Implementation of Visual Impairment Accessibility Options in a Video Game

Analysis of the Lack of Accessibility in the Gaming Industry

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Introduction

Video games as a form of entertainment have risen in popularity over the past few decades. What once was a niche hobby among a select few, has now become a multi-billion-dollar industry. Despite its increase in popularity, it is questionable if the level of accessibility in video games is acceptable. The topic of accessibility in gaming will be the main focus of my capstone project and socio-technical research. In the context of video games, accessibility enables as many people as possible to access gaming experiences, plus interpret and perceive the content as intended (Takei, 2024). My capstone project will focus on the implementation of accessibility in a 2D game developed in the Unity game engine. Specifically, I will be implementing accessibility options addressing visual disabilities such as color blindness. My socio-technical research will have me look at the lack of accessibility in the gaming industry through the lens of a Social Construction of Technology (SCOT) framework. The framework will focus on accessibility for visual and audio disabilities. Motor disabilities are better suited for a discussion about hardware development which this paper will not cover. Improving accessibility within gaming is a goal that we should strive for to ensure that everyone, no matter their disability, is able to enjoy playing video games.

Technical Topic

My Capstone project will focus on the implementation of accessibility options. For this project, I created a 2D game using the Unity game engine with accessibility options available. The game is called Witch's Flight, and it has you controlling a witch as she flies around on a broomstick and shoots fireballs at enemies. The theme of the game is Halloween because the majority of the game was developed in October. I had to learn how to develop a game in Unity

before I could implement accessibility features. Unity is a game engine, a tool used by game developers to simplify the process of developing video games. In Unity, scenes act like the canvas of your game. A game can have multiple scenes and these scenes can be proposed for things like menus or even levels. Since my game is relatively small, I only have two scenes for my game. The first scene is the title menu, which has the title of the game, a play button to start a level, and a quit button to exit the game. The second scene is the main level. All the coding for my game objects is done with the programming language C#. The witch starts on the left side of the screen. The witch has three health points, so if the witch gets hit three times by enemies, then the player will get a game over. The health points are displayed in the top left corner of the screen. A game-over menu pops up if this happens. The menu has a retry button to try the level again and a title button to go back to the title menu. There are three types of basic enemies. The bat enemy is the simplest as it spawns from the right side of the screen at a random height and flies in a straight line to the left. The flying skull enemy also spawns from the right side of the screen, but instead of flying straight, it flies in a diagonal pattern. The skull changes direction if it hits the top or bottom of the screen. The flying jack-o'-lantern enemy spawns from the top of the screen at a random x coordinate. It drops while spinning. Then, at a random height, it will fly straight to the left. The boss enemy is a giant zombie hand. It spawns after a minute from the start of the level. The zombie hand will try to damage the witch from the bottom of the screen. After attacking, it will bury itself underground. After a random time interval, the zombie hand will attack again at a different location. If the player manages to beat the zombie hand, then a victory menu will pop up indicating to the player that they won. The victory menu only has one title button to go back to the title menu.

The accessibility options I will be implementing are targeting visual disabilities. One of the accessibility options will help people with color blindness. When playing a game, visual clarity is vital for a player to understand what the game is asking them to do. If the color palette of a game is not friendly towards color blindness, then the color-blind player might not be able to distinguish game objects due to the colors blending in together. To alleviate this issue, I will add a settings button to the title menu. The settings button will send you to the settings menu, where a color-blind filter button can be pressed to put on a color-blind filter. The color blindness I will focus on is deuteranopia, which is a type of red-green color blindness and one of the most common types of color blindness. The filter will change the color of the player's hearts and the flying jack-o' lantern enemy to a bluish color, which will make it easier to see for someone with deuteranopia. To implement such a feature, I had to edit the sprites for the hearts and flying jack-o' lantern enemy using an outside image editor. I then added the sprites to my project and made a script for the settings button. The script changes the level scene that the player goes to when pressing the play button. This level scene will have the two bluish sprites. Different filters for different types of color blindness could be added in the future to accommodate more people.

Analysis of the Lack of Accessibility in the Gaming Industry

My socio-technical topic focuses on the surprising absence of accessibility in video games. Some video games do have some form of accessibility. An example is the 2D platformer Celeste and its assist mode, which allows you to adjust various mechanics such as invincibility and slower speed to make the game easier. However, there are still a good number of video games that have no accessibility options or very limited accessibility options. Animal Crossing:

New Horizons has no form of an assist mode and lacks an options menu. The addition of an options menu to adjust the text and icons would help people who struggle with reading such things. The way the developers create games might be the key to solving why accessibility is lacking. Pretty much all game developers today use game engines to create their games. Game engines are software frameworks that provide developers with the tools and resources necessary to make a game. Unity, Unreal, and Godot are examples of popular game engines. However, such game engines do not directly provide the resources necessary for accessibility. One game developer explains, "Having game developers reinvent the wheel every single time they do a game with accessibility is going to be a pain. If the you know Unreal engine itself supported some core accessibility functionality, and publishers didn't have to reinvent it over and over, you're much more likely to get people to [follow accessibility guidelines] (Porter & Kientz, 2013)". For game developers, adding accessibility takes time away from developing the core game. Reusing code that adds accessibility from one game to another is not very feasible since every game is different. Unity states that the responsibility for implementing accessibility falls on developers (Unity 2024). However, I argue that Unity and other game engines should claim some responsibility and have some built-in accessibility features. Such features take away some of the pressures on game developers when implementing accessibility. The need for accessibility is not made a priority in the industry. University of Nevada, Reno (UNR), associate professor Eelke Folmer explains, "Most are simply not aware that gamers with disabilities would like to play their games, so raising awareness is an important first step toward improving accessibility, (Garber, 2013)". Awareness of the problem is important if the state of accessibility in gaming is to be changed. The public should speak out and raise awareness of accessibility so big gaming companies can listen and implement more accessibility in their games.

The problem of how to improve the gaming industry to be more accessible to gamers with disabilities will have to be addressed to make progress as an inclusive society. My socio-technical research will aim to frame this question with a SCOT framework. The main artifact of the framework will be game engines. The relevant social groups consist of gamers with disabilities, big gaming companies, and indie gaming developers. Both indie game developers and big gaming companies use game engines to make their games. However, the lack of built-in accessibility features makes it difficult to implement accessibility. The addition of built-in accessibility features would make the process much easier. Indie game developers do not have as big of a budget compared to big gaming companies. With a limited budget, these developers do not have much time or money to add accessibility options. The addition of built-in accessibility features in the game engines these developers use would make implementing accessibility easier even with a limited budget. Big gaming companies have the standard practice of strict deadlines. These companies want to release games at an optimal time for sales, such as before the winter holidays. However, such strict deadlines limit the amount of time developers spend adding accessibility. Changing the standard so that delays on game releases should give the developers the time they need to add accessibility. Delays can cause these companies to lose money, so it should not be used all the time. However, it is undeniable that gaming companies should be less strict with their deadlines and should use delays whenever it is necessary. To make the issue of accessibility known, gamer with disabilities need to speak out and raise awareness of their struggles and the lack of accessibility in gaming. If their voices are heard, then developers can work on improving the accessibility in their games based on their feedback.
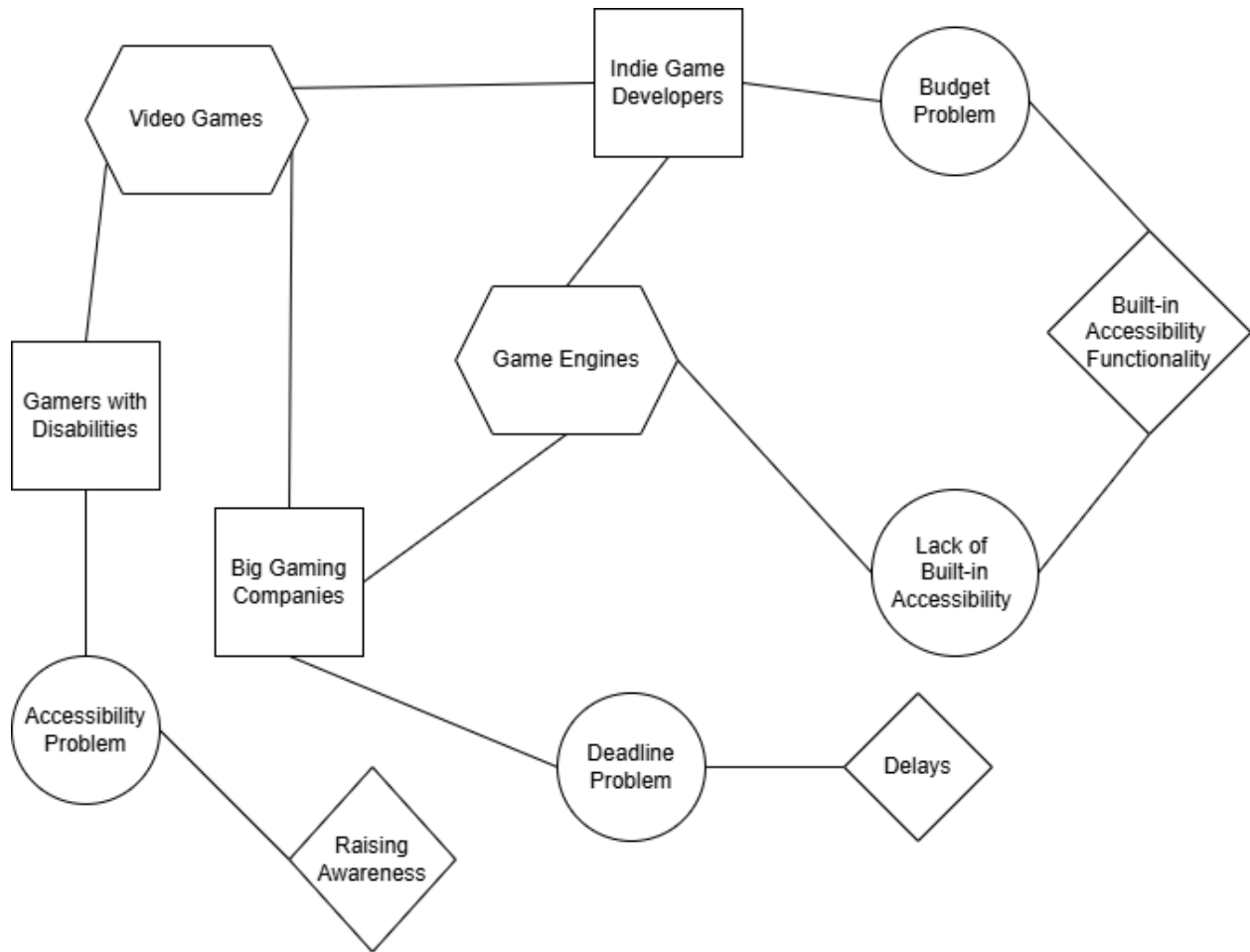
Figure 1: SCOT framework of video games and the problem of accessibility

Conclusion

There are multiple factors as to why there is a sizable lack of accessibility in video games. Game manufacturers not understanding the importance of accessibility and the time and cost required to implement accessibility options are just two factors that stifle accessibility. Despite these barriers, video game accessibility is improving. With features such as a color setting for the color blind or a text setting to make text easier to read, video games can be enjoyed by more disabled gamers than before. Hopefully by looking through the problem of accessibility in gaming through a SCOT framework I was able to clearly show the many people

involved in the problem and how they are all related. Everyone deserves the right to play and enjoy the fun experiences presented in video games.

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