CLiMB

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Executive Summary

Climb is a VR experience based around rock climbing. The experience is meant to be frustrating but rewarding similar to games like *Dark Souls* and *Getting Over It*. Rock climbing experiences exist already, but are not meant to create frustrating experiences. Climb's aesthetic follows a colorful, low polygon model to provide the players with a pleasurable visual experience which is aimed to complement a frustrating gameplay experience. Once the player's upward journey begins, the challenges involved include careful placement of vive controllers to ensure a firm grip on the hand holds and attentiveness not to let go at the risk of a long plummet to one's death - but more frighteningly, starting the climb all over again. The game does not punish the player with loss of lives or a game over, but rather by the loss of progress to the top. Plus, falling in VR is not a pleasant experience and is a punishment in and of itself.

Design

We built a VR game and experience centered around climbing. We built it with falling as the central motivator for our design. The idea for CLiMB came from us wanting to create an experience that gave the sensation of falling in VR, an experience we all agreed was strange and surreal in a way that could be used to drive gameplay.

Evaluation

To evaluate the quality and to ensure we achieved the look and feel we sought after in our design goals we made plans to use a combination of formative and summative evaluation.

Formative Evaluation

In our formative evaluations, we had users try two different climbing control schemes to see how their experience changed. The two schemes were a button based grabbing control scheme and a physics based collision system. We wanted users to fall as a result of their own mistakes and not as a result of technical limitations or unpredictable system behavior. This test was an A/B test, and involved think-aloud observations and a post-test interview.

Script

Before the tests, we read this script to our players to introduce them to the game. We wanted to make the players feel comfortable experiencing the game as they normally would, without worrying about whether or not they were playing well or giving us good feedback. Our script went as follows:

Hi, my name is [name], and I'll be observing this test. First off, you should know that we are simply testing a couple of control schemes to see which one provides the most engaging experience. We'll have you try three different control schemes, but with each one, please play the game as you would normally. While you're playing, feel free to say anything that's on your mind, no matter how unimportant you might think it is. Any response will help us understand the experience you're having. Of course, you can ask questions at any time, but we may not answer all of them, just because we want to see how players will play our game without our guidance. Don't worry about being overly critical or hurting our feelings, since any feedback we get will help us make a better game. I'll have some questions for you once you finish playing, but for now, the gist of the game is that you have to climb to the top of the level. So let's get right into it.

Interview Questions

After running a test ranging from twenty to thirty minutes and having players try different control schemes, taking notes on their experience and spoken feedback, we asked them some questions in a semi-structured interview. We wanted them to reflect on the experience and consider how the different control schemes changed their response to the game. The questions were:

Which control scheme did you find easier to use?

Which control scheme did you enjoy using the most?

Did you find anything in the game frustrating?

Do you enjoy climbing?

Are you afraid of heights?

How did you respond (physically or emotionally) to the climbing gameplay?

Did any of the control schemes change your physical/emotional response?

Do you have anything else you'd like to add?

Results

In these evaluations, we found that users generally preferred the grip-based control scheme. The physical motion of the fingers involved in this scheme is similar to the motion required for grabbing onto objects, so players were better able to connect their actions to the virtual response. This made the game more intuitive, helping players learn the rules of the game on their own. Some players did find this control scheme to be tiring, though. Both schemes have a high kinematic load involving the arms - players will have to keep their arms raised for most of the game - but the grip control scheme introduced a kinematic load on the player's fingers. Despite this, the kinaesthetic experience of the grip control scheme was immersive enough to engage players in the experience more than the physics-based control scheme, which players found easier but less predictable and rewarding.

One design element that contributed to the kinematic load was the placement of handholds. While the kinematic load is an essential part of the CLiMBing experience, the distance of the handholds in the early stages of the level, combined with the lack of feedback when users grabbed a handhold, made progress nearly impossible for some users. While learning the game's mechanics, shorter users would also be straining their arms to travel long distances, which decreased their grip strength and caused an undesirable type of frustration. These users preferred the physics based control scheme because it reduced the strain on their fingers.

Another detail we found in our evaluations was that players rarely looked down. We did not expect this behavior; we expected players to look down and gain a sense of scale. However, our level was entirely vertical, meaning players ultimately had no reason to look below them. This did remove some of the tension that we expected players to experience.

During the evaluations, we did notice that players became comfortable with the game and gained confidence in their abilities. The more a user played, the more likely they were to actually try and skip handholds or move faster. This could potentially be a result of frustration and recklessness, but it still indicates an engagement in the experience and a drive to improve. Players responded well to the environment, finding it aesthetically pleasing. This helped keep them engaged in the experience. When we finished the evaluations, most players felt encouraged to keep going and get higher than their previous best, despite in-the-moment frustrations. We were happy to have users respond that way, as our intention was to create a rewarding experience.

Summative Evaluation

In our summative evaluations, we wanted to examine the completeness of our experience. While players tested our game, we considered their emotional and physical responses to the experience. We also wanted to see if users broke the experience in any way, or if they experienced anything that would break their immersion. In this test, we observed users while they thought aloud, after which we gave them a semi-structured interview.

Script

The purpose of this script is similar to that of the formative evaluation. However, we mentioned the emotional and physical responses to the users in order to guide their thought process. This was the script we used:

> Hi, my name is [name], and I'll be observing this test. First off, you should know that we are simply trying to gauge the user experience. Please play the game as you would normally. While you're playing, feel free to say anything that's on your mind, big or small. Any response will help us understand the experience you're having. Also, please let us know your emotional response, whether you're happy, sad, angry, or anything else. You can ask questions at any time, but we may not answer all of them, just because we want to see how players will play our game without our guidance. Don't worry about being overly critical or hurting our feelings, since any feedback we get will help us make a better game. I'll have some questions for you once you finish playing, but for now, the gist of the game is that you have to climb to the top of the level. So let's get right into it.

Interview Questions

After running a test ranging from twenty to thirty minutes having players repeatedly attempt to clear the game, taking notes on their experience and spoken feedback, we asked them some questions in a semi-structured interview. We wanted them to reflect on the wholeness of the experience - and the frustrations that could break that sense of unity. The questions were:

> Are you generally comfortable with heights?
>
> When playing our game, did you feel any more or less comfortable with the height than you normally would?
>
> How did you feel overall when playing?
>
> Did you find anything excessively frustrating?
>
> Did anything pull you out of the experience?
>
> Did you ever find the controls to behave differently than you predicted?

How did the game affect you physically?

Do you have anything else to add?

Results

In these evaluations, we found that users generally responded positively to our game. The aesthetics provided a pleasant experience, and the haptic/audio feedback for overlapping and grabbing handholds alleviated problems that players experienced in the formative evaluations. The feedback also helped players predict the controls more effectively. Players would place the controllers more deliberately on the handholds and had more confidence moving after they pressed the button. Unfortunately, the shape and construction of the controllers led to some minor frustrations. The shape of the controller still made the system behavior unpredictable, and the grip buttons themselves do not give much feedback when pushed. This is why the addition of haptic feedback improved the experience, especially for users with little VR experience.
We also noticed players becoming more comfortable with our game the more they played. At the beginning of play sessions, users would approach the wall with some trepidation, being sure to grab each handhold with intense precision. As the sessions went on, however, the users would begin moving faster and even try to skip past certain handholds in order to move faster. Paradoxically, though, the faster they moved, the more likely they were to fall. Each player eventually found a balance in speed and precision.
Players expressed frustration when they fell, but more frequently mentioned that they felt motivated to try again. Each time they fell, they wanted to climb again and do better. This sense of motivation is a response that we desired from our players. The motivation that player noted, combined with their gradually increasing comfort with the system, induced a mental flow state which engaged players on a visceral level.
We did find some problems with the game. The initial placement of the handholds was still too far apart for some users, making initial progress very difficult. Additionally, users who were less familiar with VR systems were unsure of the controls at first. Some users thought they had to use their feet, some did not know which button to grip. Fortunately, these problem were alleviated very quickly, and once players became familiar with the controls, they figured out some emergent elements of the system. For instance, players can grab one handhold with both hands. We were considering whether we had to tell players that information, but most players figured it out without our guidance.

Users

Personas

We anticipated a wide variety of users for this game. This is reflected in our personas which represent a wide variety of users. In terms of how we created these personas, we found that we

should focus on the core design principles of the game and anticipate how these would affect different people. For instance, one of the primary design goals of the game was to create a challenging experience, so we made personas and thought about how these types of people would react to a challenge. Dan and Alexandria were two personas that we focused on the most in our design, since we knew available test subjects would most likely resemble these two. Below are the personas we used in the creation of this project.

Johnny Lee

"Mr. Lee is my father, call me John"

Johnny is a young father who enjoys playing video games in his spare time. He works during the day as a electrical engineer and spends his nights playing his PS4 and PC gaming rig, after he puts his kids to sleep of course. He doesn't have much time for games but does have high interest in gaming and new technology. He recently purchased a HTC Vive and is excited to see what it is capable of. He is not interested in games that require attention for too long as he does not have too much time to play in one sitting. He does enjoy games that he can play passively or in short bursts such as Pokemon Go, which his kids have turned him onto.

Johnny is an educated young parent, who in his younger years would have definitely considered himself a gamer. His work and family keep him from being being the avid gamer he once was but he still has a vested interest in the technology, especially because he has the money now.

Daniel Neely

"Climbing gives me so much energy!"

Daniel is a college student in upstate New York who finds physical activity a necessity in daily life. He walks everywhere he can, and goes to the gym nearly every day. One of his favorite things to do in the gym is scale the rock climbing wall, since he is an active climbing enthusiast. During his free time, especially in the summer, he will seek outdoor rock climbing ranges. The physical exertion, combined with the sense of scale climbing provides him, helps him maintain a sense of presence in the increasingly stressful world of college.

Daniel already owns an HTC Vive. He had been slightly interested in video games before, but the Vive was the first system that provided him with an engaging physical experience. He especially appreciates the accessibility of the console, given that he can access it any time in his home. While he prefers outdoor experiences, the Vive can be a quick and easy

alternative, especially in the winter months when the cold or snow may be too intense for him to stay outdoors.

Alexandria Little
"Give me something new!"

Alexandria is a graphic designer in her early 20's. She has been playing video games her entire life, and has fond memories of playing first person shooters with her older brothers. While she has a soft spot for these kinds of games, her favorite genres are platformers and RPGs. Given that she is a lifelong gamer, she has had experience with all kinds of games. In fact, she has played so many games in her life that she is starting to get bored with newer games. The new games that are coming out feel too repetitive, and she finds that many of the games she plays just provide her with the same experiences.

VR has piqued her interest as a result. The unique interaction modality provided her with a gaming experience she had never seen before. The HTC Vive has been her favorite console purchase in a long time, and in the past year, most of her play time has been on that system. She obsessively searches for games which employ innovative new gameplay mechanics and control schemes.
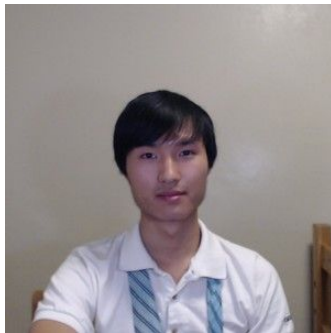
Harold "xxFailGaMiNgxx" Chung
"Follow me on Twitch"

Harold is a up and coming streamer looking for games to play on stream to grow his channel. He wants to play games that will attract viewers but will also create situations in which his reactions to the game may be clipped and posted to reddit. He is prone to overreaction partially for views but also sincerely. While playing games for countless hours may make Harold "salty" after repeated failure, Harold does not back down from a challenge, as being a quitter is not good for views. He is most easily frustrated when failure is out of his control, because either the game is buggy or his teammates are holding him back.

Harold has little experience with VR, but is more than willing to give it a shot for some views. He considers the cost of a VR headset an investment in his future as a professional content creator.

Use cases and Context

The use case for our project is pretty simple since the project is a game. The only use for the game is to be played. That said there are different contexts in which the game can be played. Contexts for a VR game may not be as varied as a mobile platform but there are several contexts that we had to account for, or at least consider. We developed and tested solely on an HTC Vive. The other systems we accounted for are VR mediums such as Oculus Rift, Windows Mixed Reality, and PSVR. The game is intended to be experienced on a HTC Vive and this poses problems when considering these different VR setups. The HTC Vive is a room-scale VR setup with its own unique controllers. Other systems like the PSVR are not room scale, and in the case of PSVR, only work when facing a built in camera. This kind of setup limits the players ability to turn around which may be a factor when playing a game like this. Windows Mixed Reality has limited behind the back functionality due to the way it detects the controllers. This is less of an issue for our game but is also a consideration. The grip button that we use on the Vive also lacks an equivalent button on most other controllers.

For the most part these other use cases were not accounted for due to time restrictions and lack of access to these systems. Though we still felt it was worth considering and discussing these cases.

Visuals

The visuals of CLiMB were originally inspired by real life. Imagine if real world places were turned into indoor rock climbing courses. The contrast of indoors and outdoors was intended to creates affordances. In the end, due to time constraints, we were unable to achieve compelling realistic design for our textures. We dropped the photorealistic approach entirely as we believe a well done cartoonish look is better than a poorly done hyper-realistic approach. In other words we didn't want to end up in the uncanny valley with our graphics. We did not however drop our based on reality feel. The level we have designed is meant to resemble a desert but in a cartoonish fashion, our hand holds are designed to stand out via color rather than differing aesthetic.

While not visual, we believe auditory elements of the game are equally important in creating the experience we strive to make. The audio of the game is meant to create unease in the player through the use of somewhat realistic sounds. Typically audio is delivered via headset or earphones when using a VR setup so this was taken into consideration when adding sound. The sounds we wanted to add to the game to enhance the experience were realistic sounds that can be used to convey the feeling of the outdoors, such as wind sounds. We also decided that a

visceral and impactful death sound was necessary, to really drive home the feeling of death, which acts as the only punishment for the player within the game.
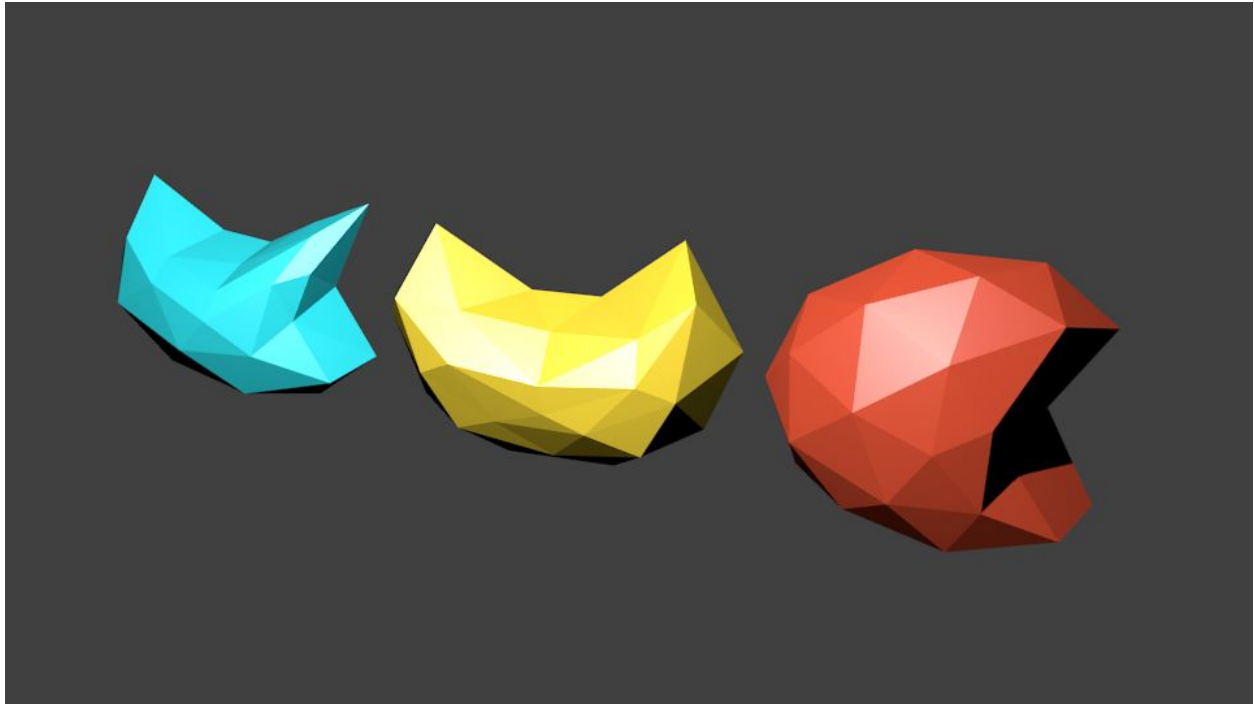
CLiMB
Overlock

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvqxyz
1234567890

4B3E4D	1E8C93	DBD8A2	C4AC30	D74F33

Architecture

System Organization

The interaction was pretty simple to diagram. There are not many paths the user can take as would be the case with a website or similar application. This was our original design flowchart. Dashed lines represent paths that are not always taken and solid paths represent paths the user has no option in taking. Even within the game itself there are not many options for the user, unless we intended to make a flowchart of each handhold the user could grab. The game itself has a simple interaction flow as well, the user has one option, well one intended option, that being to climb up the wall that is in front of them. The path is linear and unless some users find some sort of skip in the level design there is not much to map out in terms of interaction.
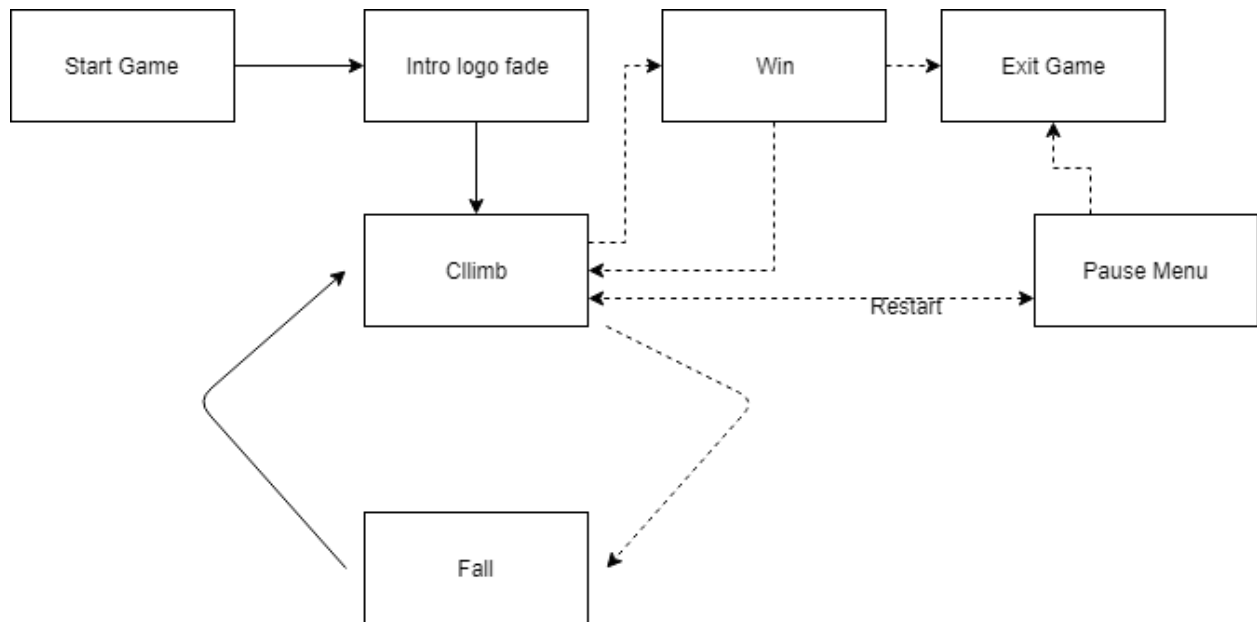
Layout

The wireframe below represents our start screen layout, however seeing as we were working in a 3d environment, wireframes were less effective of a design tool to our team in regards to the gameplay experience. The "play field" in essence consists of a textured plane with some variation for detail. In the center of the field is a tower with a path of handholds going up the height of it, and wrapping around. The path is varied to allow for a number of different climbing experiences: standard vertical climbing, going around corners, overhangs, etc…

The sketch below is a sketch we made of how we intended to to make teach the player how to play the game. The sketch represents the elements that show intended use. The name CLiMB acts as a title but also as a directive to the player. Meanwhile the handholds that stand out due to color and look similar to real world hand holds which acts as a convention. The sign in the sketch is what shows the player the controls, showing the player how to interact with these handhold and act upon the title's directive.
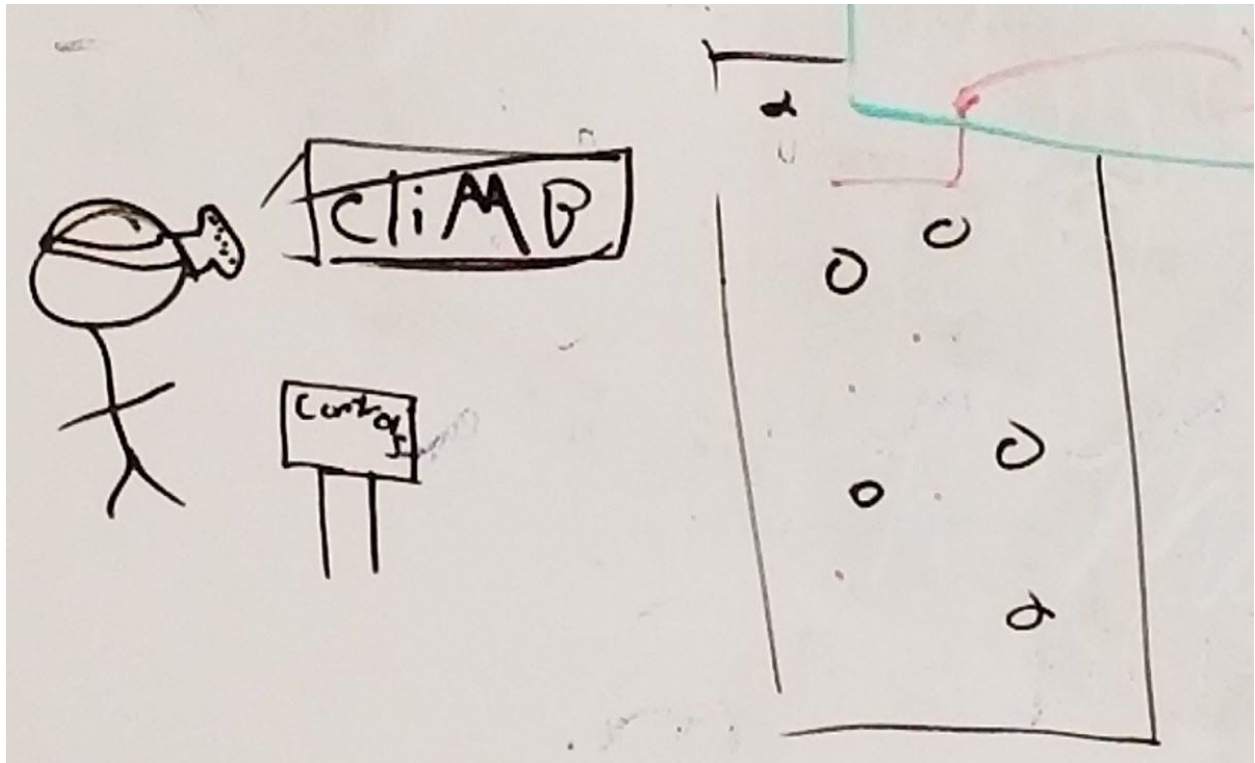
Functionality

CLiMB is created in Unity for the HTC vive. Scripting is in C#, because it's the default for Unity. There are a number of scripts controlling the overall gameplay. Each handhold has a collider attached, and when the player's controller intersects with it there is feedback in the form of audio and haptic vibration. By pressing the grab buttons, the player's gravity is disabled until they release the buttons, and they can maneuver by dragging the controller in the logical direction one would to pull their body that way. This whole process is handled by two scripts: ClimbFunctionality (attached to each controller, handles the initial collision), and GripManager (attached to the camera rig, which also has a collider to detect when it lands on a floor. Manages both controllers ClimbFunctionality scripts, and the majority of the climbing computation).

Other than that, there is also one script to detect players falling. Once they have fallen for a long enough distance, a sound of whooshing air will be played followed by snapping bones as the

camera rig is moved back to the starting location.

Lastly, we had attempted to create a means for players to actually collide with the wall, but while we can control movement based on button input, VR makes it difficult to keep players bodies from getting inside of a wall since we only have a rough approximation of where they are. In the end, it worked out fine, and the clipping issues are something that could potentially be fixed with better tracking technologies.

Conclusions

In the end we created a game that we are proud of. There are some kinks for sure but time was not on our side. We are keeping a list of things we hope to add and would even work on this project as something to do as an outside of class project. Based on evaluations with test players we believe we accomplished our goal of creating a challenging climbing game, that rewards the player though their own personal sense of pride and accomplishment.

Contributions

Isaak - Lead Engineer
Conor - Art Director (Assets Team)
Ben - Lead Level Design, UX Evaluation
Garrett - Asset Creation (Assets Team)

The project was done with an agile development approach. Meaning each member had their own responsibilities, but all tasks were open to collaboration in the event that someone fell behind or got ahead. Isaak was the only team member who had a working knowledge of the Unity game engine, though all members had to become at least semi-familiar with the interface to ensure the success of the project. The specific contributions of each team member can be found below, but it is worth noting that members of the team also assisted others with their primary duties in addition to what is outlined here:

Isaak

Isaak as lead programmer coded pretty much everything that made the game work. Isaak created and curated code to enable climbing, falling, and just about everything within the game. He was responsible for taking assets created by the asset creation team and making them work as intended.

Conor

Conor was a member of the Asset creation team. As a member of the Asset creation team Conor created the hand holds that the player climbs on. These were crafted very particularly

with close attention to both aesthetic and affordances. Conor also was in charge of art direction in the game, as his mood board was the inspiration for the aesthetics of the game.

Ben

Ben as lead level designer was in charge of creating the level that the player experiences. He placed assets created by the asset creation team throughout the map to create the level. Ben as lead level designer was also in charge of formative evaluation regarding level design, and also created rough prototype levels to test the feelings they would evoke in test subjects (In and out of team). Ben was also in charge of informing the rest of the team of the results of his tests so proper changes could be made to the design.

Garrett

Garrett was a part of the asset creation team and was in charge of creating various assets for the game including, unused pickaxe and hand models, as well as signs that would be used to instruct the player how to interact with the game. Garrett was responsible for both the textures of the signs as well as the models.