PERSONAL PORTFOLIO

Portfolio

Jiayin Wen

2022-2025

技术点

Unity | C#

■ VR游戏

1.The Grove Builders
森屿 builder

VR搭建游戏

■ 视觉游戏开发

2.Running Ball
滚球酷跑

跑酷游戏

A VR meditative building game where you can freely build digital habitats in your own dream forest

The Grove Builders

■ Unity/C#

Introduction

The Grove Builders is an immersive healing game designed for virtual reality platforms. Players step into a forgotten magical dream forest and take on the role of the last "forest builder". Through emotional perception and interaction with nature, they can collect wood and stones to create their own digital habitat. The game blends psychological healing with a gamified construction experience, guiding players to heal their inner emotions and rebuild their spiritual home through slow-paced exploration and creative building.

Rather than following a traditional task-driven structure, The Grove Builders encourages "meditative play", allowing players to express themselves, regulate their emotions, and achieve inner healing through natural interaction and freeform construction. In this peaceful virtual world, players are free to build a private digital sanctuary for themselves.

Research

Concept and Background Research

The concept of The Grove Builders stems from an exploration of how virtual reality (VR) environments and freeform building mechanics can facilitate psychological healing and emotional well-being. Traditional VR experiences often focus on goal-driven tasks or fast-paced interactions, but The Grove Builders intentionally departs from this model by encouraging meditative, self-paced engagement in a nature-inspired virtual space.

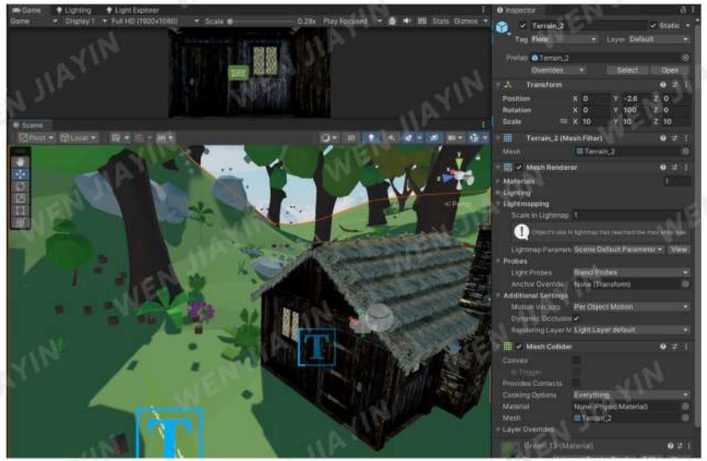
Research in environmental psychology suggests that exposure to natural environments, even in digital form, can significantly reduce stress, promote emotional regulation, and enhance mood (Browning et al., 2020). Similarly, studies on VR therapy have demonstrated that immersive natural simulations can evoke restorative experiences comparable to real-world nature, offering a valuable tool for mental health interventions (Anderson et al., 2017).

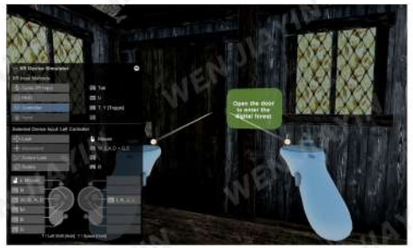
In addition, building activities in digital environments have been shown to provide users with a sense of agency, creativity, and emotional processing. Games such as Minecraft and Animal Crossing have highlighted how constructing personalized spaces can contribute to feelings of comfort, control, and self-expression, key elements in psychological resilience.

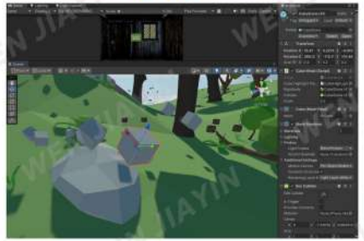
The Grove Builders integrates these strands by providing players with an unpressured digital forest where they can gather materials, design structures, and create private sanctuaries. This combination of VR immersion, nature aesthetics, and hands-on building aims to offer a new kind of therapeutic interaction — one that supports mindfulness, emotional recovery, and personal storytelling through spatial creation.

Technical Implementation

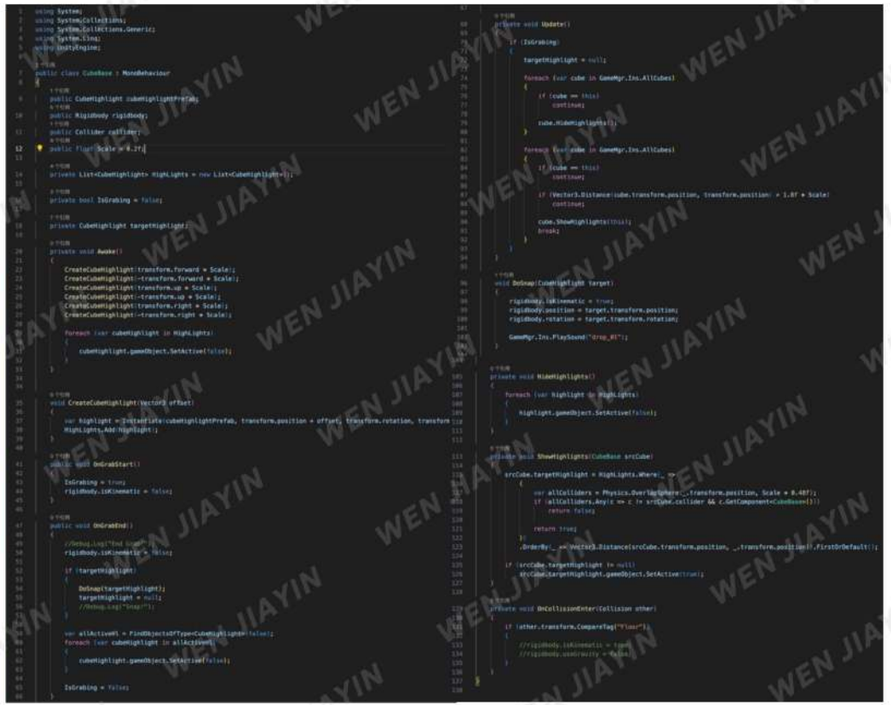
unity







Code for the block adsorption function

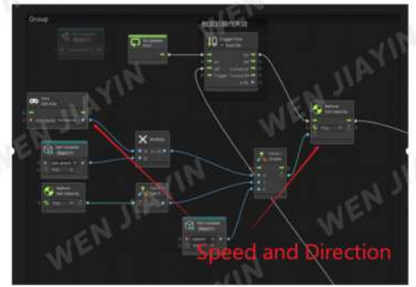


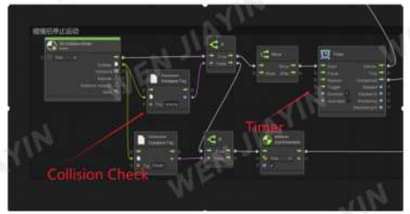
Introduction

At the very beginning, we created a basic game framework and defined the basic categories of characters, enemies, interactive props, and triggers within the game. The objects in the scene were initially built using Basic models. Based on these categories and the game's content, we started with visual Scripting for the props.

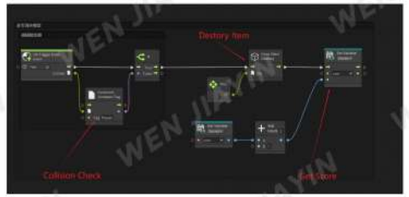
Player:

Firstly, we used the Rigidbody set velocity node to create the forward movement of the character. We used the On Collision Enter node to get the Player Tag for collision detection. We used the Timer node to make the character lose control 1 second after a collision and to reload the current level with the Get active scene node when the y-axis value is less than -1.





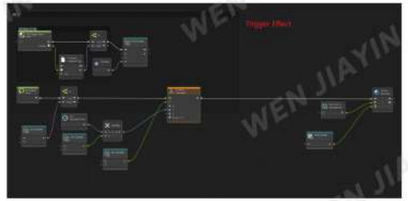
Collections:



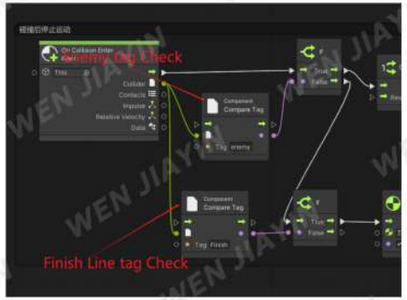
Using Playmaker to detect and add post-production sound effects based on Trigger Events.

Trigger effect:

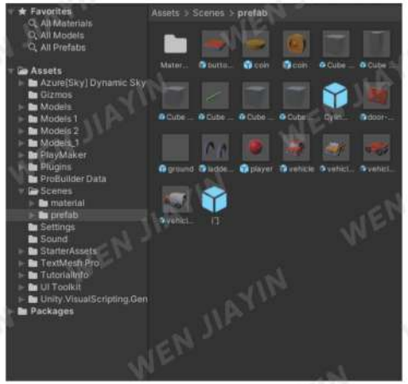
When the player steps on the trigger, it directly controls the distant door to rise.



Enemy Check and Finish line Check:

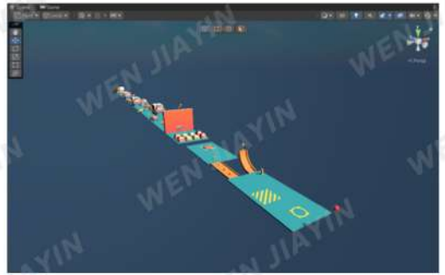


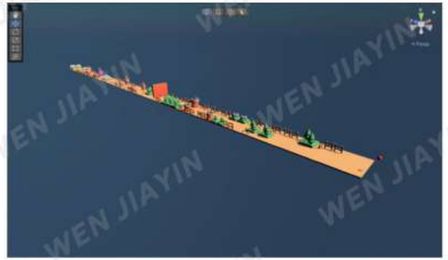
Prefab build:

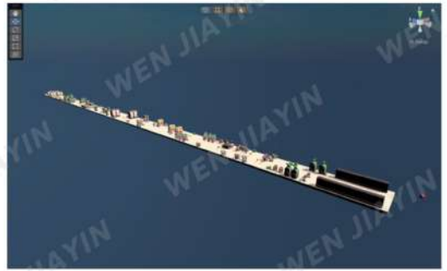


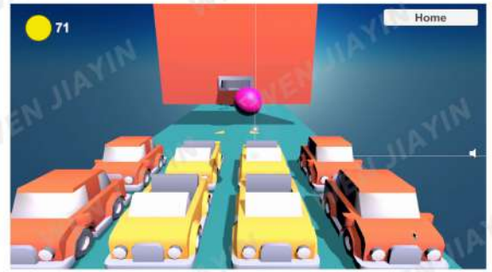
Scene asset setup:

Level1-Level3









技术点

Touchdesigner | Arduino

Mediapipe/python　　C/C++

- 互动视觉艺术装置
- 互动视觉艺术
- 互动艺术装置

1.The Feedback Loop
反馈回路

2.Generative Spirals
生成式螺旋

3.Fluttering Dance of Joy
翩跹悦舞

情绪可视化
表情识别控制

手势交互

表情、手势识别控制

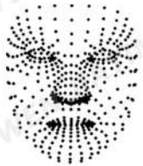
The Feedback Loop

■ **Touchdesigner/Arduino/C**

Video: https://youtu.be/358bjguS1xU

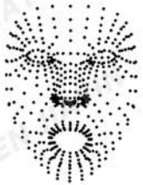
Emotion Capture

Normal



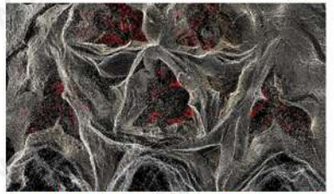
Happy
-Smiling

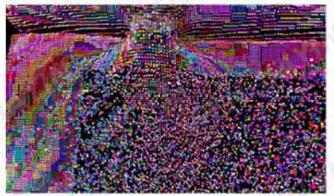
Surprised
-Open mouth



Angry
-Frowning

Machine Feedback





ILLUSTRATE

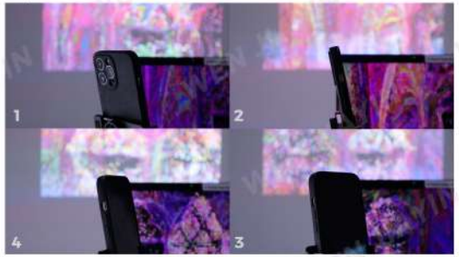
Make one of three facial expressions in front of the laptop — smiling, opening your mouth, or frowning — to trigger the machine. It will scan the environment, rotate at different speeds, and generate dynamic particle effects.

After the machine stops rotating, please wait five seconds before making the next expression.

This system simulates the machine's perspective in particles. By detecting facial expressions, it translates emotions — such as joy, surprise, or anger — into mechanical movements and

Technical Implementation

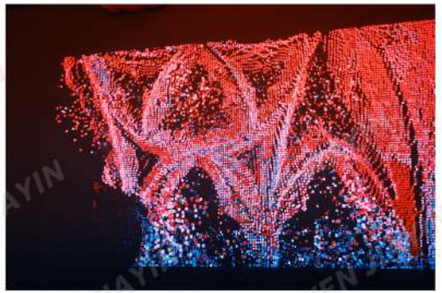
Expression controls the rotation of the machine



a.TouchDesigner (Perception and Conversion): Uses MediaPipe to recognize faces from the camera video stream and extract facial landmarks. By analyzing the movement of specific landmarks (such as mouth openness and eyebrow height), it quantifies several basic expressions and outputs them as simple parameters (such as floating-point numbers between 0 and 1).

b.Communication: TouchDesigner transmits these parameters to the Arduino via serial communication.

c.Arduino (Execution and Control): Based on the received parameters, the Arduino drives the stepper motor in various rotation modes (such as forward, reverse, dither, and acceleration) and frequencies (representing the intensity of the emotion).



Generative Spirals

This project uses gesture recognition and real-time generative spirals to explore the non-linear temporality and spatiality of plants and the universe through an interactive visual environment.

■ Touch designer/Mediapipe

video : https://youtu.be/mBa1sZVTc2U?si=6tS7FTzEqV2Ko_Si

Introduction

This project is built on the TouchDesigner platform, combined with the Mediapipe gesture recognition system, to create an interactive visual environment of dynamically generated spiral patterns. Through real-time gesture control, viewers can manipulate the evolving forms of the spirals, simulating the rhythms of plant growth and the structures of cosmic vortices. The work explores nonlinear and open-ended perceptions of time and space within the natural universe.

Concept and Background Research

Spirals in nature are not only common geometric structures but also carry rich cultural and philosophical symbolism, widely associated with the growth of life, cosmic evolution, and nonlinear perceptions of time (Marder, 2013). Spiral forms appear at both micro and macro levels, such as the double helix structure of DNA, the phyllotactic patterns of plants, and the cosmic layouts of spiral galaxies (Liu and Hu, 2023), collectively revealing a spatial-temporal logic where fluidity, generation, and difference coexist in nature.

This project is inspired by philosopher Michael Marder's concept of "plant temporality" (hetero-temporality), seeking to break away from anthropocentric, linear narratives of time and move toward a heterogeneous, multi-rhythmic, and non-teleological experience of natural temporality (Marder, 2013). The dynamic generation of spirals in the work visualizes the non-ending, continuously unfolding temporalities characterized by suspension, reactivation, and subtle repetition in plant growth.

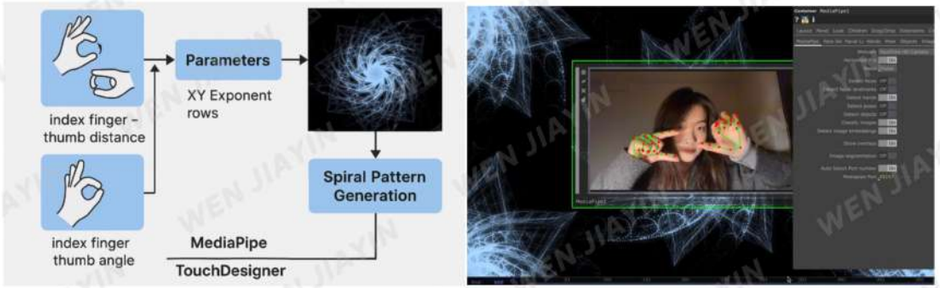
Creatively, the project draws from generative art's emphasis on rule-driven, self-evolving processes (Galanter, 2003) and integrates principles of eco-aesthetics, which highlight the agency of natural systems (Berleant, 1992). By establishing a real-time, gesture-based interactive system, viewers' subtle hand movements directly influence the expansion, contraction, and rotation of spiral forms, simulating the flexible responses of plant life to environmental disturbances and creating a nonlinear, open ecological space of co-existence between humans and nature.

Visually, the spirals generated in the work present a dynamic texture that bridges the micro growth of living organisms with the macro evolution of the cosmos. Each spiral maintains mathematical order yet continuously unfolds, twists, and proliferates under the guidance of gestures, resembling cell division, vine coiling, or the slow rotation of galactic vortices. The distribution of particles adjusts with parameter changes, producing breathing rhythms of density and dispersion, crafting a dynamic space that feels both soft and profound.

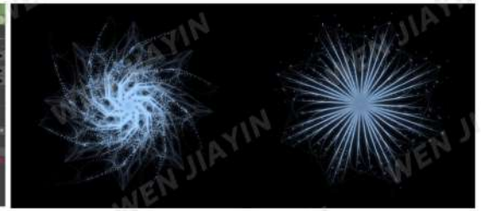
In the experience of the viewer, the spiral patterns unfold gently against a black background, with subtle flows of particles resembling living entities floating through boundless space. As hand gestures subtly change, the forms rhythmically shift between expansion and contraction, as if time itself were bending, branching, and recomposing. Here, the viewer is no longer a traditional controller but becomes a "natural disruptor," participating in a non-human-centered, generative, and open ecological system.

Through this mechanism of micro-gesture-induced macro transformation, the project achieves a deep integration of technology, ecology, and aesthetics, offering a poetic response to nonlinear time, natural agency, and decentered modes of existence.

Technical Implementation



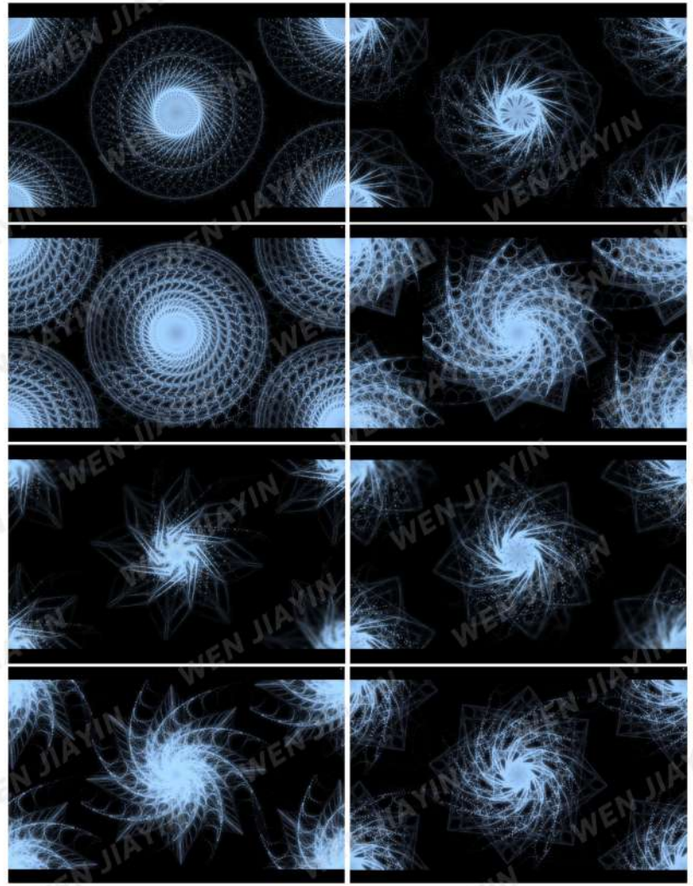
In this project, the distance between the left index finger and thumb is mapped to the XY Exponent, determining the expansion or contraction of the spiral in 2D space and adjusting the tension and density of the form. Meanwhile, the rotational angle between the right index finger and thumb controls the Rows, altering the number of spiral layers and directly impacting the complexity and richness of the pattern.
Through the coordinated changes of both hands, the system generates a dynamic, kaleidoscopic spiral form in real time — adhering to strict mathematical logic yet responding to delicate hand movements with organic fluidity.
This mechanism translates tangible hand gestures into the growth and evolution of spiral structures, constructing a visual experience of nonlinear, non-anthropocentric temporality, as if each subtle movement of the viewer continuously rewrites a microscopic ecological spiral of time.



TouchDesigner and Mediapipe Gesture Control Mechanism:

1. Gesture Control (captured via Mediapipe):
• Left hand: The distance between the index finger and thumb controls the XY Exponent parameter.
oWhen the distance increases → the spiral pattern expands, overall tension increases, and the structure becomes sparser.
oWhen the distance decreases → the spiral contracts, overall density increases, and the structure becomes more compact.
• Right hand: The rotational angle between the index finger and thumb controls the Rows parameter.
oWhen the rotation angle increases → the number of spiral layers increases, enhancing the pattern's complexity and detail.
oWhen the rotation angle decreases → the number of layers reduces, simplifying the overall structure.

2. Combined Hand Effects:
Through coordinated movements of both hands, users can dynamically and continuously adjust both parameters, generating a rich variety of spiral forms in real time. Subtle hand variations, such as slight compression or rotation, directly influence the shape evolution of the patterns, creating an organic sense of flow.
The patterns maintain mathematical order (through spiral structures and rows control) while introducing life-like variability through the real-time and random nature of gestures.



Fluttering Dance of Joy

An interactive device headband which can control butterfly movements with people's smiling expressions and gestures.

■ Arduino/C/Mediapipe/Touchdesigner

video: https://vimeo.com/1037247594?share=copy

Introduction

My work aims to combine artistic aesthetics and clothing through the image of a butterfly and concretize people's joy through interactive technology. By integrating smart clothing with emotional expression, this project provides a novel way for individuals to visually and physically showcase their happiness, offering an innovative perspective on human-computer interaction.

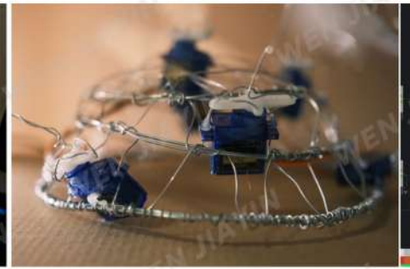
Concept and Background Research

Smart clothing can bring many conveniences to people's lives, but current research mainly focuses on its functionality and the development of smart materials, especially in health monitoring and medical nursing applications. While these areas are vital, the aesthetic potential of smart clothing remains underexplored. By shifting the focus toward integrating aesthetics with functionality, this project aims to explore the untapped potential of wearable technology as an emotional medium.

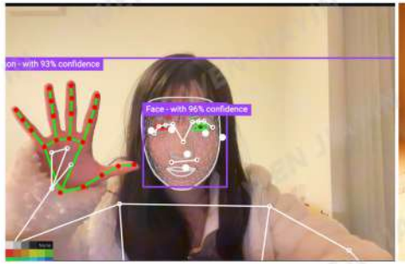
In terms of visualizing happy emotions, I chose to use "butterflies" to present them. The butterfly holds deep cultural and artistic significance. In Chinese folk culture, it symbolizes beauty, vitality, and optimism, acting as a metaphor for the noble soul. The transformation of a butterfly—from caterpillar to chrysalis to its final graceful form—also resonates deeply as a representation of personal growth and positive change. This artistic and symbolic connection makes it an ideal choice for portraying happiness.

To enhance the interactivity and expressiveness of the design, the butterfly's movement is interpreted as "dancing," symbolizing joy in motion. By leveraging interactive technology, this project transforms abstract emotions into tangible, dynamic visuals. As a result, happiness is no longer an abstract concept but a living, breathing artistic creation embodied by the butterfly's movements. This approach not only bridges the gap between technology and art but also offers a creative medium for people to communicate their inner feelings in an intuitive and artistic way.

Technical Implementation


The Arduino, connected to the servos on pins 4 to 9, receives the data via serial communication. The servo angles are adjusted in two ways:
1. Instant Adjustment (Command "1" or "0"): A "1" command increases the angle by 40 degrees (up to 180), while a "0" command decreases it by 40 degrees (down to 0). These changes occur instantly across all servos.
2. Slow Angle Transition (Command "2"): The "2" command gradually adjusts the angle by 80 degrees, in 1-degree increments with a 20ms delay, for smooth motion. The movement stops when the target angle is reached.




In this project, TouchDesigner captures real-time facial expressions and hand gestures, which are sent to Arduino to control six servos. The system uses a webcam or depth camera to detect facial landmarks or hand positions, processing this data into numeric values corresponding to servo angles.

duoji12-5-1.ino

```
    currentAngle += 40;
    if (currentAngle > 180) {
      currentAngle = 180;
    }
    for (int i = 0; i < servoCount; i++) {
      servos[i].write(currentAngle);
    }
    Serial.print("All servos angle increased to: ");
    Serial.println(currentAngle);

  } else if (strcmp(buffer, "0") == 0) {
    // 减小角度40度（瞬间改变）
    currentAngle -= 40;
    if (currentAngle < 0) {
      currentAngle = 0;
    }
    for (int i = 0; i < servoCount; i++) {
      servos[i].write(currentAngle);
    }
    Serial.print("All servos angle decreased to: ");
    Serial.println(currentAngle);

  } else if (strcmp(buffer, "2") == 0) {
    // 在当前角度基础上缓慢增加80度，但不超过180
    int targetAngle = currentAngle + 80;
    if (targetAngle > 180) {
      targetAngle = 180;
    }

    Serial.print("All servos start to rotate slowly to ");
    Serial.print(targetAngle);
```


技术点

Javascript | Touchdesigner

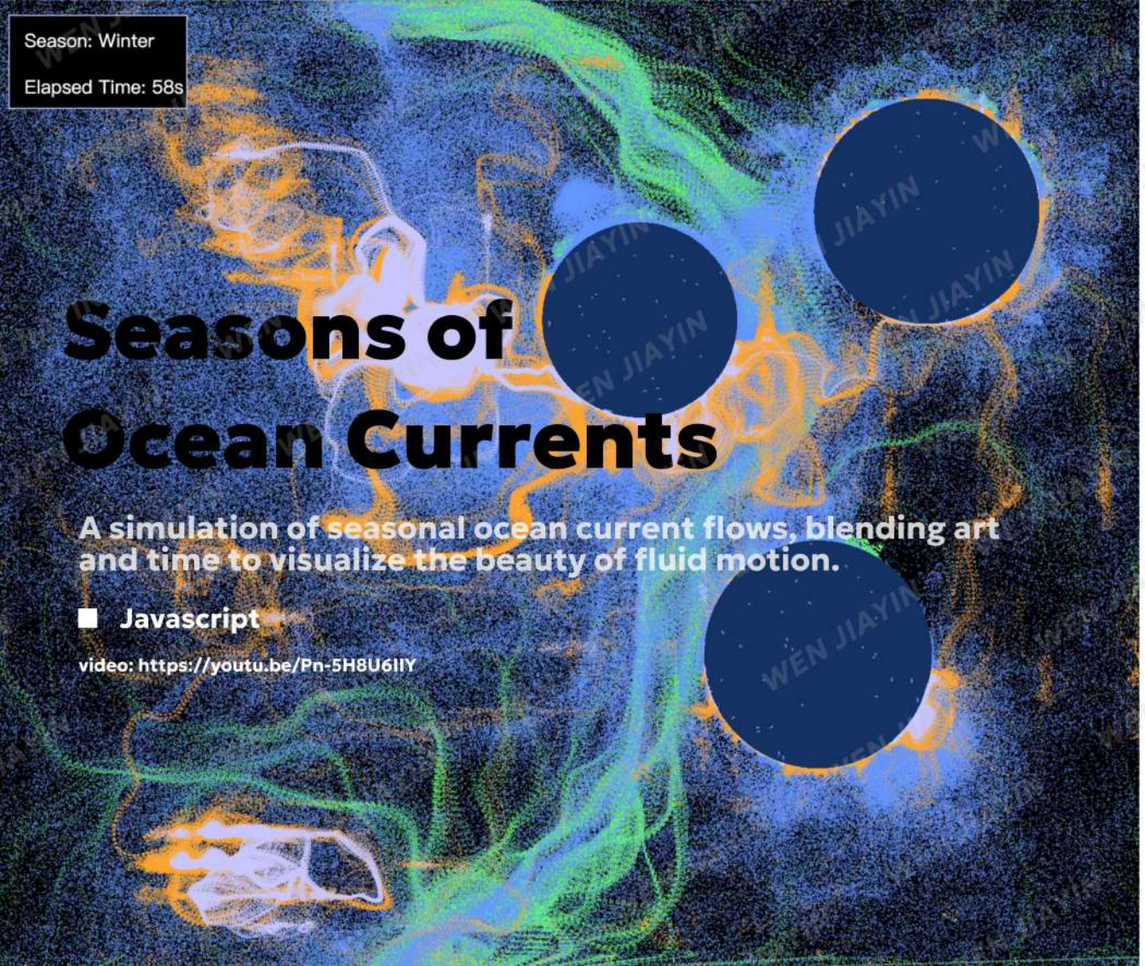
P5js

■ 算法艺术 1.Seasons of Ocean Currents 鼠标交互、视觉生成

洋流四季

■ 视觉艺术 2.Spiral Galaxies 动态艺术

旋涡星系



Introduction

The project, Seasons of Ocean Currents, is a creative computational art piece inspired by the mesmerizing motion of ocean currents. The simulation uses particles to represent the flow of ocean currents as they interact with continents, changing dynamically with the seasons. By combining art, coding, and interaction, this work encapsulates the passage of time and the cyclic nature of nature itself.

Concept and Background Research

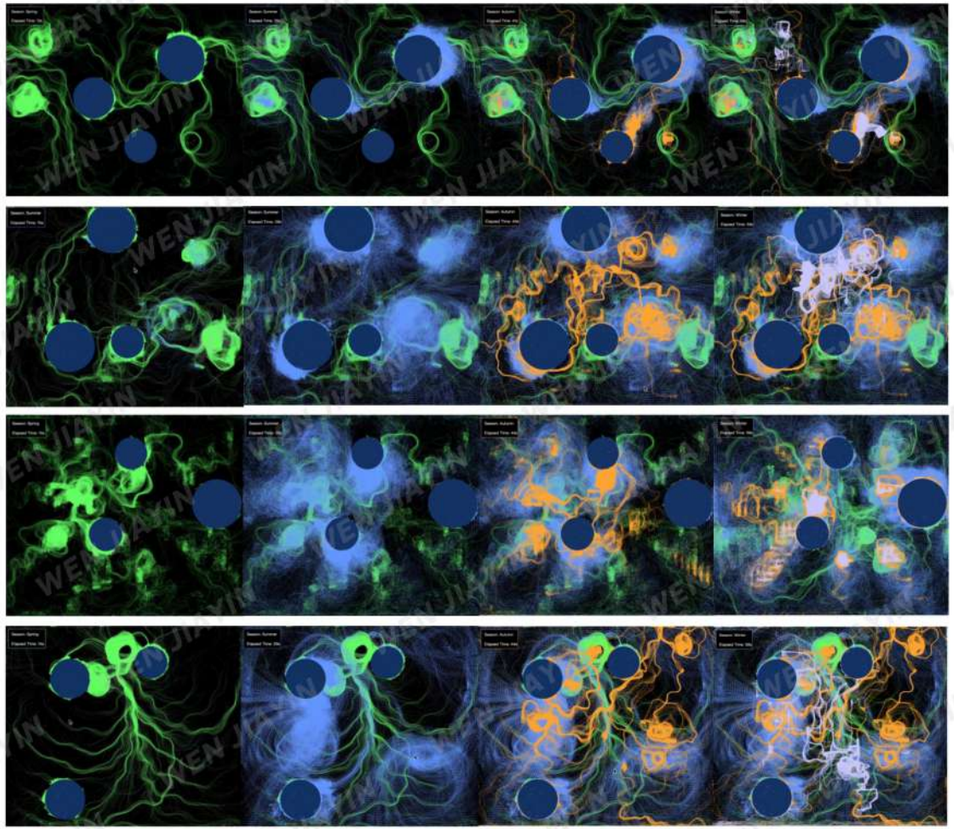
Ocean currents are largescale seawater movements in the ocean with relatively stable flow rates and directions, similar to "rivers" on land. Its existence and changes have a significant impact on the global climate system(MOU L,CHEN XJ,SONG J,2011).They are affected by many factors, including wind power, the rotation of the earth, etc. For example, the surface and subsurface ocean circulation in the western tropical Pacific Ocean and the sea around the warm pool is complex and variable, consisting of several equatorial currents and western boundary currents(YUAN X,2023).Additionally, the Pacific Ocean has many and complex currents, and the circulation system formed is the most complete among the oceans. The Pacific Ocean currents take about 1,000 years to circulate once. If we look at it from a human time scale, or a hundredyear scale, then from a macroscopic perspective, the ocean currents seem to be long and endless both in terms of cycle and in their movement paths. But in the microscopic part of this macroscopic process, we can quietly follow the flow of the sea water, feel the silent passage of time in nature, and experience the beauty of the flow of time from another perspective.

The simulation aims to evoke the viewer's sense of timelessness and connection with nature. Inspired by the fact that ocean currents like the Pacific circulation take thousands of years to complete a single cycle, the artwork shrinks this immense timescale into a humanperceivable experience. The seasons' cyclic transitions are a metaphor for Earth's natural rhythms, inviting the audience to reflect on the passage of time and their place within it.
By using particles to represent microscopic elements of the currents, viewers can experience both the macro and micro perspectives of time — the vastness of geological processes and the fleeting nature of individual moments.

Technical Implementation

The artwork is built using p5.js, a JavaScript framework for creative coding. The following technical features are implemented:

1.Dynamic Flow Fields:
The particles follow a flow field created using a combination of noise and spiral functions. The spirals are generated around random points (representing centers of ocean gyres), and their angles dynamically adjust over time.
2.Seasonal Transitions:
The program calculates the progress of time within a one minute cycle, divided into four seasons. Each season changes the visual aesthetics:
Spring: Green hues with moderate flow speeds.
Summer: Blue hues with faster flow speeds, representing active motion.
Autumn: Orange hues with slightly slower flow speeds.
Winter: White hues with calm, slower motion to represent stillness.
3.Interactive Elements:
Spiral centers dynamically affect the flow field, creating spiral like motions that represent ocean gyres.
Users can interact by clicking to add new spiral centres, mimicking how external forces, such as winds or human interventions, influence ocean currents.
The project also incorporates sound effects triggered by interaction, creating a multisensory experience.
The randomness of the spiral generation and the randomness of the viewer's mouse clicks can cause the image to take on a variety of shapes.

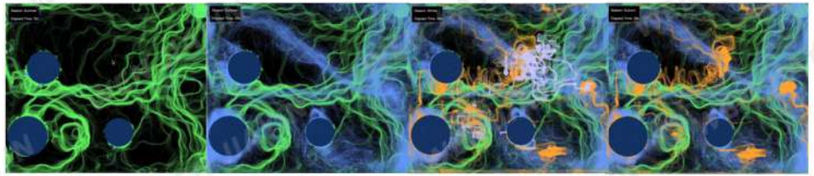


4.Continental Obstacles:
Circular shapes represent continents and act as physical barriers for particles.
Particles detect collisions with these obstacles using distance calculations and reflect their motion upon impact, mimicking real-world dynamics of currents interacting with landmasses.

5. Sound Effects:
The project includes an audio feedback mechanism using a p5.js oscillator.
Clicking to add a spiral centre triggers a sound, with the pitch determined by the X coordinate of the mouse. The sound fades in and out, creating an auditory response to the visual interaction.

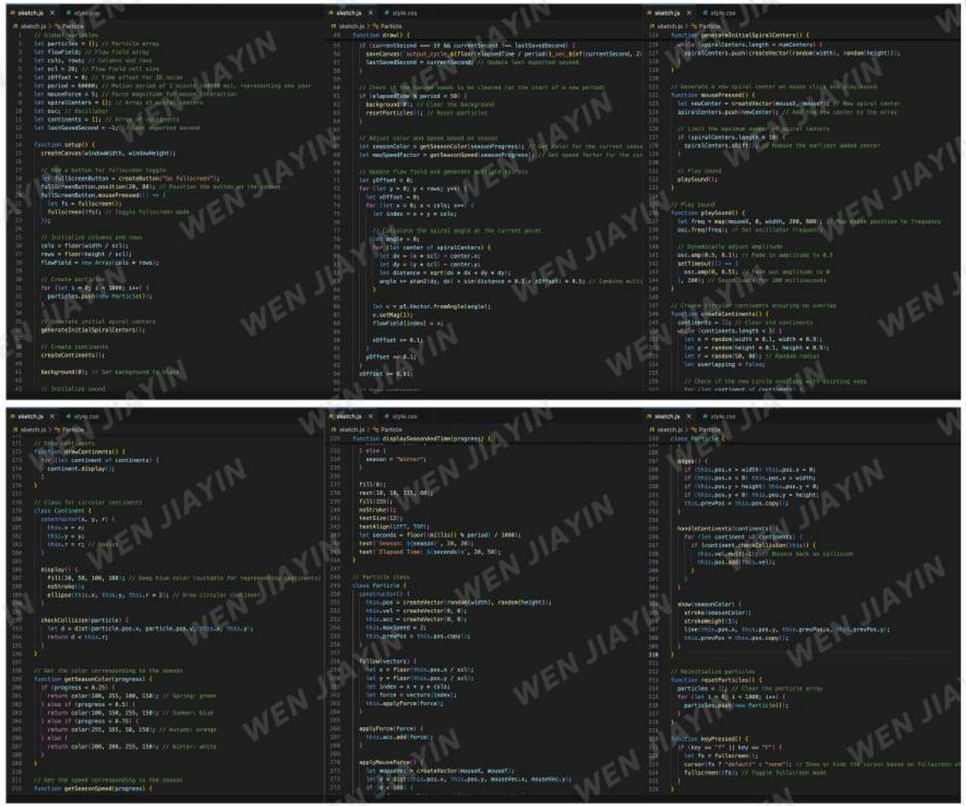
6.Responsive Design:
The canvas dynamically adjusts to different screen sizes, ensuring accessibility across devices.

7.Export and Documentation:
At the end of each cycle, the artwork automatically exports a snapshot of the currents' motion, creating a record of the dynamic beauty at a specific moment.

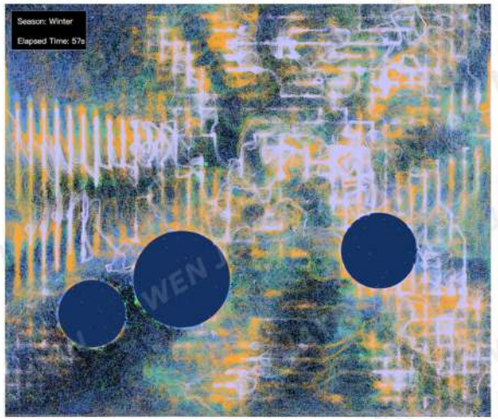


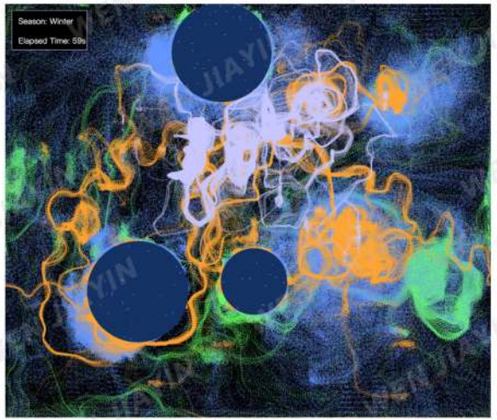
Technical Implementation

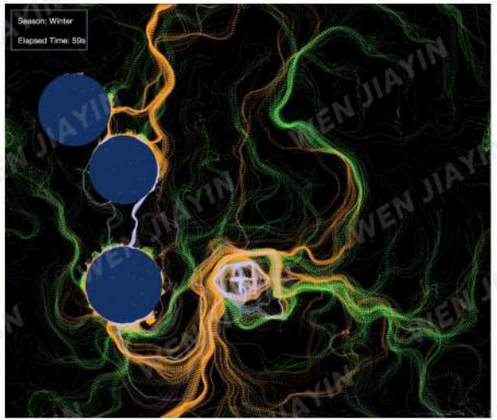
JavaScript code demonstration

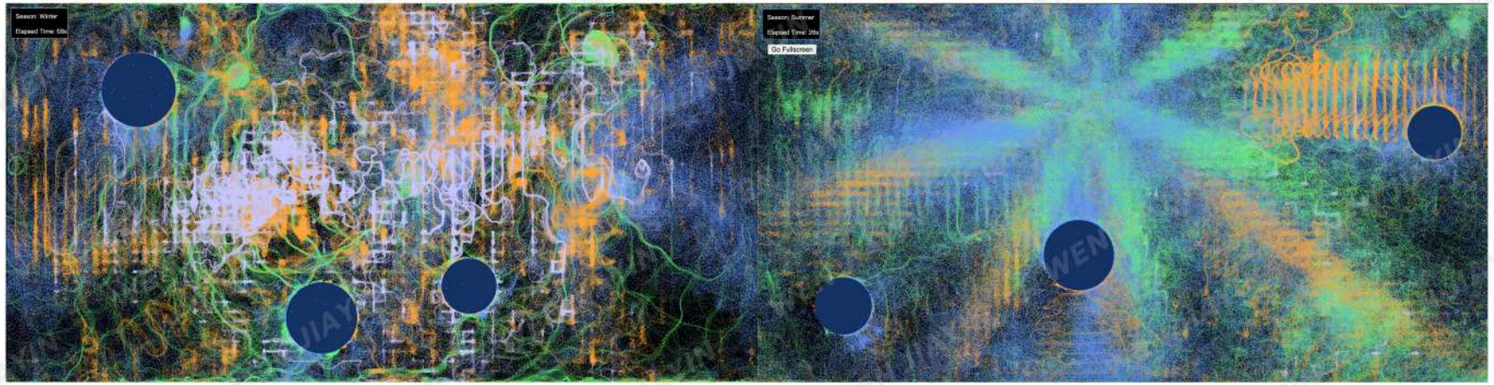


Generate image







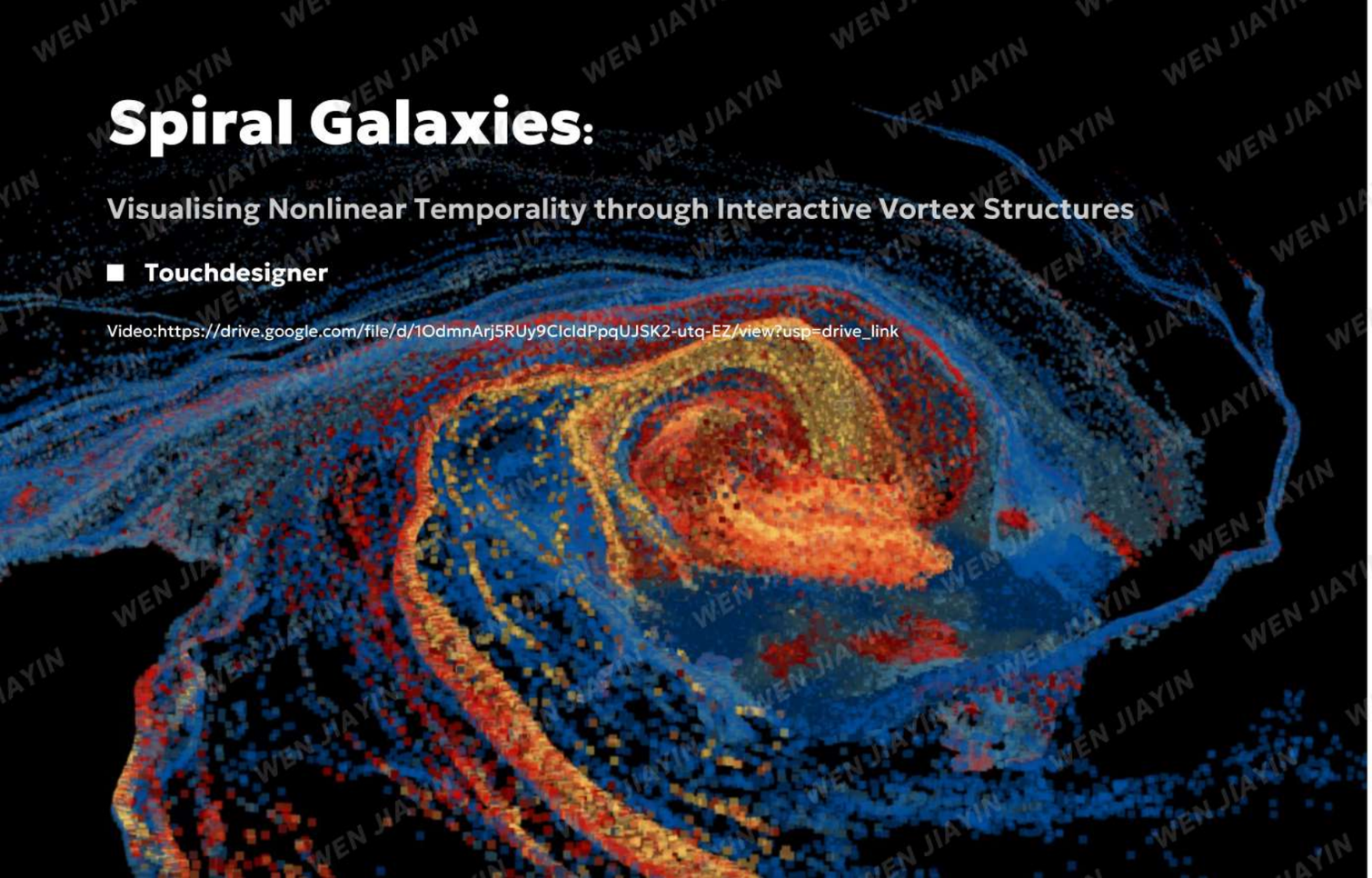


Spiral Galaxies:

Visualising Nonlinear Temporality through Interactive Vortex Structures

■ **Touchdesigner**

Video:https://drive.google.com/file/d/1OdmnArj5RUy9CIcIdPpqUJSK2-utq-EZ/view?usp=drive_link



Introduction

The spiral is one of the most symbolic and pervasive forms in the cosmos, appearing in the structure of galaxies, cosmic vortices, and celestial dynamics. This project, developed in TouchDesigner, creates an interactive visual environment in which viewers can influence the motion of spiral nebulae through simple mouse input. By moving the cursor across the screen, audiences trigger dynamic behaviors such as rotation, expansion, and contraction, simulating the slow and continuous transformation of galactic matter. The work explores a nonlinear, open-ended experience of cosmic time and spatiality, evoking the rhythmic dynamics of stellar flow and gravitational motion beyond anthropocentric perception.

Concept and Background Research

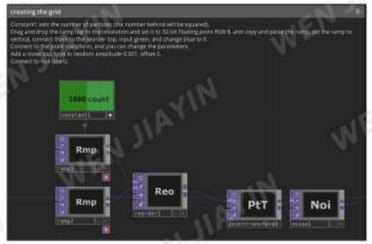
The spiral holds profound cultural, scientific, and symbolic significance. In cosmology, spiral galaxies embody rotational symmetry and nonlinear time. Philosophically, spirals represent continuity without repetition—a structure of becoming, not arriving.

In this project, the spiral nebula acts as a generative logic. Moving beyond linear time, it embraces cyclical, iterative temporality where each turn is a transformation, not a return, echoing Deleuze's "difference and repetition."

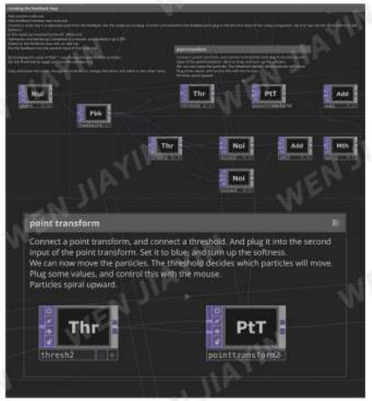
Generative art theory provides the computational framework, allowing the system to evolve through encoded rules and audience gesture input. Ecological and cosmic aesthetics inform the interaction: users influence the system subtly, like gravitational disturbances, rather than controlling it directly.

Technical Implementation

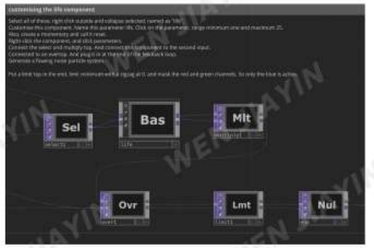
The Expansion and Enlargement of the “Universe Galaxy” Particle Space in Touch Designer. Use mouse interaction to perform a series of particle shape changes.



1. Creating the grid

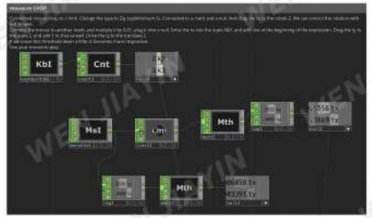


2. Constructing a particle system



3. Customising the life component

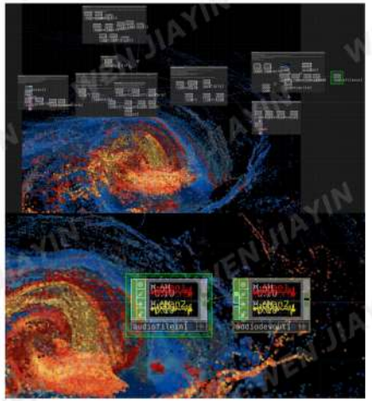
4. Build a resettable life cycle control mechanism



5. Mouse Interaction

6. Particle Rendering

7. Add color



Jiayin Wen

技能掌握 SketchUp
Rhino
Figma
Python
C语言
Arduino
V-Ray、Keyshot

01
Low Carbon Market Design

Architectural design
UI design

02
Cure Of Mink Self-Biting Behavior

Service design
System design
Spatial design

03
Information Cocoons

Device design
Physical computing design
Interaction design

04
Fire Of Love

Device design
Experience design

Low Carbon Market Design

■ Architectural design ■ UI design

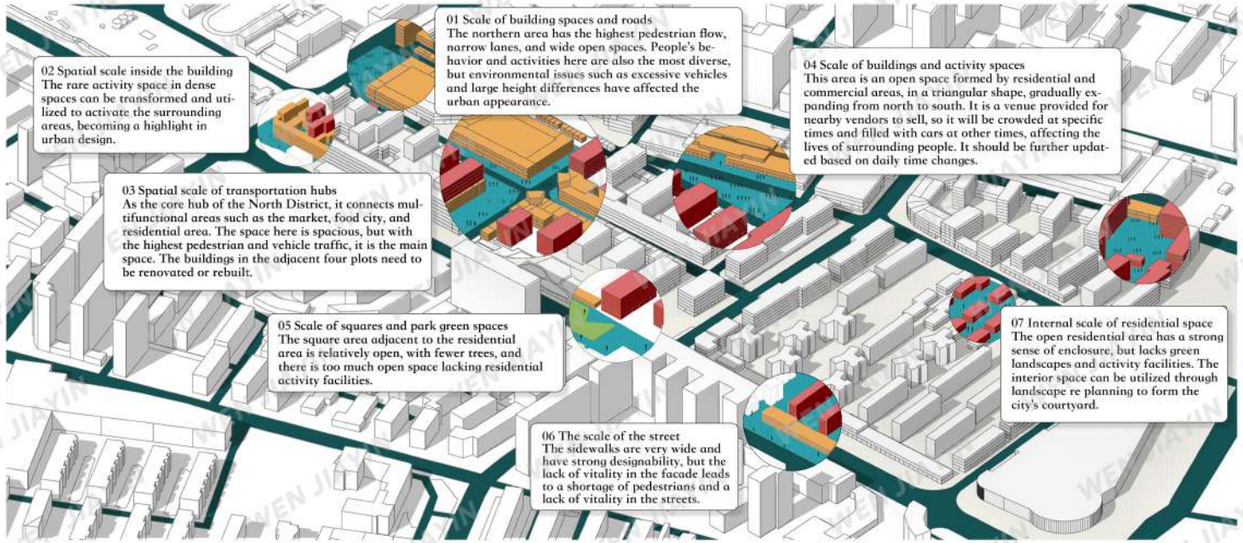
Adding low-carbon shopping concepts to the old market update. I want to recommend shopping routes based on ***carbon dioxide emissions*** when shopping in the market, and present the trend of personal dietary carbon emissions.

Individual project

2023.4-2023.10

INTRODUCTION

Wuyishan Road Community



In the renovation of old communities, preserving buildings and upgrading old communities with old ones can significantly reduce carbon emissions, undoubtedly becoming a green, low-carbon, and sustainable way of life.

Location analysis

Wuyishan Road Community is located in Huangdao District, Qingdao, China, formerly known as Haonantou Village, and is located in the administrative and commercial center of the development zone.

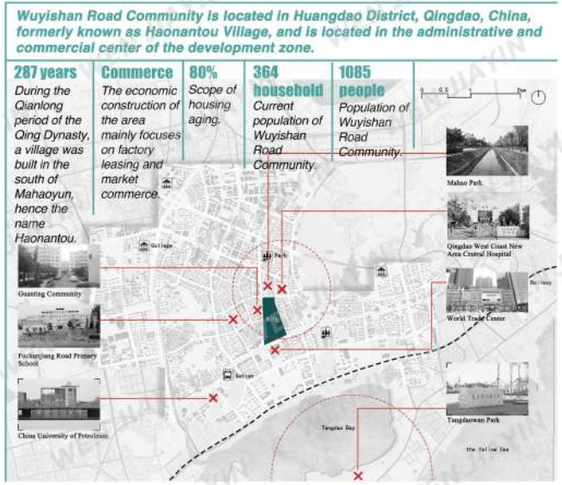
287 years
During the Qianlong period of the Qing Dynasty, a village was built in the south of Mahaoyun, hence the name Haonantou.

Commerce
The economic construction of the area mainly focuses on factory leasing and market commerce.

80%
Scope of housing aging.

364 household
Current population of Wuyishan Road Community.

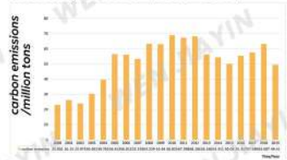
1085 people
Population of Wuyishan Road Community.



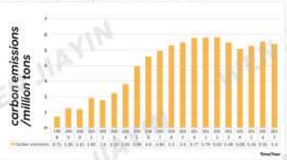
Main carbon emission sources

According to the survey, the carbon emissions of Huangdao District in Qingdao are relatively large, and the annual emissions of Huangdao District are roughly 5 million to 6 million tons.

Annual carbon emissions in Qingdao, Shandong Province (2000—2019)



Annual carbon emissions in Huangdao District, Qingdao (1998-2017)

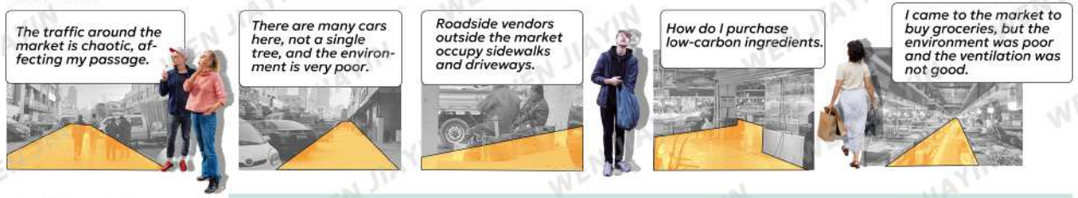


Resident Activities

REASERCH

Time line

Interviw



Problems in the original market

According to local residents, the Mount Wuyi market is crowded with vehicles, and the market is dilapidated, closed, and chaotic, which not only affects air quality and living experience, but also causes more carbon emissions.

FOOD CARBON EMISSIONS

Low carbon

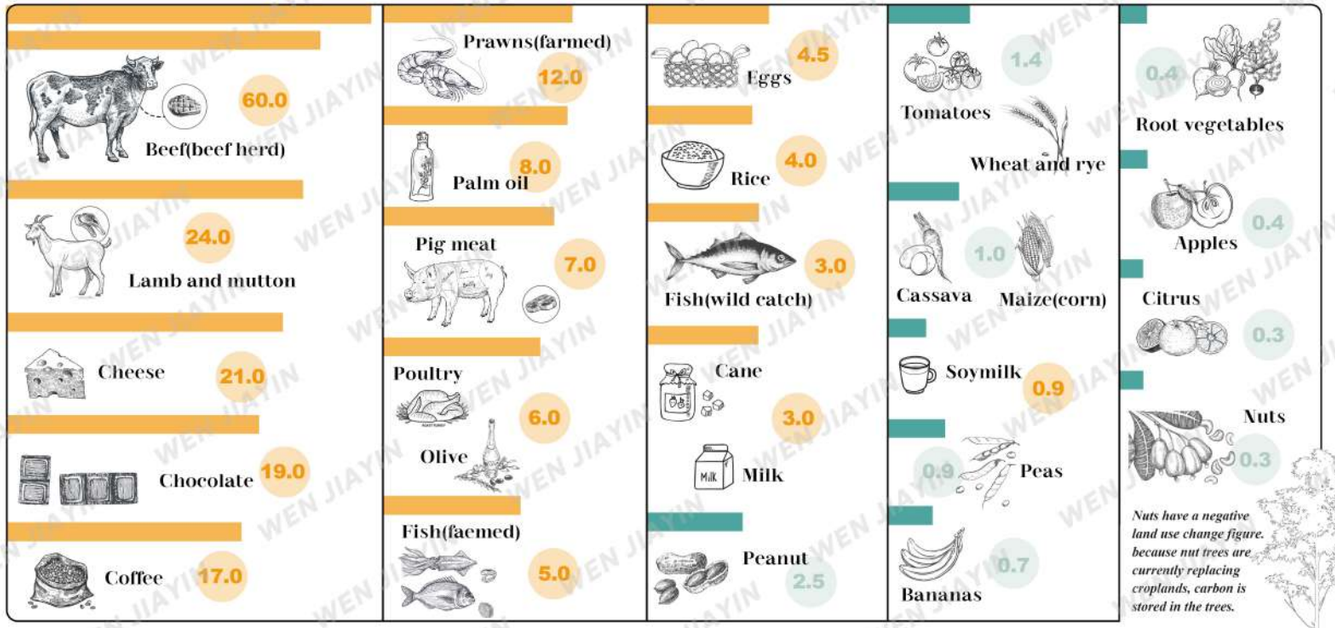
Low carbon food mainly refers to food that generates less carbon emissions during production, processing, transportation, and consumption.

How to reduce carbon emissions from food consumption?

1. It is recommended to reduce the intake of refined grains, processed foods, and added sugars.
2. Eat more whole grain and potato foods rich in dietary fiber, as well as a variety of fruits and vegetables.
3. Eat less red meat and more white meat, nuts, beans, etc. to intake protein.
4. Eat dairy products in moderation while controlling dietary fat intake.

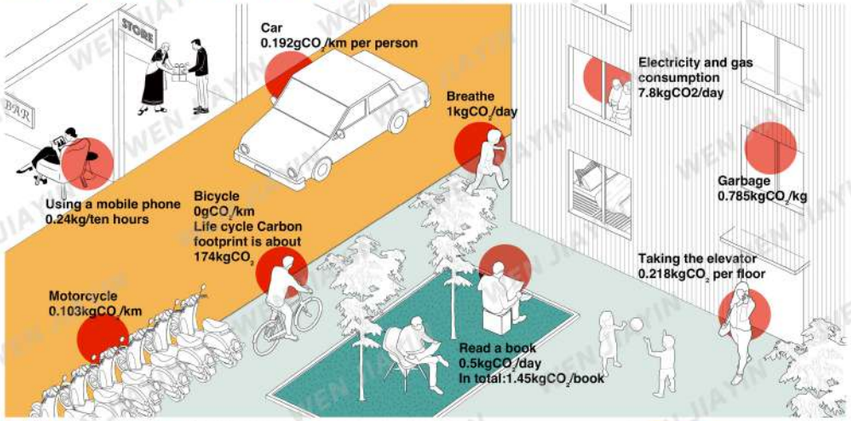
Carbon dioxide emissions data for the entire industry chain of the food system

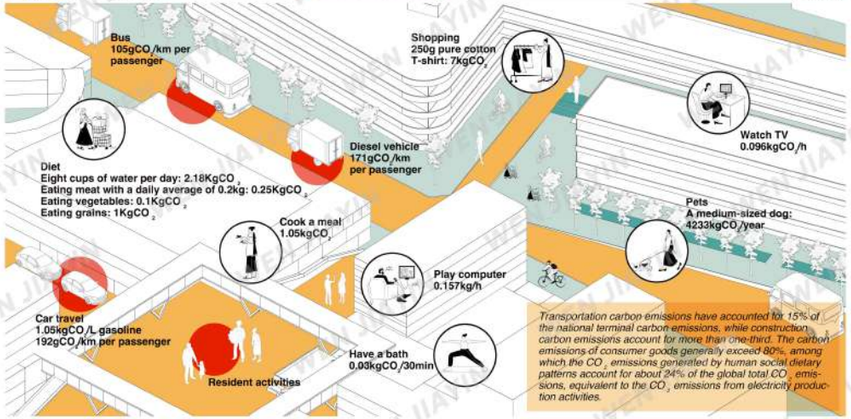
GHG emissions per kilogram of food product (kg CO2-equivalents per kg product)



Nuts have a negative land use change figure. because nut trees are currently replacing croplands, carbon is stored in the trees.

CARBON FOOTPRINT





USER JOURNEY MAP

Stage	Before	During		After	
Touch point	Food pairing Energy demand Dietary preferences	Low Carbon Diet Choose food Food pairing	Navigation Choose a shopping route Checkout	Eating Work	Entertainment and fitness
Doing *The Young* Think&Feel Doing *The Old*	*5pm* *Going home from work* *Determine ingredient list* *Setting low-carbon dietary target values* *6am* *Wake up at 6 o'clock* *Eat breakfast* *Depart for the morning market*	*Purchase ingredients* *Looking for stalls for meat, fruits and vegetables, and daily necessities* *Purchase ingredients* *Looking for stalls for meat, fruits and vegetables, and daily necessities* *Prefer a light diet*		*Dinner* *Entertainment and leisure* *Sports and Fitness* *Do home cleaning* *Going to the park for leisure*	
Pain Point	Difficulty in selecting ingredients for healthy, low-carbon dietary combinations	Unclear market functional zoning and chaotic streamline Unable to know the specific carbon emissions of the purchased ingredients	The market environment is chaotic There is no elevator in the market, and climbing stairs is tiring	Unclear about the exact value of dietary carbon emissions for a day	
Opportunity	• Low carbon recipe recommendations • Knowledge Popularization of Low Carbon Food Ingredients	Market Navigation App Design Display of ingredients and their corresponding carbon emissions Calculate the specific carbon emissions of customers purchasing ingredients Market transformation, dividing food according to the size of carbon emissions Low carbon route setting and other route recommendations		Determine whether the daily dietary carbon emissions have reached the low-carbon target View personal dietary carbon emissions trends Planting nuts with saved carbon emissions	

1 According to the survey, young people in the Mount Wuyi market area generally go to the market in the evening after work, while the elderly generally go to the morning market.

2 People are increasingly advocating a healthy dietary structure with low CO_2 emissions, and also want to know the carbon emissions and trends of personal diets. There is a demand for market route navigation recommendations such as low-carbon routes.

PERSONA

Local young people

About me

I am a local office worker.. I get off work late, so I have limited time to go shopping.
Daily Carbon footprint: get up, eat breakfast, go to work, eat lunch, work, get off work, go shopping, go home, eat dinner, walk, sleep.

Personal Data
Name：Xiao Yang
Age：26
Height：165cm
Weight：100kg
Mount Wuyi Area, Qingdao
Designer

Wants&Needs

- Have a better shopping experience
- Record food carbon emissions during market shopping and obtain accurate data
- Find a suitable low-carbon recipe
- Recommendation of low-carbon shopping routes in the market

Why

Price
Quality
Convenience
Types
Local food

Motivation

Likes to quickly purchase ingredients in the market after work

Pain Points

- It is difficult to know the carbon emissions caused by purchasing food.
- It is difficult to know individual carbon emission trends.

Local elderly people

About me

I am a retired old man. My life is relatively leisurely. I often visit the local market.
Carbon footprint every day: get up, eat breakfast, go to the morning market, eat lunch, relax, go to the market, go home, eat dinner, dance in the square, and sleep.

Personal Data
Name：Lao Yang
Age：66
Height：170cm
Weight：110kg
Mount Wuyi Area, Qingdao
Retired

Wants&Needs

- Record food carbon emissions during market shopping and obtain accurate data
- Find a suitable low-carbon recipe.
- Recommendation of low-carbon shopping routes in the market.

Why

Price
Quality
Convenience
Types
Local food

Motivation

Likes to quickly purchase ingredients in the market after work

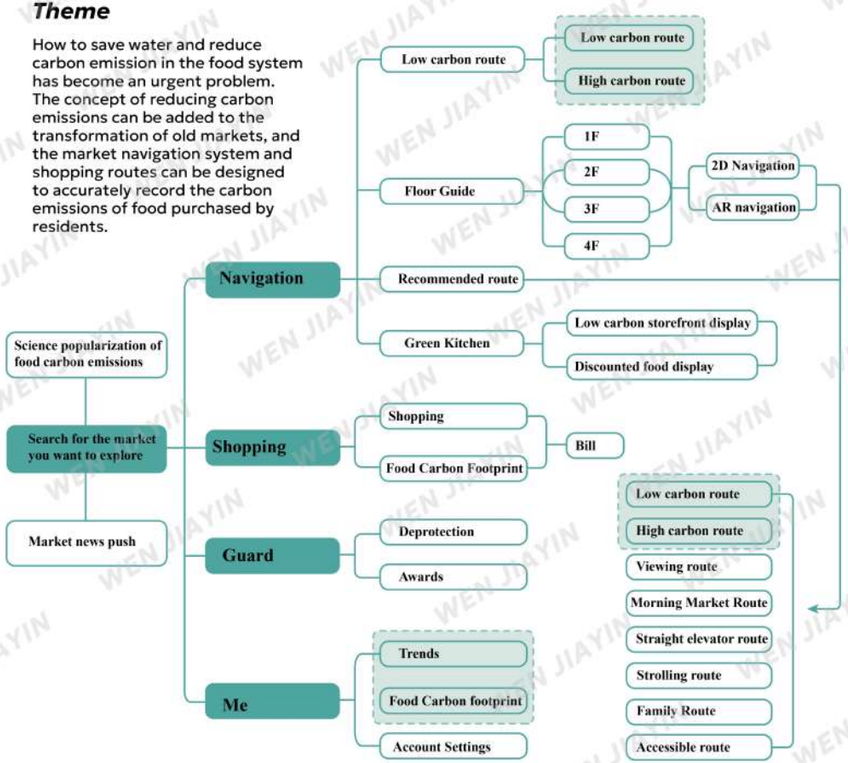
Pain Points

- Difficult to have awareness of a low-carbon diet.
- It's difficult to know if the purchased food meets the energy needs of a day.

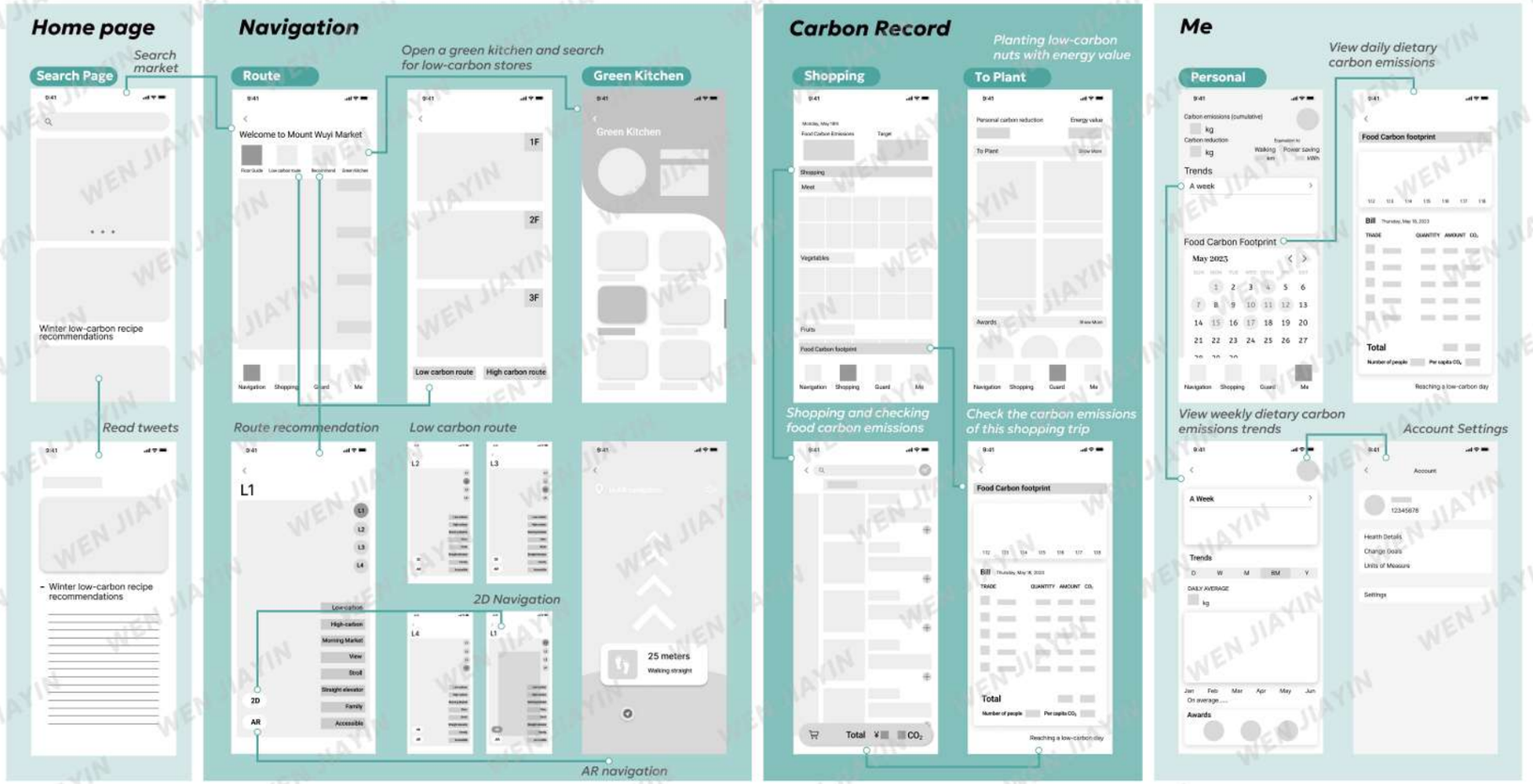
FUNCTION STRUCTURE

Theme

How to save water and reduce carbon emission in the food system has become an urgent problem. The concept of reducing carbon emissions can be added to the transformation of old markets, and the market navigation system and shopping routes can be designed to accurately record the carbon emissions of food purchased by residents.



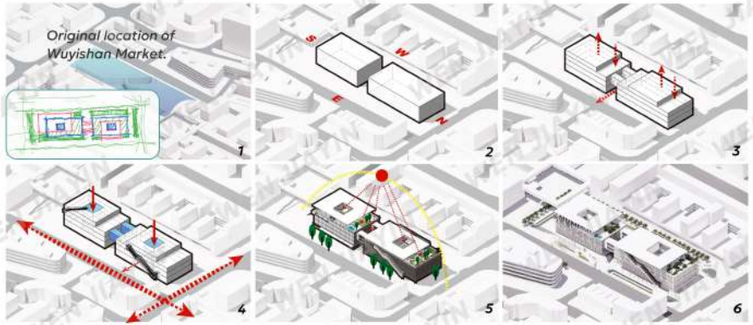
WIREFRAMES



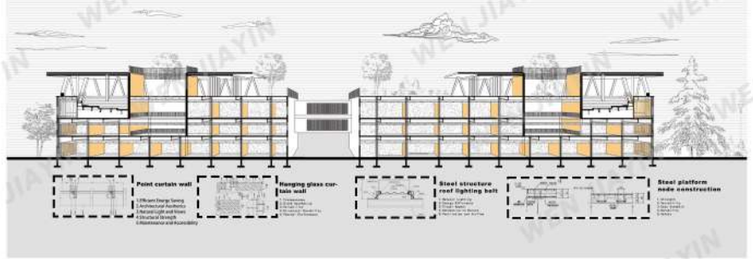
MARKET DESIGN

Design Description

In the renovation, the original column network of the market will be retained, and the two parts will be replaced by two staggered interlocking individual blocks. The appearance will mimic the high-tech feel of the Pompidou Art Center, using a steel frame structure and connected by an aerial corridor in the middle. The interior serves as the market, with a terrace at the top. The first and second floors are mainly food sales areas, the third floor is mainly low-carbon display areas, and the fourth floor is a terrace.



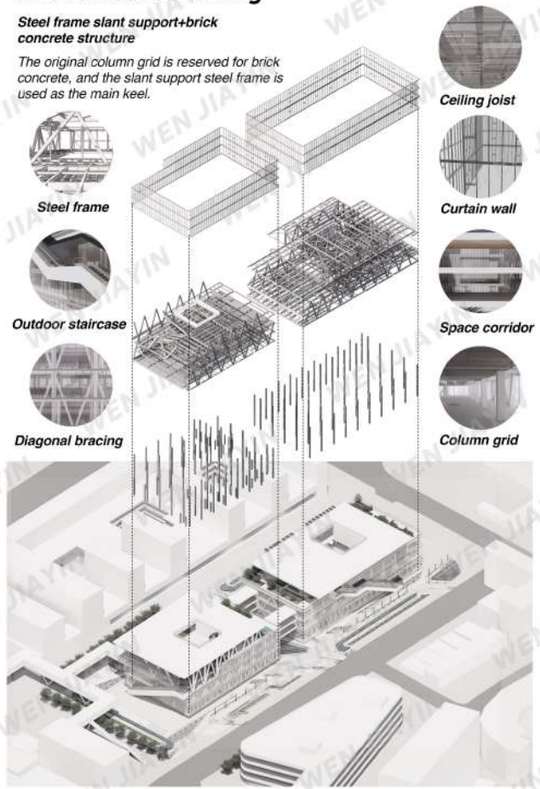
Sectional Perspective View



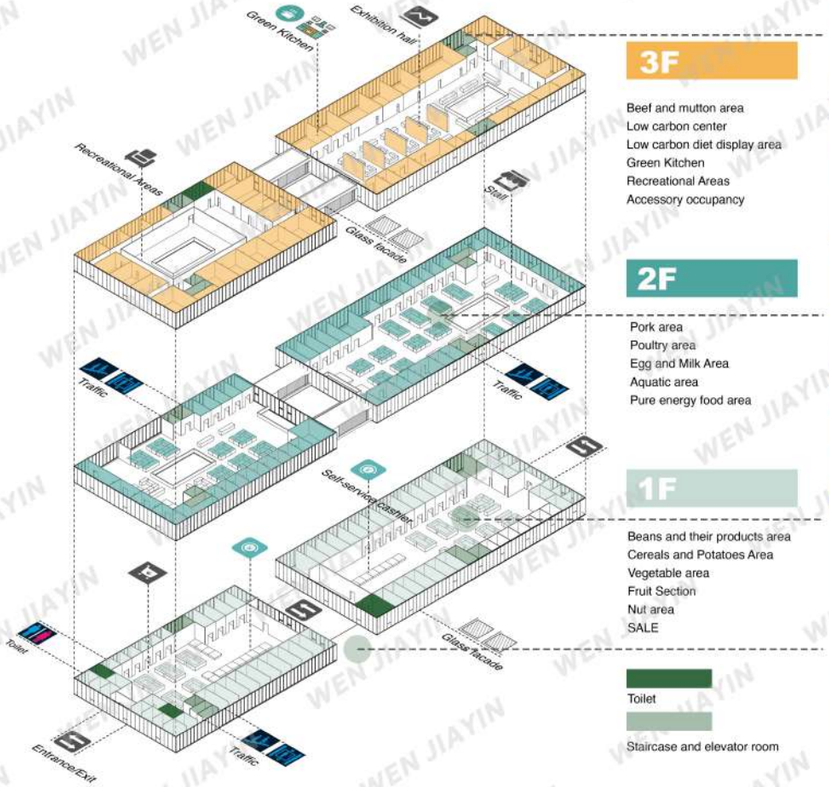
Axonometric drawing

Steel frame slant support+brick concrete structure

The original column grid is reserved for brick concrete, and the slant support steel frame is used as the main keel.



Floor Guide



3F

Beef and mutton area
Low carbon center
Low carbon diet display area
Green Kitchen
Recreational Areas
Accessory occupancy

2F

Pork area
Poultry area
Egg and Milk Area
Aquatic area
Pure energy food area

1F

Beans and their products area
Cereals and Potatoes Area
Vegetable area
Fruit Section
Nut area
SALE

Toilet

Staircase and elevator room

Interior space

STORYBOARD

Entering the market and using navigation

- *View low-carbon diet tweets.*
- *Search the market you want to go to (such as Mount Wuyi market).*

Choose food and calculate carbon emissions

- *Shopping for food.*
- *Check the carbon emissions of various foods.*
- *Calculate the total CO_2 emissions from food.*

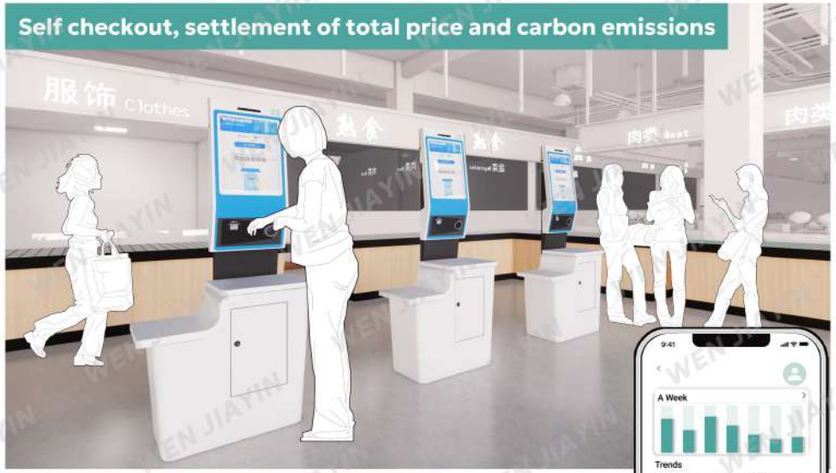
Market Navigation

- *Choose the food area you want to go to.*
- *View various recommended routes (mainly promoting low-carbon routes).*
- *Open 2D Navigation.*
- *Open AR navigation.*

STORYBOARD

- *Automatically record daily dietary carbon emissions after shopping.*
- *Display the trend of personal dietary carbon emissions to users in the form of a chart.*

Self checkout, settlement of total price and carbon emissions

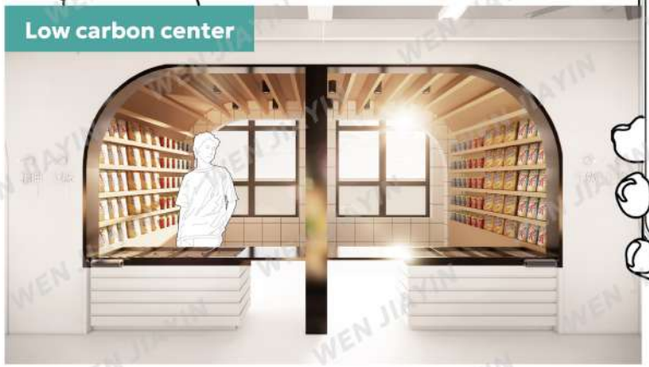


Dietary carbon emissions record

- *Reward mechanism: After the energy value reaches a certain value, nuts can be planted. After collecting energy and planting, nut fruits can be obtained, and users can collect them at the low-carbon nut center in the market.*
- *Energy value: The difference between the highest standard value of dietary carbon emissions and the carbon emissions value of shopping for customers on that day (personal saved carbon emissions).*

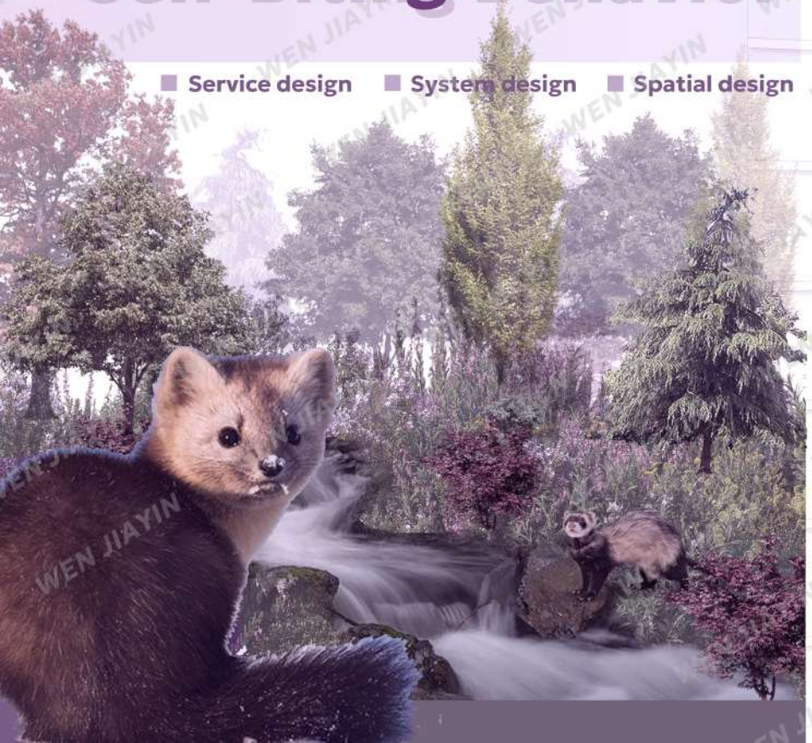
Nut reward mechanism

Low carbon center



Cure Of Mink Self-Biting Behavior

Service design System design Spatial design



BACKGROUND

Since the development of the leather industry, mink breeding has always been a relatively high-cost breeding industry. The main product is mink fur, which is one of the three pillar commodities in the world fur market. The biggest problem is diseases caused by breeding methods. Autobitism is a chronic disease that harms caged minks, which can cause self-biting trauma and affect their growth and fur quality. The mink fur industry cannot be completely replaced in a short period of time, so temporary animal harm is inevitable. Promoting more welfare for minks can make them more comfortable while they are alive.

Abnormal Behavior

Self-biting behavior

Mink self-biting syndrome is a chronic infectious disease in mink with self-biting and trauma as the main symptoms. It occurs periodically, usually at an interval of 6 to 7 days. When the sick mink is excited, it bites a certain part of the body. In mild cases, it may cause hair loss or loss of hair. The bite can injure the flesh, and in severe cases, the tail can be broken off, causing suppuration or death.

Behavioral Stereotypy

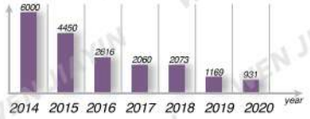
"Self-biting" is also a manifestation of stereotyped behavior. Stereotyped behavior is a behavior that is repeated, consistent in form, and has no obvious function. Animals (including domestic animals, zoo animals, and experimental animals) often exhibit stereotyped behaviors under artificially restricted conditions.

Economic Losses

Damaged mink skin

Mink leather is fine and thick, soft and strong, with smooth color. Poor mink breeding conditions and other reasons can induce diseases such as autobitism, resulting in damage to mink skins and a decline in grade.

Annual output of mink skins in China (10,000 pieces)



Skins downgraded due to self-biting behavior (10,000 pieces)

The production volume of mink skins in the world alone is about 50 million, and the number of skins that have been downgraded due to self-biting behavior is between 2 and 3 million. The annual incidence of self-biting mink is about 5%-20%, which seriously affects the skin quality. Quality has brought huge economic losses to the mink breeding industry.

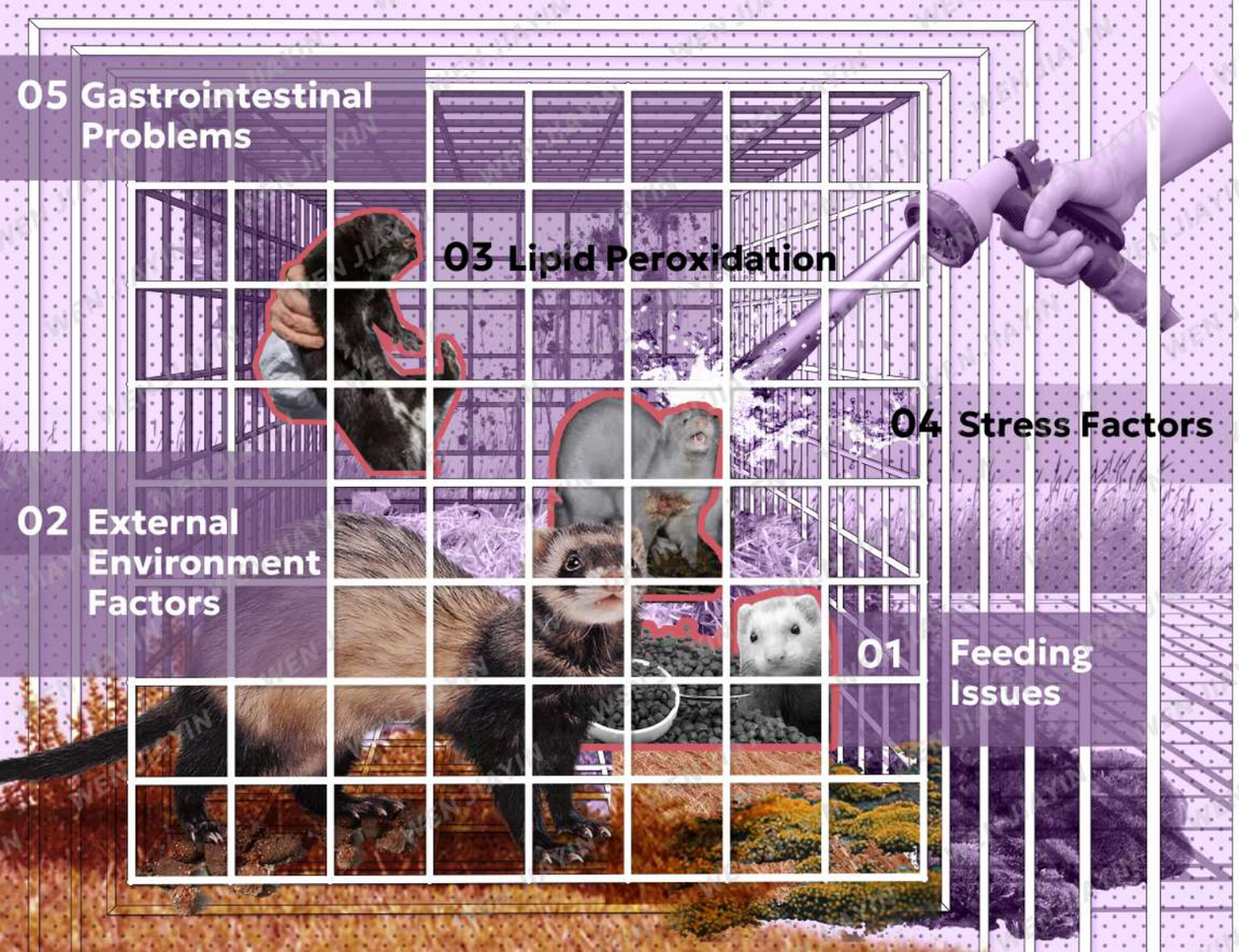
Loss Of Life

Self-biting disease is hereditary. Minks suffering from self-biting disease are ruthlessly killed, and the mink's life and health are endangered.

Suffering from self bite

• Raise in cage • Fur infection • Fall ill

• Death • Damaged fur



RESEARCH

Reason	Influence Factor		How To Treat
Feeding	Feeding a single feed for a long time results in malnutrition, especially a lack of protein and trace elements.	Lack of Protein,Na,Ca  Excessive content of NaCl and I_2	• Reduce the proportion of marine fish. Nitrosamines in meat threaten brain cells. • Replace some animal feeds with plant-based feeds. Add allicin, carrots, etc. to neutralize nitrosamines. [1]
External environment factors	Cage space is small. Poor indoor ventilation and unstable temperature. Insufficient or too strong light.	*It causes discomfort to the warm air flow, causing endocrine disorders and leading to a decrease in regulatory function.* 	• Expand the cage area and control the number of groups. • Constant temperature and enhanced ventilation. Artificial lighting control.
Lipid peroxidation	Poor environment and welfare benefits trigger lipid peroxidation.	*Lipid peroxidation refers to a series of chain free radical reactions on the double bonds of polyvalent unsaturated fatty acids (PUFAs). It is related to the antioxidant enzyme activity and antioxidant capacity of animal liver.*	• Add vitamin E and selenium to the feed to improve the antioxidant capacity of fur-bearing animals, such as rapeseed and green beans. • Add natural antioxidants such as tomatoes to the cage. [2]
Stereotypes triggered by stress and depression	Being subject to stress stimulation: driving, chasing, binding, vaccination, drug anesthesia, noise, violent storms and mental stress, etc. [1] Anxiety, depression and other emotions trigger stereotyped behaviors, with the mink spinning around in the cage and biting its tail.	*Research has proven that there is a bidirectional relationship between depression and gut microbes. Intestinal flora dysbiosis, especially Lactobacillus depletion and Akkermansia enrichment, is related to neuroinflammatory activity and is a potential cause of depression and stress reactions.* [3] *Gut flora affects the brain through the microbi-ome-gut-brain axis, regulating stress, anxiety and cognition.* 	• Environmental Enrichment: Add toys-like materials. Provide necessary stimulation devices and set up shelter caves. Music therapy. • Using fecal microbiota transplantation technology to regulate intestinal flora: Antibiotics, probiotics, and prebiotics can be used to regulate intestinal flora to combat depression. [4]
Gastrointestinal problems	The digestive capacity of the gastrointestinal tract is weak, and nutrients such as feed protein are not fully absorbed, causing diarrhea and indigestion.	*Detect mink feces and observe the mink's health. Isolation and screening of Bacillus subtilis from healthy mink feces.* 	• A strain of Bacillus subtilis with good stress resistance and capable of producing a variety of enzyme systems was isolated from healthy mink feces and used as an exogenous feed protein additive. [5]

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[3]CUI J Q,CHEN Q Y,LI N. Research progress of gut microbiota-gut-brain axis in neuropsychiatric disorders [J]. Shanghai Medical & Pharmaceutical Journal,2023,44(01):14-18.
[4]CHEN W L,YAN X R,GAO J P,SONG G H. Research progress on the regulatory mechanism of intestinal flora in the occurrence of depression [J]. CHINESE JOURNAL OF COMPARATIVE MEDICINE,2022,32(10):130-135.
[5]YU D T,LI J Y,LIU S. Isolation, identification, and enzymatic characterization of Bacillus subtilis from mink [J]. Microbiology China,2023,50(09):4078-4089.DOI:10.13344/j.microbiol.china.230293.

DESIGN AIM

To cure self-biting in minks and improve welfare, new circulatory systems for mink farming are needed.

Control minimum material costs.

Use the smallest cage area to house the largest number of minks.

DESIGN POINT

Caged mink can develop behavioral deficits. In order to better design the mink activity space, it is necessary to investigate several behavioral behaviors of mink in the wild.

Behavior Of Minks In The Wild

Wild minks use natural caves to nest, with the cave openings on the shore or underwater, and nearby grass for cover. Minks feed on rats, mice, frogs, fish, and plant fruits. Except for mating and lactation, they mostly live alone and scattered.

Mink is a semi-aquatic mammal with a slender body and a weight of 16 to 22 kilograms.

It is generally believed that light, food supply and predation pressure affect mink activity.

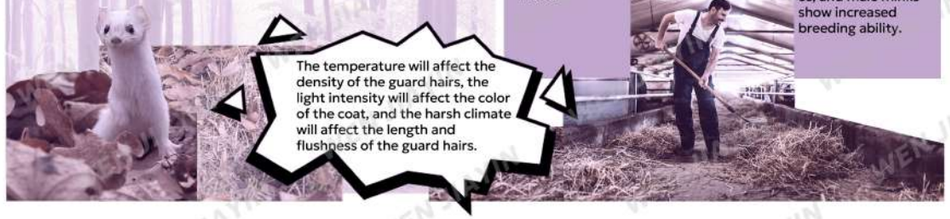
Environmental abundance can reduce feed consumption and nesting material waste and increase mink productivity levels.

Minks in complex environments spent more time playing, were quieter, and showed less fighting behavior.

Female minks in enriched environments gave birth to larger litters.

They provide 10% more live-weaning litters than female ferrets in a poor environment.

When the number of minks biting their hair decreases, the level of cortisol in their feces decreases, and male minks show increased breeding ability.



The temperature will affect the density of the guard hairs, the light intensity will affect the color of the coat, and the harsh climate will affect the length and flushness of the guard hairs.

FINDING AND SOLUTION

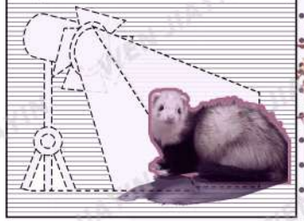
01 Environmental Enrichment

Increasing the abundance of the breeding environment and adding slight stimulation can increase the amount of mink spontaneous activity, such as adding olfactory enrichment and sound stimulation.

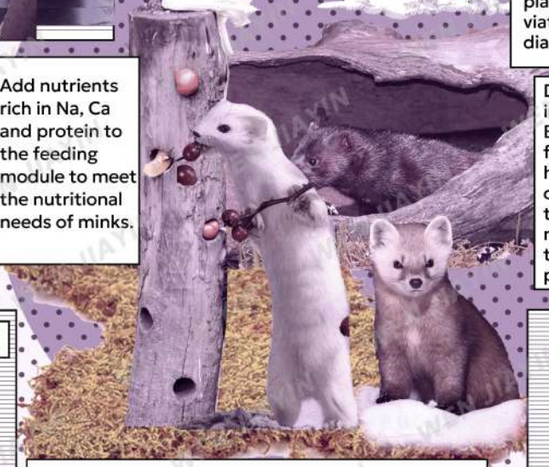
02 Nutrient Elements

Add nutrients rich in Na, Ca and protein to the feeding module to meet the nutritional needs of minks.

03 Lighting Control



Use artificial or modern electronic technology to provide long or short light and simulate changes in natural light cycles. Artificially giving seasonal light signals can speed up hair growth.



The gut microbiota is closely related to the occurrence of depression and can regulate the symptoms of depression and diarrhea of minks.Fecal microbiota transplantation can alleviate anxiety and diarrhea of minks.

Do feces examinations. Extract Bacillus subtilis from the feces of healthy minks for cultivation and transplant to the minks with gastrointestinal problems.

Provide environmental stimulation and set up caves for minks to hide in.

05 Feces Examinations, Fecal Microbiota Transplantation

04 Bacillus Subtilis

06 Stimulation Device

Mink Feeding And Management Cycle During Molting Period

September | **October** | **November**

Before — Feeding period — **Molting period** — Feeding period — **After** — Peeling period

Separate cages
Minks with self-biting symptoms were separated from normal minks, and eight minks formed a feeding module.

Probiotics and prebiotics

Probiotics reverse the intestinal flora imbalance caused by depression and produce significant antidepressant effects by regulating the immune system, endocrine system, and central nervous system.

Short day light control

Shedding summer hair and replacing winter hair is done under short days. "Embryonic hair" begins to form in mink skin 70 days after the summer solstice. When the daylight hours shorten to 12.0-11.5 hours (autumn equinox), winter hair grows and summer hair falls off. When the sunshine shortens to 11.0-10.5 hours (30 days after the autumnal equinox), the winter hair will grow except for the head. When the sunshine is shortened to 9.5 hours, the winter hair all over the body grows and the fur reaches maturity.

加入笼舍环境的植物

Plant tomatoes. Lycopene is the most powerful antioxidant nutrient discovered so far.

Common fruit and vegetable feeds include cabbage, cabbage, rape, carrots, spinach, etc.

Add sound stimulation devices. When foraging for food in the cage, the switch is triggered and sounds are stimulated.

Music Therapy

Low-frequency (80 Hz) light music can alleviate heat stress damage and improve the impact of high environmental temperatures on animal production.

Make a design of climbing cage which conforms to the coexistence and solitude of minks and meets the behavioral needs of minks in the natural environment, planting nutritious plants, improving their welfare, in order to reduce their stereotypical behavior.

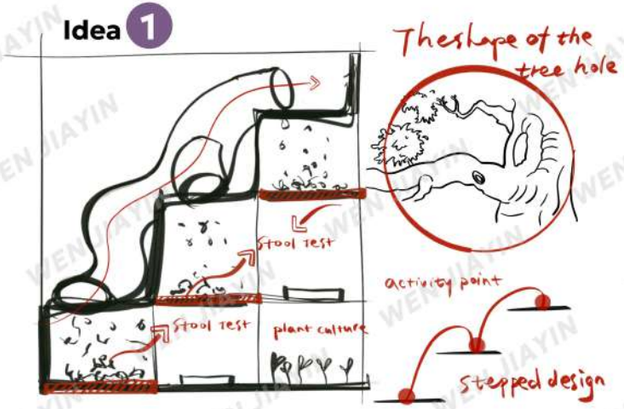
The activity of minks is proportional to the size of the cage and increasing the cage area can reduce mink behavioral deficits.

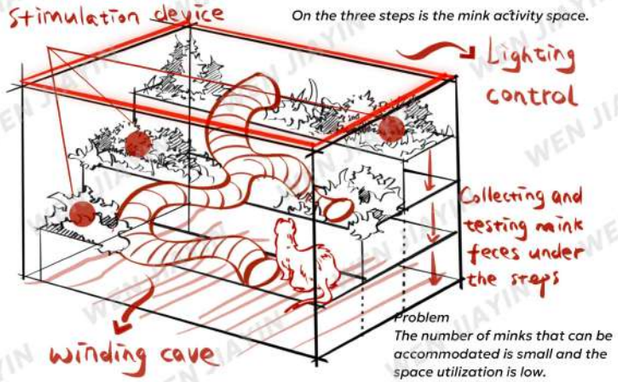
Detecting feces	**Stool test** *Put sick mink in a cage.*		**Stool test** *Detect mink feces and observe the physical, mental and gastrointestinal conditions of the mink.*		**Stool test** *Detect mink feces and observe the physical, mental and gastrointestinal conditions of the mink.*
Environment	**Raising in separate cages**	**Light control**	**Add stimulation device**	**Light control**	**Add stimulation device**	**Light control**
Feed	**Growing fruits and vegetables**	*Supplement vitamin E and selenium*	**Add probiotics and natural antioxidants to food** *Alleviates symptoms of depression in minks*			
Intestinal Colony	**Intestinal colony isolation** *Healthy mink poop*	**Intestinal flora transplantation** *Cultured benign flora were transplanted to minks suffering from autobiting syndrome to restore the intestinal microbial balance of minks.*	**Intestinal colony isolation** *Healthy mink poop*		**Intestinal flora transplantation**	

Autumn moulting period Detect, prevent and cure mink suffering from autobiting in one cycle (three months).

Cage Design Ideas

Idea 1

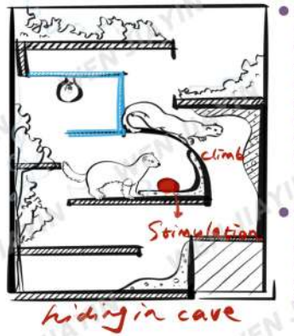




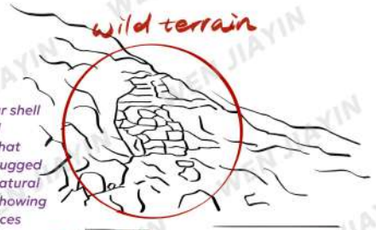
On the three steps is the mink activity space.

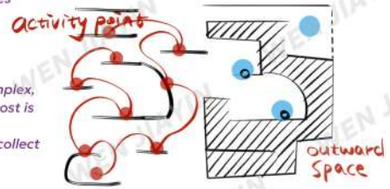
Problem
The number of minks that can be accommodated is small and the space utilization is low.

Idea 2

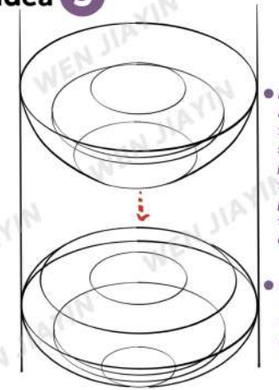


- Design
  The rectangular shell has an internal cross-section that simulates the rugged terrain in the natural environment, showing height differences between layers.
- Problem
  The shape is complex, the production cost is high, and it is inconvenient to collect feces.

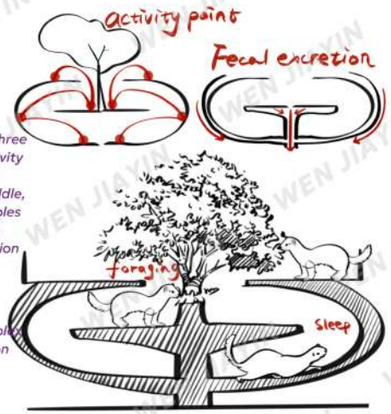




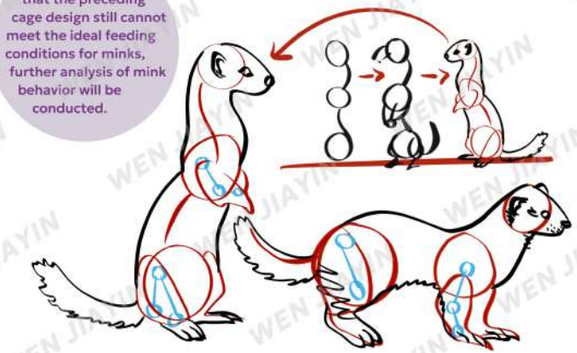
Idea 3

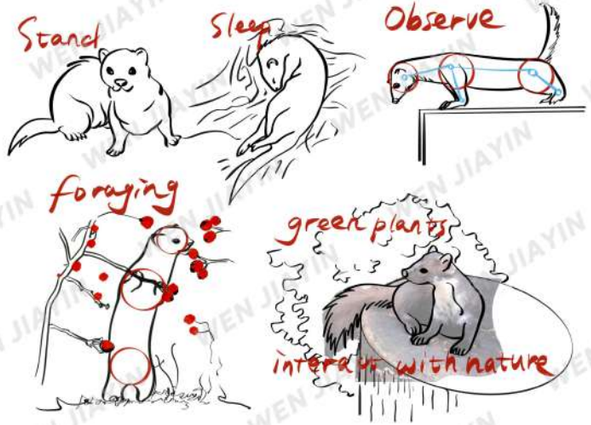


- Design
  Elliptical design, three floors of mink activity space, with a tree planted in the middle, fruits and vegetables planted under the tree, and stimulation devices set up.
- Problem
  The shape is complex and the production cost is high.

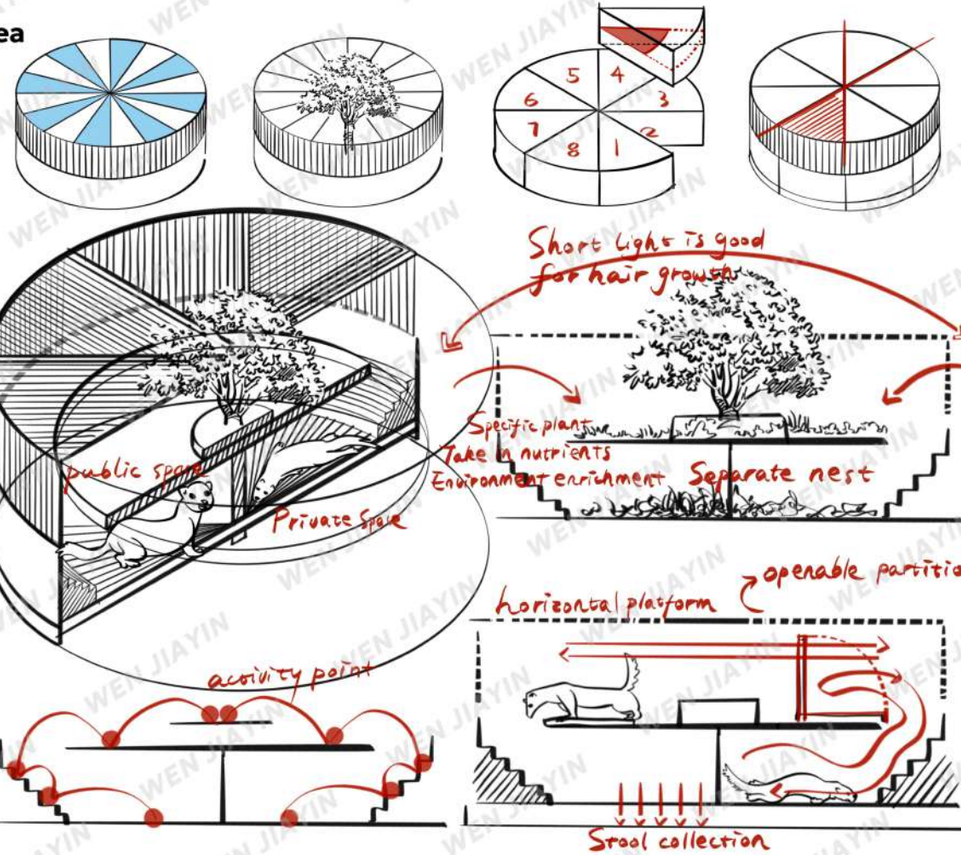


Considering that the preceding cage design still cannot meet the ideal feeding conditions for minks, further analysis of mink behavior will be conducted.





Final idea

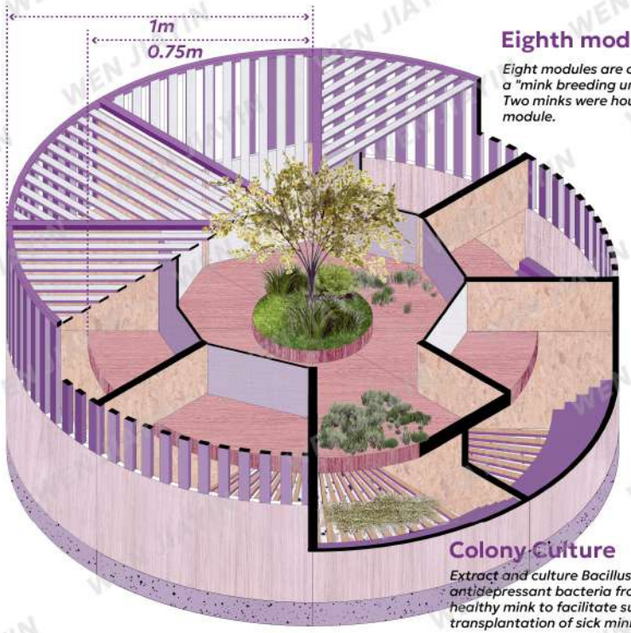


Cage Design And Model

Final Idea

Divide a cylindrical space into 8 equal parts, and one-eighth module is the suitable space required by two minks. This cylindrical unit simulates the environment and mode of mink survival in the wild. This can reduce breeding costs while improving mink welfare and space utilization.

Mink space cutaway diagram



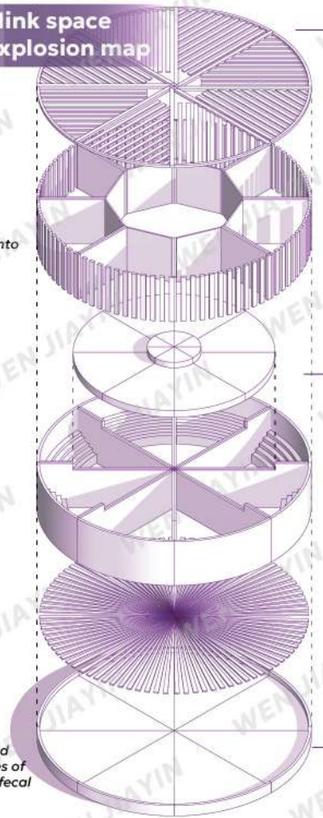
Eighth module

Eight modules are combined into a "mink breeding unit". Two minks were housed per module.

Colony Culture

Extract and culture Bacillus subtilis and antidepressant bacteria from the feces of healthy mink to facilitate subsequent fecal transplantation of sick mink.

Mink space explosion map



⑥ Top Fence

*The upper fence is enclosed, and the lower baffle is enclosed, combining virtual and real, interweaving light and dark, and controlling the appropriate amount of **light**.*

⑤ Stimulation device & sound settings

*Alternate sound control. Usually use **low frequency (80 Hz)** music for **emotional regulation**. Mink forage in the plant area and touch the button to trigger sound stimulation.*

④ Public Space

*During communication time, the partitions are opened to create a circular public space where minks can **explore** and enhance **communication** in each space.*

③ Plant Cultivation

*Essential nutrients are cultivated in the soil in the form of **plants** and made available for consumption.*
*1. Tomato tree, enhances the **antioxidant capacity** of mink.*
*2. Cabbage, cabbage, rape, carrots, and spinach provide essential **vitamin E and selenium**.*

② Alone Space

*Mink have the ability to live alone, ensuring that they have a **private space**, and partitions are placed between mink dens to separate them.*

② Avoid Caves

*In the wild, mink rely on burrows to avoid predators and use sound **stimulation** and **enrichment** to reduce **stereotyped behaviors**.*

① Stool Collection

*The bottom layer collects feces for **health testing** and **bacterial culture**.*

Information Cocoons

- Device design
- Interaction design
- Physical computing design

Living in an information cocoon, we are constantly restricted by the information environment. Due to the influence of algorithms, a person will continue to see things that he has seen or is interested in. As time goes on, he will become more and more intolerant. Other things are like being trapped in a cocoon.In order to more directly remind people what kind of cocoon they will be in when they are addicted to the Internet, I want to design two network cocoon reminder mechanisms using code running, dock scanning, and printers. When users repeatedly browse the same text on the Internet and reach high frequency, all repeated text will be printed out in real time.

INTRODUCTION

The Information Cocoon

The information cocoon refers to the phenomenon where people's attention to the information field is habitually guided by their own interests, thus constraining their lives in a cocoon like "cocoon room".

A warm and friendly place

For leaders and others living in an information cocoon, this is a warm and friendly place where everyone shares our perspectives.

A terrible nightmare

But a major mistake is the price of our comfort. For both private and public institutions, cocoon houses can become terrifying dreams.

Characteristic

The information cocoon reflects the tendency of the public's content to constrain the information environment of modern people. People get lost in information, build their own information cocoons, and are unwilling to come out.

What kind of phenomenon is Information Cocoons?

CAUSE

Information Cocoons

Individual Emotional Cognition

Psychology

People usually like to hear compliments, like to be in a comfort zone.

People remain silent when they disagree with others and gradually become assimilated into the group.

Communication

Algorithm Technology

Media

Group views of events tend to follow the direction of online media.

With the development of the internet,and life is occupied by a vast amount of information.

Internet

Distribution Of Benefits

Network push

To maximize commercial benefits, The Internet continuously utilizes algorithms to accurately push content.

The aggregation effect of the internet deepens public opinions, excludes heterogeneous information.

Environment

ANALYZE

Definition: People tend to hear voices with the **same opinions**, but this also makes them more **isolated** and unable to hear opposite voices, ultimately leading to information and viewpoints being strengthened in a **closed circle.**

Definition: Algorithms represented by search engines filter out heterogeneous information by understanding **user preferences**, creating a personalized information world for users while building a "wall of isolation" to immerse them in a "network bubble" environment and hinder the exchange of diverse perspectives.

How is the phenomenon of "ECHO CHAMBER" getting worse and worse?

Information cocoons

From "The Utopia of Information - How People Generate Knowledge" by Harvard Law School professor Keith Sanstein, it can be understood that the essence of forming an information cocoon is "the communication field where we **only listen to what we choose and what pleases us.** Over time, we confine ourselves to a cocoon like" cocoon room ".

INTERVIEW

I feel that the information cocoon is controlled by capital. People around me are all reading the same content using different platforms, and their emotions have become similar, as if something is controlling people's mentality.

When I use an app for a long time, I will feel the existence of an information cocoon. The things it pushes are becoming more and more monotonous, but I don't want it to push a single thing that conforms to my opinions and preferences.

Never believe the information pushed to you by the Internet, because this is what others want you to see.

People are aware of the information cocoon, but it is difficult to get rid of the echo effect. They will be unable to control themselves from watching similar content. So, I make a small device which can remind people in real time.

How to receive information

Various search engines: Baidu, Google

Various mobile apps, including shopping, entertainment, and social media.

Newspapers, books

How to transmit information

Telephone, TV, mobile phone, radio, newspaper, etc

How information is stored

USB drive, hard drive, CD, paper, human brain, etc

CASE STUDY

Profit Driven

The human brain can be hacked, just like "fragile" computer programming. Smart entrepreneurs have successfully taken over our brains, creating products that rob us of our attention. Using mobile phones is not entirely based on personal needs and wishes. It only took 10 years for products such as Facebook, Snapchat, and Instagram to devour the global advertising market.

Commercial Competition

Algorithm Design

Self-driving Force

Dopamine is a substance that secretly controls our attention. Having something that provides us with a "dopamine reward" hundreds of times a day is right in front of us, and of course the brain can't help but be drawn to it. The "Information Cocoon Room" will satisfy netizens' pursuit of sensory comfort zones, and we will unconsciously enter the self-constructed cocoon room.

Emotional Identification

Psychological Satisfaction

Social Needs

Fake news is not only shared by more people, but also spreads faster and is more inflammatory, regardless of the truth. Real news takes at least 6 times longer to catch up with fake news. Once a user clicks on fake news, the algorithm will increase its priority and place it at the top of the information flow. Algorithms deliver it, and people have a tendency to share fake news in relays. As people follow what others say, fake news is mistaken for truth.

Media Communication

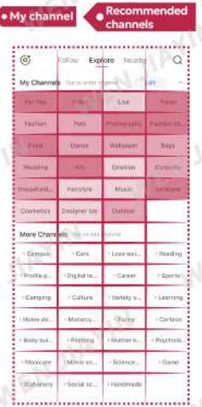
Social Circle

Take Xiaohongshu APP as an example:

1

Open social media, and the information that hits you is likely to be tailor-made by algorithms based on your preferences, rather than the truth.

After you select a tag, the APP will only push the content of the tag to you. It seems that you have chosen a point of interest, but in fact it will lead you into an information cocoon, sinking deeper and deeper into it.



2 **APP push mechanism**

Enable personalized recommendations

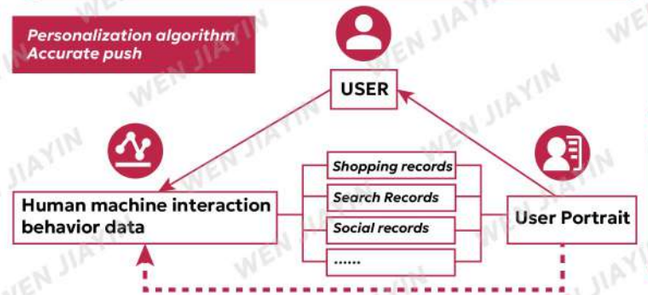
Xiaohongshu's personalized recommendation mode ***is enabled by default*** and will always use preference features to push content. Users will continue to see content they are interested in.

If personalized recommendations are turned off, content that is almost uninteresting will be displayed and users will lose their desire to use the Internet.

So, I couldn't help but turn on the button and voluntarily enter the information cocoon that I had woven. This button cannot really dismantle the cocoon, it will only make you believe in the cocoon even more.

The basis of personalized algorithms is user data. Internet companies build user portraits by collecting basic user information. All human-computer interaction behavior data such as user shopping records, search records, social records, etc. will constantly update and complete this portrait to truly make to precise positioning and targeted push.

Personalization algorithm Accurate push



Do as one likes

The more you like information in a certain field, the more the system will push you.

Labeling

Focus only on labeled things, losing diversity and live in the flat state on social media.

CONCEPT

■ *In order to make people more directly aware of what kind of cocoon they are living in, I want to design a device which can remind people of information cocoon.*

Model 1

Process

STEP1

Users play on their phones, swipe and browse web pages, and share their phone screens on computers.

STEP2

Intercept the mobile phone page in real time and use Python to identify words with high repetition frequency on the page.

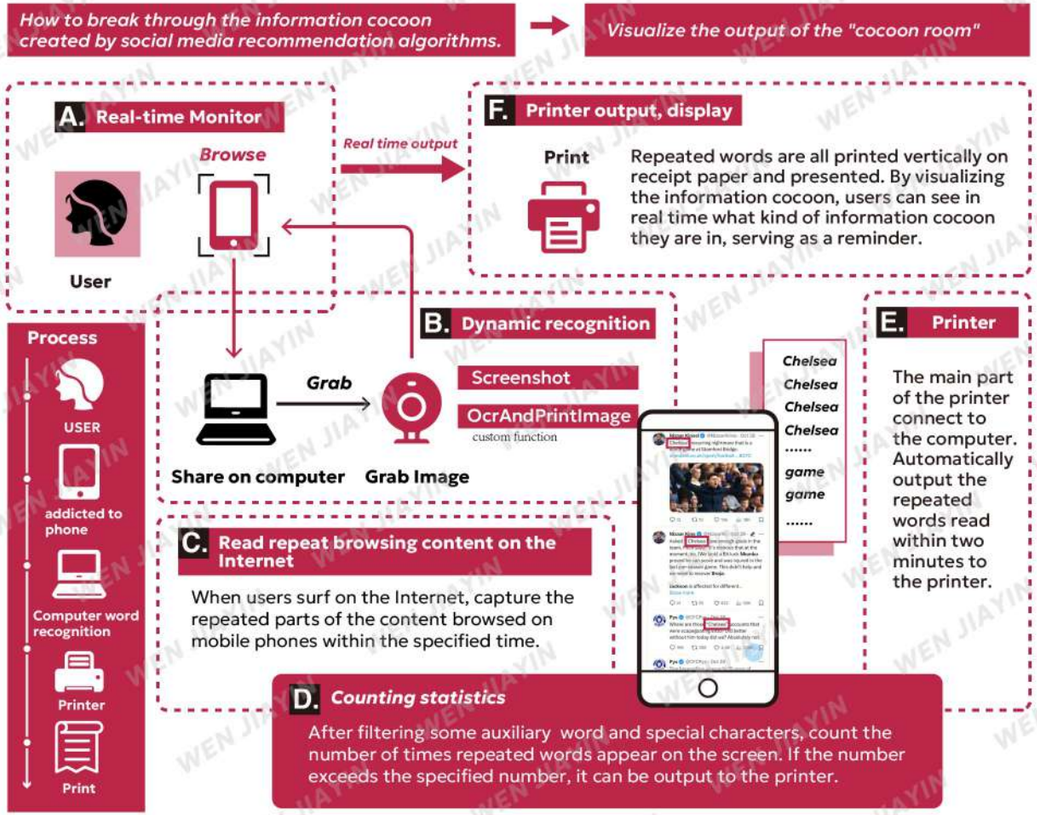
STEP3

Connect the computer to the receipt printer, set the browsing time on the mobile phone for 2 minutes, and count the repeated words.

STEP4

Words that are repeated more than 4 times within 20 seconds are automatically transferred to the printer for printing. To remind users of the risk of data leakage.

How to break through the information cocoon created by social media recommendation algorithms. → *Visualize the output of the "cocoon room"*



■ *The first plan is to share the screen and let the computer capture the screenshots on the phone and analyze the duplicate content.*
The first plan can be slightly improved, and the mobile phone page can be directly captured through the scanning device, and words with high repetition frequency can be identified, so I made the second plan.

Model 2

Process

STEP1

Users play on their phones, swipe and browse web pages.

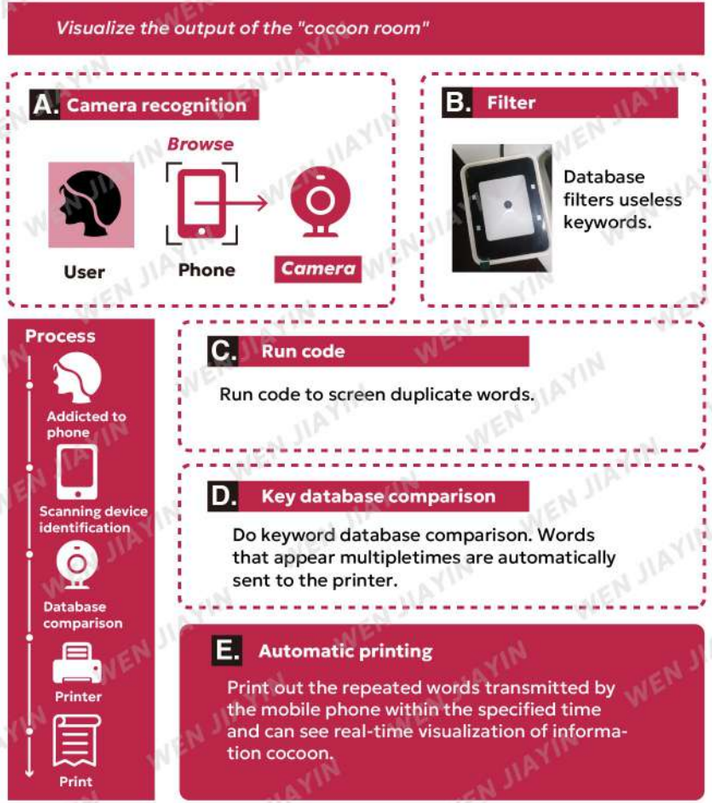
STEP2

The scanning device identifies the mobile web pages and database filters useless keywords.

STEP3

Screen duplicate words and print them.

Visualize the output of the "cocoon room"



CODE--Technical Analysis

Screenshot module & Word recognition and word segmentation module

```python
import time
import datetime
import os
from PIL import ImageGrab
from PIL import Image

import io
import sys
import glob
import pytesseract
import nltk
from nltk import FreqDist
import concurrent.futures
import re

symbols = ["&", "@", "+","-",".",",","[","]","(",")","{","}","|","!","?"] #

filtered_words = ['be', 'am', 'is', 'are', 'was', 'were', 'being', 'been', 'have', 'had', 'may', 'might', 'can', 'will', 'could', '

def isPureOrTransparent(image):
    # 获取图片颜色通道数
    num_channels = len(image.getbands())
    # 判断是否为透明图片
    is_transparent = image.mode == 'RGBA' and image.getextrema()[3][0] == 0
    # 判断是否为纯色图片                                    (variable) pixels: list
    pixels = list(image.getdata())
    is_pure_color = all(pixel == pixels[0] for pixel in pixels)

    return is_pure_color or is_transparent

def ocrAndPrintImage(file, keyword):
    # 使用PIL库打开图片
    image = Image.open(file)
    # 判断图片是否为纯色
    if isPureOrTransparent(image):
        return None
    # 使用pytesseract进行OCR识别
    text = pytesseract.image_to_string(image, lang='eng')
    #print(text,flush=True)
    return text

def ocrAndPrintImages(save_path):
    path = save_path + "\*.png"
    imageFiles = glob.glob(path)
    count = 0
    all_text = []
    # 使用多线程处理图片文件
    with concurrent.futures.ThreadPoolExecutor() as executor:
        # 遍历图片文件，提交任务到线程池
        results = [executor.submit(ocrAndPrintImage, file, '') for file in imageFiles]
        #处理OCR识别的结果
        for future in concurrent.futures.as_completed(results):
            text = future.result()
            if text:
                # 将文字拆分为单词并加入到all_text列表中
                words = nltk.word_tokenize(text)
                filtered_words = [word for word in words if not re.match(r'[{}]'.format(''.join(map(re.escape, symbols))), word)]
                all_text.extend(filtered_words)
```

Share mobile screen to computer

List of special symbols and words that need to be filtered.

Get the color channel of the image, excluding transparent images and solid color images.

Use pytesseract database for OCR recognition.

Custom Function

Use multithreading to process image files.

Process image text

```python
    # 使用NLTK库的FreqDist函数统计关键词频率
    fdist = FreqDist(all_text)
    for key, value in fdist.items():
        if value >= 4 and value <= 90:
            for i in range(value):
                print(key, flush=True)

def clean_directory(directory):
    for filename in os.listdir(directory):
        file_path = os.path.join(directory, filename)
        if os.path.isfile(file_path):
            os.remove(file_path)


def capture_screen(region, save_path):
    screenshot = ImageGrab.grab(bbox=region)
    screenshot.save(save_path)

if __name__ == "__main__":
    # 定义屏幕区域，左上角坐标为(x1, y1)，右下角坐标为(x2, y2)
    x1, y1 = 1150, 63
    x2, y2 = 1790, 1350
    region = (x1, y1, x2, y2)

    # 保存路径
    save_path = "E:\cache_photo\screenshot"

    sys.stdout = io.TextIOWrapper(sys.stdout.buffer, encoding = 'utf8')
    second = 0
    i = 0
    while True:
        dateObj = datetime.datetime.fromtimestamp(time.time())
        timeString = dateObj.strftime("%Y%m%d-%H%M%S")
        capture_screen(region, save_path + "\photo" + timeString + ".png")
        print("Screenshot captured and saved.")

        i = i + 1

        if i == 4:
            # 指定关键词调用函数
            ocrAndPrintImages(save_path)
            i = 0
            time.sleep(20)
            clean_directory(save_path)

        time.sleep(5)# 等待5秒后继续截图
```

Count keyword frequency.

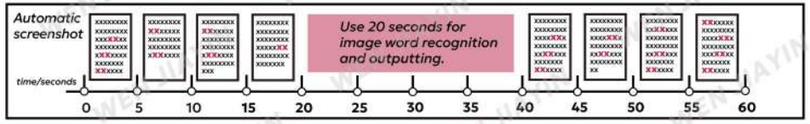
Frequency condition

Words that appear more than 4 times within a 20-second process will be output.

Main Function

- Start taking automatic screenshots.

- Wait five seconds to continue taking screenshots.
- Take four screenshots in twenty seconds
- Automatically save screenshots to the specified folder.
- Identify screenshots
- Participle

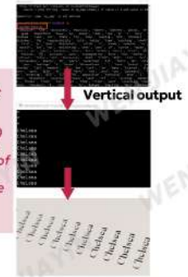


Printing

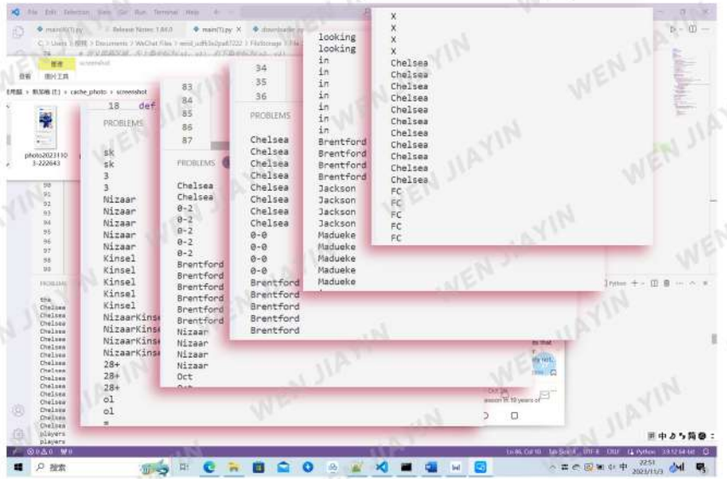
```python
def printString(string):
    defaltPrt = win32print.GetDefaultPrinter()
    printer = win32print.OpenPrinter(defaltPrt)
    win32print.StartDocPrinter(printer, 1, ('my doc', None, 'RAW'))
    win32print.StartPagePrinter(printer)
    bytestr = bytes(string, encoding='utf-8')
    win32print.WritePrinter(printer, bytestr)
    win32print.EndPagePrinter(printer)
    #结束打印
    win32print.EndDocPrinter(printer)
    win32print.ClosePrinter(printer)


    for key, value in fdist.items():
        if value >= 3:
            for i in range(value):
                print(key, flush=True)
                printString(key)
```

Test Results: The word 'Chelsea' appeared 10 times within 20 seconds of the user browsing the web page.

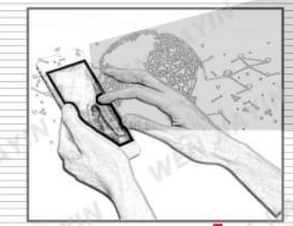


Test results for word recognition randomly



INTERACTION PROCESS

Model 1



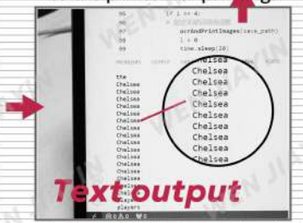
Recent topics frequently followed by user: Football, Chelsea FC, Esports.

① Addicted to phone

② Multi-screen collaborative sharing.

③ Running the program, automatically take screenshots and save them.

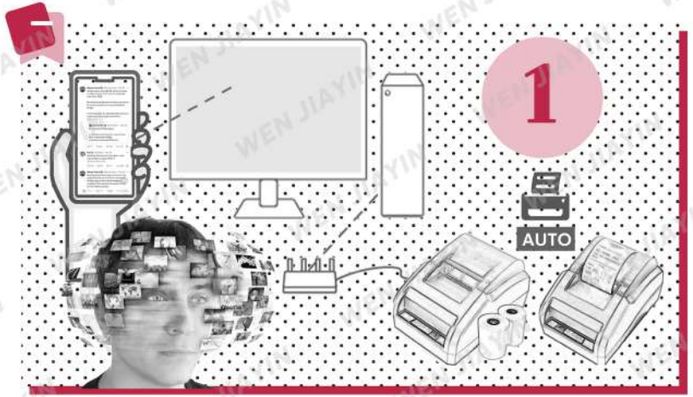
④ The program identifies, segments and counts the screenshot pages.

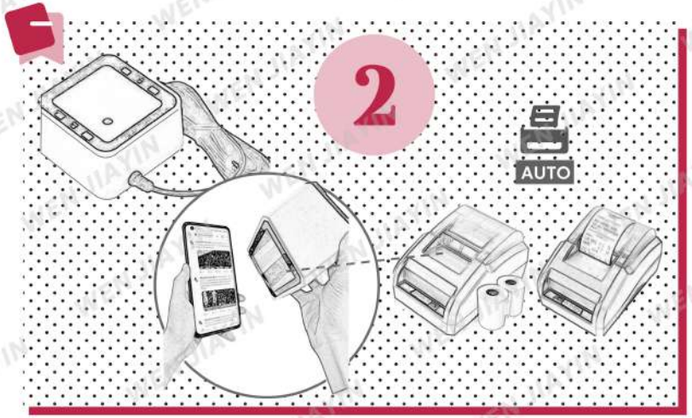


⑤ Run the window and output repeated words that meet the frequency condition.

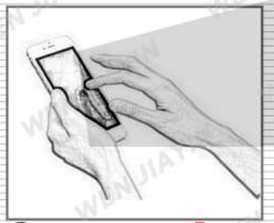
After forty seconds, the loop continues to identify and print duplicate content.

⑥ Text is automatically transferred to the printer for printing.





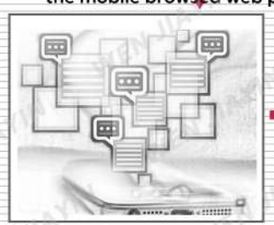
Model 2



Recent topics frequently followed by user: Esports,LOL.

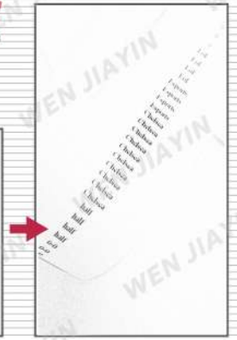
① Addicted to phone

② Scanning device directly identify the mobile browsed web pages.



③ Run code to screen duplicate words. Do keyword database comparison.

④ Words that appear multiple times are sent to the printer.



⑤ Print.

After forty seconds, the loop continues to identify and print duplicate content.

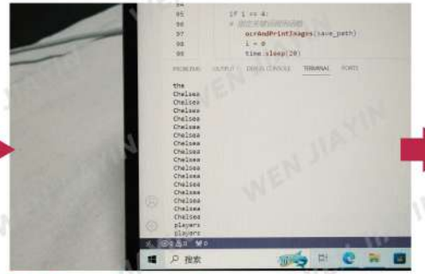
FINAL OUTCOME

Main part of the printer

Model 1

1 *Addicted to phone.*

2 *Share phone screen to the computer and run the program to take automatic screenshots.*



3 *Recognition, word segmentation, efficiency statistics and run window, then output high-frequency words.*

4 *Real time print.*

Model 2

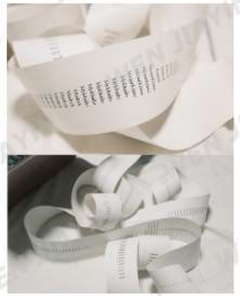
1 *Camera full data capture mobile phone page.*

2 *Database filters useless keywords.*

3 *Run code to screen duplicate words. Do keyword database comparison.*

4 *Automatically sent them to the printer for printing.*

Production process



Fire Of Love

■ Device design ■ Experience design

I'd like to always be on craters.We no longer see the world with all its mediocrities.

Volcanos are greater than man,is something beyond human understanding

Starting From A Documentary

Katia,"Once you see an eruption,you can't live without it,because it's so grandiose,it's so strong."

"Me,Katia and the volcanoes, it is a love story."

Maurice,"My right leg was burned in hot mud.140 degrees hot enough for me!It's a volcanologist baptism."

Vulcan team

The Story of Two Volcanologists Dancing on the Edge of a Volcano

The protagonists Katia and Maurice of the documentary "Volcano Love" are one of the few volcanologists of the last century, and they are also a couple. They are deeply enamored with volcanoes and have been following global volcanic eruptions for more than 20 years since the late 1960s, observing, experiencing, and documenting volcanoes up close, leaving rich and shocking visual records. Until 1991, Katia and Maurice passed away in Sendai, Japan due to a volcanic eruption.

My Reflections On Their Story Journey

According to the timeline in the documentary, Katya and Maurice grew up in the post-war ruins. They felt lonely in the turbulent real society, but the volcanic world brought ecstasy. But later on, they found eternal pleasure in seemingly more dangerous and barren land, learned greater love, and became the brightest flowers on the layers of volcanic ash. The lifestyle they choose is incredible for most people. What factors drive them to purely detach from human society and rush towards a volcanic world?

Katia Maurice

Katia and Maurice grew up in post-war Arthas, separated by over twenty kilometers.

In 1966, Katia and Maurice formed an alliance due to Mount Etna and Mount Strombo.

In 1967, the Vietnam War began and they joined the anti war march together.

Disappointed with humanity, decided to devote oneself to volcanology.

Entering the volcano for the first time, curiosity overcame fear, became obsessed with the volcano, and felt ecstatic.

Far away from humans, living on the edge of volcanoes, observing over 170 volcanoes over the past 20 years.

Morris was planning a magma drift at the time.

In 1977 and 1979, Mount Nyiragongo and Mount Indonesia erupted respectively, claiming tens of thousands of lives.

They stationed at close range to observe volcanic eruptions and experienced firsthand the casualties caused by volcanoes to humans.

Only by staying away from humans can one fall in love with them.

They returned to Alsace to convert photos and images into books and videos, and made speeches on tour.

After the eruption of Mount St. Helens in 1980, they began to approach the dangerous ash volcano infinitely.

In 1985, the Nevado Druis volcano erupted and they called for the establishment of an alarm system and evacuation plan.

The film plan is to capture images of the damage caused by volcanic eruptions to attract government attention.

Fascinated by the 'killing volcano', disregarding safety.

In 1991, Katia and Maurice died from the eruption of Mount Yunsen in Japan.

A rebel obsessed with volcanoes.

Earth science enthusiasts.

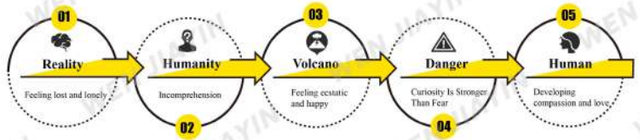
Katia—Geochemist Maurice—geograph

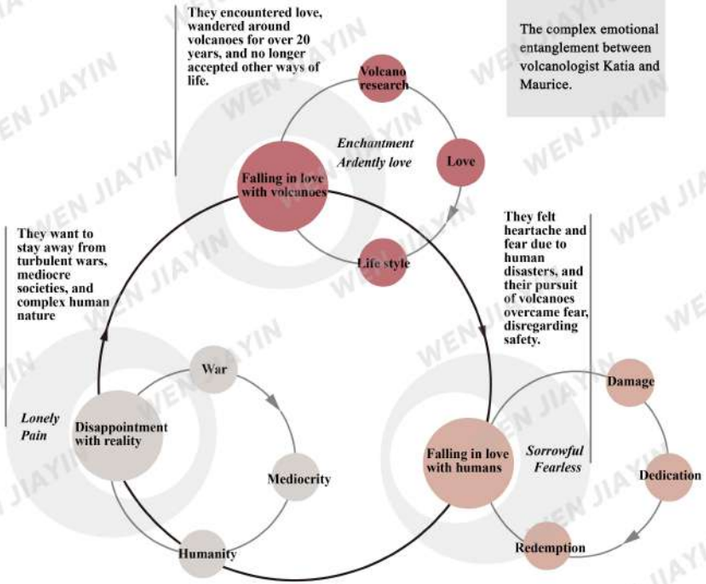
Feeling uneasy in the turbulent reality, ecstatic and lonely in the face of volcanoes.

Feeling heartbroken about the destruction of life by volcanoes, I once doubted my life goals.

Sentiment Analysis

The Emotional Changes of Volcanologists Katia and Maurice.





The complex emotional entanglement between volcanologist Katia and Maurice.

The documentary records their wandering volcanic life, but I cannot intuitively experience the three emotions of volcanologists. Therefore, I want to use installation works to provide a way of experience, using artistic installations to reproduce the emotions of two volcanologists and their understanding of reality and volcanoes. Bringing into the perspective of French volcanologists Cartier and Maurice, we will understand the emotions of these soul mates towards withdrawing from human society, and the three levels of love towards volcanoes, towards each other, and towards humanity, bringing complex emotional reflections to the audience.

Original Narrative Style

Time clues

Cartier and Morris met and fell in love due to their disappointment with reality and shared love for volcanoes.

They rushed towards a common ideal and stationed themselves on volcanoes, thus initiating more than 20 years of research on volcanoes.

They developed a love for humanity by witnessing volcanic disasters firsthand, collecting information on volcanic eruptions and making videos to warn humanity.

In the end, they both died while pursuing the eruption of the ash volcano.

My Narrative Style

Emotional clues

- Pain
- Lonely
- A hatred of war
- Lack of understanding of human nature

Anger

- Volcano
- Love

Happiness

- Volcano research
- Life style
- Stay away from mediocrity

Enthusiasm

- Volcano killing
- Love humanity

Sorrow

Expression

My creation will consist of two parts, one representing the loneliness and helplessness of the real world, and the other representing the scorching heat of the imagined world. The movement of the camera represents the tendencies of the two volcanologists in the movie, attempting to vividly depict the transition from the dark real world to the exciting volcanic world, as well as the dedication of the volcanologists to safety.

The uncontrollability of natural

Brave and fearless pursuit of truth

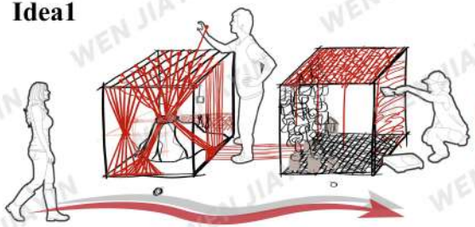
Contribution to Volcano

Compassion for human

May we all have the courage to continue loving, just like Katia and Morris, even after being stabbed by the blade of reality; Having eyes that have seen the lives burned, as well as a heart full of water and plants.

Ideation

Idea1



Disadvantage

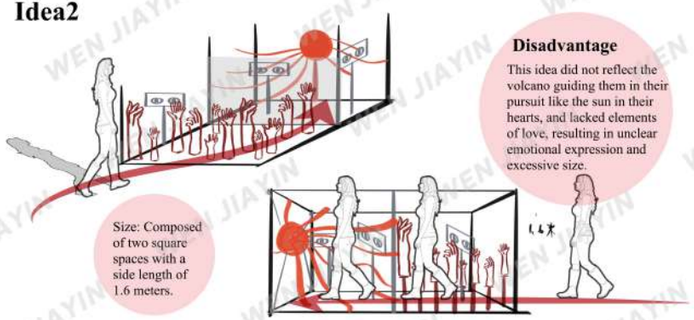
The expression of this idea is too straightforward, the production model is too concrete, and the two spaces are independent and not related

A volcanic world surrounded by red silk threads.

Hand weave red silk thread around the entire space, painting all four sides in red.

Simulating the Real World Destroyed by War with Black Clay.

Idea2



Disadvantage

This idea did not reflect the volcano guiding them in their pursuit like the sun in their hearts, and lacked elements of love, resulting in unclear emotional expression and excessive size.

Size: Composed of two square spaces with a side length of 1.6 meters.

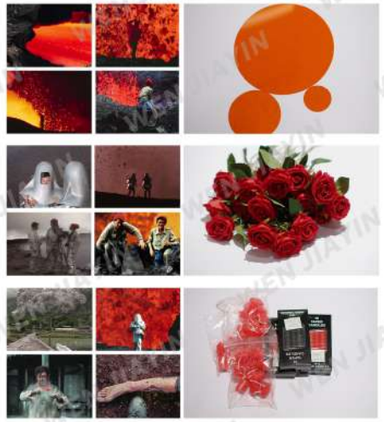
Traveling between many 'hands'.

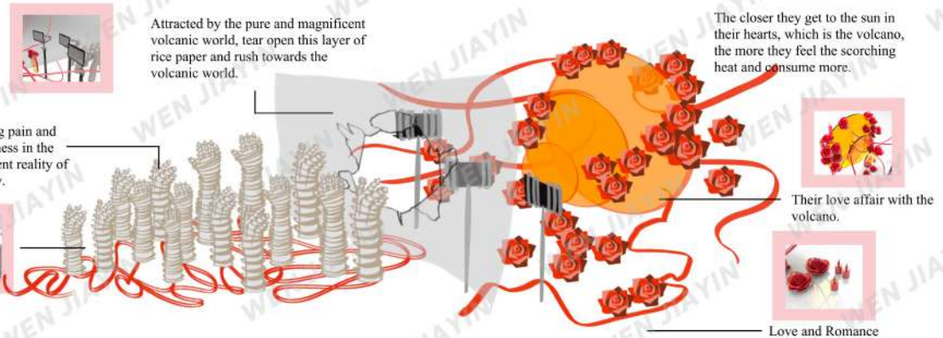
Tear down the barrier and obstruction between mediocre reality and ideals.

Come to another space and gradually move towards an orange acrylic board.

Final idea

- A hand made of sisal hemp
  The constraints of cruel reality and disappointment with human nature
- Red silk thread
  The confusion and constraints of the real world
- Orange circular acrylic board
  Simulate the Sun in Their Heart - Volcano
- Screen
  Showcasing emotional changes in different spaces through eye contact
- Rose
  Symbolizing the love between the two and the volcano
- Glowing red lamp tube
  Using red light tubes to represent eruptive volcanic lava flows
- Candle
  Life burned and lost due to the high temperature of volcanoes





Attracted by the pure and magnificent volcanic world, tear open this layer of rice paper and rush towards the volcanic world.

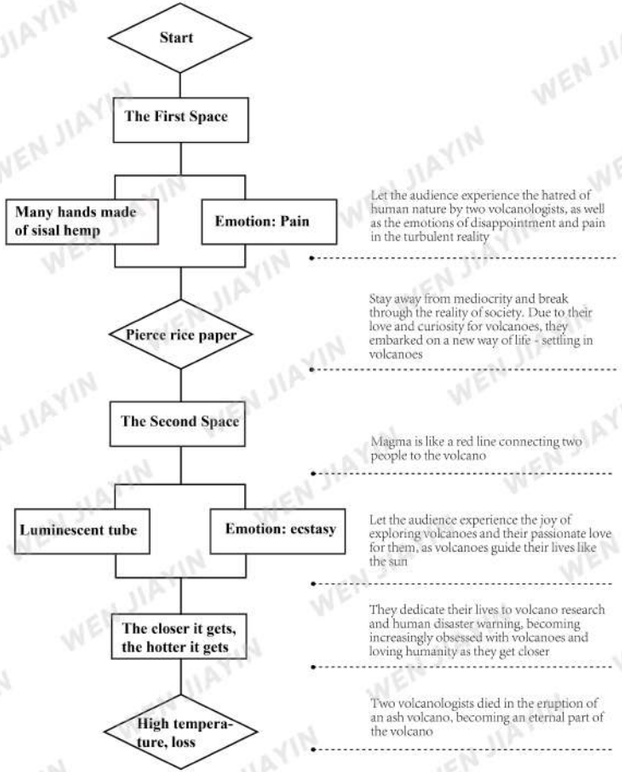
Feeling pain and loneliness in the turbulent reality of society.

The closer they get to the sun in their hearts, which is the volcano, the more they feel the scorching heat and consume more.

Their love affair with the volcano.

Love and Romance

Interactive Process



Story Board

1 The experimenter moves forward in many "hands" made of sisal hemp, feeling lonely and uneasy.

2 In an environment of sisal hemp, feeling constrained and struggling, unable to move at any pace.

3 During the journey, the experimenter is scraped to the leg by sisal hemp.

4 Traveling in the direction of the red glowing light tube, you can vaguely see the volcanic world through the rice paper.

5 Tear down the rice paper bit by bit along the direction of the light tube, attracted by the beautiful and pure volcanic world.

6 Thoroughly tear open the rice paper and come to the world of volcanoes.

7 Feeling ecstatic in the world of volcanoes, infinitely approaching grandeur and distancing oneself from mediocrity.

8 "Me, Katia, volcano, it's a love story."

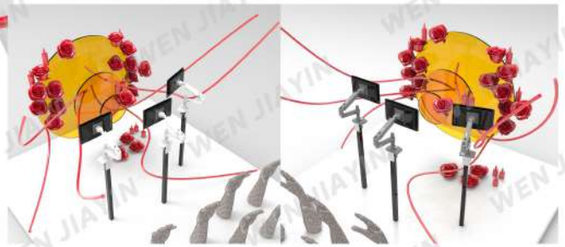
9 The closer the experimenter approaches the solar device, the brighter the light bulb and the more scorching it feels.

10 The candle keeps burning, shedding wax and releasing heat.

11 Get closer to the candles and light bulbs, feeling even hotter.

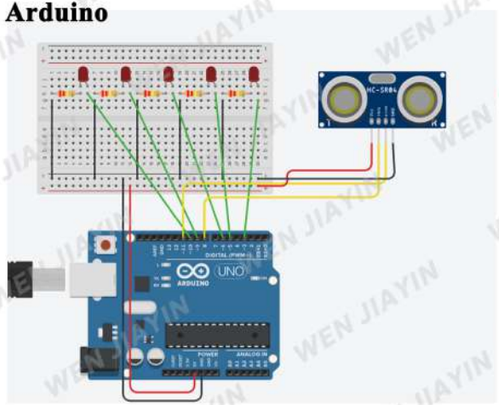
12 The device heats up and is completely depleted.

Model Making



Schematic Diagram

Arduino



Main board Arduino uno

Arduino breadboard

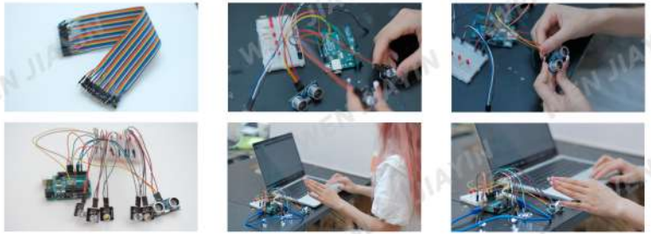
Ultrasonic HC-SR04

LED lamp

Technical effects

As a person approaches the LED bulb, the bulb gradually becomes brighter.

Production process



Code

Arduino Uno

dengpaobianliang.ino

```
#define LED1 3
#define LED2 5
#define LED3 6
#define LED4 9
#define LED5 10

int trigPin = 8;
int echoPin = 11;
int DURACION;
int DISTANCIA;
void setup() {
  pinMode(LED1, INPUT);
  pinMode(LED2, INPUT);
  pinMode(LED3, INPUT);
  // pinMode(LED4, INPUT);
  pinMode(LED5, INPUT);
  pinMode(echoPin, INPUT);
  pinMode(trigPin,OUTPUT);
  Serial.begin(9600);
}

void loop() {
  digitalWrite(8, HIGH);
  delay(1);
  digitalWrite(8, LOW);
  DURACION = pulseIn(11, HIGH);
  DISTANCIA = DURACION / 58.2;
  Serial.print("DISTANCIA = ");
  Serial.println(DISTANCIA);
  delay(10);
  if(DISTANCIA<20)
  {
   analogWrite(3,240);
   analogWrite(5,240);
   analogWrite(6,240);
   analogWrite(9,240);
   analogWrite(10,240);

  }
  else if(DISTANCIA<30)
  {
   analogWrite(3,200);
   analogWrite(5,200);
   analogWrite(6,200);
   analogWrite(9,200);
   analogWrite(10,200);
  }
  else if(DISTANCIA<40)
  {
   analogWrite(3,150);
   analogWrite(5,150);
   analogWrite(6,150);
  analogWrite(9,150);
   analogWrite(10,150);
  }
  else if(DISTANCIA<50)
  {
   analogWrite(3,100);
   analogWrite(5,100);
   analogWrite(6,100);
   analogWrite(9,100);
   analogWrite(10,100);
  }
  else if(DISTANCIA<60)
  {
   analogWrite(3,70);
   analogWrite(5,70);
   analogWrite(6,70);
   analogWrite(9,70);
   analogWrite(10,70);
  }
  else if(DISTANCIA<70)
  {
   analogWrite(3,50);
   analogWrite(5,50);
   analogWrite(6,50);
   analogWrite(9,50);
   analogWrite(10,50);
  }
  else if(DISTANCIA>70)
  {
   analogWrite(3,0);
   analogWrite(5,0);
   analogWrite(6,0);
   analogWrite(9,0);
   analogWrite(10,0);
  }
}
```

Define pins.

Set ultrasonic pins.

Define variables.

Define output input.

Calculate distance.

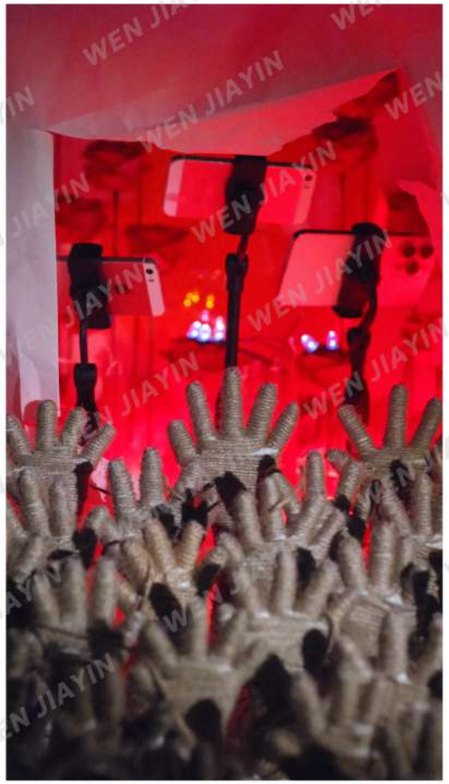
Compare the distance and set values to set the different brightness of the light.

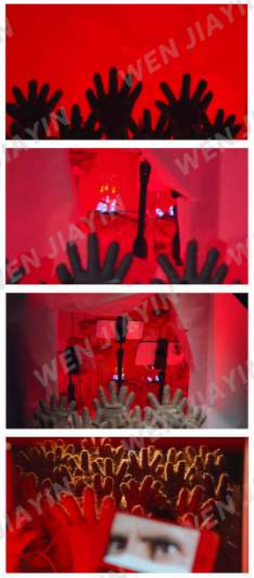
Entity Model

Model production process

Model physical image

Room 1





Walking through many hands woven of sisal hemp, the screen behind the hands displays the hatred of human nature and turbulent society in the eyes.
Attracted by the red light passing through the rice paper, I tear it apart bit by bit, jumping out of numbness and pain, and entering the space representing the ideal world.

Room 2

Use roses to represent the love between two volcanologists and their love with volcanoes.
LED lights and candles are combined to create a burning sensation of light and heat, and the closer they are, the brighter and hotter they become.

From right to left, the screen displays emotional changes
1. Pain and hatred
2. Stay away from mediocrity and pursue the joy of magnificent volcanoes
3. Pity and love for humanity

In the end, the candle burned out, indicating that the life of volcanologists was completely lost in the process of studying volcanoes and protecting humanity.