

A Date With Cheemis: Bullying in the Virtual Space

A Senior Project Presented to
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Introduction

In 2022, we live in an exciting era where our entertainment mediums envelop all of our senses to tell stories, communicate experiences, and create relationships with people across the globe. Today, the most effective medium to integrate ourselves into our stories is video games, specifically gaming in virtual reality (VR). Unlike any other medium, virtual reality allows us to observe other worlds and lives from someone else's perspective. As a result, it can create some of the most realistic and genuine interactions with technology. Virtual reality allows us to interact with entirely fabricated worlds. This emerging technology will be a gateway to normalizing personal interactions with other people across the globe, such as through the video game *VRChat*.

VRChat is one of the leading pioneers of online interactions and relationships between people worldwide using the medium of virtual reality. In *VRChat*, players can meet new people, discuss interests, and find a community that they might otherwise not find in their immediate lives. While this is the core experience that *VRChat* aims to create, players can also use their freedom of expression to bully and belittle other users. Like most other video games, *VRChat* hides its users' identities behind unique avatars and usernames, meaning there are few consequences for malicious behavior in the virtual space. As a result, a malicious player's actions may negatively impact another user's experience and relationships in the virtual world. Bullying is an issue in all online spaces but becomes much worse and more consequential in virtual reality. Because of virtual reality's ability to create a feeling of presence between a user and others in the virtual world, negative emotions imposed onto players feel very authentic, hurting users more than traditional video games. We need to ensure that online culture does not decline into a series of malicious interactions, which is why as gaming continues to integrate the player into its worlds, we need to teach players how to be kind to each other and have empathy rather than spite. For this reason, my senior project aims to teach the consequences of being a toxic player through a cast of colorful characters in the dramatic comedy *A Date With Cheemis*.

Application

These are instructions for how to access A Date With Cheemis at the time of writing this report. Navigating VRChat is subject to change.

A Date with Cheemis will be available, for free, to all windows users capable of running *VRChat*. *VRChat* is downloadable from <https://store.steampowered.com/> by searching for "VRChat" in the website's search bar. While *VRChat* implies that the game requires a virtual reality headset, the game is playable in a "desktop mode," where players have access to all of the game's essential mechanics. For maximum comfort, desktop mode users should use an external mouse, headphones, and an external microphone to play *VRChat*.



Figure 1: The VRChat Steam store web page.

Once In *VRChat*, players can access *A Date With Cheemis* by opening the games menu (unique to the different controllers that come with a virtual reality headset or the "ESC" when in desktop mode) and navigating to the "worlds" menu. From here, players can use the search bar in the upper right-hand corner to search for "A Date With Cheemis." Once the players have found the world, I advise players to create a "private instance," also known as an invite-only world, to ensure that no other players will join their game during their playthrough of the game. The game will start upon entering the *A Date With Cheemis* world.



Figure 2: The VRChat worlds menu.

Background

A Date With Cheemis is a *VRChat* world designed in the Unity real-time 3D development platform.

Unity

Unity is a "real-time 3D development platform" used primarily in designed video games, animated movies, and industry simulation production⁹. The engine is an easy-to-use, beginner-friendly development environment that many game studios, both big and small, utilize as the backbone of their projects. At the time of writing this report, some of 2020's most popular games, *Fall Guys*², *Among Us*¹, and *Phasmophobia*⁴, were all developed in the Unity 3D game engine. On the development side, users typically program in C#, as it is a fast and legible programming language⁷. Unity supports all types of game and software development - able to develop both 2D and 3D games. For my project, I am utilizing the 3D tools Unity offers.

VRChat

I am developing my project in an older build of Unity because *VRChat* is a Unity game running in the 2019.4.31 version of Unity 3D¹¹. *VRChat*, developed by VRChat Incorporated, is a virtual reality game that "...offers an endless collection of social VR experiences by giving the power of creation to its community."¹⁵ At its core, *VRChat* is a game about meeting new people, talking with other users in different environments, or "worlds," and creating community. As stated in the Application section of this paper, *VRChat* also has a "desktop" mode where all the core features available to virtual reality users are available using a mouse, keyboard, and microphone instead of a virtual reality headset¹². Additionally, *VRChat's* largest appealing feature is the ability to upload custom models and worlds to the game. Players can find comfort in being whoever they want to be, whether that be a pop culture figure, a cartoon character, or an original character they designed themselves. Furthermore, players can upload a variety of worlds, such as worlds designed to hang out with friends, worlds to explore, and, most importantly, worlds that offer players alternative ways to play *VRChat*.

Udon

While most worlds offer players a consistent experience to hang out and talk with friends, *VRChat* has recently begun allowing users to program alternate game modes and features using Udon. As stated by VRChat Inc., Udon "is a programming language built completely in-house by the *VRChat* Development Team."¹⁴ Udon is a node-based coding system in which users draw lines from one box of code to another to create actions and processes for Unity 3D objects. Although Unity gives developers access to the C# language, VRChat Inc. is developing Udon with two primary goals: allowing inexperienced users a comfortable environment to code in and preventing security and privacy breaches. With control over user security and providing a

comfortable environment to code in, Udon enables both experienced programmers and regular users to make unique worlds and features.

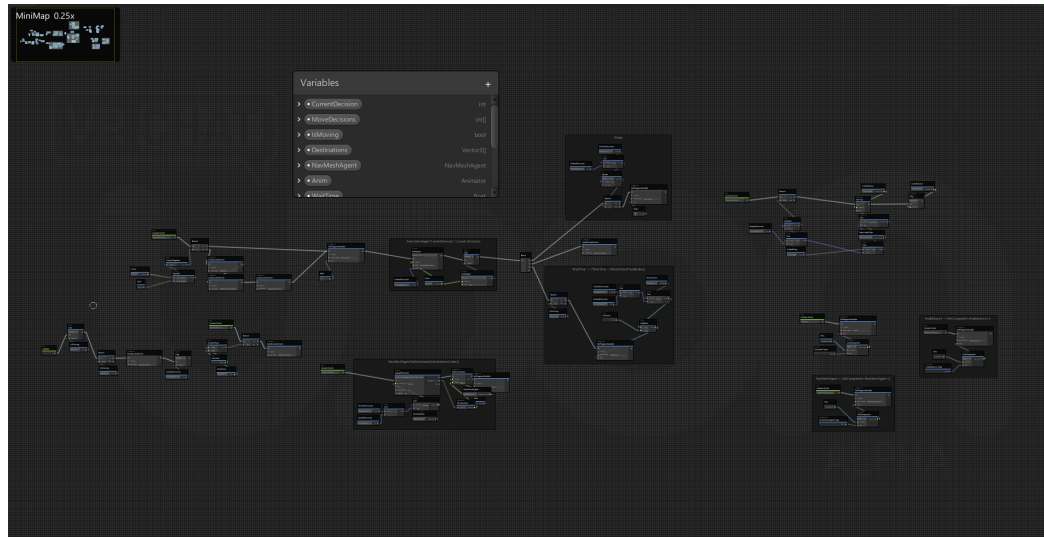


Figure 3: The Udon graph for an NPC AI controller prior to its conversion to Udon#.

Udon#

While Udon allows inexperienced programmers to create unique features, graph-based coding is not as fast or as easy to debug as C# code, which is why for this project, I am using the Udon# compiler to convert C# code to Udon assembly. Udon#, developed by the *VRChat* community member Merlin VR, is a compiler that turns C# code into Udon Assembly code³. Udon# is a great tool for experienced coders. It allows more experienced programmers to avoid the restraints that come with node-based coding and take advantage of the syntax, coding standards, and ease of writing in a traditional language while still abiding by *VRChat*'s security measures. For this project, I am writing all my code in both Udon and Udon#.

Design

Since its inception, I designed *A Date With Cheemis* to be a "choose your own adventure game" built within *VRChat* using Udon. My project is only accessible through the PC version of *VRChat* as a single-player explorable world. As an alternative game mode, *VRChat* defines player movement, controller interactions, and world navigation for my project. Because I did not need to create a system for the player to navigate the world, many of the features I created for *A Date With Cheemis* are player interactions with the world. Throughout the experience, users will explore my crafted world, grab 3D speech bubbles to make decisions when interacting with non-playable characters (NPC), pick up objects to hand to NPCs, and punch particular NPCs to interact with the world. Within the constraints of these interactions, *A Date With Cheemis*'s primary gameplay loop consists of

- 1) entering a scenario presented by characters
- 2) making a decision based on the information characters provide the player
- 3) watching the characters' reaction to the player's choice.

As the player makes decisions, they will learn about the other characters and their motivations, choose which characters to support, and influence the story's ending.

During the development of *A Date With Cheemis*, the project's programming design has had to stay within the confines of the Udon programming language. This project began development in the summer of 2020, coinciding with the release of *VRChat's* Udon coding language¹⁶. A significant consequence of the game's early development was that Udon's initial bugs and limitations define *A Date With Cheemis's* essential systems. Although VRChat Inc. has slowly improved Udon since its release, Udon is still not designed to take advantage of the Unity platform, preventing me from creating unique classes and data structures and using predefined systems in Unity. As a result, I had to redefine a signaling system that contacts both NPCs and the environment, calling code from animations, and timing and coroutine functions. Today, many of my early systems are unmodified, and many of the game's core mechanics rely on my recreated Unity systems.

In addition to being the technical director of *A Date With Cheemis*, I have also been in charge of the artistic design of the project. Throughout the project's development, I have recruited and worked with a 3D asset director, music director, casting director, and voice acting director. I continue to communicate and ensure that all directors have the same ideas and goals for this project through communicating in a private Discord. Within this Discord, I communicate my artistic vision through sharing gameplay and floor diagrams, surveys, and talking in specified voice and text channels. Overall, I have created an organized environment for everyone dedicated to the project to stay in touch and organize work.

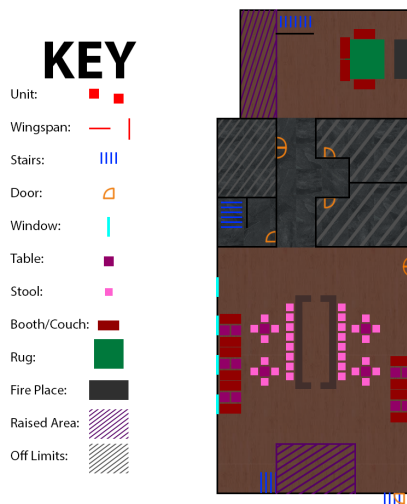


Figure 4: The Floor Plan for the game's setting: The New Echidna

Implementation

Throughout the *A Date With Cheemis's* development, I built many systems to recreate the sensations of a real *VRChat* lobby. To review the game's implementation, I will only discuss the primary systems: the signaling system and NPC characters.

The signaling system has three primary functions:

- 1) to receive input from the player,
- 2) communicate the player's choice to NPCs and the environment
- 3) prepare the following decision buttons the player will use.

The player will never directly communicate with this system, and instead, players will utilize buttons and trigger areas to communicate their decisions to the signaling system. Within *A Date With Cheemis's* main gameplay, there are four ways a player can "make a decision."

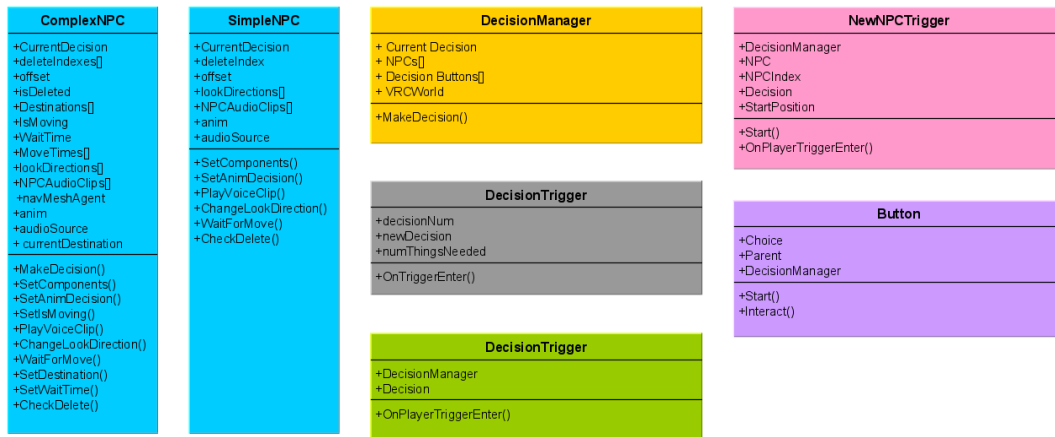


Figure 5: The UML diagrams of the primary classes that enable players to make decisions.

The primary way players make decisions is by grabbing word bubble buttons, which have text on them implying what the player can say or do. Once pressed, a button will communicate the decision made to the signaling system. The signaling system will then communicate what state all NPCs and the environment need to enter.

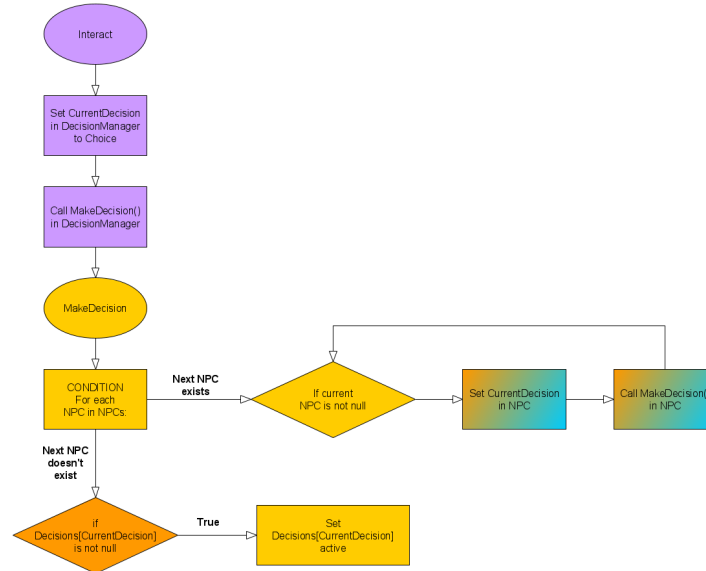


Figure 6: The Flowchart for when a player makes a decision using a button.

Players can "make a decision" by walking through a loading trigger. When a player enters a loading trigger, the trigger creates a new NPC and assigns this character in the signaling system to listen for new decisions. Additionally, the trigger will communicate a new decision to the signaling system. The signaling system will then communicate what state all NPCs and the environment need to enter.

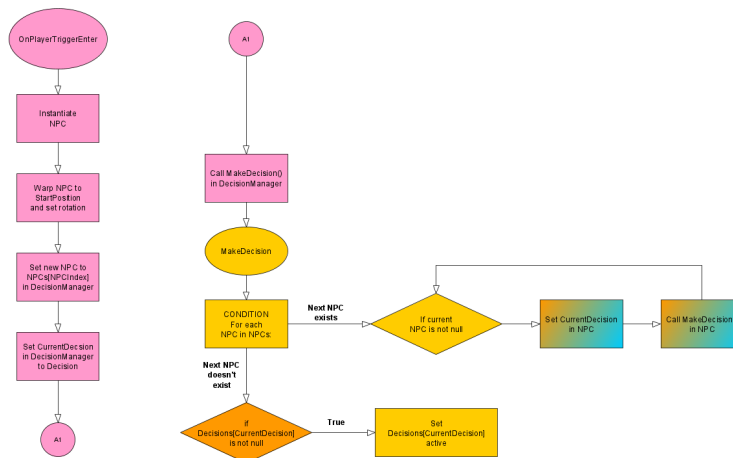


Figure 7: The Flowchart for when a player enters a loading trigger.

Players can "make a decision" by walking through a decision trigger. When a player enters a decision trigger, the trigger will communicate a new decision to the signaling system. The signaling system will then communicate what state all NPCs and the environment need to enter.

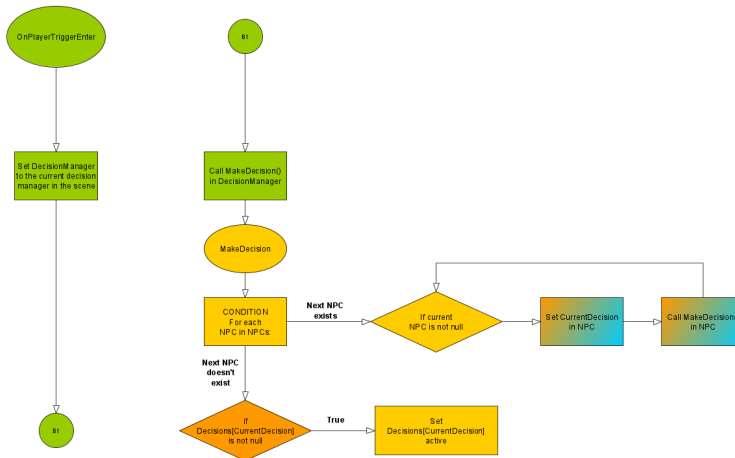


Figure 8: The Flowchart for when a player enters a decision trigger.

Finally, players can "make a decision" by handing items to certain NPCs. If an NPC detects that you handed them a deliverable item, it will check to see if it needs any additional items. If no more items are needed, the NPC will communicate that the player has made a new decision to the signaling system. The signaling system will then communicate what state all NPCs and the environment need to enter.

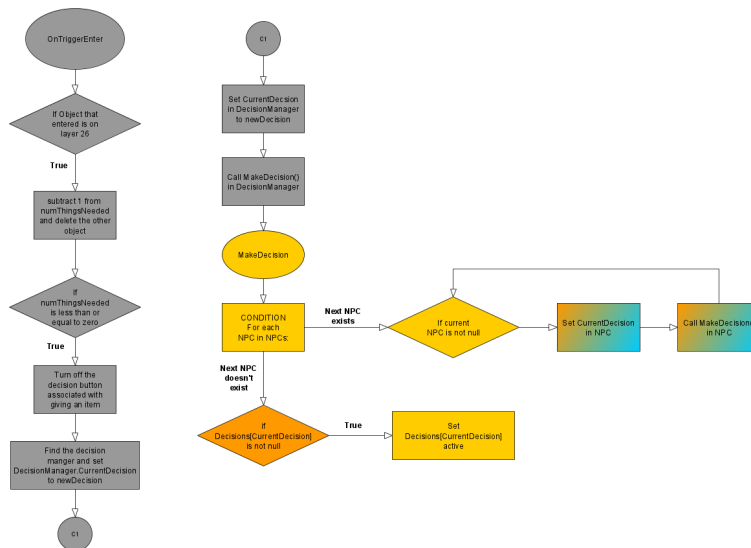


Figure 9: The Flowchart for when a player hands items to NPCs.

The other primary system is the NPC controller that every character uses to accompany the player throughout the experience. Currently, there are two types of NPCs: advanced NPCs and Simple NPCs. Both NPCs are structured the same way, with the only difference being that Simple NPCs cannot walk around the world.

NPC characters must accomplish four primary tasks:

- 1) relay specific dialogue to the player
- 2) respond when the player makes a new decision
- 3) look at particular objects, directions, or the player
- 4) navigate to specific areas within the world.

Although not as complex as the signaling system, I did have to recreate certain Unity systems for NPC characters to work. As stated before, Udon does not allow users to create custom data structures or classes, which means NPCs must store dialogue, destinations, looking directions, and waiting times in easy-to-reference lists that the NPCs can index through. When a player makes a specific decision, NPCs will determine what dialogue to say, where to look, and when and where to go based on the signaling system's "current decision" number. NPCs classes are some of the first systems I completed for this project, and as a result, Udon's early bugs and limitations restricted the development of the NPC classes.

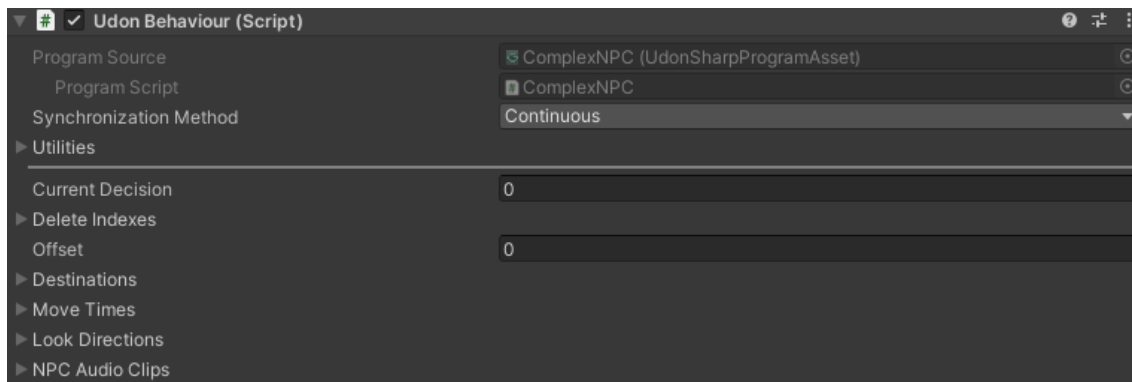


Figure 10: The elements of the Advanced NPC Udon Behavior

Analysis and Verification

Throughout *A Date With Cheemis*'s development, the project has seen continual positive feedback. Since August 2020, the project had two large playtests: a paper playtest of just the story, and a playtest when the story was complete. From the wide range of playtesters in both playtests, I feel like I received satisfying feedback to guide *A Date With Cheemis* to be a well-structured experience tailored to the *VRChat* community.

Early in the project's development, the game received positive feedback from story playtesters. During this set of playtesting, my goal was to see if people would enjoy playing a story-based experience in *VRChat*. Playtesters could only read through the game's script, making

decisions by skipping to specific pages in the script. Initial feedback thought the story embodies what it felt like to play *VRChat* with my in-game character's eccentric personality, which I am trying to create with this experience. Additionally, playtesters understood the themes of judging others and diversity in the *VRChat* community. From this stage in development, I felt like my story was a sufficient skeleton to guide the project's software development.

During a more recent playtest, conducted in August of 2021, I received feedback from three types of playtesters: active *VRChat* community members, non-*VRChat* community members, and a fellow *VRChat* alternative game mode creator. After reviewing the feedback from both active *VRChat* community members and non-*VRChat* community members, I concluded that my story was enjoyable and impactful. Playtesters were able to suspend their disbelief and integrate themselves into the story, enjoy the characters, see the impact of their choices, and conclude the experience with a positive view of the project. When asking participants what I could improve, the consistent piece of feedback I received was that the game lacked infrastructure: world design, unique character models, background characters, and character animations. This feedback did not concern me, as my goal moving into the next quarter was to start polishing the game's visuals.

Although most playtesters were able to look past the lack of infrastructure, When reviewing feedback from a *VRChat* content creator, I learned that building infrastructure was the essential next step for the project. This user was not familiar with me as a *VRChat* user, so they viewed my project without bias towards my sense of humor and personality. Upon reading their feedback, they believed the game was not as completed as they would have expected, and as a result, they found themselves unable to suspend their disbelief for the story. Without suspending one's belief, a game does not entertain users and is not worth their time. As a result, this feedback was the most important, as I realized I needed to make my world, characters, and backgrounds more robust and appealing to exist in to create a sense of presence and importance to the story.

As the game approaches its release, I have resolved many of the issues expressed by the *VRChat* content creator. Since their playtest, I have modeled and animated all characters, enriched the setting with textures and furniture, and added background NPCs roam around the lobby. I did all this to allow players to believe they are in a typical *VRChat* lobby. Moving into the project's initial release, I will be monitoring player feedback heavily to make sure that players feel immersed and incorporate all critical feedback necessary to improve player immersion and enjoyment. Regardless of what feedback may arise, I believe that the project is now in a state that if the previously discussed *VRChat* content creator above participates again, they will be engaged by the world, the unique characters, and feel like they are in a *VRChat* lobby.

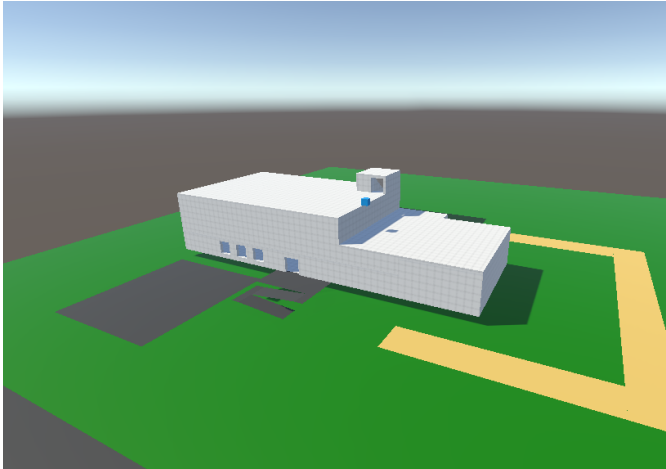


Figure 11: A level comparison between the first playtest and the current state of the project

Interdisciplinary

In my effort to stop online bullying, I'm utilizing my independent engineering course of study in game design and my independent liberal arts course of study in game design and storytelling.

Liberal Arts Connection

An essential aspect of *A Date With Cheemis* is conveying heavy emotion to teach the player the importance of empathy, so, as a result, the game needs a well-written narrative. Through my studies at Cal Poly, learning how to write screenplays, produce films, and analyze game narratives, I crafted the game's story to have realistic characters and a story that can only exist in *VRChat* but communicate universal lessons and emotions. Beyond the narrative, I've designed the level, characters, and game environment using photoshop, blender, and Unity 3D to cement this game further as a *VRChat* experience. Additionally, my studies in character design helped me choose voice actors for every character in the story. Through my education in film and storytelling, I am releasing trailers, short messages hinting, and a public release of the game's level without any gameplay elements to entice players to play the game when it comes out.

Engineering Concentration

Behind the scenes, I did all the programming myself in Unity using Udon and Udon#. Because Udon isn't an exposed coding language like C#, a lot of Unity's functionality had to be remade in addition to coding NPC AI, decision trees, and animation trees. Additionally, because *VRChat* is still in Alpha, every time *VRChat* updates its engine to a newer version of Unity, I also had to update my Unity to ensure my game will still work in *VRChat*.

Related Works

As a *VRChat* world, there are countless other worlds and game modes similar to *A Date With Cheemis*. *VRChat* provides all its users the ability to create and share unique worlds they've built, allowing users to socialize with friends and strangers in comfortable environments. At the time of this senior project, *VRChat*'s most popular worlds are *The Great Pug* and *The Room of The Rain*¹³. Alternatively, other content creators spend a lot of time crafting alternate game modes for *VRChat*, such as the popular *VRChat* user Jar (@vr_jar). Jar has made countless alternate game modes, including *Murder 4*, *Kingdom Scrolls RPG*, and a full remake of 2018's *Among Us* in *VRChat*¹⁷. As this project seeks to advance what is possible in *VRChat*, Jar's work is the most similar to my project and is all available to play for free on *VRChat*.

Outside of *VRChat*, *A Date With Cheemis* is similar to experience to a lot of VR games. While my game might not be as full as VR games produced by game studios, my game is similar to AAA games like *Half-Life Alyx*¹⁰ and smaller VR studio's games like *Trover Saves the Universe*⁵. Regardless of team size, my project and their games offer fulfilling and exciting experiences while also pushing virtual reality into mainstream entertainment. Outside of virtual reality, my project is similar to and inspired by the Telltale line of games. Starting with 2012 *The Walking Dead*⁸, Telltale crafts games that offer players the video game equivalent of a "choose your own adventure" book, allowing users to integrate themselves into the narrative. Beyond these specific examples and genres, my project is a video game. At its core, my project is in a medium meant to entertain us and tell stories in an interactive way that other mediums like books and movies can't.

Future Works

As software development is a continuous process, the current development team has expressed interest in the continued development of *A Date With Cheemis*. The development team plans to strengthen all aspects of the game, including polishing code, reworked voice acting, improving models and animations, and updating the sound design. Although *A Date With Cheemis* is in a complete state as of writing this report, I believe the game can be further improved to strengthen player immersion and project cohesiveness. Additionally, while the project is currently too big for *VRChat*'s requirements⁵, adapting the game for stand-alone VR headsets may be a project goal in the future. To conclude, there is no set end date for development nor a goal towards what the final game should look like. Instead, the development team and I will continue to improve the project and update it for future *VRChat* engine changes and potential platforms.

Conclusion

In its current state, I am happy with the ongoing development of *A Date With Cheemis*. Since its inception, *A Date With Cheemis* has been an experience-driven *VRChat* world intended to teach the *VRChat* community about bullying in the virtual space and its consequences. Through the power of the Unity real-time development platform, Udon, and the Udon# compiler, I have crafted a story that alerts the VR community to the rampant bullying and toxic behavior that takes place in the virtual space. Although there are many other alternative game modes in *VRChat*, this is the first of its kind that tells an engaging story and where the player can affect other characters' responses and the story's outcome.

Additionally, I am proud to be working with a diverse set of talent on this project. *A Date With Cheemis* has six directors for the game: a game director, a 3D assets director, a music director, a voice director, and a casting director. I am proud that the project has accumulated a lot of support and additional talent. With all the extra help, the project has become better than it could have been if I had been the only developer. Although *A Date With Cheemis* is my senior project, the game shows no signs of stopping development after my graduation. Along with all active team members, I will continue developing and supporting the game for a long time. *A Date With Cheemis* shows promise as an excellent teaching tool for the entire VR community through a powerful story against the dangers of harassment, bullying, and toxic relationships in the VR space.

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