

# Nonlinear Time 非线性时间

Game Programming Defense  
School of Software Engineering

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Nonlinear\_Time SSE@Tongji

# Contents

This presentation consists of four modules:

「 INTRO. —— PLAN—— DESIGN —— TECH. 」

**INTRO.**:WHAT is Nonlinear Time and WHY is it?

**PLAN**:HOW we planned our time to complete the development?

**DESIGN**:HOW we design the game logic, SFX and VFX ?

**TECH.**:What technologies we use to make it all happen ?



# Introduction

- **What:**

The director of the M Lab stumbled upon the technology of manipulating time and has since called himself chronos, and has taken on the role of god of time. chronos uses an energized light wand to release rays that control the flow of time lines outwards, bringing creatures into a world of non-linear time;

But, this technology has also brought him armies and trouble....



Chronos (Χρόνος)

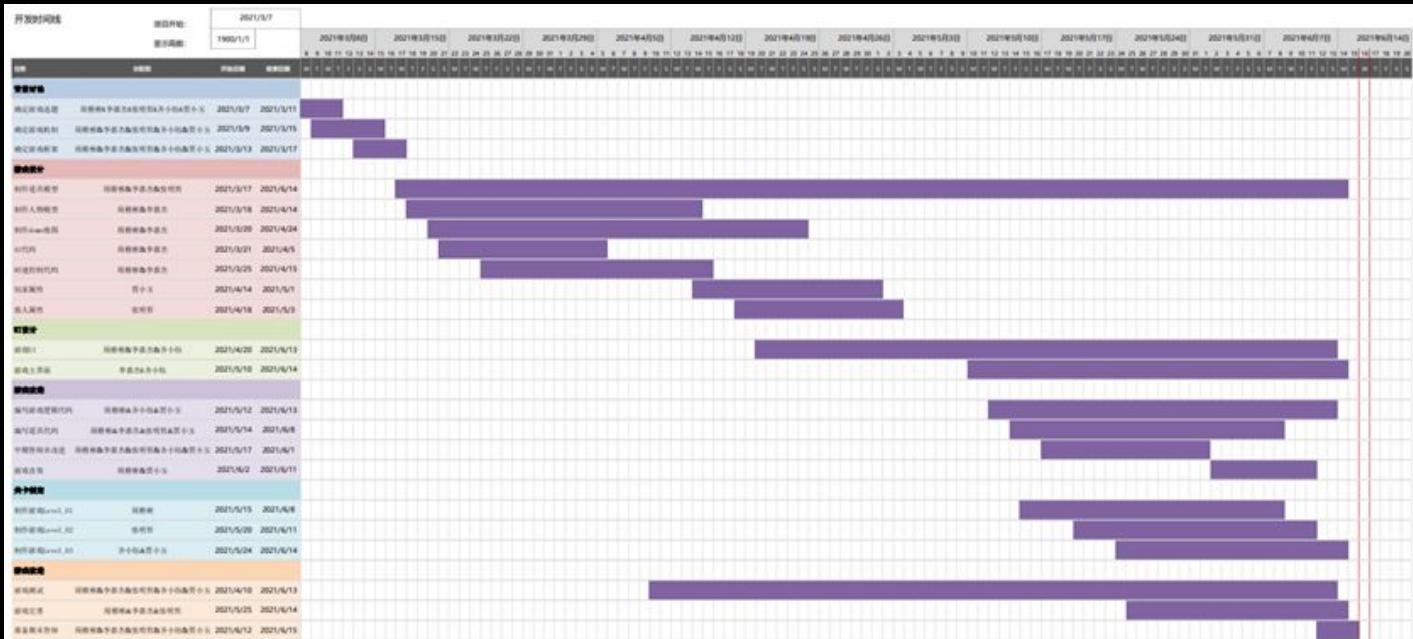
- **Why:**

1. First-person perspective + Puzzles
2. Limited resources + No direct damage to enemies
3. Each object has its own independent timeline and can be controlled independently of the flow of time



# Plan

Gantt



Timeline

人员	开始日期	结束日期	内容
周楷彬&李嘉杰&张明哲&齐小钰&贾小玉	3月7日	3月11日	确定游戏选题
周楷彬&李嘉杰&张明哲&齐小钰&贾小玉	3月9日	3月15日	确定游戏机制
周楷彬&李嘉杰&张明哲&齐小钰&贾小玉	3月13日	3月17日	确定游戏框架
周楷彬&李嘉杰&张明哲	3月17日	6月14日	制作道具模型
周楷彬&李嘉杰	3月18日	4月14日	制作人物模型
周楷彬&李嘉杰	3月20日	4月24日	制作demo地图
周楷彬&李嘉杰	3月21日	4月5日	AI代码
周楷彬&李嘉杰	3月25日	4月15日	时速控制代码
贾小玉	4月14日	5月1日	玩家属性
张明哲	4月18日	5月3日	敌人属性
周楷彬&李嘉杰&齐小钰	4月20日	6月13日	游戏UI
李嘉杰&齐小钰	5月10日	6月14日	游戏主界面
周楷彬&齐小钰&贾小玉	5月12日	6月13日	编写游戏逻辑代码
周楷彬&李嘉杰&张明哲&贾小玉	5月14日	6月8日	编写道具代码
周楷彬&李嘉杰&张明哲&齐小钰&贾小玉	5月17日	6月1日	中期答辩并改进
周楷彬&贾小玉	6月2日	6月11日	游戏音效
周楷彬	5月15日	6月8日	制作游戏Level_01
张明哲	5月20日	6月11日	制作游戏Level_02
齐小钰&贾小玉	5月24日	6月14日	制作游戏Level_03
周楷彬&李嘉杰&张明哲&齐小钰&贾小玉	4月10日	6月13日	游戏测试
周楷彬&李嘉杰&张明哲	5月25日	6月14日	游戏完善
周楷彬&李嘉杰&张明哲&齐小钰&贾小玉	6月12日	6月15日	准备期末答辩

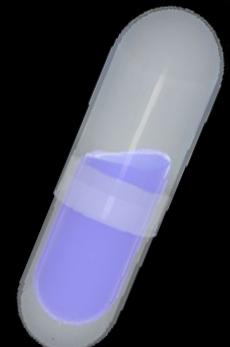
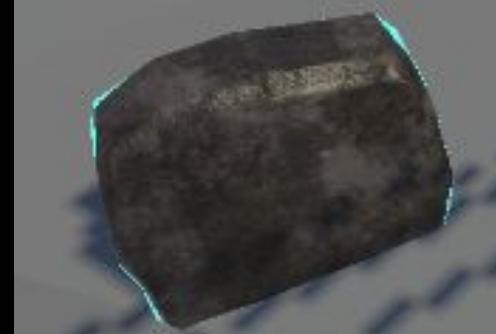
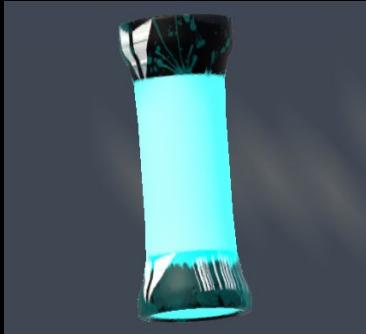
# Design - Enemies

- **Type:**  
Different colors different strength and property values
- **AI:**  
With auto-targeting and pathfinding AI



# Design - Items

- item Categories:
  - Magic Wand
  - Magic Area
  - Throwble Objects
  - Potion
- Item Switch:  
Number keys to switch backpack items



## Design - Time Control

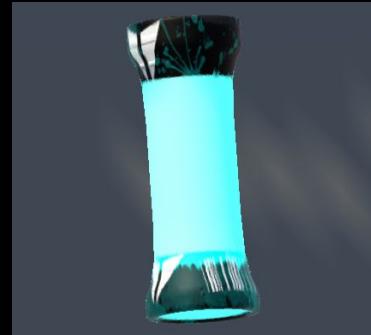
- Control the time flow:

Just Aim at the object and then Scroll your Mouse Wheel !

**Yellow:** Selected **Green:** Accelerated

**Red:** Decelerated **Blue:** reversed

The *darker* the color the *stronger* the acceleration/deceleration effect



# Design - Beginner's Guide

- Things to learn:
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      - Basic indicator of time status
      - The concept of time energy bar
    - Time Control Methods:
      - Mouse Wheel(Magic Wand)
        - Acceleration
        - Deceleration
        - Reverse
      - Magic Area(Magic Ring)
    - Potion
    - Throwable Objects
- 
- ```
graph LR; A["Basic Time Mechanism"] --> B["Level 1"]; C["Time Control Methods"] --> D["Level 1"]; C --> E["Level 2"]; F["Potion"] --> G["Level 2"]; H["Throwaway Objects"] --> G
```

# Design - Beginner's Guide

- Things to learn:

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- Time Control Methods:

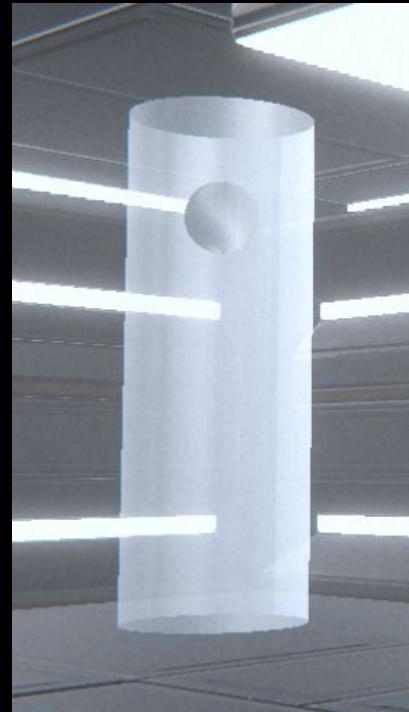
- Mouse Wheel(Magic Wand)

- Acceleration
      - Deceleration
      - Reverse

- Magic Area(Magic Ring)

- Potion

- Throwaway Objects



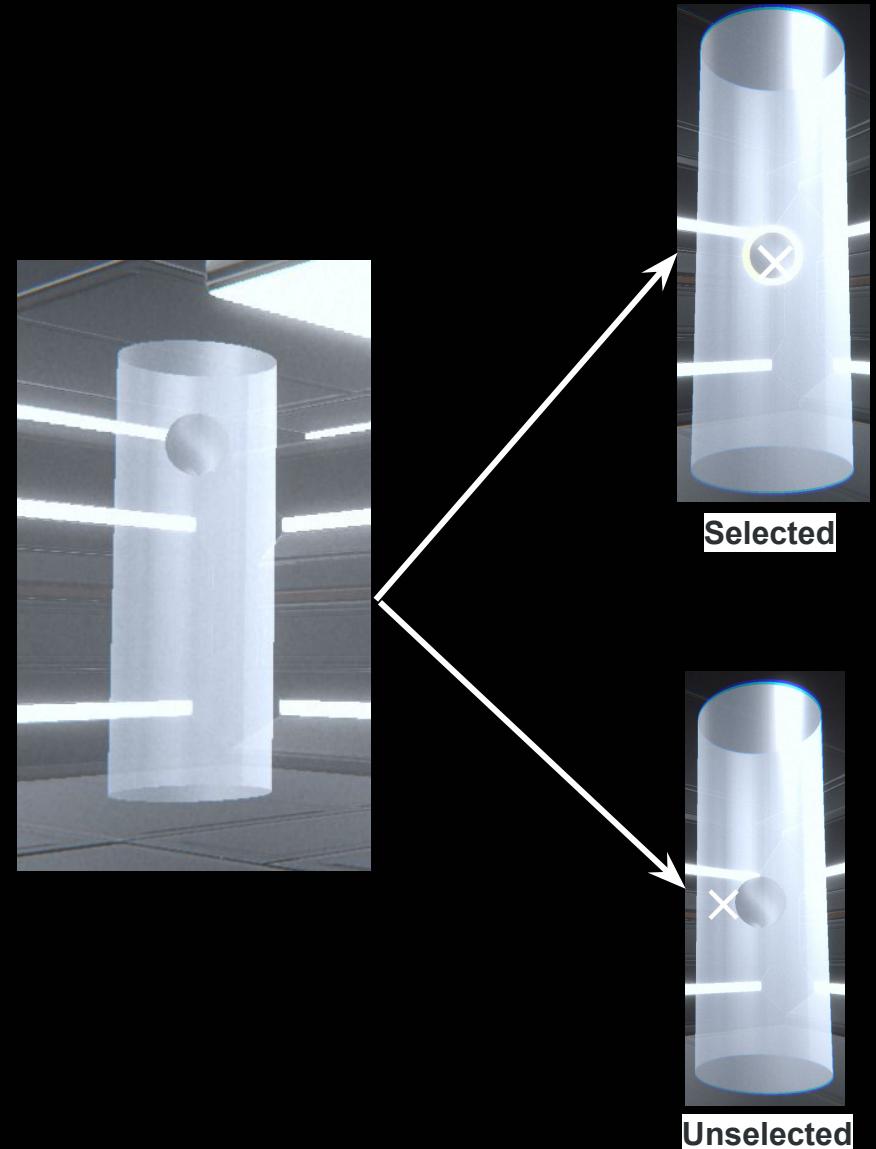
A free-falling sphere to indicate the passage of time in the game, used to guide players to gradually understand the game's time mechanism.

Before the player picks up the wand, the sphere will be normal free-fall movement, symbolizing the normal passage of time.

When the player picks up the wand, the sphere will only fall when the player moves, and if the player is stationary, the sphere is also stationary. Implying that time will only pass when the player moves.

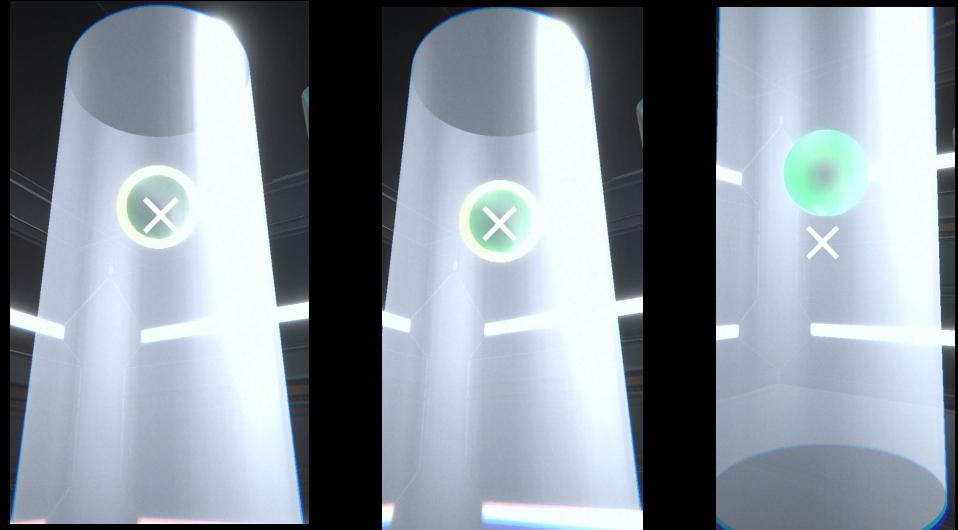
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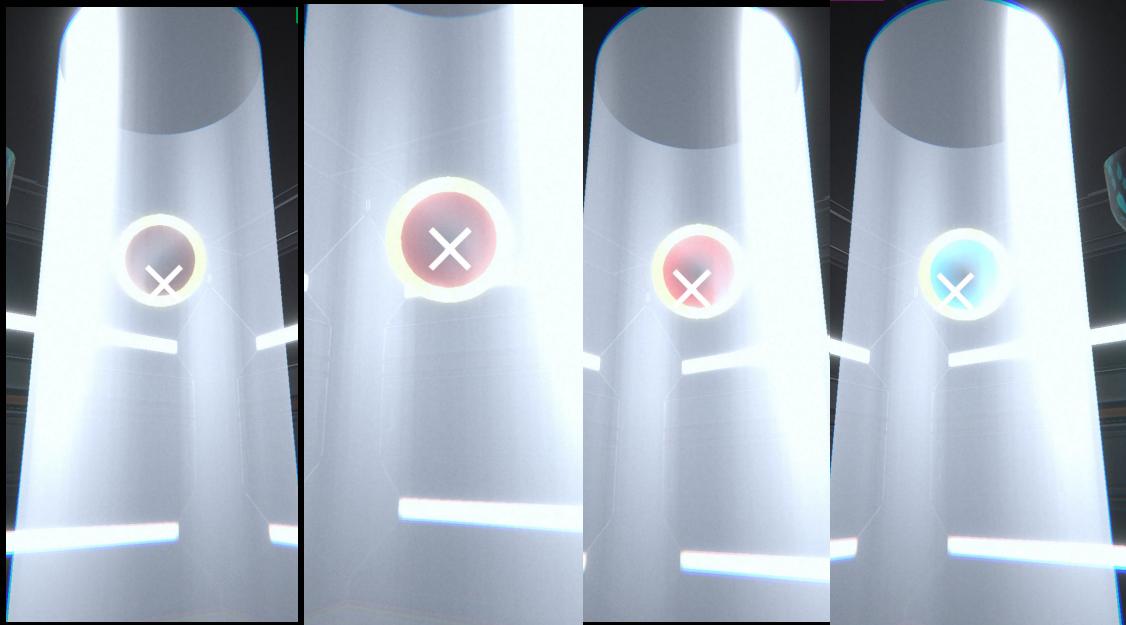
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Different acceleration levels, the darker the color, the faster the speed

# Design - Beginner's Guide

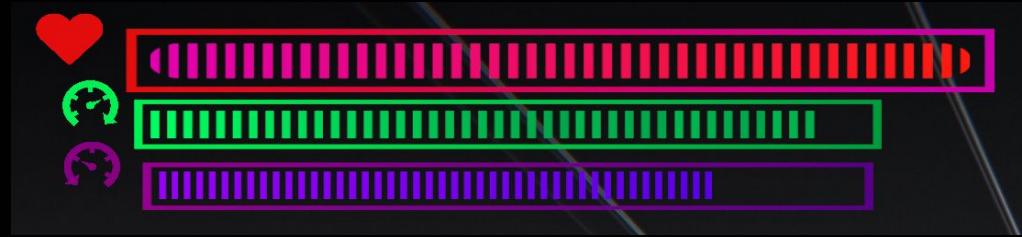
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Different deceleration levels, the darker the color the slower the speed,  
Blue represents the reverse

# Design - Beginner's Guide

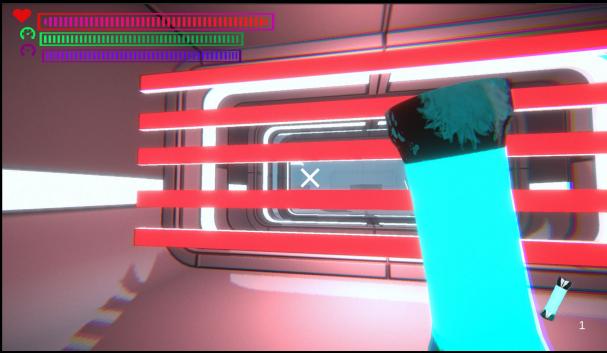
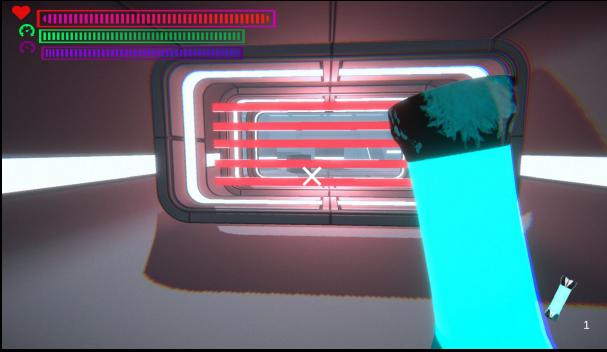
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- Red is the health bar, which is consumed every time you take damage and cannot be restored naturally
- Green is the acceleration energy bar, which is consumed every time you use your wand to perform an acceleration operation and cannot be restored naturally
- Purple is the deceleration energy bar, which is consumed every time you use your wand to perform a slowdown operation and cannot be recovered naturally

# Design - Beginner's Guide

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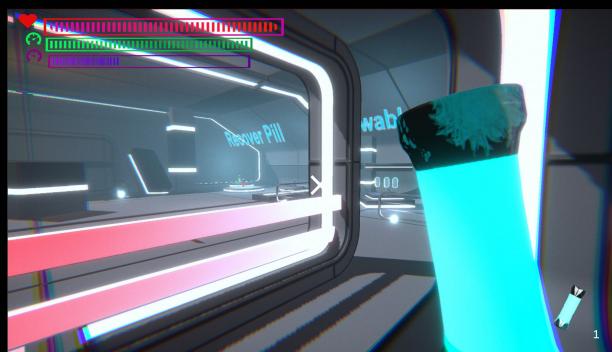
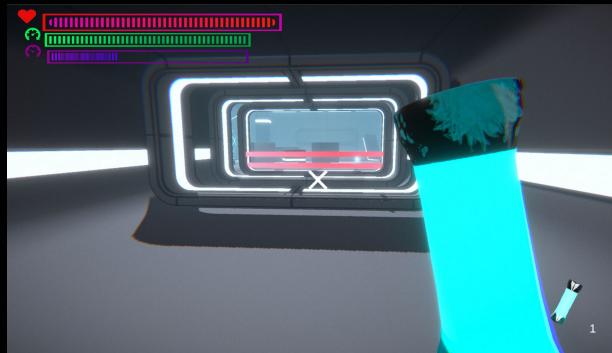
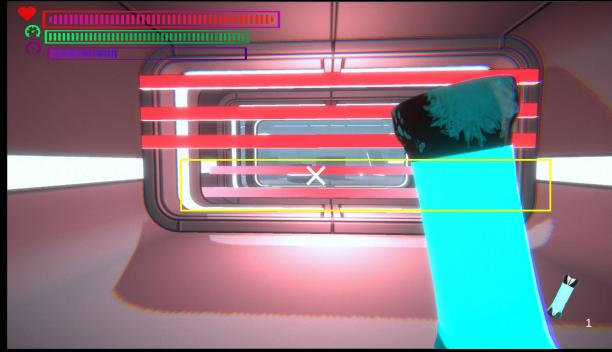


The door of the doctor's laboratory has infrared radiation.

If you do not deal with the touch of infrared radiation will immediately die.

# Design - Beginner's Guide

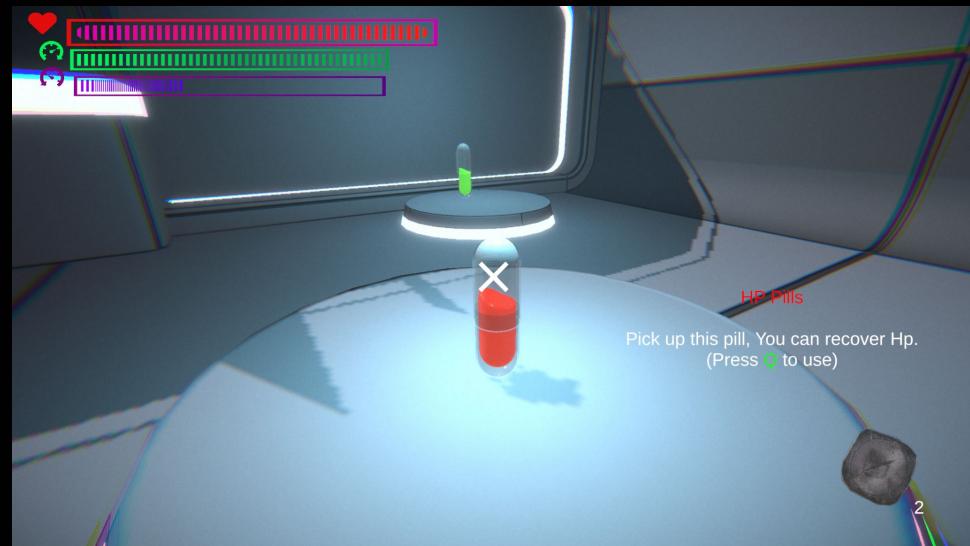
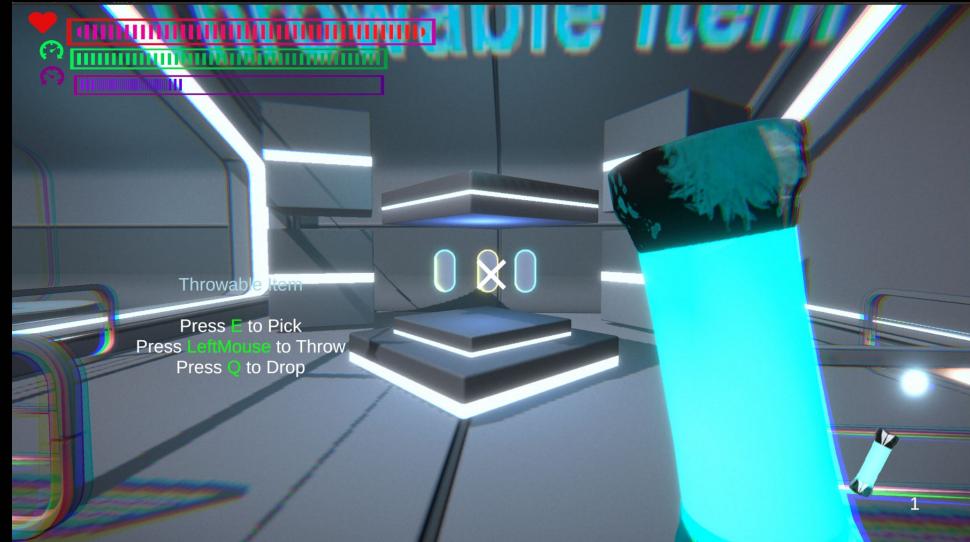
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Use the reverse ability, so that the bottom two infrared back, you can pass through the channel.

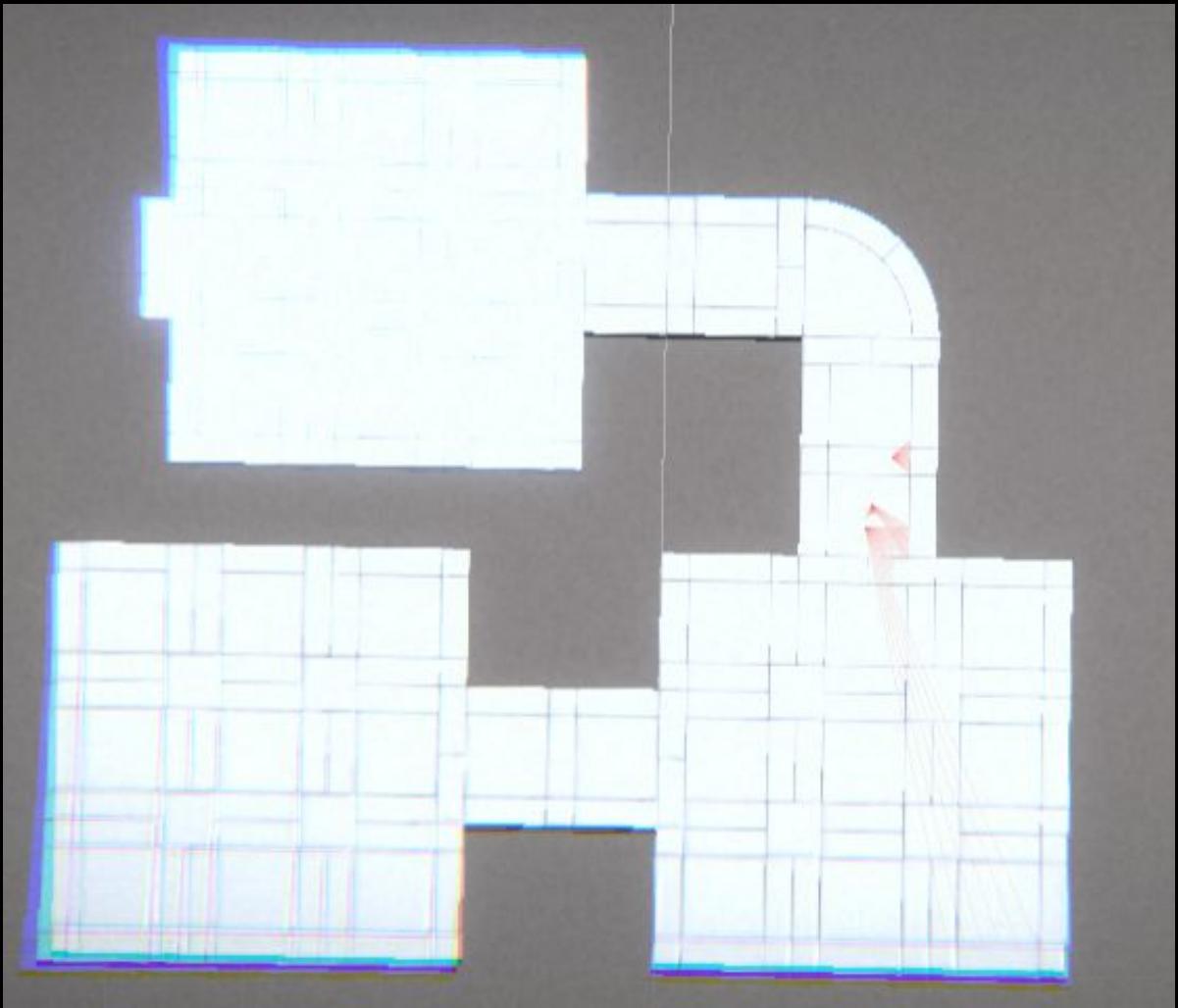
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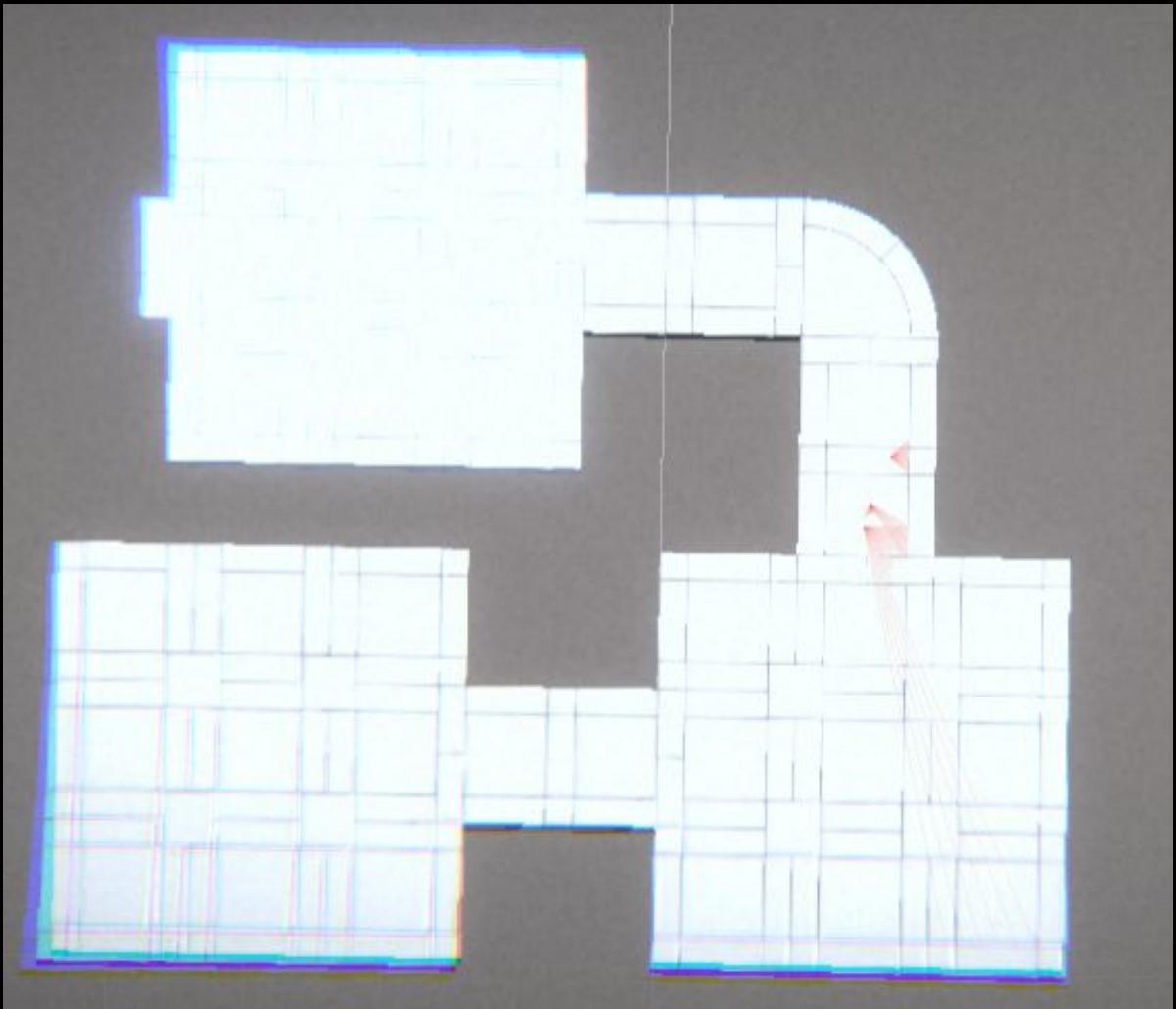
## Design - Level 1

- Storyline
  - Dr. Kronos discovered the technology of manipulating time in the laboratory, and his wild and unrestrained character made him attract a lot of attention, but also got into trouble because of it, and he decided to run away from M Lab with his research.

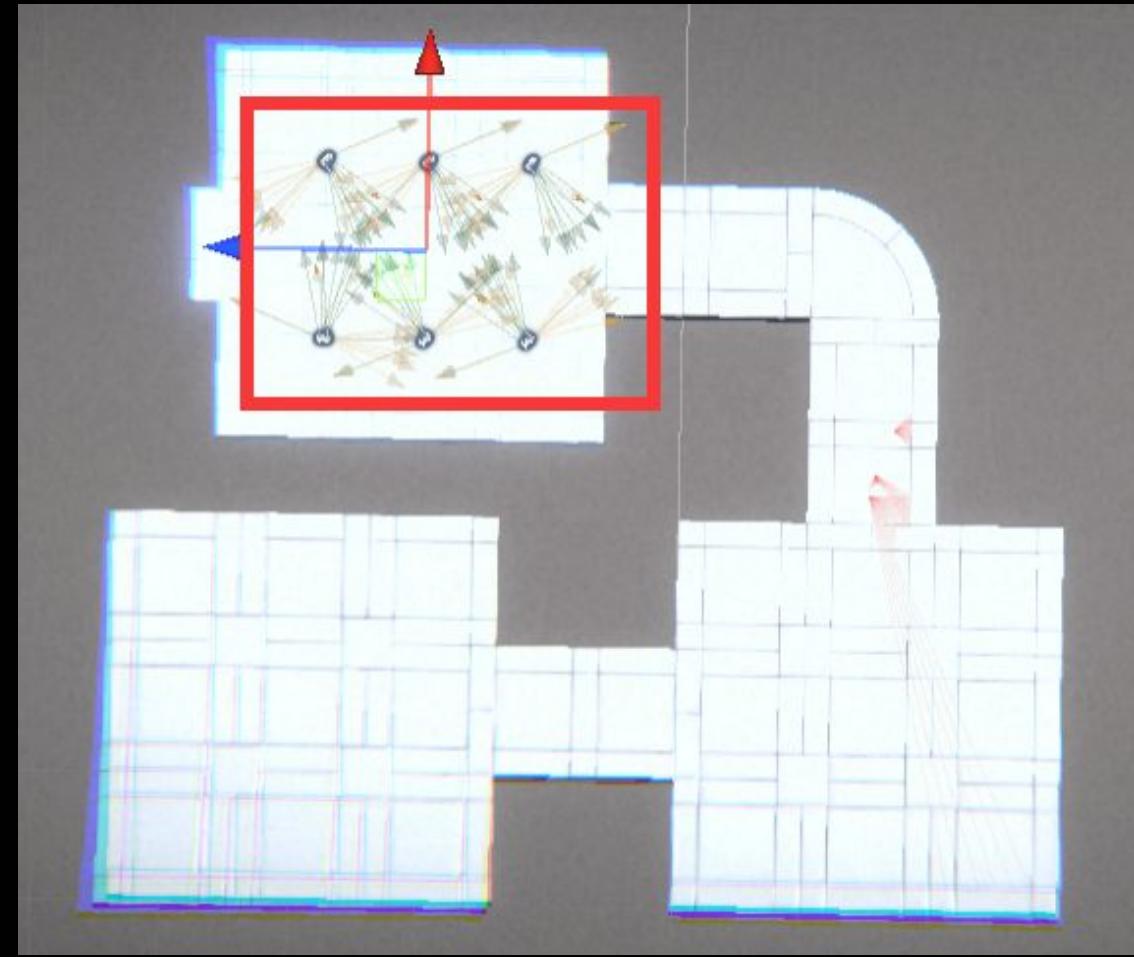
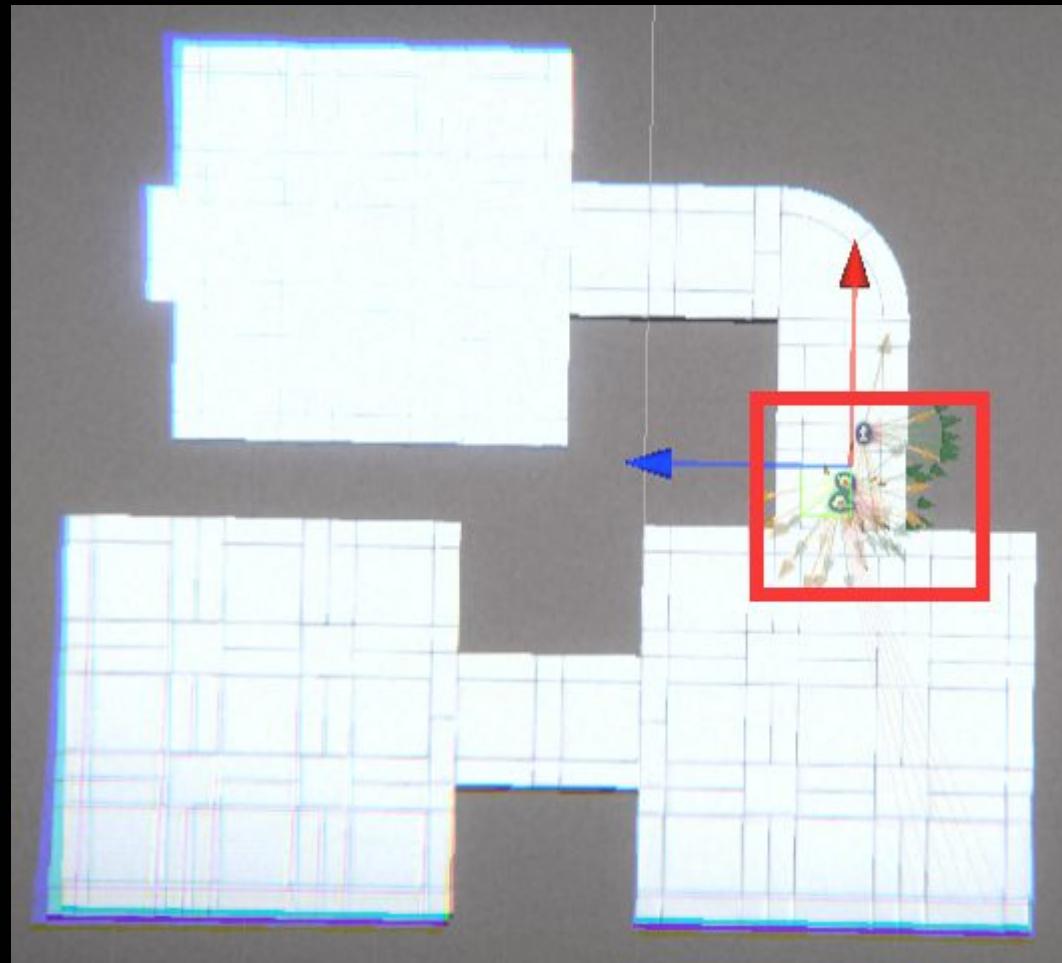


## Design - Level 1

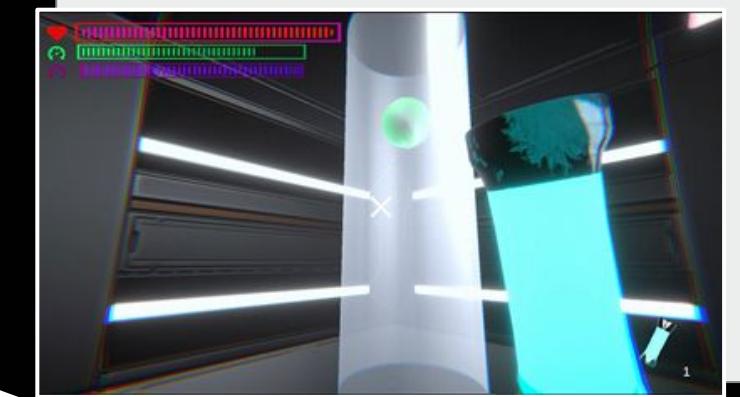
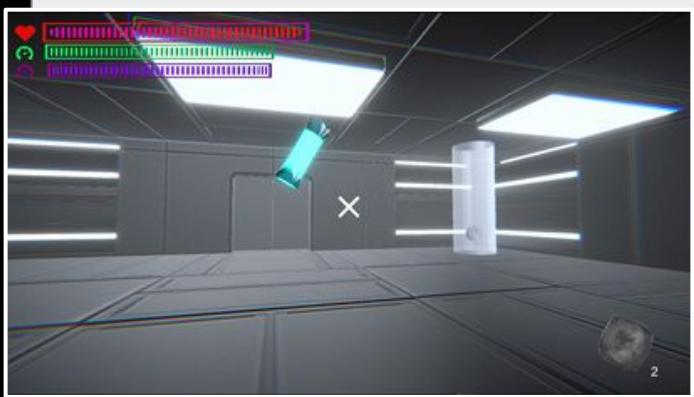
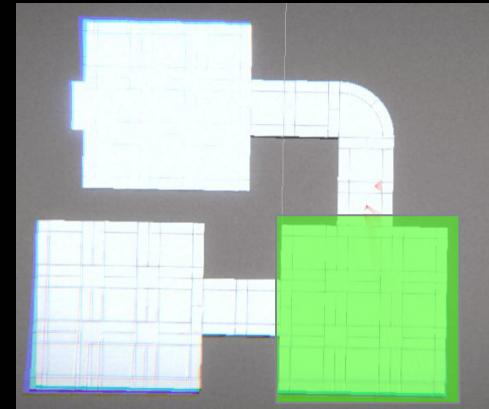
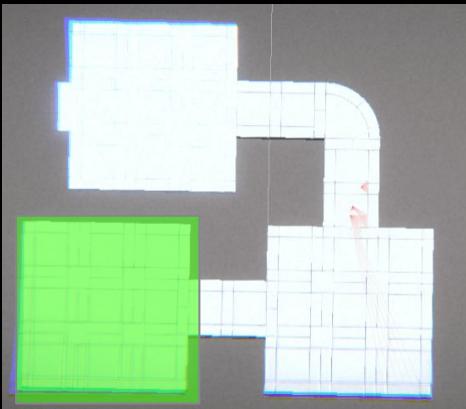
- Things to learn:
  - Basic Time Mechanism
    - Move to control the time flow
    - Basic indicator of time status
    - The concept of time energy bar
  - Use mouse wheel to control the time flow
    - Acceleration
    - Deceleration



## Design - Enemies of Level 1



# Design - Events List of Level 1

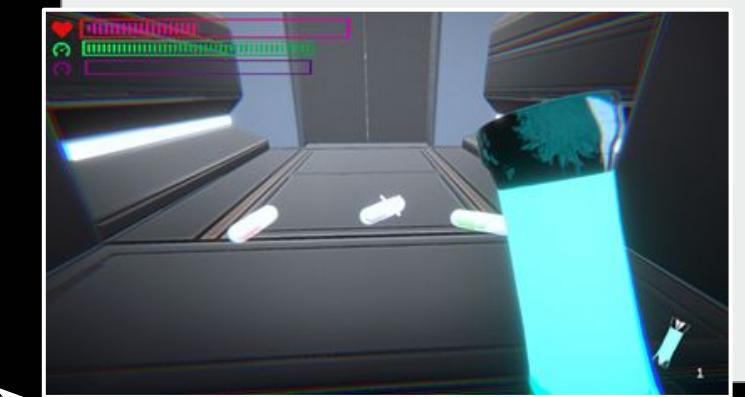
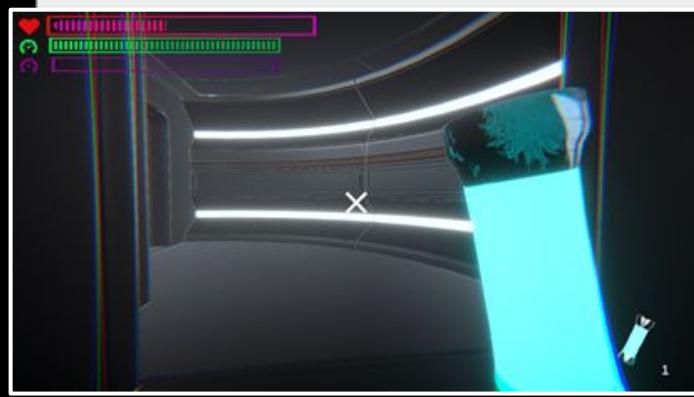
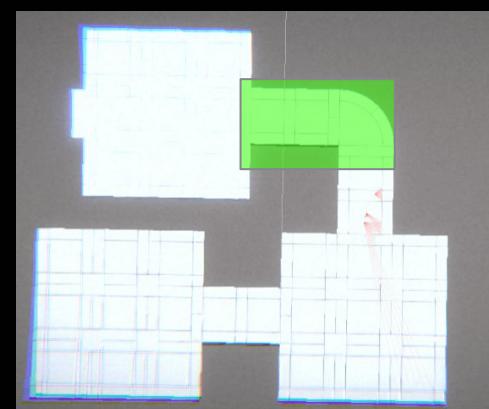
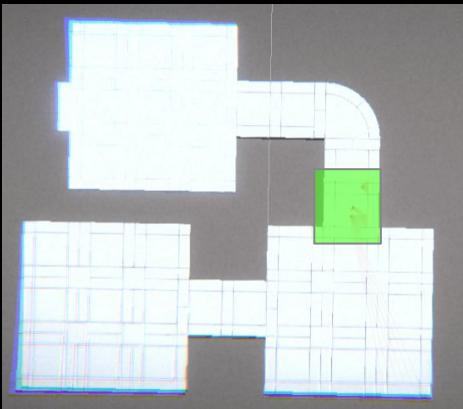


① The doctor woke up from the laboratory, picked up the ground can control the time of the wand, after a strong light, the entire world of time slowed down.

② The Doctor explores the lab and finds a wand that can control time. After picking it up, time stands still, or more precisely, time only passes when the Doctor moves.

③ The Doctor tries to control time with the wand on the ball's free-fall device, such as slowing down, accelerating or reversing the speed of the ball.

# Design - Events List of Level 1

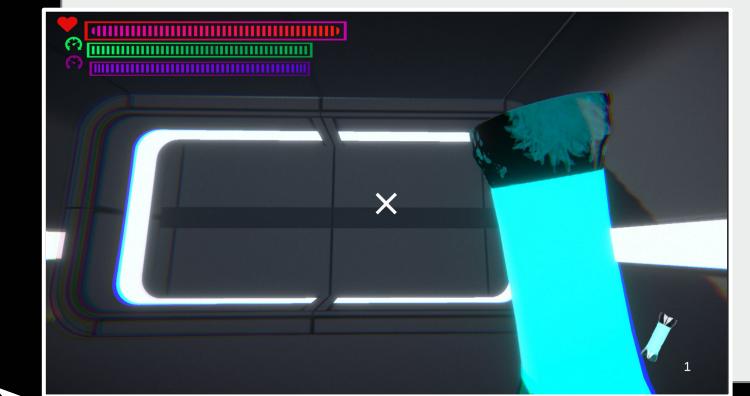
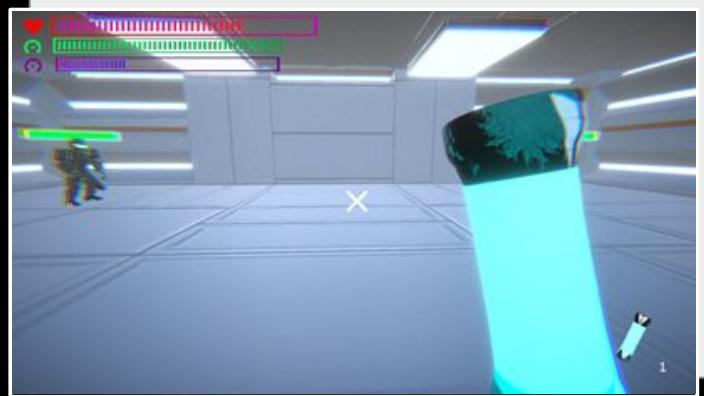
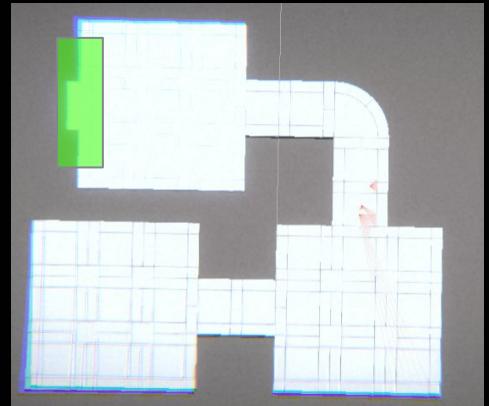
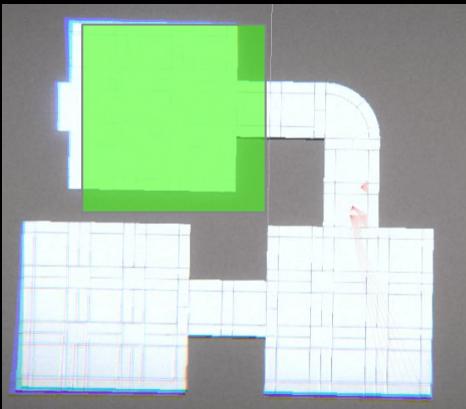


④ The doctor opened the door to meet the first wave of enemies.

⑤ The Doctor controls the speed of the enemies and the bullets, so that the enemies kill each other, or let the bullets flow backwards or the enemies speed up, finally the enemies are killed by their own bullets.

⑥ After killing the enemies, the doctor will pass through the passage to the door of the second room, pick up the potions on the ground at the door to restore HP or MP.

# Design - Events List of Level 1



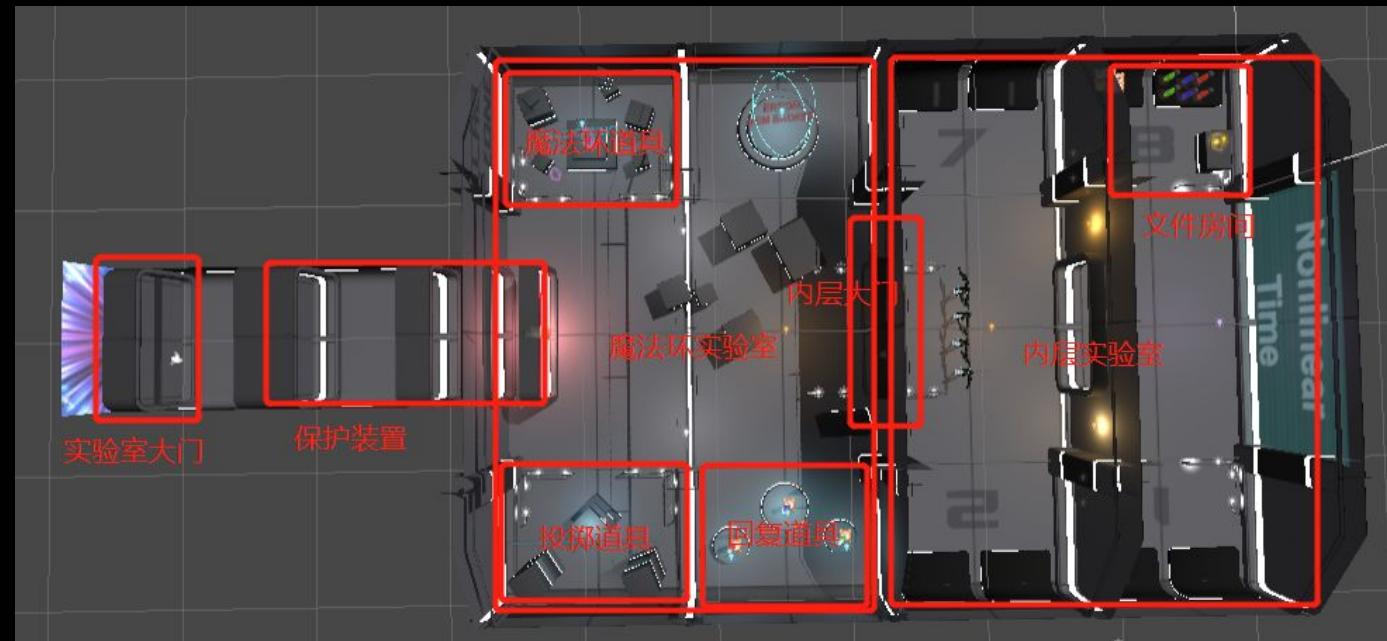
⑦ The doctor enters the second room, there are a large number of enemies in the room, the doctor can not react to the door was closed, the doctor must face the second wave of enemies.

⑧ The first level is cleared, the laboratory door opened.

⑨ The doctor came to the entrance of the second level.

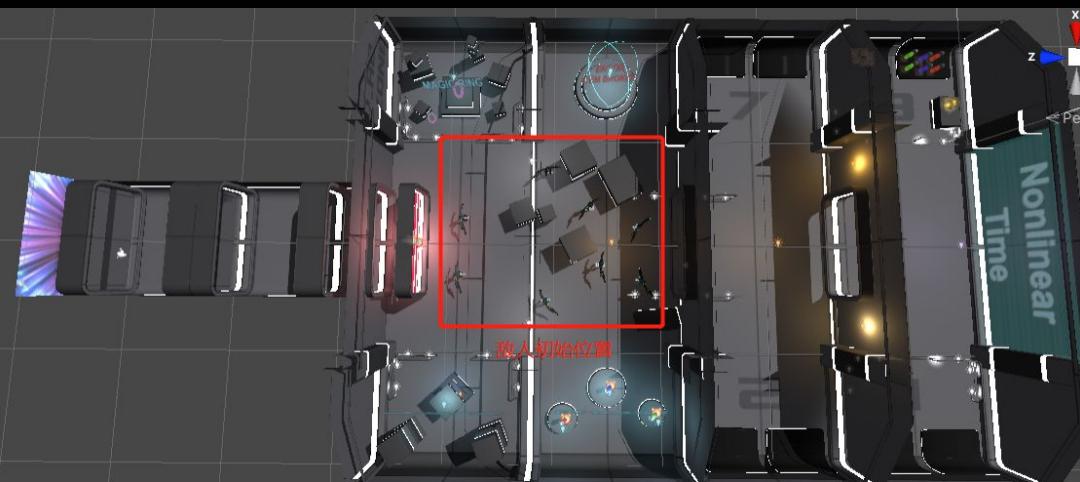
## Design - Level 2

- Things to learn:
  - Time Control Methods:
    - Mouse Wheel(Magic Wand)
      - Reverse
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  - Potion
  - Throwables Objects



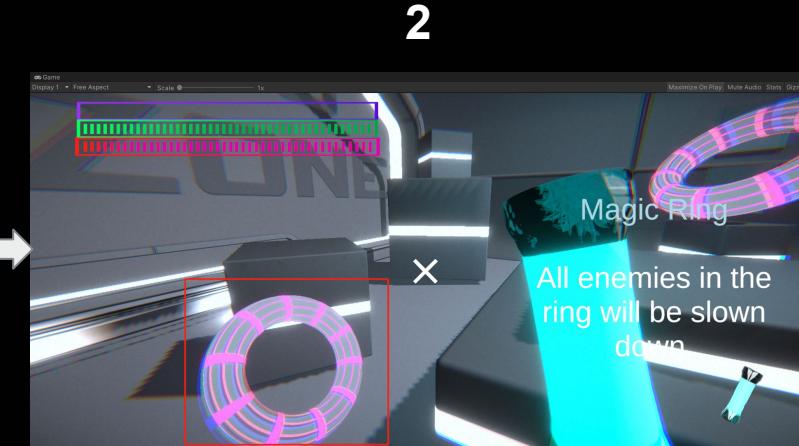
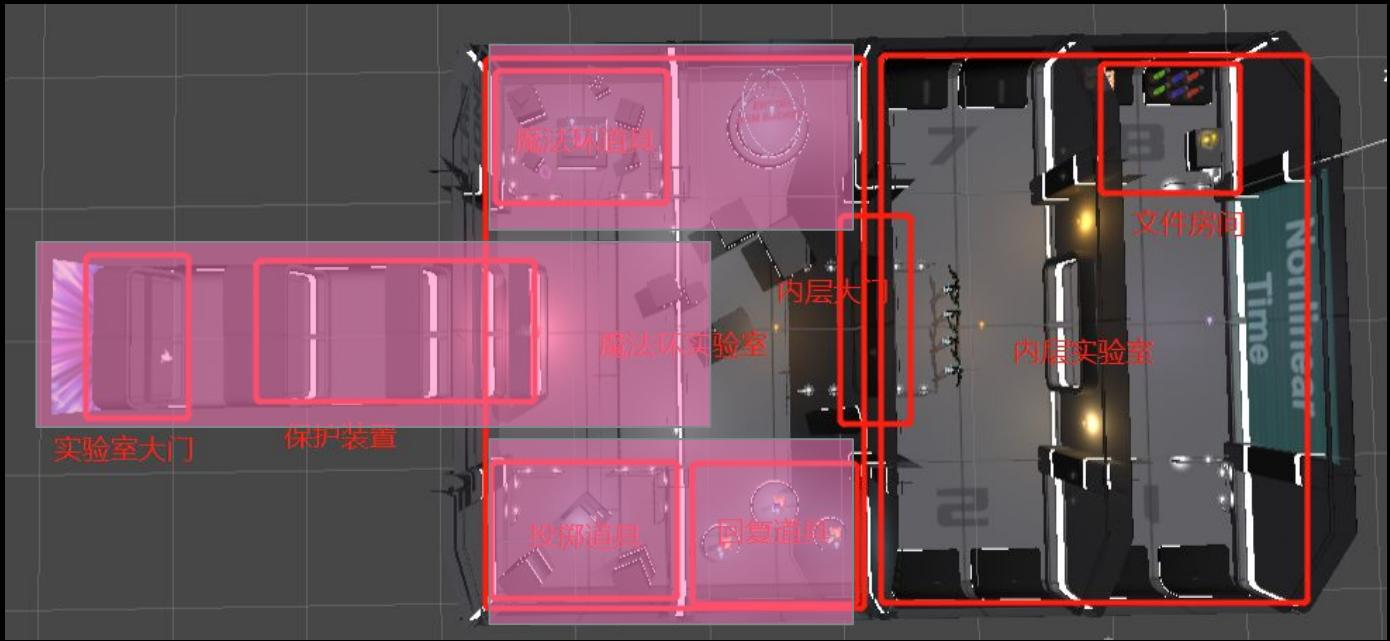
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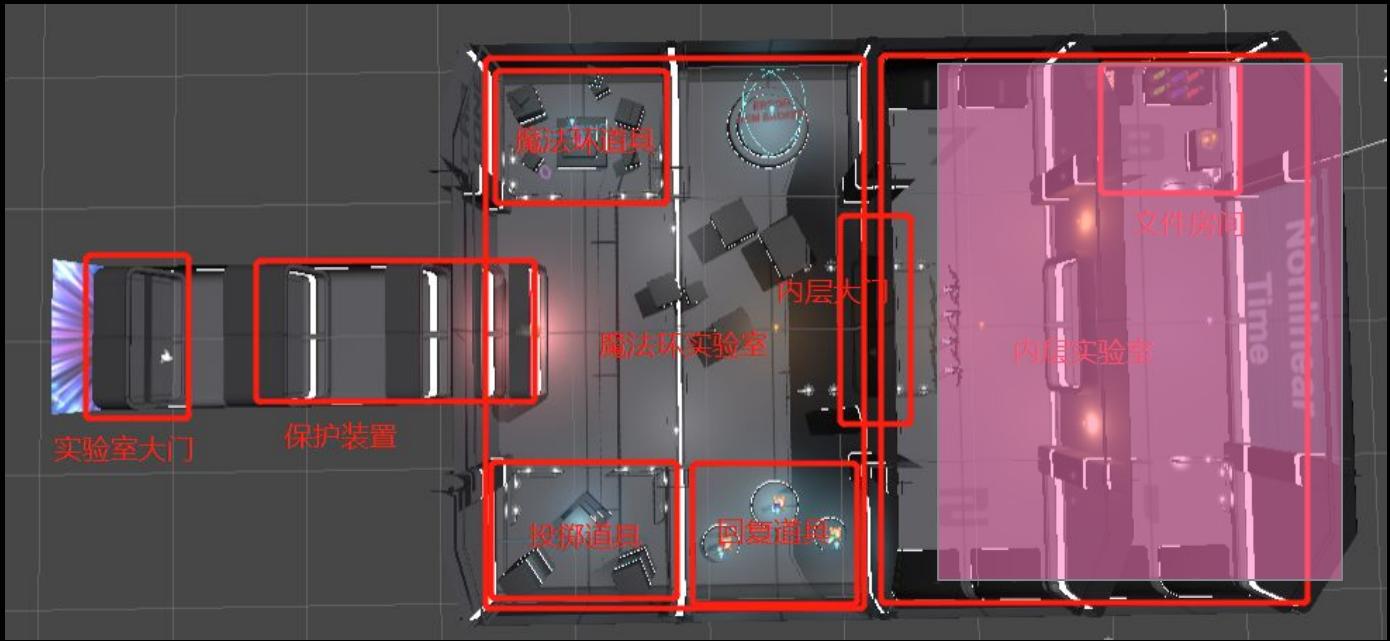
# Design - Level 2

- ① Open the laboratory door
- ② Obtain the magic ring
- ③ Obtain the recovery item
- ④ Open the inner door
- ⑤ 1st wave of enemies spawn
- ⑥ Destroy the first wave of enemies
- ⑦ Get the file, the 2nd wave of enemies spawn
- ⑧ Destroy the second wave of enemies
- ⑨ Reopen the laboratory door and leave

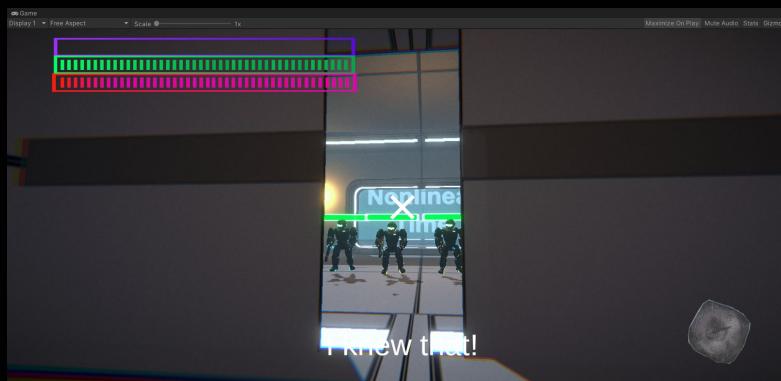


## Design - Level 2

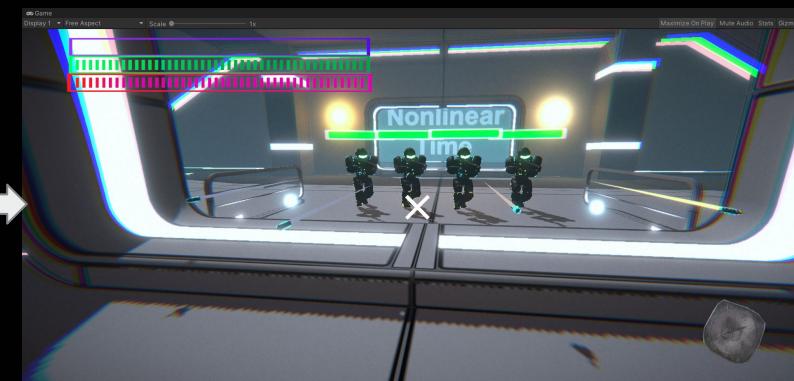
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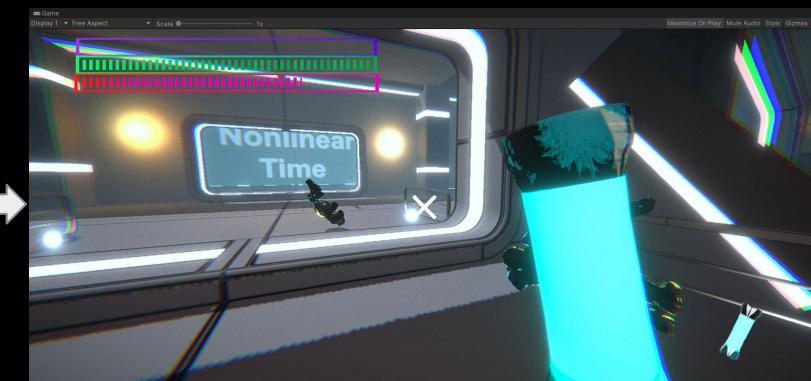
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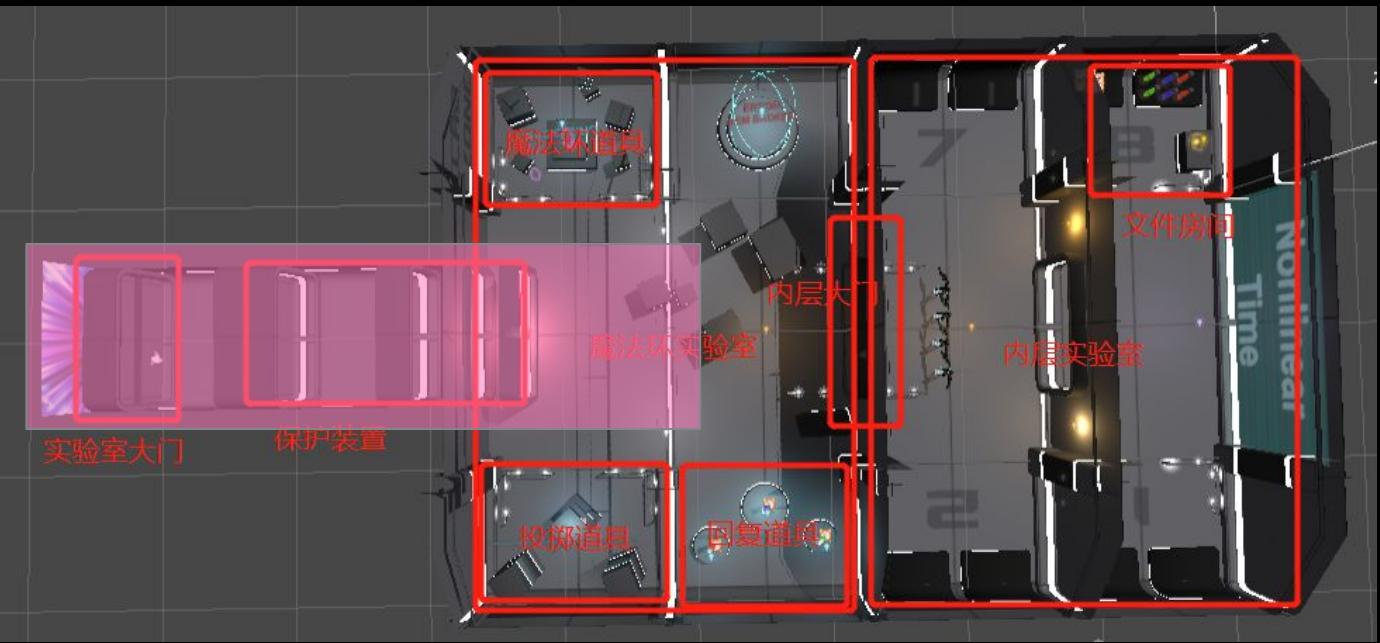


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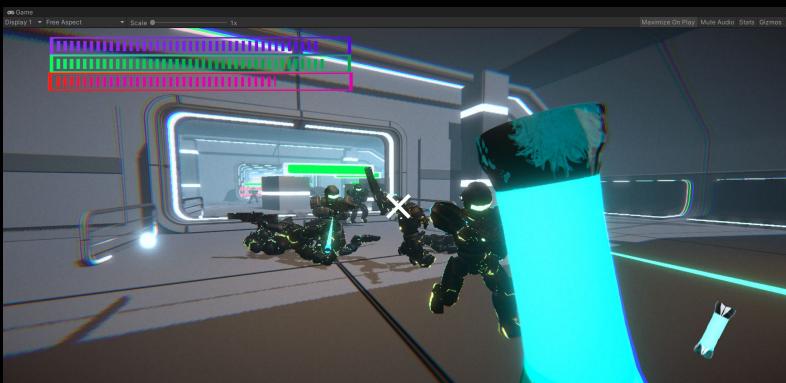


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7



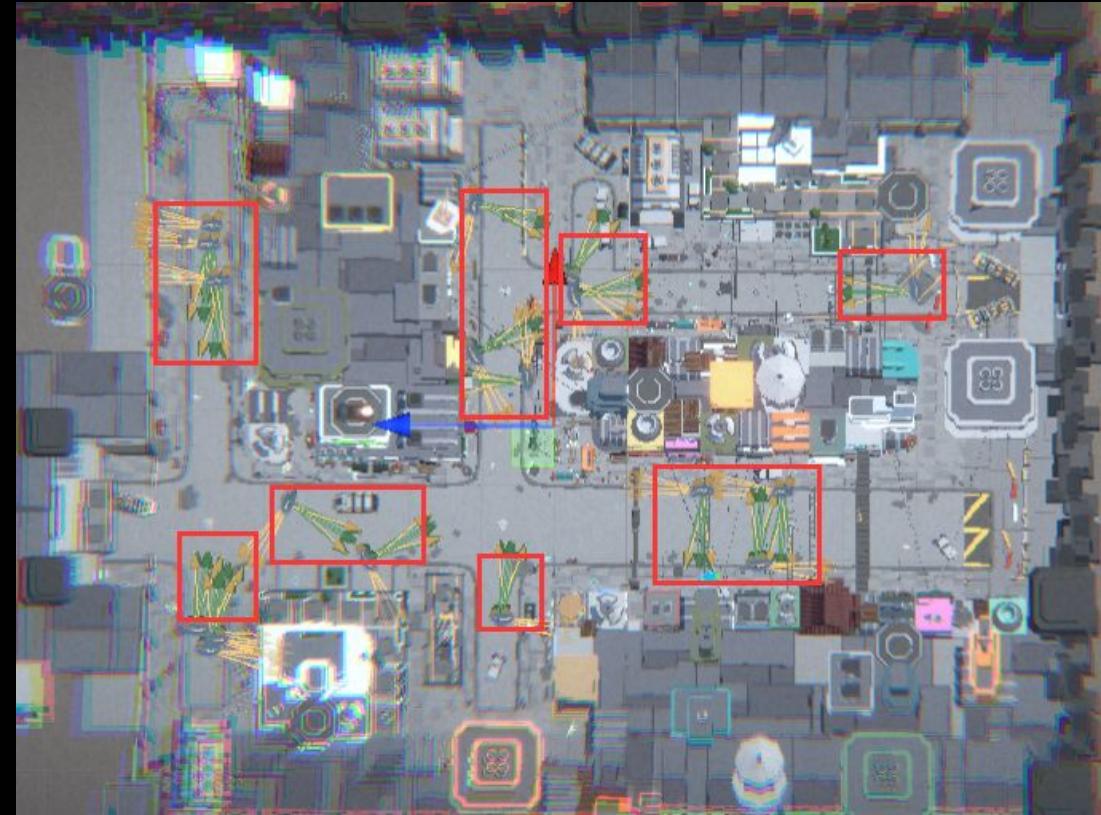
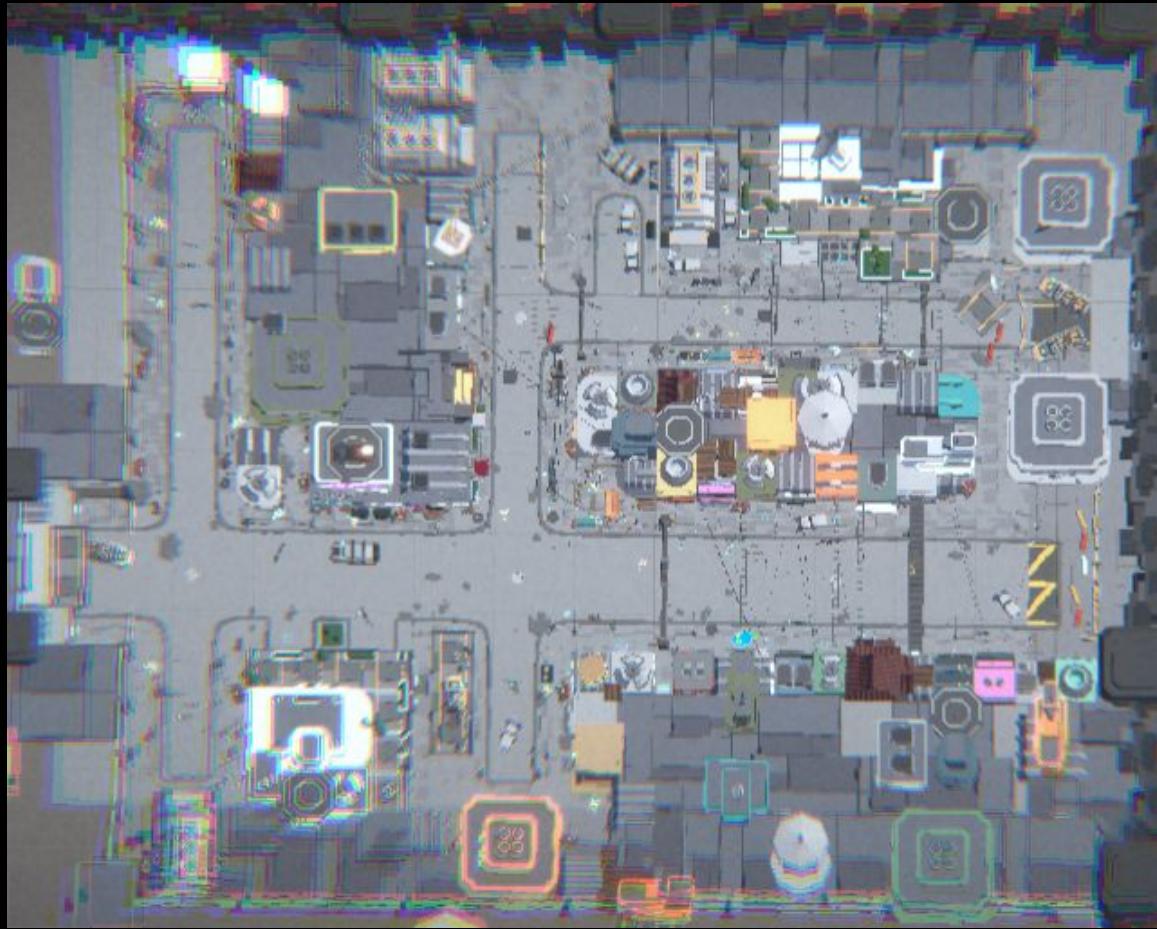
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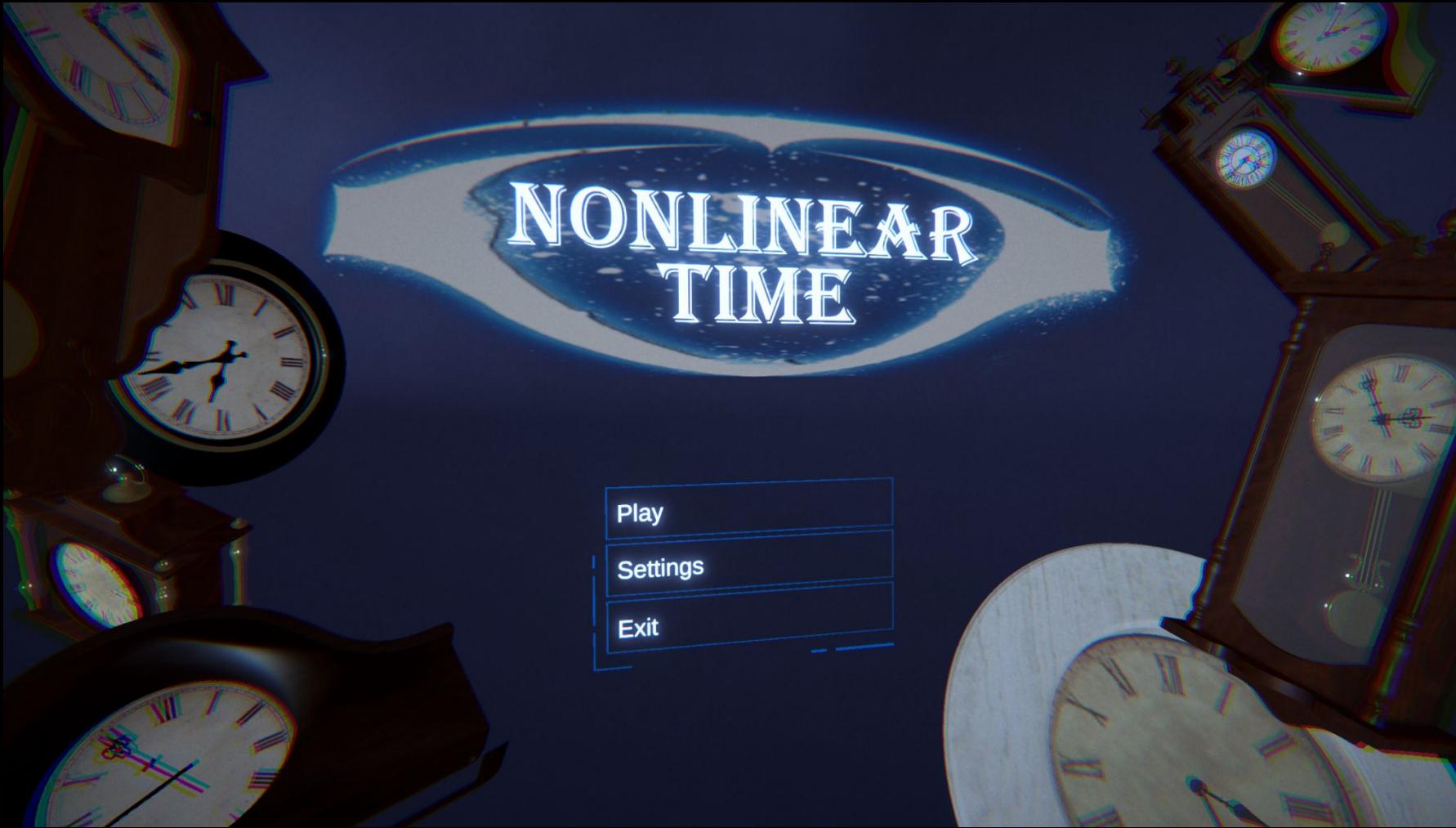


## Design - Level 3



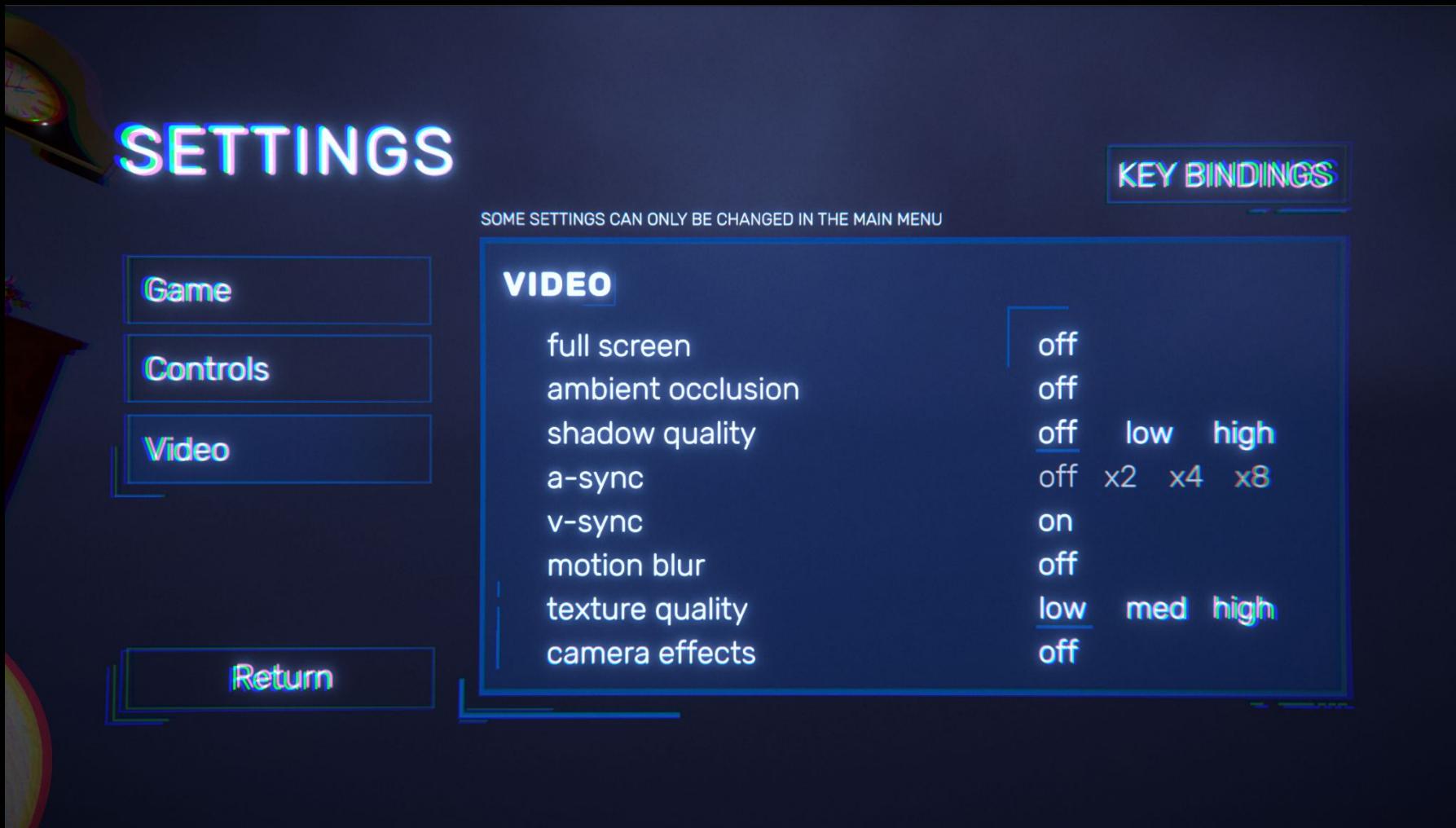
Nonlinear\_Time SSE@Tongji

# Design - User Interface



Nonlinear\_Time SSE@Tongji

# Design - User Interface

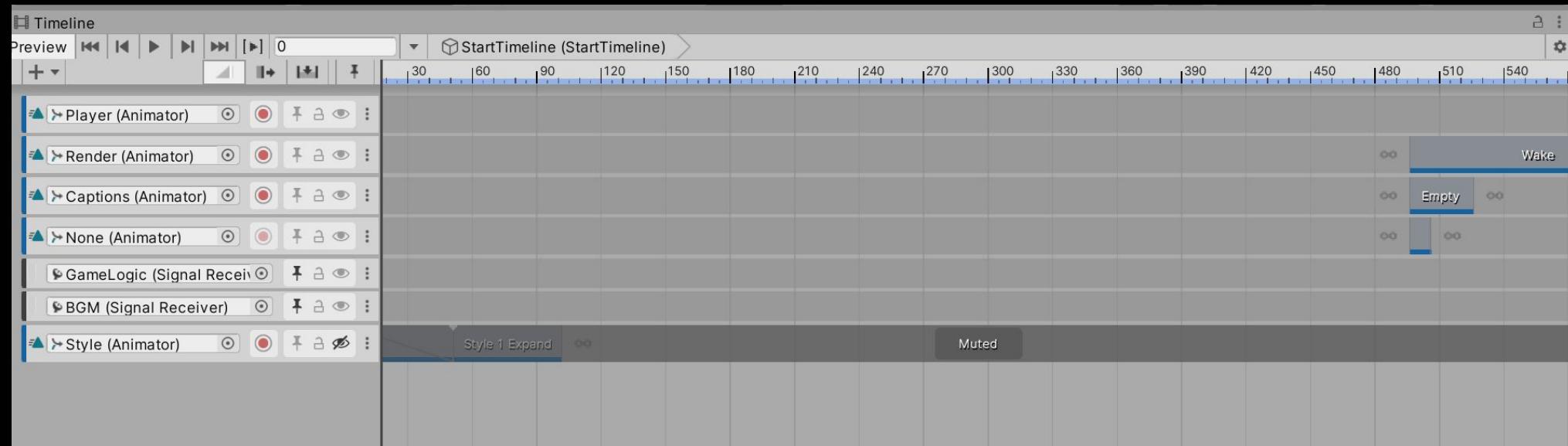


# Design - User Interface



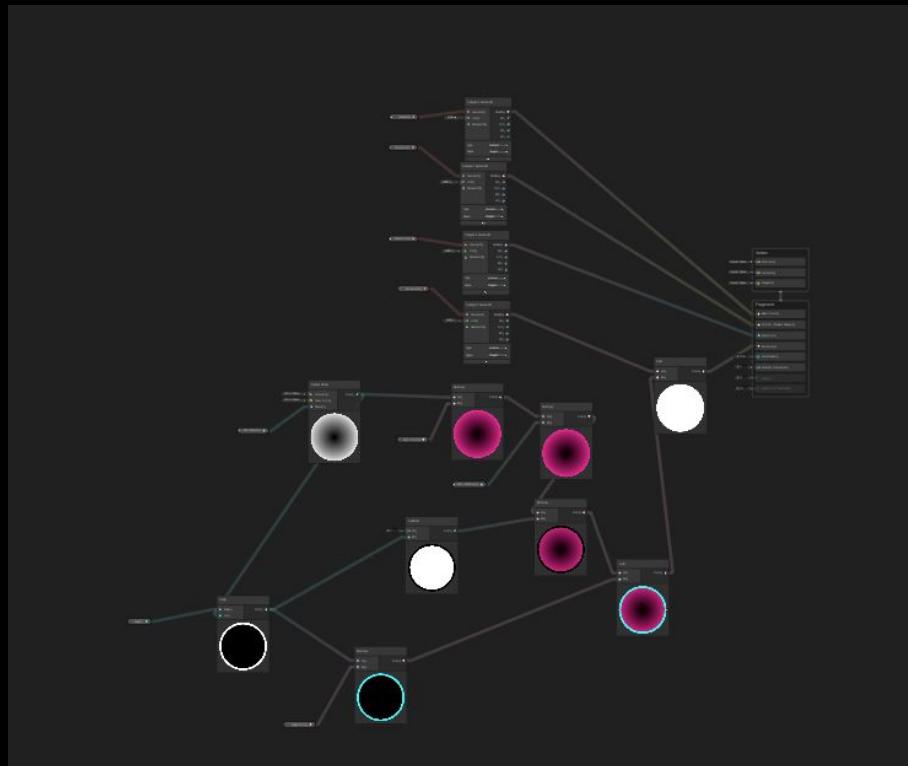
# Techniques

- **Timeline:** Use Unity Timeline to create cinematic content, game-play sequences, audio sequences, and complex particle effects.



# Techniques

- **Shader Graph:** Shader Graph simplifies shader writing by letting you build shaders visually and see the results in real time. You can create and connect nodes in a network graph without having to write code.



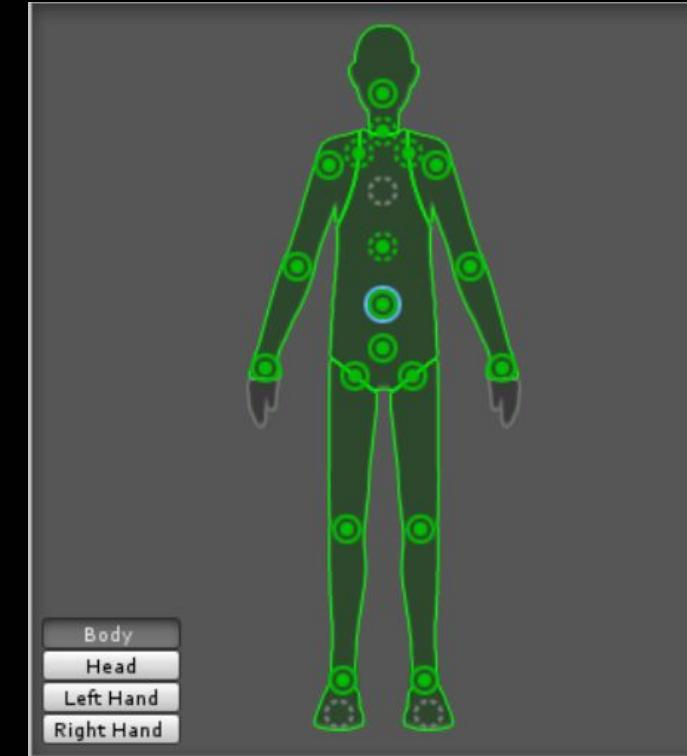
# Techniques

- **Chronos:** Chronos brings full time control to Unity. It is easy to use, optimized for performance and equipped to handle any scenario you have in mind.



# Techniques

- **Ragdoll:** Ragdolls are variants of animated objects whose bones are completely taken over by the force of physics. They're most often used when a character is defeated, like in an action game when a player's health depletes, or when you want a character's movement to appear to be driven by physical forces.



# Techniques

- **Post-processing:** Unity provides a number of post-processing effects and full-screen effects that can greatly improve the appearance of your application with little set-up time. You can use these effects to simulate physical camera and film properties, or to create stylised visuals.



# Thanks !