description:	The player can choose the sound and music volume
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in the options menu
Normal sequence:	<ol style="list-style-type: none"> 1. The player slides the bar to change the sound volume 2. The system applies this change
Alternative sequence:	None

Table 3.4: Case of use «Volume options»

Requirement:	R5
Actor:	Player
Description:	The player can exit the game by pressing the <i>Quit</i> button
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in the main menu
Normal sequence:	<ol style="list-style-type: none"> 1. The player presses the <i>Quit</i> button 2. The system exits the game
Alternative sequence:	None

Table 3.5: Case of use «Quit game»

Requirement:	R6
Actor:	Player
Description:	The player can go to the next level by pressing the <i>Continue</i> button
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in a clue text
Normal sequence:	<ol style="list-style-type: none"> 1. The player presses the <i>Continue</i> button 2. The system loads the next level
Alternative sequence:	None

Table 3.6: Case of use «Continue»

Requirement:	R7
Actor:	Player
Description:	The player can navigate through the level
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in one of the levels 2. The clue text has to have ended 3. The player has to be out of the pause menu
Normal sequence:	<ol style="list-style-type: none"> 1. The player presses W, A, S or D keys 2. The character moves in the direction assigned to that button
Alternative sequence:	None

Table 3.7: Case of use «Navigate the map»

Requirement:	R8
Actor:	Player
Description:	The player can interact with key objects
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in one of the levels 2. The player must be close enough to a key object
Normal sequence:	<ol style="list-style-type: none"> 1. The player approaches to a key object 2. The player has to press the E key in the keyboard 3. The object disappears
Alternative sequence:	None

Table 3.8: Case of use «Interact with objects»

Requirement:	R9
Actor:	Player
Description:	The player can pause the game
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in one of the levels or in a clue text
Normal sequence:	<ol style="list-style-type: none"> 1. The player presses the Esc key in the keyboard 2. The game pauses 3. The Pause menu gives more options to the player
Alternative sequence:	None

Table 3.9: Case of use «Pause»

Requirement:	R10
Actor:	Player
Description:	The player go back to the game from the pause menu
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in the pause menu 2. The player has to press the <i>Resume</i> button
Normal sequence:	<ol style="list-style-type: none"> 1. The player presses the <i>Resume</i> button 2. The system resumes the game
Alternative sequence:	None

Table 3.10: Case of use «Resume the game»

Requirement:	R11
Actor:	Player
Description:	The player can go back to the main menu
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in one of the levels 2. The player has to press the <i>Main menu</i> button
Normal sequence:	<ol style="list-style-type: none"> 1. The player presses the <i>Main menu</i> button 2. The system loads the Main menu
Alternative sequence:	None

Table 3.11: Case of use «Go back to main menu»

Requirement:	R12
Actor:	Player
Description:	The player quit the game in the pause menu
Preconditions:	<ol style="list-style-type: none"> 1. The player must be in the pause menu 2. The player has to press the <i>Quit</i> button
Normal sequence:	<ol style="list-style-type: none"> 1. The player presses the <i>Quit</i> button 2. The system exits the game
Alternative sequence:	None

Table 3.12: Case of use «Exit the game»

3.3 System Architecture

The minimum requirements to play the build of this project are the following:

- **Operating system:** Windows 10.
- **CPU:** Intel Core i7 / AMD Ryzen 7.
- **RAM:** 8 GB.
- **GPU:** NVIDIA GeForce GTX 1060 / AMD Radeon RX 580.
- **Additional hardware:** A keyboard and a mouse.

These prerequisites come from the official Unreal Engine 5 website ([1]).

3.4 Graphics and Styling

This video game's graphic style is a mix between two different aesthetics, low-poly and plastic toy soldiers. This was decided taking into account the number of assets needed and the amount of time required to create them, so doing a more complex style would mean expending too much time and so by simplifying the modeling process allowed to create over 30 original assets. Another important point to note is that since the setting of the game is during the Napoleonic era, so, to be historically accurate it was necessary to do some research in order to create the uniforms and weapons as realistic as possible,

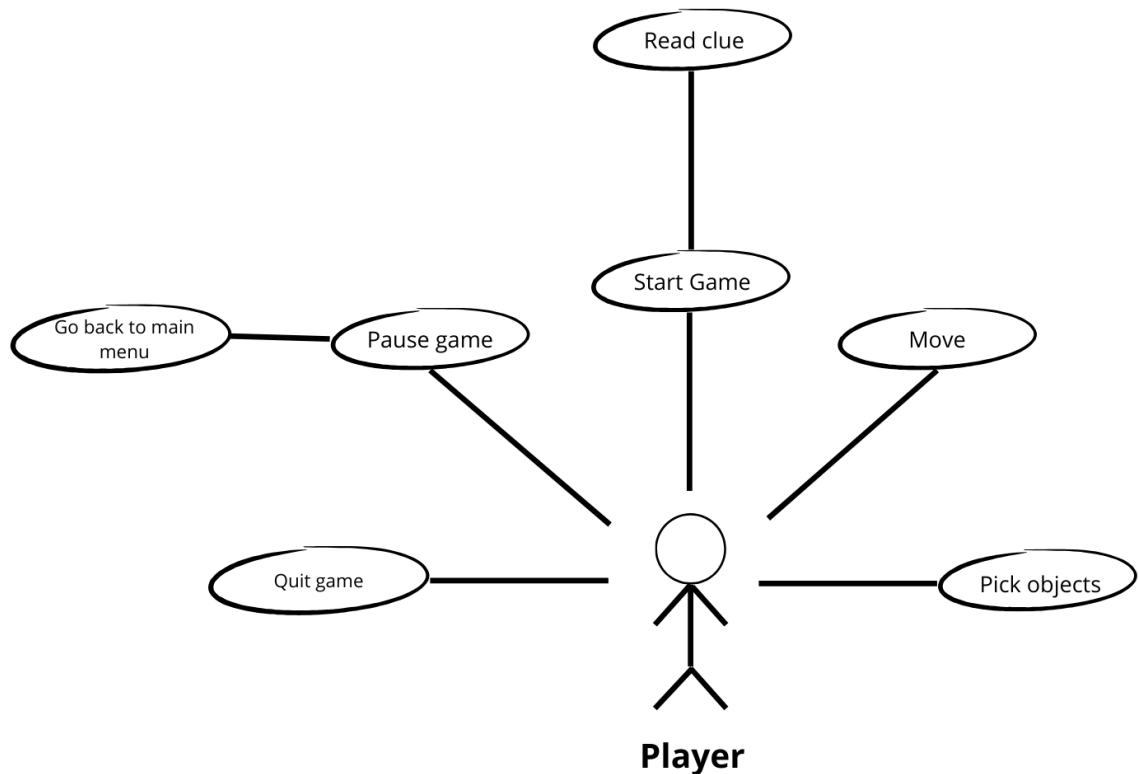


Figure 3.2: Case use diagram

but taking into account that this game is meant to be cartoonish. This research was thanks to the Wikipedia post on the Grand Armée [19] and a blog about french troops during this era [5]. Also back in that time lead soldiers were very popular, so the idea was to create the characters similar to these toys (see Figure 3.3). The last reason for creating the characters like this was that the book in which it is based on is almost a comical story, though the events narrated are quite horrible, so making them look funny, was essential in order to emphasize this idea of a horrible situation with a comical touch.

During the gameplay it can be seen two key attributes added to the game to give it a special touch, these are the particles and a camera filter (see Figure 3.4 and Figure 3.5). The particles are from the starter content from Unreal Engine and add more realism to the sceneries, because in the middle of a battlefield there is a lot of smoke and dust so it was important to put something to reflect that. The camera filter is a post-process effect, the reason for this is because the game is adapting a book from 1993, so it shows an old paper looking border to the game. This could seem a small detail but it really changes the way the game looks and feels (see Figure 3.6).



Figure 3.3: Soldier example



Figure 3.4: Graphics with filter and particles 1



Figure 3.5: Graphics with filter and particles 2



Figure 3.6: Graphics without filter and particles

Each level has different key objects, for example in the first one players have to collect three patches from other units (see Figure 3.7, Figure 3.8 and Figure 3.9) and in the second they must find a pistol and a boot (see Figure 4.1 and Figure 3.11). This has been done accordingly to the events that happen in the book.



Figure 3.7: First object from Level 1



Figure 3.8: Second object from Level 1



Figure 3.9: Third object from Level 1



Figure 3.10: First object from Level 2



Figure 3.11: Second object from Level 2

3.5 Interface Design

There are a few User Interface (referred as UI from now on) elements in the game, for example in the Main Menu we have three buttons, which have been described before. Below there is a picture of how it looks like (see Figure 3.12). In the options menu there are also UI elements to change different aspects of the graphic settings and volume settings. In this menu there is also a button called optimal settings that runs a hardware scan and applies the best settings according to each player's computer (see Figure 3.13).



Figure 3.12: Main Menu



Figure 3.13: Options Menu

Once players have started the game the only UI elements are in the clues screens where below the text there is always a button to continue either to the next clue or to the next level (see Figure 3.14).



Figure 3.14: Clue

WORK DEVELOPMENT AND RESULTS

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This chapter will explain the whole process this project has gone through from the beginning until the end and also an assessment of the results, the different issues that happened while developing the game, how they were solved and what has changed from originally thought.

4.1 Work Development

In this section, it is going to be explained how the game has been done, in chronological order. The first thing was to read the book again to have the story fresh and take notes of the most relevant moments in the story. After that a script was written to give the video game an overall structure, with the different parts it has. The game is divided into an introduction, four levels with a previous clue each one and an a final screen for the ending, so in that script was explained which characters will appear and what will happen in each level.

Once the game had a structure, it was time to start creating the assets. First, the easiest ones were created like rifles, cannons, swords and most of the objects (see Figure 4.1 and Figure 4.2). Next, it was time to create the characters, the methodology for this was to make a first base soldier and after that make copies of him and change little details like adding a mustache or sideburns and change the hair color, all the soldiers look similar except from the captain who is the most unique character in the squad in

order to make him easily reconcilable. The biggest issue in this part was to correctly add the rigging to the base soldier, because this is a delicate process where the weight influences of the different parts of the skeleton had to be hand changed to avoid that when the character moves a leg, the hand also moves.

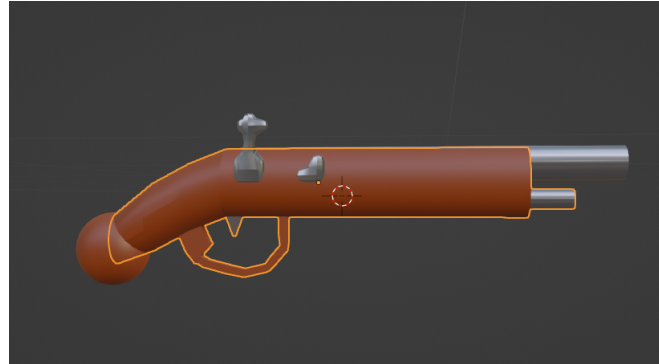


Figure 4.1: Pistol

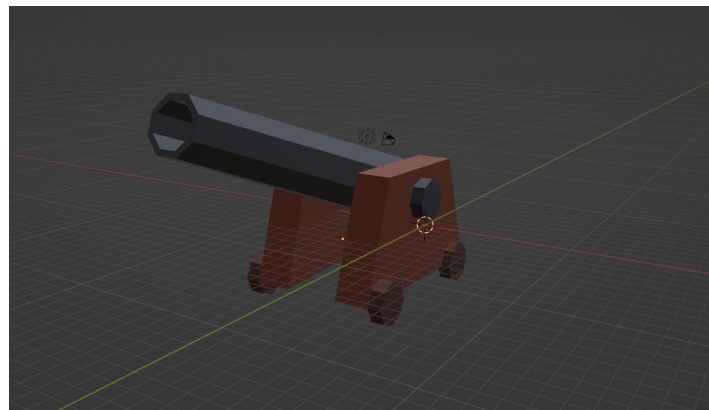


Figure 4.2: Cannon

The next step once all the assets were created was to jump into Unreal Engine 5, but not before a short familiarization process with the software following an engine tutorial [16]. When everything was set to start developing the game, the first thing was to create the scenery where all the levels would take place, this means sculpting the land to add hills and valleys, give them textures and finally adding a castle to the level (see Figure 4.3). Then it was time to add the cornfield, that will limit the player's movement inside the level. The last part for creating the level was to add all the assets required. Some of these assets gave some problems when imported to the project and some big changes in the final game style, but this will be explained later in the next section.

After all the levels were designed and filled with the required assets, it was time to start with the logic part of the game, this means getting into the blueprints system from



Figure 4.3: Scenery created with sculpting tool

Unreal Engine and start coding. The first thing was to make the player and the camera movement, which is quite easy to do with the blueprints language. Coming up next was the biggest piece in this part and what took most of the time, to allow the player to pick the key objects from the level. In order to achieve this, an object class had to be created for the key objects which had to have a collider box, so when the player gets inside of it, unlocks a function of the player's class and that locks again if the player goes outside the box, so if the player is in the collider box and the E key is pressed, the object will be picked. This is easier to explain with a picture of the code (see Figure 4.4 and Figure 4.5).

When the previous part was finished, it was time to make sure that once the player has collected all the key items from one level, this triggers the next clue to appear and the next level after that. This is simply done by having a counter in each level that adds a 1 every time an object is collected and when the counter number is the same as the number of objects in that level, then the next clue appears.

By that time the hardest and most time consuming parts of the game were over, it was time to add a few elements to make it look better and more professional. The first thing added was a main menu screen with three perfectly working buttons, which are a Start game button, an Options button and a Quit game button. Next, the game options menu was added, where players can change the graphic settings and game volume. To create the main menu and the options menu some tutorials from Matt Aspland [11] were followed and for the volume slider it was one from Gorka Games [7].

Finally, to complete the game some particles, sounds, music and a camera filter were added to enhance the overall experience and make the game more immersive and interesting. The cannon sounds come from a Youtube sound effects video [18] and the song that plays during the menus is the BSO British grenadiers march [12]. Some edition

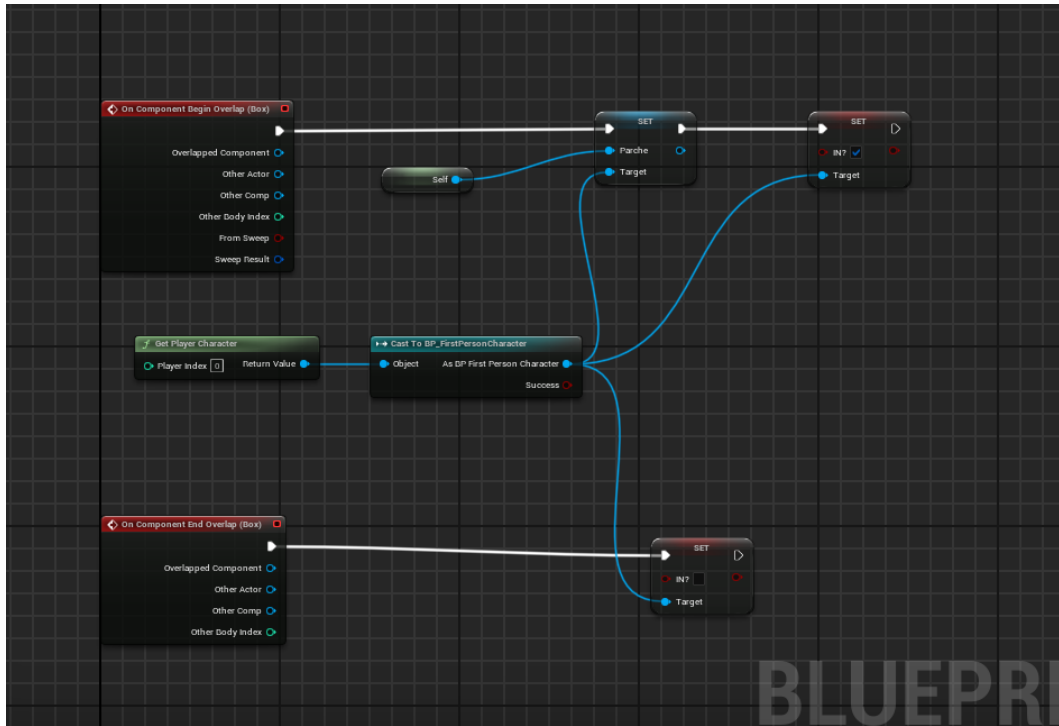


Figure 4.4: Picking objects code 1

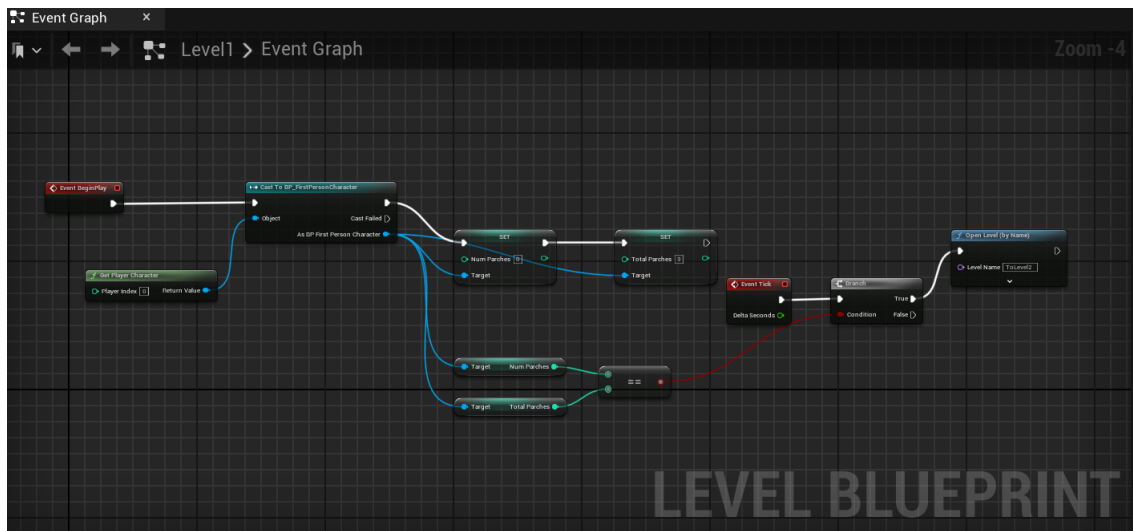


Figure 4.5: Picking objects code 2

with Audacity had to be made to these sounds in order to fit better into the game.

4.2 Results

In the section 1.2 of this final project report the objectives were outlined and now in this section is the time to check if they were accomplished.

Starting with the main goal for the project which was to develop a polished good looking game it can be affirmed that it has been achieved. The game looks pretty good, has high quality graphics and runs without any errors or bugs due to the fact that it was taken into a process of testing, where some former students of the degree tried the game looking for flaws and errors which were noted and solved. In addition to that, they also gave ideas to improve the game, for example the one mentioned above about the graphic and volume options.

The first partial objective was to learn the basics of using blueprints in Unreal Engine 5 which it can be said that has been also achieved due to the amount of time it has been spent during the whole game development process. As a matter of fact it has been quite an educational project, because not only has blueprint coding, it also uses many of the other tools like material creation, terrain sculpting, post-processing effects, lighting and much more.

The second partial objective was to develop a narrative video game with different levels of complexity telling the story of the book in which is based on through clues and texts. This was obviously achieved since it's the game's core and players will be able to get an overall idea of what the books about while playing the game.

Finally, the third partial objective was create 3D assets historically accurate taking into account the game's art direction. After a lot of research into the topic, the assets were created following depictions and paintings from that historical period. Beyond there is a comparison of a real French soldier and the characters of this game (see Figure 4.6 and Figure 4.7).



Figure 4.6: Napoleonic French soldier uniform



Figure 4.7: Game's French soldier uniform

The last objective was getting better at 3D modeling, which has also been accomplished with all the assets that have been created for the project. The only thing that could be said that has not been achieved in this objective is that the initial idea was to add a cell-shading effect to the assets to give them a more cartoonish style, but sadly when importing the assets from Blender to UE5, the materials couldn't apply this cell-shading effect and doing this effect inside the engine wasn't as good looking as intended. In the image below (see Figure 4.8) can be seen what was the idea of the cell-shading effect.



Figure 4.8: Asset with cell shading applied

CONCLUSIONS AND FUTURE WORK

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

5.1 Conclusions

The end of this project means also closing a big chapter of my life. Six years have passed since I entered the Video Game Design and Development degree and I can happily say that the educational experience has been great even though it had many ups and downs.

Throughout all this time, I have been able to learn about a lot of things such as different types of coding languages, painting and drawing techniques, various 3D modeling tools, design, to start with a little concept and develop it into a playable game, marketing and business development. I have also done many team projects which served as a good way to perfect my abilities as a teamplayer. I did my student practices in such a great place with nice professional coworkers that helped me to improve my web design skills and experience how life is inside a real working space . And most recently I was given the opportunity to study abroad for a few months, an experience that allowed me to improve my English, learn other studying methodologies and meet people from around the globe.

Going back to the development of this project, I feel it has been a great chance to learn a few things I wasn't able to do before, which has improved my skills and knowledge

as a game developer, making me a more complete professional. The game itself looks pretty good, taking into account it is my first time developing one all by myself.

In conclusion, I am grateful for having the opportunity to study this course and develop this game because of what it means to me and the useful knowledge that has given to me.

5.2 Future work

The whole idea for this project was to make a good looking, polished game and in my honest opinion I think I have accomplished that goal, but of course there is plenty of room to improve and expand this game, for example, this game only adapts the first half of the book. So, in a future, to implement the game with the rest of the history would be interesting. In the second half of the book they arrive to Moscow and Napoleon's army is forced to retreat so, the levels can be increased, create new assets and scenery.

One thing I would like to improve is a better ending for the game, for example: do a drawing of my own or maybe create an animation, but these are things that take too much time and I couldn't afford with this project.

But if I'm being honest I don't think I will do any of these thing in a near future because I have new projects in mind that excite me more right now. Maybe after a while the excitement for this project comes back and I'll add these things.

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