

ENTROPY

DEVELOPMENT INFORMATION

May 2022, Personal project, Most of the content is finished and being optimized, and I am making a final gameplay video.

Position: Game Designer, programmer, artist

Entropy is a first-person action, stealth, and mysterious game, created by myself during the summer break in 2022 in the library of the University of Michigan, Ann Arbor.

PREFACE

Close my eyes, there are insects whispering outside my window;

*Inside my head, all those rushing memories
are mixed with roaring echoes;*

*I am falling, I can feel my heavy body,
and there is a feeling of endless vertigo;*

*Is it resentment? Is it insane? Is it a pity? Is it helpless?
Is it eternity?*

Time is still flowing slowly...

But who defines its direction?

Who am I in the dream, and where does the time go?

Is this a bad dream, or is this my real feeling inside?

I don't know, but I do know...

If I can't answer myself, then this will not be a dream,

It will be the prison that imprisons my soul...

In this game, let us follow our protagonist, entering the gallery of time. Let us see what has led her to get trapped in this bad dream...

RESOURCES

*The model of the clock is from
<https://sketchfab.com/>*

*Textures are downloaded from Quixel Megascans assets
Downloaded textures and modelings have been modified by myself
All the rest of the assets are made by myself*



GAME DESIGN OVERVIEW

ABSTRACT

Entropy is a first-person action, stealth, and mysterious game, which aims to provide players with a unique time-controlling ability and a mysterious environment to explore.

INSPIRATION

• Code learning experience

The whole idea of time rewinding comes is inspired by my learning of how to use array in python. I was thinking that if an array could record an object's all transform information, then I could somehow use the information to control the object's movement trajectory in time, which means I am controlling the direction of time flow for that object.

• Cixin Liu's science fiction

One of my favorite short science fiction is written by Cixin Liu, the written who also wrote *the Three-body Problem* and *The Wandering Earth*, in which he imagines that scientists have predicted the time when the universe starts to collapse. But people realize that time would flow backward if it starts to collapse only a few seconds before it happens. And here is where the characters of all the sentences start to reverse from the back to the front when scientists shouted out, which is a mind-blowing reading experience on the paper.

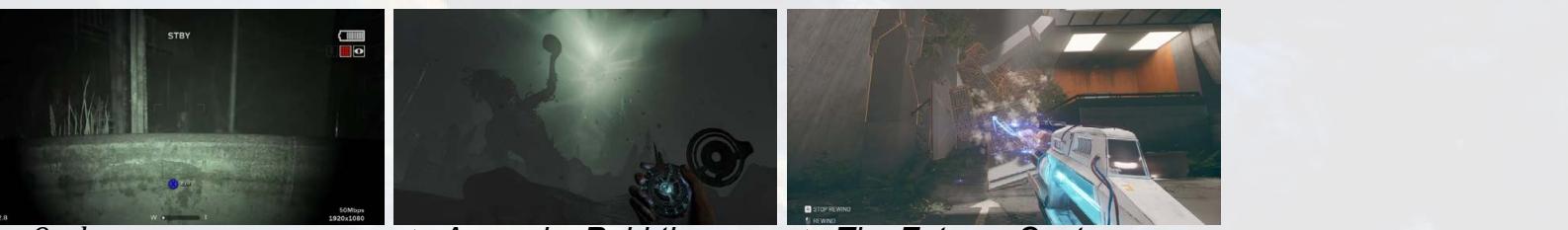
• A power dreamed of by everyone

Time is such an interesting and amazing topic as people usually forget how precious and important it means to us. Having a game's theme focusing on time control will also attract lots of people because nearly everyone wants this power in their daily life.

GAMING EXPERIENCE

- Entropy provides unique time control game mechanics, which allow the player to manipulate time and complete puzzles with that ability.
- A unique story in which players follow the experience of the protagonist, experiencing the ups and downs in her emotional development.
- Use of environmental storytelling, which by creating a mysterious and oppressive world that leads the player on to discover the secrete by besting their own inner fear.

GAME REFERENCE

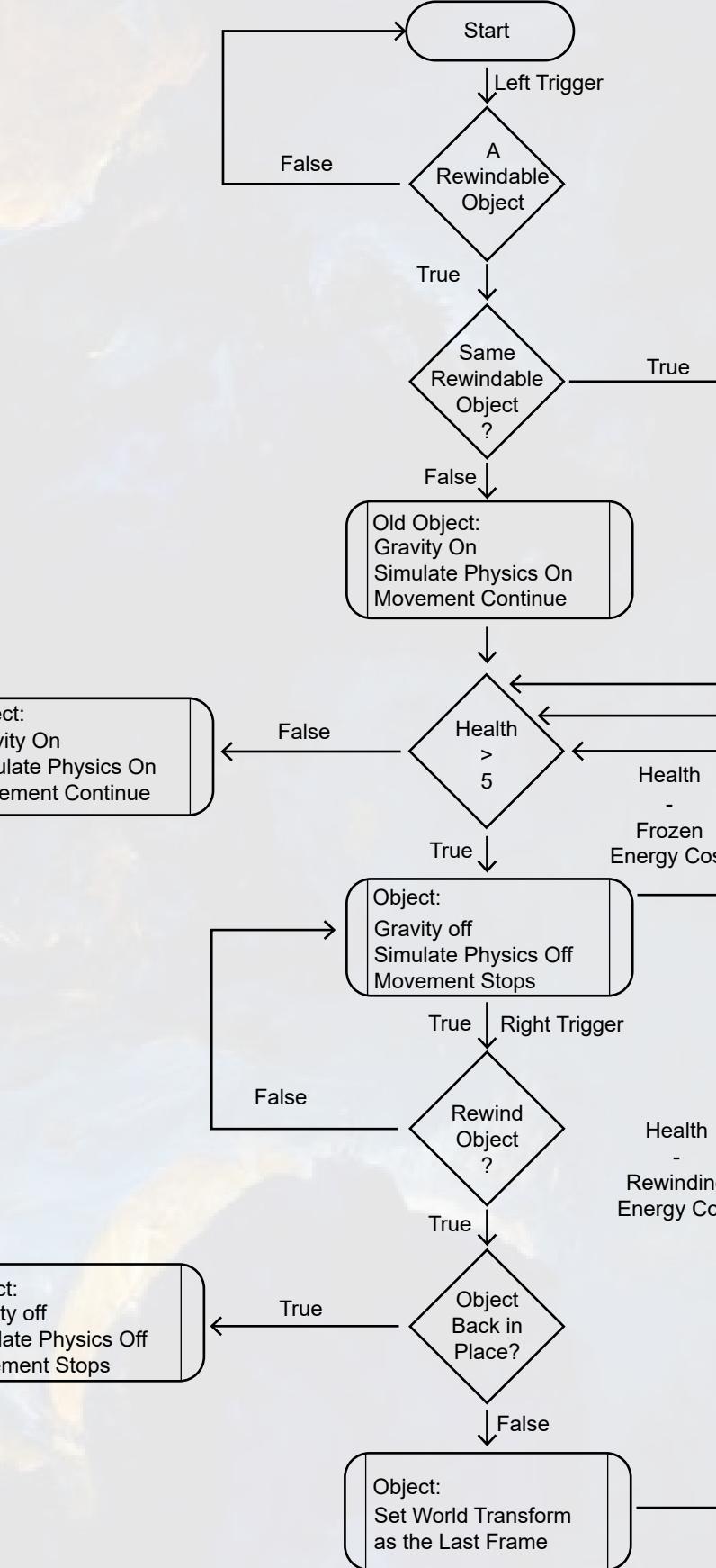


I takes many thrilling survival horror games for reference, including the *Outlast*, *Amnesia: Rebirth*, and *The Entropy Center*.

- The lack of weapons and hiding from the enemy is a great source of fear in the *Outlast*, which is why my game *Entropy* doesn't have any way for the player to attack the enemies but only hide from them and block them away.
- *Amnesia: Rebirth* gives me the inspiration how to create an immersive UI for thrilling games. The compass of time and space gives me the idea of creating diegetic elements implemented in my game.
- The setting of the ability for the gun in *The Entropy Center* is quite similar to the time control power I design but I find it is focusing on solving puzzles backward.

GAME MECHANICS

POWER FLOWCHART



POWER OF CONTROLLING TIME

Chronos' Clock System

To create a system that integrates UI, power status, health, and items in the first person's view, I use a month to develop the system called **Chronos' Clock**. On this page, I'll introduce how it interacts with game objects.

I Frozen Moving Objects



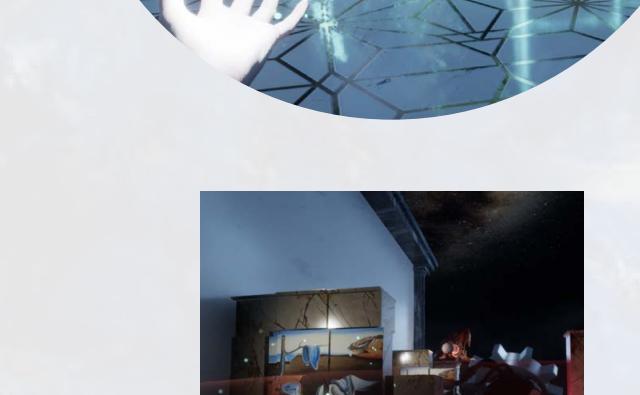
In this game, objects are moving under three conditions:

- Some objects are falling down or breaking apart due to gravity.
- The second type of moving objects are gears rotating at their own speed, some of them have staircases and platforms attached to them.
- Other objects like exhibition walls or pillars will be exploded into pieces due to the attack or explosion caused by the enemies.

The freezing ability is able to freeze all these three types of objects in the air, meaning objects stop falling, gears stop rotating and exhibition walls and pillars hold together even under attack.



II Rewind object's Movement Trajectory

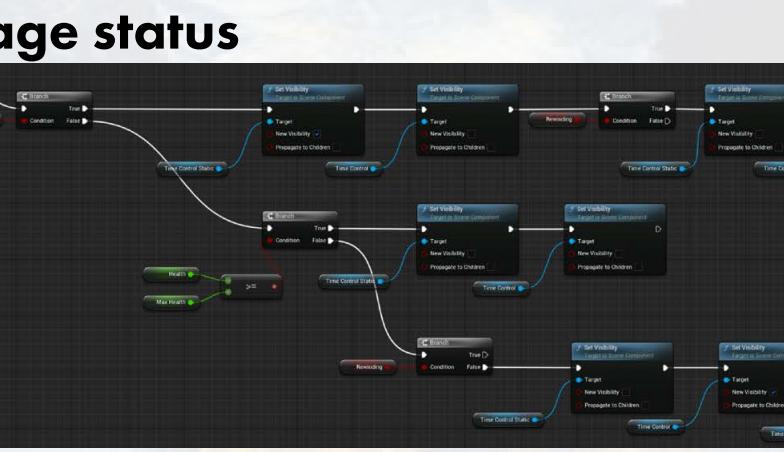
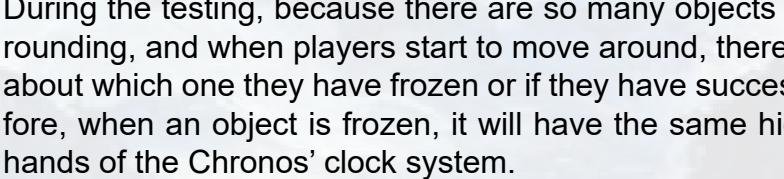
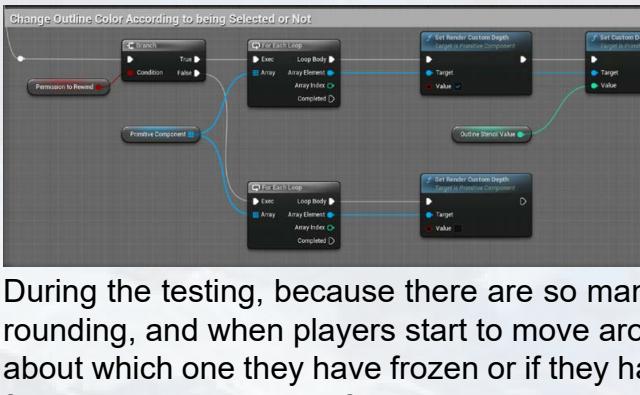


To perform the rewinding time ability, players have to press the right mouse click(trigger) continuously after freezing the object

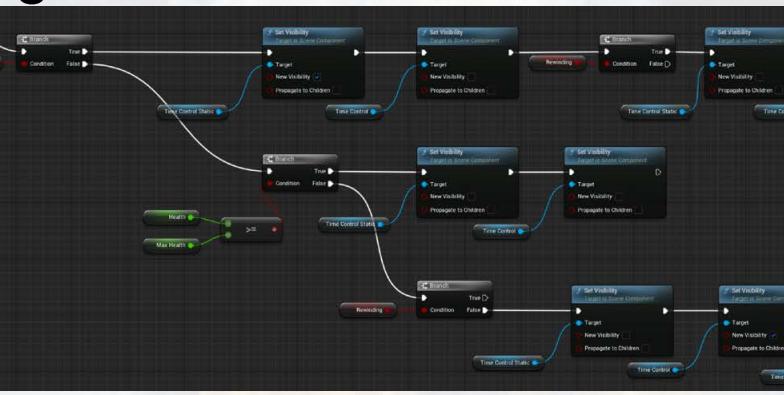
Moving objects are recording their transformation information since the start of the game. And when they are in reverse time mode, they will get to the position in the last frame.

This ability also works towards a certain type of enemy by controlling them to move back to where they appear.

V Target Highlight



IV Show power usage status



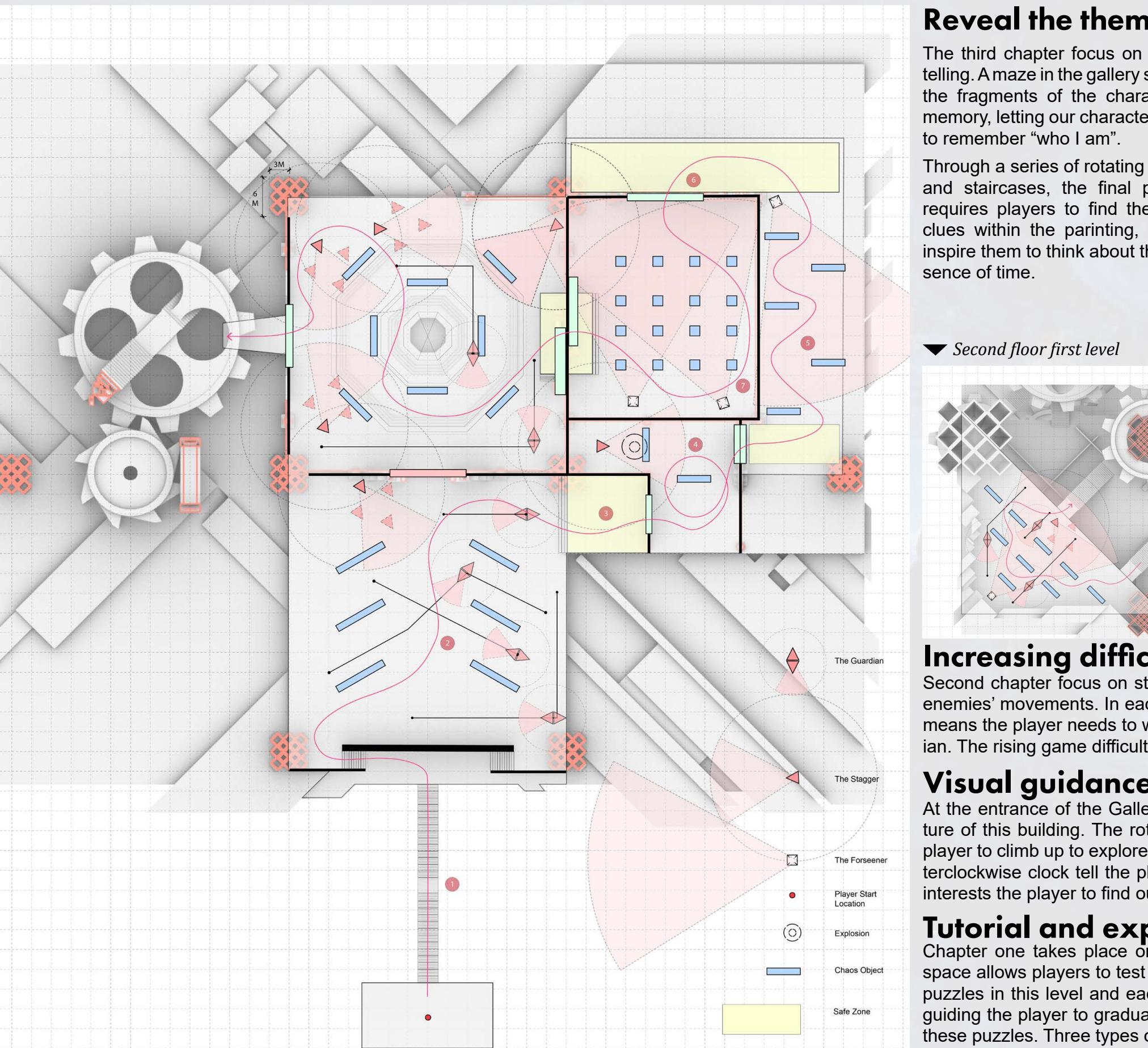
To let the player clearly know which power they are using and the speed using the energy, I design two Niagara effects and change the variables to create the animation for four statuses:

- The first one is shown when the player is freezing objects, twelve sparks will rotate counterclockwise slowly.
- When the player is rewinding objects, all those sparks will be rotating at a faster speed.
- When the clock system is charging, all sparks will rotate clockwise.
- When the power is fully charged and there is no action from the player, all the sparks will disappear.

III Show how much "time" is left

One balance to restrict the player's power is that the total time that the player could freeze objects and rewind time is limited. In this game, energy and health are shown by the Chronos' clock system. At the start of this game, there are six hours in total to use. Freezing objects, rewinding time, and being attacked by enemies will cause different reduced values of time, making the clock rotate counterclockwise. When the power is not being used, it will recharge gradually by rotating clockwise.

LEVEL DESIGN

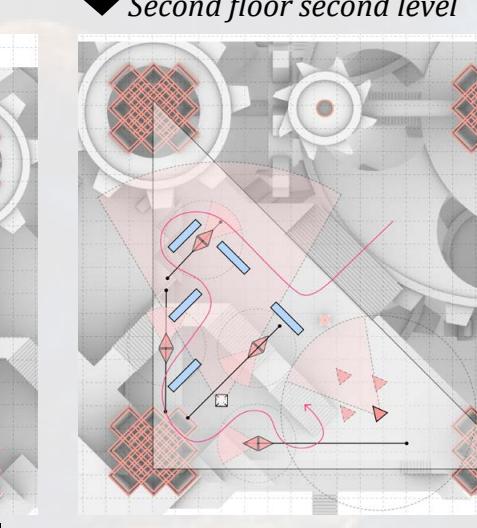


Reveal the theme

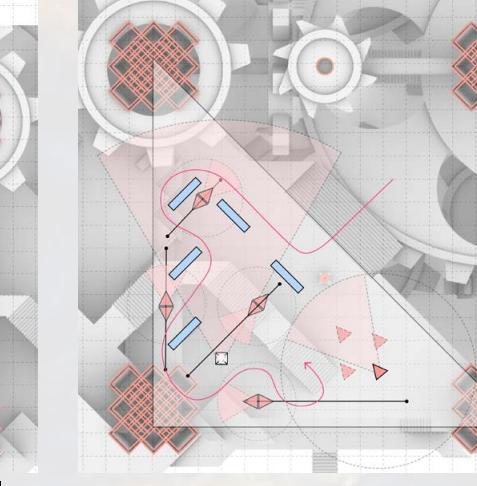
The third chapter focus on storytelling. A maze in the gallery shows the fragments of the character's memory, letting our character start to remember "who I am".

Through a series of rotating gears and staircases, the final puzzle requires players to find the time clues within the painting, which inspire them to think about the essence of time.

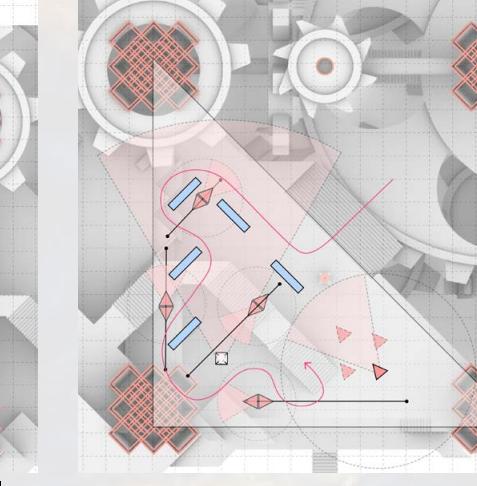
▼ Second floor first level



▼ Second floor second level



▼ Second floor third level



Increasing difficulty

Second chapter focus on stealth, requiring higher precise control of the time power and prediction of the enemies' movements. In each level, most of the space is under the forseeners and stagger's watch, which means the player needs to watch out for these dangerous areas while avoiding being caught by the guardian. The rising game difficulty will push the player to question why the character come to this place.

Visual guidance

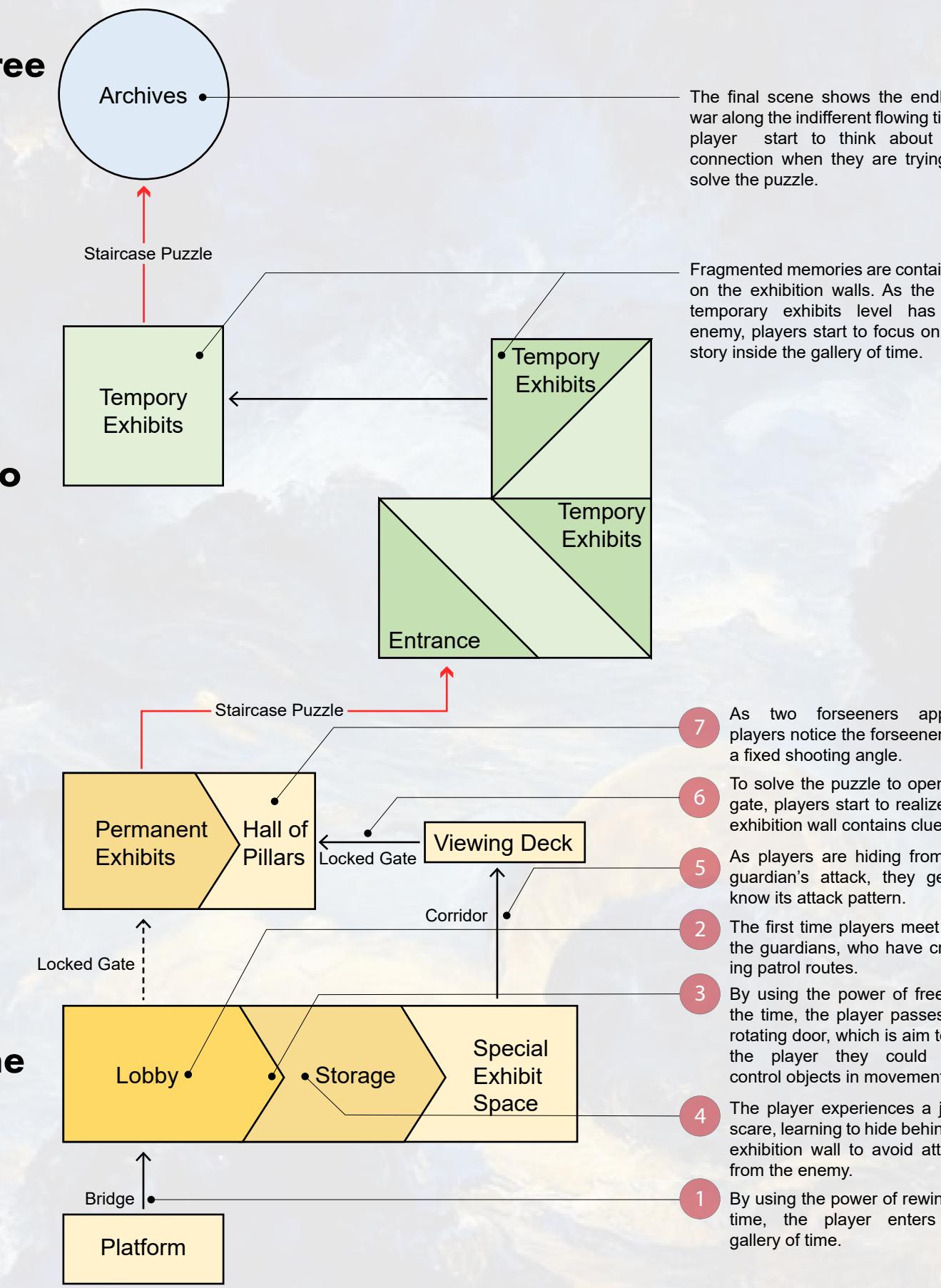
At the entrance of the Gallery of Time, the player will see the full picture of this building. The rotating gears and moving staircase attracts player to climb up to explore. The swinging pendulum and ticking clockwise clock tell the player that the time here is distorted, which interests the player to find out what is happened to the time gallery.

Tutorial and exploration

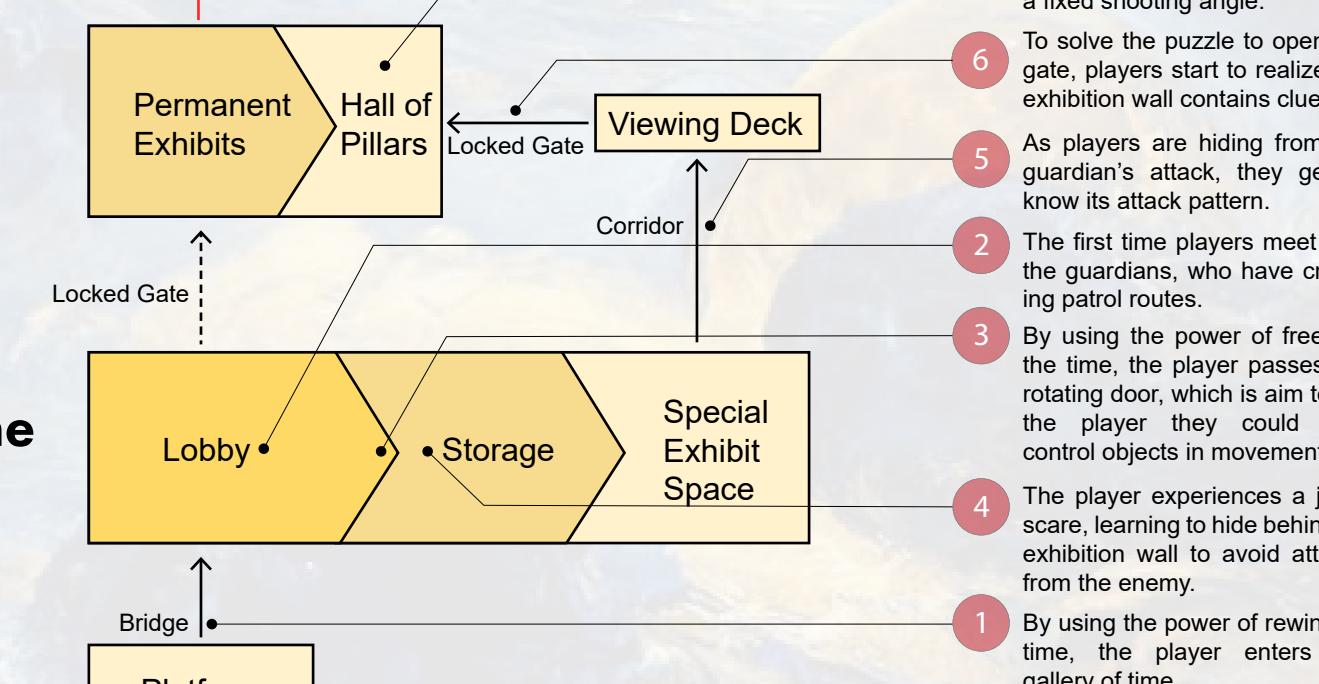
Chapter one takes place on the first floor where the wide and open space allows players to test their time-controlling power. There are five puzzles in this level and each of them is getting a bit harder to solve, guiding the player to gradually know how to use power to interact with these puzzles. Three types of enemies will show up each by each, providing opportunities for players to observe their mechanisms.

LEVEL FLOW OVERVIEW

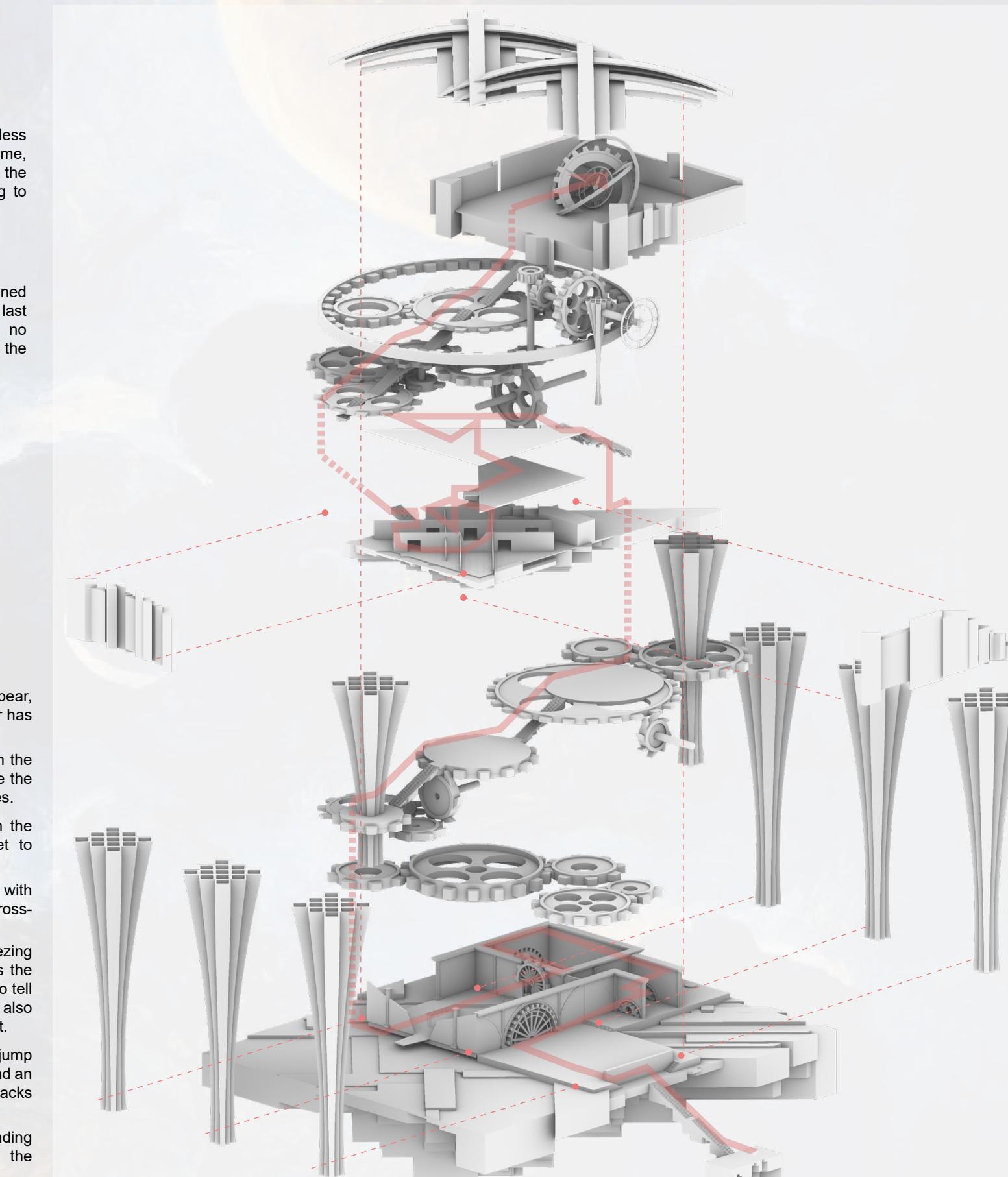
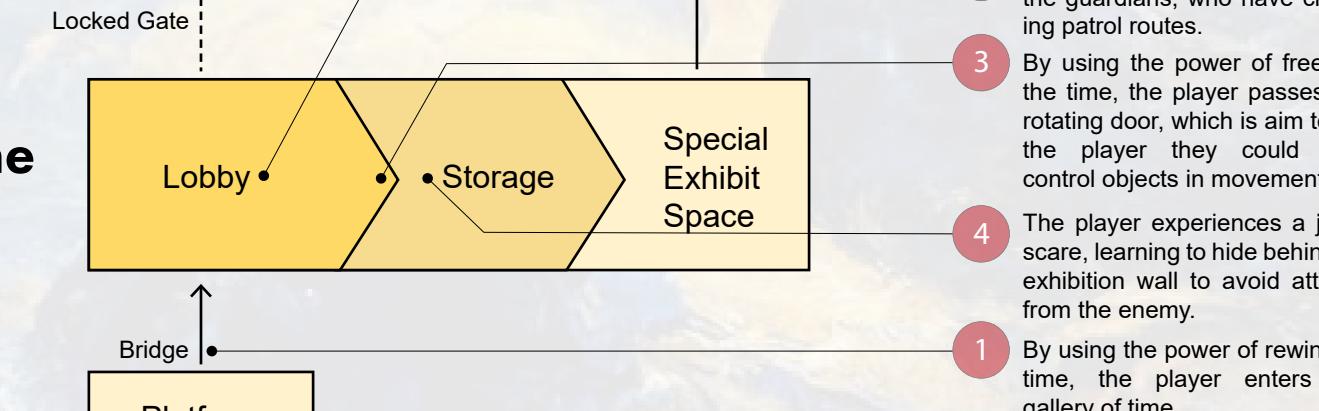
Chapter Three Endless Time AND Eternal Time



Chapter Two Why AM I Here?



Chapter One Introduction to the Time Gallery

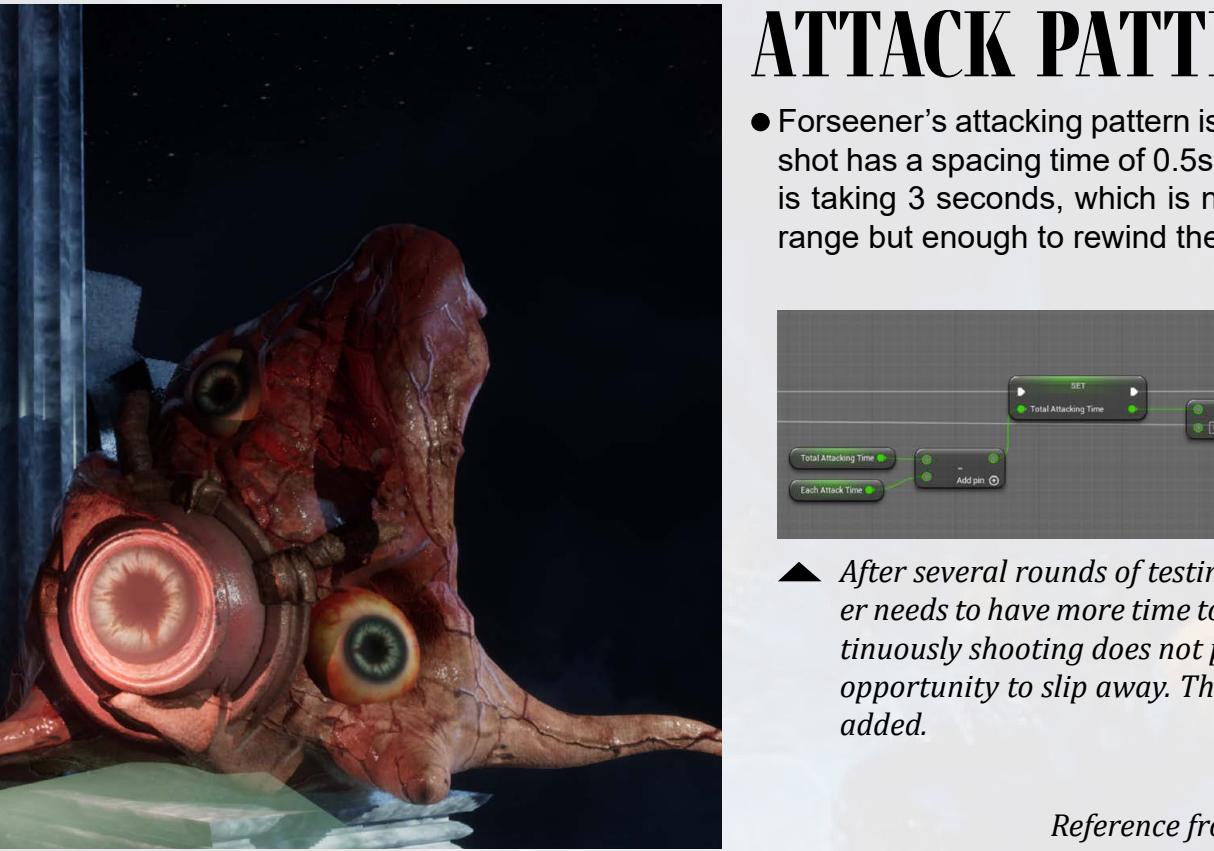


EXPLOSION AXONOMETRIC

ENEMY DESIGN

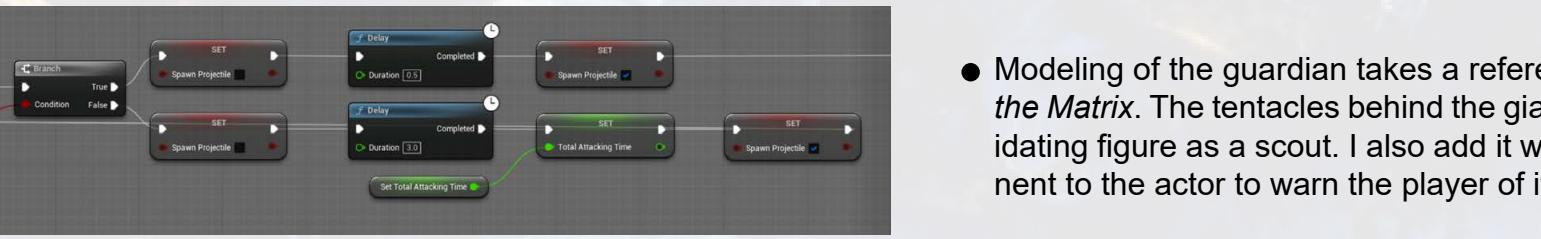
THE FORSEENER

- The forseener works like a turret, it attacks whenever the player is in range, caring not about whether they are hidden behind a wall or not. The function of the forseener is to destroy the rewindable objects to expose the player under fire. The reason for this setting is to force the player to use her power of time control during the encounter with the enemy.
- The design of the modeling emphasizes the large intimidating eye and bloody body bound with the machine structure. There are also additional eyes on the body to increase the scary feature. The overall design is warning the player to stay out of its "sight".
- The forseener is not invincible because it has a limited attacking range and shooting angles. The player could run into its deadzone and use the power of rewinding time to turn it off because the enemy rising from a column underground could be reversed to move back by our protagonist's power.

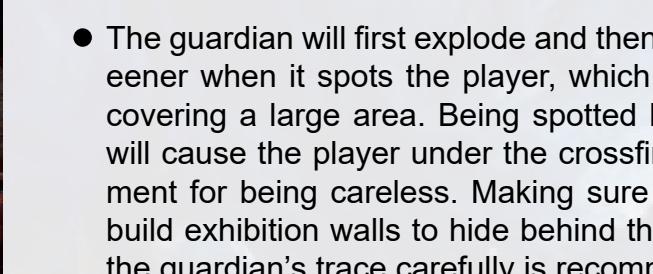


ATTACK PATTERN

- Forseener's attacking pattern is fierce but predictable. It has three seconds of shooting time, and each shot has a spacing time of 0.5s, which makes it shoot 7 shots and then start to cool down. The cooling is taking 3 seconds, which is not enough for the player to run all the way to get out of the attacking range but enough to rewind the walls on the advancing path to provide protection.

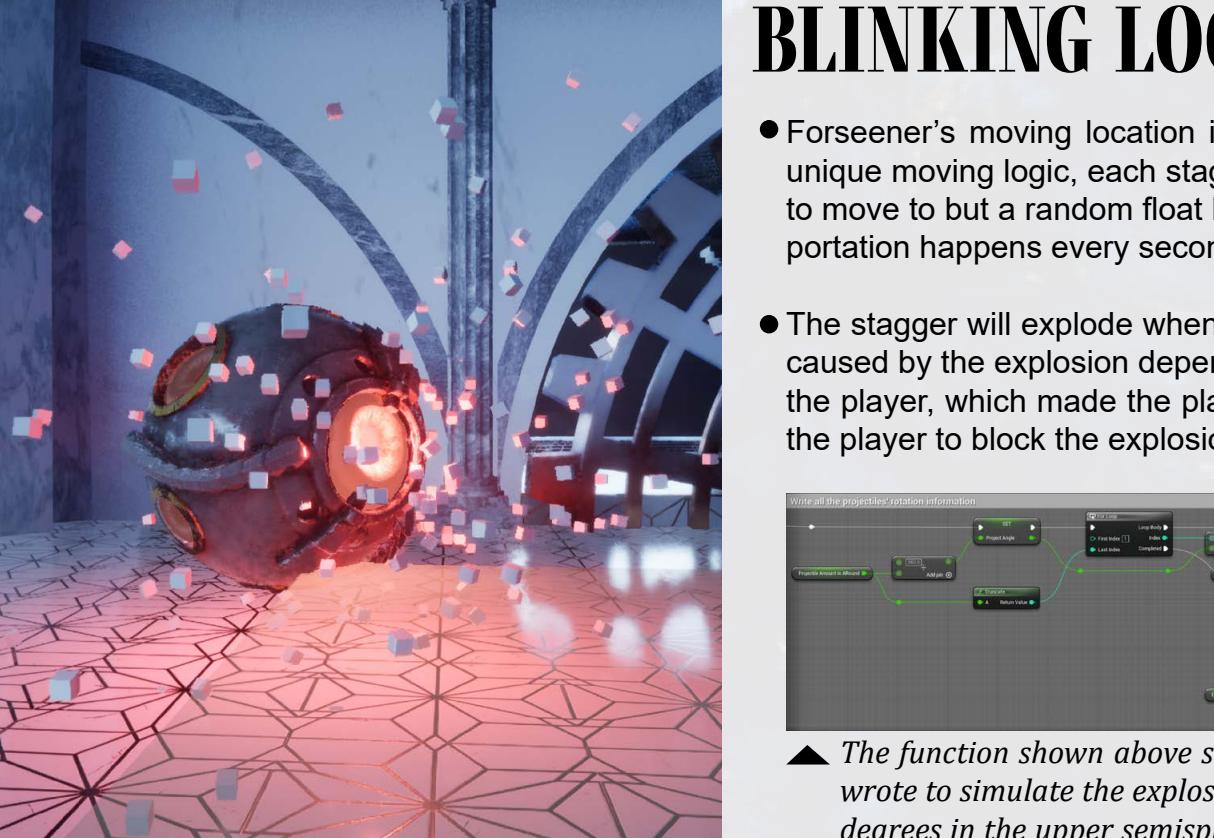


▲ After several rounds of testing, I realize that the player needs to have more time to rewind objects, and continuously shooting does not provide players with any opportunity to slip away. Therefore, cooldown time is added.

Reference from Enrico Tammekänd ► 

THE STAGGER

- The stagger services like a zombie guarding a certain place in the game. The innovation of the design is that the stagger is blinking and teleporting between the current location and the other four locations around it, creating a sense of uncertainty and scare when the player is trying to sneak past it or being chased.
- The modeling is inspired by the deep water mine, which is installed with multiple eyes on every side instead of sensors detecting collisions. I also add a Niagara effect of absorbing small cubes to make the figure look like a bomb that could detonate whenever the player gets close to set off the fuze.
- The stagger also tempts to ambush the player from an unexpected area, which forces the player to rewind an exhibition wall to block its chasing or the explosion it made.



BLINKING LOGIC & EXPLOSION

- Forseener's moving location is unpredictable but limited in a small area around it. To realize this unique moving logic, each stagger is defined with four boundary points, it is random taking any point to move to but a random float between 0 to 1 is controlling it how far to go in that direction. This teleportation happens every second.
- The stagger will explode when it gets to six meters from the player. And the counting of the damage caused by the explosion depends on how many of the 108 spheres it shoots in all directions have hit the player, which made the player must get behind a wall or rewind a wall between the stagger and the player to block the explosion.

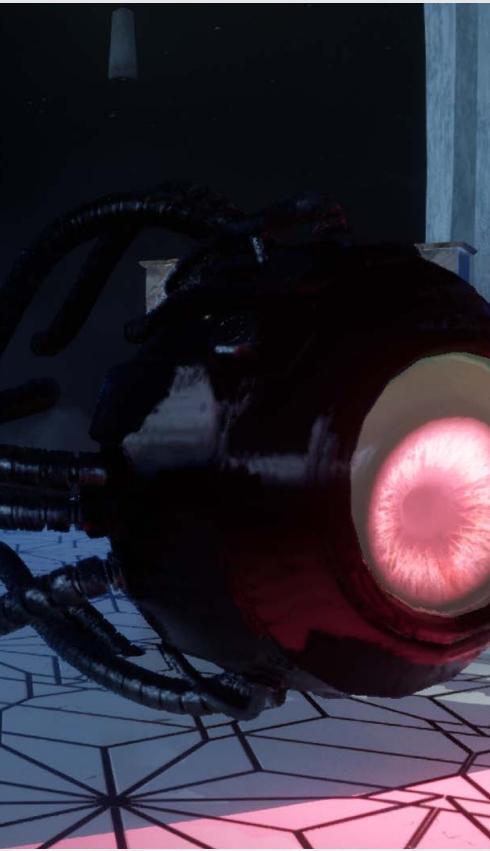


▲ The function shown above shows the explosion function I wrote to simulate the explosion. I set off projectiles every 30 degrees in the upper hemisphere to simulate so it seems like the explosion destroys the exhibition wall.

Gravity Rush ► 

THE GUARDIAN

- The guardian works like a patroller, it patrols on a fixed path and repeats. Encounter with this enemy requires the player to watch and figure out the enemy's patrol path first and then find the timing to go through after it has gone to the next point.
- Modeling of the guardian takes a reference to the sentinel in *the Matrix*. The tentacles behind the giant eye make an intimidating figure as a scout. I also add it with a spotlight component to the actor to warn the player of its moving direction.



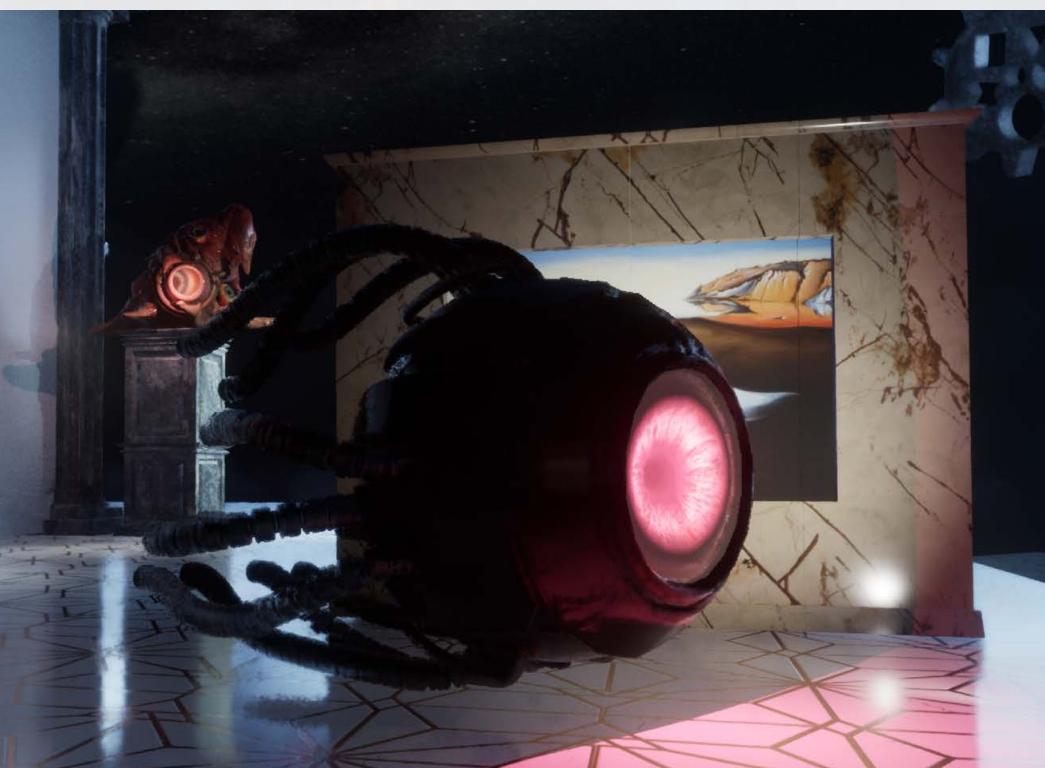
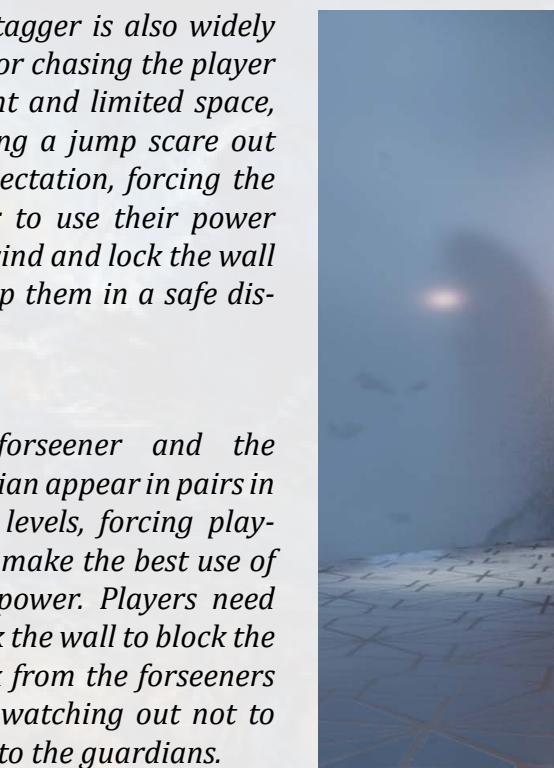
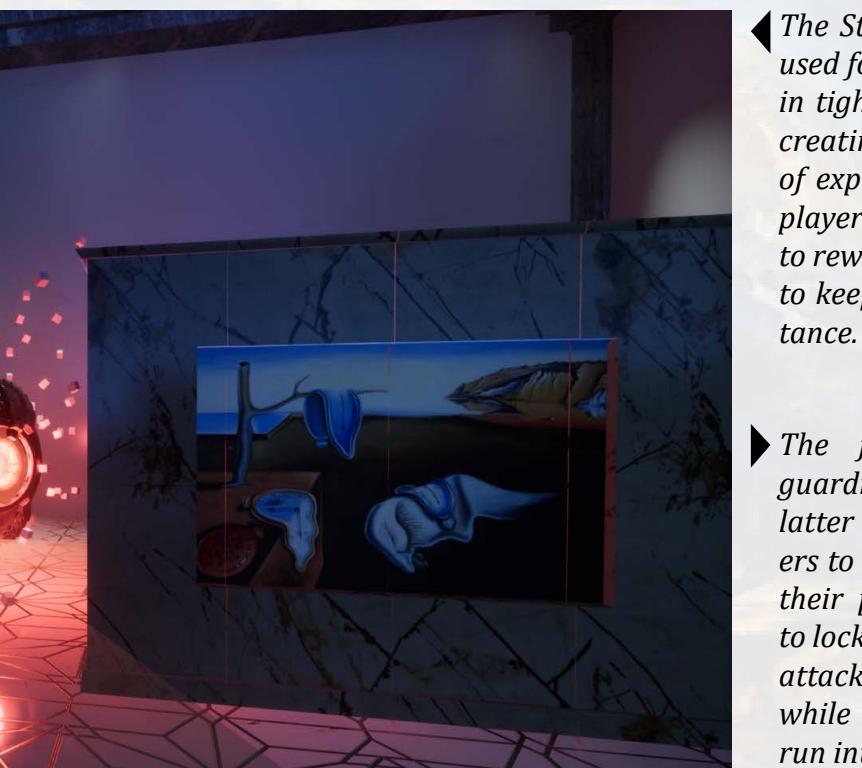
Reference from Enrico Tammekänd ►



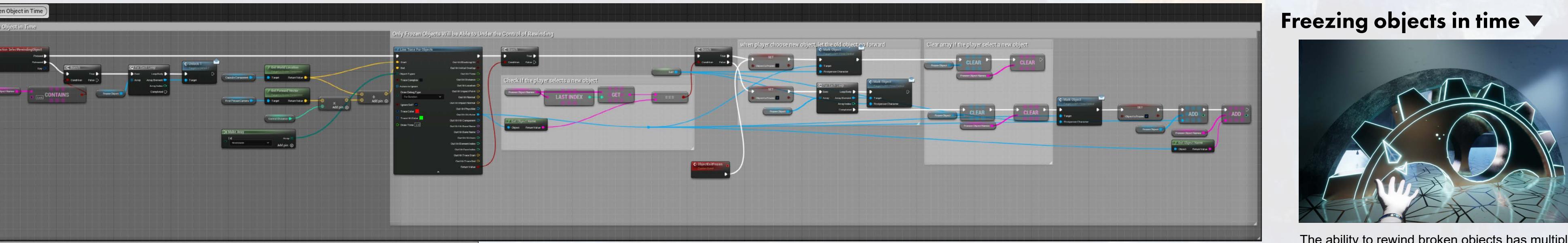
OVERVIEW

For all three enemies' designs, the modeling uses the element of eyeball, which is used to respond to the existence of the time gallery, emphasizing the behavior of watching the exhibition. As the window of the human's mind, all those eyes were bound by the steel machinery, which also represents the souls and fleshes being tormented by the endless war, being locked in the eternal time gallery.

ENEMY VISUAL EFFECTS



PROGRAMMING

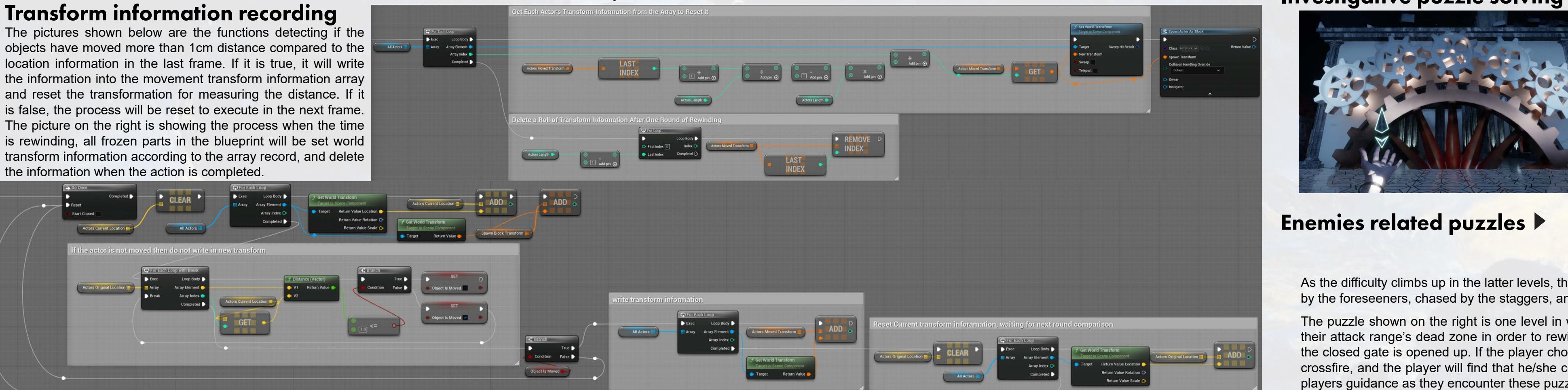


trol

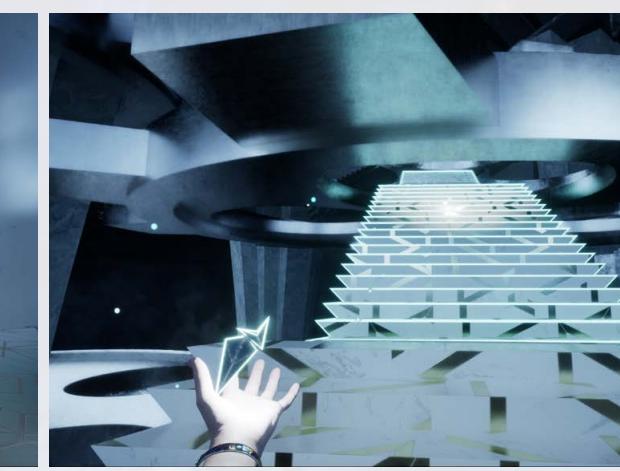
own above and on the left are the main functions controlling the ability to freeze objects and rewind time. When the trigger is triggered, the line trace for objects function will detect if the object in front is tagged with "rewindable". And if there is no the array that records every frozen object's name, the object will be frozen. If it is the same object according to the array, will send out the mark object function to unfreeze the object; Otherwise, it will send the mark object function to both the objects to freeze the new one and unfreeze the old one. When there is a frozen object, by clicking the right mouse(right sing continuously, the time will rewind. The time will be frozen when the right mouse(right trigger) is released. And when an object, time will flow forward.

Transform information recording

The pictures shown below are the functions detecting if the objects have moved more than 1cm distance compared to the location information in the last frame. If it is true, it will write the information into the movement transform information array and reset the transformation for measuring the distance. If it is false, the process will be reset to execute in the next frame. The picture on the right is showing the process when the time is rewinding, all frozen parts in the blueprint will be set world transform information according to the array record, and delete the information when the action is completed.



Page 1



As the fundamental power ability in the game, players need to use the power from time to time to face different situations in the game. To make the player use their ability from time to time to advance in the level, there are moving and rotating objects blocking their path at each checkpoint. These puzzles also require the player's precise control because when to freeze and which one to freeze first decide if they could go pass through.

The picture on the left shows a door consisting of double rotating gears, which need the player to freeze one first and find the timing to pass through. And the second one is a puzzle made of a series of rotating staircases, in which players need to freeze the staircase to aim at their moving direction and freeze the second staircase when the connecting staircase's ends meet up with the one they are standing on.

► Rewind b

ies inside the game, including reconstructing the staircase to move through (shown on the right). They can also freeze objects in time to stop them from moving, which can be useful for avoiding their attacks (shown below). This game mechanic becomes a puzzle as players have limited 'wind' power. They must learn to rewind the objects in time and think about if their remaining power could fully rewind the time. If they succeed, the objects will return to their original places, and they will stay in the place forever, without the effects of gravity or wind. However, if they fail, the objects will remain frozen, and the rewinding process will stop and frozen objects will continue moving, wasting all players' previous progress.

iving shown below, players need to seize the timing between the enemy's every round of attack.



The pictures on the left shows the sequence of solving the puzzles which requires player to investigate clues in the game.



In the demo, as the player moves through the corridor they will find their way is blocked by a gate and five gears are rotating above it. The pattern on the gear has five elements and players will recall that there are also five exhibition walls in the corridor. By finding each clue hiding inside the painting, the player needs to freeze the gear when the matched element is lightened and pointed by the hand on the gate. When all five gears are frozen at the right place, the gate will rotate 180 degrees and open up.

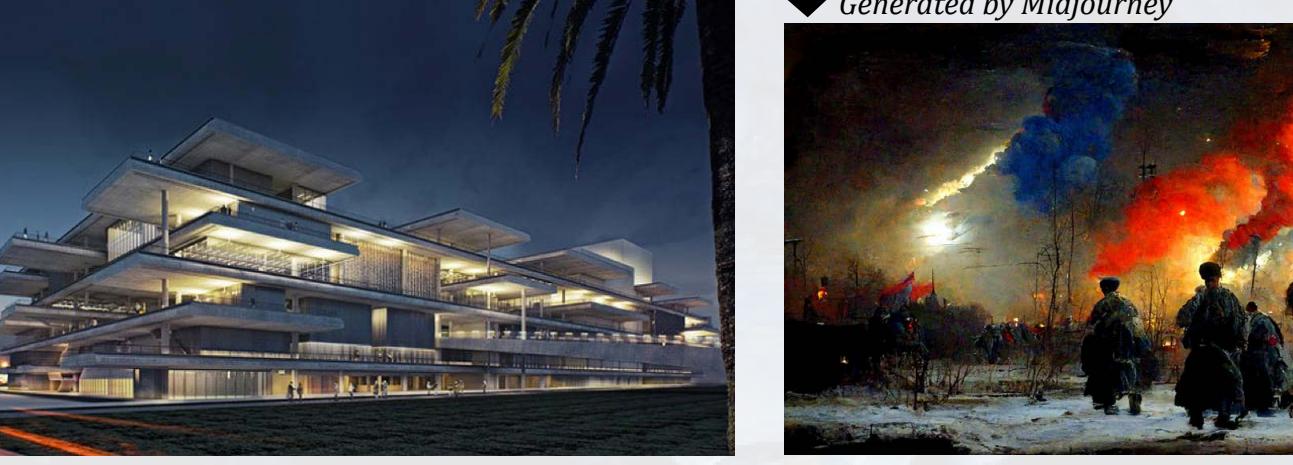
Player finds that they need to push forward while under pressure, avoiding running into the guardian.

h players have to avoid two fourteeners' attacks and keep them underground to turn them off. Only then, they can rush to the gate, then our character will be under attack and not get through the gate. Lightings in these levels

ENVIRONMENT DESIGN REFERENCE



Cultural Complex by Luz. Herzog & de Meuron ➤
Herzog & de Meuron designed The Cultural Complex Luz with the strategy of weaving floors to organize theatre, school, corporations, library, and a parking building, keeping transportation spaces separated from each other while letting them have a smooth flow in space.



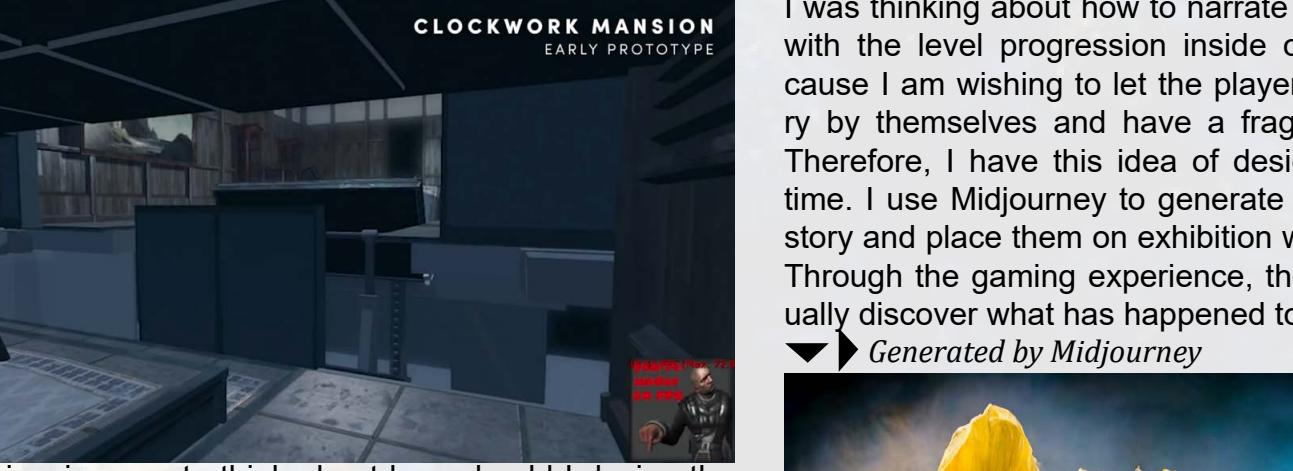
Architecture Design Perpective

Instead of finding a specific gallery design for reference, I looked into the space form of weaving as an early concept of constructing a complex space form which has multiple connections in space. The Taichung City Cultural Centre is a cultural library and municipal art museum that "synergizes" art, education, and recreation with the key concept being the idea of permeability.

◀ Taichung City Cultural Centre by SANE

Level Design Perpective

One of my favorite level designs I am trying to learn from is the clockwork mansion level in *Dishonored 2*. I think this design is stunning not only from a level design perspective but also from the architecture design perspective, in which the level designers decided to let the players be able to get inside the mechanisms from day zero. The concept of letting players explore behind the scenes amazes me.



➤ Screenshots of the early prototype for the clockwork mansion
CLOCKWORK MANSION
EARLY PROTOTYPE

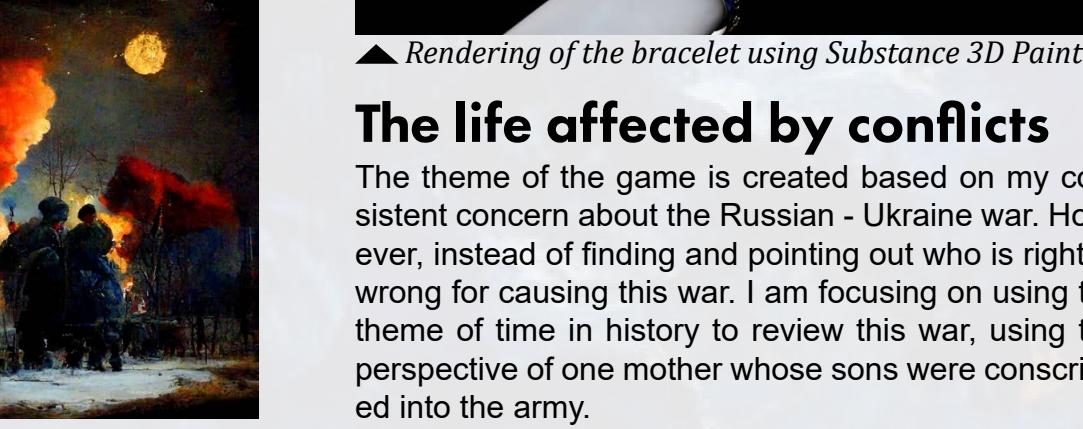
It also inspires me to think about how should I design the building for this game, which is also a functioning machine that allows the player to explore inside. I am also thinking that the mechanism would be overwhelming if it could bring the player to different levels, creating a vertical space complexity that intrigues the player's curiosity. This kind of transformation should combine the theme of time. Then I started to think about if I could turn the clock mechanism into the environment and level design in this game.

BACKGROUND STORY & CONCEPTS

Hidden clues

The bracelet is the clue to the protagonist's identity, which shows on the left wrist all the time during the gaming experience. The bracelet is also a symbol responding to the theme of the game. The eye shape formed by the olive branch and gem represents the hope for peace against the ever-ongoing war, which is why in her dream, she is given the rewinding power.

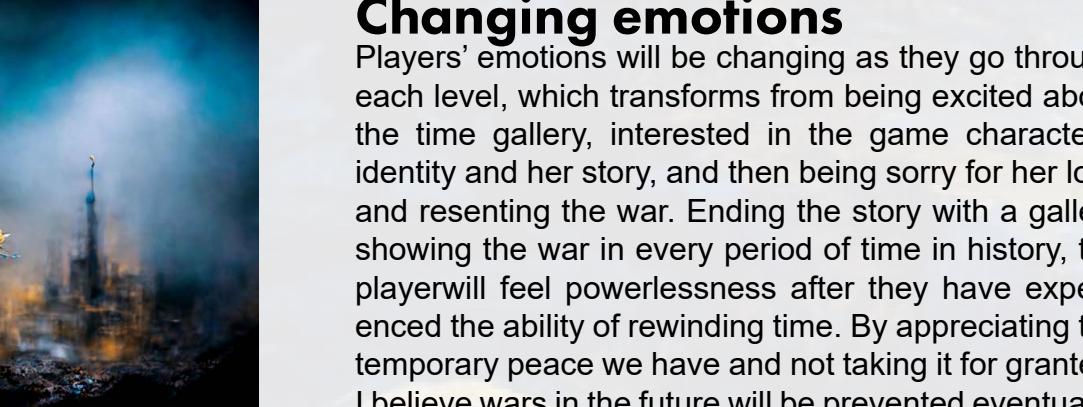
▼ Generated by Midjourney



Fragmented narrative

I was thinking about how to narrate through the game with the level progression inside one structure. Because I am wishing to let the player discover the story by themselves and have a fragmented narrative. Therefore, I have this idea of designing a gallery of time. I use Midjourney to generate illustrations of the story and place them on exhibition walls in the gallery. Through the gaming experience, the player will gradually discover what has happened to the protagonist.

➤ Generated by Midjourney



▲ Rendering of the bracelet using Substance 3D Painter

The life affected by conflicts

The theme of the game is created based on my consistent concern about the Russian - Ukraine war. However, instead of finding and pointing out who is right or wrong for causing this war. I am focusing on using the theme of time in history to review this war, using the perspective of one mother whose sons were conscripted into the army.



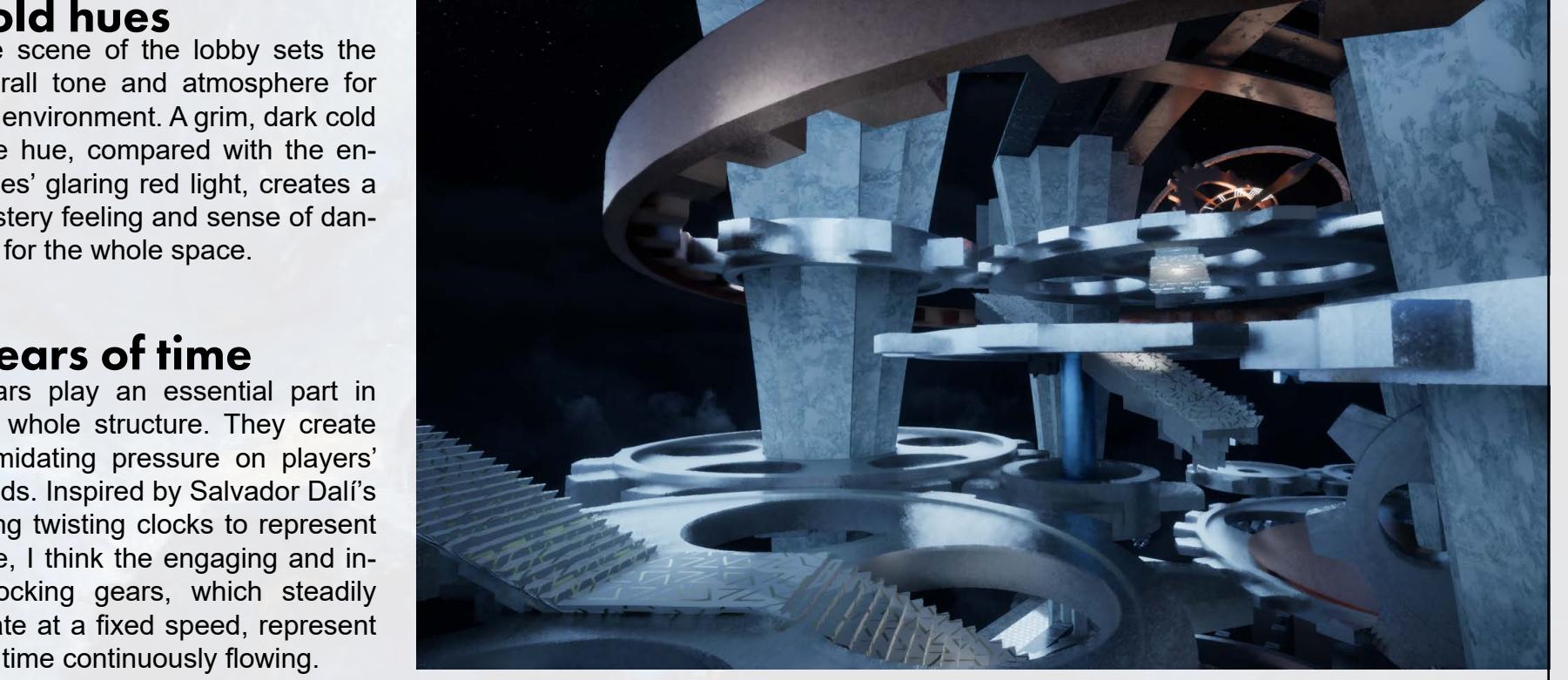
▲ The lobby of the Gallery of Time

Cold hues

The scene of the lobby sets the overall tone and atmosphere for the environment. A grim, dark cold blue hue, compared with the enemies' glaring red light, creates a mystery feeling and sense of danger for the whole space.

Gears of time

► Gears play an essential part in the whole structure. They create intimidating pressure on players' minds. Inspired by Salvador Dali's using twisting clocks to represent time, I think the engaging and interlocking gears, which steadily rotate at a fixed speed, represent the time continuously flowing.



▲ The rotating staircase puzzle connects to the final puzzle ▲



▲ The temporary exhibits on the second floor

Visual guidance

► The design of the gallery's layout uses exhibition walls as a division of space and frame to guide players' attention and where they should be focusing. Therefore, by progressing through the levels, players will gradually discover those images which reveal the story.

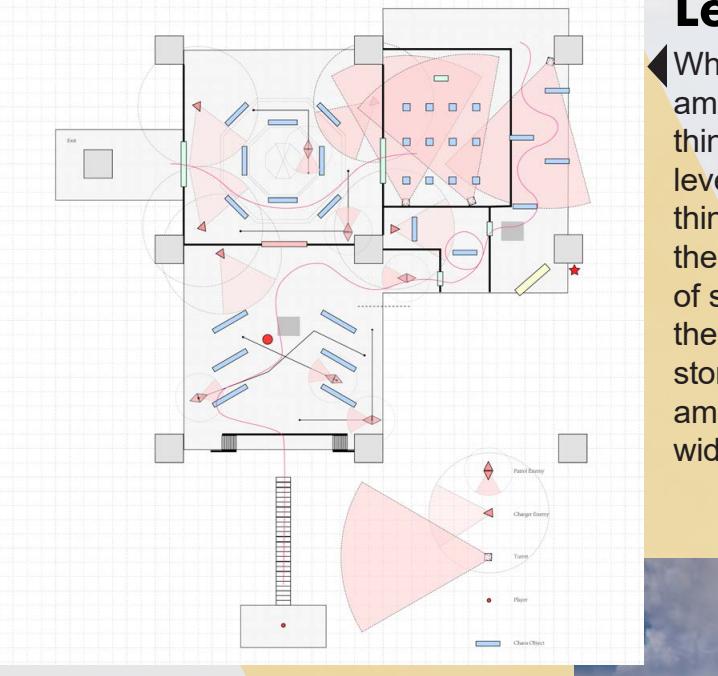
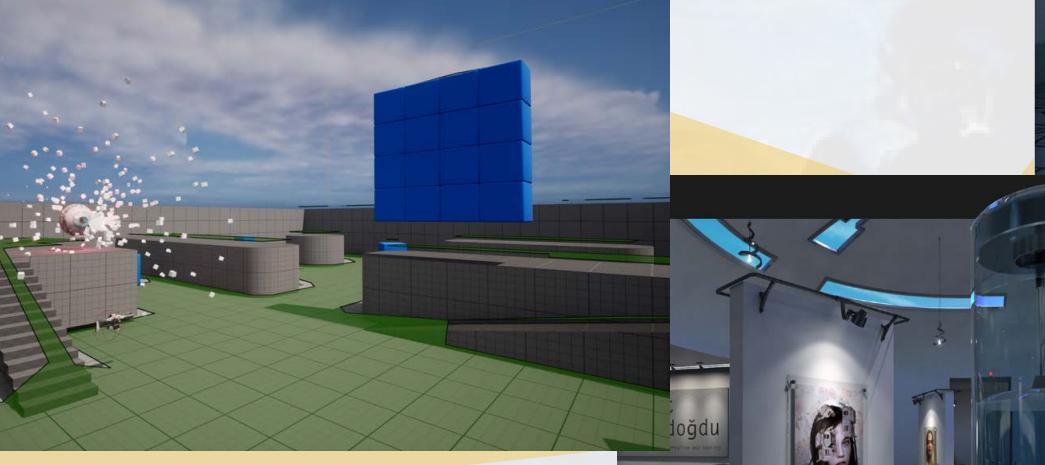
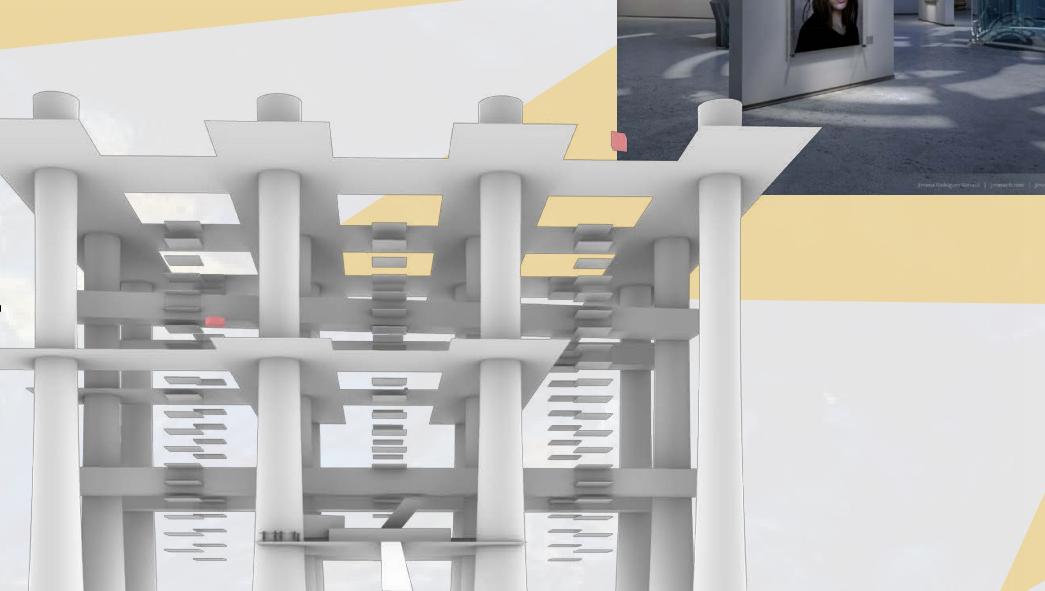
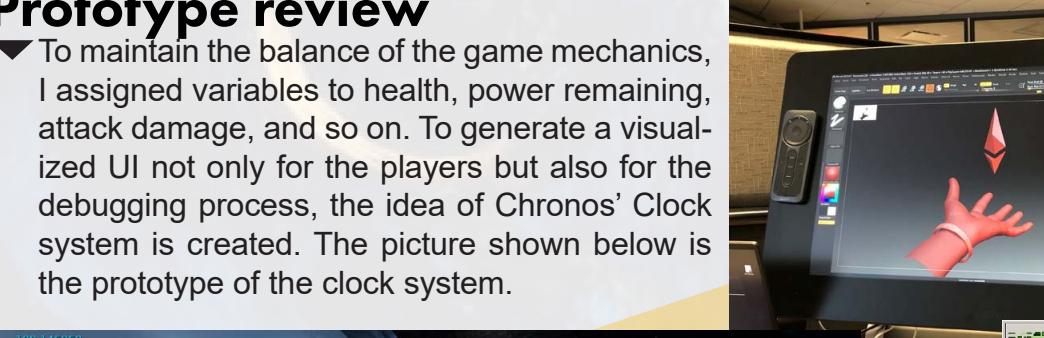
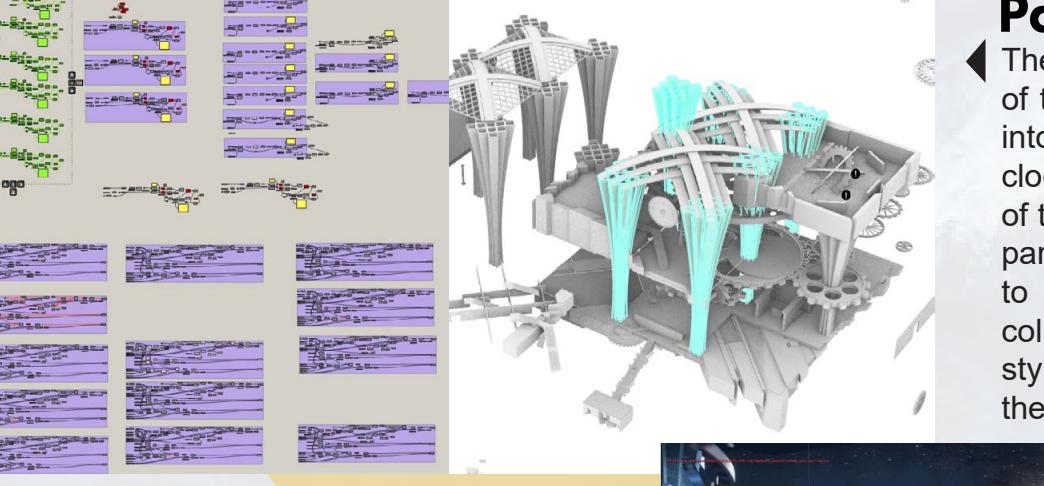
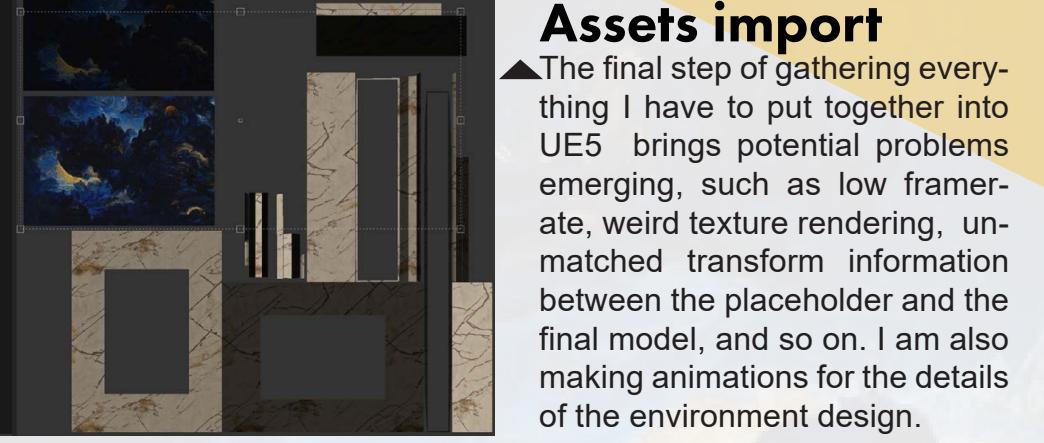
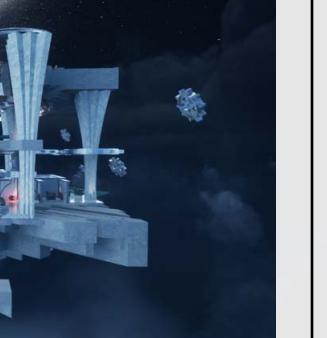
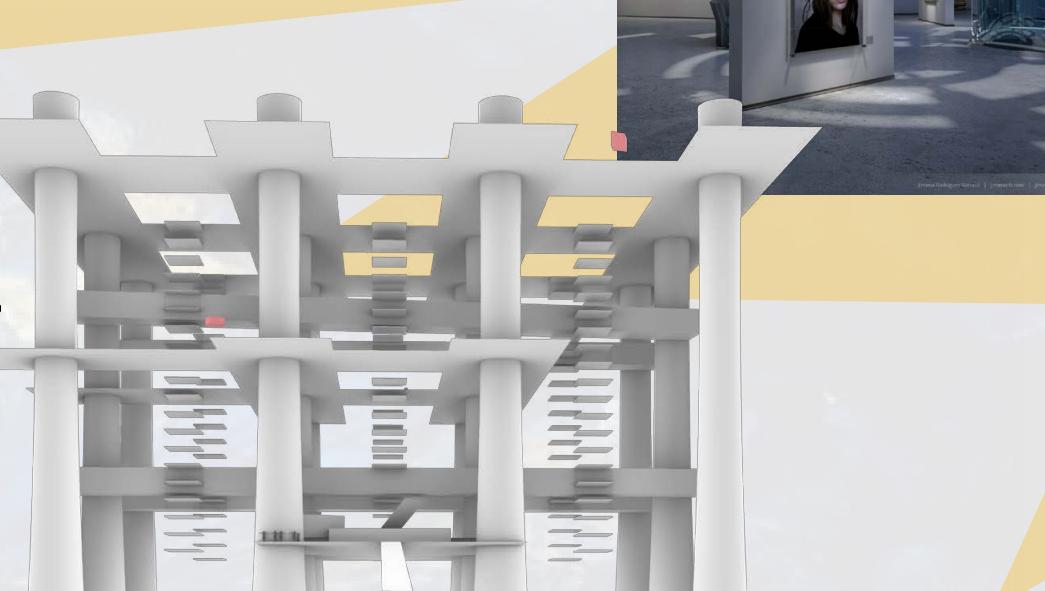
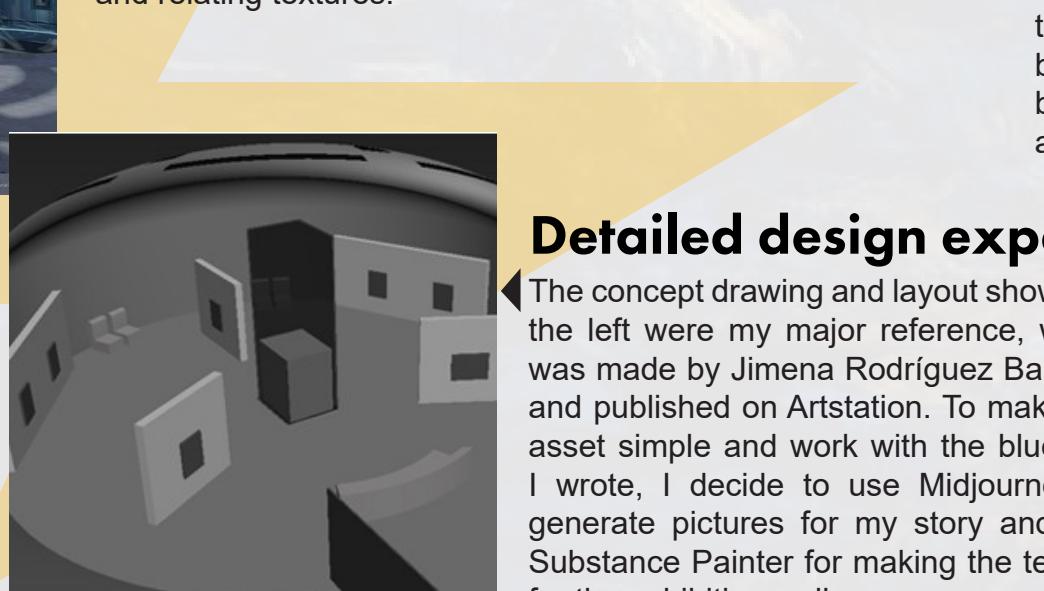
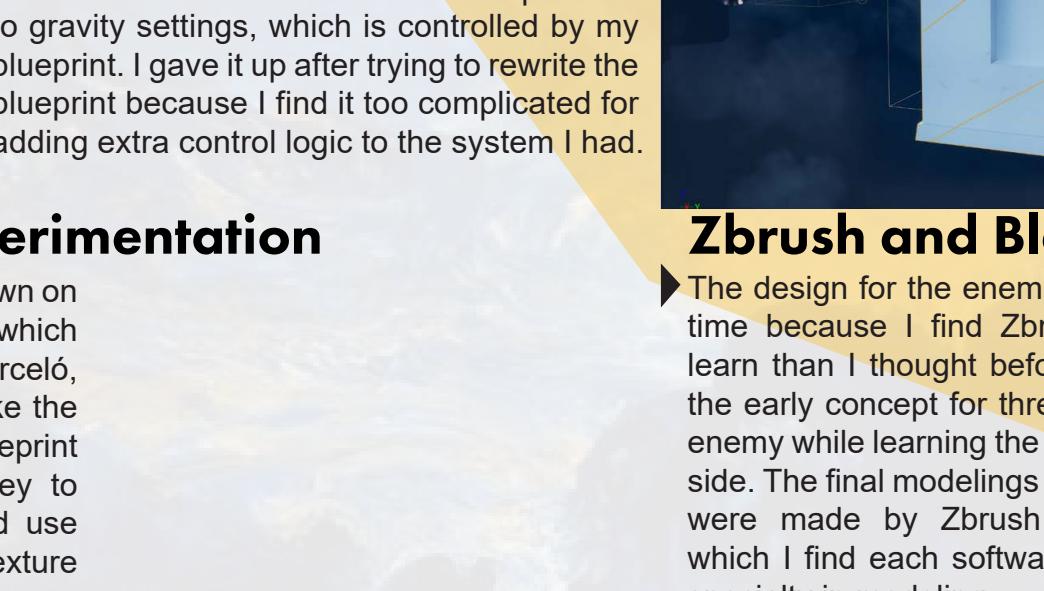
➤ Storytelling puzzles

► The final puzzle on the top floor represents how the endless war goes as the eternal time flows along with it. Players need to find clues in the three exhibition walls to solve the puzzle to make the gears continue rotating, which restores the order of the time.



▲ The final puzzle on the Third floor ▲

DEVELOPING TIMELINE

May	June	July	August	September	October	November
Game Design  Prototyping  <p>I tested to see if the time-freezing and the time-rewinding power is achievable in the Unreal 5 Engine. The blue blocks and the staircases shown in the right picture are testing objects for the time control game mechanics. I was also learning AI pawn sensing and trying to design different logics for my three types of enemy design.</p>	Week 1 Week 2 Week 3 Week 4 Level design and story planning  <p>When doing the first draft of the level design plan, I am using the traditional architectural design method, thinking about the column grid and the layout of the level. I decided to design a gallery because I was thinking about fitting my story into an exhibition. In the very first stage, I am considering how the form of space could contribute to the interaction between the player and the environment as well as the storytelling. Being free from the physical constraint, I am thinking about using massive columns to create wide open spaces for exploration.</p>	Week 1 Week 2 Week 3 Week 4 Prototype review  <p>To maintain the balance of the game mechanics, I assigned variables to health, power remaining, attack damage, and so on. To generate a visualized UI not only for the players but also for the debugging process, the idea of Chronos' Clock system is created. The picture shown below is the prototype of the clock system.</p>	Week 1 Week 2 Week 3 Week 4 High polygon model making  <p>This picture is taken by me when I start to study Zbrush, which software I find quite different from the ones I used before. I like the Critic pro 24 in my school's library which makes the drawing process much more efficient. I am also refining my story and decided to let the decorative item asset responds to the theme of the game.</p>	Week 1 Week 2 Week 3 Week 4 Parametric design  <p>The design and modeling of the gallery of time takes a long time as I was looking into how gears transmit power and how the clock tower works. To make the mechanics of the building look realistic, I am using the parametric design from architectural design to control the generating of every gear, column, and floor. I am also testing different styles of gears, and roofs to see if I could let the assets share the same aesthetics.</p>	Week 1 Week 2 Week 3 Week 4 Realizing destruction system  <p>I was planning to use the chaos system inside the unreal engine to simulate pieces after the explosion at the very beginning of my game design. However, after splitting up the asset, it turns out that the assets would fall apart due to gravity settings, which is controlled by my blueprint. I gave it up after trying to rewrite the blueprint because I find it too complicated for adding extra control logic to the system I had.</p>	Week 1 Week 2 Week 3 Week 4 Optimization and video production  <p>Currently, all the design and producing works are done and the game is being optimized for final gameplay video making. The walkthrough video will be uploaded to my personal portfolio website: https://paidiseyar.wixsite.com/cxstudio</p>
ART Level implementation first Draft  <p>The draft modeling on the right is the first version of 3D modeling for the gallery of time. Compared to the plan, I am considering the connection between each level and thinking about how to have a design letting the game mechanics participate in the level space transition.</p>	Week 1 Week 2 Week 3 Week 4 Detailed design experimentation  <p>The concept drawing and layout shown on the left were my major reference, which was made by Jimena Rodríguez Barceló, and published on Artstation. To make the asset simple and work with the blueprint I wrote, I decide to use Midjourney to generate pictures for my story and use Substance Painter for making the texture for the exhibition wall.</p>	Week 1 Week 2 Week 3 Week 4 Zbrush and Blender  <p>The design for the enemies took a long time because I find Zbrush harder to learn than I thought before. I designed the early concept for three types of the enemy while learning the Zbrush side by side. The final modelings of the enemies were made by Zbrush and blender, which I find each software has its own specialty in modeling.</p>	Week 1 Week 2 Week 3 Week 4 Baking and UV improvement  <p>For these assets like exhibition walls and enemies, which need to combine several materials into one texture, I used Substance Painter to do the work. The learning process took a little while because the software is simpler than I thought as Adobe is making the interface and logic similar to other design tools they owned.</p>			

THE STELLAR MOMENT

DEVELOPMENT INFORMATION

July 2022, Personal project, Most of the content is finished and being optimized now, and I am making an gameplay video.

Position: Game Designer, programmer, artist

The stellar moments is an untraditional collaborative racing party game, which translates the British Antarctic Expedition in 1910-13 into the format of interactive media.

Created by myself during the summer break in 2022 in the library of the University of Michigan, Ann Arbor.

PREFACE

Have you ever dreamed of going on a great adventure?

to conquer nature,

to test your limits,

and to prove yourself to the whole of mankind?

If so, my dear player,

please join me on this journey dates one hundred years ago,

*to witness, to experience
this stellar moment in human history:*

the race to the South Pole!!!

In this game, we will follow the track of Robert Falcon Scott, a great explorer, to experience his race to the South Pole in this no man's land of Antarctica!

RESOURCES

*Modeling and texture like rocks and glaciers are from
<https://sketchfab.com/>*

Quixel Megascans asset are from Epic

*Downloaded textures and modelings have been modified by myself
All the rest of the assets are made by myself*



GAME DESIGN OVERVIEW

ABSTRACT

The Staller Moments is an untraditional collaborative racing party game, which translates the British Antarctic Expedition in 1910-13 into the format of interactive media.

INSPIRATION

• Historical inspirations

This game is inspired by the stellar efforts of the British Antarctic Expedition 1910-13, which was led by Robert Falcon Scott, a British explorer who dreamed of being the first person to reach the South Pole.

• A tragedy of a great adventure written by Stefan Zweig

When I first get to know this story, I was reading *Decisive Moments in History: Twelve Historical Miniatures* by Stefan Zweig because I am a big fan of Zweig's in-depth description of human minds. I was immediately impressed by captain Scott's great tragedy, which tells a story of breaking humans' physical limits and a song praising mankind's courage.

• Game mechanics inspirations

So, when I was thinking about my second personal project, I did not hesitate to use this chapter as my background story and looked into the historical picture and equipment analysis related to the captain's expedition. I make reference to a variety of games that preserves history, for example, *Assassin's Creed* and *This War of Mine*. However, I find them either too violent or too depressed and nearly all of them are designed to play alone. Finding Scott's team is hauling hundreds of pounds of equipment by themselves, and their sincere friendship in the expedition, I decided to translate the man-hauling method and cooperative format for my game to preserve this piece of history.

• A game dedicated to all explorers who sacrificed

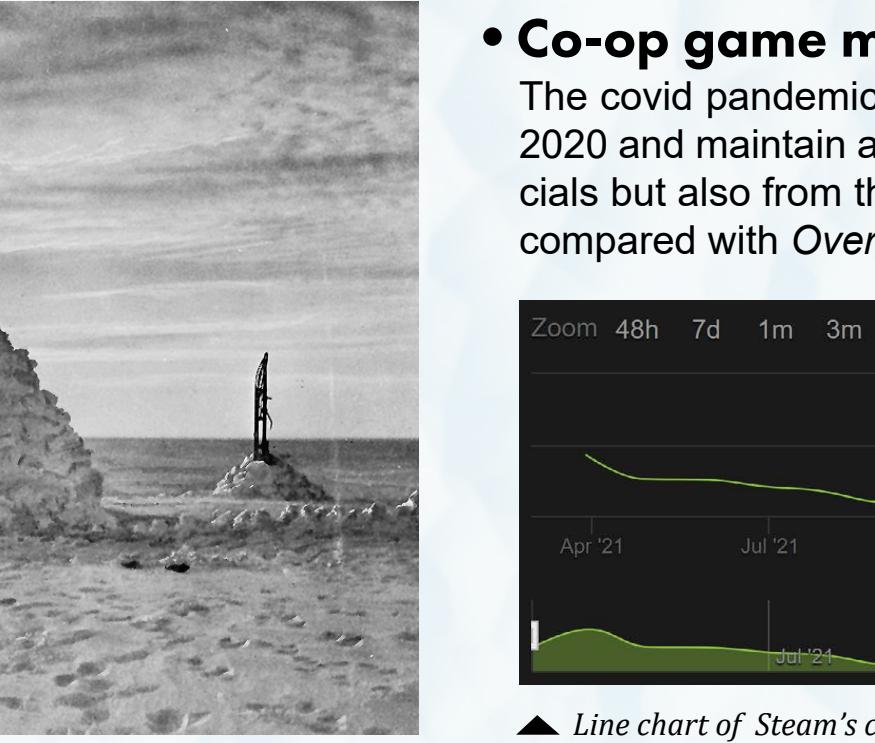
Nowadays, a south pole station is named Amundsen-Scott to memorize this deadly race to the south pole. And there are scientists are carrying out research on this noman's land like captain Scott. I dedicate this game to all the great heroes who sacrificed themselves for human exploration.

GAME EXPERIENCE

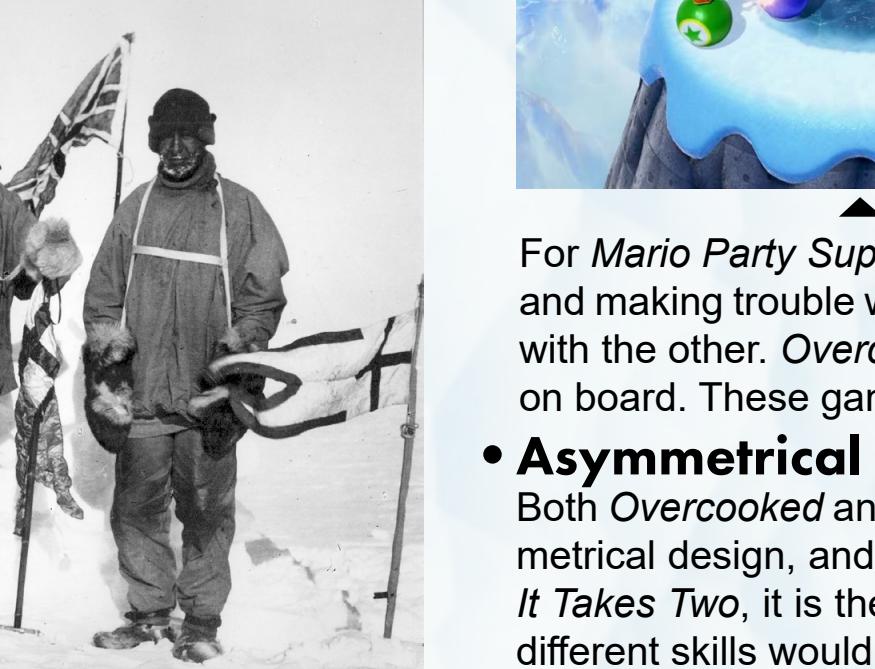
• Player demographics

This game aims to provide a satisfying gaming experience to different types of players. According to Bartle's player type, there are four types of players which are killer, achiever, socializer, and explorer. And by creating a multiplayer cooperative sled racing system, I am trying to attract three types of players.

- Explorers will find this game could let them experience Scott's adventure in the Antarctic;
- Socializers will find great fun in playing this game with their friends, enjoying the joy of cooperation;
- Achievers will get feel satisfaction when they finally arrive at the south pole after countless failures.



▲ A snow cairn was built over the final camp and the bodies of Scott, Bowers and Wilson on the Great Ice Barrier, 12th November 1912.



▼ The South Pole party from left to right - Oates, Bowers, Scott, Wilson, Evans. They reached the Pole on the 18th of January 1912.

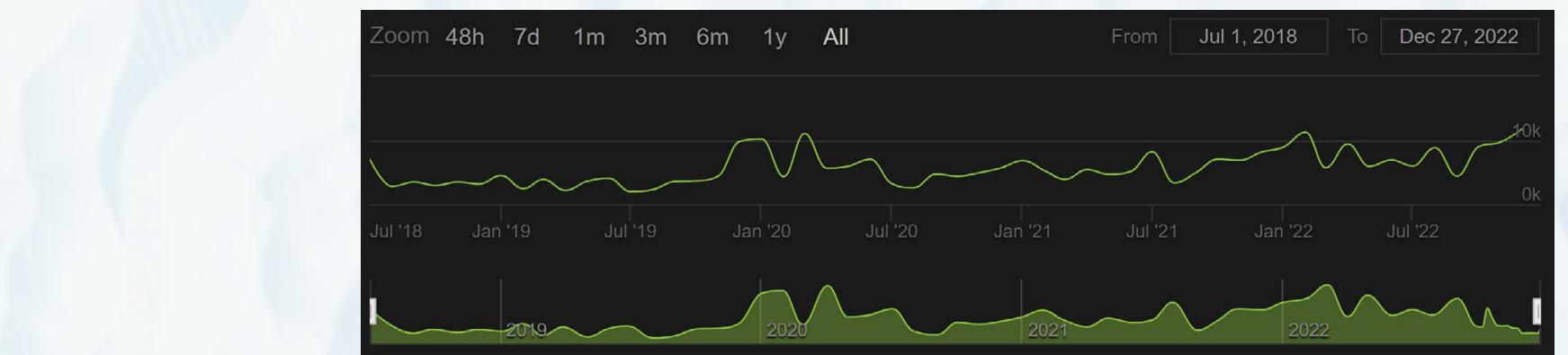
MARKET RESEARCH

• Co-op game market thrives both during and after the pandemic

The covid pandemic helps the co-op game market thrive since the start, which shows clearly in the Steam charts of *Overcooked 2*. Its player group steadily increase from early 2020 and maintain a relatively high population since then, which is usually hard to see when a game is published after a year. *It Takes Two* is a great success not only in commercials but also from the game design perspective. Even though *It Takes Two* is harder to play and more expensive to purchase, the peak of its players online has reached 32,647 compared with *Overcooked 2*'s 11,787. Both games have identical increase and decrease trends as the player population goes up in the summer and holiday seasons.



▲ Line chart of Steam's current *It Takes Two* players from Steam Charts



▲ Line chart of Steam's current *Overcooked 2* players from Steam Charts

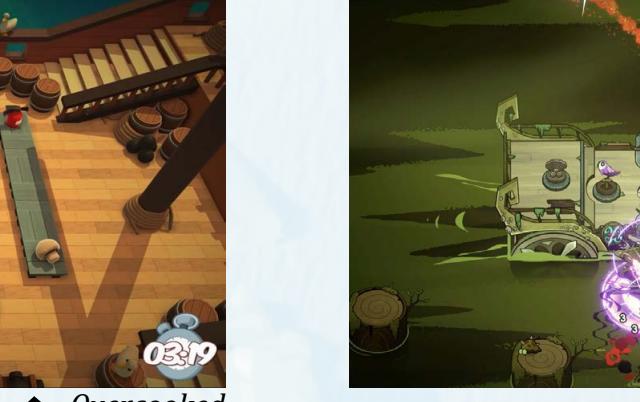
GAME REFERENCE



▲ *Mario Party Superstars*



▲ *Overcooked*



▲ *Ship of Fools*



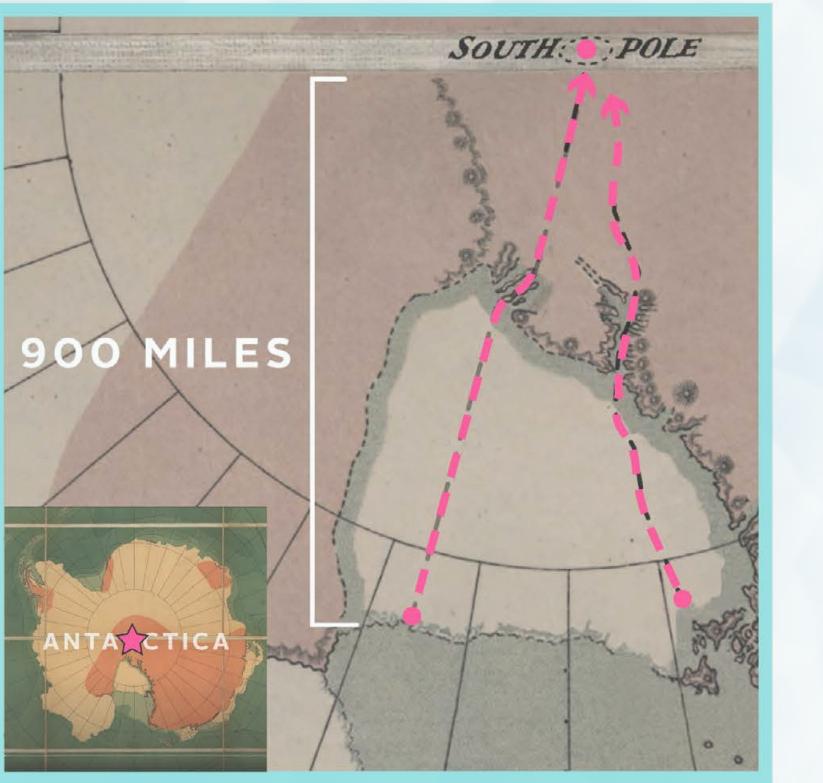
▲ *It Takes Two*

For *Mario Party Superstars*, personally, I only like a few mini-game designs in which you need to learn the skill to fight against your friends. It is focusing on the fun of competing and making trouble with your friends. Considering my game's background is two teams racing to the south pole, I am thinking about record finishing time to let each team competes with the other. *Overcooked* series and the *Ship of Fools* require constant communication and role transitions, watching out not to let the kitchen get on fire or let the enemies get on board. These games inspire me to think that I should design interesting obstacles to push the team to communicate and work as a team.

• Asymmetrical or symmetrical power design?

Both *Overcooked* and *It Takes Two* focus on having cooperative game mechanics in which players have to constantly communicate with their partner because they have an asymmetrical design, and force each player to find their roles. In *Overcooked*, it is the level design that force player who has the same power to keep changing different roles. And in *It Takes Two*, it is the asymmetrical design of ability that forces players to communicate to share the information which the other player needs. Considering players, if they have different skills would drastically increase the difficulty in puzzle designs, I have opted for all players to have the same skill set.

STORYBOARD



Select Expedition Route

Players could choose their expedition route to start. Some roads are shorter but more dangerous, while others are safer but have a longer distance.



Decide How Much to Take With You

Before hitting the road, players could choose how much food they would like to take, more food increases the weight and slows down the speed.



Cooperate to Push Through the Level

Obstacles will slow down the team and trap the player so they need to help each other to get out. The team also need to prevent the sled from turning over.



Survive to Reach the South Pole

The food that the whole team brings will transform into heat which they lose every second, player needs to rush to the south pole before the foods run out.



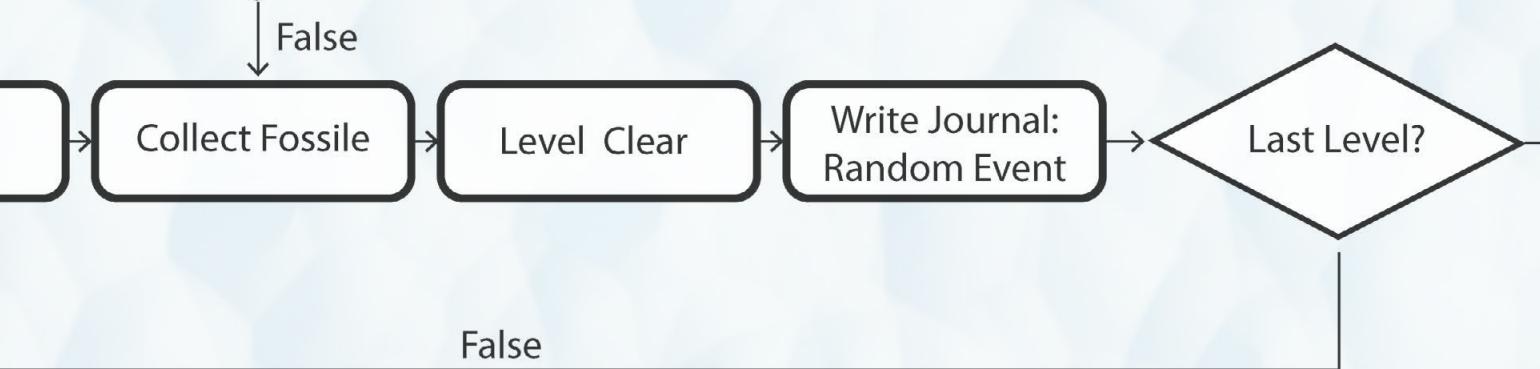
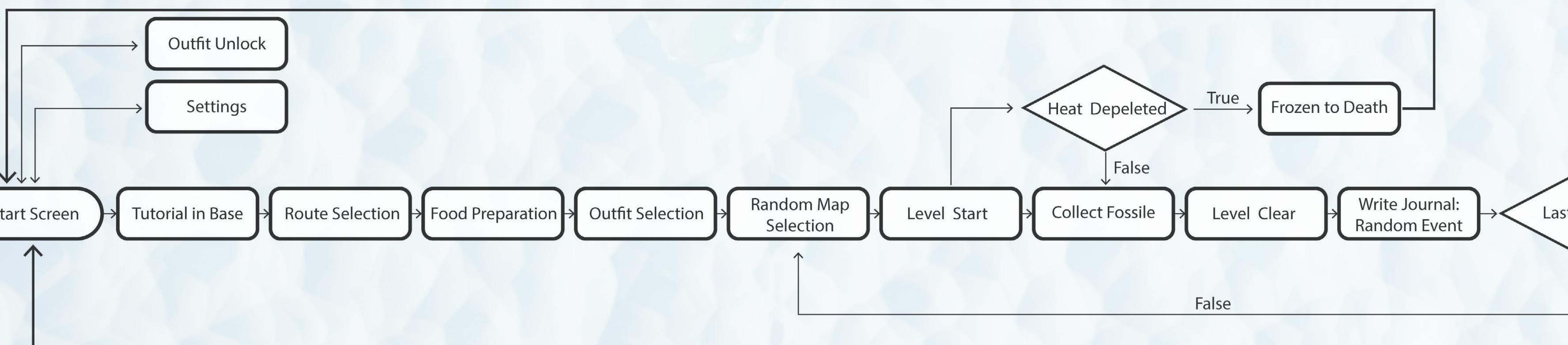
Get Credits and Unlock Cosmetics

Every time players successfully reach the south pole, they will get credits according to the time they use and the collections they find, which they can use to unlock cosmetics.



Play Caption Scott's Story

When players reach the south pole and get back to base successfully for the first time, the game will play the background story to tell the great adventure.



GAME CYCLE FLOWCHART

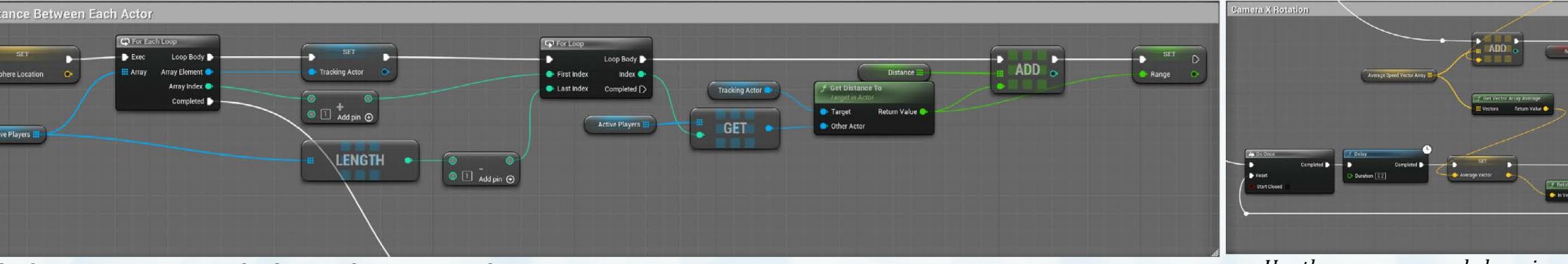
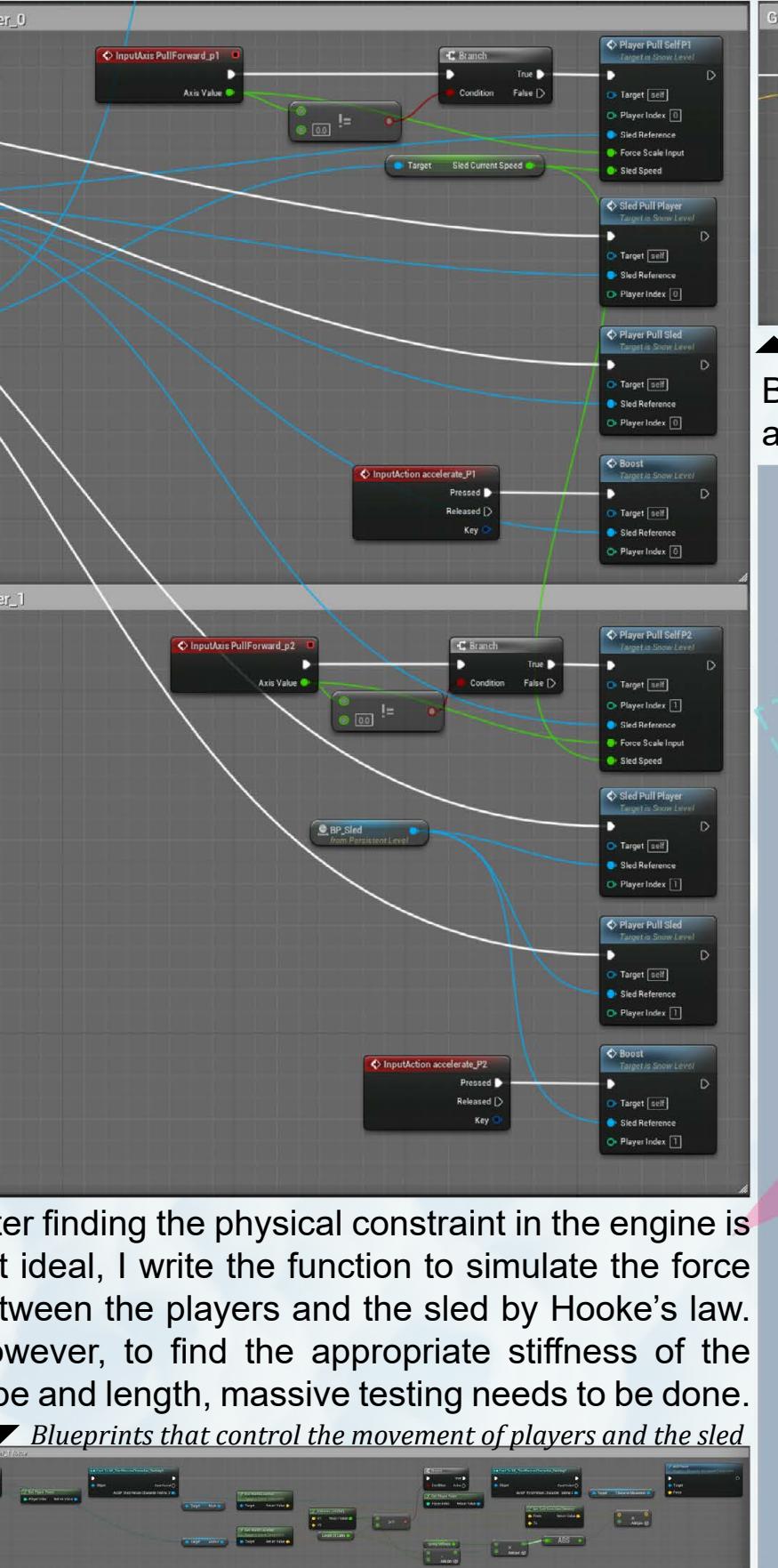
A roguelike cycle to encourage players challenge themselves

The game system is designed to encourage players to constantly try to reach the south pole as there are random events on the way preventing players' team from moving forward as well as random maps to let players have different playing experiences each time.

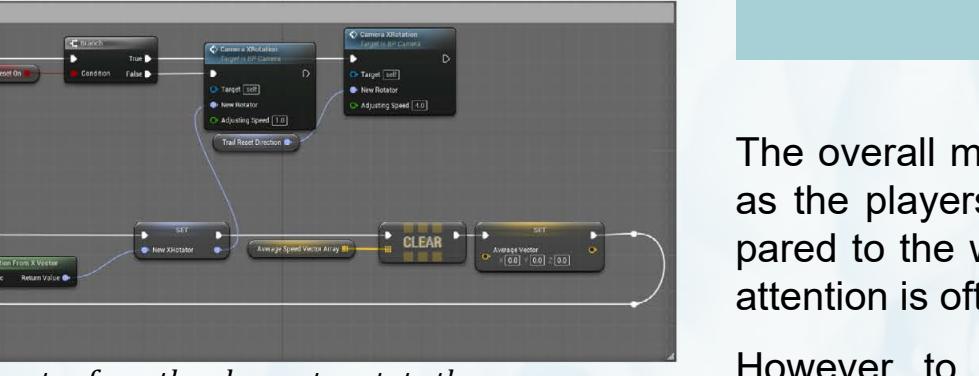
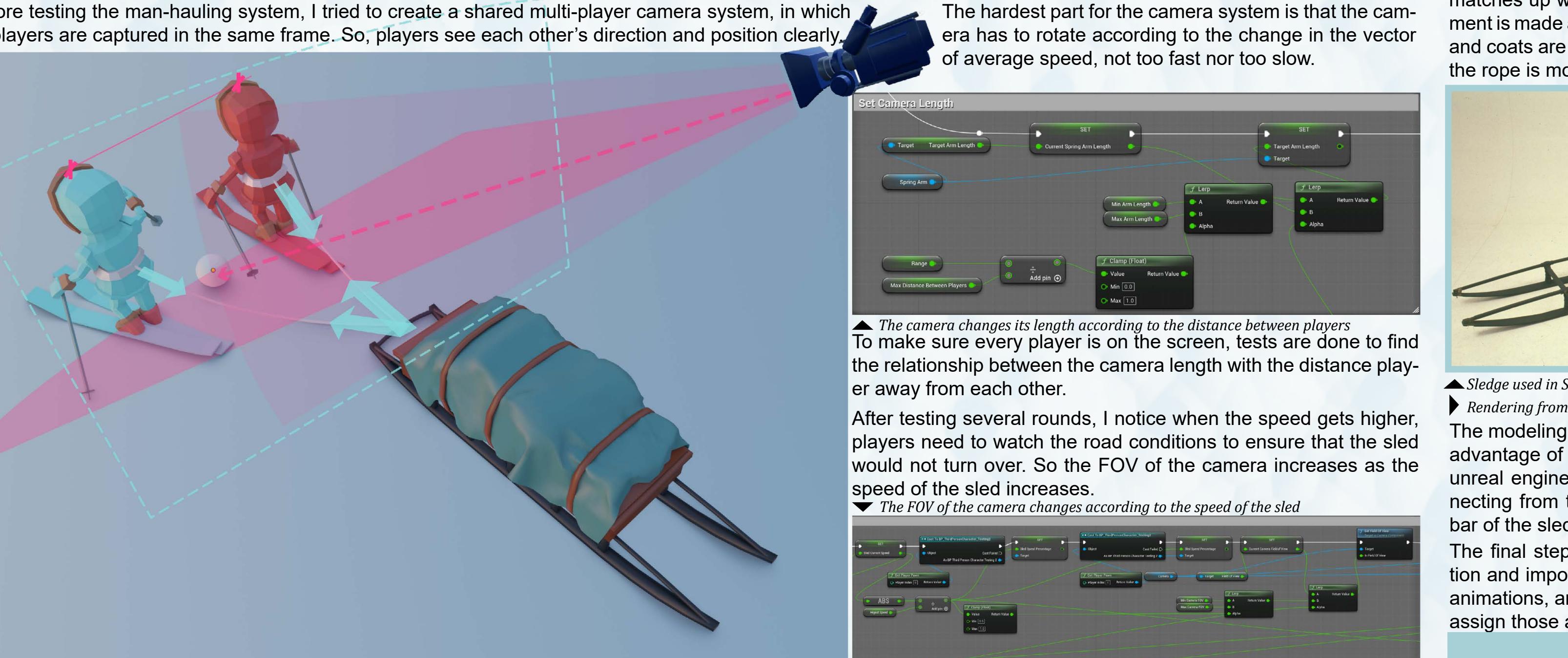
Every travel and collection picked by the team will turn into credits, which could be used to unlock cosmetics to wear in the next round.

THE CREATION OF MULTIPLAYER SLED RACING SYSTEM

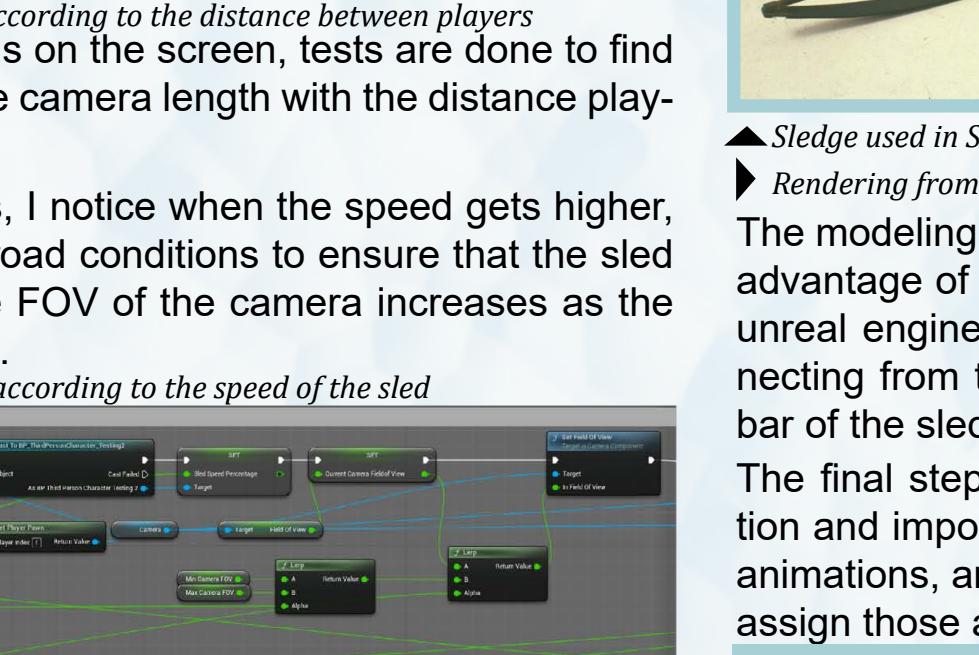
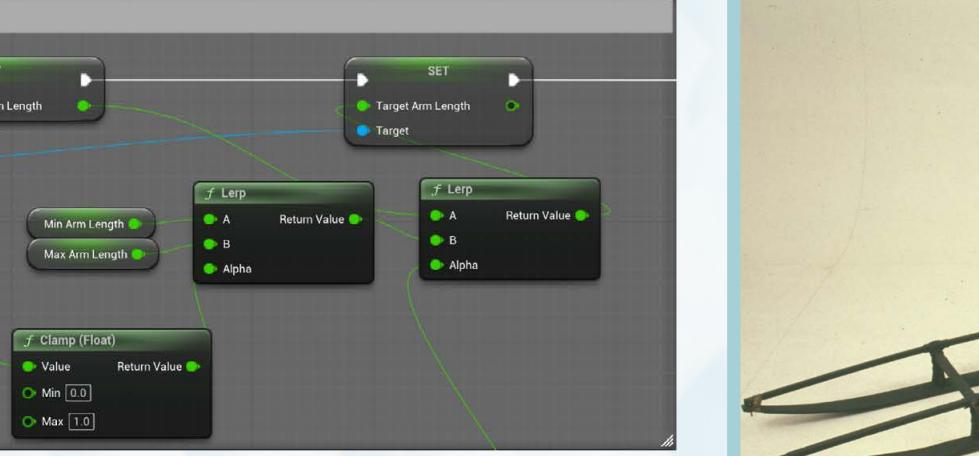
MULTIPLAYER COOPERATIVE SLED RACING SYSTEM



Before testing the man-hauling system, I tried to create a shared multi-player camera system, in which all players are captured in the same frame. So, players see each other's direction and position clearly.



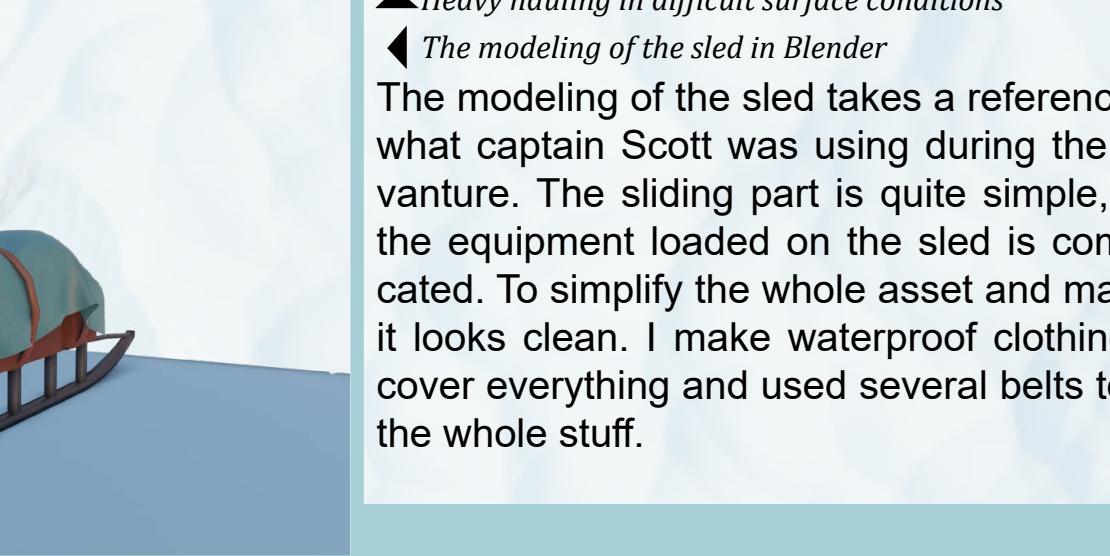
The hardest part for the camera system is that the camera has to rotate according to the change in the vector of average speed, not too fast nor too slow.



SHARED LOCAL CAMERA VIEW

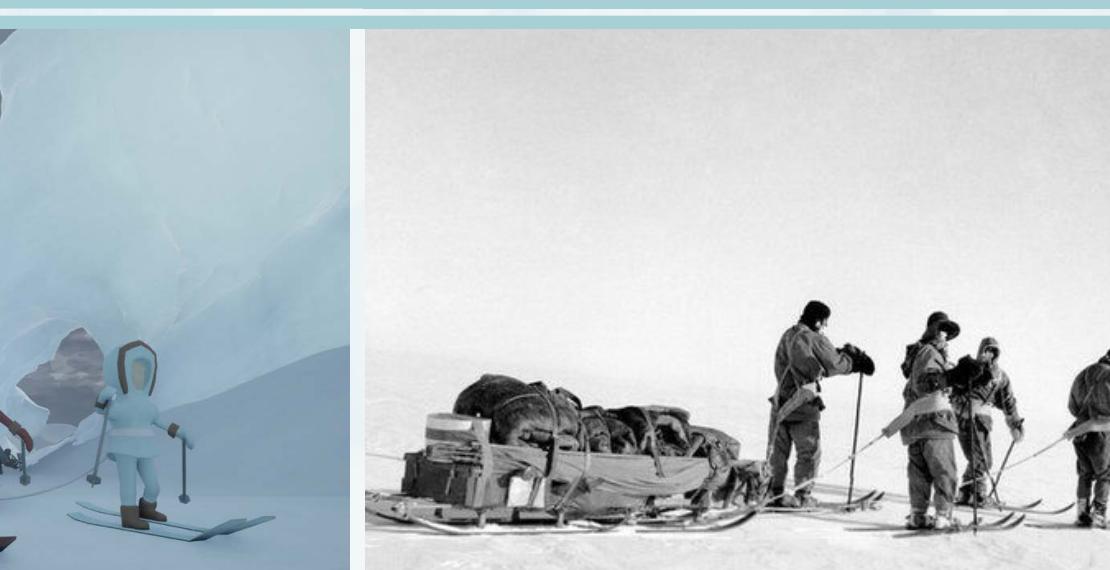
The overall modeling art style takes low poly as the players' team is relatively small compared to the whole environment and players' attention is often on the road.

However, to ensure that this transportation matches up with the history, the skiing equipment is made and features of oversized gloves and coats are modeled. The belt used to hook the rope is modeled to connect to the sled.



The modeling of the sled takes a reference to what captain Scott was using during the adventure. The sliding part is quite simple, but the equipment loaded on the sled is complicated. To simplify the whole asset and makes it looks clean. I make waterproof clothing to cover everything and used several belts to fix the whole stuff.

MODELING



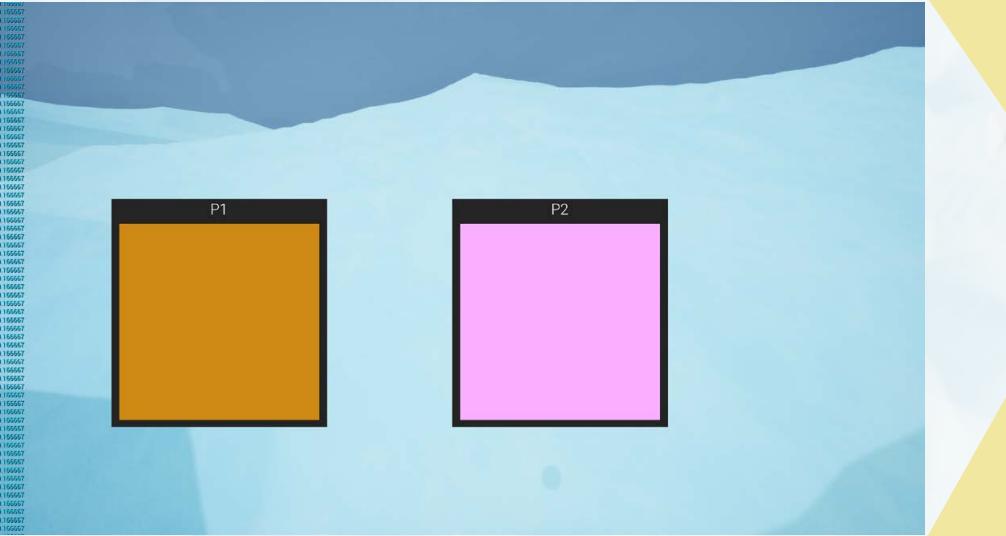
PROTOTYPE

August

Week1 Week2 Week3 Week4

Fragmented developing mode

I use fragments of time to develop this project after the main part of the first project is completed. This is also because this game is consists of multiple system, such as local multiplayer system, force interactions, a shared camera view system, and track designs.



Prototype testing

The local multiplayer system I make right now supports four people. And for most of the testing work, I ask my best friend to do the testing with me. Players select their character's coat color before jumping into the game.

September

Week1 Week2 Week3 Week4



Functionality testing

During the testing of the QTE system and if the obstacles could stop the players, I found that collaborating to control the sled to turn is already hard and fun, which makes all those traps become interruptions for the gameplay and the frequency is too high. The amount required for pressing the QTE is also too much which bores my test players.

October

Week1 Week2 Week3 Week4



Adjustment for the track design

The pictures shown above are the early track design which I found has too many turns and the curve sometimes is unable to get through. During this phase, I straighten the curves and decrease the number of obstacles.

Assistance for the racing system

After that, I find the camera unable to follow the player when the turning angle is too large and deceleration is sufficient. Trying to simplify the game control and gaming experience, I think about the need for speed and have the idea of adding driving assistance.

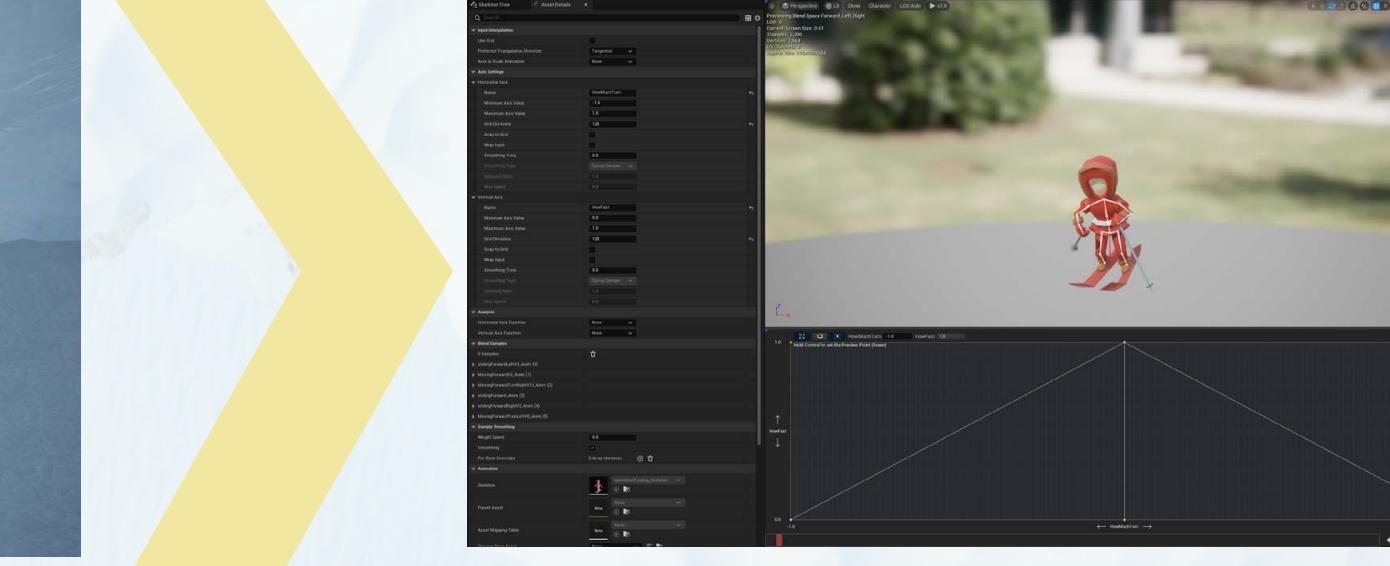
November

Week1 Week2 Week3 Week4



December

Week1 Week2 Week2 Week4



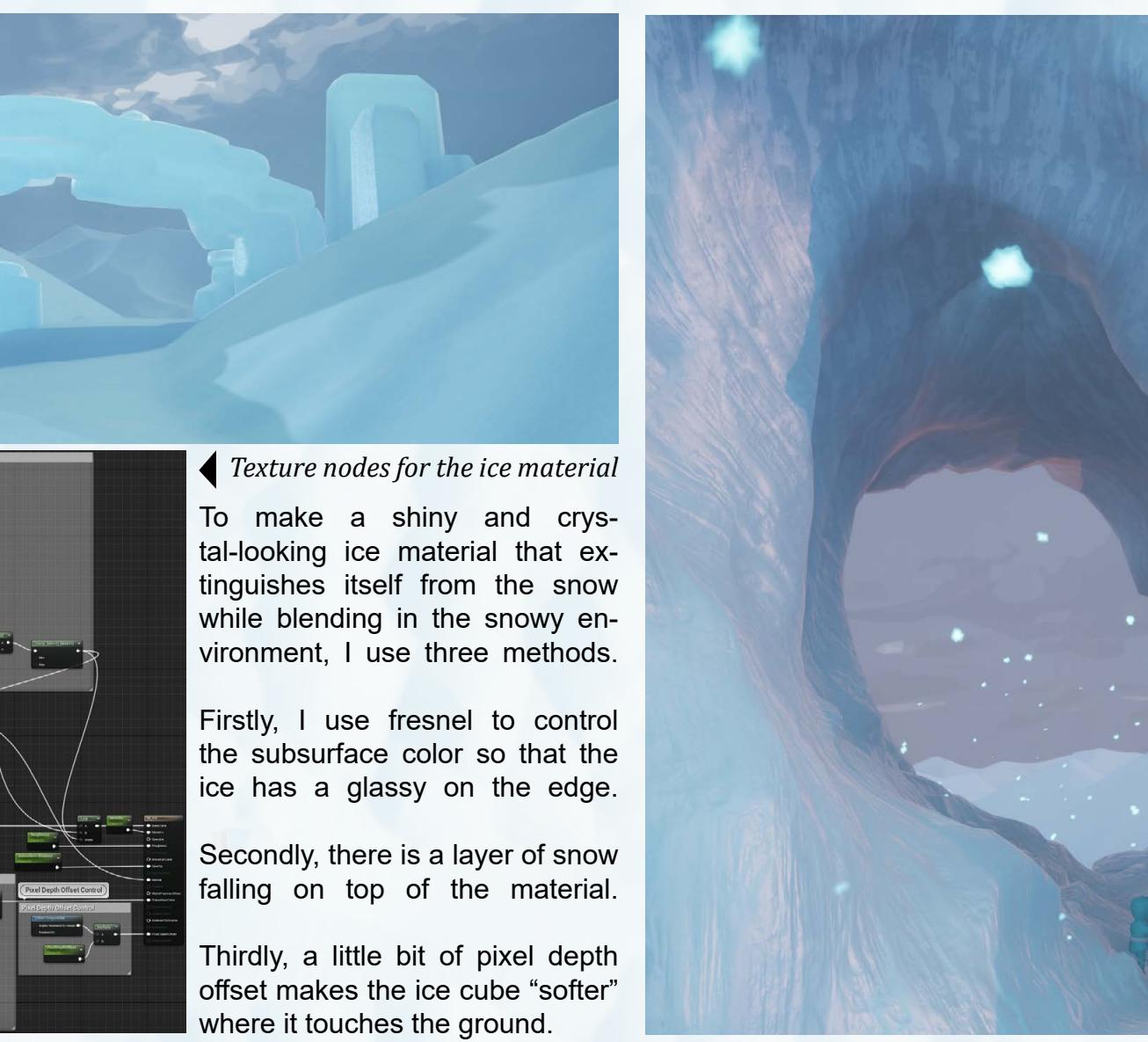
Animation blending and blueprint

Now the game is being optimized for making videos. And I have learned to use blender to generate animations and use blend space in Unreal engine to blend all six animations. The main issue is to optimize animations with controller input so the control and animation will match up. The final video will be uploaded on my personal portfolio website: <https://paidiseyar.wixsite.com/lxstudio>

ENVIRONMENT DESIGN



▼ Texture nodes for the snowy ground



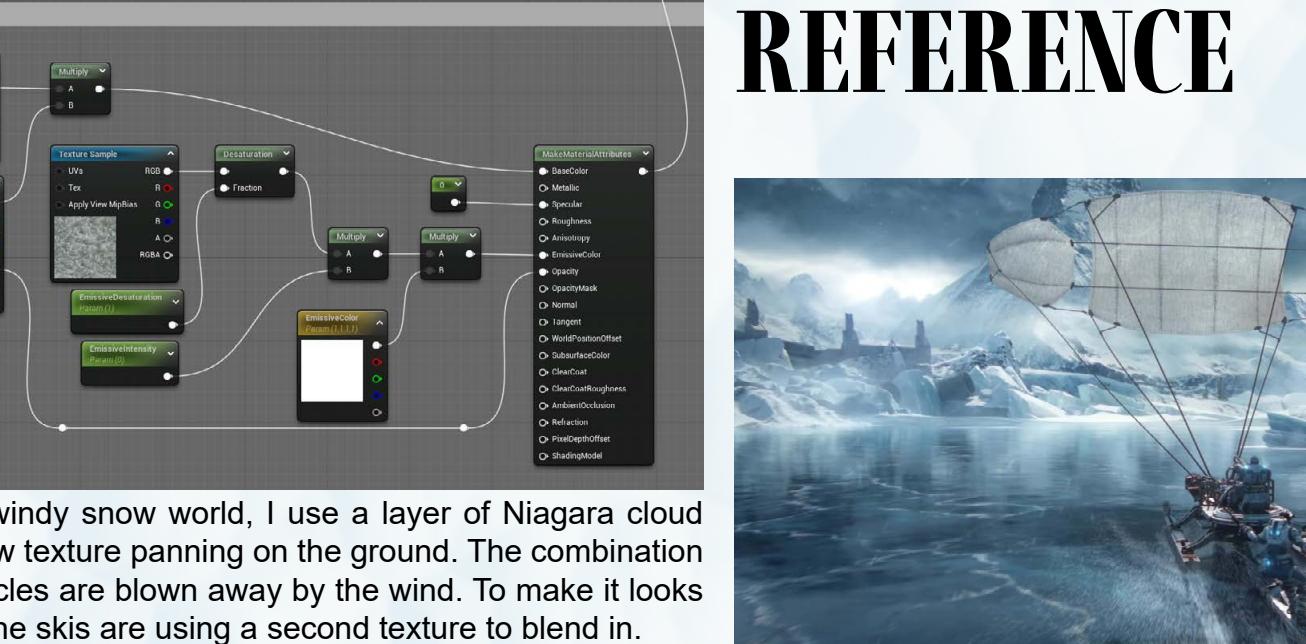
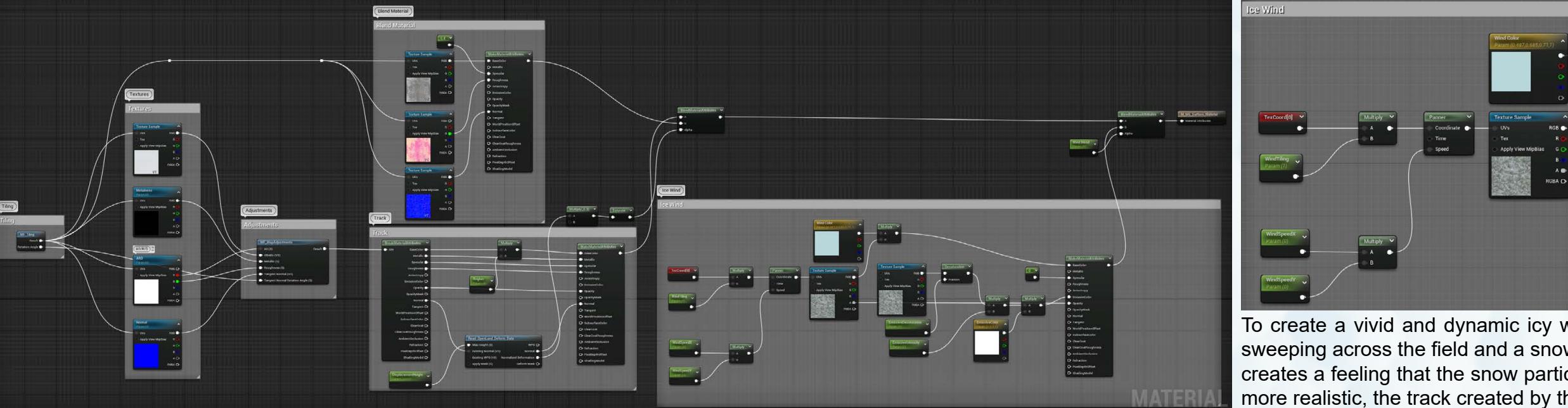
◀ Texture nodes for the ice material

To make a shiny and crystal-looking ice material that extinguishes itself from the snow while blending in the snowy environment, I use three methods.

Firstly, I use fresnel to control the subsurface color so that the ice has a glassy on the edge.

Secondly, there is a layer of snow falling on top of the material.

Thirdly, a little bit of pixel depth offset makes the ice cube "softer" where it touches the ground.



▼ Texture nodes for the snowy ground

◀ Texture nodes for the snowy ground

To create a vivid and dynamic icy windy snow world, I use a layer of Niagara cloud sweeping across the field and a snow texture panning on the ground. The combination creates a feeling that the snow particles are blown away by the wind. To make it looks more realistic, the track created by the skis are using a second texture to blend in.

MATERIAL

◀ Gears 5

This scene inspires me to create a large open frozen lake area as a landmark for the player sliding through.

◀ Battlefield: 2042

I like the overall color tone of this map: BREAKAWAY in Battlefield: 2042. The highly reflective icy surface gives a great visual effect to the ground which makes a rich environment design.

▶ Took by Scott's offical photographe

, Herbert Ponting

Looking into historical photos, I think I could use the cave inside an ice berg to frame certain game play moments and use them as a check-point to generate the next random map.

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I like the overall color tone of this map: BREAKAWAY in Battlefield: 2042. The highly reflective icy surface gives a great visual effect to the ground which makes a rich environment design.

▶ Took by Scott's offical photographe

, Herbert Ponting

Looking into historical photos, I think I could use the cave inside an ice berg to frame certain game play moments and use them as a check-point to generate the next random map.

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THE LITTLE ALCHEMIST

DEVELOPMENT INFORMATION

September 2022, SI559 - Introduction to AR/VR Application Design

Individual assignment, four weeks of VR game design

Position: Game Designer, programmer

The Little Alchemist is a VR simulator that allows the player to become an alchemist to cook potions and do experiments with the potions.

Made for my course assignment at the University of Michigan, Ann Arbor

PREFACE

It is a busy Saturday morning as usual,

*I could hear the market near my house get noisy with the loud
music playing along;*

*It seems like I already have a customer today and the order is
already pinned up on my workstation;*

I better get up and check my Alchemist Manual...

*In this game, let us become a little alchemist whose job is
to create potions at the workstation in her own house.*

*But please watch out my friend,
seems like some ingredients are highly explosive!*

RESOURCES

Part of the models come from <https://sketchfab.com/>.

UV, texture, and modeling have been modified

The rest of the models come from the free assets in the Epic online store, and
the modeling have been modified by me using Blender.

The instructions pinned on the workstation, glass and liquid material textures
inside the flasks are made by myself.



VR PROBLEM STATEMENT & COMPETITIVE ANALYSIS

ABSTRACT

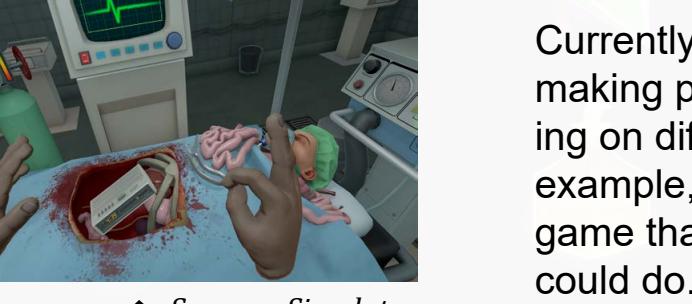
The Little Alchemist is a VR simulator that allows the player to become an alchemist to cook potions and do experiments with the potions. This game also aims to test if complex chemistry experiments could be depicted using VR, to practice doing dangerous experiments.

DOMAIN

This simple little simulator game is trying to test out if the VR tool could be used as an educational tool to develop people's operational skills in the chemistry experiment field. However, in order not to let players confuse the game with real life, causing them to overlook the risk of doing chemistry experiments, this simulator will create a witcher world without recreating the exact same reactions in real life. Thus, this project is standing between the domain of education and gaming.

CONTEXT AND INSPIRATION

The simulator game market share is already quite large in the traditional game industry and VR takes a step forward. Using the motion-tracking head-mounted display and six-axis tracking controllers, players are given full freedom to carry out complex operations in the virtual environment. Inspired by the *Surgeon Simulator*, I was thinking if it is possible to let the player try to learn how to do chemistry experiments.



▲ Surgeon Simulator

CONTRIBUTION

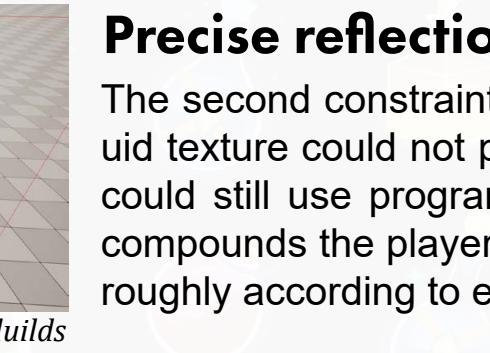
Safe and effective Education
Students will be taught a variety of operation knowledge and learning reactions in a safe environment and at a low cost by using this simulator. Students could do experiments freely and effectively without any limitations.



CONSTRAINTS

Fluid Simulation

The first constraint is that the fluid liquid in the bottle and pouring effect is hard to make, especially considering that in the VR world players could get the flasks and test tubes really close to their eyes to observe. The Unreal Engine 5 has the Fluid Niagara plugin which is able to simulate the collision of fluid, but the shape is limited to square.



▲ Unreal Engine 5: Niagara Fluids

Precise reflection of the reality

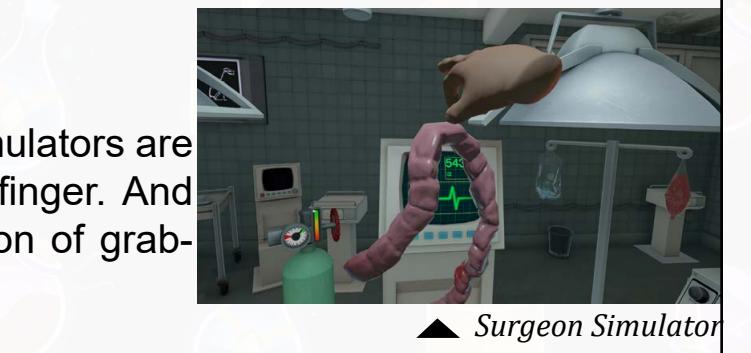
The second constraint is that using variables to control the liquid texture could not precisely reflect the real situation. But we could still use programming to determine the amounts of the compounds the player added and to give them visual feedback roughly according to each reaction.



▲ Half-Life: Alyx

Clumsy VR control

The third constraint is that currently all the simulators are unable to provide detailed control for each finger. And usually, the control is simplified into the action of grabbing, pointing and releasing.

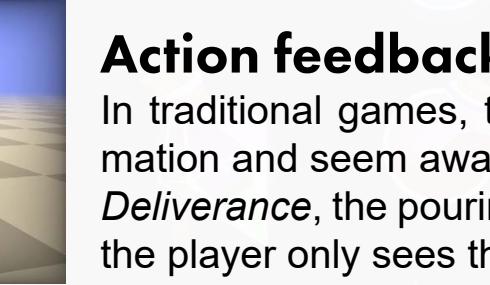


▲ Surgeon Simulator

CURRENT PROBLEMS

High level shader language

I need to make the fluids in the virtual world and the animation of liquid pouring down through the test tubes and flasks. One method I have heard of is using high-level shader language to control how the objects look when the distance between objects are changed.



▲ Ray Marching, and making 3D Worlds with Math

Action feedback is too primitive

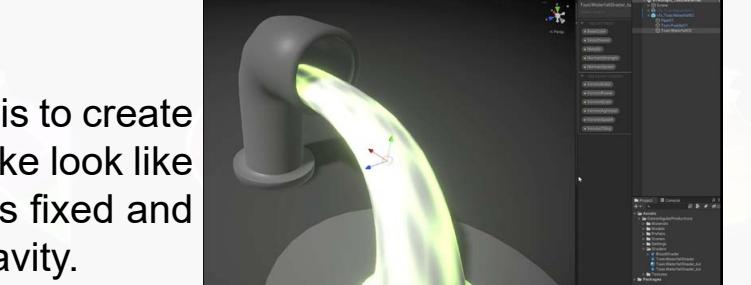
In traditional games, those simulations are simplified into animation and seem awarded. For example, in the *Kingdom Come: Deliverance*, the pouring action doesn't have any animation and the player only sees the water level in the pot increasing.



▲ Kingdom Come: Deliverance

Fixed flowing volume

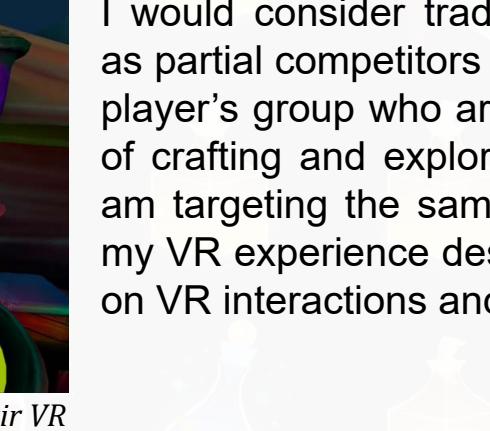
One common way to make pouring animation is to create a flowing texture and give it to modeling to make look like the water is pouring. However, the modeling is fixed and the water will not be changed according to gravity.



▲ Using changing texture to simulate flowing

COMPETITORS IN THE MARKET

Currently, there are not so many VR simulator games focusing on making potions, but there do have VR witcher simulator games focusing on different powers and traditional 2D or 3D crafting games, for example, a game like *Elixir VR*. This partial competitor is a VR witcher game that let players experience all kinds of activities that a witcher could do. They provide all kinds of interactions but the crafting, and the experimenting part is relatively simple and lack imagination. What I am thinking is to enhance the interactions in this perspective.



▲ Elixir VR

I would consider traditional potion crafting games as partial competitors as they aim specifically at the player's group who are interested in the interaction of crafting and exploration of mixing ingredients. I am targeting the same group of people. However, my VR experience design should concentrate more on VR interactions and controls.



▲ Potion Craft: Alchemist Simulator

In the game *Kingdom Come: Deliverance*, the game mechanics also provides an interesting potion crafting system in which players need to mix several ingredients to get the potion they want. However, players don't have to tell how much each ingredient they need to add and the mechanic seems like a waste for using only once because the player could automatically make the potion after it has been made once.

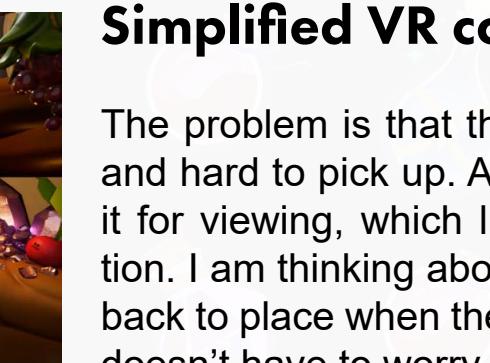


▲ Kingdom Come: Deliverance

VR INTERACTIONS DESIGN

Instruction Display

The very first important interface to consider is how to display the instruction for making all the potions. Including what ingredients are needed to add and how much of them. I am imagining there is a parchment on the table fixed on the table which shows which to add and the amount needed. And when you want to switch to another table to find other ingredients, you could grab the parchment and take it with you like a newspaper.



► A Garden Witch's Life
► Half-Life: Alyx

Simplified VR controls

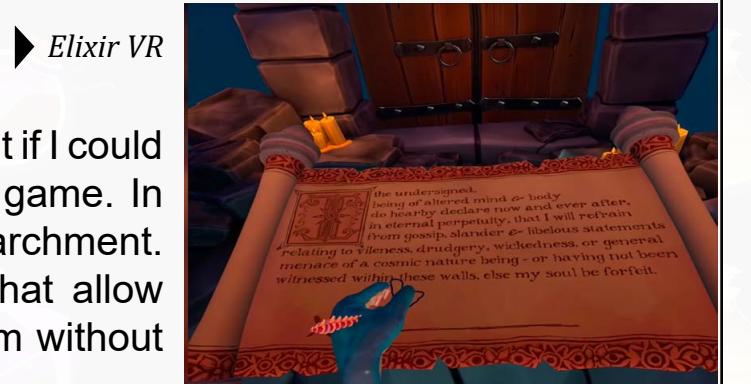
The problem is that the newspaper is easy to drop and hard to pick up. Also, it requires a hand to hold it for viewing, which limits the other hand's operation. I am thinking about a way to get the instruction back to place when the player drops it, so the player doesn't have to worry about picking it up.



► Half-Life: Alyx

Freedom in experimenting

I am also inspired by the *Elixir VR* to think about if I could add more freedom to the interaction for this game. In *Elixir VR*, players could write freely on the parchment. I am thinking about designing interactions that allow players to grab any flask or bottle to mix them without any limitations.



► Elixir VR

VR PROTOTYPE

ENVIRONMENT DESIGN REFERERENCE

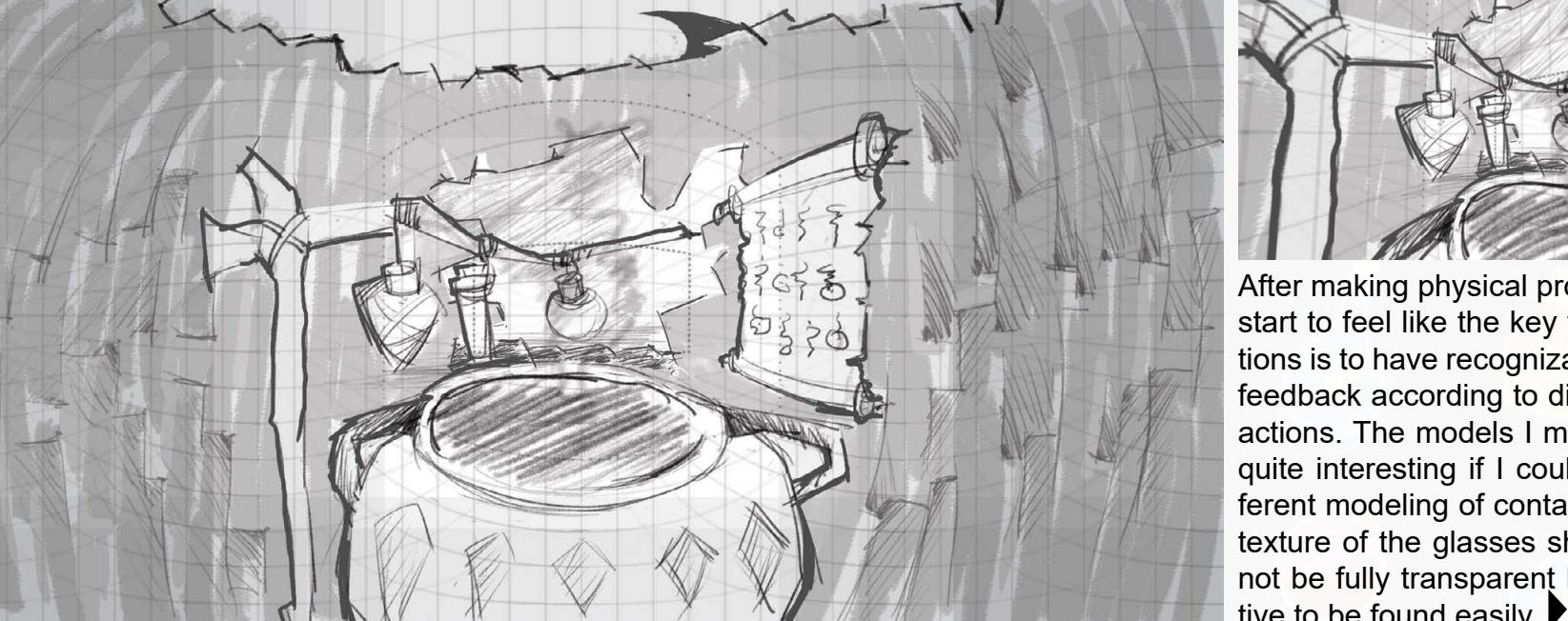


▲ Concept Design from Oliver Beck on Artstation

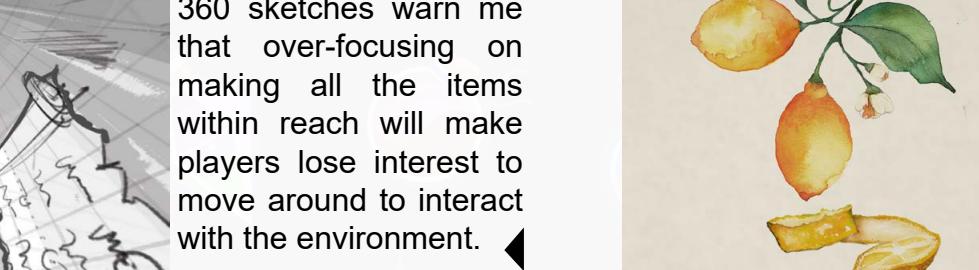
As the alchemist usually means a mysterious occupation who always works in their lab, the concept design I have found also shows an enclosed interior working space with limited sunlight. As my game requires the player to see clearly which potion they need, how much they are adding and the instructions. So, I am thinking about increasing the sunlight and size of the window. This is also a decision for some players who may find it uncomfortable staying in a dark enclosed space like the references shown above.

I am also thinking about using other alchemist-related items to illuminate the interior to create a sense of mystery. This idea later expands to imagine what an alchemist's home would look like when the workshop is combined with his/her home. The environment could also serve the function of storytelling.

PROTOTYPING



After making physical prototypes, I start to feel like the key to interactions is to have recognizable visual feedback according to different reactions. The models I made seem quite interesting if I could find different modeling of containers. The texture of the glasses should also not be fully transparent but reflective to be found easily.



Reflections from physical models and 360 sketches



Buy ingredients according to your orders and needs



Sell potions to your customers to get money



Decorate your house and keep your own pets



Learn to unlock new potion recipes



Grab flasks and pour them into the pot to mix the ingredients



Different mixture will have different effects



The potion you made will react with other objects in the scene

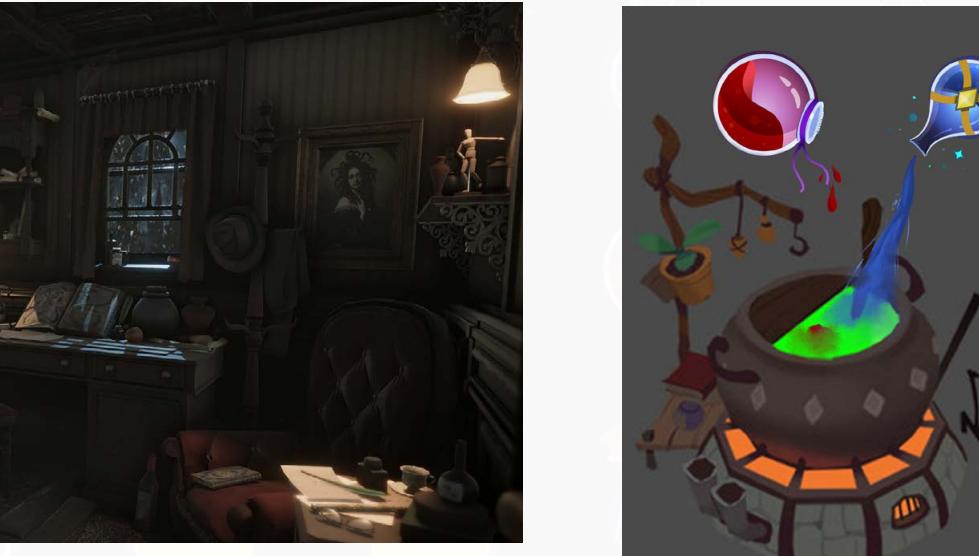


Grab parchment to check the instruction in detail

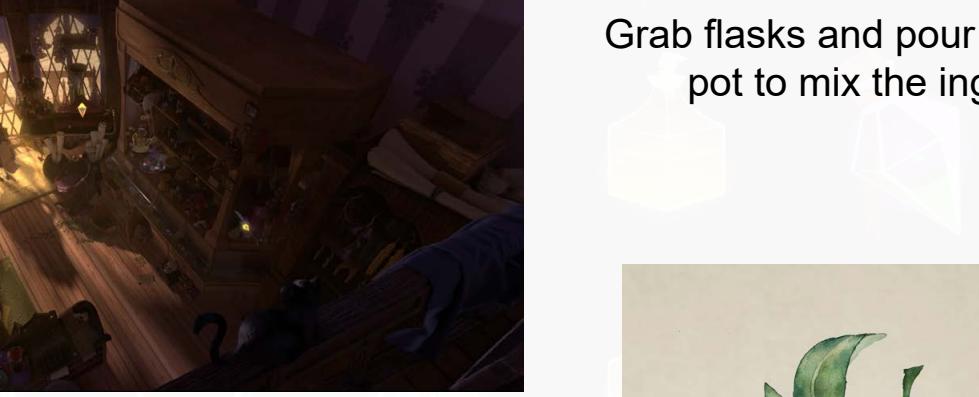


GAME MECHANICS

STORYBOARD



▲ Concept Design from Victor Denoncin on Artstation



► Concept Design from Caroline Ng on Artstation



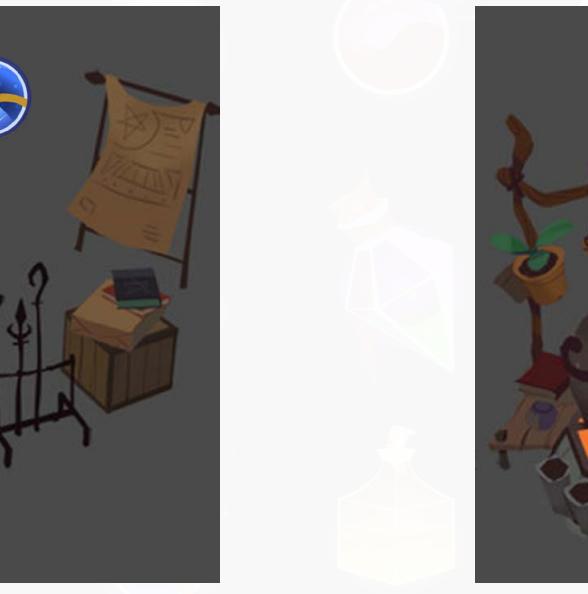
Grab flasks and pour them into the pot to mix the ingredients



Different mixture will have different effects



The potion you made will react with other objects in the scene



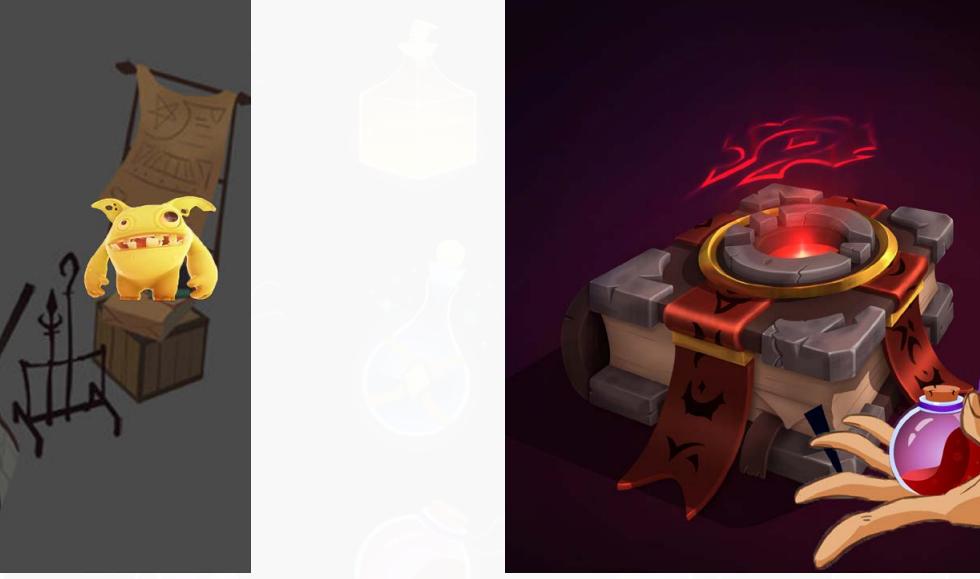
Grab parchment to check the instruction in detail



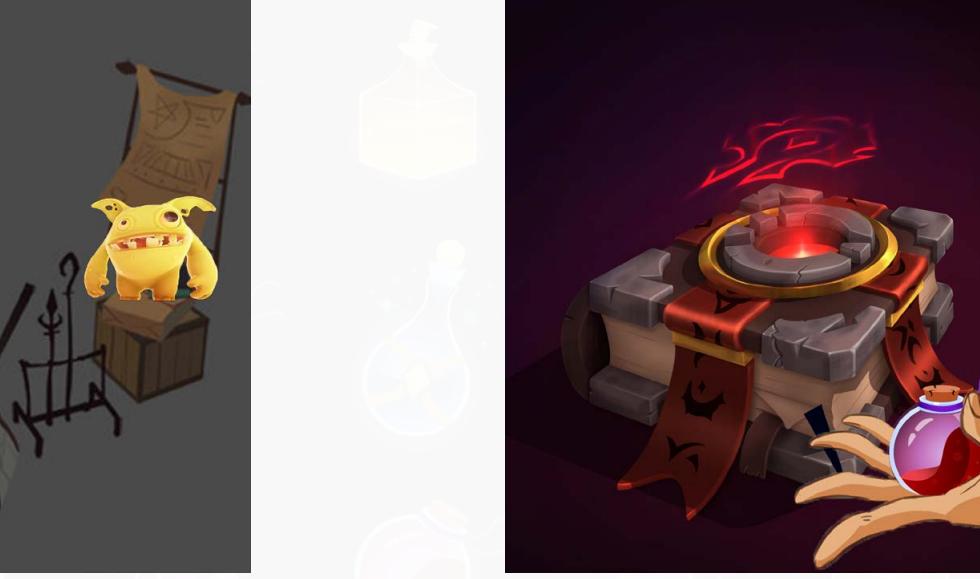
Buy ingredients according to your orders and needs



Sell potions to your customers to get money

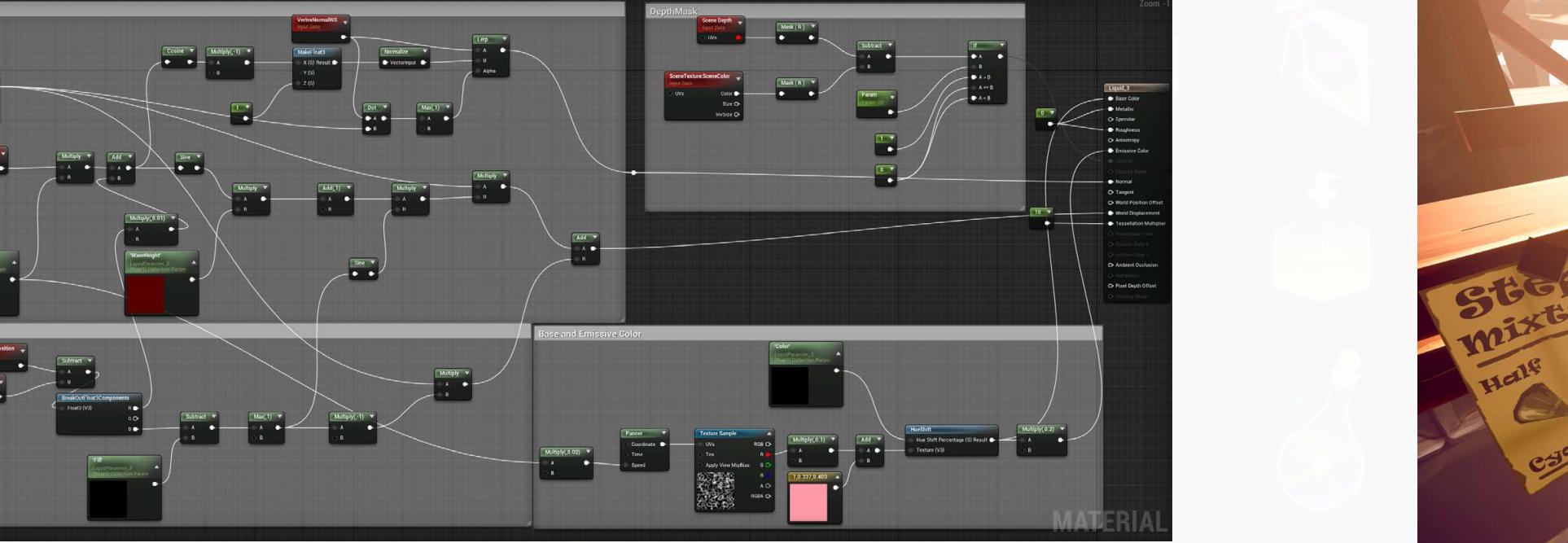


Decorate your house and keep your own pets

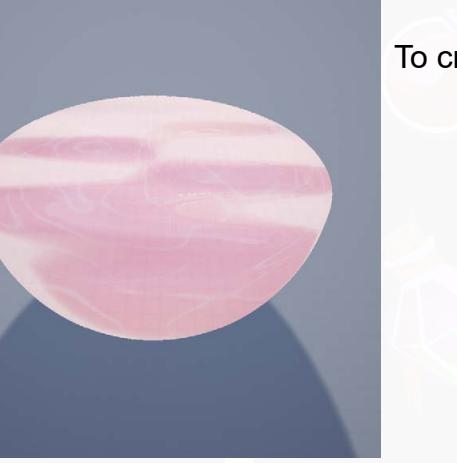


Learn to unlock new potion recipes

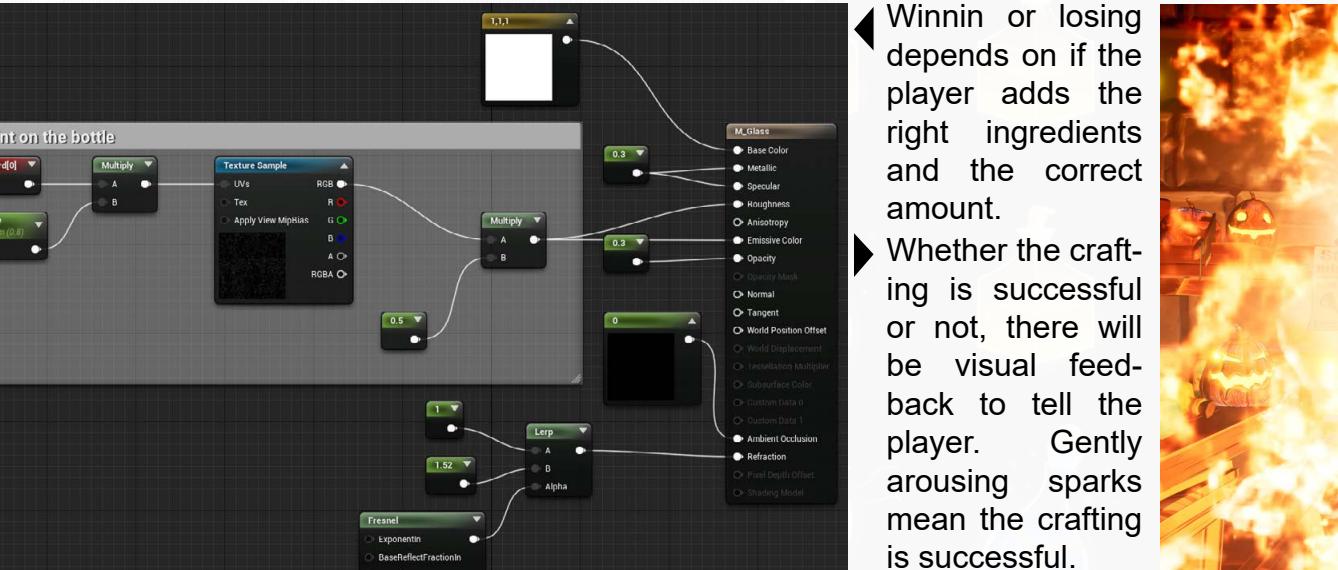
PROGRAMMING TEXTURES AND VISUAL EFFECTS



▲ Texture nodes for the liquid material in the bottle

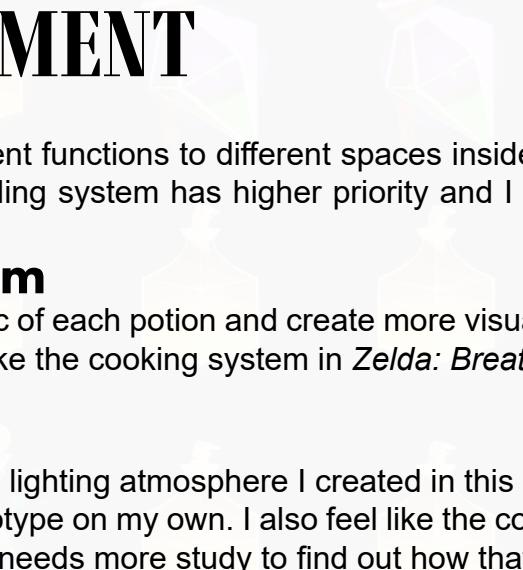


To create a



◀ Winnin or losing depends on if the player adds the right ingredients and the correct amount.

► Whether the crafting is successful or not, there will be visual feedback to tell the player. Gently arousing sparks mean the crafting is successful.



• System expanding

System expanding

System expanding

System expanding

System expanding

THE CANDY SNATCHER

DEVELOPMENT INFORMATION

October 2022, SI559 - Introduction to AR/VR Application Design

Individual assignment, four weeks of AR game design

Position: Game Designer, programmer

The Candy Snatcher is an alternate reality game, combined with AR technology to explore the potential of AR advertising. Made for my course assignment at the University of Michigan, Ann Arbor

PREFACE

Oh my god,

tomorrow is Halloween and I just find our candies are missing!

We still have some left,

but where are all the lollipops we made?

Could it be possible that the ghost just appeared
and took all our lollipops?

And Look!

There are candy wrappers left on the Wall!

We must find someone to help us catch the candy snatcher!

It is Halloween night and our librarian found out that all the
lollipops made for children are missing.

The librarian has put up a poster and there are candy wrap-
pers on the wall as clues.

Please take your phone and help us find the candy snatcher!

RESOURCES

All models come from <https://sketchfab.com/>.
UV, texture, and modeling have been modified.

The poster's material comes from Artstation.

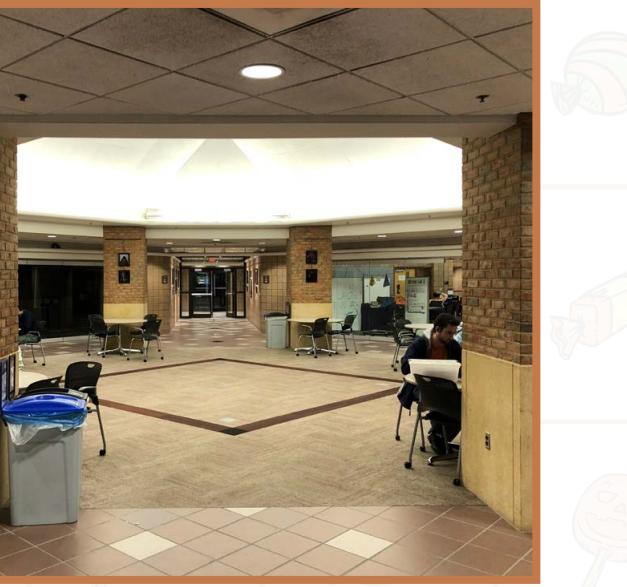
I combine other materials from www.pinterest.com to make the poster.

The candy wrappers are modified from
Dums Dums company's cherry flavor candy wrapper.

All the compass designs are from Pinterest,
being line traced by Adobe Illustrator.



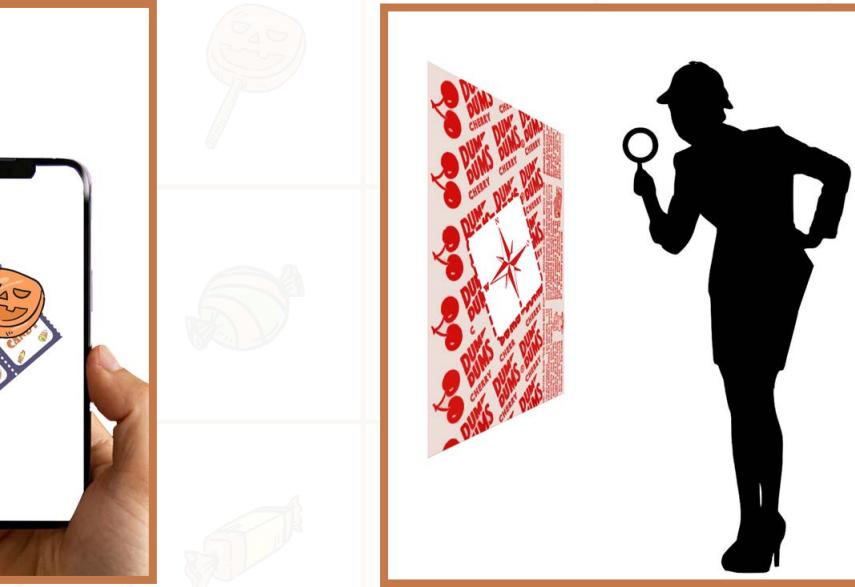
GAME MECHANICS STORYBOARD



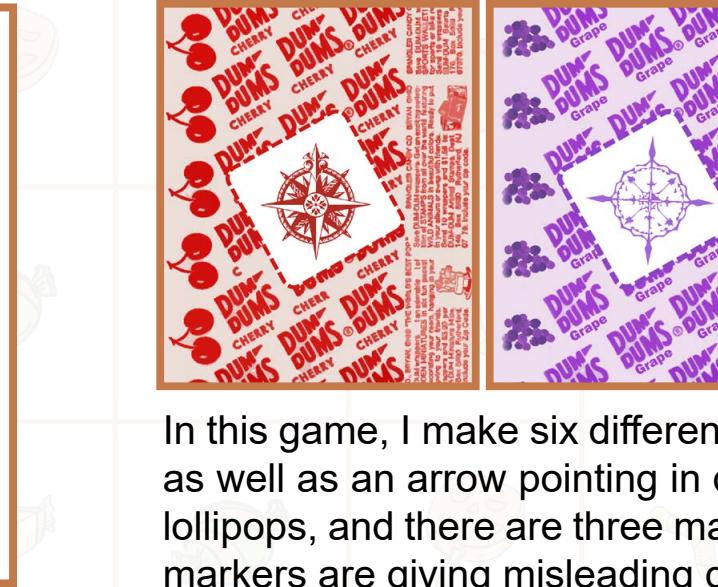
These posters are placed around resting areas



The poster contains a mission, and by scanning the marker on the poster, players get to know what has happened



By scanning the coupon marker, players will know what they could get as a reward



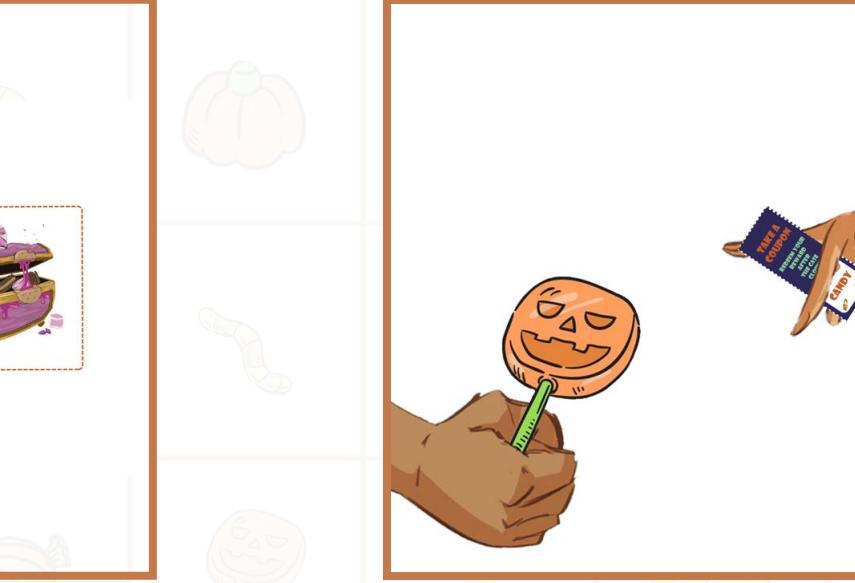
To find the "clues", players need to explore the library they are visiting



Clues will give players a direction, but only the one that matches your tracking object gives the right direction



The destination is a pamphlet, which explains the story and has a final puzzle



In this example, we need to track the missing lollipops, each player has different tracking object



After solving the puzzle, it will tell you where to redeem your prizes, usually at the front desk or exits of the building

CANDY WRAPPER



In this game, I make six different "clues". And by scanning them, each marker is showing a different type of candy as well as an arrow pointing in different directions on the player's device. Players should be tracking the missing lollipops, and there are three markers containing the lollipop icon with correct direction information. The rest of the markers are giving misleading directions.



▶

These "clues" are using different flavors of candy wrappers. And the grape and orange flavor wrappers are designed by me. If this game could be used by any commercial company, then they could replace the Drum Drum candy company's logo with theirs. Players will gradually find themselves memorizing this brand during the gameplay because they are searching for clues with their brand logo.

PAMPHLET



▶ In this game, when players get to the final destination, they will find this pamphlet which contains the ending of this story and the final puzzle waiting to be solved. The final puzzle is simplified because I don't want to confuse and fail the player in the last step.

► I use two strong colors as well as a big question mark in my poster to attract people to participate in this game. The marker in the center is the trigger of a ghost popping up animation, and the marker on the bottom are used to reveal players' tracking object and their rewards.



AR PHYSICAL PROTOTYPE POSTER

FINAL REVIEW



PROGRAMMING

```
16 public void RotateRoller(int WhichRoller)
17 {
18     switch (WhichRoller)
19     {
20         case 0:
21             roller_Model[0].transform.Rotate(new Vector3(120.0f, 0, 0));
22             if(IntRotation[0] == 2)
23             {
24                 IntRotation[0] = 0;
25             }
26             else
27                 IntRotation[0]++;
28         }
29     }
30     roller_Model[1].transform.Rotate(new Vector3(120.0f, 0, 0));
31     if(IntRotation[1] == 2)
32     {
33         IntRotation[1] = 0;
34     }
35     else
36         IntRotation[1]++;
37     }
38     break;
39     case 2:
40         roller_Model[2].transform.Rotate(new Vector3(120.0f, 0, 0));
41         if(IntRotation[2] == 2)
42             {
43                 IntRotation[2] = 0;
44             }
45             else
46                 IntRotation[2]++;
47         }
48     }
49     break;
50 }
51 public void RotateBackLever()
52 {
53     switch (WhichRoller)
54     {
55         case 0:
56             roller_Model[3].transform.Rotate(new Vector3(-90.0f, 0, 0));
57             if(IntRotation[0] == 2)
58             {
59                 IntRotation[0] = 0;
60             }
61             else
62                 IntRotation[0]++;
63         }
64     }
65     roller_Start();
66     for (int i = 0; i < roller_OriginalAngle.Length; i++)
67     {
68         roller_Model[i].transform.Rotate(new Vector3(roller_OriginalAngle[i], 0, 0));
69     }
70 }
71 void Start()
72 {
73     roller_Start();
74 }
```

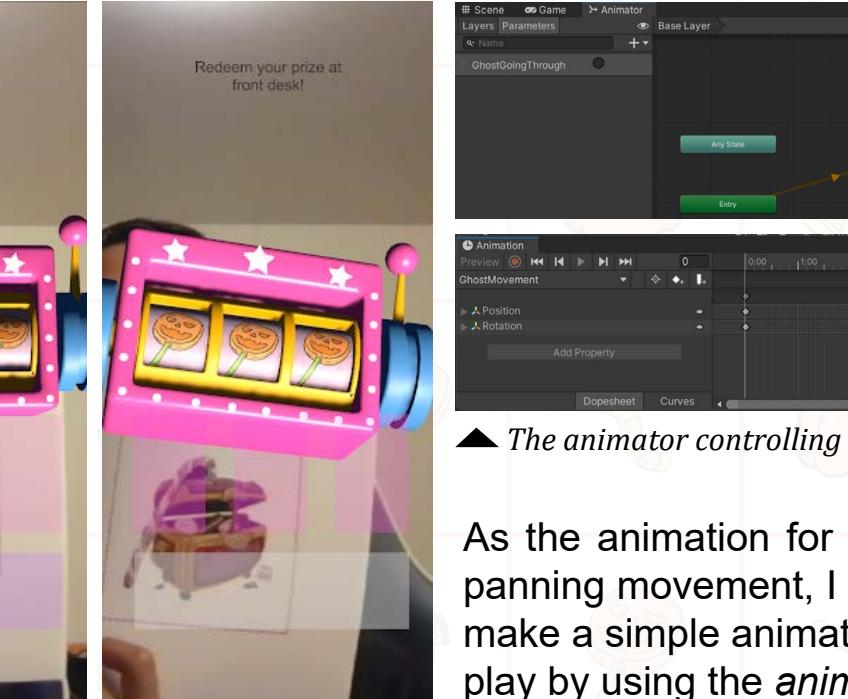
For the final puzzle, there are four buttons on the interface. Three of them is controlling the scroll of the roller, and the button on the bottom controls the lever, triggering the function to open the chest.

The scripts I wrote for the final puzzle

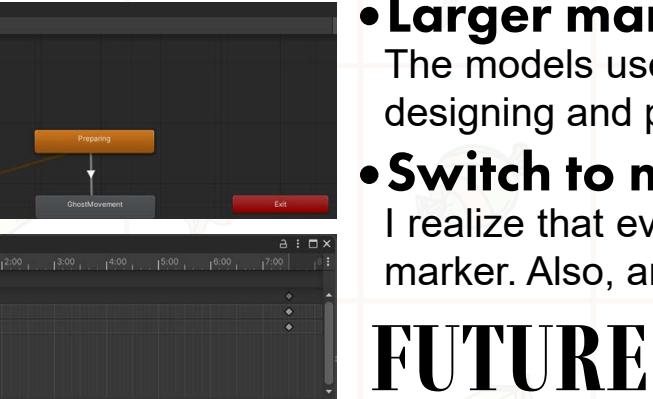
```
59 public void OpenChest()
60 {
61     //rotate the lever
62     roller_Model[3].transform.Rotate(new Vector3(90.0f, 0, 0));
63     //determine the chest open or not base on the angle
64     for (int i = 0; i < roller_AngleX.Length; i++)
65     {
66         //roller.AngleX[i] = roller_Model[i].transform.rotation.x;
67         //Debug.Log(roller_Model[i].transform.eulerAngles.x);
68     }
69     //if all angle = 0, open the chest
70     if (IntRotation[0] == 0 && IntRotation[1] == 0 && IntRotation[2] == 0)
71     {
72         Debug.Log("showText");
73         Debug.Log("showText");
74     }
75 }
```

After using debug to find out that the rotation angle would not go bigger than 180 or small than -180 degrees, we could make it show the text when all the roller rotation angles equal zero.

Screenshot of testing the final puzzle



As the animation for the ghost is just a panning movement, I used the engine to make a simple animation and control the play by using the animator.



The animator controlling the ghost

REFLECTIONS

- Larger marker with more complex puzzles**

The models used in this demo are quite simple and the scripting is also quite simple as well because it is the first time I learn to use the market-based system. I am thinking about designing and printing a larger marker so that I could create a small scene above the marker to build a more complex puzzle.
- Switch to markerless AR**

I realize that even though the marker-based system is quite stable when it is recognized by the camera, the markerless system will be the future as it is not limited by the physical marker. Also, another problem found in the testing is that the web camera I used has a terrible focus function, which makes the recognition process take too long.

FUTURE DEVELOPMENT

- Adapting and upscaling**

I feel like this game format could be held in a lot of public places, like supermarkets or malls. The process of finding markers will give the players a different perspective exploring the building they are familiar with. The clues could also be changed according to the narrative and the environment. The scale of the story and exploration area could be increased.

- Commercialization**

By changing the reward and the advertising brand, this game could work with different commercial partners to advertise a variety of products. I am also planning to learn the markerless system to see if the game will have a better game experience when it is free from the marker.

MEMORY CONTAINER

DEVELOPMENT INFORMATION

January 2023, Assignment for Arch 509

Position: Programmer, Artist, Technical Artist

Memory Container is an AR social media puzzle game that is currently under development of the concept.

PREFACE

Did you have any objects that are torn away but you just don't want to throw them away?

It may be because it might look like trash to others but they are precious to you, to your memory

So, how about trying to give them a digital eternal life that is recorded forever with you? To record your memory forever?

*To let it become,
your memory container*

RESOURCES

All the models are exported from the Reality Capture by myself

The shader is written by myself

The textures used in different materials are downloaded from the Internet



APPLICATION DESIGN ANALYSIS

ABSTRACT

Memory Container is a social media application, that focuses on using photogrammetry to record daily objects and the space they have been to. Users use the format of puzzles to share stories within the scanned objects with each other.

BACKGROUND

As markless AR technology developed, the technology used in 3D reconstruction systems made photogrammetry more and more precise and efficient. Through tracking and registration, the reconstructed 3D models could be easily loaded in an AR environment to facilitate displaying, interacting, and rendering. Thus, I assume there is the possibility that photogrammetry becomes the mainstream way of recording people's daily life.

INSPIRATION

Japanese Iwama published a video in 2022, in which he shows all the hotel rooms he has been to in the format of AR models. I was surprised to find how convenient and precise it is for him to use Metascan on his iPhone 12 pro to record the space. Since then, I have had the idea of developing a social media app where people share their daily life using photogrammetry.



▲ Iwama uses Metascan on his iPhone 12 pro to record the hotel room he has been to

PROBLEM STATEMENT

There are a few similar application designs, but I think the driving force for the users to use their app is insufficient because photogrammetry takes time and the efficiency is too low compared to photo or video-based social media apps. Therefore, I believe exploration and interaction should be the driving force.



▲ Ubiquity6 Launches Displayland, an Instagram for Photogrammetry

UI DESIGN

Content Creator

Every user could publish their own memory story on the app for others to solve the puzzle and discover others' stories.

Scanned Models

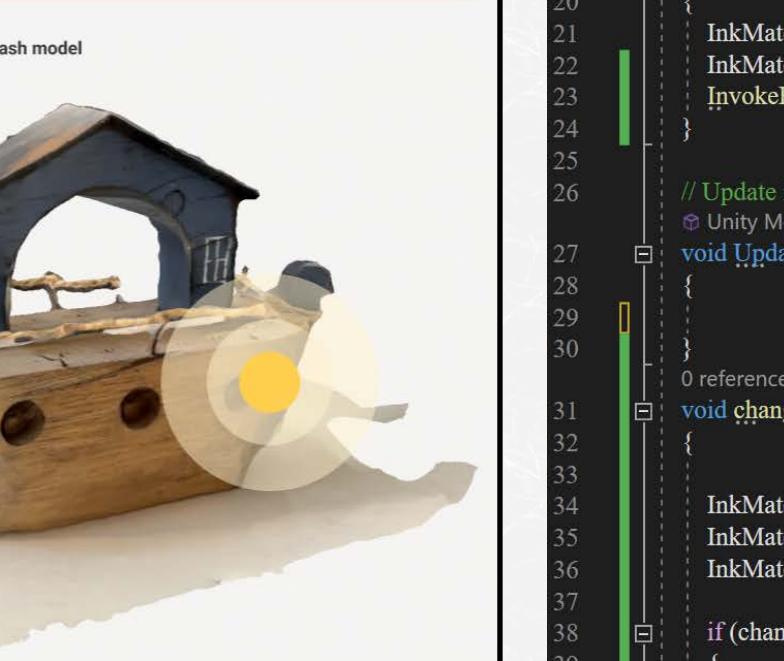
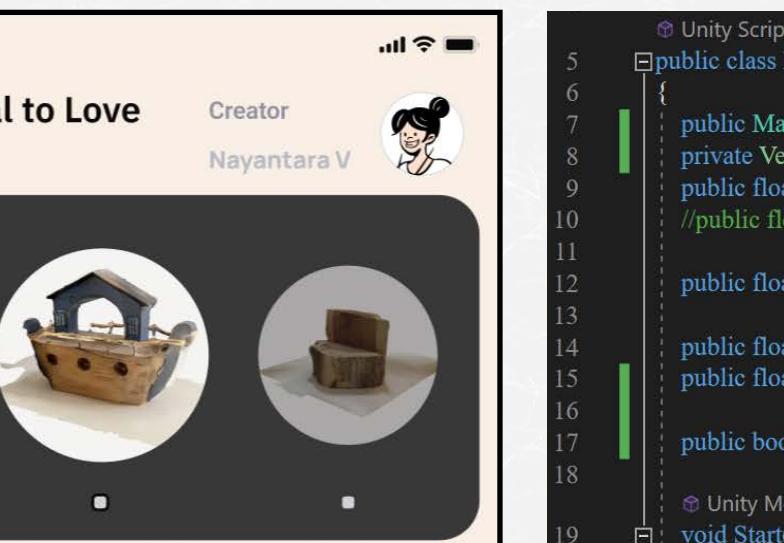
The content creator will hide the clues in the models they scanned. Each object will have several hidden clues. Other players could switch between the collections to find them.

Hint

Hits will be displayed above the central area to tell players what should do next.

Find clues hidden in objects

Players need to rotate and zoom to check the object in detail to find the clues that could reveal the author's story. If players spend too much time without successfully finding one, the system will use centric yellow circles to show the approximate location of the clue.

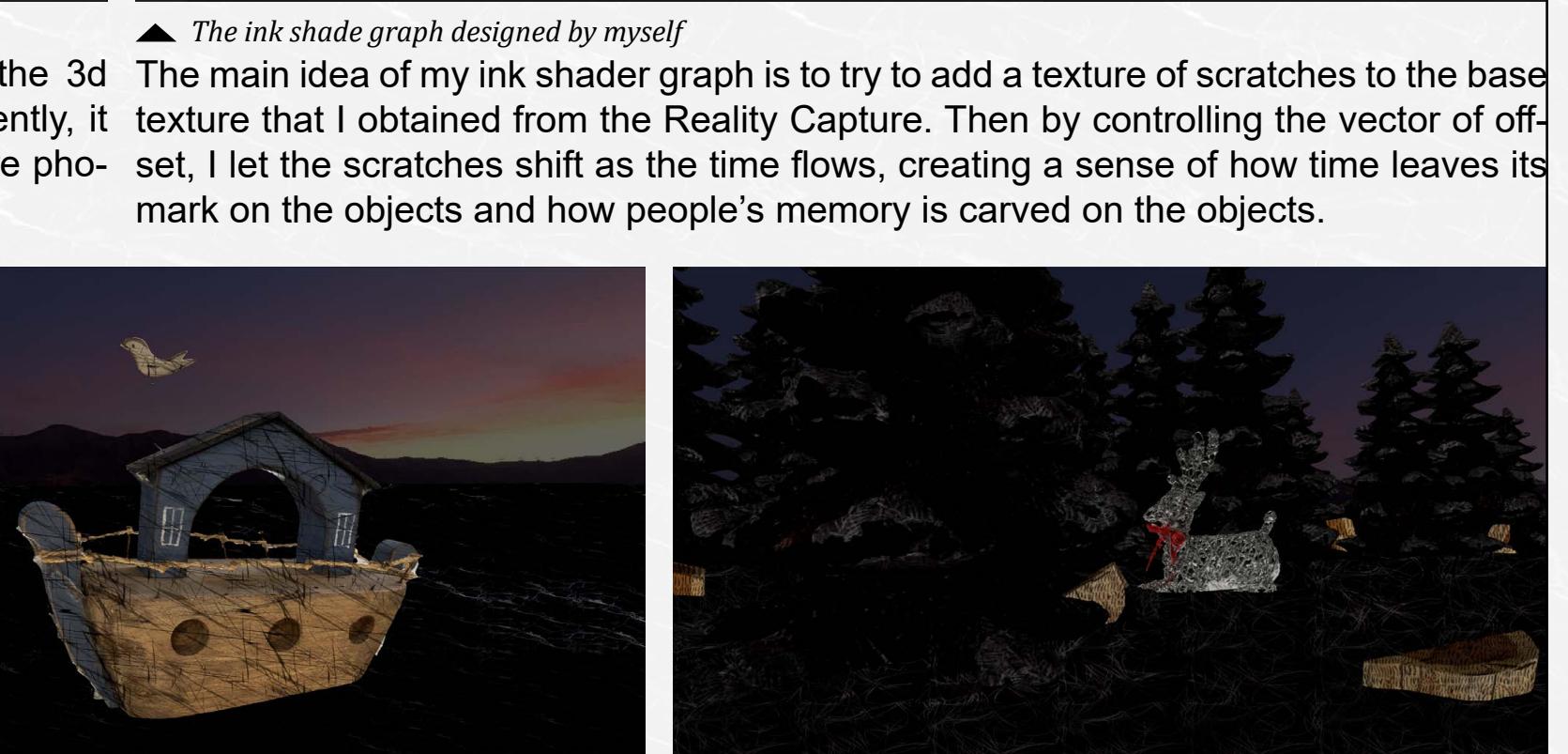
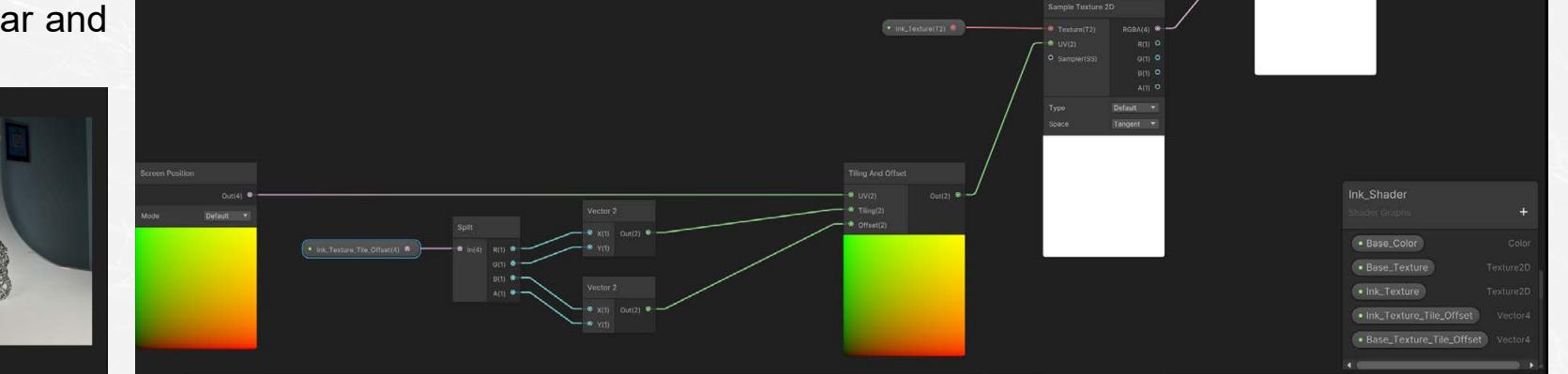
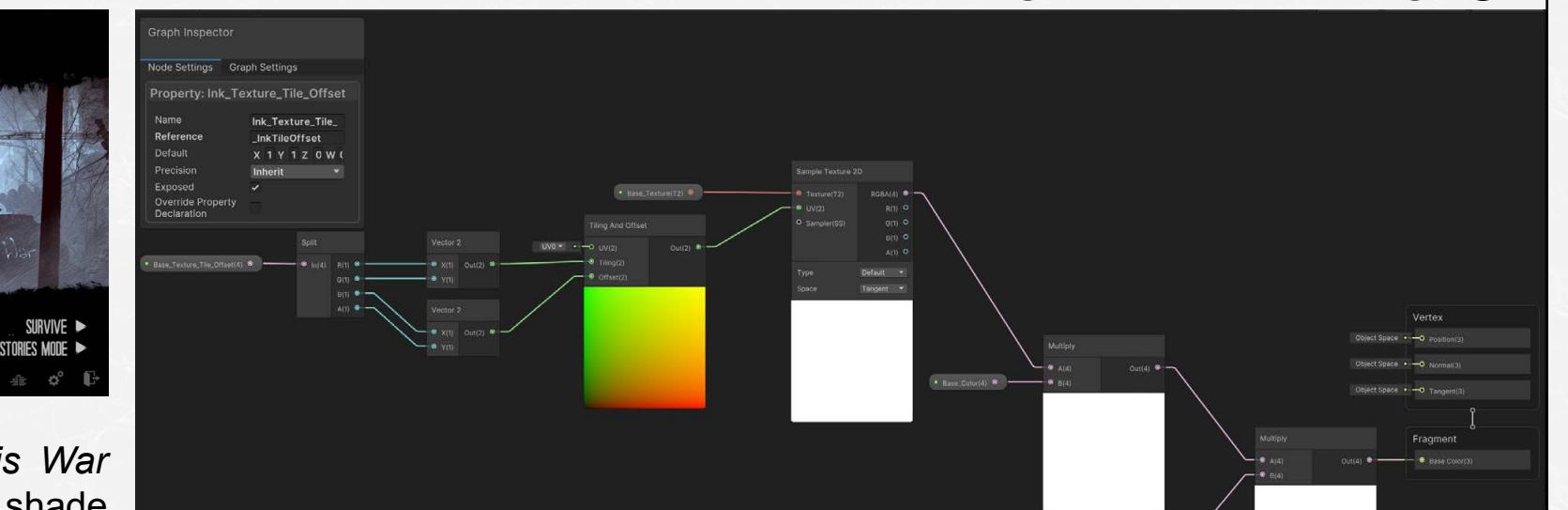
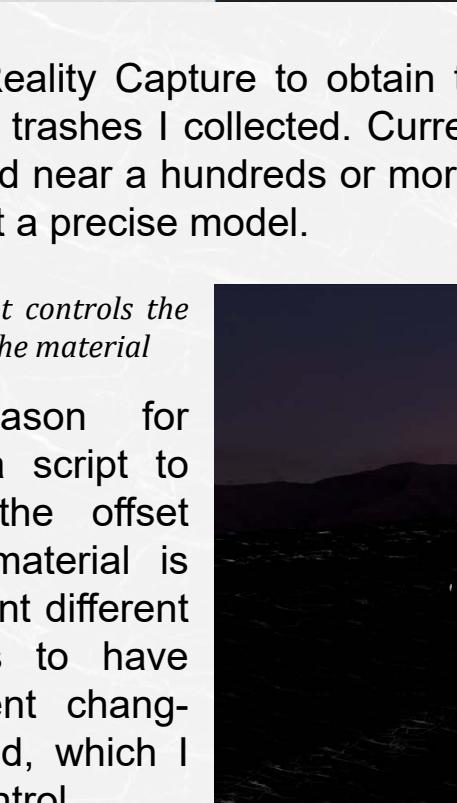
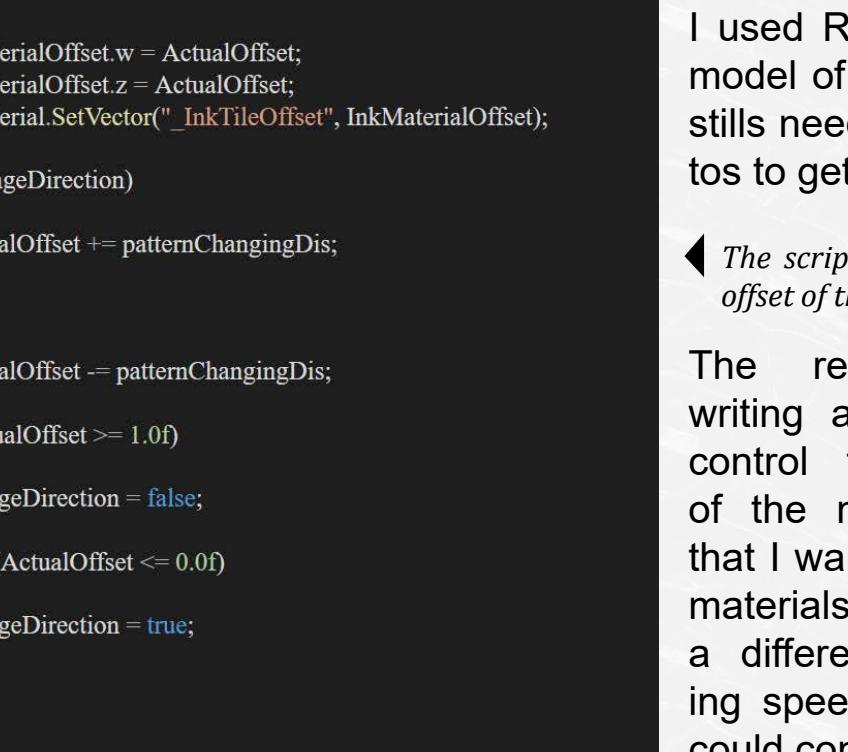
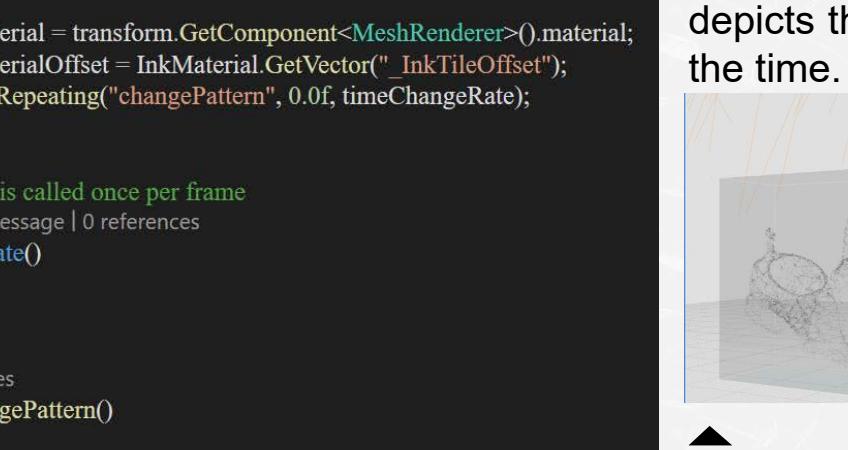
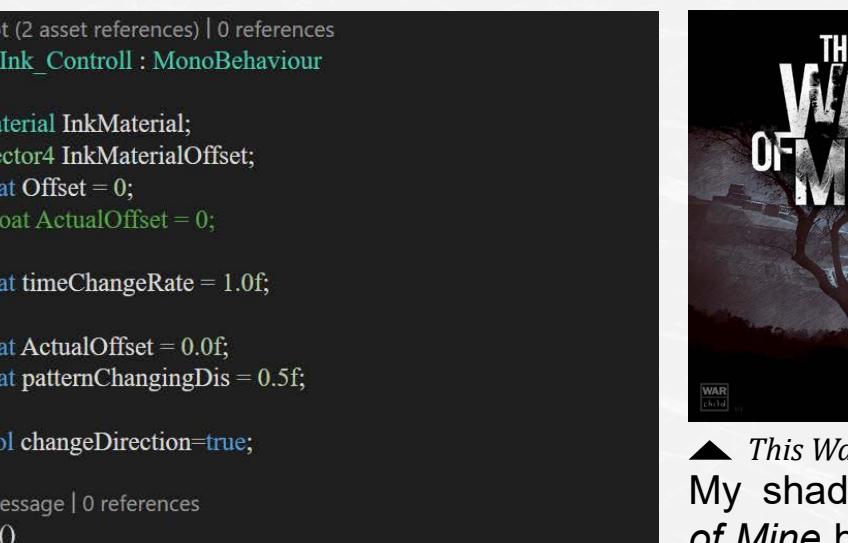


Story pieces

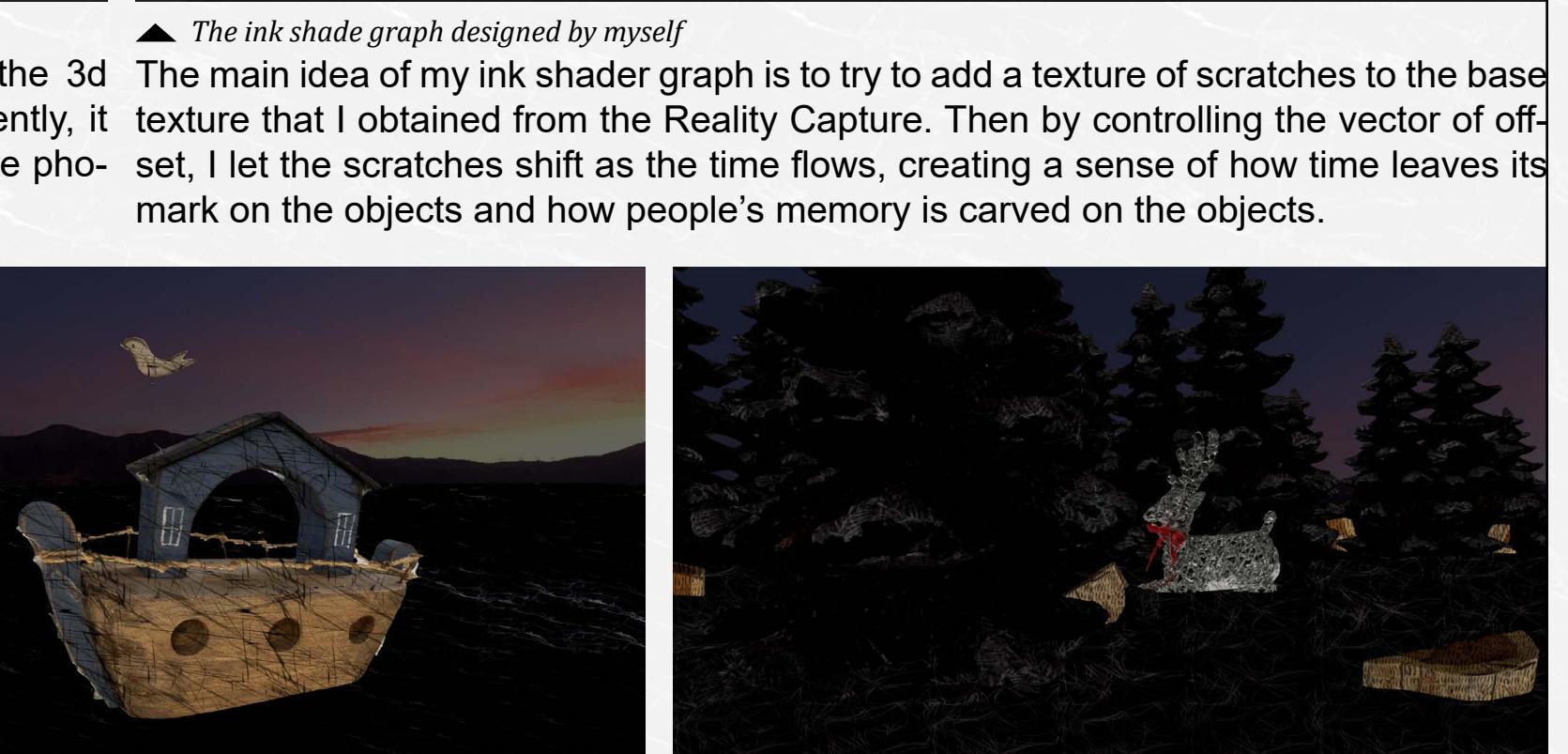
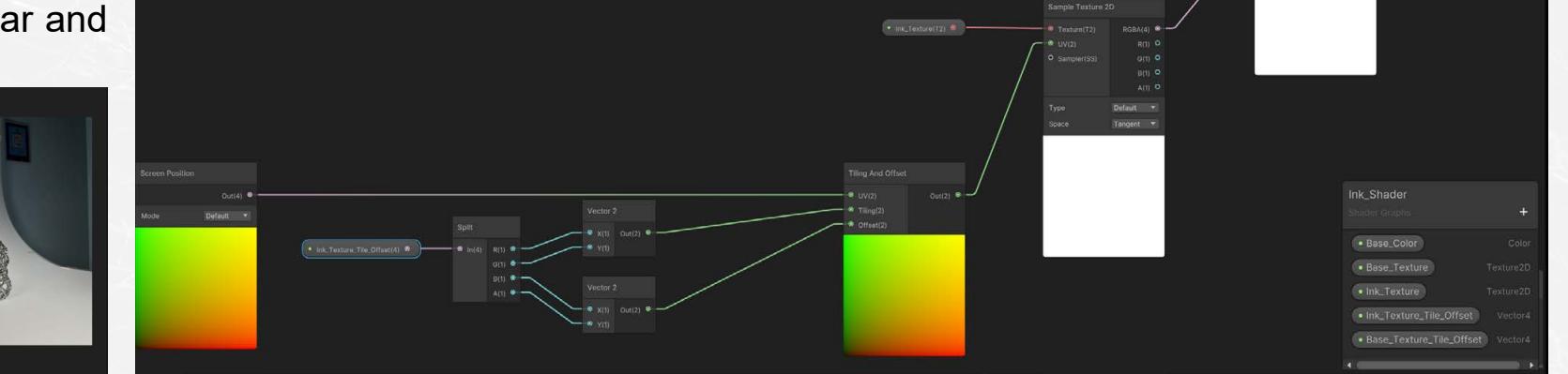
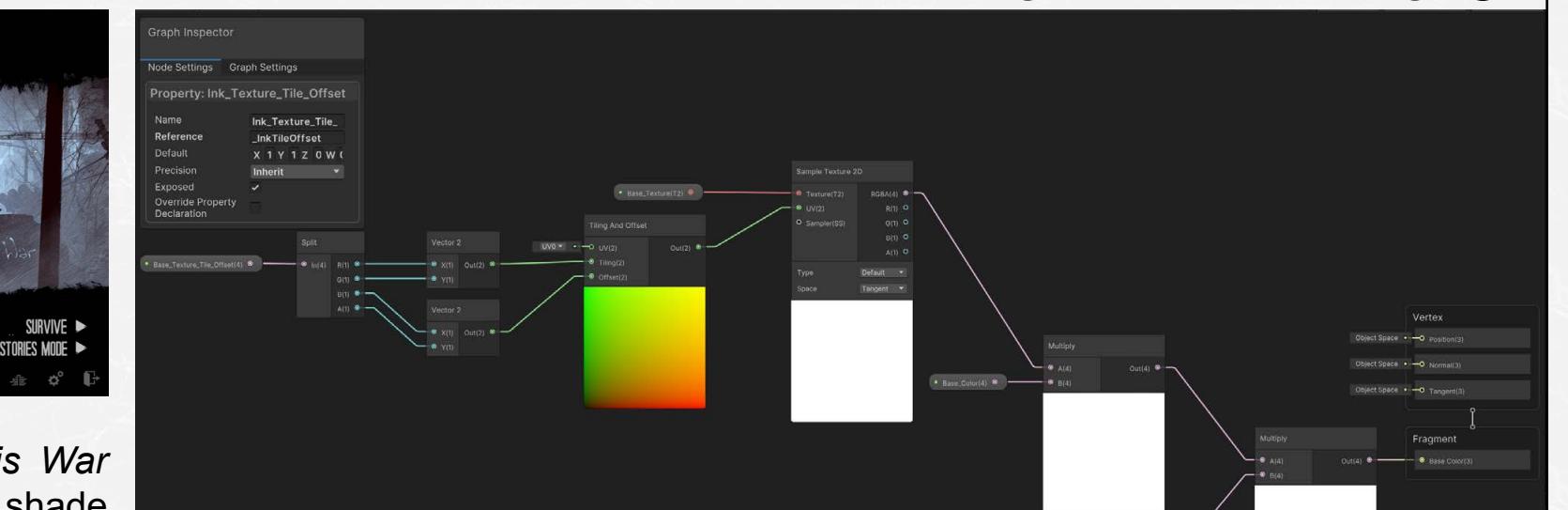
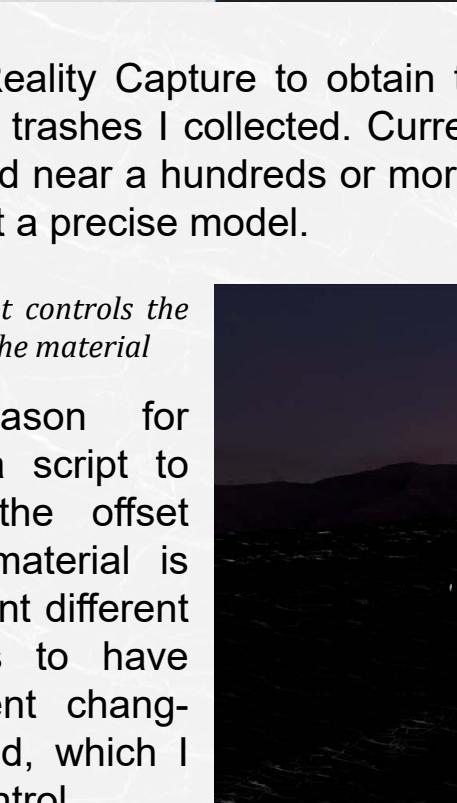
Each clue found from the scanned object will reveal a photo that the creator took and the story that he/she wrote.

Arrange the order of the photos

By matching up the scanned object, story pieces, and photos, the player needs to try to press and drag the photo to put them in the right order. After all the pieces are collected and the order is correct, the full story will be revealed.



SHADER DESIGN



THE PROTECTIVE SHELL

FOR CONSTRUCTION WORKERS ON THE LAND OF UNBEARABLE HEAT

DEVELOPMENT INFORMATION

January 2023, Thesis project

Instructor: Jose Sanchez

Position: Architect, Technical Artist, Programmer

The Protective Shell is a migrant construction worker simulator that is currently under development for my thesis at the University of Michigan, Ann Arbor

PREFACE

Architects, Artists, animators, directors, and Engineers, are fascinated by the concept of mobile megastructures in the past century.

However, a project of such scale needs endless resources including labor forces. And in the Qatar world cup, thousands of migrant workers died due to working long hours under the heat stress

But as the project "Neom", the largest megastructure is about to be built, we need to question:
how many migrant workers will die during construction?

RESOURCES

All of the models come from <https://sketchfab.com/>.
UV, texture, and modeling have been modified
Shaders, material and textures are made by myself

