The Star Caller: Shining a Light on Game Production and Real Time Cinematics

Jehoshaphat Chacko
jchacko@clemson.edu

Follow this and additional works at: https://tigerprints.clemson.edu/all_theses

Part of the Game Design Commons, and the Other Film and Media Studies Commons

Recommended Citation
Chacko, Jehoshaphat, "The Star Caller: Shining a Light on Game Production and Real Time Cinematics" (2024). All Theses. 4314.
https://tigerprints.clemson.edu/all_theses/4314

This Thesis is brought to you for free and open access by the Theses at TigerPrints. It has been accepted for inclusion in All Theses by an authorized administrator of TigerPrints. For more information, please contact kokeefe@clemson.edu.
THE STAR CALLER: SHINING A LIGHT ON GAME PRODUCTION 
AND REAL TIME CINEMATICS

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Masters of Fine Arts
Digital Production Arts

by
Jehoshaphat P. Chacko
May 2024

Accepted by:
Dr. Eric Patterson, Committee Chair
Dr. Jerry Tessendorf
Professor Rodney Costa
Abstract

In the landscape of interactive entertainment, the synergy between game play and real-time cinematics has become a pivotal force driving innovation and engagement in modern video games. “The Star Caller” is a project made by a small group of talented artists that explores this intersection. It serves as a prime example of how these two features coexist in modern gaming. This project utilizes the fundamentals of not only video game storytelling, but also all the popular aspects of a single player experience. Artistic inspiration from popular works such as *God of War: Ragnarok*, *Warframe*, and films such as *Children of Men* shaped the entire framework of this project, paying homage to these cinematic aspects featured in those games. As the director of this project, I brought together a team of diverse students, each contributing a unique background to author assets required to create the proof of concept for “The Star Caller”. The insights from various stages of the pipeline frequently led to the creation of new methods to streamline processes for efficiently delivering assets to be incorporated into the game. This then turned to hands-on experience of realizing what it would be like to deal with real issues created by working in a game studio. Through different issues of managing assets, music, and most importantly, people, “The Star Caller” illustrates the effort required to orchestrate the creation of a game featuring unique characters, story-driven environment art, motion capture, and real time visual effects. Bringing this all together, an emphasis was placed on the convergence of cinematics and games, exploring the intricacies of blending these two creative realms to produce a cohesive and immersive gaming experience.
Dedication

I would like to dedicate this thesis to everyone who pushed me forward and told me not to stop. I will never forget the words you said and the actions you took to help me get through everything.
Acknowledgments

I would like to thank my family back in Houston for also providing for me and giving me the support to be here in Charleston. Getting my Masters in something as far away from our culture as “The Arts” was definitely a challenge. Thank you for taking a chance and letting me pursue my dream of furthering my education here. My father, Dr. Sam Chacko, has been a hard working man ever since he arrived here in the states. It was due to his perseverance through hardship that he inspired me to further build my education in this country by getting my M.F.A. My mother, Mercy Chacko, has also been a great example of pushing forward no matter the setback and it was through her hard work and sacrifice that I was able to get through my early college. My sister, Zinnia Chacko, is still going through high school, but I hope that me getting my masters inspires her to get her own in the future.

I would also like to dedicate this thesis to my closest friends for their support throughout my years in this program. To my friends in Houston: Sebastian and Megan Thacker, David Leal, and my friend in Las Vegas, Jerome Butler. Throughout the years I have struggled with trying to figure out how I would complete this program after I left Houston. It’s been extremely tough financially, physically, and most of all mentally to be so far away from home to pursue what I love to do. However every time I would even think about giving up and going home you have all been there to remind me what I’m doing this all for. I would like to personally thank each and every one of you (Family and Friends) for being in steady contact and supporting me either by sending me uplifting words or personally helping with my project. All because of your push forward I was able to get back on my feet and complete this thesis.

Lastly I would like to thank my wonderful team that took time out of their busy schedule to help me push this project forward. Their weekly checkups and continuous pursuit of getting a better product has influenced me to keep pushing myself and my drive for this game. From the
bottom of my heart I would like to thank these artists for helping with The Star Caller.

David Leal: Modeling
David Miller: Modeling
Karim Hudson: Animation and Game Development
Steve Jennings: Story, Screenwriting
Stephanie Shultze: Modeling, Environments
Alison Gaddy: Modeling, Acting
Gabby Delo: Concept Art, Color Script
M.C. Wilcox: Model, Concept Art, Acting
Calla Corder: Modeling
# Table of Contents

Title Page ........................................ i

Abstract ........................................ ii

Dedication ....................................... iii

Acknowledgments ................................ iv

1 Introduction ................................... 1
  1.1 Why Game Cinematics? ....................... 1
  1.2 Story Overview ............................. 3
  1.3 Characters ................................ 5

2 Game Creation ................................. 16
  2.1 References ................................ 16
  2.2 Game Mechanics ............................ 20

3 Asset Creation ................................. 23
  3.1 Characters ................................ 23
  3.2 Environments ............................... 34

4 Animation ...................................... 46
  4.1 Vision ..................................... 46
  4.2 Motion Capture ............................ 46

5 Cinematics .................................... 59

6 Conclusions and Discussion .................. 63
  6.1 Post Mortem ................................ 65

Bibliography ................................... 67
Chapter 1

Introduction

1.1 Why Game Cinematics?

Game Cinematics, or what is normally referred to as “cut-scenes” have been a main driving force of narrative storytelling since the 1960’s. These cut-scenes would often introduce the game, give the player context as to what they were playing, and more than likely give the player a reason to press on after the game initializes. One of the first games to utilize cut-scenes Donkey Kong started the game with an un-skippable cut-scene that showed a clear objective to the player [1]. For “Donkey Kong” we see that there is a massive gorilla “Donkey Kong“ climbing up a ladder with someone in his grasp. The animal then jumps up a few times to offset the platforms that the player needs to use to get to him. Once the princess is at the top of the map and Kong is done smiling you are given the challenge “HOW HIGH CAN YOU GET?” in all caps. This provokes the player to take the challenge and climb the map to save the princess.

With this small cinematic we are given three things. The first being a clear laid out path for the player to go down. This is called a “linear” game framework. This is where the player must follow a clear progression to complete the game. [2] This plays a hand in how a developer would like to tell their story. Do they want to give agency to the player to discover the game in its fullest, or is the game clean and gets straight to the point without any hoops for the player to jump through? These are decisions that the developer must consider before they start the game.

The second point that the small cinematic from Donkey Kong shows us is that there is a goal for the player to get to. From the layout of the first level, our eyes are drawn up the
pathway to *Donkey Kong* at the top. We see that he has the princess and the player, depending on their familiarity with video games, can instinctively see that they need to go up the ladders and pathways to the top. This can be guided ultimately by good art direction. Since this is by current terms considered a classic game, there are not many bells and whistles such as particle systems and lighting systems set in place to busy the screen for the player.

The third point is that the player is beckoned to attempt the challenge. In a game like this, the “in your face” approach of typing a question in all caps is enough to get the point across to all ages. However we can see nowadays that there are different ways to do this. *Donkey Kong* provides a simple task to the player. How high can you get? Other games, for instance, *Call of Duty* regularly uses the trope of using the target audience’s emotions to their advantage. Regularly the player is confronted by a calamity to start the game. *Call of Duty: Infinite Warfare* used an attack on a futuristic America’s Memorial day as a catalyst to give the player a motive to chase the enemy to the stars.

These three points, a clear path, a goal for the player, and a challenge are the main topics that would guide the framework for “The Star Caller”. Creating cut-scenes, or in game cinematics, will utilize these points to create a drive for the player to push forward. This is mainly why a linear framework was chosen to showcase this game. Giving the player too many options to go after would dig into development time and further more be in direct conflict with the minimum viable product or M.V.P. Creating ”The Star Caller“ with a simple framework and giving it a complex story will give any developer on this project an easy medium to keep adding on without worrying about not reaching deadlines.

With these three points in mind, why is the focus of this paper on game cinematics? ”The Star Caller“ was created with a focus on its story. Why is the character on this planet? What happened? Why should we care? These are narrative questions that should be asked and answered through the game’s narrative. With this we can use the limitation of M.V.P. to plan an effective goal of hooking the player and its through a focus on cinematics that this can be accomplished. It is through the tools available through Unreal Engine that there was a clear path that could be taken to export the process of delivering such a complex and unique story.
1.2 Story Overview

"The Star Caller" is a story following a woman named Cinder, a fire mage who has returned to her home planet. The planet, which is similar to Earth, has been turned into a mostly icy wasteland by its Matriarchal Despot, Queen Andrea. She repeatedly speaks to Cinder through her innate psionic abilities (psychic). With the use of this ability she regularly taunts Cinder as she progresses through the game, giving the player valuable exposition to decode what has happened to the planet that a.) The player has not seen before and b.) Cinder has not seen in decades. Throughout the progression of the game she first sees a grand temple of gold and asteroids in space. This story “called” to me because it was already a developing story that needed an medium to develop fully. Its through the interaction of the character and the story that I believe they there would be an adequate avenue to pull the audience in to the story and characters.

The game starts and she begins to walk down the golden path towards the “Star Gate”. She is then taunted by Andrea, and that is when we first get to hear Cinder’s voice when she responds to her. When she walks through the portal at the end of the pathway, we see that she is taken to the ruins of her home planet. The planet, being decades older than from when she saw it, is now an icy wasteland and a shadow of its former self. As she progresses through the level she is met by a mirage of Andrea facing several guards at a clearing in the path. She is commanded to surrender, but she instigates a fight and they all are next seen dead in the landscape. They have been left in this clearing for the last few decades. As Cinder makes it to the first area, she is told to go to the castle’s combat yard by Andrea for a surprise. When she gets there, Cinder is confronted by her brother who was turned into a massive rock Golem. After defeating the Golem, there is a small interaction that happens that causes Cinder to be thrown by the boss towards the entrance of the courtyard. Aurelius grows bigger and bigger, more than likely charging up a massive attack. Then out of nowhere Andrea speaks and Aurelius is killed by just the Queen’s words.

The Queen then beckons Cinder to take her flame and open the door to the castle. As Cinder makes it to the gate she has to place the flame on a pedestal, which then triggers the door to open. As she enters the castle she sees that its being lit by her flames and filled with gold ornaments while the floors glew with rocks reflecting an out of world essence. As she made her way past the statues, she is then pulled by the Queen into her Court. Once she is there the Queen confronts her, and ultimately reveals her true intentions to Cinder and the player. Which then she tells Cinder
that once shes done with this planet, and with Cinder, she will move onto Earth. She then says one line that leaves the audience on the edge of their seat, ready to play the game and defend their home (Earth) from this villain.

Throughout the course of this story we are given many avenues to give both the player, character, and also camera space to be expressive to convey the story. This also, provided by the story, gives the three points as mentioned in the previous chapter. A clear path, being the linear map and lighting used to guide the character. A motive, being provided by the interactions given to the player by the exposition spoken by the characters. Then finally the challenge, being the ultimate “Defeat the Big Bad before she takes over Earth”.

In the Bible, the story of the great flood has been a captivating story that had captivated most. After being left to their own devices, mankind fell from the grace of their Creator and were ultimately doomed to be destroyed by his wrath. That moment when the Abrahamic God looked down at his creation, filled with disgust, and unleashed his wrath has been a pivotal tale to remember in my life. Throughout the months working on this, Throughout several instances in the Bible, a viewer can witness and imagine the scale of the wrath that was sent out from the creator’s actions. One such imagining being John Martin’s *The Great Day of His Wrath*.

![The Great Day of His Wrath by John Martin](image)

Figure 1.1: The Great Day of His Wrath by John Martin

It is a painting that started my art career. I thought to myself that one day I would look at my own work and be able to feel the same emotions I felt when seeing this painting. Tying this to “The Star Caller”, this image is what was referenced to create the mood and atmosphere of the destroyed kingdom int he second level. When looking at the use of color, floating environments and the sense of scale with the absolute destruction caused by Abrahamic God, that’s what was meant
to be the best representation of the level.

1.3 Characters

Throughout the development of this story, there were many avenues in which to add characters and motives to keep the story of the game going forward. To focus on the main characters, there was major development on Cinder, Andrea, and the Golem. Both Cinder and Andrea will be explained here, but the Golem will be elaborated on in 3.1.2.

1.3.1 Cinder

Cinder is a character created to be the main protagonist of this game. Due to the need of keeping things as plain as I could, she needed to be as easy to read as possible when it comes to her design. From that it was very apparent that for the character the attitude of “What you see is what you get.”. She is a cloaked and mysterious character, and a certain level of assertiveness needed to be planned with her movements and costume. From wanting a straightforward character without too many bells and whistles, it was necessary to be very deliberate with her design.

Her background and main story of the game is meant to showcase that there is depth, but due to the scope of the story the player will need to speculate what her background was and what exactly she was up to before the events in the playable game. As stated before, she is a fire mage with the ability to not be affected by the uninhabitable void of space. Due to this innate ability that she was born with she was set apart and adopted into the royal family. In Figure1.2 and Figure1.3 its shown that her character is mainly inspired by the concepts of Frey from Forsspoken. [3]

Figure 1.2: Forsspoken Concepts
From these basic reference images, we can see that Frey is a character that is shrouded by a cloak and has tight fitting clothing with some equipment/armor around her to help facilitate her movement and ease for animation. However even though Frey’s design fits her game really well, it would not completely fit “The Star Caller”. When the concepts were approached the character needed to have the cape, but she also needed to have some familiarity with her past. It was thought to put emphasis on the armor that’s underneath her cloak, to symbolize a past that she is trying to hide away. These are concepts that were drawn by Gabby Delo. See figures Figure1.4, Figure1.5, and Figure1.6.
Figure 1.4: Cinder Concepts Undergarments, by Gabby Delo

Figure 1.5: Cinder Concepts Armor, by Gabby Delo
It is important to start from reference when working on characters in art. [4] In the article *The importance of consolidated inspirations in video game creative processes*, Welsh describes the process of getting a game. He states that concepts art is the guideline and to bring a proposal to life. Using images as visual queues are important to get the team on board and to follow the artistic vision of the project. When designing Cinder we wanted to be sure about how she would put the armor on and how things would layer on each other. It was under our full intention for this character to be cast in a good amount of shadow, to further showcase the life that she previously tried to run away from and is now running towards. According to the lore, she left this planet decades ago. She still wears the armor and equipment she had on when she left. When she returns, she is contrasted by the gold and metal that has taken over her home. This is a stark contrast to the matte and lack luster nature of her armor.

After taking these concepts and turning it 3D we needed to fix certain aspects of the design that wasn’t working. When creating the character we needed to make sure that the model itself wasn’t going to get too dense and could deform properly with the meta human rig. This was a continuous process of trial and error. There were times that the concept worked and clothing pieces on the character moved very cleanly, but others needed to be reworked. The parts that needed to be required were the cloth pieces around the arms, neck and chest. This was a brief, yet frustrating period of weeks in which we needed to create the asset, move it around in Maya, then finally test it in Unreal Engine. Through this process and through a series of tools made to make the process easier, we were able to get to this point. The frustrating parts of the workflow came from understanding

Figure 1.6: Cinder Concepts Cloak, by Gabby Delo
how *Metahumans* worked and how to get clothing and animations to correctly work. Through these careful steps we were able to create Cinder for this game. For further iterations, it would be best to create a unique rig for hero assets so that we knew exactly what every feature of the model did.

There were times in which the project was open to critique from the public. Through this time the main issue came from the main character’s design in 3D. Cinder’s cape and cowl wasn’t working. It was evident that the cape was not functioning realistically and there were massive inter penetrations during the game-play. Next, people commented that the texturing was too close to that of Lambert shaders on the character. This was expected due to there being no textures from Substance Painter on the character this time. Next, I was asked to re-evaluate the overall design of the character. Does the character’s outfit work with her back story? Does the hood make sense? Do I need a hood to deliver this type of character? The answer that eventually reached was that this character didn’t have to hide herself even though she left her planet and there was no reason why Cinder’s design felt so barren while she is apparently a “princess” of the kingdom.

It was at this time that two major things happened. One, Cinder’s hood needed to be removed. This was because her hair regularly interpenetrated through it and chaos cloth was not responding well to it. If there were more time, the main fix would be to rig the hood and utilize Ncloth to predetermine deformations rather than have Unreal calculate it in real time. Two, that her whole outfit looked barren. She had clothes, but they all looked like proxy geometry rather than a solid foundation for a main character. I looked through different character ideas on Artstation and Pinterest. What kind of outfit could work for Cinder? She is a rouge mage that left her home, so I needed heavier armor and more straps around her body to signify how lightweight it was give her easier avenue to move. I eventually found a 3d model done by Huan Gugu on artstation and that pivoted my design of Cinder. I really liked the amount of armor and belts that were on the character’s arms and legs, and this reminded me of how much I liked the final fantasy and Asian MMO character design. This new design inspired by what already works for games, further pushed the “fighter” aspect of the character. Cinder was eventually outfitted with layered shoulder pads, more armor, belts, and more accessories on her legs.
Figure 1.7: Huan Gugu “girl”

Figure 1.8: Cinder Ingame Render: Front
1.3.2 King Aurelius (Rhel)

King Aurelius is an unseen side character for this story. He is the brother and former ruler of this planet before he was usurped by Queen Andrea. The reason I went this route with the character is because the story needed a way to give more exposition to the character and context to the real heaviness of the lore. The background of this lore, is that King Aurelius, though a king, was just a pawn for greater powers on the planet that made Queen Andrea’s life miserable. Since she never told him what the issue was, he never knew. Then over time that misery turned into anger. It was through that anger that the rule of Aurelius ended. It is through the activation of periodic vigils that he tells Cinder about what really happened on the planet and how "The Star Caller" was found and the scope of its power.

Since its not a part of the main game, and Cinder has a choice in whether or not she can activate these vigils this part of the story has been deemed as a side quest. This side quest, called “The Echoes of Rhel” showcases audio voice lines of King Aurelius as he discovers, investigates, and is ultimately betrayed by “The Star Caller” and his wife.

These four voice lines lay a crucial groundwork to tell the audience of how wrong things went after Cinder had left the planet.
1.3.3 Queen Andrea

Queen Andrea was a difficult character to concept due to how liquid the concept and story was at the beginning of the production. Originally the story had centered around her being a cold reminder of the life Cinder had abandoned. Eventually the story needed to be more streamlined, and truthfully, there was only time to properly model and animate two characters for this production. When Vox Solaris, the previous antagonist, was removed he was replaced by Queen Andrea. The Queen, instead of being a sad and remorseful spectre of her former self, was reformed into a vengeful despot. Previous concepts of this character Queen Andrea are shown in Figure 1.10.

![Figure 1.10: Andrea Concepts Old, by Gabby Delo](image)

Andrea needed to reflect the royalty and majesty of the castle. Using colors like purples and golds, the character appeared like she fit in the castle while also not appearing as a hostile force. She had to fit emotional roles for the scenes that she was in, stating lines such as:

“All of it, destroyed by one madman on his quest for power. He was going to eat the sun, did you know that?”

“You had every idea. I told you this was going to happen, yet you left me to “train” on another planet. Both of you changed on a quest for power. You were both my friends. I loved you yet you ran from me…”

“...leaving me in the middle.”

Her outfit was originally created to feed off the emotional pull towards her and Cinder. It was needed to reflect design principles of the castle around her, but the scene that she was in was
not meant to be hostile. It only meant to be felt as remorseful and a vague memory of line of royalty that once was. After careful consideration, the original story did not sit well with a few students and readers and so the story needed to be redone in a different angle due to both time and necessity.

Queen Andrea was eventually redone into the main antagonist. She is an ever present force guiding cinder through the game. Since she shifted from a non-hostile character to a hostile one she needed to be revisited at the drawing board. A running theme of the revisited map was the abundance of gold and iridium everywhere. See figure Figure1.11 and Figure1.12 for the new concept that needed to be created for the script.

Figure 1.11: Andrea Concepts Full, by Jehosh Chacko
Andrea was turned from a memory of Cinder to a very present villain that she needed to confront to get to “The Star Caller”. The concepts that were done were made to convey that she is a mad Queen. Covered in gold with odd shapes on her body that resemble a seraphim. Gold that matched the same gold on “The Star Caller” is also present on her body. Throughout the story we see that she is constantly picking at Cinder and commenting about the scene around her. How meaningless her grief was and how “The Star Caller” made her better. This is best reflected in these lines:

“There’s something poetic about the ruins of a kingdom. The reflection of the choices we make. I don’t want you to feel guilty, my dear Cinderella, I want you to understand. I want you to realize the true cost of ambition.”

“Aurelius was never smart enough to see how the future was unfolding. He chose to let this empire crumble, his Two Hands – our best Suzerains, left to roam outside of the empire, and most of all – you being one of them.”

“You thought that you could come back home and pretend that what you did to me didn’t matter? I destroyed this kingdom because they were going to take everything from me. “The Star Caller” allowed me to shape it in my image.”
From these quotes it is apparent that Queen Andrea is off the deep end, and more than likely too far from grace. However its in this blatant disregard for life that we can find the flaws in her logic and in her character. It is by piecing what happened in “The Echoes of Rhel” and what she is saying that we can confirm that Andrea is possessed by whatever deity was on the brink of dying in The Totality. That the “she” that Cinder knew was either evolved or replaced by this deity during the calamity event. However, it is due to these beats in the story that we were able to make decisions on how she would look with her costume and how she would be presented to the camera.

1.3.4 The Star Caller

“The Star Caller” is a magical book that is the object in which this whole story revolves around. Given the very limited story, the book was concepts to be simple in shape. There was no need to put any straps, bells or whistles on the cover or pages, but just present the book as a magical book by using panning textures and design principles from sacred geometry. The book, being no bigger than a forearm’s length, is used as a conduit to channel unfathomable amounts of cosmic energy to the user’s fingertips. In “Echoes of Rhel” it was used to create tears and in the main story it was used to reshape the kingdom Andrea lived in. Due to these feats, it was thought best to keep the design of the book as simple as possible, but to keep what happens what you look at it different.

To create this effect the process of Parallax Occlusion Mapping was utilized to give the book depth where there would feasibly be no depth. When designing this book, it was one of the rules to imagine the book as a tome that the user did not read, but it was one that they experienced.

In conclusion, when we design characters for a script its important that the characters are designed to reflect the emotions and theme they are carrying. This is also further emphasised when telling a story that is fiction. When there is not much reality for the audience to relate to, it is important that the characters themselves are designed and themed to reflect the story they are telling. It is through the iterations that the artists went back and forth that these characters were able to get to this point.
Chapter 2

Game Creation

2.1 References

Throughout the creation of this project, there were many sources of media that were used as reference to show what the potential of the end product could look like. When going through all of these sources of media, we can see just how important the location of the camera, the focus of the action, the placement of the shot, and the lenses are are important to the end result. They are important because of they are the avenue in which the audience can experience the story. These sources of reference were picked due to how well they executed key concepts that were used in the formation of this Game and how well they showcase the world. When we break down what is going on in a game cinematic, what is happening? We have a program that is rendering images up to or even more than sixty times a second. This program, be it Unreal Engine or whichever the user has, is running calculations about that game at an astronomically fast rate to get the game running at the speed that it does. For cinematics, we need to think about film in the same way. What distinguishes a film from other forms of media such as still photography is utilizing the movement of the camera. The most basic tool for a cinematographer is the motion picture camera. The beginning cinematographer’s goal should be to become thoroughly familiar and comfortable with the camera’s operation, so that he or she can concentrate on the more creative aspects of cinematography. [5] it is through this that there is a huge push for the sake of the project to reference cinema so that I can use the camera in a similar aspect to how they use it in the industry.

Referencing cinema was a major task that needed to be done. Looking at how professional
studios and film makers approach different challenges in cinema was a very interesting phase in the research that I had to undertake. The art of properly planning the shot, selecting the lens, who is in focus, and what the aspect ratio would be were all decisions that I felt needed to be referenced. The main cinematic challenge was to make the entire game in a no-cut camera. Where the game can easily go from the player’s perspective to the “cinematic” perspective easily and with a smooth transition. I regularly wanted to try this, but I knew that I had to look at films and really analyze them. Films such as *Children of Men* and *1917* were screened several times to look at how they transition between scene changes. The same went for popular games in the industry. These games, *God of War* and *Warframe*, were pivotal games that inspired the creation of “The Star caller”. Going through these references, both their strengths and advantages in their approach are examined. It is through examining how these shots effective that helps formulate a plan and process of how to use similar moving compositions to enhance “The Star Caller”’s narrative.

When we look at how the camera is used in film, we can try our best to emulate its effect in games. Since the main behaviors of a camera can be emulated by math we can, as artists, take notice of the behavior of cameras and put that into the game. The main route of cinematic storytelling that was chosen was through the avenue of the single shot. In an article about the single shot and its effects in the viewer, it is mentioned that the main reason that generally the single shot results in a greater immersion and a greater involvement of the viewer in what he sees and in the actions of the filmed characters. [6]

### 2.1.1 Children of Men

This film is important to this project mainly because of its iconic first scene. In this scene we see the main character playing his part in a coffee shop completely indifferent to the distress that the other people around him are feeling. He orders a cup of coffee, looks at the TV, and then quickly steps out of the coffee shop to mix liquor into the cup right outside of the shop. During this time we see the camera following the main character throughout this entire scene with a technique called a “no cut camera”. The film, being shot on film with either an ARRICAM Lite (LT) Camera or an ARRIFLEX 235 Camera, used Zeiss Master Prime Lenses 35mm with a Super 35 Camera Aperture. [7]

For a shot like this, we can see how important the acting was as well as how important the camera specifications are. Due to the complexity of this shot, the camera was an instrument to
guide the audience through the narrative. Due to the selection of lenses, camera, and actors, we are able to see how this scene would unfold. We can see how they kept the main character in either the right or left third of the screen and only switched sides to showcase that there was another event going to happen in the right third. Throughout the creation of “The Star Caller” it was important to see films like this, that showcase a no cut camera so that it can be referenced. Its throughout the use of the No Cut or Single Take camera, that we can break from the usual shot-verse shot aspect that’s in games and that we can have a seamless transition between game-play and cinematic.

2.1.2 Warframe

*Warframe* is a third person massively multiplayer online game that is developed by Digital Extremes. It is a game that came from humble beginnings and its a small project that was seeking the limelight ten years ago and is now one of the top games in the industry. The reason why this game was an inspiration for cinematics is due to its effectiveness at handing off the camera from the cinematics to the player when game play starts. When we look at the “Whispers in the Walls” demo from Tennocon 2023, we can see that this is a showcase of several aspects of game play and cinematics. One type of game play is when the player is forced to follow ”Loid” through the map, which pushes narrative. The second type of game play is when the player has to engage the enemy in order to get to a certain point. The third type of game play is interaction with the environment to further push the narrative and understand the lore of objects in the game. When we get to the twenty one minute mark we are transitioned from one time period to another. We are shown another playable character that is currently engaged with enemies in a subway train. The camera then pans to keep the character in either the right or left third of the screen. These camera movements are sudden and it keeps the audience right up close and personal with him. When he stops fighting we see that he has fallen to the ground, tired and out of breath. Then when he gets up the game then puts the camera in position and finally hands off the camera to the player so game play can start. These aspects of game play are incredibly important to keep the player immersed in its story. It also, based on the amount of movement was in that demo, takes very careful planning to execute those type of camera movements without feeling disoriented or out of place.

When it came to “The Star Caller”, it was very certain that there will be a story that needed to utilize several aspects of this type of demo with it. When the game starts, Cinder is guided through the map by a voice that directs both her and the player’s actions. This is also
helped by the map itself being shaped to have the character follow a certain path. Meanwhile, the
game play also has Cinder rub the golden skull of the Golem Boss. This then causes the boss fight
to initiate. This is a good example of phase two of the second type of game play. The third type
of game play is used when we see the scene at the “glade” in the center of the map (in front of
the castle) play. This transports the area in front of Cinder to a place that’s in the past which
both pushes the story and provides a good context of what the area looked like before the calamity
happened.

2.1.3 God of War

The God of War games that came after 2018 were a huge influence on the development of
the script and cinematic storytelling in this game. This was due to three major factors. First there
was the no cut camera that was used, second was the story, and third was the art direction. When
one were to play the original God of War games and then play the new ones, they will notice that it
was taken a newer avenue than the original games. Due to all 3 factors, they were able to effectively
move from a game that focused on the needless destruction of the Greek pantheon to then shift to
the character growth of Kratos on his journey to raise his son.

The first factor of the game, the camera direction, utilized a no cut camera. A no cut
camera is when the camera does not cut between shots and it is directed to seamlessly transition
from one shot to another. In God of War, the game was expertly crafted to have the game hand off
the camera from game play to cinematics without any abrupt cuts or pauses in the game. Through
this venue of camera direction the player’s viewing experience is never interrupted and they can play
the game for long periods of time without realizing how much time had passed.

The second factor of the game, the story, was crafted to follow Kratos on his journey with
his son. It showcased the man he had become after possibly decades after the events of the original
game and how he had changed due to time and age. This was a great influence on how “The Star
Caller” was crafted due to how Cinder needs to return back to her home world face her past. She
is a one of a kind creature of power, like Kratos, and the camera follows her path through her
world. In God of War, there were many scenes in which character’s needed too grab each other in
a confrontation and its through those scenes that the most emotional performances came out. it is
through scenes like this in God of War that some scenes in “The Star Caller” were crafted. In the
scene where Queen Andrea and Cinder finally see each other they have a confrontation then Andrea
gets mad and grabs at Cinder. That scene was heavily influenced by scenes from God of War like the ones with Freya and Baldur or Kratos and Thor. It is when the character’s are close that they are able to show their true emotions to the camera.

The third factor of the game was the art direction. God of War had a relatively realistic looking world, but it style put emphasis on certain aspects on what fit the story and what looked appeasing. While they did utilize PBR techniques, they did not go for a completely real looking game. PBR, or Physically Based Rendering, is a rendering shading system that simulates how light reacts in the real world. Since this is a game, its incredibly difficult to simulate all aspects of materials and rays cast in real time. In game engines like this there need to be sacrifices made in order to get the same result but in a faster time. In God of War they utilized very intuitive avenues of creating high fidelity assets, but not waste time or resources loading them in and out of the game. For one, was Raytracing. Raytracing is a part of the rendering process that simulates the natural reflection, refraction, and shadowing of light by 3D surfaces. [8]. In modern hardware and in Unreal Engine, features such as using raytracing in real-time has been a pivotal aspect of showcasing realistically looking environments and characters to the audience. Although the game engines that are used in God of War and "The Star Caller" are different, the same principles are there. It is through the aesthetics of what is portrayed in God of War that we can push the story and mood. Using techniques such as a PBR pipeline, we can ground the story in reality since light and materials will behave the same. This will allow similar moods that are achieved in film to be portrayed through movies. Thus through the lighting and composition we can effectively establish mood and story to the audience properly.

2.2 Game Mechanics

Game Mechanics establishes rules in which a game operates. In games like God of War and WarFrame, we see two different games mostly defined by the way those games operates. One is a tile-based third person shooter and the second is a third person action game. It is through these differences that certain game mechanics were chosen to further push the story and character direction in the story. For a game like this and the scope of this game, there are no formal combat mechanics.
2.2.1 Movement

When creating a game, it is integral for it to have mechanics. However for this one, it is important that the character moves so that the player can progress through the story. For this the game was created for the player to use the mouse to move the camera and the W, A, S, and D keys for movement through the maps. It is integral that these movements are simple and do not over complicate the movement, but add character to it. In “The Star Caller” we utilize a third person character game with an 8 way directional movement set. Through this the character was able to move in 8 directions: Forward, Backward, Left, Right, then the directions in the middle of those, Forward-Left, Forward-Right, Back-Left, and Back-Right. Through this we have a very straightforward movement system that also respects the speed in which the character moves.

2.2.2 Trigger Events

Throughout “The Star Caller” we are shown cinematics when the character reaches a certain point in the map. How are these cinematics triggered? This is through using Trigger Events. From the first cinematic, which is triggered to play On Event Begin, the cinematic will play until the planned sequence has reached its end. Once the event has reached it is end it will ease into the game play camera. From then on the future cut scenes are triggered by boxes that the player needs to overlap. Once overlapped, and depending on the cut-scene, the sequence will play and resume game play afterwards.

Some triggers are not meant to just start the sequences, but also to remove and replace objects at a certain time. It is pretty common in ”The Star Caller“ to start the cinematic, then at a certain time the game engine will be timed to swap out objects. This then fits the story progression in the game and helps the narrative move forward. For example, destruct able doors, dying bosses, weather changes, ect. These are all ways that The Star Caller used trigger events to progress the player experience.

Trigger Events are also ways that narration is queued as well. Throughout the side quest “Echoes of Rhel“ the player will need to step near the vicinity of the vigils to activate it. This will then tell the engine to play the audio file and play whatever animation is necessary to complete its job. After it is done the vigil will resume to normal and the game-play can progress.

It is very often that games do events like this. God of War or Warframe both incorporate
trigger events to start their cut-scenes and move the camera, assets, lights to certain points when
the sequence starts. An example of this trigger would be when in the game, the character would
reach a certain distance from a focal point in *God of War*. The trigger would then activate a small
sequence that would cause the object to move and signal a story significance to the player. The
same thing was done in “The Star Caller” when Cinder walks towards the main doors of the castle
and it magically unlocks and opens. This was all done through a trigger box activating a sequence
that played as the player got closer to the door.
Chapter 3

Asset Creation

3.1 Characters

As it was mentioned earlier, we have a cast of characters with a wide array of looks and features that needed to be put together in a short amount of time. Putting together the time constraints of the project and the overall detail that needed to be put into the characters, there needed to be little time wasted on the creation of the characters. Each character’s outfit told a story to the audience, whether it is subtle or obvious. For example, references to The Star caller on Andrea’s outfit and the rouge general that is Cinder. These facets of their character needed to be apparent to the audience so that there is some context given to them. Since this is a story that takes place in the middle of a larger story, there needed to be some preparation to tell that story. Which is why it was important that we used Metahumans.

3.1.1 Metahumans

When it came to creating the characters for the game, it was imperative that what is being picked for the game was at a sufficient quality. With Meta Humans we are given a very great baseline for photo-realistic models that can be used for games. From the beginning of design for the game, it was imperative that since cinematics were the focus, the models that were used were high quality and had a well built motion capture rig. Throughout the course of this chapter I will showcase the workflow of getting these characters from design to finish. With Meta-Humans there
were a lot of benefits to using the assets, but at the same time there were setbacks for using them due to how bleeding edge the tool is for productions. Using Cinder as the main tested for our production, there were many challenges that needed to be overcome to get her to a suitable place for delivery. Throughout the course of this chapter I’ll go over the different processes and setbacks I had to overcome to get these 3D models living in the game as characters.

3.1.2 Facial Capture

It is important to start from reference when working on characters in art. [4] Going back the idea of using images as filling a artistic guideline, we had to be sure that the lines that are delivered in a way that can imagine the characters saying them. First and foremost, we needed to attain a certain level of realism to showcase a sense of familiarity with the audience. For the case of when “The Star Caller” is represented, we will be able to see Allison Gaddy and M.C. Wilcox play as the characters. We chose to scan their faces because it brought the story to another level of realism that the player could experience. Through this we had to take photo-scans of the actresses and record them performing with audio and performance capture.

To scan the faces, I had tried several avenues to get the faces of the characters right in engine. The first route was to borrow the school’s RED Komodo camera and have the actors sit on a chair and spin around as the camera captured them. After images were transferred from its original R3D format to .png we put them in Agisoft Meta-shape. In Figure 3.1 and Figure 3.2 we have the results of what the photogrammetry setup produced.

![Figure 3.1: M.C. Red Camera Agisoft Face](image-url)
When these meshes were trimmed and put into Epic Games’ Metahuman Creator we got meshes that were close but it was not them. There were too many inconsistencies in the capture that led to a character that was too far from the original.

Pivoting quickly there was a brief inquiry into PolyCam, which was a popular app on the iPhone that used the depth camera in the phone to take high fidelity 3D scans. This also did not work. The results gave a low poly version of the person with muddy textures that confused Metahuman Creator. These models were also very low poly despite having the app process the “High Quality” versions of the model. It was known for a short period of time that the process needed to divert to something more practical to use. It was one thing to have metahuman creator make the models, but it was another thing to have it guess the features of the models. If too many factors of the actor’s face were left to chance there would be very little avenue to return to the original face without having to sculpt them and spend more time.
Since the Poly cam versions were too far from the original it was time to discuss this with my committee and see what they could offer when it came to guidance. Finally we set our sights on Professor Rodney's help in capturing the faces. Using his Creaform Go!SCAN 3D we were able to get high resolution meshes from the device that meta human animator processed well. With this scanner we were able to scan a full high resolution mesh of the actors without having too many discrepancies in their facial structure.
3.1.3 Implementation

Using these meshes we were able to continue the character down the pipeline towards putting them in the engine with costumes. [9] From the Unreal Engine Documentation it states that the basic workflow of getting a photoscanned head through MetaHuman Creator would be to:

Import and prepare the mesh. Create and populate a Metahuman Identity Asset. Create and track a Neutral Pose. Run the Identity Solve. Submit the Template Mesh to the Metahuman Backend. Further customise your MetaHuman in the MetaHuman Creator Download and import the MetaHuman to Unreal. Throughout these steps, we have a very basic workflow. We want to take the mesh and make it usable for Meta Humans. When we create and tract the neutral pose, we are creating landmarks to guide an automated re-topology into their mesh layout. Once that is
done, the mesh is then sent to the MetaHuman Back-end so that it is processed and the rest of the mesh can be generated on top of that.

These instructions were the general basics of what the project followed to import the models into metahumans. However there were some things that needed to be fine tuned. When we imported the mesh to Unreal, it was imperative to take out whatever wasn’t needed like the neck, shoulders, hair, and the such to that the program was not confused with details that were not perfectly symmetrical. Sometimes it took these features and exaggerated these features due to its algorithm. the process after that was relatively straight forward. Once the character was imported into Unreal Engine we were able to create a meta human identity by finding a neutral pose and making sure that the trackers on the characters face were in the correct spots. Since the meshes were so high fidelity, Unreal was able to see the features of the actor’s face and give them a correctly defined face. Here are the final results from meta human creator. To make them closer to the characters in the game I tried to add things like freckles, hair color, blush, and the such. Here are the characters that were created:

![Figure 3.7: M.C. Metahuman Face](image-url)
Based on these results, we were confident that this was a good direction to go with these faces for the game. This way when the characters needed to speak, the facial mocap could be transferred to this rig with the facial and vocal cues matching the face.

3.1.4 Golem (Aṅgulimāla)

The Golem, or Aṅgulimāla, is a character created to fit the role of a tutorial boss for the game. This was when there was still a game plan for implementing game play for the game. The character itself is a basic rock golem with a standard human FK rig that you see on a lot of basic rigs. The character in itself is meant to showcase a point in the story where Cinder sees how deep Andrea plunged herself into the book to get power. Summoning this creature to fight Cinder shows that she would do anything for power. The character in itself was an autonomous rock golem that activates whenever Cinder approves one of the rifts that Andrea opened before the events of the story. It is preceded by a floating skull that emerges from the murky texture of the wall, then the rock golem itself emerges from it. When the character is done loading, it turns to the camera and the fight sequence starts.

3.1.4.1 Simple Modeling

The model in itself is based off of character archetypes that I found interesting to go against in a game like this. One would be a Rock Golem, mostly brought to life by interest from a previous project “Lunar Deep“. The rock golem, being referenced from one of the Ancients from God of War, and a villain from the game “League of Legends“, brought together the idea of a massive skeletal Rock Golem for the game.
These two characters influenced the Golem by how it is set up to move in game and break apart when the game play is created. Using the basics of both of these characters I wanted to use the fundamentals of what was created in “Lunar Deep”, which was a rounder rock golem, and make a more intimidating boss. Using the features of floating rock clumps and armored ribs and spine, I was able to concept the images in Figure3.11 and Figure3.12.
When it came to rigging this character it came down to a few simple things. What is the primary animation? What's the secondary animation? What will it ultimately do? There were going
to be many avenues in which I could make this rig as complex as I possibly could, but when it came down to it. I needed it to move like a human (Primarily) and then move like a Golem (Secondary). Therefore the rig looks very similar to that of a human. See figure Figure3.13 and Figure3.14.

Figure 3.13: Golem Rig
From the images above, we see that the golem is a very basic human FK rig. Then it came to animation I wanted things to be very simple and not go too out of hand with movement. When it came to the spine, I wanted to move it so that I could flex the spine in different ways when game play was a part of the game. It was imperative that the rig be kept simple and maintained the same bone structure as the Unreal Engine 5 mannequin rig so that re-targeting would be simple and without much issue. Needed joints like the root, pelvis, spine, arms, etc were maintained with the same bone counts so that there were no failures to re-target later on in the workflow. When it came to the spine, it was only used in an older version of the game that had a cut-scene. Right now it is treated as a child to the second spine joint.

When it came to the boss, it was a very interesting dive into creating a character from concepts, model, retopology, rig, and mocap a few things for him to be a viable tutorial boss for the game. When all of that was done it was very interesting to see the character assemble and form in the game to challenge Cinder on her way to Andrea.
3.2 Environments

Environments played a major part into the development time to this game. When creating this game, there were a few questions that needed to be asked. How are we presenting the assets? How are they lit? How are things glowing in the light, and where are the eyes attracted to. When it comes to game development, most of what’s done is through smoke and mirrors. Since we do not have the luxury of waiting for a path traced forward render, we need to take our assets and have them shown with very quick math at up to 60 frames per second. When it came to this what would the team need to sacrifice in order to deliver assets to this game? Luckily in Unreal Engine 5.3.0 there were a few tools available to use to get assets quickly into the scene without wasting much time. First there was Lumen.

From the Unreal Engine Documentation “Lumen is Unreal Engine 5’s fully dynamic global illumination and reflections system that is designed for next-generation consoles, and it is the default global illumination and reflections system. Lumen renders diffuse interreflection with infinite bounces and indirect specular reflections in large, detailed environments at scales ranging from millimeters to kilometers.”[10]

From the beginning the game was going to utilize a large map with a lot of big assets. Baking lighting to fit all of these things would take far too long. On a previous project “Lunar Deep” we used baked lighting in the game with large shadows and assets. This took astronomically long to process and it made the game development process far too slow to do. Using Lumen gave me as a developer the avenue to experiment with different lighting situations with the directional light in the scene. With a big scene like the Castle Level or a small one like the Space Temple, there needed to be avenues to experiment and choose a lighting situation for these environments that best suited the game and its art direction. This was also further coupled with the fact that if there were changes that needed to be done, we would have to bake the lighting again to get the proper shadows or else the lighting would be invalidated. This was important to the reason why we kept with Epic Game’s Lumen and Nanite. [11]

Another great tool in Unreal Engine 5.3 was Nanite. From the Unreal Engine Documentation “Nanite is Unreal Engine 5’s virtualized geometry system which uses a new internal mesh format and rendering technology to render pixel scale detail and high object counts. It intelligently does work on only the detail that can be perceived and no more. Nanite’s data format is also highly
compressed, and supports fine-grained streaming with automatic level of detail. [12]

Nanite is a virtual geometry technique in which the tangent space is derived in the pixel shader. [12] Through this way of using meshes in a real-time engine, it was possible to save time by taking the mesh from Maya and doing a surface level pass of optimizing the UVs and topology and then put the meshes into the engine. The Engine, after enabling Nanite on import, will then only render pixel detail to what is perceived by the human eye and not much more. Since this is a game that is meant to be a proof of concept this tool was incredibly useful in bringing in assets that were not optimized for an older version of the engine. With this tool we were able to bring the asset into the engine and do whatever we needed to with it by enabling nanite and lumen at the same time. Also, if you wanted to use Nanite, it was recommended to turn on Lumen as well.

When we speak about the environments, we also need to speak of the narrative as well. When we look at the castle and other objects in regards to architecture in the game, they all reference the Star Caller. Circular shapes and golden structures adorn the area of a kingdom that was very rich and powerful. This is then further emphasised by the scale of the assets in the game. As they towered over Cinder as she walked through the area, we can see their former power shown to the audience.

### 3.2.1 3 Ideas from research

From the beginning of this, we are introduced to three main ideas that helped in crafting the world, story and characters. The first one being a Clear laid out path for the player to traverse. This greatly influenced the creation of the levels due to how necessary it was to have great camera angles and layout. The simpler the path was, the more we could be expressive with the environments.

![Figure 3.15: Level 1: Clear Path](image)
Through these figures, we can see that there was a clear path laid out so that both the player and character could go through and experience the game and its events without having to deviate too far.

The second idea would be that there would be an achievable goal. In most games, we are given things that are possible to grasp. Grabbing an object, earning currency, and most of all, defeating a boss. In this case, Andrea destroyed the kingdom of Alethia due to being manipulated by “The Star Caller”. The player must destroy the book and deal with her.
The third idea from the game would be that the player must be beckoned to attempt the challenge. In most games we have a big bad, in this case its Andrea, challenging the protagonist to fight or stop them.

In this case we are antagonized by Andrea from the moment the game initializes. This is through her speaking through Cinder’s mind, summoning the Golem, and finally revealing herself to Cinder. On top of that the game takes place in the destroyed home that Cinder wanted to return
to. Then finally, the main drive to beckon the player would be that Andrea attacks the player.

3.2.2 Iterations

Throughout the development of the game there were different milestones overcome for the past 13 months. Since this project has been in development, there was much research to do for a project as ambitious as this. For example, workflows for modeling, importing, experimentation with animation and how to get those assets in there, managing files etc. It was through the development of “Lunar Deep” that I was able to dive deep into the pipeline of Unreal Engine and really understand the limitation of the engine and what it would take and what it wouldn’t. Of course, “Lunar Deep” at the time was in Unreal Engine 4.27.2, which did not have Nanite or Lumen. However it was through this limitation that we were able to overcome issues in our own workflow and create a really high fidelity game.

During the Rendering Talk from Stephen McAuly at GDC (Game Developer Conference), he spoke about focusing on the Narrative Features first since God of War was such a narrative driven story. First and foremost, the team needed to tell a story and it needed to found out if the Rendering team can create tools to deliver features to the engine. [11] This was first and foremost what needed to be thought about when working on the environments of the story.

It was through iterations that the team needed to iterate on feel and looks. When the character steps onto the level, does she fit in there? Is there wind blowing? Is there an atmosphere? It was important that through planning and integration the game needed to have features that made it stand out with its lighting and environments and also its feel as the player walked through it. When Cinder steps onto the gold path of the Space Temple, she is a victim of its ethereal glow as she approaches it. There is a sense of majesty and ethereal calling as she walks toward it.

Since this was a short game there was no need to worry about Time of Day changes, water, or sudden weather changes. However it was important that whatever biome was created, the lighting from the atmosphere did it justice. That is why the Ultra Dynamic Sky package was used for this project. It gave very comprehensive tools so that the lighting and weather effects were exactly how it was meant to be. Of course, not all levels had it. However for the Castle and Final Level that package was used to fine tune the lighting. It was through this and the use of Lumen that many possibilities of the lighting of the map could be evaluated.
3.2.3 Events

Throughout the game, there needed to be many different events that happen when the character reached a certain point in the environment. These events are triggered usually when Cinder enters a box or when the level is started.

![Figure 3.20: Level 3: Overall Blueprint](image)

In Figure 3.20 we can see that several events can happen in level 3. Some of these events trigger weather changes, lighting changes, cut-scenes, and FX as well.

![Figure 3.21: Level 3: Specifics Blueprint](image)

In Figure 3.21 we can see that the first thing that happens is that the Binding Tag from the level sequence is bound to both playable and non-playable character. This is so that when the cut-scene happens, both player A (the cut-scene character) and player B (the game-play character) are doing the same thing. This helps to position the character correctly in space when the cut scene ends and not have to worry about teleport or sweeping the character to the correct spot after the scene is done. The following updates are simple, some trigger volumes turn off collision for a few moments, others update the weather for the golem interaction, and the last one plays the “door open” sequence for the player when Cinder gets near the door.
3.2.4 Production

Throughout the course of the production, the main focus was making the maps look as cinematic-ally pleasing as we could. How do the paths fit in the shot? How can we improve the lighting so that its very clear that there is a direction to go? These are questions that through iteration needed to be worked on. See Figure3.22, Figure3.23, Figure3.24, Figure3.25 and Figure3.26.

Figure 3.22: First Walk — Space Temple

Figure 3.23: Boss Confrontation — Castle Level

Figure 3.24: Andrea First Encounter — Castle Level
When it came to creating these environments there needed to be clear direction as to how things were put together. Since most of the game is witnessed from the player camera, it was important that things are light well enough to draw attention to it, but not reveal them too early. For example, in Figure 3.19 it was imperative that the character see the forming boss at the end of the path more and more as she walked down. The main purpose of that scene was to show the imminent danger show itself as the character advanced farther and farther down the path to Andrea. In Figure 3.18 we needed to do a grand reveal of the castle as it opens (Which will be elaborated later).

In Figure 3.17 we had to repeatedly ask ourselves, does the character fit in the scene? Does it seem like she is being a participant in the space? These are all things that needed to be taken into consideration when making the maps.

Going through the maps, we can see that there was the main art direction which was whether or not the character fit in the scene, secondly there needed to be elaboration on the lighting so that things are seen precisely when they are needed to. Finally when it came to the assets, there needed...
to be models that were both made and procured from an asset library.

The asset library, being Quixel Megascans, was used to get some basic snow clumps and rocks to fill the scene. Since its a free asset library that ships with Unreal Engine it was no issue to get that into the game. Secondly we needed to make assets that worked with the mood and the art direction in the scenes. For example, the trees in the scene were modeled by Stephanie Shultze to be very pointy and foreboding to the player as they first arrive in Alethia. These models were great because they changed the tone from the gory and Majesty of the Space Temple to that of the desolate and destroyed kingdom. Next we needed to decide what the kingdom would look like. There was were pages of lore created to put into this game. However due to lack of time and wanting to show the player only what the basics of the story was, we needed to tell the story through the environment art.

The Kingdom of Alethia was a strong and space venturing faction that conquered the stars. They were a kingdom filled with reverence and resolute dominance through the powerful individuals they had and displayed it through the architecture they used. Through the use of big concrete and gold structures the nature of this nation could be seen by approaching the gates. During the modeling of phase of the castle we needed to be very sure that this was a building that would be brutalist and at the same time fantasy. Once the character is inside of the castle we can only see large walls, it was when we look up that we can see windows giving barely any light to the hallway. This was then balanced out by the glowing floors and the golden artwork around the area.

![Castle Blockout](image.png)

Figure 3.27: Castle Blockout
In Environment Art, we can use Virtual Architecture to affect three things. Through Behavior we can influence Strategy, through context, we can give a historical and cultural shorthand of what the place is like for the story, and finally we can manipulate the perception of events. This through narration and riving the plot forward. [13] Through this we can give things to the player. these two things Overt and Subversive, are used to shape the player experience as they go through the story. For Overt, Player makes choices on information gathered from the environment which is above the level of consciousness. Then there is the subversive, in which the player is manipulated by information given by the environment. This is below level of consciousness. [13]

In “The Star Caller” there are many times we used this to shape the player experience. This is through the repeated use of concentric circles, gold, architecture, and the ruins around the map. We can see the type of civilization and what Andrea allowed to remain after she took over. We needed to be very sure that when the camera is moving to certain spot or when the character itself moves to a particular spot in the map, we are giving the player exactly the information that we need.
and not more than we need to. For the Overt things, we are giving a basic understanding of the context of the story. This is through foreshadowing and plot. We tried many avenues to deliver this through the environments and mostly through the voice lines that are played when the character reaches particular points in the map. This is then pushed further by the subversive details, which is ambience. How the fog feels, the sound of the feet on the snow, the music. How does this all affect the player and their experience when playing? [13] It is through the iterations in Figure3.27, Figure3.28, and Figure3.29 that the current look of the game was achieved.

Figure 3.30: Alethian Architecture I

Figure 3.31: Alethian Architecture II
In Alethian architecture we can see the repeated use of golden circles and blue rocks all over the environment. This is a direct reflection on the dependence that the society had with “The Star Caller”. Since most of what the book has on its cover was gold and blue, it was imperative that the inside of the castle reflect that. It was through iterating through versions of this design style that we were able to create the main architecture of the kingdom. It was through a very vigorous testing cycle of seeing what works for the game and what didn’t was it how we landed at the game we are delivering. The focus on architecture, the snow, how the characters sit in the scene. These things all mattered when it came to creating this game. This is because of the interplay between these elements grounded the scene in a narrative that was constantly feeding information to the player.
Chapter 4

Animation

4.1 Vision

When it came to the vision of the animation I had to be very realistic and eager to improve my abilities. The task of doing animation for a game that’s not only heavy with an 8 directional movement set, but also cut scenes with voice acted/motion captured acting in them. It was a task that required alot of moving parts and bugs to be overcome. Luckily there were many resources to troubleshoot any errors or mistakes I ran into when creating this aspect of the project. The animation in this section of the game had to be seamless and give personality to all of the characters involved in the game. Cinder, being the main protagonist was the main test character in which I had to devote countless hours to figuring out solutions. It was through countless hours in testing her rig that there feasible solutions created to give Queen Andrea a suitable performance. Throughout the course of this section I will go through the different aspects of the workflow needed to get one character from start to finish.

4.2 Motion Capture

Motion capture is a process of recording the movement of objects or people and translating that data into a digital format [14]. This was a massive topic to work upon and understand. We needed to track body movement and face movements, plus we needed to make sure that the workflow that we came up with was compatible with unreal and metahumans. As an overview, the project
needed motion capture for scenes and reactions to events in the game. To go through each of these
scenes, it was more than obvious to come each of the sessions with a plan and a overall understanding
of how the programs work and how to make that actors job as easy as possible.

4.2.1 Perception Neuron: Axis Studio

Perception Neuron is a motion capture technology that was available to the program. Through several iterations before “Lunar Deep”, “Lunar Deep” itself, and now “The Star Caller”, we were able to get a better understanding of how the system works and how to best use it. With the system, it was very useful to track character movement. For Cinder, Andrea, and the Golem boss. However through the process of using the system, we encountered major issue with the system that needed to have alot of man hours dedicated to fixing the animations after it was recorded.

Since the Perception Neuron: Axis Studio system was very low cost, we already came to the project with an understanding that this wasn’t going to be as good as an optical system like Vicon or Optitrack. An Optical system is a system that uses cameras to track reflective or LED markers on the body. The markers are then tracked to calculate the actor’s movements in 3D space.[14] With Axis Studio, this was a magnetic system. The system used magnetic sensors to track the movement of objects. A system like this would be limited when it came to range and accuracy [14]. However even though it was inaccurate, it still saved plenty of time during production so that we can start with “human-like” movements and then move from there.

4.2.1.1 Axis Studio

One of the major pros of using a magnetic suit like Axis studio was the fact that it was very simple to just put on the suit, calibrate the sensors, and start capturing performances. Through this ease of use we were able to capture many different takes and be more flexible with people’s time for recording.
In this image we can see a recorded take from one of the scenes that we shot for the game. This take, called “CinderDoorPunch008” was one out of many takes that was recorded for the Door Punch scene. While the exact actions of this take isn’t all too important for this section, it is important to go over the setup so that re-targeting from this skeleton to the Unreal Skeleton is easier. After we turn on and connect the system to the program, we need to run two types of calibration. One being magnetic and the other being the body calibration. It was important to bring up these types of calibration because of how easy it was for the suit is calibration to fall off. We would regularly need to redo calibration after a major movement was done.
Based on Figure 4.2, this is basically what the actor had to put on when they had to perform for the game. There are straps for the head, shoulders, arms, legs, waist, and feet. This gave us data for every bone that was needed for the unreal engine 4 mannequin. After the data from the actor was finalized and we wanted to export it to whether it was Maya or Unreal Engine we were able to export it using these settings.

Figure 4.3: Axis Studio Export Settings

Exporting from Axis studio was a crucial point in which data can be given to Unreal in a way that the engine itself can interpret it properly. Through a meticulous process of trial and error we eventually landed on these settings. We exported in FBX (or FilmBox) at 90FPS. We found that the frame-rate would be adapted into the game and this would not be too much of an issue when exporting. The Skeleton was obviously needed to be changed to the Unreal Engine mannequin (Unreal Engine 4 Mannequin) with the rotation at ZXY. This is mainly because the engine is Z-UP and that orientation mattered when playing back the animation in-game. Finally we wanted the data to have the motion data, reference pose, and displacement. Then finally we wanted it to be ASCII and in FBX 2018. FBX 2018 was a good version that was stable and ASCII was great because if the file ever corrupted we could go into the file and fix it.

When the data was put into unreal engine we had to do some tweaks to the meta-human skeleton so that we could re-target the animation from the Unreal Engine 4 skeleton to metahumans.

4.2.2 Metahuman Animator

Capturing the face for use in this game was a very workflow to figure out. Luckily there was a good starting point already created by Epic Games. As described in the article, Metahuman Animator is a new feature that enables you to capture an actor’s performance using an iPhone or
stereo head-mounted camera system (HMC) and apply it as a high-fidelity facial animation on any Meta-human character, without the need for manual intervention [9]. From this starting point and guidance, the individual’s performance was able to be captured and processed by Unreal Engine.

To make sure that every segment of audio was being recorded to the best quality as it could, there was a number of things that needed to be done. First and foremost, when the recordings needed to take place, there needed to be poses that the actor needed to do so that there could be calibration done on the Meta-Human Identity later on.

![Figure 4.4: MC Neutral Pose](image)

Figure 4.4: MC Neutral Pose
Figure 4.5: MC Look Up Pose

Figure 4.6: MC Look Left Pose
It was after very meticulous involvement with documentation and trial and error that we were able to get some convincing facial capture the project. Over time we needed to calibrate,
record, evaluate, and re-shoot most of the shots several times to get them close to what the vision was for the characters. Once that was done we would import that footage into the game. To get the footage into the game, it was a processes of importing the footage, using the calibration poses to teach the neural network, and then finally processing the data using the Meta-Human back end.

![Andrea Facial Mocap](image1)

Figure 4.9: Andrea Facial Mocap

![Cinder Facial Mocap](image2)

Figure 4.10: Cinder Facial Mocap

Through this and throughout the course of the end result of the footage, we can see that both body and facial mo cap are used to deliver performances for the story. This aiding to give a more suitable performance and represent the characters for the game and its cut scenes.
4.2.3 Retargeting

Animation Re-targeting is the process of re-purposing existing animations for use between multiple characters, eliminating the need to create entirely new animations as you can instead share your animation assets between characters. [15] When it came to re-targeting the metahumans to be used in the shorts, there was a simple way to re-target motions for cinematics and game play. To begin, the user needs to go to the skeleton asset of the metahuman. For this project, Cinder used the “fmednrw” skeleton. When in the skeleton asset, we need to change some settings for the retargeting settings.

![Metahuman Retargeting Tools](image)

Figure 4.11: Metahuman Retargeting Tools

From what is mentioned in Figure 4.9, we can see that everything that is a child of pelvis has its translation re-targeting set to skeleton. Then everything at pelvis and above are set to Animation Relative. We use animation re-targeting due to the fact that in productions there are some animations that need to be reused between characters that use the same skeleton. However we need to account for how the deformations work between these different characters. According to the documentation, we have three main ways we can affect the bone translation. The first being Animation, which has the bone translation comes straight from the animation data, unchanged. The second is Skeleton, which the translation comes from the skeleton’s bind pose. Then the last one is animation scaled, which the bone translation data comes from animation, but it is scaled by the skeletons proportions. [15]

Even though the project mainly only had the one playable character, Cinder, we still need to think about how we are capturing, recording, and then transferring this data to a complex rig.
such as the meta-human rig. Then when we want to view it in the sequencer we use the re-targeting tools on top of it to get translations working correctly. This is only for use in the level sequencer however. Since we don’t need to worry about game-play int he sequencer there is no need to worry about the UE5 Mannequin. However for movement in the game, we needed to make it easier for animation from the EU4 animation to be remapped to the UE5 Mannequin.

Why do we want to use UE4 animations? This is coming from a combat pack that was used to get some game-ready animations for this demo. Since those animations are in Unreal Engine 4, it was important to create a workflow to get that data working for UE5. How the setup to get the character working in game goes like this.

To keep this as simple as possible for future use, we had the Third Person Character running the animation for the character. All animation goes through that blueprint with inputs, jumping behaviors, abilities, etc. The Third Person blueprint BP is then the parent of the meta-human, which then feeds the animation data to the skeleton of the meta-human. Since it does it like this, the main joints are run by the UE5 skeleton, but the helper joints on the rig (used to help with deformations, are running normally when the character moves in the game. This was the easiest way that was used to get animations onto Cinder for game-play use.
As is described in Figure 4.12, we can see how the body of the meta-human asset is a child of the mesh of the Third Person Blueprint. There are other ways to automatically re-target the animation from UE4 to the meta-human rig. This would be by using the Live Re-target Mode in the meta-human blueprint. However there were issues of the animation data not transferring correctly. This would showcase the character having “chicken wings” when the animation is sent through. This was not the desired effect so the longer way to map the animation was used. See Figure 4.13 and Figure 4.14.
It is through the use of animation and re-targeting that we were able to get the basic framework of the game ready to show the audience. Whether it was big changes like recapturing animation data or small ones like fixing the “chicken arms” bug. It was apparent that there needed to be a back and forth with what is delivered. Since there were two characters that needed to have their movements performed and voice acted there were many avenues to research and improve how
the data is captured and put into unreal engine.
Chapter 5

Cinematics

The purpose of cinematics for “The Star Caller” was to bring the player to the experience and make sure they feel the same emotions that they are feeling. We can push this by manipulating the camera, lighting, motion capture, and even audio to heighten this effect so that the audience feels something about what’s being shown. This is imperative to moving the game from just a singular player-press-button interaction to a complex experience.

5.0.1 Entrance Cinematic

When it came to visual effects the main goal was that whatever is in a scene needed to make sense with what’s going on. For example, in the “Only Me” chapter, there needed to be a way that she entered and exited a shot. The best way that made sense was to use an explosion of gas and smoke and have her emerge from that. In another shot, we wanted the main character “Cinder” to emerge from a tornado of flames. We mainly needed to make sure that when the vfx was used it was used in a way that made sense to what was being seen by the audience.

When the game first starts we are introduced to Cinder by seeing her slowly become visible through a tornado of flames in which she is being transported through. To sell the effect that she is being transported as an intentional decision, I looked for references in cinema that would greatly resemble what I wanted to showcase with the character’s actions and the story. The movie, Terminator 2: Judgement Day was used to reference the starting pose and effect. Since Cinder is coming from another world, and possibly from another time (since she is rapidly traversing space), I
wanted to try an emulate a similar entrance into the game that the T-800 robot did in Terminator. We started effect by having the actor assume the same pose as the T-800 terminator [16]. See figures Figure5.1 and Figure5.2.

Figure 5.1: Terminator 2: Judgement Day T800 Pose

Figure 5.2: Cinder Terminator Pose

This effect, being a real-time fire simulation being driven by particles, is a very simple effect once its broken down.

Figure 5.3: Fire Simulation Particles
When we start with particles, it gives us as a user a much easier way to determine the directional behavior of the smoke. This way we don’t have to wait or possibly crash the game by running the gas simulation at all times. When the tornado is looking close to how we want it, we then feed the particles into the gas simulation and have the particles set as its source. This will then cause the particles to emit gas and behave in reaction to the actions of its parent. Another setting that was needed to be enabled was the temperature setting. This was to have this “hot” flame being used to brighten the area. It is when we use the camera’s exposure settings that we are able to see the intensity of the flames increase over time.
5.0.2 Golem Fight Intro

For the Golem Fight intro cinematic, I wanted to signify that there was a power from the other side of the wall summoning the golem. With the emerging golden skull from the wall, we see that there is a formation of rocks forming around a single point. Its through this single point, being the main animation diving the simulation, that we finally get to see the golem form and reach into the sky. It is after he’s done reaching and resets his stance that we see him face Cinder and is ready to attack.

Since the animation for the Golem was done in Houdini, I was able to get the alembic cache of the rbd sim from Houdini and import it into Unreal as a Geometry cache. Once that was done, it was a matter of putting it into the sequencer and having the cache play at the correct time in the sequence.
Chapter 6

Conclusions and Discussion

When we think about cinematics for a video game we need to understand the amount of work needed to plan, execute, and refine how the work is presented to the audience. With this, there needed to be a great number of assets that needed to be prepared and assembled in engine so that the sense of scale and grandeur of the area is showcased to the audience. Going back to the points made in chapter 1.1, we have three points that need to fulfilled first for a successful cinematic. First, a clear laid out path. Second, being a goal for the player to get to. Then finally there must be a point in which the player is beckoned to attempt the challenge of the game. Using these points we went over the story and influences that pushed the creation of the story forward. Other video games such as Warframe and God of War, and then movies such as children of men showcase fundamental aspects of film making and pacing for a successful piece of media.

When approaching “The Star Caller”, the main push was to create a seamless experience in which there would be seamless hand offs from the cinematics to game-play. These hand-offs being similar to what was discussed in the media listed beforehand with their use of a no-cut camera. After all is said and done, it was definitely a process to get this project to a finished demo. Since there was no need to establish game play and boss fights there was alot of time that was saved in development time that could be diverted to just the cinematics.

Cinematics, as mentioned in the beginning of the thesis, is a very important aspect of modern gaming. It provides context and a drive to play through the story and get to the end. The formula of putting the project together by preparing the project, assembling what needs to be done, and executing on that plan was a tough process. As we see in previous chapters, the story
changed to fit the time allotted on production. Therefore the scenes needed to change. This posed a significant hindrance to the progress of the project rather than push it forward. It was through this endeavour to get these cinematics to a finished state that the team and I had a lot of fun in the story’s development and execution. They were able to get themselves into character and really sell the story of the characters and put themselves in the character’s shoes to showcase the game to their friends. The Star Caller is most definitely the largest project I have ever taken on, but it more than likely won’t be the last. It was a great way to deep dive into the inner workings of Unreal Engine and see what could be done to deliver a believable story.

When putting together “The Star Caller” there were many phases to the story, animation, voice acting, modeling, and music that needed to be tracked and managed to deliver the story to an acceptable state. The process of planning what needs to be done, what jobs had priority (M.V.P.), and how it all fit together was planned around how well the cinematics could be executed so that the audience experience could be heightened.

Looking back at my work as an individual, I think the amount of work that was created and the scale of the project amounted to both a success and a valuable lesson on scope. Even though minimum viable product was a reoccurring theme for the project, there were still multiple assets and events cut due to lack of time in production and presentation. For future iteration I would recommend any future version of this project to work on bits and pieces at a time, refine them, then move to the next piece. There were so many pieces that needed to be done at one time, it was almost an overwhelming task. For example the painting from Figure 1.1, I believe that the goal of creating a scene of absolute destruction was close, but it didn’t achieve the scene of absolute destruction. For instance, the lighting could have been improved. Assets were far too large to light properly and there would be great errors if I were to use a massive spot light on those assets due to how experimental Nanite and Lumen are. However since the music, assets on the ground, and atmosphere layered on top of each other it was more important to make sure that whatever is immediately in front of Cinder was lit rather than distant things.

However, even though somethings were cut, I am very satisfied with whatever made it to the final presentation. It showed the product of countless hours of hard work, dedication, and most of all, a willingness to fail and try again. Cinder is not a perfect character, and “The Star Caller” is far from a perfect story, but I value the lessons that I learned. By no means does that mean that we did not hit the goal of artistic and narrative ideas that were originally envisioned, but and it taught
me valuable lessons on how to manage my time and assets in the months that I have for a project.

6.1 Post Mortem

Throughout the course of this project there was a large amount of time in which there needed to be a great deal of trial and error done to get the project finished. There were frequent crashes, metahumans becoming invalidated, and most of all Perforce regularly gave issues as the project got larger and larger. However it was through this tireless loop of fixing error that one eventually begins to get better and better with fixing issues that came up in the workflow. There were regular times in which it was a good time to question the possibility if it was even possible for just one person to do all this work and finish it on time. However as time progressed and I processed the issues with the game and made the suitable changes necessary to get the game to a playable state.

When it came to the production with people, it was a very challenging job to balance people’s workload and what they are able to do. Ultimately it came down to balancing the contributing team member’s enthusiasm for the project. For the case of the voice actors, they were extremely enthusiastic in playing the parts of Cinder, Aurelius, and Andrea. It’s mainly because of that they we see their work flow better into the story. Sometimes there were cases in which things were promised, but they weren’t delivered. This would hinder the progress of the production and force me as a director to re-evaluate what the team should be doing and what I should be doing. This was an important lesson because it taught me that not everyone has the same interest in your project as you do. There’s going to be grunt work that takes people out of the interest and slowly push them away. For example, assigning people to make small props for the game. It was very important to learn balance in what is being assigned to team members.

Looking at the project after everything is said and done, I felt like the overall reception of “The Star Caller” was positive. However seeing it on the big screen there could be some improvements in camera positions for game-play and in the cinematics. There were obvious stuttering in the last encounter when the camera switched from Andrea’s point of view to Cinder’s and the transition was not fluid. There were also other times in which the game did not fully keep to the single-take “hand-off” camera that was intended for game-play. However these were issues that were bugs in how the character’s were set up and not with the cinematics. For example, when cinder is thrown
she needs to have her collisions turned off but the collisions would not turn back on after. This would cause her to walk indefinitely and fall off the map. It’s small bugs like this that caused issues with the seamless experience.

"The Star Caller" in itself was a successful project in my option and it laid the foundation for a story that was well received with the audience and the team. It’ll take a few more years to figure out the next phase of the story and future processes. However this project has laid a good foundation on not only how I approach big projects, but also small tasks. Most of the time the answer is mostly putting my head down and to do the work and the other times the answers was just to work as a team to get one aspect of the game looking good. I’m really thankful to everyone that helped with the project and my committee for pushing me forward and assisting in every way possible.
Bibliography


~:text=Animation%20Retargeting%20is%20the%20process%2C%20your%20animation%20assets%20between%20characters.