Kevin H Gordon

Process Book

Project Title : White Room

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The Project

COMPLETE TRAIL
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What is White Room?

This was the final project for Professor Cookson's Immersive Level Design class during the Fall of 2019. The theme of this project revolved around the concept of 3 encounters, whereby a player has to complete 3 levels to beat the game. Upon revisiting this project, I've narrowed the overall project to focus on only the first 2 levels.

The piece served as a purely technical Unreal Engine 4 project, so I initially refrained from 3D modeling any new assets. Main goal was making sure the game was functional, and that all game mechanics worked as expected. In a deconstruction, one would find that this piece is composed of three core functionalities. They are as follows:

- Pickup System
- Pressure Plate System
- Enemy Bot script

Though there were many hardships when it came to programming this piece, at the end of the day the project was a success. All of the functionality worked as expected and the game was effectively playable. After the completion of this project however, I was not satisfied with a couple of aspects the project. I've since revisited this project and turned it into, what I believe to be, a fine portfolio piece.

In this book, I will break down the journey of this project, and show what went into it at each stage.

Project Inspiration

The original idea for this project was inspired by a local Game Jam topic that I'd heard about earlier that year. While the exact specifics of the Jam eludes me now, the theme of **escape** and **reclaiming one's self** were two thoughts that stuck out to me. As such I designed this project to emulate my vision of how a game with these theme would be. For this project, I was largely inspired by three guiding principles, of which guided me through the design of this entire project. These elements are as follows:

- The Purpose : Escape
- The Gameplay : Puzzle Game
- Story Theme : Remembrance

The next couple of pages will breakdown my thought process for each of the elements listed. From there one will be able to see the full scope of the gameplay elements that was included in the game.

Purpose : Escape

As the particular game jam concept dealt with an element of escapism, I wanted the primary goal of this game to deal with escaping from a place. Some common tropes in real-world escape rooms include being locked in a room with only minimum hints given about how to escape. As such I set out to make the first level to emulate that process as much as possible. Upon the successful completion of the first level, I expanded this escape room theme to the encapsulate the later levels.

Inspiration images below
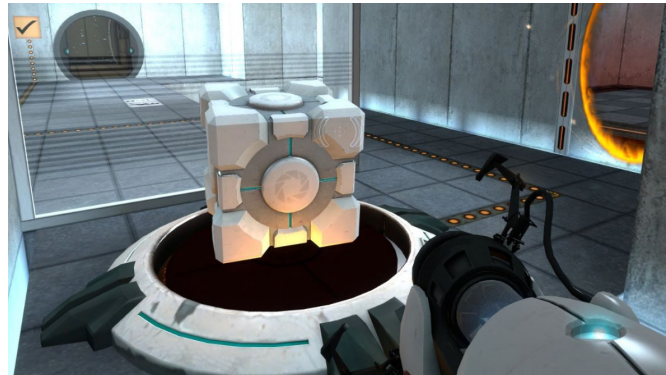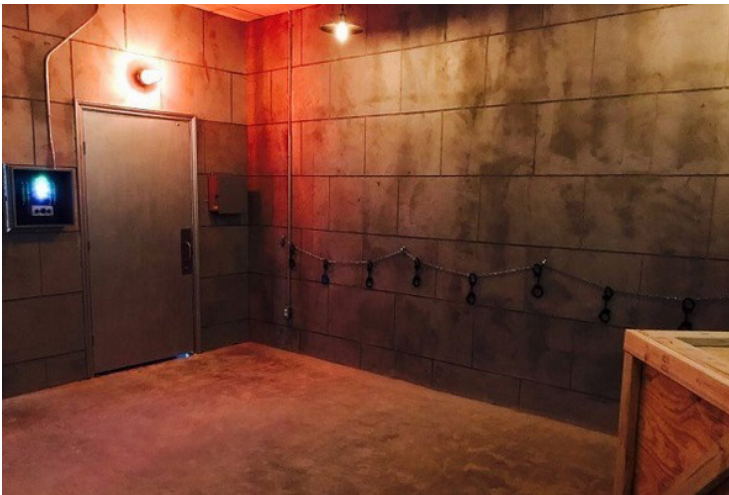
Gameplay
Puzzle

Going into this project, I knew that a puzzle game would be my ultimate output. This was done partially as a result of the project specification, but also because a puzzle game was been the most feasible project that could be accomplished within the time frame. I took a heavy amount of inspiration for the puzzles and game-play elements from gaming classics like Uncharted 2 and Tomb Raider. Additional media inspiration include the Indiana Jones series. The primary element I was concerned with was the idea of placing key objects on plates to complete a puzzle, with the player having to physically bring the object to it's final position.

Inspiration images to the right.

Uncharted 2 : Among Thieves

Shadow of the Tomb Raider

Indiana Jones and the Raiders of the Lost Ark

Story : Remembrance

As I was designing the story elements for this game, I had a vision of people who are lost and have forgotten themselves. The central issue of people being lost, and it's possible connotations, was the driving force behind the overall thematic element of Remembrance. In the beginning, the game was going to be based around an indigenous person becoming lost with their roots. That concept later evolved into a person who's been trapped in isolation so long, that they've forgotten who they are. Through recognizing and remembering items from their past, they are able to find one's self again. That is the essence of the game White Room.

"Never forget who you are."

–The Lion King

In this African tribe, when someone does something wrong, they take the person to the center of the village where the tribe surrounds him and for 2 days say all the good he has done. The tribe believes each person is good but sometimes people make mistakes, which are really a cry for help. They unite to reconnect him with his good nature. (So beautiful)

No matter where life takes you, don't forget where you come from.

The First Level

Level Outline

When designing this project initially, art and design took the backseat to mechanics and systems; so for the first part of the book I will only high-light the original design of the game. With all of the thematic elements of the game established, I set out to design the first level. This level not only serves the purpose of introducing players to the world, but also exposes players to this core pickup mechanic of the game.

With the purpose established I went on to design the level floor plan. The original sketch was done on paper, and later translated to digital format. Image of floor plan below.
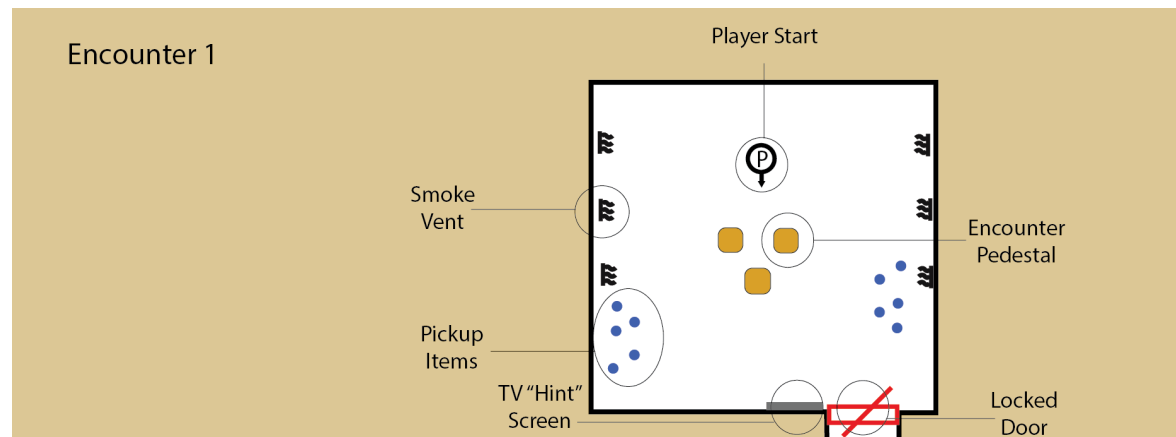
Encounter 1 Breakdown

Each of the elements this level has a functional purpose. A breakdown of each element is featured below

Player Start
Position where the player starts from. Wanted the player to immediately face the pedestals when the game began, so objective would be clear.

Smoke Vent
Smoke was added as a pacing mechanism to give the player a sense of urgency when completing the level. This eventually turned into a timing mechanism for the level.
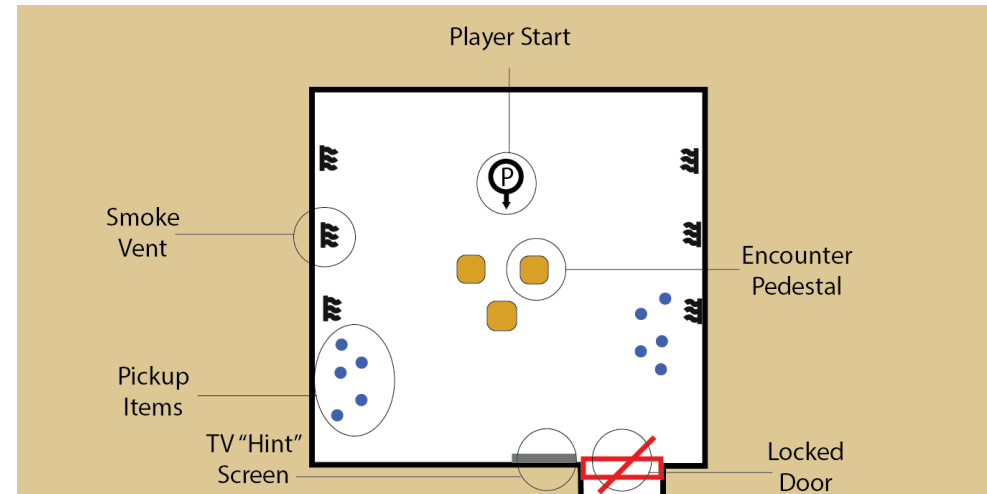
Encounter Pedestal
Position of the pedestals. These pedestals ended up being a core component of the game

TV Screen
Original placement for where the puzzle hints would live.

Pickup Items
Assortment of items that could be placed on the pedestal

Locked Door
Target door that player has to unlocked. Positioned so that the player is able to see the door right as the game starts

Encounter 1 Flowchart

In addition to the level outline, I also designed a flowchart that deconstructs the level step-by-step. This flowchart helped to organize my process while also providing helpful guidance for scripting in UE4.
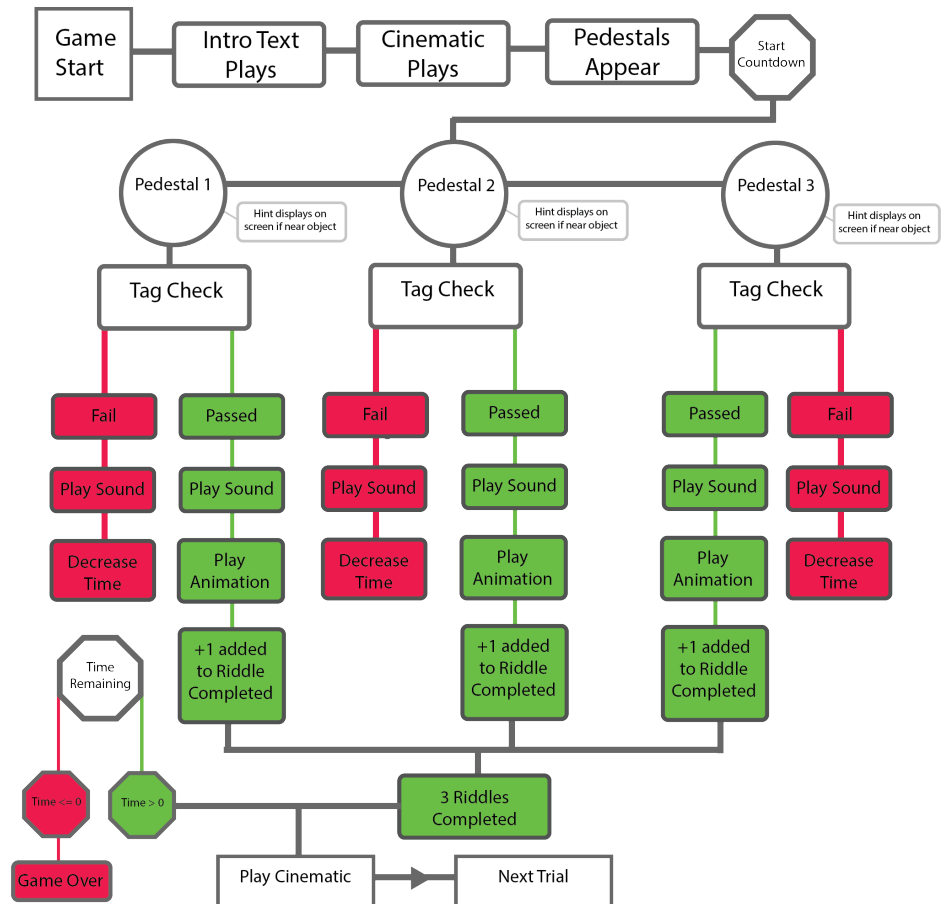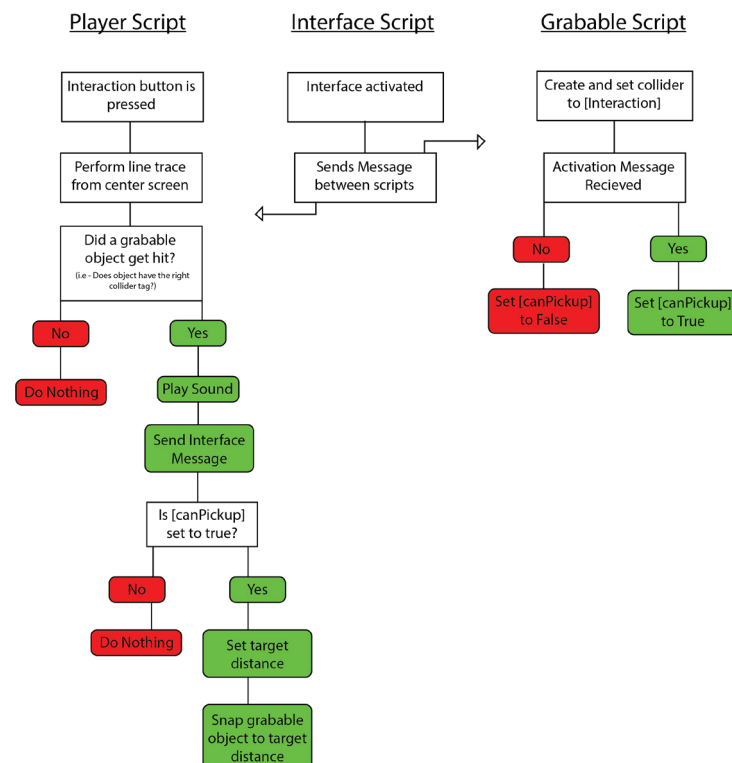
Pickup System Design

The pickup system was the first major programming challenge I tackled on this project. This system was no easy task, and involved making 3 scripts communicate with each other in-game.
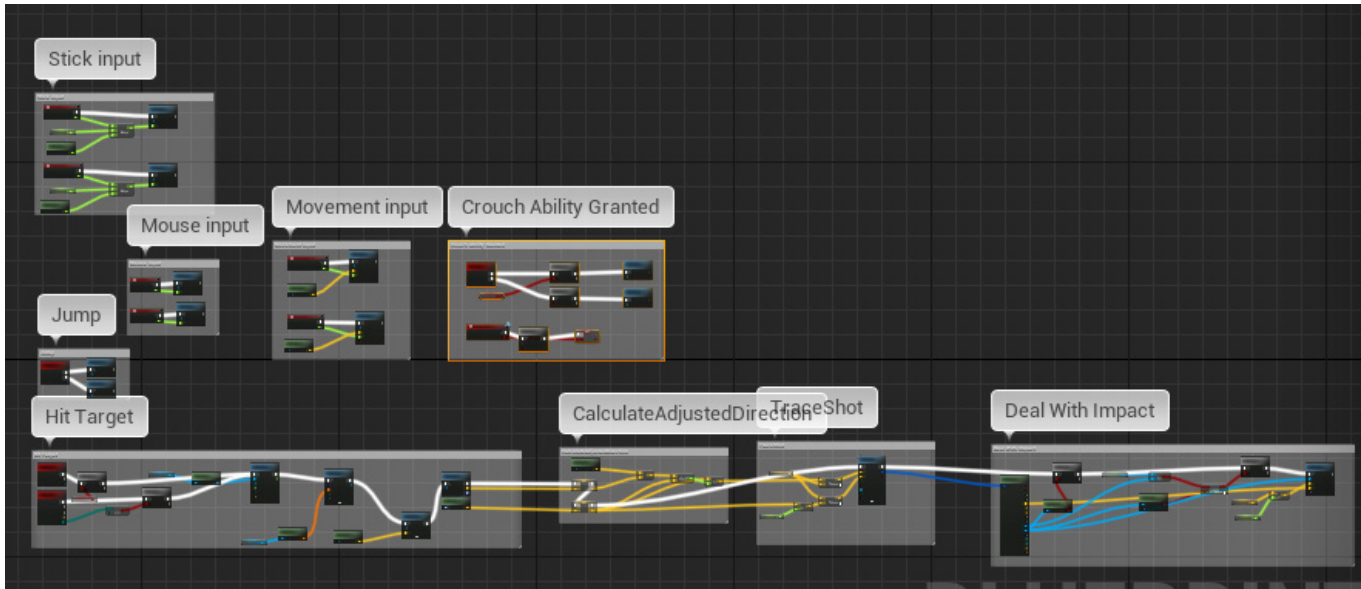

- Firstly, a script was made to check if the player was currently looking at a grabable object.
- If that was successful, an interface node sends a message to the target object.
- That grabable object would then snap to a fixed point in front of the player, and follow where the player is looking.
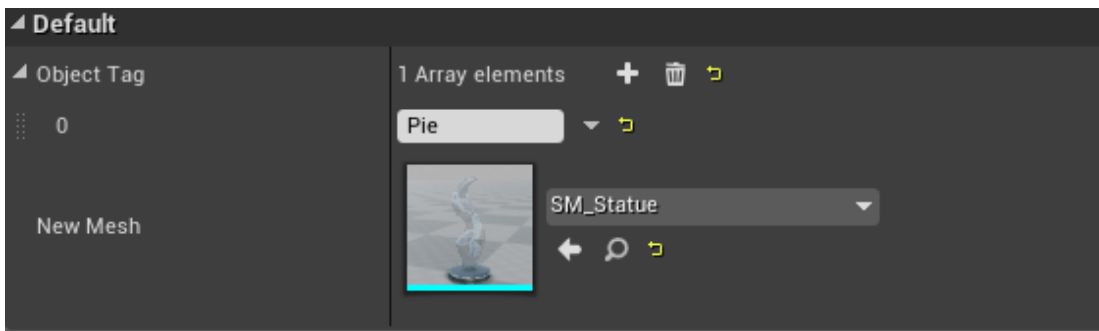
Pickup System

UE4 System Scripting

Section of pickup script within the First Person Character BP

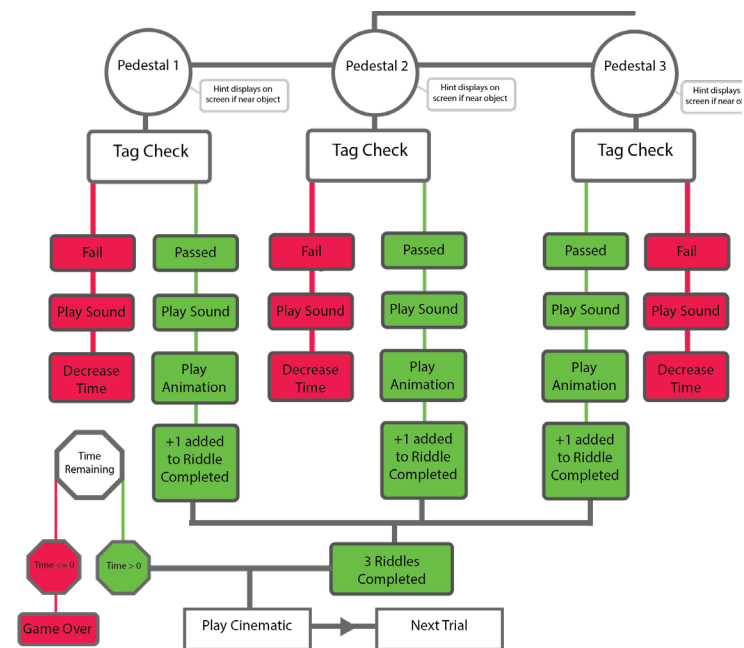Components created for in-game modularity of Grabable Object

Pressure Plate System Design

The pedestal system was the second piece of programming functionality created for this game. Getting this mechanic working just right was crucial to the overall gameplay experience. This system not only had to check if the place object was correct, but also keep track of player progression so the game could know that a trail has been completed.
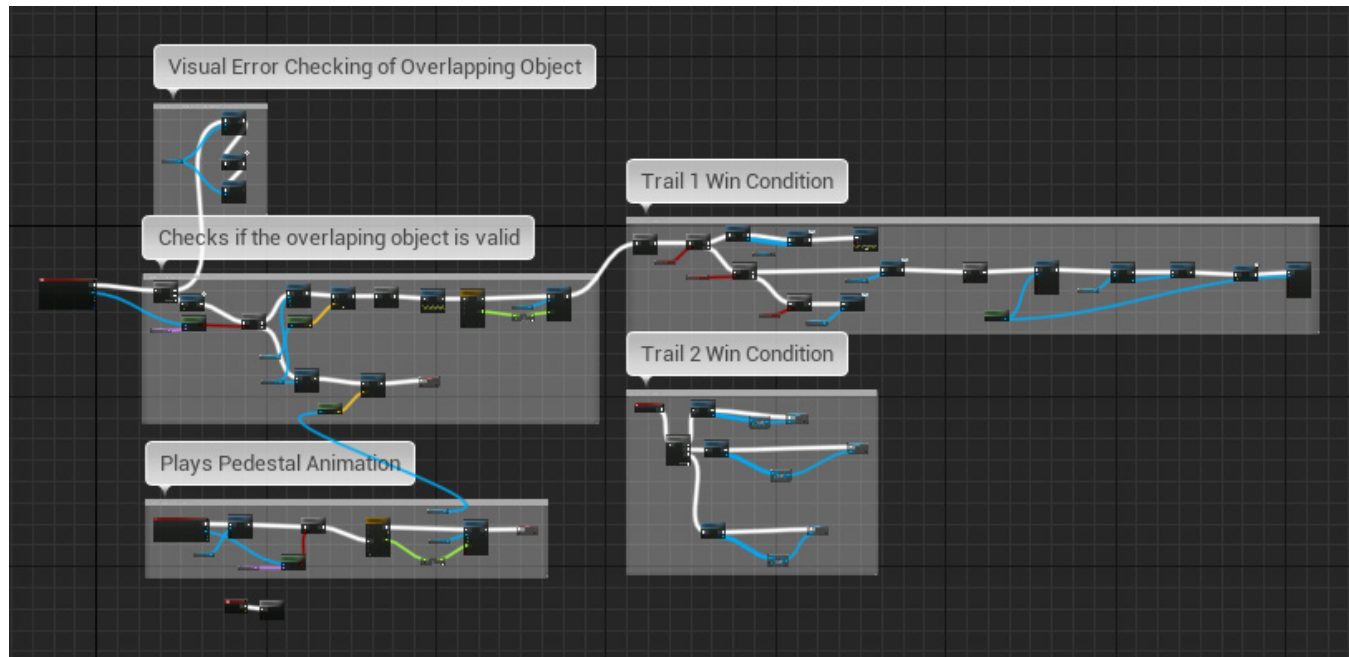
- Firstly, a script was made to check if the target object has a specific tag
- If the tag of the object matches that of the pedestal, the puzzle would be complete.
- Script checks whether all puzzles has been completed, then send message to game to proceed to next level.
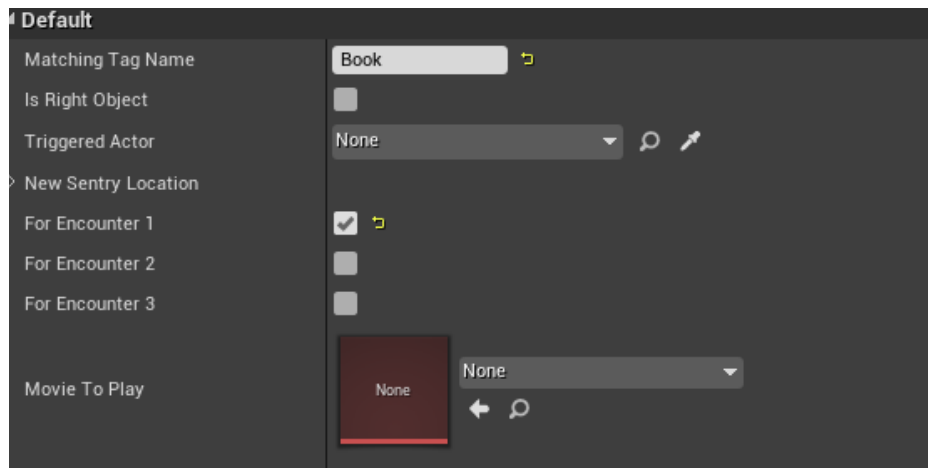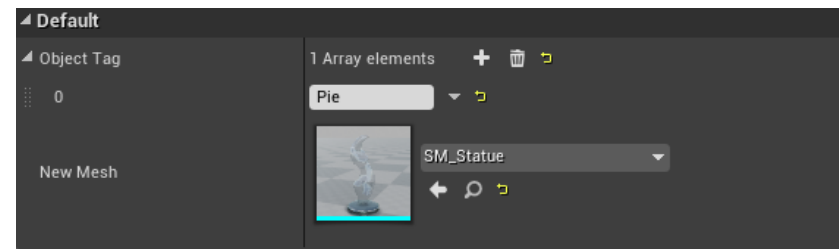
  Flowchart of the script to the right

UE4 System Scripting

"Brain script" for Pressure Plate System

Components created for in-game modularity of Pressure Plates

Components created for in-game modularity of Grabable Object

The Second Level

ress "Ctrl" to Crouch

Once the player is able to complete the first level of the game, the locked door opens and a cut scene reveals the second level. The goal for this level was to build onto the established mechanics, while also adding new skills and obstacles into the mix. When the player first enters this level, they gain the ability to crouch. Though the time element has been removed, players will also notice that the game now has enemies that must be avoided.

As with the last level, I first fleshed out the floor plan before going deeper into development.

Encounter Trigger
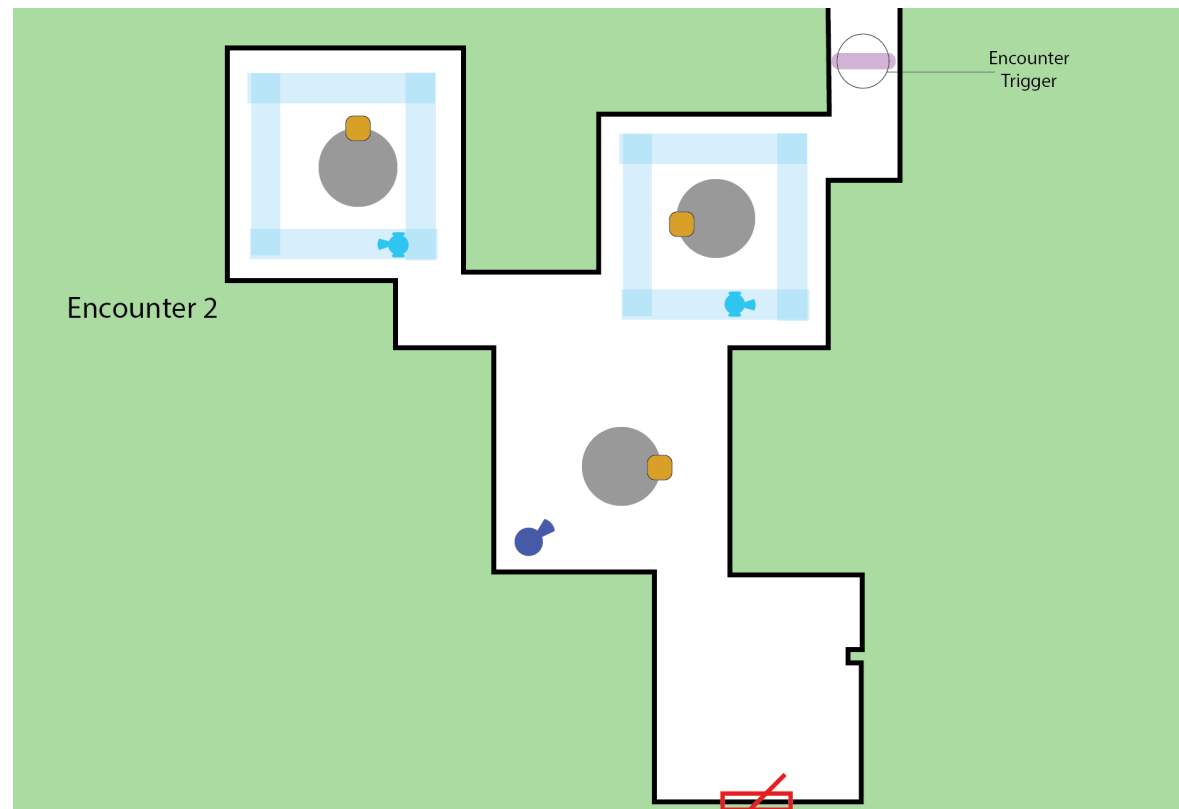
Encounter 2

Encounter 2 Breakdown

Each of the elements this level has a functional purpose. A breakdown of each element is featured below

Encounter Trigger

Encounter 2

Encounter Trigger
Collision object that, when touched, grants player the ability to crouch

Robot
Robot is denoted in blue, with the path it can take drawing in a light blue color. Each corner square is where robot begins to scan for the "escaped" player.
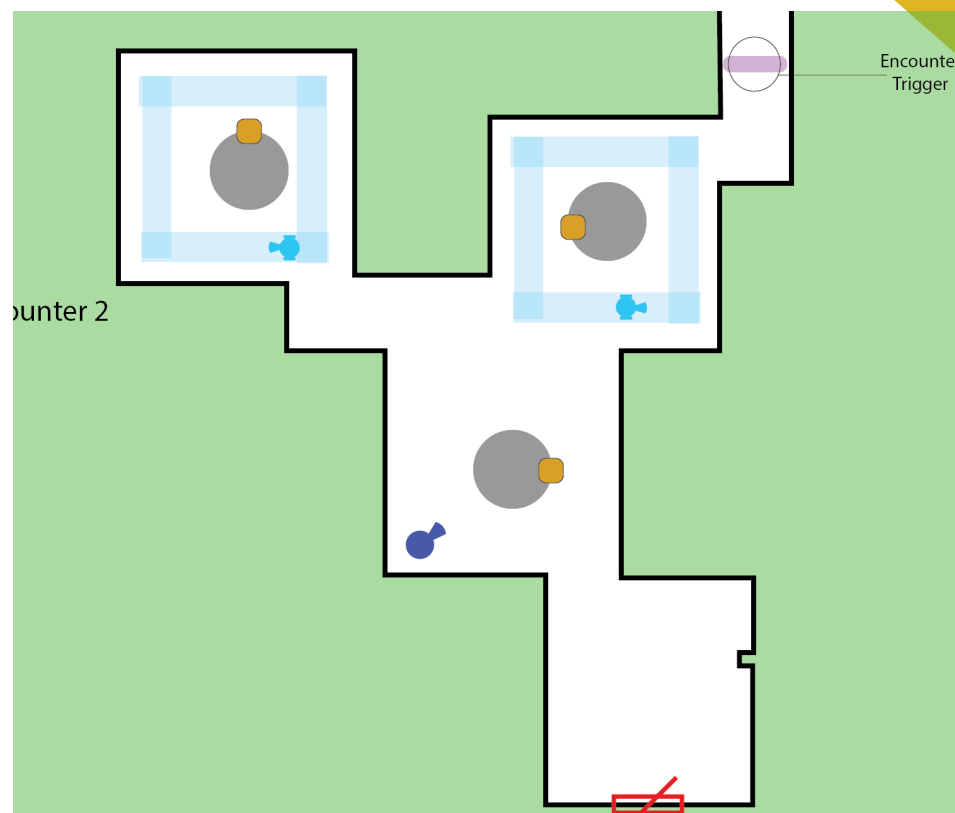
Pedestal Room
For this level, the pedestals are used again, but this time it's confided into small rooms. The player has to crouch into these areas while avoiding the robots

Locked Door
Target door that player has to unlocked. Introductory cut scene highlights the door as the player's objective

Encounter 2 Flowchart

In addition to the level outline, I also designed a flowchart that deconstructs the level step-by-step. At it's base level, this level has the same base components of the first level, only without a timing element. This flowchart helped to organize my process while also providing helpful guidance for scripting in UE4.
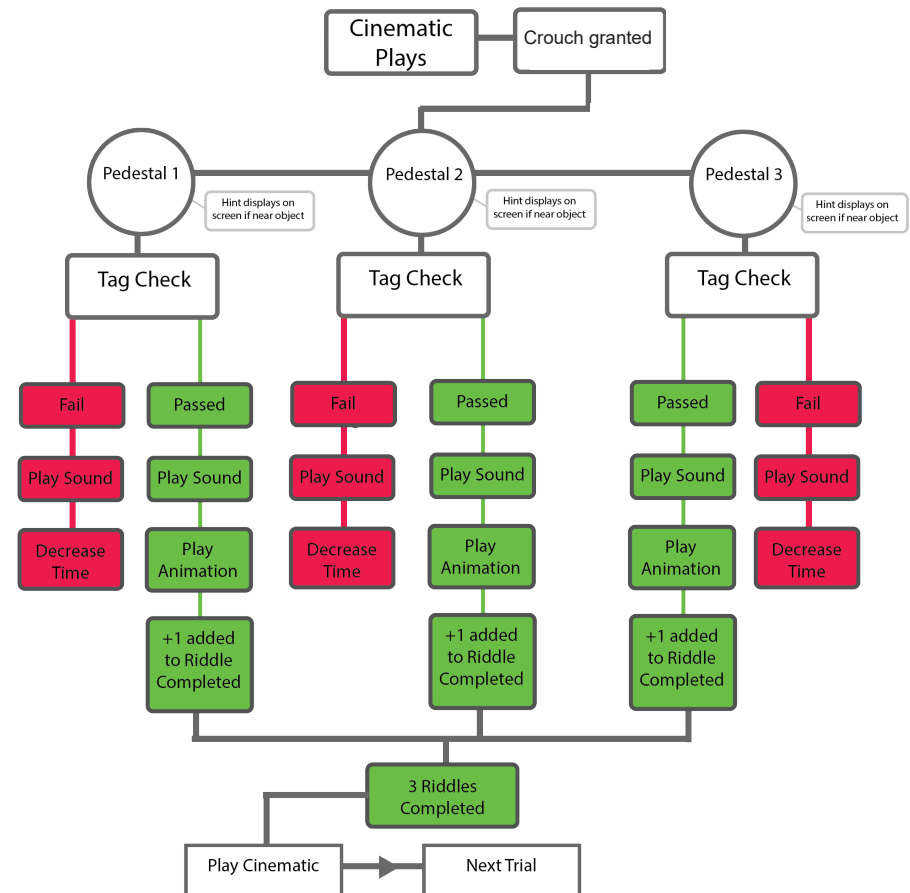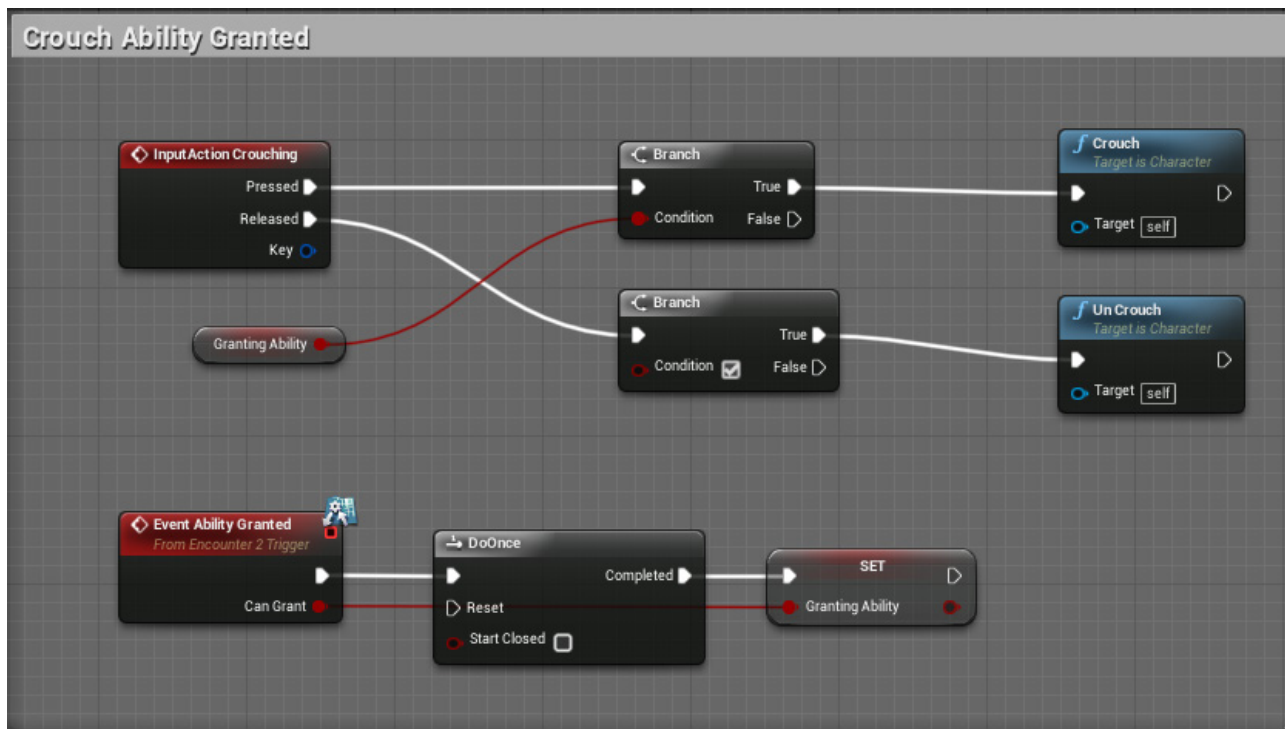
Crouch Ability Implementation

The crouch ability was added as a way of increasing the complexity of the game for player. Now the player not only has to worry about finding the right object, but also has to get through tight spaces in order to complete the puzzles.
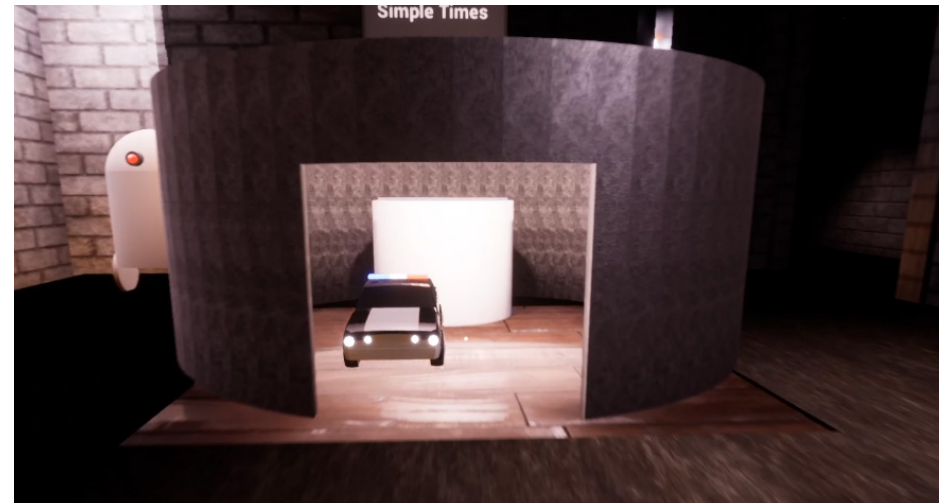
UE4 System Scripting

Section of crouch ability in First Person Character BP

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Robot System

The robot system was easily one of the more tricky elements to create in this project. This robot not only had to move and looks for the player, but also do so on a continuous loop so long as the game is running.

In approaching this script, I broke the script up into 4 parts.

- First start by initializing the robots default position
- Because there would be multiple bots in the scene, creating a simple timeline animation wouldn't suffice. Created a modular system where movement positions can be specified by the user in-editor.
- Making turret's to rotate was a fairly involved process. Not only did the bot have to check in all 4 directions, but also required was the need to reset that action with each new zone.
- Finally having the bot check for the player was the final component of this piece. From there all actions could be looped and repeated.

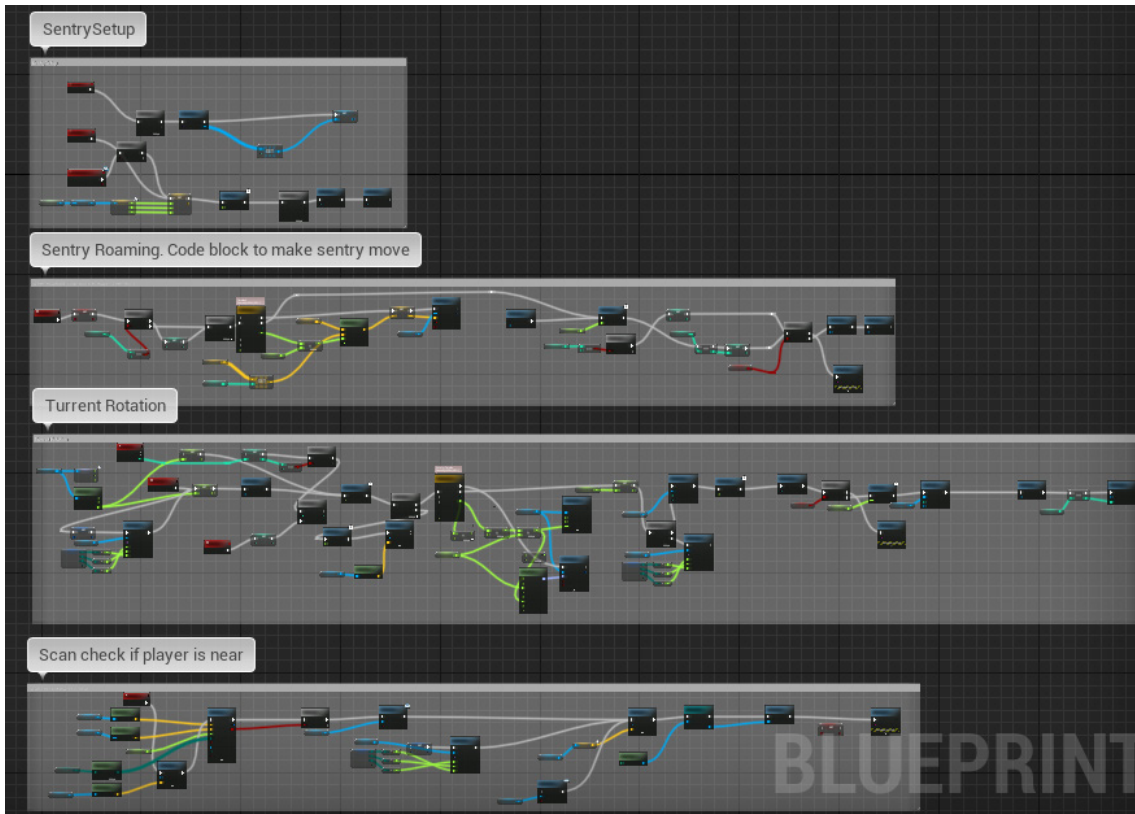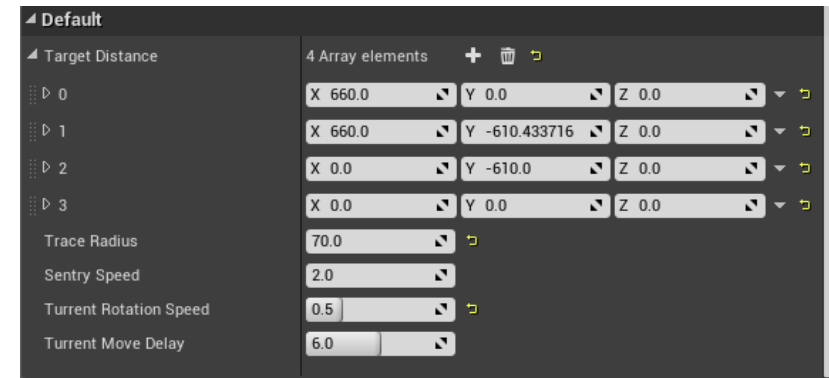   Flowchart of the script to the right.

Robot System
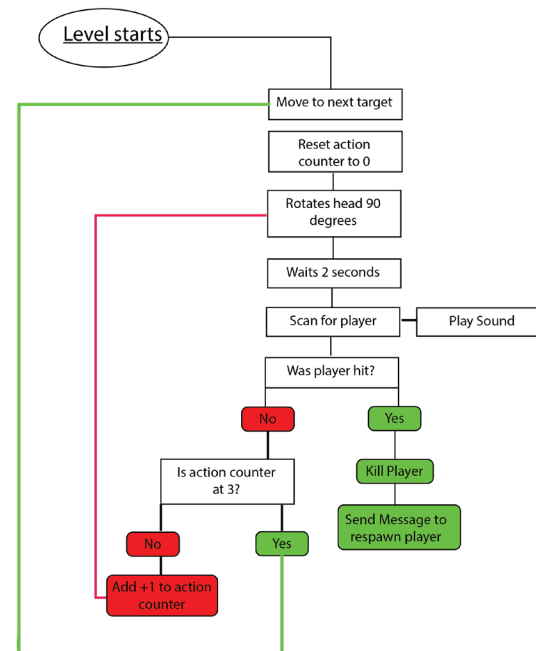
UE4 System Scripting


Script snapshot of Robot System script in UE4

Script snapshot of Robot components. Components created for modularity

Initial Conclusions

This was definitively a challenging project to create. This project not only pushed my game development in Unreal Engine, but also made me a more polished programmer as a result. Though there are many technical systems that I listed in this documentation, that only scratches the surface of the programming that went into this game. Through the use of BP interfaces I was able to develop a password input system, respawns system and much more. To see the full depth of systems designed for this game, download the game via the link at the end of this book.

In-game screenshots featured to the right -->

Tutorial Breakdown of Passcode System
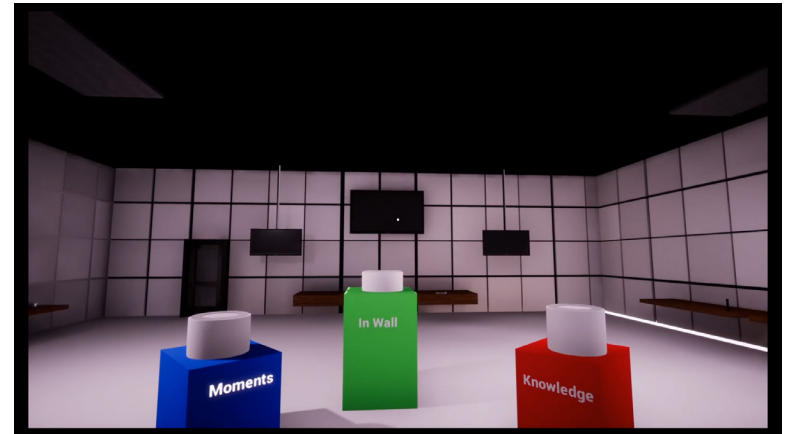
Initial Renders
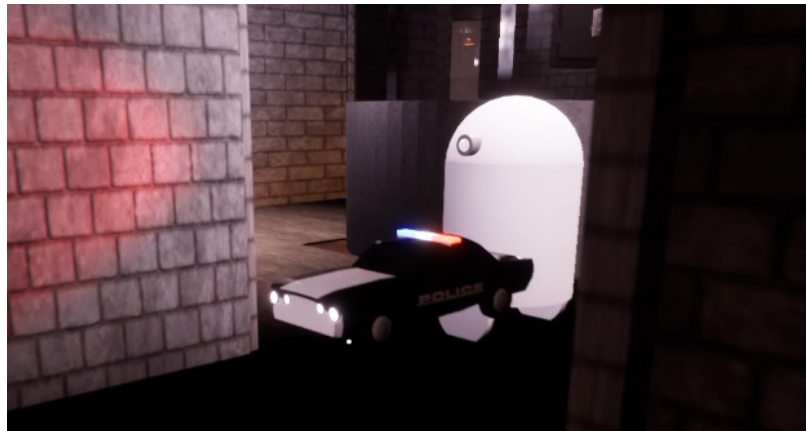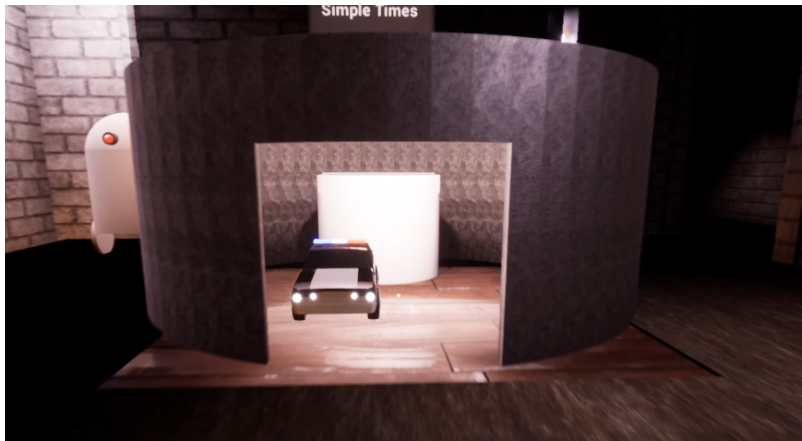
Project Revision

Why Revise?

The original version of this project was completed in the Fall of 2018 and, aside from tuning up some system element, I considered this project a success. Even though this project was a success from a systems and technical standpoint, I couldn't quite bring myself to make this a featured project in my portfolio. The reason for this is because, even though it's technically solid, the art direction of the piece left much to be desired. A large majority of the assets for this piece used basic primitives, or assets from UE4's starter content, which often left the design uneven.

As I bill myself and Environment Artist and a Technical Artist, I knew that the design of this piece had to be refreshed before I could put this in my portfolio. The only caveat is that while I wanted to overhaul and fix many design elements, I didn't want to drastically change what already existed. My goal was to amplify what already exists, and only create new assets when necessary. To do this, I followed a four step process which entailed the following:

- Identify what elements need to be fixed
- Recommit and gather reference images of design improvement
- Create required new assets
- Refresh the lighting design of the environment

The breakdown process is featured below

Identifying Inconsistencies

In tackling this refresh, I first started by playing through the old version of the game and taking note of what could be improved. In this analysis, I chose to focus only on elements that were egregiously bad, or elements that could be improved with simple model or texture creation. After identifying all 3 levels, I came to a few important conclusions.

- The 3rd level would have to be cut from the project, as redesigning that level would require intensive modeling and design. Something that's counter to the mission of refreshing this project
- The 1st and 2nd level of the game could be polished to a nice standard, with only 3-6 additional assets that would have to be created from scratch.
- Lighting will play a substantial role in the overall professionalism of the project

Identified Asset Lists
- Clipboard
- H VAC System
- Industrial Power Outlet
- Ceiling partition for White Room
- Corner Wall
- Wall Mounted Table

Environment Paint-overs
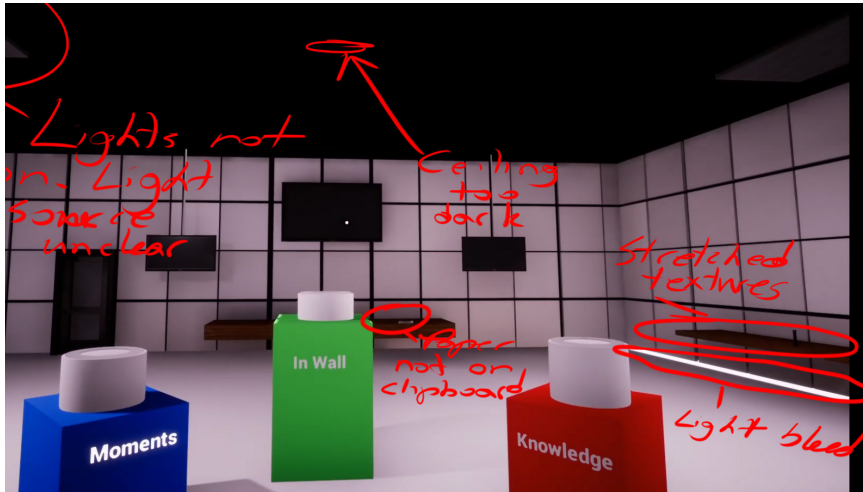
Gathering References

After identifying which elements of the original project was ripe for a refresh, I started the process of gathering reference images. In selecting reference images, I decided to make the images closely fit the overall thematic elements I established early in the project.

Doubling down on the theme of a person losing themselves in isolation, I searched for reference images of old psych wards and solitary confinement rooms. These images were the primary reference for the first level, titled "White Room". For the second level, the basement corridor them was fleshed out to include partitions that covered the corner walls. As well as adding additional elements to flesh out the environment more. As such, I gathered reference images to reflect those desire design decisions.


alamy stock photo   FB7B71
www.alamy.com

Reference Images
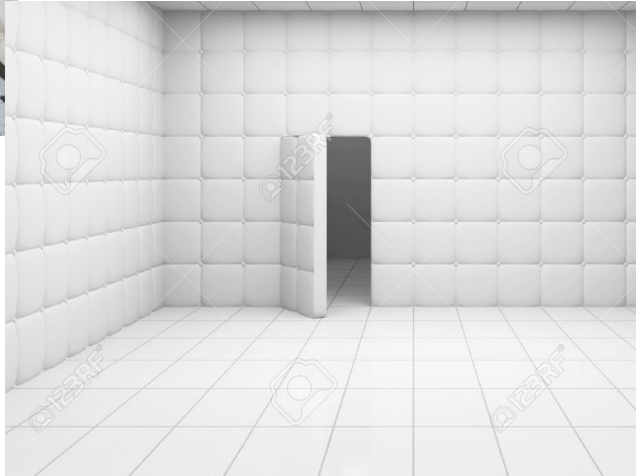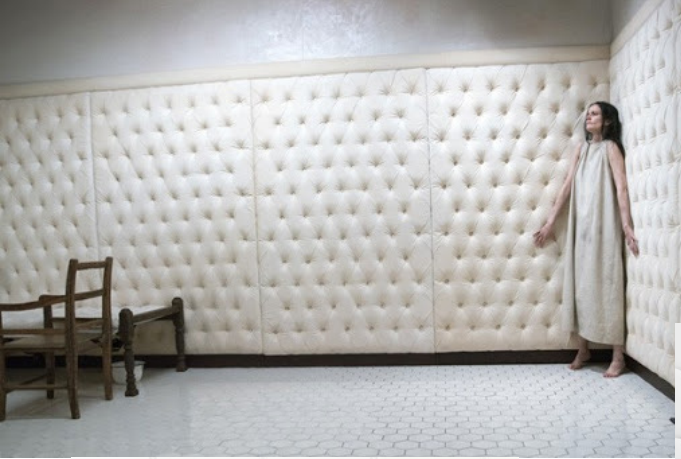
Assets Creation

The next step in this process was modeling out the 6 key models that were identified from the previous analysis. Though texturing would be inevitably be required for most of the models, there were a few models that could utilize UE4's standard asset materials. Assets such as the wall corner and ceiling light, are great for tiling, and such benefited greatly from the reuse of built in assets.
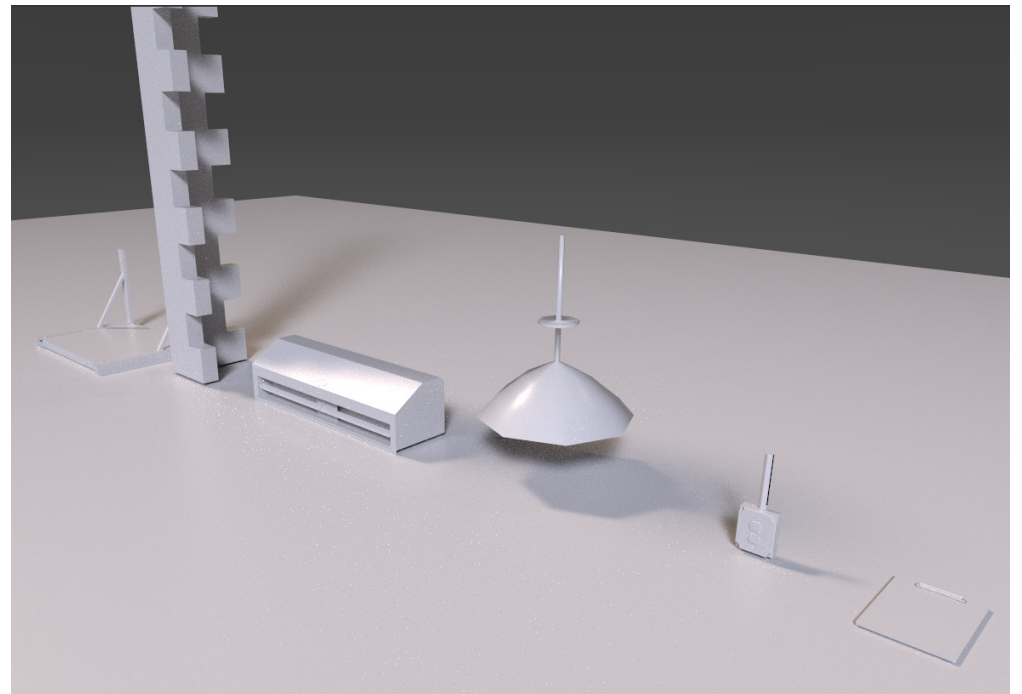
Before and After Shots
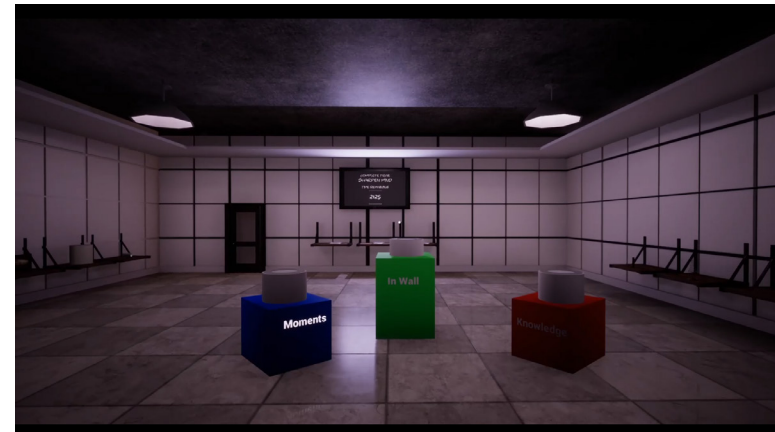
Before and after shots of level 1 room. The tables and spotlight shots add to the realism of the piece. Hint text now has a clipboard underneath, so that the paper isn't floating in space anymore.
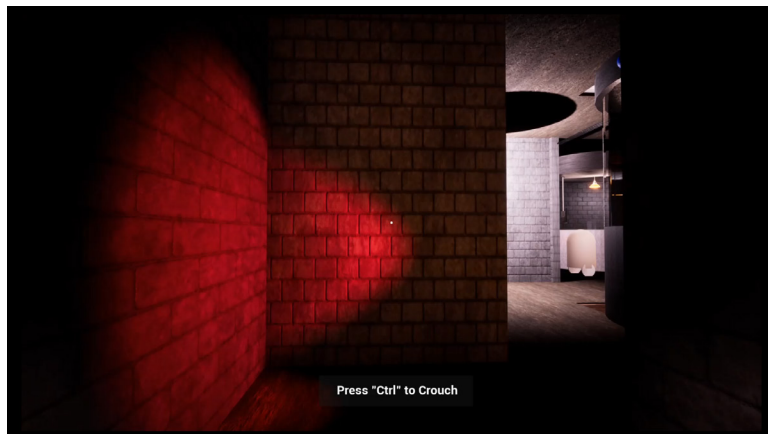

Before and after shots of level 2 corridor. Addition of corner wall and spotlight helps ground the shot on the right.

Revisiting Lighting

The final stage to polishing this piece was taking another pass at lighting the environment. When this project was first complete, lighting and design was secondary to function. Since the function and design had been completed, it was finally time to worry about lighting.

As noted to the right, there were several instances in the original project where the light was either to dark, too light, or produced harsh shadows. My design strategy was to tackle each of those elements one by one. On the next page I will detail the 4 different stages of lighting design.
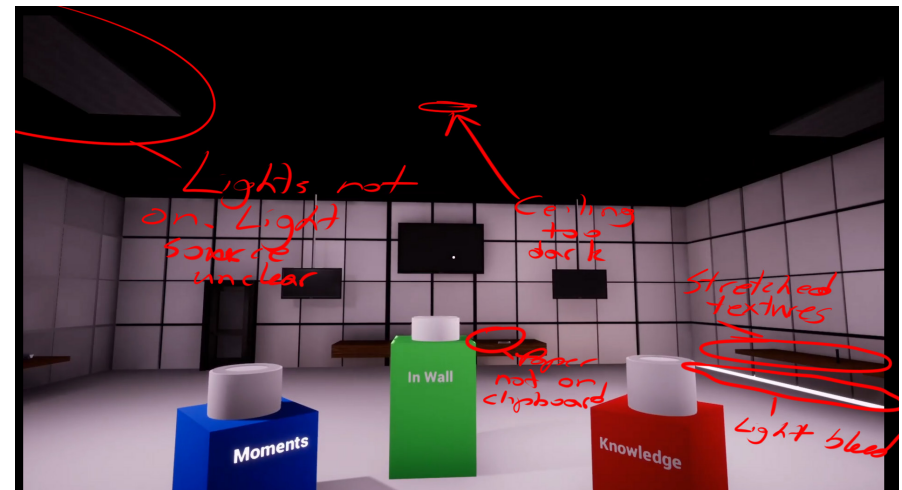
Lighting Stages

Stage 1

Light placement has just begun. Still figuring out where to place lights. Added new spotlight 3D model
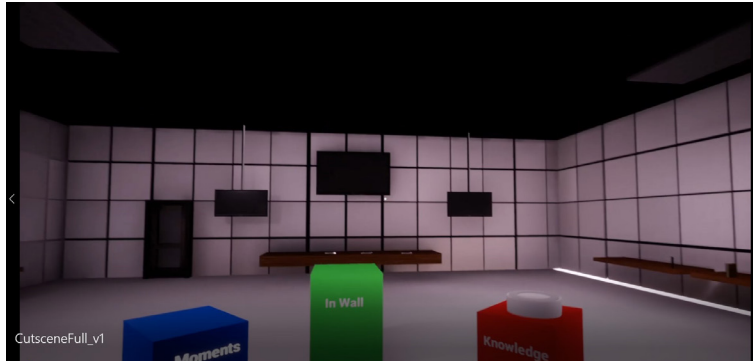
Stage 2

Lighting is beginning to take shape. Added fill lights above light model to brighten ceilings

Stage 3

Lighting is close to final. Floors and ceiling have adequate lighting. Added post-process volume to add lighting effects.

Stage 4

Lighting has been polished and finalized. Floors and ceiling are evenly lit. Reflection probe adds specular highlights to assets.

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Final Thoughts

This has been a truly transformative project to work on. From the onset it was riddled with challenges, as I constantly pushed myself out of my comfort zone to reach new heights. When I first had the initial idea for this project, I'd never imagine the project would get to this point. The systems are solid and the design has been polished to a high standard. In many ways I'm glad that I didn't polish this piece with art content after first completing the original project. Had I done that, I would've never need able to implement all of the lighting and modeling techniques that I've gained since Fall 2018. The rendering and material editing techniques I've learned over the past year and a half have helped tenfold towards making this a standout portfolio piece.

One last time, in-game stills to the right -->

CutsceneFull_v5

Final Renders
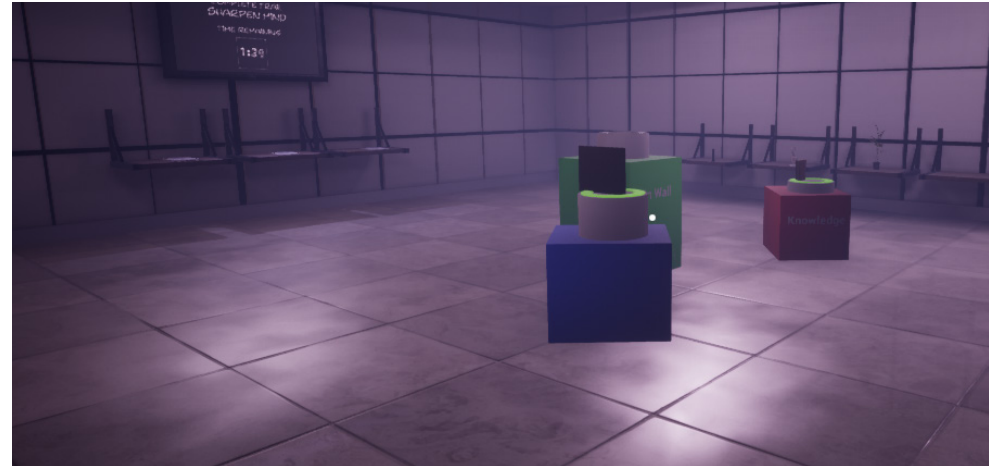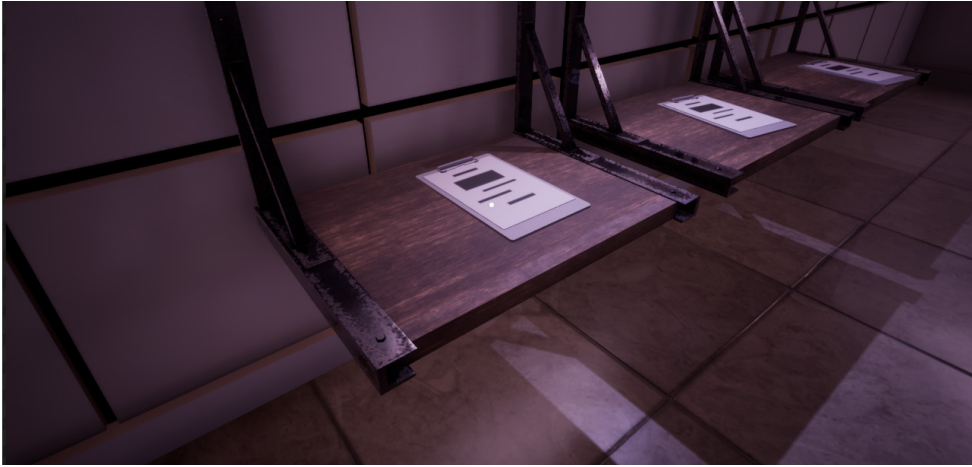
Special Thanks

Special thanks to all of my friends, family and professors who've supported me throughout the years. Without them, none of the work featured in this book would be possible!

Links and Resources

Passcode System Tutorial
https://tinyurl.com/PassCodeUE4