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CTEC3451 Development Project

**“Creating a control mapping program for game accessibility”**

First Deliverable

Project Supervisor: Jethro Shell

Project Author: Ruya Kumru-Holroyd (P2512547)

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# Abstract

There are millions of video games out there in the world, but how many are truly accessible and have the right representation? The answer is less than you would hope, which is why I am creating a project that will show it is possible to do and can be used and adapted for future use.

This report details the research into creating a control mapping program, as well as the two prototype games created to test the control mapping program. For these games, I wanted to include the right representation and accessibility options, to really deliver the importance and the ability to be able to include these in video games. Therefore, I took the time to research different disabilities, types of game accessibility in current games as well as looking at controllers and mapping solutions to create this project.

# Literature Review

Video games, “a game in which the player controls moving pictures on a screen by pressing buttons” (Cambridge Dictionary, (2020). VIDEO GAME), have become an everyday presence in today’s modern society. Being around since the 1950s, they have gone from military machines to arcade systems, to home consoles, to handheld consoles and mobile devices (History.com Editors, 2019). With the evolution of video games has also come the evolution of technology itself, with great improvement on new hardware, graphics, and performance.

It first started out as electromechanical games that were introduced in military bases, to offer relaxation to recruits, for example in 1951 Marty Bromley ran a games room in a military based and launched SEGA (Service Games) (Carrera, S. (2016), pg. 16). They also started as dissertations in universities by avid student programmers such as OXO, known as noughts and crosses, created by A.S. Douglas at the University of Cambridge in 1952 (History.com Editors, 2019). In 1958 the first electronic game, Tennis for Two was created by Willy Higinbotham, which was then adapted in 1968 by Ralph Baer who sold it to Magnavox and, in 1972, released it in the first console named the Odyssey. Also, in 1972 was the release of Pong in the arcades by the company Atari which started the first court battle of rights of a game. In 1980, the Japanese company NAMCO released Pac-Man in the arcades which brought in a broader variety of players, as the game was even popular to the female audience (Carrera, S. (2016), pg. 16) and in the same year Nintendo, also a Japanese company, launched Donkey Kong and an office in the United States. Both games brought a lot of success to the arcade business. However, in late 1982 there was a crash in the video game industry which lasted until 1985 with the release of Nintendo’s Famicon, more widely known as the Nintendo Entertainment System (NES) (mentioned in the History of Video Games timeline (Wolf, M.J.P. (2008), pg. 18), due to its graphically advanced technologies and story based characters, with titles such as Mario Bros and The Legend of Zelda, that were responsible for the NES success of selling over 50 million consoles. From this, Nintendo was able to hold out with the most sold console of all time even with their upgraded Super Nintendo Entertainment System (SNES) beating out SEGAs Genesis console release in 1991. This was until Sony released the PlayStation in 1995 which was able to become the most sold console of all time until they were beaten by their next generation, PlayStation 2 in 2000. Finally, in 2002, Nintendo returned with the GameCube and Microsoft joined the console market with their release of the XBOX, since then these three companies have been battling the console market with new generations of consoles being released every few years, as mentioned by (Carrera, S. (2016), pg. 17) in their account of console history. A brief timeline of video game history can be found in Mark J. P. Wolf’s book The Video Game Explosion: A history from PONG to PlayStation and Beyond, (Wolf, M.J.P. (2008), pg. 17-21).

According to (Clement, J. 2021), the number of video game users in the UK is 44.32 million people, over 50% of the whole UK population. The game industry in the UK itself is the biggest in Europe and the sixth worldwide, with a market value of £5.3 billion, this makes it one the highest market in the entertainment industry, compared to music and film.

And, since the 1950s, video games have grown massively in the games market and in technological advances. The number of people playing video games has also risen massively over the years, and with more players come more different types of players and player styles. Back in the early days of video games, controls were very simple with only a couple of buttons, or a joystick needed to play them, however with the advancement of hardware and technology over the years, controllers have become more complex with multiple buttons and keypads or joy sticks on just one controller. This makes it a lot more difficult for those with motor disabilities to enjoy or be able to play modern video games. Also visually, graphics in games have come a very long way, “It is no longer about the dark background with characters represented by white rectangles” (Carrera, S. (2016), pg. intro) it is now full 3D animation, with complicated environments and full-fledged stories. According to AbleGamers, a charity that aims to improve accessibility in video games, around 46million video game players in the United States have a disability (Valentine, R. 2020). Which is around 1 in 5 of video game players in the United States, which is why there is a need to have awareness and for action. Many of these players are unable to play popular games due to the complexity and lack of accessibility options for them.

Silvio Carrera who has been mentioned throughout this Literature Review with his book, *Accessibility in Games: Including people with disabilities*, I have been able to learn about the history of video games and see what game developers need to do to make games more accessible, with details of different genre’s, types of disabilities and the three issues that disable gamers come across within video games the most, the third one being one that I have decided to take as the aim of this project,“3. They might not be able to use the default controller the platform suggests, which means they won’t be able to do input in the game.” (Carrera, S. (2016), pg. 13), …

*More here about research stuff and control mapping program stuff, maybe further up include game accessibility history, might have to get rid of or size down video game history stuff.*

My project to create a control mapping program for game accessibility, will need a couple of prototype games to test the program on, whilst I could create any simple prototype game, I thought it would be best to create a couple of game prototypes that would include some disability representation within them. For example, my first game prototype is a simple 2D basketball shooter, where the main character is in a wheelchair. This idea came about as I read through (Brody, 2020)’s article for the AbleGamers Charity called *The Need for More Disabilities in the Games We Play*. Where they discuss how there is little physical disability representation in games in our current society, and a good way to overcome this is to have a game such as Wheelchair Basketball, which could be like any other sport games out there. Another approach is to include disabled people in a wheelchair for basketball video games. I also got inspiration from the android game Doodle Basketball, (Byril OOO, 2013) for gameplay and style.

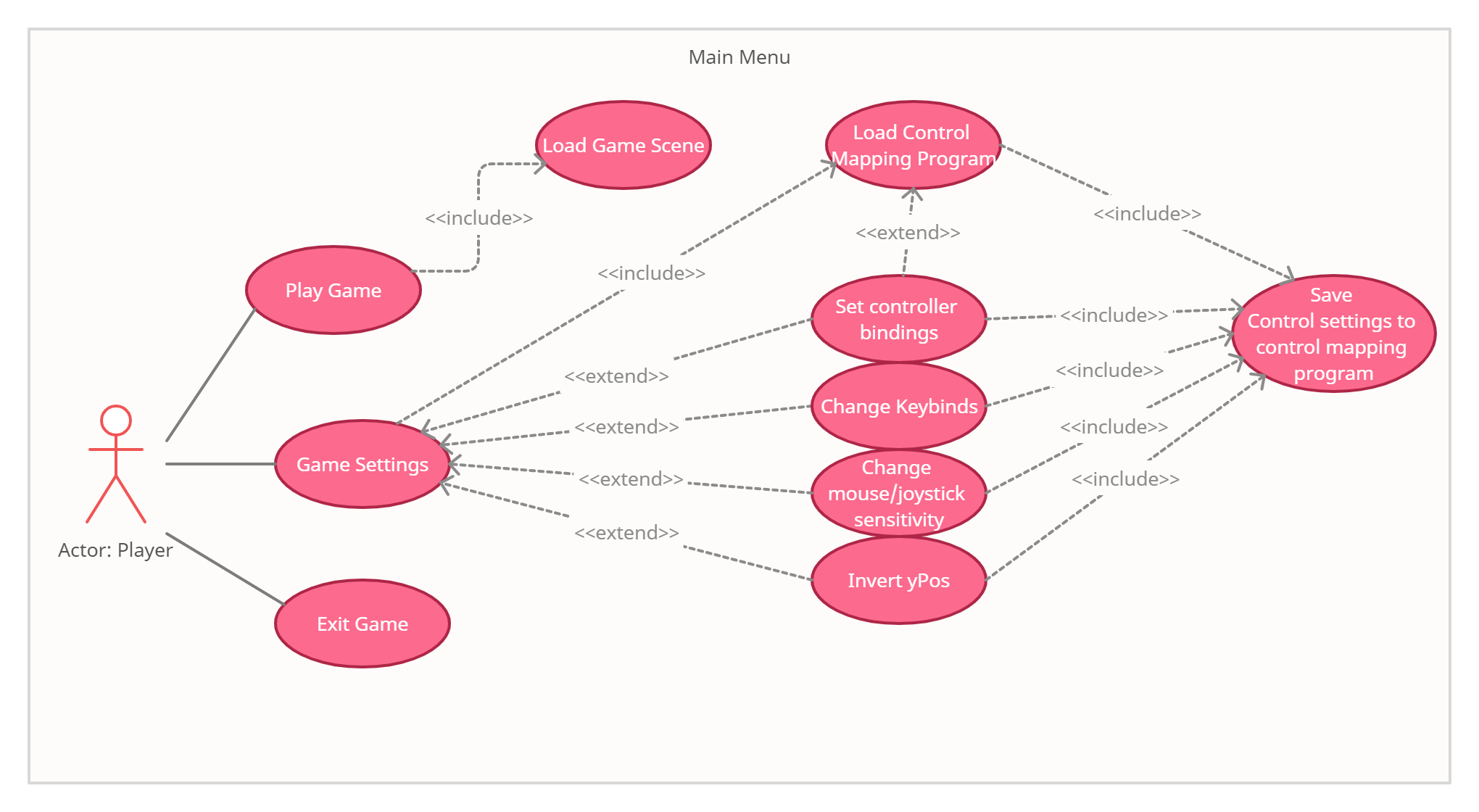
The second prototype game is.

# Functional Requirements

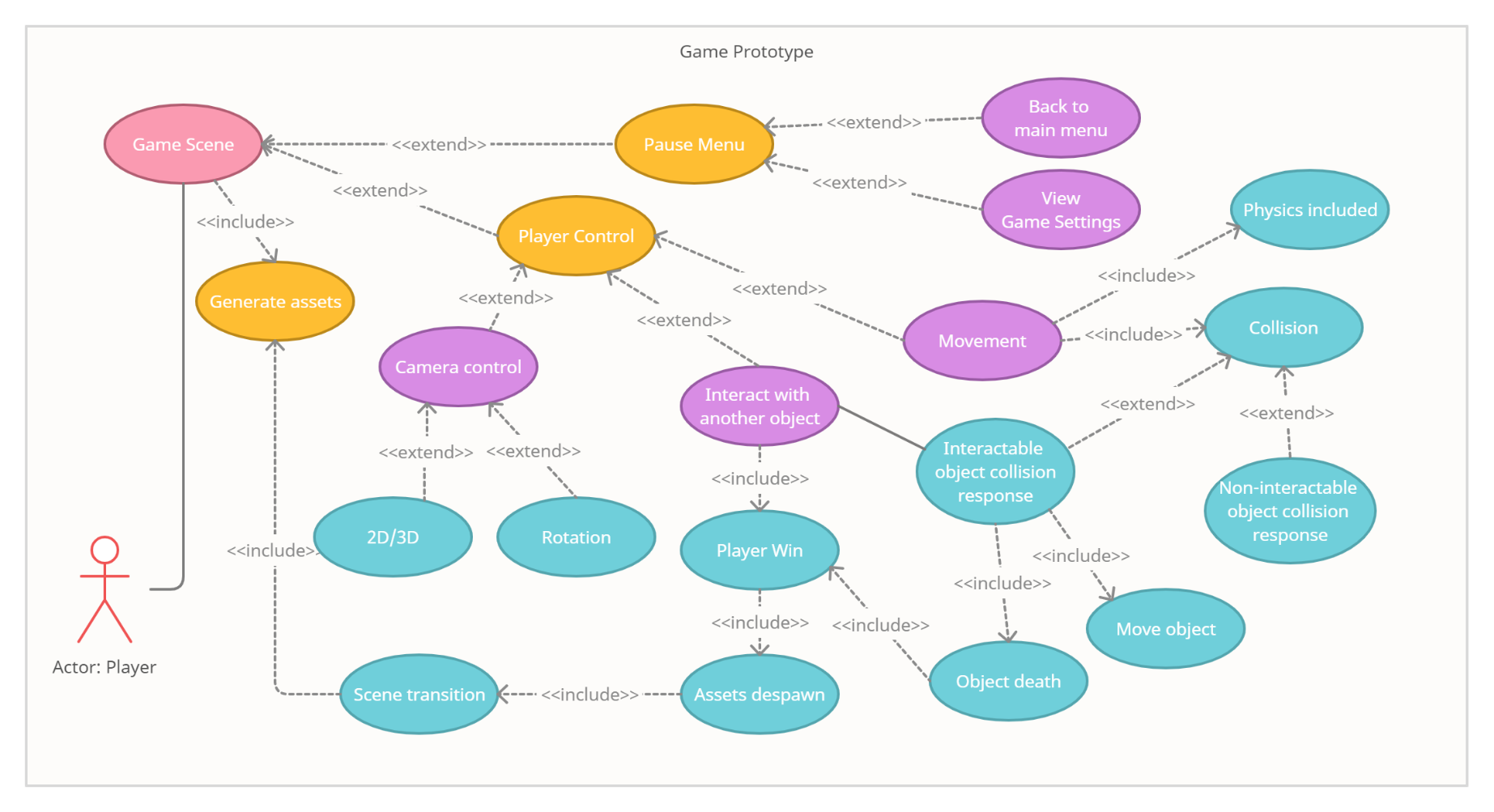
A Functional Requirement, as described by (Martin, M. 2019), is a statement that describes the service that the software must provide. It refers to a software system or a component of one. A function is nothing more than the inputs, behaviours, and outputs of a software system. A calculation, data manipulation, business procedure, user interaction, or any other unique functionality that defines what function a system is likely to execute can all be considered. Functional Requirements are also known as Functional Specification in Software Engineering. For this project, it was necessary to identify the functional requirements by identifying who the users would be, construct a use case diagram, which depicts the user’s (also known as the actor’s) relationship with the application’s numerous use cases, and then define each of the use cases with a use case specification, provide specific details regarding each distinct use case.

**Use Case Diagrams (USD)**

In this project, there are multiple sections that require their own sets of functional requirements and use cases, as there is the main control mapping program and the two game prototypes.

For each game prototype there is a main menu scene, which has its own use cases and functional requirements such as loading the game scene, changing game settings, and exiting the game. The menu’s game settings are the highlight of this project, as this is where the control mapping program takes place and is used.

**Figure 1:** Use Case Diagram for the Main Menu scene

Although there are two game prototypes in this project, they typically share the same functional requirements from the actor as they navigate through the games. These functional requirements being, game scene loaded, pausing game, player control, generating assets, loading game settings and more.

**Figure 2:** Use Case Diagram for the Game Prototypes

**Use Case Specification (USC)**

These following use cases are descriptions of the use cases in the USDs above, giving more detail and understanding to the project and its functional requirements.

Main Menu:

|  |  |
| --- | --- |
| Use Case | Description |
| Play Game | Button from that takes actor from main menu to the game scene |
| Load Game Scene | Load the prototype game scene and all its levels |
| Exit Game | Exit the game prototype application |
| Game Settings | Change the game settings within the game, includes the load control mapping program which is the heart of the project |
| Load Control Mapping Program | Load’s the pre-set control settings that have been saved from one of the game prototypes. Any that have not been set will remain at default unless changed. This includes the saved mapped controls already on the program. |
| Set Controller bindings | If the actor is using a controller, set the controllers button bindings |
| Change Key-binds | Change the key binding for PC keyboard if actor is using it or change the bindings to another controller button or other equipment for controlling. |
| Change mouse/joystick sensitivity | Change the sensitivity for the mouse or joystick for the game prototypes. |
| Invert yPos | Invert the vertical position Y for inputs such as mouse or joystick to best suit actors’ preferences |
| Save control settings to control mapping program | Save changed game settings to the control mapping program so that it can be loaded onto other games and the data can be transferred. |

Game Prototypes:

|  |  |
| --- | --- |
| Use Case | Description |
| Game Scene | The whole game scene, with included levels and information |
| Pause Menu | Button that makes the whole game pause, includes options such as returning to the main menu or looking at the game settings. |
| Back to main menu | Button in pause menu that takes actor back to main menu of game prototype. |
| View Game Settings | Button in pause menu that takes actor to the game settings to change or load settings. |
| Player Control | All cases that contribute to the controlling of the player |
| Movement | The movement of the player object in the game prototype, including physics that occur with movement and collisions that may occur. |
| Physics included | The physics that happen as the controlled player object is moving through the game space. |
| Collision | Collision that happens with the player object that is being controlled by the actor. This can be with an object that is interactable or an object that is not. |
| Non-interactable object collision response | The response that happens when the player object controlled collides with an object that is non-interactable. |
| Interactable object collision response | The response that happens when the player object controlled collides with an object that is interactable. This includes an object being moved or being deleted. |
| Move object | An object that has been collided with moves to a different position |
| Object death | An object that is dies after a collision due to game rules, this includes the rule that the player can win due to this object dying. |
| Interact with another object | Like *interactable object collision response,* it is associated with it, this includes move object and object death as well as player win. This also interacts with another object due to player control with other inputs instead of collision such as game rules or controllers. |
| Player Win | Player win can happen when an object dies and the game is over, when this happens it includes score counting and assets de-spawning and this transitions to a new scene which could be a new level scene or a menu scene |
| Assets despawn | When the player wins, despawn all the assets to load the new scene |
| Scene Transition | Load the next scene, which can be a new level, game over scene or the main menu, this includes Generate assets for the assets needed for the next scene. |
| Camera Control | The camera that is controlled by the player and follows it, this is primarily for 3D camera compared to 2D camera which will be stationary. |
| 2D/3D | Setting the camera for either 2D or 3D depending on the game prototype. |
| Rotation | The camera rotation that happens when the camera follows the player in a 3D environment. |

# System Design

## Back-end

## Front-end

# Testing Plan

# Implementation Report

Wait for meeting with Jethro

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## Figures

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