2021
Game Design
Portfolio
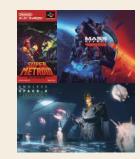LiYi Tang

UnFettered Space

Abstract

UnFettered Space is a 3D side-scrolling action shooter that takes place in a mysterious universe. In the world of UnFettered Space, players will explore more than a dozen areas of varying design in a galactic Castlevania-style game map. Countless hidden rooms, secret passages, and shortcuts are combined with a variety of core gameplay including combat, puzzle solving, and platform jumping, requiring completion of challenges large and small to earn rewards.
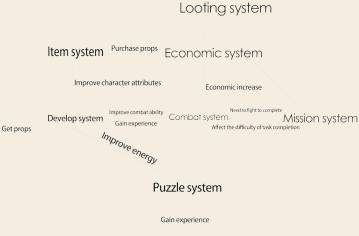
Inspiration

One of the inspirations for this game came from METROID, which I first played on the SFC console in my childhood, and it was the first time I played a sci-fi game and was attracted by the unique level design and artwork of the two-dimensional scrolling game. It also laid the foundation for the Metroidvania genre: an excellent combat system, a free mix of skills, open maps, and room-spaced archive points, which are still popular in the latest games. The game's art style is inspired by Endless Space II and Mass Effect.

Target Audience

The target audience for the game is those interested in Metroidvania elements, enjoy sci-fi games and enthusiastic about the various level designs that challenge the game. The game is mainly puzzle-oriented, players will experience the fun of gradual exploration in the space world. The stage of the game will be a vast but isolated island that will not change in any way. All kinds of creatures, bosses and routes will be pre-defined and hidden somewhere in this vast world waiting to be explored

Looting system

Item system   Purchase props   Economic system

Improve character attributes   Economic increase

Develop system   Improve combat ability   Combat system   Need to fight to complete   Mission system
                  Gain experience   Affect the difficulty of task completion

Get props   Improve energy

Puzzle system

Gain experience

Looting System: Player can loot enemies, NPC items while stalking and consume energy points. Player can use the looting tool on knocked down enemies, NPC's and pass throughto obtain a large number of items in a limited time. Player can obtain all items(weapons, defense equipment) of the enemy upon successful looting, no chance of dropping them.

Fear Systeam: Player can choose Player killing method when Player sneak up on an enemy,different killing methods will create fear in the surrounding enemies and drive theminto madness.

Mission System: Players will complete main quests to experience the story and earn some quest rewards. Players are also free to choose side quests. There are three types of side quests in the game class. In the Bounty category quests. Every time a main quest is completed, a new bounty quest will appear for the NPCs and the player will be able to gain additional money or resources. In the Puzzle category, by solving specific level organs in each chapter, players can obtain special items. You have three attempts to solve a clue (mechanism) within your energy limit, and you will fail if you have not solved it after three attempts.

Demo Link:https://www.liyiportfolio.com/

Level Design

Character Movement

The game contains characters that can walk, run and jump. In the levels players need to use various movements to challenge some mechanisms such as moving lasers and enemy projectile attacks.

Character Attack

Characters can make attacks on enemies, such as shooting and melee attacks. This is one of the effective ways to defeat enemies.

Interaction

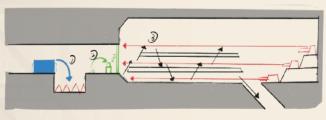Characters can interact with some objects, such as the operation of the elevator and the movement of boxes.
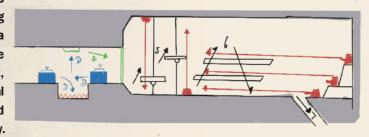
AI Attack

When the player is close to the enemy, the enemy AI will automatically track and attack the player, different enemies have different ways of attack.

This Level 1 alpha version consists of three main mechanisms. One of them requires pushing a moveable box into a trap in orderto pass in Process 1. Process 2 requires a button to open the door. In process 3, you need to move on the platform to dodge the bullet and reach the exit.
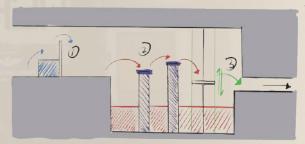
This Level 1 version of Beta features difficulty enhancements and changes over the three mechanics of the Alpha version. In Process 1, each of the two boxes has its own magnetism. The player will open the door by moving the boxes in a direction that will cause each to move to a fixed position. Where box 1 will move to the trap on the score, box 2 will move to the roof button. And in process 2, the projectile attack will turn from the original horizontal attack to vertical horizontal combination. And increased the number of movable platforms to increase the difficulty.
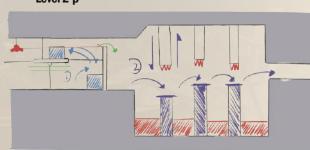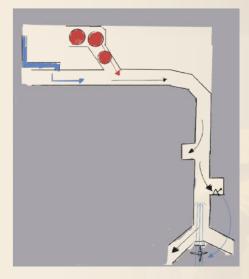
Level 1-α

Level 1-β

Level 2-α

The Alpha version of Level 2 consists of two parts. The first part of which requires moving boxes to get over obstacles, which requires the character's jumping ability. The second part requires jumping to a safe platform on a pillar to prevent falling into the red venom.

Level 2-β

The beta version of Level 2 has increased in difficulty. Among them in the first part of the extra moving platform, tracking type of enemies. Players need to jump to the moving platform to push the boxes to make the boxes stacked to pass the obstacles. High barriers can defend against tracking enemies. In the second part, traps that can be closed are added. Players need to observe the trap closing time to catch through.
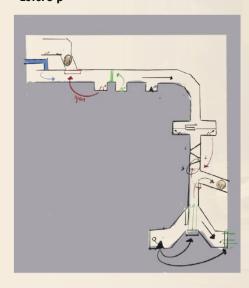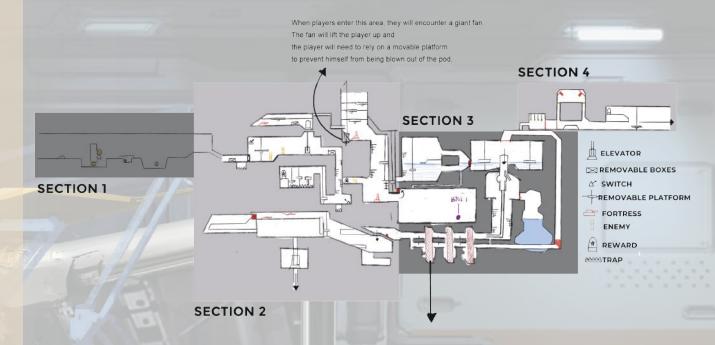
Level Design

Map Design

Level 3-α

Level 3 alpha version is designed as a prototype for the following waterway escape. It is mainly composed of two parts, the first part is to avoid the rolling of boulders on the horizontal surface. The second part requires a recess in the front wall to avoid the boulders.

Level 3-β

Level 3 Beta version adds more opportunities to avoid the boulder and requires players to manipulate the switch to control the rolling direction of the boulder. It is mainly composed of two parts. When avoiding the rolling of the boulder on the horizontal plane, the player needs to manipulate the switch to stop the movement of the boulder. The second part requires the control of different baffles to make the boulder fall to the correct position that can be blown

When players enter this area, they will encounter a giant fan. The fan will lift the player up and the player will need to rely on a movable platform to prevent himself from being blown out of the pod.

SECTION 1

SECTION 2

SECTION 3

SECTION 4

ELEVATOR
REMOVABLE BOXES
SWITCH
REMOVABLE PLATFORM
FORTRESS
ENEMY
REWARD
TRAP

SECTION1:
This is the area outside the ship, it is located on a planet desolate plains, a space base can be seen in the distance. Here the player will encounter the attack of alien bugs, the player also needs to solve the puzzle of the boulder to move on.

SECTION2:
Once inside the ship, this includes the deck, cockpit and power plant of the ship. Players will encounter robot attacks here. Here there are also some rooms with special functions props waiting for players to explore.

SECTION3:
From here, water starts to enter the rear of the ship due to the ship's wreck. Players need to pass through these water-soaked areas within the time limit. At the same time, players will also encounter powerful bosses here.

SECTION4:
Section 4 is the ship's emergency escape route, which is littered with the bodies of ship personnel and alien creatures. Players need to defeat these alien creatures and dodge the barrage of turrets in order to proceed.

Character Design

RUN

JUMP 1

ATTACK 1

ATTACK 2

Main Character
Name: Sifer
Height:1.8M
Background:
After the fall of Infinity City, many refugees fled to the moon base, and Slifer was one of them. Slifer's unique appearance convinced the Garde of Moonbase that they had the blood of the evil Architect in them. Because of this, Slifer witnessed the murder of his parents, which made Slifer hate Warlocks and their androids.

SKETCHS

Ability Design

Sketch

BOSS Ability Design

The Alien Pope
Name: Uria, Lord of Phantasms
Height: 2.6m
Background:
Uria is a powerful new human created by the warlocks of the Void Fortress during the War of the First Ephemeris. In order to realize the battle plan of the Void Fortress, Uria was sent to the Infinite City by the "Witch Club" to carry out brutal slaughter and destruction of the architect's home. Before heading to the Infinite City, Uria set a trap in the control method provided for the magic ship, which eventually caused the magic ship to lose control during the trial voyage, leaving the warlocks of the void fortress to suffer their own consequences.

Automated Combat Creature No. 1
Height: 2m
Background:
With the development of biotechnology, significant improvements have been made on the basis of the first generation of synthetic organisms. In order to increase the possibility of mass production, the generation developed for the purpose of creating "self-reproducing individuals", accompanied by synthesis The improvement of technology and the ability to enable future generations to inherit their needs are the main characteristics of this generation.

Monster Design

The

The Town

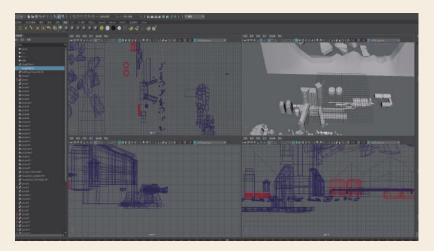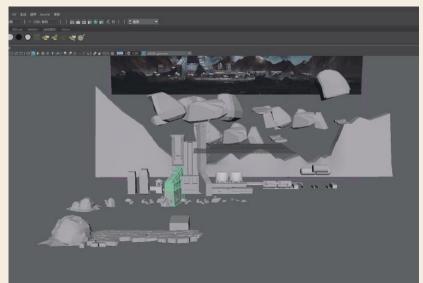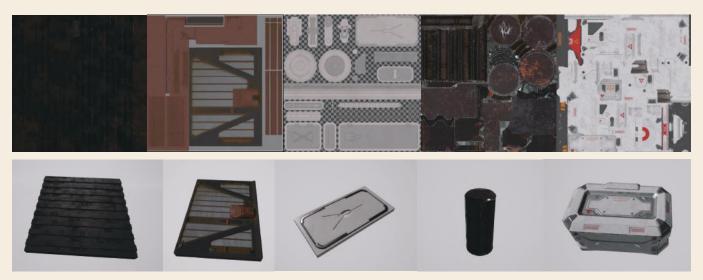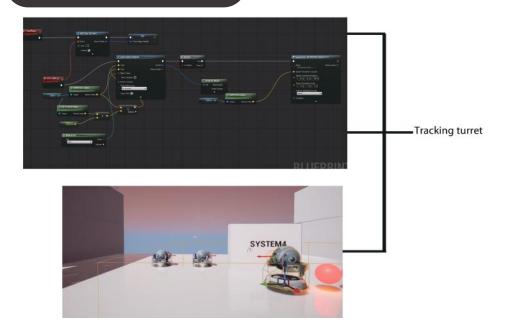Outside the space

Inside the Space base

3D Modle

3D Texture

3D Background
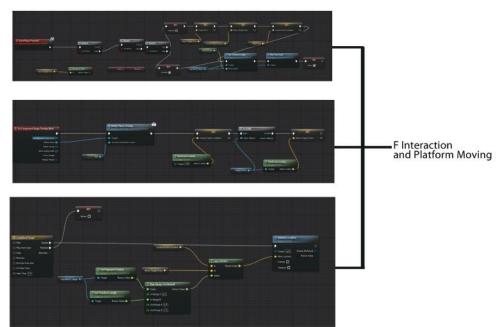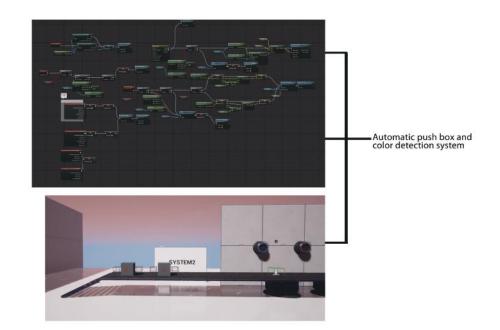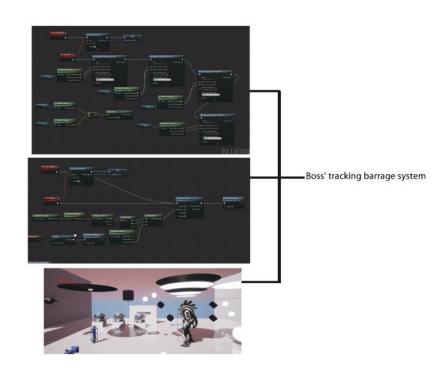
All Props Molde

UE4 Blueprint

Tracking turret

Automatic push box and color detection system

F Interaction and Platform Moving

Boss' tracking barrage system
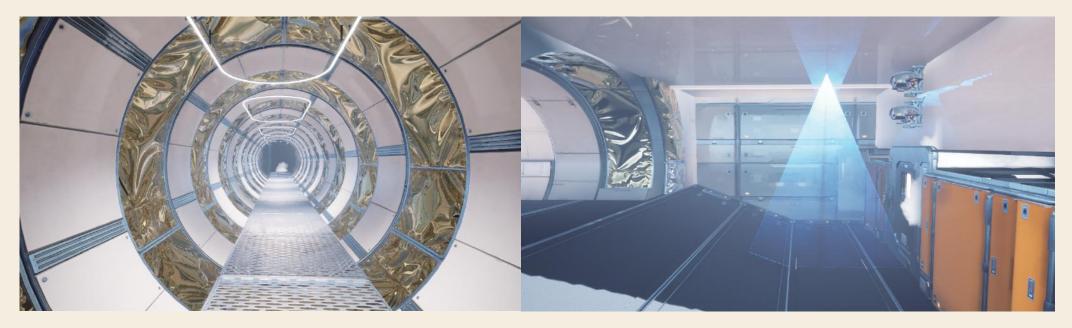
Virus of War

Abstract

Virus of War is a strategy board game about viruses and cells and supports 2-4 players. In Virus of War, players will take on the role of one of the viruses or immune cells and set up their own cells from their own domain to form an expansion and finally devour the opponent's parent cells. Different races have different skills, different terrains have different effects, and they will be the main factors that will change the game situation.

Inspiration

The game was inspired by COVID-19, a disease that swept the world with common symptoms including fever, cough, fatigue, shortness of breath, and loss of taste and smell. It led to an ongoing epidemic that became one of the deadliest epidemics in human history, and Virus of War hopes to simulate the human body fighting the virus in a board game.

Target Audience

The target audience for the game are people who passionate about matchmaking in board games. The various cards and maps of the game have a certain scientific function on the human immune system. This is helpful for those players who wish to understand the process of fighting against viruses and humans.

GAME FLOW

START → Each player randomly draws a race card and obtains the corresponding cell bank and matrix → Once a turn, the player will receive two command cards → Use command cards to move or evolve cells, and use function cards.

NO → Occupy the opponent's three production frames

YES → Victory

SET UP

1. Place the map in thse center of the table
2. Organize and place command cards, swallow cards and function cards on the table

FUNCTION

COMMAND CARD

SWALLOW CARD

Place the function card with the back side up

3. Each player randomly draws a race card and obtains the corresponding cell bank and matrix

RACE

Lymphocytes

RNA Virus

4. Each player places a cell bank: normal cells x20, level 1 cells x10, level 2 cells x6, level 3 cells x4

x 20

x 10

x 6

x 4

DEVOURING CHAIN

Normal Cells < Level 1 Cells < Level 2 Cells < Level 3 Cells

BATTLE

1. Once the round starts, once a turn, the player will receive two command cards. Using a command card, the player can choose to order a cell to move, a cell to evolve, or a new normal cell to be produced. Only one of the three options can be selected

i: Move the cell by one frame

ii: Fill one cell in the production cell

2. When a player's cell enters the organ map, it will randomly receive a function card for every frame it moves. Function cards can be selected to be opened or stored during any turn. A maximum of 3 function cards can be stored.
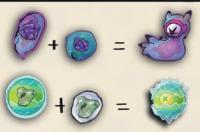
FUNCTION

FUNCTION

Open

Players can only see the effect of a function card when they decide to use it.

- RNA Virus
Effect: When devouring low level cells, it can evolve itself by 1 level.
- Lymphocyte
Effect: Cells of the same level can fuse with each other to evolve (does not consume command cards)
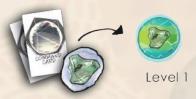
4. Command Cards:
Players can also choose to command cells to upgrade
The number of command cards required for cell evolution varies by level.
Upgrade to level 1: 2 cards
Upgrade to level 2: 3 cards
Upgrade to level 3: 4 cards

Level 1

General cells

5. Cell bank categories:
General cells: ordinary cells without special effects
Virus.
Level 1 virus: After devouring the opponent's cells, it can transform the opposite cells into our cells and place them at the birth point
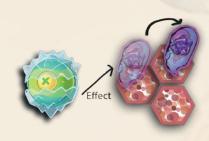**Level 2 virus: can move two squares**
Level 3 Virus: You can select any of our cells below level 3 on the map to move within one square of yourself.
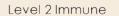**Immune cells.**
Level 1Immune: consumes one command card to prevent itself from being devoured once.
Level 2 Immune: Can cause any cell to move back one square
Level 3 Immune: Can select any opponent cell on the map that is lower than level 3 to move within one square of itself

Effect

Effect

Level 2 Immune

Level 2 virus

6. Special terrain (cells cannot be superimposed on the terrain)

Blood vessel
Effect: When on a blood vessel: can freely move anywhere within the vessel, and cannot cross its cells when there are other cells in the path.
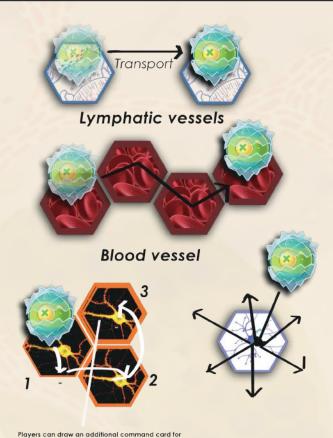
Lymphatic vessels
Effect: When on a lymphatic vessel, it can be transported to another lymphatic vessel in another compartment

Nerves (multi-level platform)
Effect: The player must travel to higher platforms in order, and may draw an additional command card for each turn spent on the highest platform.

Synapse
Effect: When entering a synapse, you can pop up one grid in any direction along a straight line.

Transport

Lymphatic vessels

Blood vessel

Players can draw an additional command card for every turn they stay on the highest level platform

The victory condition is the death of the opponent's mother, the mother's death condition is three production cells occupied by the opponent.

Neurological System | Normal cell grid | Lymphatic vessels | Synapse | Blood vessel

Game Test

Test 0.3
Play time: 90min, 2turns

Simply set up a cell vs. cell map with victory conditions of devouring the opponent's mother cells. The cell pool includes normal cells x 10,level 1 cells x 5, level 2 cells x 3,level 3 cells x 1. Higher level cells can devour lower level cells.

Reflection:
1. The length of the battle is too long.
2. The cell movement distance is too short.
3. The battles between cells are not interesting

Evaluation:
1. Add special effects to each cell level. 2.
2. Reduce the length of the map.
3. Modify the victory condition

Test 1.5
Play time: 236min, 12turns

Added new hexagonal map, added new terrain, victory condition is to defeat all level 3 cells of the opponent. Cell pool includes normal cells x15,level 1 cells x10, level 2 cells x5,level 3 cells x2. Each level has a special effect. Add command card mechanism, command card can make cells evolve.

Reflection:
1. The effect of the virus has a clear advantage.
2. The middle nervous system has a decisive influence on the battlefield.
3. The unlimited extraction of command cards leads to too fast evolution of low level cells.

Evaluation:
1. Weaken the special effect of the virus and change the movement from three squares to two squares.
2. Layout the nervous system in the middle, so that its shortest distance is the same as both sides.
3. Limit the number of command cards drawn per turn and increase the number of command cards consumed for evolution.

Test 1.8
Play time: 127min, 5turns

Added added new terrain such as synapses and lymphatic vessels, with a victory condition of defeating all the opponent's production cells. Increased the number of cells per level. Added function cards and devour cards, cells need to consume command cards to advance.
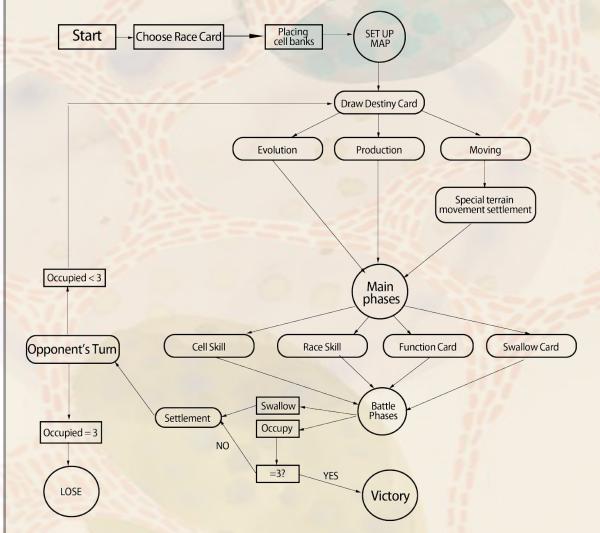
Reflection:
1. There are too many negative effects in the function tiles.
2. The topographical effect of synapse is very small.
3. The usage rate of devour cards is very low.

Evaluation:
1. Add more function cards with positive effects.
2. change the effect of synapse to one frame in any direction after entering synapse.
3. Reduce the number of command cards needed to redeem devour cards.

PLAY PROCESS

Start → Choose Race Card → Placing cell banks → SET UP MAP

Draw Destiny Card
- Evolution
- Production
- Moving

Special terrain movement settlement

Main phases

Occupied < 3

Opponent's Turn

Occupied = 3

LOSE

Cell Skill · Race Skill · Function Card · Swallow Card

Battle Phases

Settlement
- Swallow
- Occupy

NO

=3? — YES → Victory

Preparation Phase

1. Set up the map
2. Placing special terrain
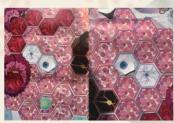
1. Select the race card of both players
2. Layout of cell banks for two types of cells

Main phases

1. Once a turn, the player will receive two command cards.
2. Using a command card, the player can choose to order a cell to move, a cell to evolve

3. When a player's cell enters the organ map, it will randomly receive a function card for every frame it moves.
4. Function cards can be selected to be opened or stored during any turn. A maximum of 3 function cards can be stored.

5. Players can use the special features of different terrains to move cells

6. When encountering each other's cells, the higher cells engulf the lower cells

7. Once the opponent has captured three production cells, the player wins.

Card Design

Card Back

COMMAND CARD

SWALLOW CARD

RACE

FUNCTION

Posion
Discard all command cards

Stress Response
Obtain a command card from the opponent

Active transport
Specify a cell to
go to any location on a special terrain

Gene mutation
Select a cell to evolve one level

Treatment
Get two command cards

Hurt
Both sides choose to destroy
their own two cells

Handwashing
Destroy a cell on the
opponent's field

Loss of activity
Select a cell degradation level

RNA Virus
After swallowing low-level cells,
it can evolve itself to level 1.
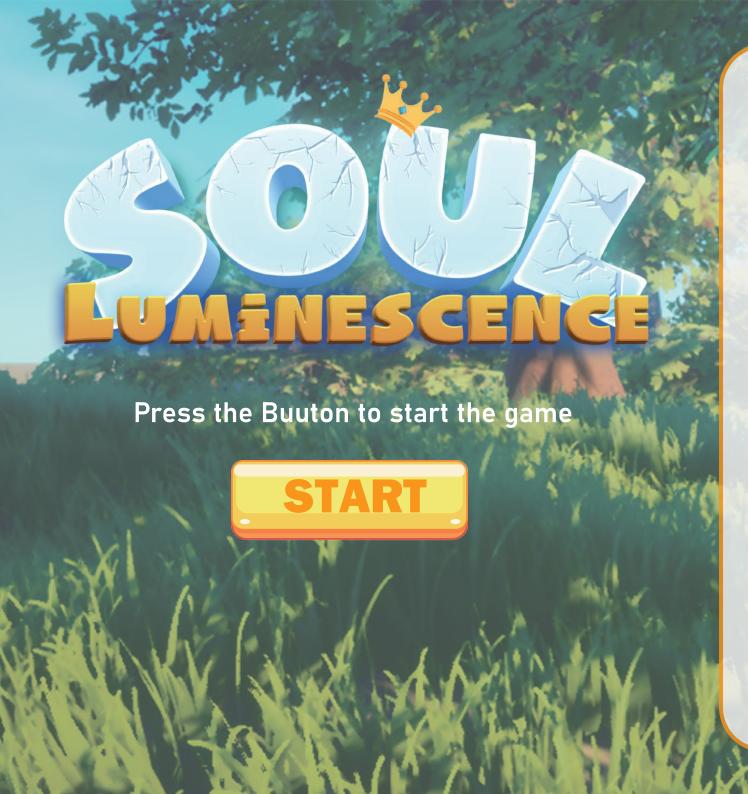
Lymphocytes
Cells of the same level can merge and evolve
with each other
(do not consume command cards)

Fuction Card

SOUL LUMINESCENCE

Press the Buuton to start the game

START

Abstract

Soul of Luminescence is an educational game that focuses on teaching English to youngsters. The purpose of this game is not only to develop their interest in learning English, but also to improve the efficiency of English learning. The game combines beat-em-up mode and English memorization with a blend of artificial intelligence, graphics, animation, and sound. The game is based on the story of a half-human, half-elf child who wants to save their kingdom. Lumine is a lick figure "Luminescence Protector". In this game, players need to constantly fight with dark monsters by reciting English words, in this game in the form of magic spells. They need to get new spells over and over again until all the dragons are destroyed. In this way, children can experience the fun of the game and remember the English words at the same time.
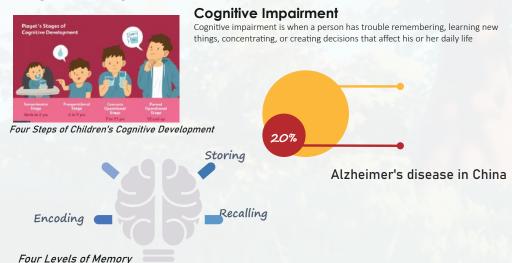
Target Audience

This VR game project is aimed at players who are interested in educational games and those who like to play games but also want to learn some foreign vocabulary. For pre-teens aged 9-13, it helps with memory skills and stimulates word learning.
For those who have Cognitive Impairment, this game also helps them to do some recovery training.

Demo Link:https://www.liyiportfolio.com/

Research

Cognitive Development of Children

Cognitive development is the development of knowledge, skills, problem solving and character that helps children think and make sense of the world around them. Enhancing memory is part of cognitive development.

Four Steps of Children's Cognitive Development

Cognitive Impairment

Cognitive impairment is when a person has trouble remembering, learning new things, concentrating, or creating decisions that affect his or her daily life

Storing

Encoding

Recalling

Four Levels of Memory

20%

Alzheimer's disease in China

Virtual Reality & Immersion

One such study, from the University of Maryland study points to virtual reality tools in education offer an improvement over tablet-based or traditional computer-based learning. The study showed that people remember information better and have a higher recall when that info is presented in VR compared to iPads and Chrome-books.

8.8%
higher average recall in VR

12%
higher average recall in VR

VR vs traditional 2D Video

Effectiveness of Serious Games in Cognitive Development

Research studies have demonstrated the increase of cognitive skills, reaction times, self-esteem, and a sense of well-being in the elderly when playing computer games.
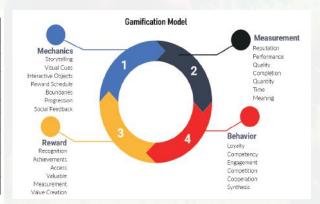

Games	Cognitive Description	Cognitive Skill
High-Low	This is a math puzzle game that requires users to decide whether a number is greater or less than previously displaced number. A player needs to be constantly attentive to recall the immediate previously displayed number.	Attention
Color Game	This is a color game that displays a grid of colors that appears on a background color. A player must constantly be attentive to keep up with matching grid colors that are similar to the background color due to the constantly changing background color.	Attention
RPS	This is a popular fun game that uses objects such as Rock, Paper, or Scissor. The player follows the rules to determine which object wins in each round.	Memory
Find Me	This is a sentence game that requires players to constantly remember displayed sentences and their object locations in each round	Memory

Overview of the Proposed Game Framework

GBL – Game Based Learning

Game based learning (GBL) is a type of gameplay that has defined learning outcomes. Generally, game based learning is designed to balance subject matter with gameplay and the ability of the player to retain and apply said subject matter to the real world.

Comparison of Traditional Training, Hands-On, and Game-Based Learning

Methodology and game implementation

Method A Song Beater

The game is to beat music with fists according to rhythm. Song beater contains more than 60 songs and also supports custom songs. Users can relax and exercise while playing music games

Disadvantages: First of all, the number of songs in this game is limited, which is a major limitation of the game. Second, the game is lack of chance for users to learn something useful.
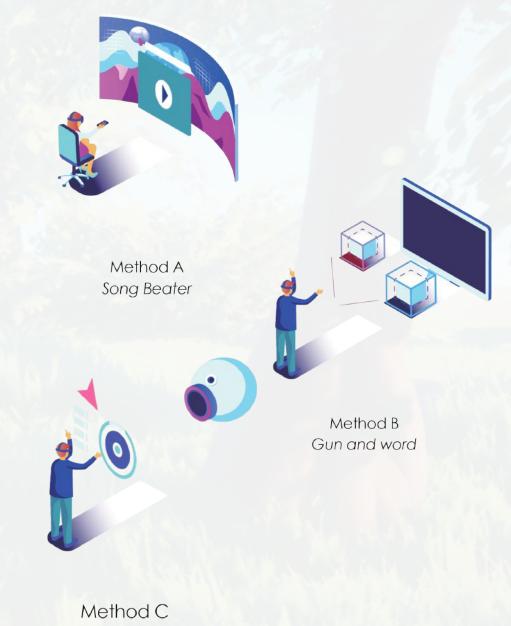
Method B Gun and word

This is also an experiential learning game, which makes the learning process more vivid and interesting.

Disadvantages: Although this game improves the learning effect as well, the setting of the game is shooting, which makes the device more demanding and difficult for children aged 9-13 to use.

Method C Vivedu Head Remember

This is also a VR application to help memorize English words through VR exercise.

Disadvantages: Users need to move their heads to select the correct letters for spelling, which leads to some security risks in the game. Users are easy to fall down and get injured in the process of using it.
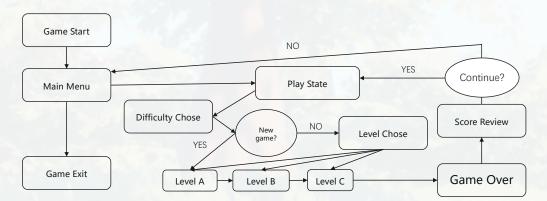
Method A
Song Beater

Method B
Gun and word

Method C
Vivedu Head Remember

Methodology and game implementation

Method Evaluation

1. The game will choose the content of English textbooks for all ages as the database of English words.

2. Users can learn in relaxation.

3. The game will choose boxing mode to interact with the device, which makes the game easier to understand and convenient for users.

4. In the game, letters will be set on some small monsters, which makes the game more playable, and the painting style of the game more attractive to children. The operation of the game is two handed boxing, which is safer than head control

Gameplay
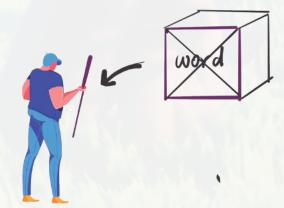
Core mechanism

Players can move through the VR controller, and movement usually occurs after defeating the enemy to move to the next scene.

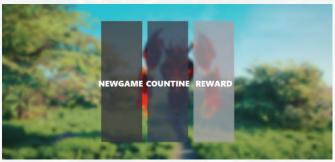Players can pick up items and gold coins dropped by enemies to improve their abilities

Players can use the weapons in hand to attack the enemy thrown words. This requires the player to spell the corresponding word correctly
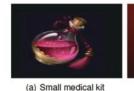
Gameplay

User Interface

During the game, each monster may randomly drop different items. As shownin Table, different props have different drop probabilities and different functions. Figure shows the images of these props, when a player obtains a small/large medical kit, the system automatically determines to use it immediately and restores the player's HP. The elimination card can be selected at certain specific times according to the player's needs.

(a) Small medical kit   (b) Large medical kit   (c) Eliminate card

Item names	Features	Drop probability
Small medical kit	Restore 10 points of health	20%
Large medical kit	Restore 10 points of health	10%
Eliminate the card	Destroy monsters(not including boss)	5%

User Manual

Players will enter the game and will use the VR handle to simulate combat. After the game starts, the boss will prompt a picture or explanation of the word, and players will need to hit the correct word in order to do damage to the boss.
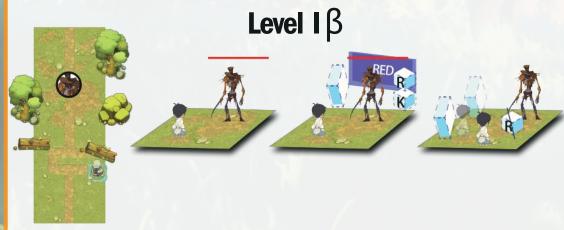

Final Gameplay
Soul of Luminescence

Game Level design

Level 1 α

In Level 1 the player will face the attack of small monsters directly after a certain distance. In the face of monster attacks, players need to choose the correct word square to strike, which will cause some damage to the monster.

Level 2 α

In the Level 2 alpha version, the scene will switch and players will encounter impassable lakes on the way.
Players will need to build bridges to get through. To build a bridge, you need to select the correct spelling word to make the bridge move.

Level 1 β

In Level 1 β version, the complexity of the route before enemy encounter has been increased and some props are available. In the monster attack method, the word spelling of the monster is split. And increase the obstacles to be avoided.
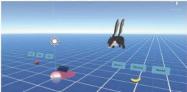
Level 2 β

In Level 2 β version, the scene in the first version on the basis of the addition of more complex maze and obstacles, players need to choose the right route to reach the end of the road, the way will also get some favorable props rewards and monsters. Players also need to build bridges to pass. The spelling needed to build bridges has been changed, and players need to arrange and combine letters to make the bridge move.

Game Test

Description:
The 1.0 version simply made monster models, and the game mechanics were mainly to attack the monsters by spelling the correct words.

Reflection:
There are too many single attacks, and the word spelling link is rather boring. The monster attacks are simple and lack a difficulty gradient.

Evaluation:
Add more attacks and add the vocabulary degrees needed for different enemies.

Description:
In the 2.0 version, the modeling of scenes and different attack methods were added. There are two options in a battle, melee and magic, each requiring different word spelling and memorization..

Reflection:
The spelling of words is too homogeneous, and the modeling of the environment and monsters lacks appeal.

Evaluation:
Add more attacks and add the vocabulary degrees needed for different enemies.

Description:
In the 3.0 version, more refined environments and models have been added. The way of spelling words was changed to attacking objects thrown by monsters. Added attack effects.

Reflection:
Lack of combat feedback, the monster attack too fast to react.

Evaluation:
Add item destruction effects and monster spell casting action.
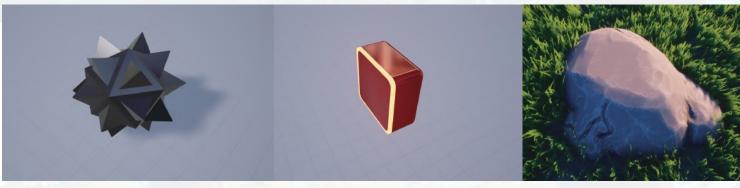
Art Research

CHARACTER DESIGN

TEXTURE MAP

NAME: Nightmare Straw
HEIGHT: 3m
BACKGROUND: Nightmare Straw is a Dark World magical creature that appears in the material world by attaching itself to a scarecrow. It has strong magical power, can float itself in the air by scratching the ether in the air, and is good at the art of petrification.

3D MODLE
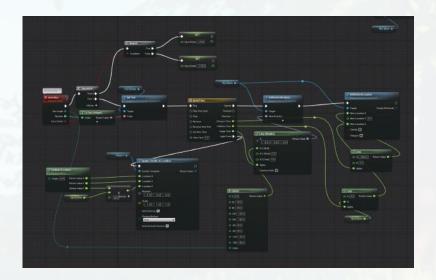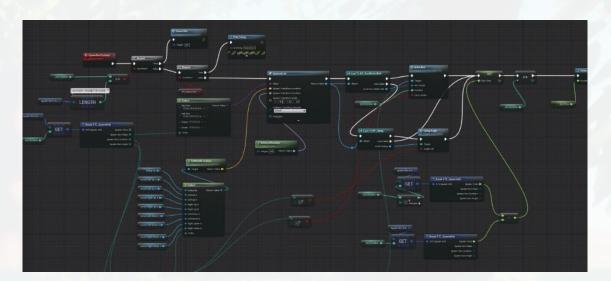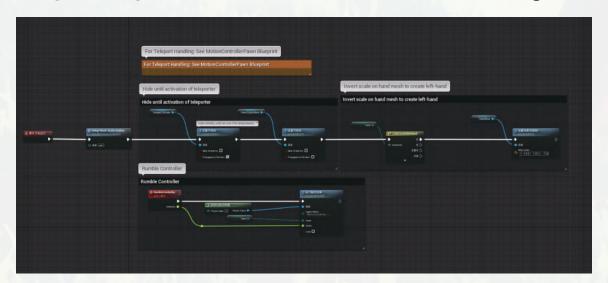
UE4 Blueprint

Boss attack cube generation and game winning conditions

Handle controller cutting Boos block blueprint

VR Handle

Final Game