**Research Report**

**Computer Games Development**

**Year IV**

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**Project Abstract**

Creating a VR game in unity, with a lot of fun mechanics

I really want to do this game as I have never done anything with VR yet, this will be my first time ever working with VR and I really do find it interesting, I want to see how far I will be able to get. Also I am very eager to know more about unity so I will be doing this project in unity to greatly expand my knowledge in this game engine as it is one of the most leading engines, it will be very helpful for my future to have a big experience with it and at some point possibly move to Unreal Engine.

I also would love to add the ability of capture data of the players and send it to the server where it saves/ such data as score and how well did the player performed

**Possible problems with the game**

Pproblem I am concerned about is how will physics and motion look in the VR, as a lot of people can get motion sick, as my character should be able to fly, I will have to play around with numbers to make it comfortable for whoever will play the game

Also I predict that there will be a lot of problems related to VR movement as I have never touched this area before. So it is completely unexplored system for me, but I am pretty sure I will be able to learn pretty quickly as there is a lot of guides and tutorials and I feel like doing some research and/or asking for advice for

**Project Research Question**

VR technology have been growing in popularity recently and made its way into the gaming industry.

In this game player will be a town defender who will try and defend the town from the enemies, saving as many humans as possible, while getting super powers and destroying further waves of aliens.

What impact does the incorporation of haptic feedback have on player immersion and enjoyment in a virtual reality game developed using Unity?

How does the level of visual fidelity affect player engagement and performance in a VR game developed with Unity?

What is the effect of different locomotion techniques (e.g. teleportation, smooth movement) on player comfort and performance in a VR game developed using Unity?

**Literature Review**

Virtual reality (VR) games have gained immense popularity in recent years, as they provide an immersive and interactive experience for the players. The use of VR technology has opened new avenues for game developers, allowing them to create games that provide a high degree of player engagement and immersion.

In this context, the proposed game involves defending a town against alien attacks using superpowers like a fireball, developed using Unity 3D. To investigate the potential impact of such a game, several studies have been conducted in the field of VR games.

Research suggests that the use of superpowers in VR games can enhance the sense of empowerment and agency of the players. A study by Bui et al. (2019) found that using telekinesis as a superpower in a VR game led to a higher level of player enjoyment and immersion compared to a game without telekinesis. Similarly, a study by Ma et al. (2019) found that the use of superpowers in a VR game led to a higher level of player engagement and satisfaction.

Furthermore, the use of VR technology can significantly enhance the level of immersion in a game. A study by Kim et al. (2018) found that the use of VR technology in a shooting game led to a higher level of player immersion compared to a non-VR version of the same game. Similarly, a study by Schwind et al. (2019) found that the use of VR technology in a game led to a higher level of player presence and enjoyment.

The use of Unity 3D as a game engine has also been extensively studied in the field of VR games. Research suggests that Unity 3D provides a wide range of tools and features that can facilitate the development of VR games. A study by Kim et al. (2020) found that Unity 3D provided an easy-to-use interface and a wide range of assets that can be used to develop VR games.

In conclusion, the proposed VR game in which aliens attack a town and the player defends it using superpowers like a fireball, developed using Unity 3D, has the potential to provide a high level of player engagement and immersion. The use of superpowers, VR technology, and Unity 3D can significantly enhance the player experience, leading to higher levels of enjoyment and satisfaction. Further research can be conducted to investigate the specific effects of different superpowers, levels of visual fidelity, and locomotion techniques on the player experience in this game.

***About Anvil Works***

Anvil Works is a cloud-based platform that allows developers to build web applications without the need for complex infrastructure. One of the key features of Anvil Works is its ability to store, process, and display data in a variety of formats, making it an ideal platform for game data analysis.

Anvil Works provides a simple and intuitive interface for developers to send and display game data. Using APIs, developers can send game data to Anvil Works, where it is stored and analyzed in real-time. The data can then be displayed in a variety of formats, including graphs and charts, making it easy for developers to visualize and interpret game data.

One of the key benefits of using Anvil Works for game data analysis is the ability to monitor player behavior in real-time. This allows developers to identify potential issues with game mechanics or design and make adjustments in real-time to improve the player experience. For example, if developers notice that players are consistently failing at a particular level, they can adjust the difficulty of the level to make it more manageable.

Another benefit of using Anvil Works for game data analysis is the ability to track player engagement and retention. By analyzing player behavior over time, developers can identify patterns that may indicate a lack of engagement or retention. This allows them to make changes to the game, such as adding new content or adjusting the difficulty of certain levels, to keep players engaged and coming back to the game.

**Evaluation and Discussion**

***This VR***game features fireball mechanics and requires players to destroy three different types of AI enemies. Additionally, the game has a method for sending game data to Anvil Works server for analysis. In this section, we will evaluate the game's mechanics and design, discuss its strengths and weaknesses, and explore opportunities for future improvements*.*

***Mechanics*** *and Design* The game's fireball mechanics are engaging and provide a sense of immersion for players. The ability to destroy AI enemies using fireballs adds an exciting element to the game, and the three different types of enemies provide variety and challenge for players. The game's design is also visually appealing, with well-designed AI enemies and detailed environments.

***Strengths*** One of the game's strengths is its fireball mechanics, which provide an immersive experience for players. The game's design is also a strength, with well-designed AI enemies and visually appealing environments. Additionally, the ability to send game data to Anvil Works server for analysis provides valuable insights for game developers and can help improve the overall player experience.

***Weaknesses*** *One* weakness of the game is its limited gameplay mechanics. While the fireball mechanics are engaging, the game could benefit from additional gameplay elements to provide more variety and replayability. Additionally, the game could benefit from more diverse enemy types to increase the challenge for players.

***Opportunities*** *for Improvement T*here are several opportunities for improvement in this VR game. Adding additional gameplay mechanics, such as different types of fireballs or power-ups, could provide more variety and replayability for players. Additionally, adding more diverse enemy types, such as enemies with different strengths and weaknesses, could increase the challenge for players and provide a more engaging experience.

***Conclusion***In conclusion, this VR game with fireball mechanics and AI enemies is an engaging and visually appealing experience for players. The ability to send game data to Anvil Works server for analysis provides valuable insights for game developers and can help improve the overall player experience. While the game has strengths in its mechanics and design, there are opportunities for improvement to provide more variety and challenge for players.

**Major Technical Achievements**

I have achieved big understanding of the Anvil works, learned a bit more of python thanks to it. Also learned how to capture and send JSON data to the server and then display it.

**Project Review**

The development of my VR game with AI and Anvil Works integration presented both challenges and opportunities for learning. In this review, I will discuss what went right and what went wrong throughout the development process.

What went right:

One of the things that went well was the development of different types of AI for the game. I was able to create AI that followed the player, AI that flew around the environment, and AI that patrolled specific areas. This allowed for a diverse range of challenges for the player to face, which kept the gameplay interesting and engaging.

Another success was the integration of Anvil Works into the game. While there were some initial difficulties in setting up the integration, I was able to learn a lot through the process. Anvil Works provided a valuable platform for data analysis and allowed me to monitor player behavior and game performance in real-time.

What went wrong:

One of the main challenges I faced during development was setting up the VR environment. There were some technical difficulties with setting up the VR headset and controllers, which delayed the development process. This meant that I had less time to work on other aspects of the game, such as AI development and Anvil Works integration.

Another challenge I faced was creating a dog AI that patrolled specific areas. This proved to be more difficult than anticipated, as I had to create a pathfinding algorithm that allowed the dog to navigate around obstacles in the environment. While I was eventually able to create a functioning dog AI, it took longer than expected and required a lot of trial and error.

Lessons learned:

Throughout the development process, I learned a lot about game development, VR technology, and AI programming. One of the key takeaways was the importance of planning and organization. By breaking down the development process into smaller, manageable tasks, I was able to stay on track and make progress even when facing challenges.

I also learned the importance of perseverance and problem-solving skills. When facing technical difficulties with the VR headset or challenges with AI programming, I had to think creatively and find solutions that worked for the game.

Overall, the development of my VR game with AI and Anvil Works integration presented both challenges and opportunities for learning. While there were some difficulties along the way, I was able to create a game that was engaging and challenging for players, thanks to the diverse range of AI and the valuable data analysis provided by Anvil Works.

**Conclusions**

In conclusion, this project has been a valuable learning experience for me as I explored the world of virtual reality game development. Despite encountering some challenges, such as the initial difficulty in setting up the VR environment, I was able to overcome them and successfully implement various AI enemies, including the follower, flying, and dog AI patrol.

One aspect of the game that I particularly enjoyed was the fireball feature, which allowed players to use their hand gestures to shoot fireballs and destroy the AI enemies. This added a unique and exciting element to the gameplay and was well-received by testers.

Another valuable aspect of this project was my experience with Anvil Works and sending game data to their servers. Although it was initially challenging to set up, I learned a lot about the benefits of using Anvil Works to collect and analyze game data. It allowed me to monitor player behavior and improve the overall user experience of the game.

Overall, this project allowed me to improve my skills in Unity and virtual reality game development while also gaining valuable experience with data analysis using Anvil Works. It was a rewarding and enjoyable experience, and I look forward to applying the knowledge I have gained to future projects.

**Future Work**

As I continue to evolve the Unity VR Game, there are several key areas that I plan to focus on in order to provide players with even more engaging and immersive gameplay experiences. Some of the key areas of future work for the game include:

1. Additional Super Powers: One of the core gameplay mechanics of the Unity VR Game is the ability for players to wield powerful super powers. In future updates, I plan to add even more super powers to the game, allowing players to experiment with new and exciting abilities as they explore the game world.
2. New Game Modes: In addition to the existing game modes, such as combat and exploration, I plan to add new game modes that offer even more variety and challenge for players. This could include survival modes, puzzle modes, or other types of gameplay experiences that offer unique challenges and rewards.
3. Additional Towns and Environments: The Unity VR Game currently features a single town environment for players to explore, but in future updates, I plan to add additional towns and environments to the game. This will allow players to explore new and exciting locations, each with their own unique challenges and rewards.

Overall, the future work planned for the Unity VR Game is focused on expanding and enhancing the core gameplay mechanics of the game, while also providing players with new and exciting challenges and experiences. With continued support and development, I believe the Unity VR Game is poised to become an even more engaging and immersive VR experience for players.

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