

BACKGROUND

"Ripples" is an interactive installation I created for my graduation project, inspired by the source of life, Water.

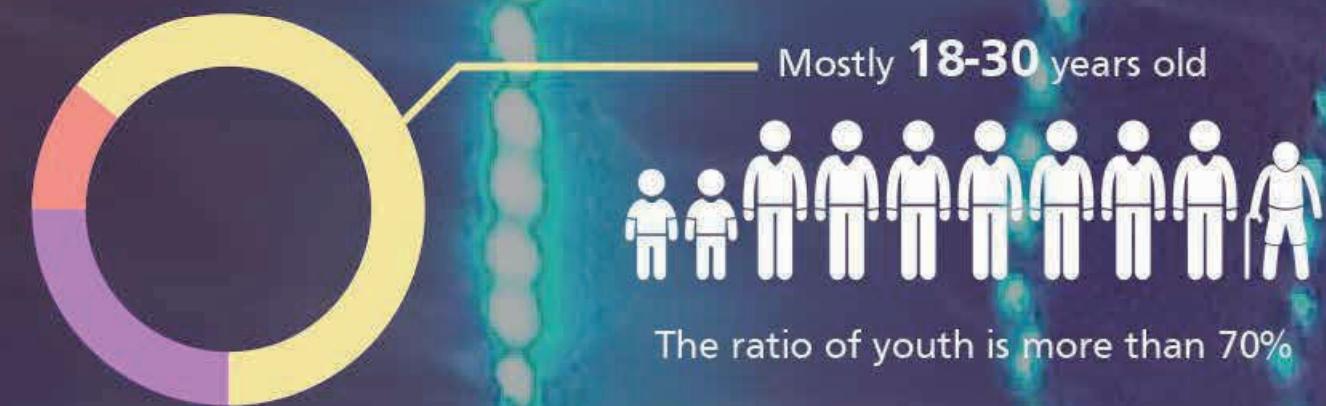
The background of the project is to create a commercial space proposition, combining the existing space and the crowd. I'm curious on how art installations and the Mixc's brand image can be combined with commercial spaces.

Project Site

The Mixc Chongqing



Age Ratio of Consumers



Current problems at the Mixc



- Homogenization
Most of the complex looks the same
- Online Mall
Convenient online shopping
- Pandemic
Travel restrictions

Mixc's Existing Strategies

- Changing business strategies
Increase the advantage industry of the mall & abandon obsolete projects
- Expanding commercial scale
Expand the area in order to increase the influence
- Optimizing business environment
Improve the customer shopping experience

RIPPLES

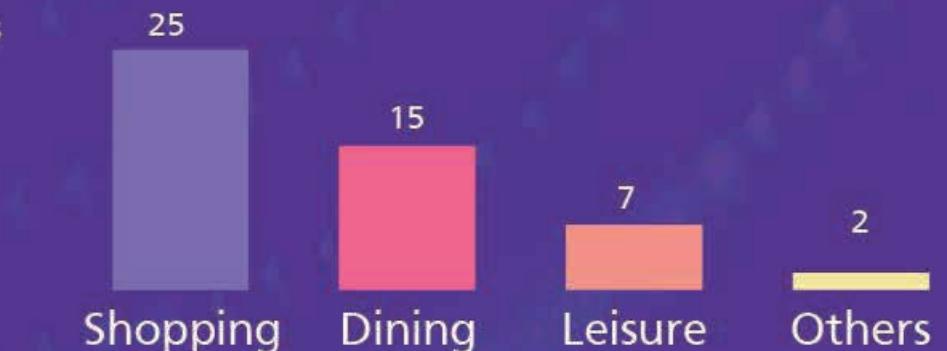
An interactive art installation inspired by water ripples, bringing new vitality to the scene while bringing customers to the mall

Installation Design
Interaction Design

Individual Project
April – June. 2019

Reasons Why People Visit the Mixc

(Number of samples: 50)



Insight

The Commercial Complex is facing a gradual increase in the predicament, guests are being snatched by other commercial carriers. If they want to further their ambition, they must attract sufficient customers.

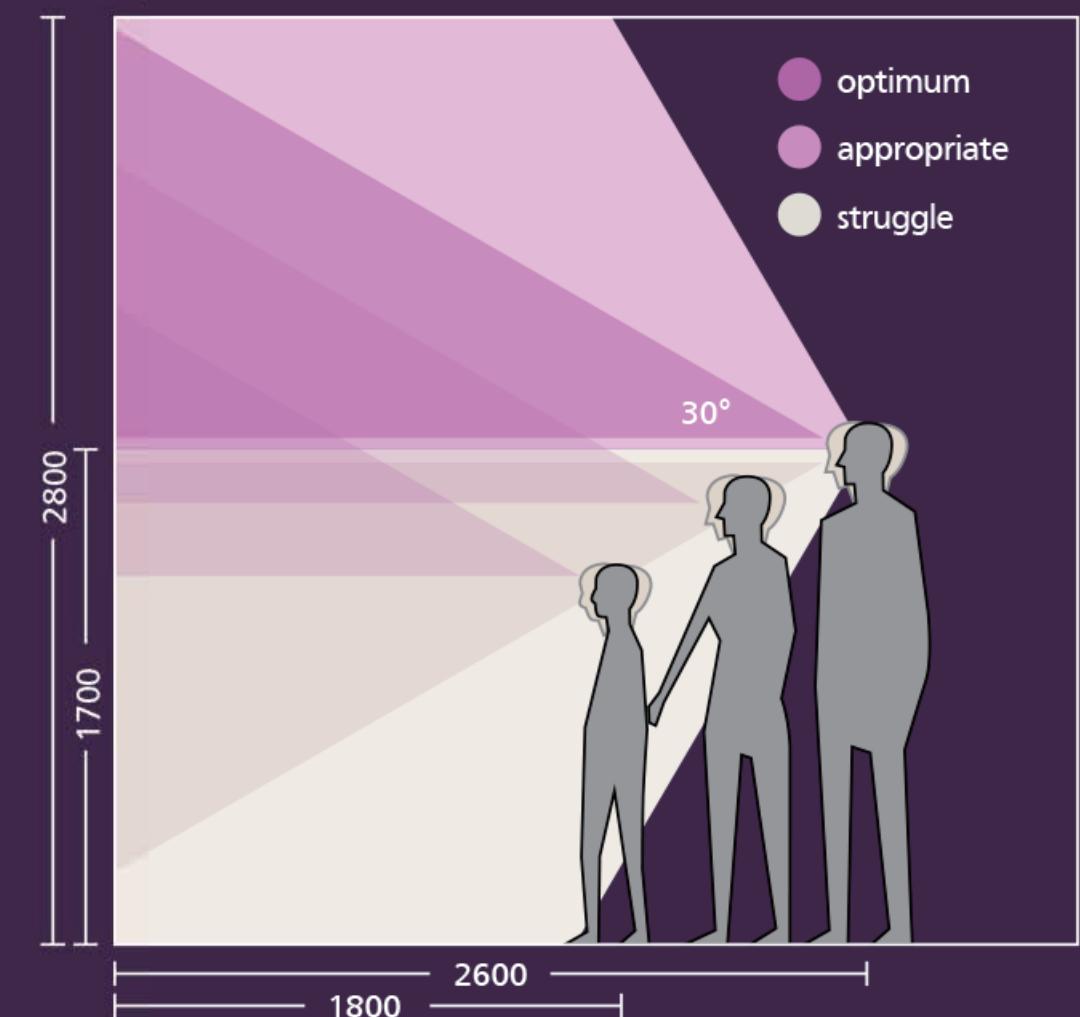
CONCEPT

Five Senses Design

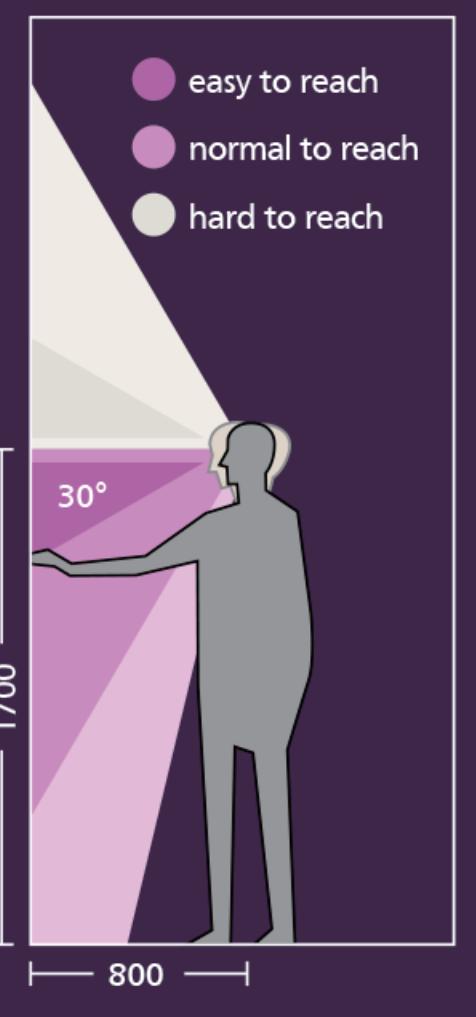


Sight line & Volume control

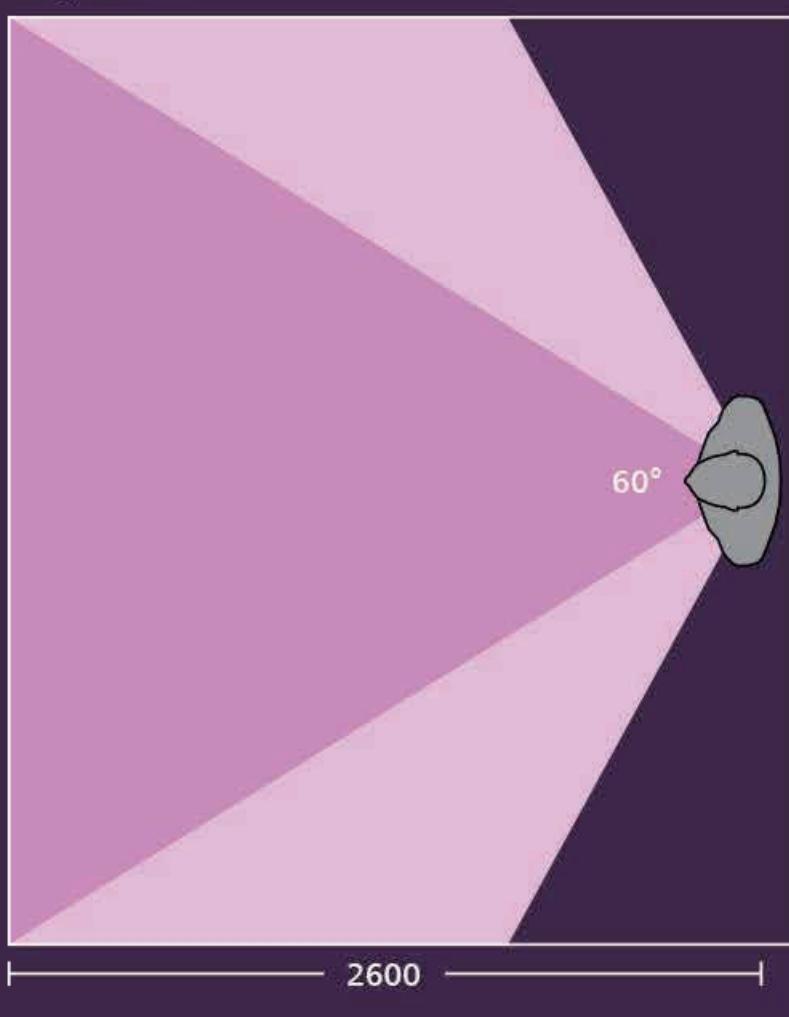
Optimal height & distance



Close interaction

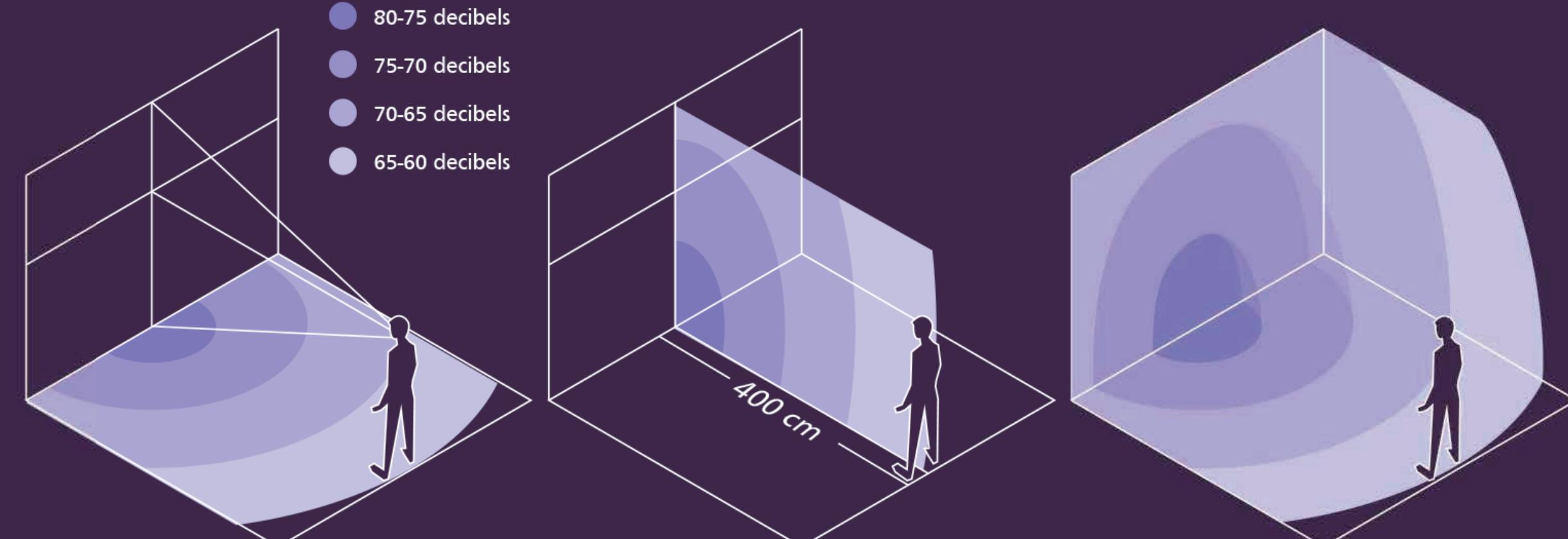


Top view



Optimal sound radiation range

To achieve the effect of attracting pedestrians, at the same time, not induce noise pollution. I tested the volume decibel change of the voice under the change in distance.



Materials

Degradable & Recyclable materials

- Translucent Glass
 - Hollow Cylindrical Foam
 - LED
 - Corrugated Water Ripple Mirror
-

Source of Inspiration

Chongqing terrain



Flood in Chongqing



Rain season



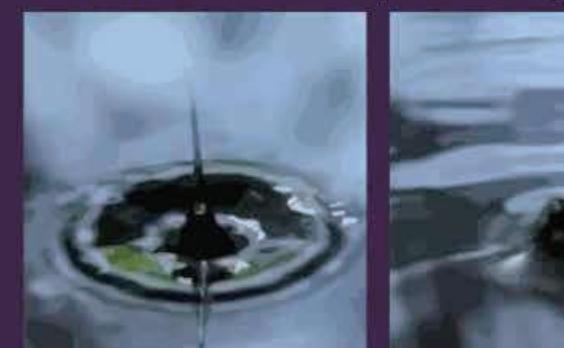
Harvest season



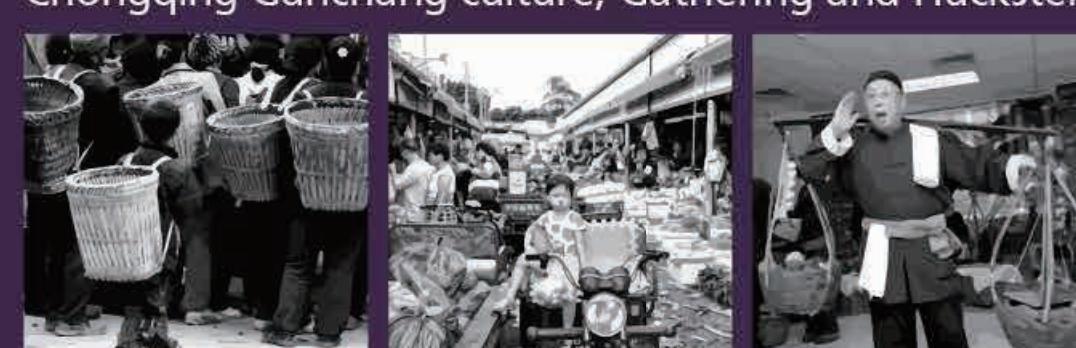
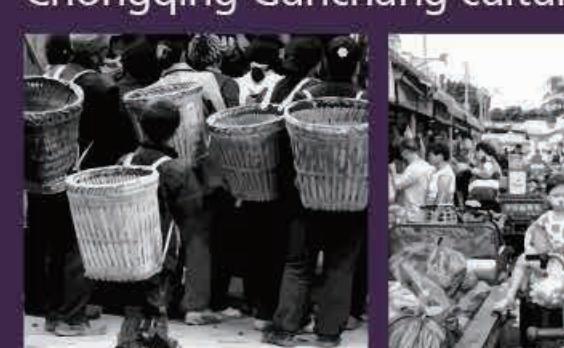
Water occupies an alienable situation in the hearts of the Chongqing people. The confluence of the two rivers in Chongqing contributes to Chongqing as one of the most important transportation and economic hubs in the Yangtze River Basin.

Key words

River, Water drop and Ripples

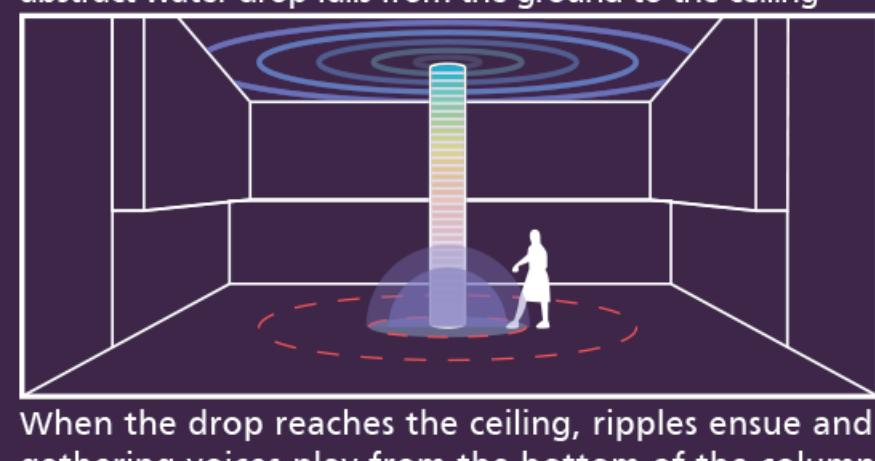
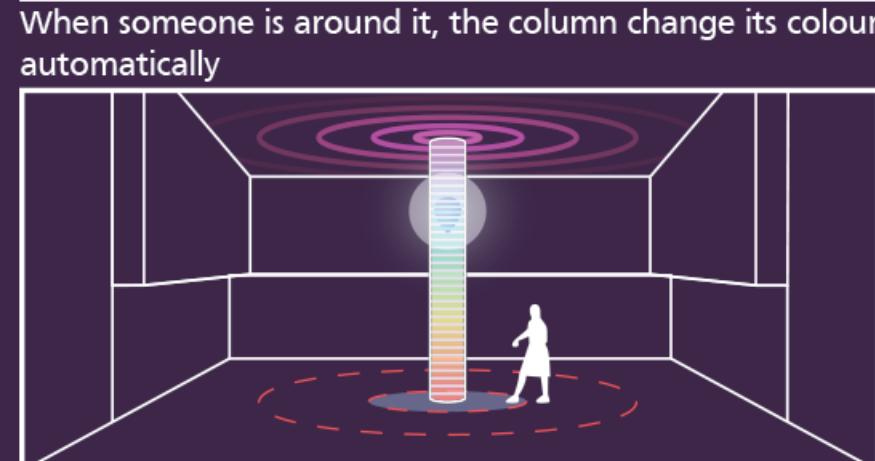
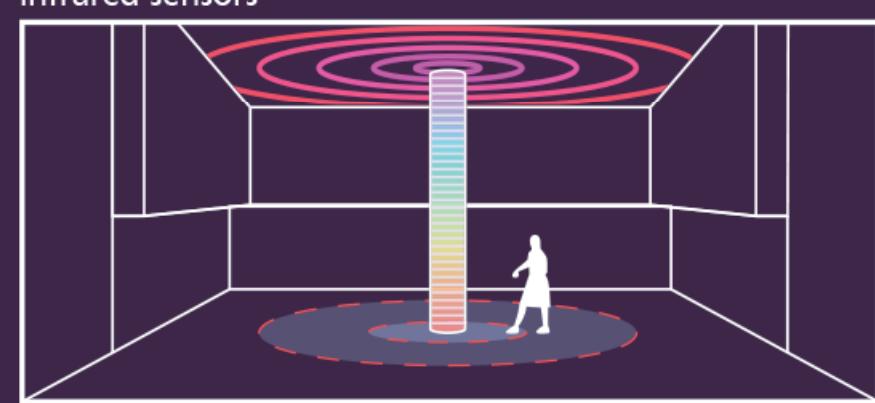
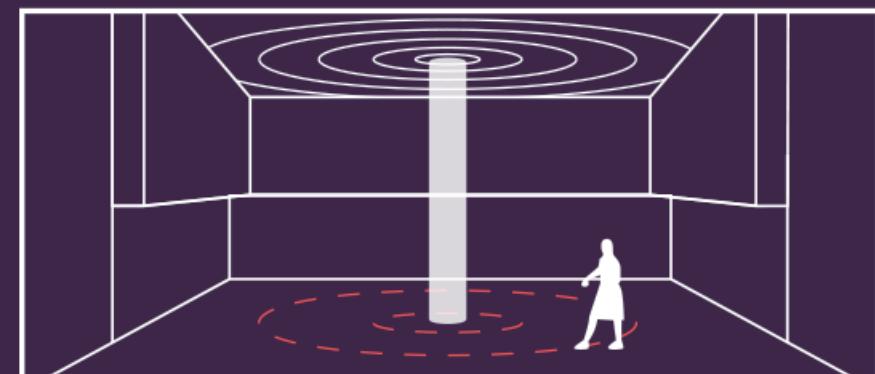
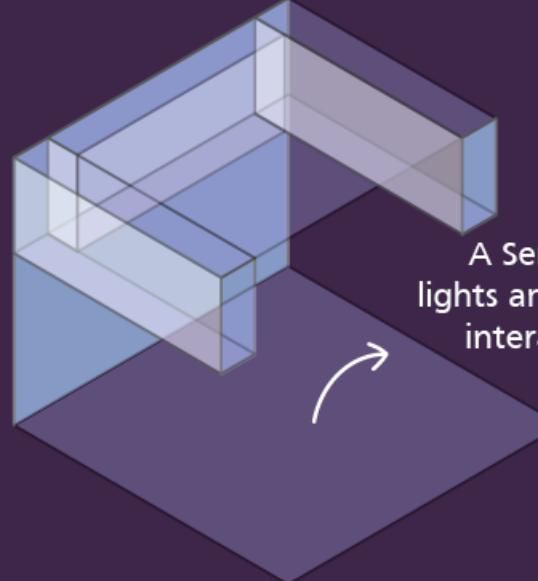


Chongqing Ganchang culture, Gathering and Huckster

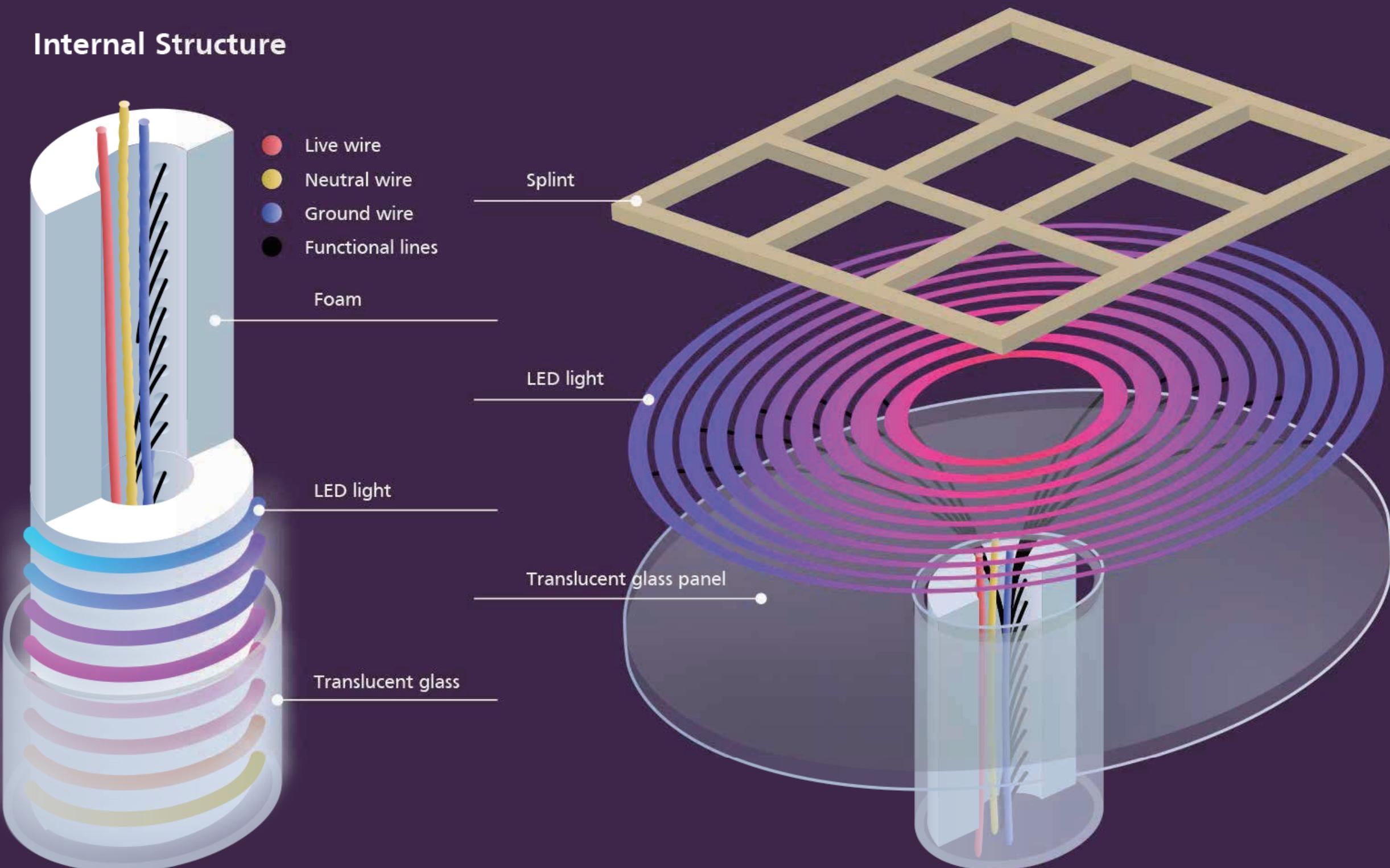


IDEATION

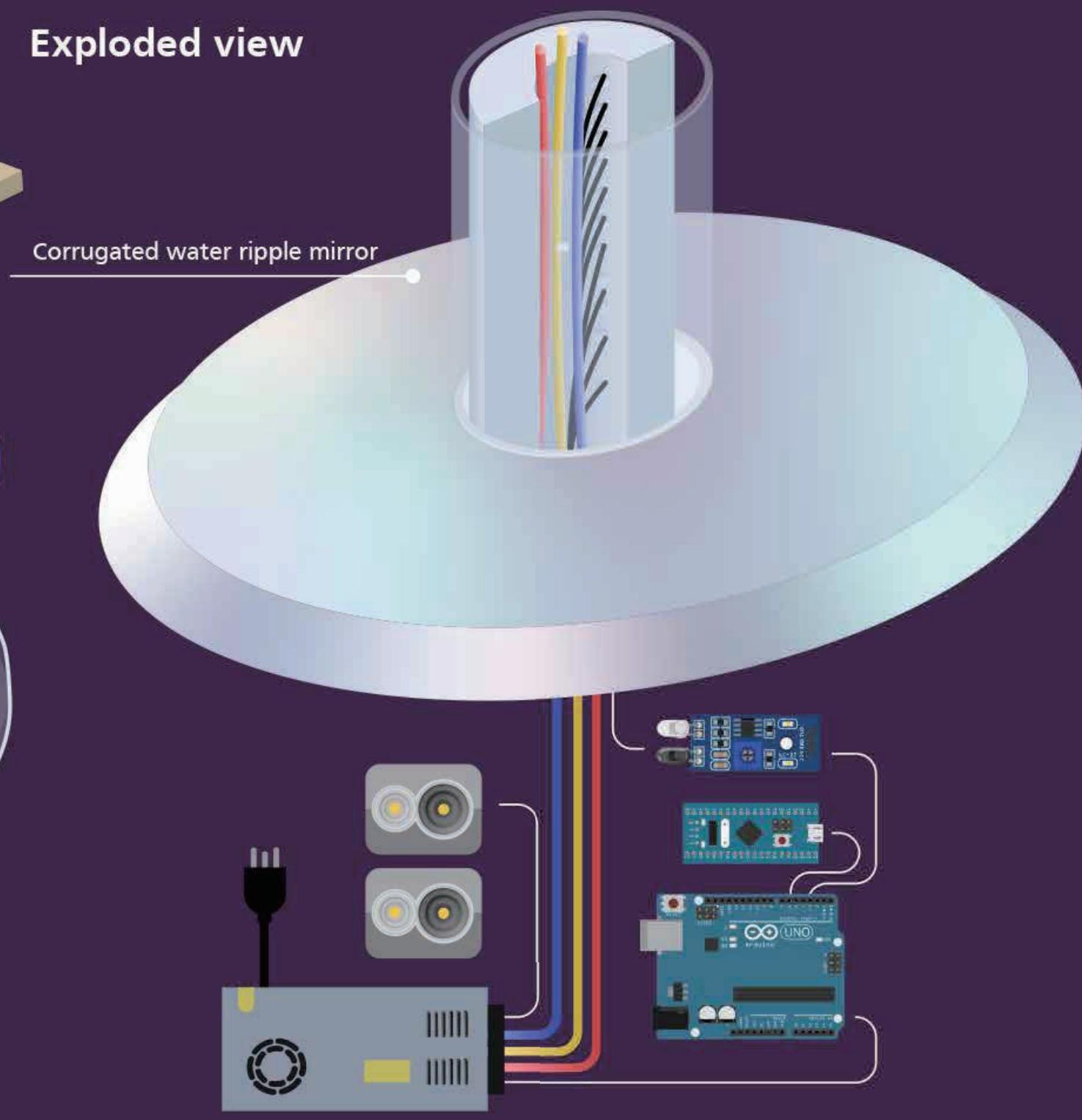
Sketch



Internal Structure



Exploded view



Components



Data collected from Infrared sensors transmitted to here
Control input and output

- Bluetooth Module — HC05
Insert on Arduino UNO R3 and transmit data collected from Infrared Sensor

- Infrared Sensor
To support interaction mode by detecting people's movements

- Bluetooth Speakers
Hiding under the column to make interactive noise

- LED Strip Lights
Total 40 strips of LED lights are attached to the foam. Colour change in all spectrum.

- Power Supply
To convert alternating currents to direct currents

Arduino Coding

To play interactive sound

```
#include <IRremote.h>
char val;
void setup()
{
  Serial.begin(38400); //蓝牙模块默认波特率为38400
  pinMode(13, OUTPUT); //板载LED灯引脚
}
void loop()
{
  val = Serial.read(); //读取串口缓冲区的数据
  if (val == 'n') //当接收到的数据为'n'时
  {
    digitalWrite(13, HIGH); //点亮LED灯
    Serial.println("LED ON!");
  }
  else if (val == 'f') //当接收到的数据为'f'时
  {
    digitalWrite(13, LOW); //熄灭LED灯
    Serial.println("LED OFF!");
  }
  delay(100);
}
```

Detect the movements

```
#include <IRremote.h>
#define IFCY_PIN 11;
IRrecv irrecv(IFCY_PIN); //定义接收引脚为11引脚
decode_results results; //声明一个IRrecv类的解码结果变量
void setup()
{
  Serial.begin(9600);
  // 做启动校准操作，提示用户启动校准
  serial.println("Enabling IRin");
  irrecv.enableIRIn(); //启动接收器
  Serial.println("Enabled IRin");
}
void loop()
{
  if (irrecv.decode(&results)) { //检测是否接收到红外遥控信号
    Serial.println(results.value, HEX); //输出接收到的红外遥控信号
    irrecv.resume(); //继续接收下一个信号
  }
  delay(40);
}
```

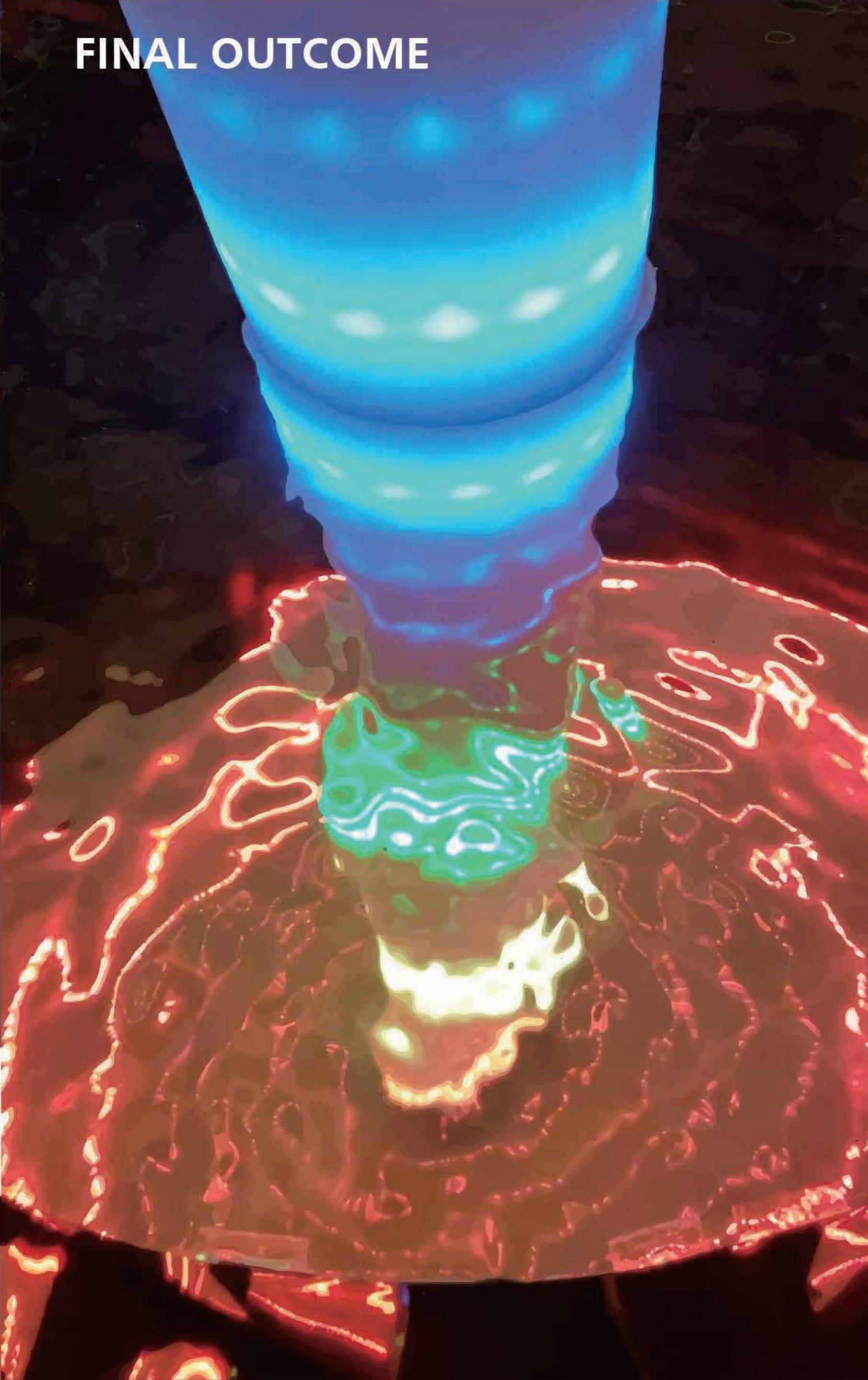
Ripple-like LED lights

```
#include <FastLED.h>
#define IFCY_PIN 7
#define NUM_LHS 30
CRGB leds[NUM_LEDS];
void setup() {
  FastLED.addLeds<WS2812, IFCY_PIN, GRB>(leds, NUM_LEDS);
}
void loop() {
  for (int i = 0; i < 25; i++) {
    leds[i] = CRGB( 255, 0, 0);
    FastLED.show();
    delay(40);
  }
  // green
  for (int i = 0; i < 25; i++) {
    leds[i] = CRGB( 0, 255, 0);
    FastLED.show();
    delay(40);
  }
  // blue
  for (int i = 0; i < 25; i++) {
    leds[i] = CRGB( 0, 0, 255);
    FastLED.show();
    delay(40);
  }
}
```

AE Special Effects



FINAL OUTCOME



Assembling



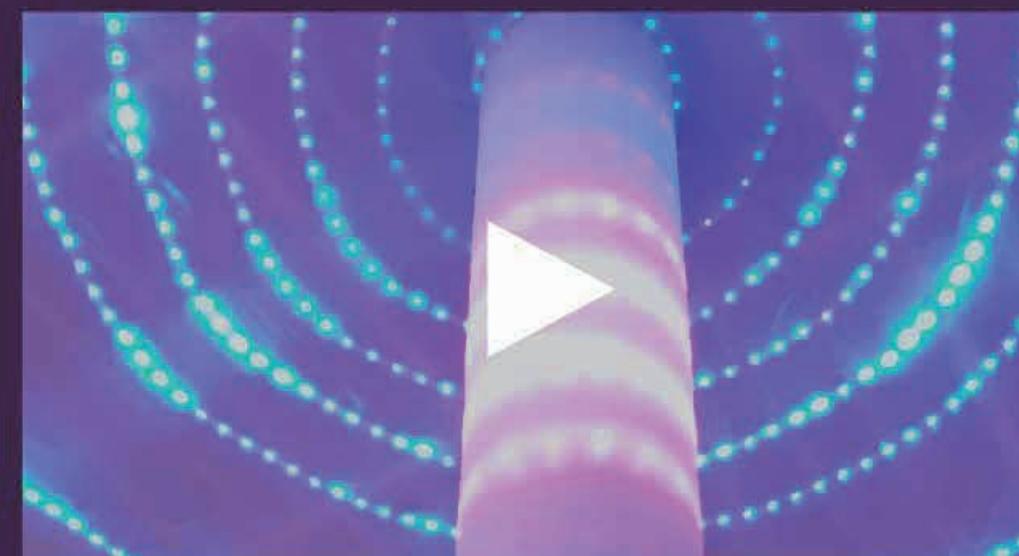
Connect the wood framework, and then wrap the light strips on the wood splints to stabilize the whole structure, otherwise the top structure will not support the weight of the translucent glass.



Exhibition



Video



<https://vimeo.com/740371309>

Feedback



Deng Dan
24 Years old
Senior

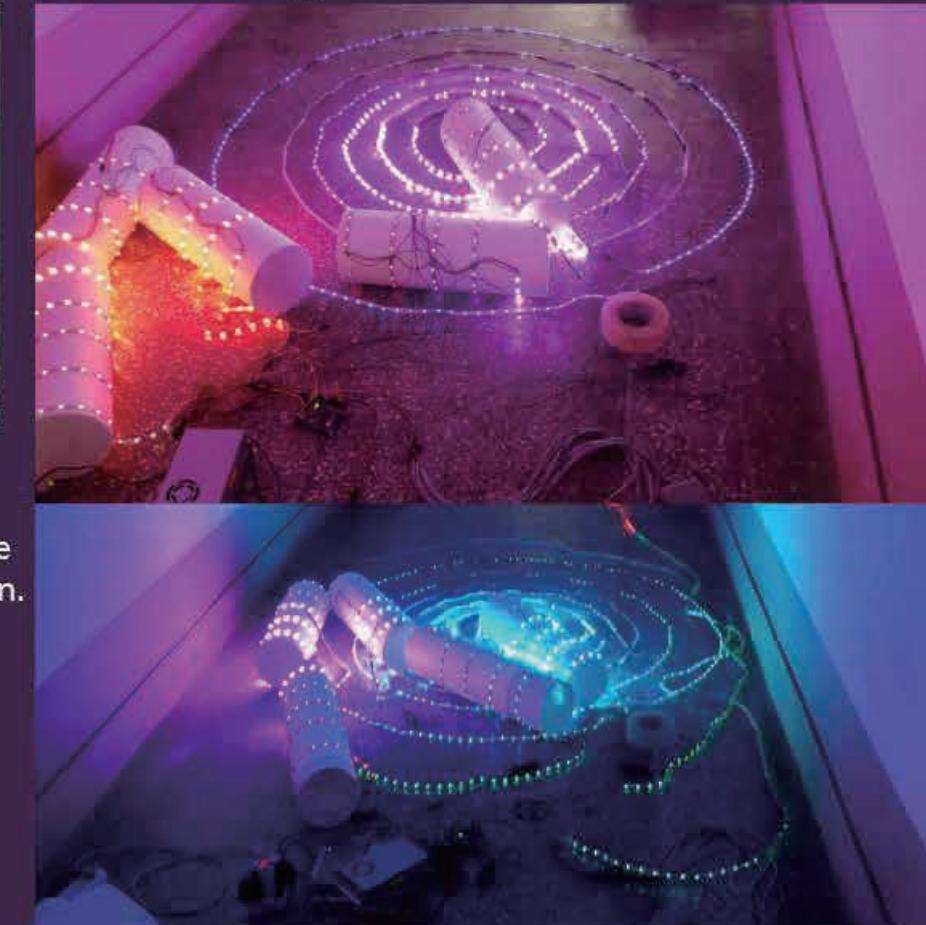
The way you set the interaction makes me feel comfortable. In many other interaction installations, I have to stand in a specific circle and make a specific gesture. But here, the only thing I need to do is wander and watch.



Xia Yin
22 Years old
Sophomore

The audio drags me back to 1999, hahaha. My father used to take me there, Jiaochang Kou, the largest gathering in urban Chongqing. I think this is the most attractive element for me in this installation.

LED testing



On-site installation

The glass is easy to break during transportation. Before arriving at the scene, I divided the whole structure into three parts, the top, the middle and the bottom. The middle part of the column needs to be welded at the venue, and the upper and lower parts need to be accurately measured. If not, the whole structure cannot be aligned at the end.

Conclusion

Application of Smart Sensors

There is a clear and promising future of technology applied in art installations. The Commercial Complex needs cutting-edge technology to enhance the experience for customers.

From this project, I learned a lot of arduino and Lighting materials in this project, which will be of great help to my future creations

Proactive interaction

With deep research on human sentiment and intention, people would like to stay here and encourage more people to come.

BACKGROUND

TOP STUDENT

"Top Student" is a pencil sharpener installation that can detect a users' approach and sharpen pencils automatically. Its rotational speed will increase as you get closer to it, but it won't work if you "push it too hard".

Speculative Design
Interaction Design
Product Design

Individual Project
July — September. 2022

Why I made this installation

I grew up in a society that encouraged competition among Chinese students. My parents, like other parents, tried everything they could to improve my academic performance since I embarked on Primary school. In China, every Chinese parent wants their child to be the top student in the class, but they pay little attention to their mental health. I want to show audiences this phenomenon because I think it is worth being faced head on.



Anxiety



Rebellion



Depression

What are Chinese students facing

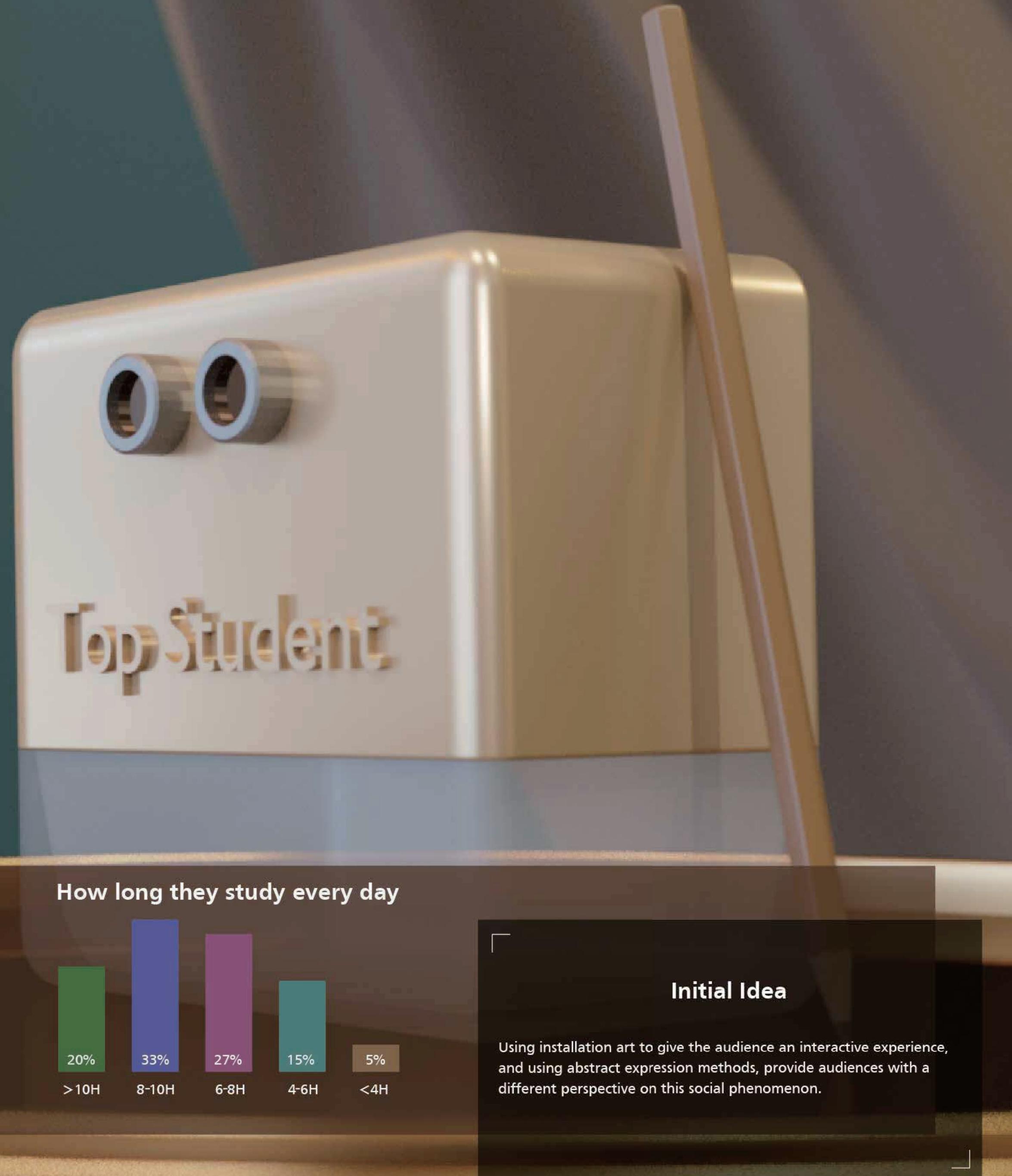
- More and more students are entering the competition
China has the largest number of students in the world
- Rising study pressure among Chinese students
Parents stipulate that they have to get a great score in final exam
- Rising incidence of mental illness
Chinese parents believe good grades can change their destiny

How long they study every day



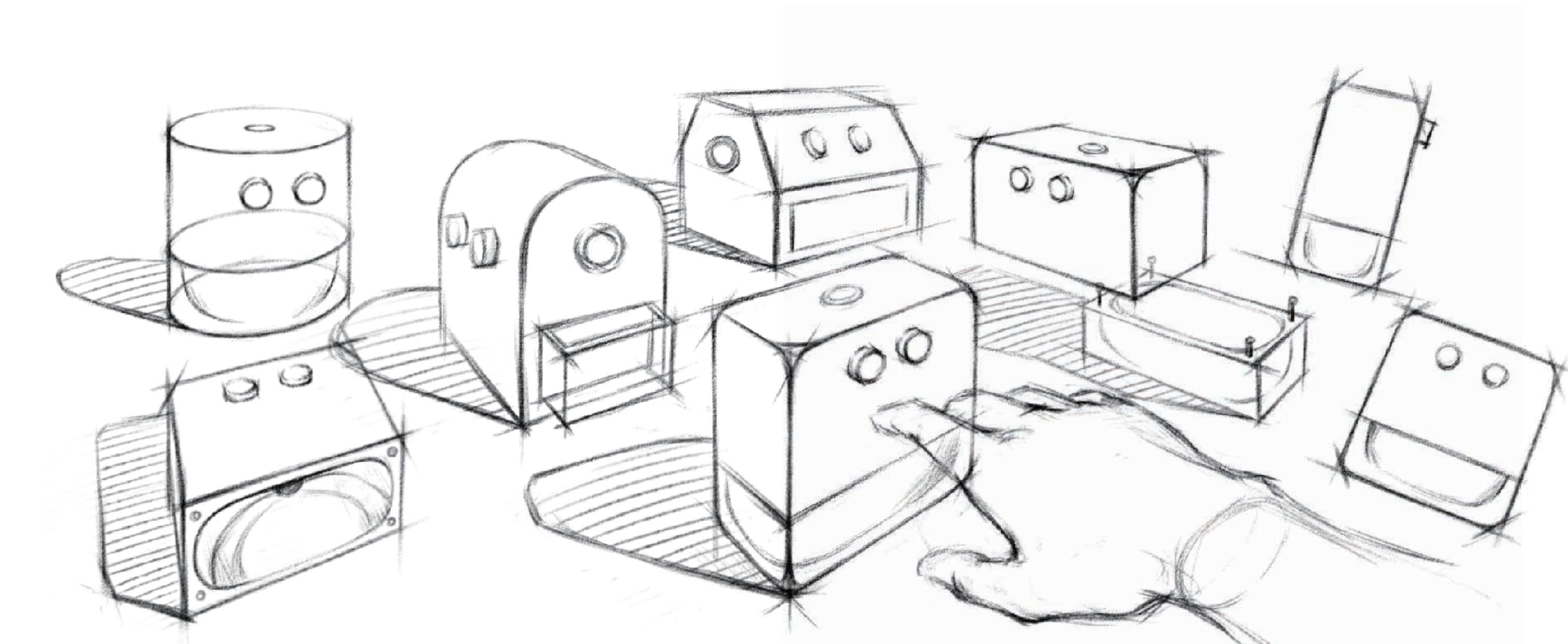
Initial Idea

Using installation art to give the audience an interactive experience, and using abstract expression methods, provide audiences with a different perspective on this social phenomenon.



CONCEPT

Research Wall

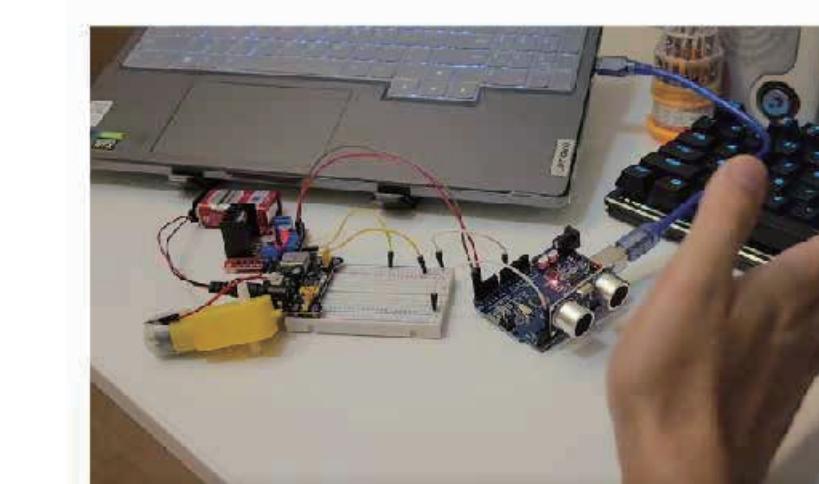


Metaphor

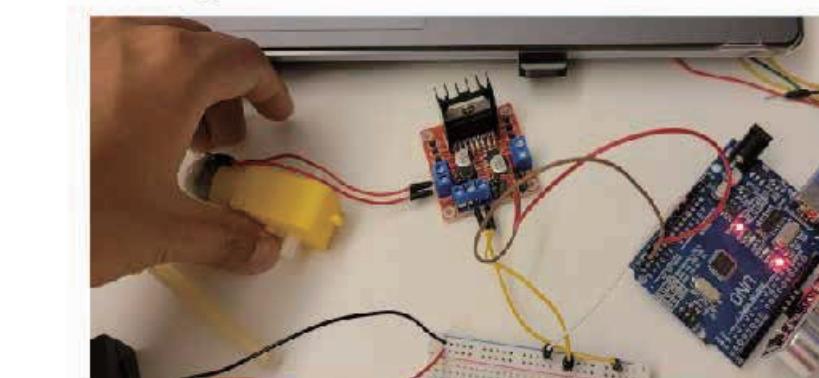
As a necessary stationery for students, pencil sharpeners have their functional properties. I compared it to the law of operation of this society, and the student is the pencil. The students all strive to abide by this social norm, sharpen themselves, and become top students. Without other options, they dive right in and unknowingly cut off too much of their beautiful leisure time.

Parents always want their children study harder, like sharpening the pencil, shaping their children as the person they want them to be — the Top Students.

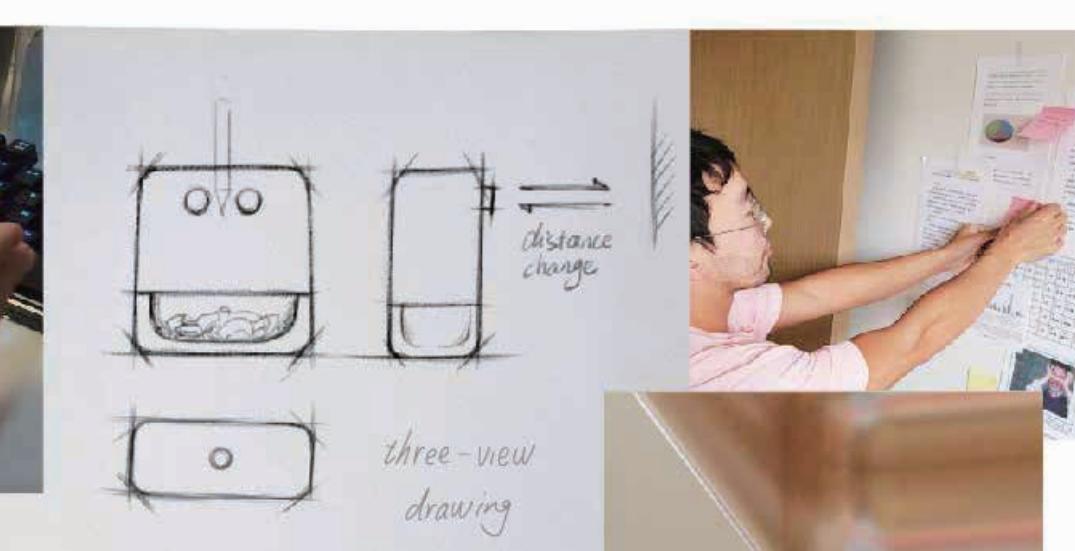
Sometimes children rebel, don't listen to their parents when they feel too tired. They break, they depress, they need some time to heal themselves.



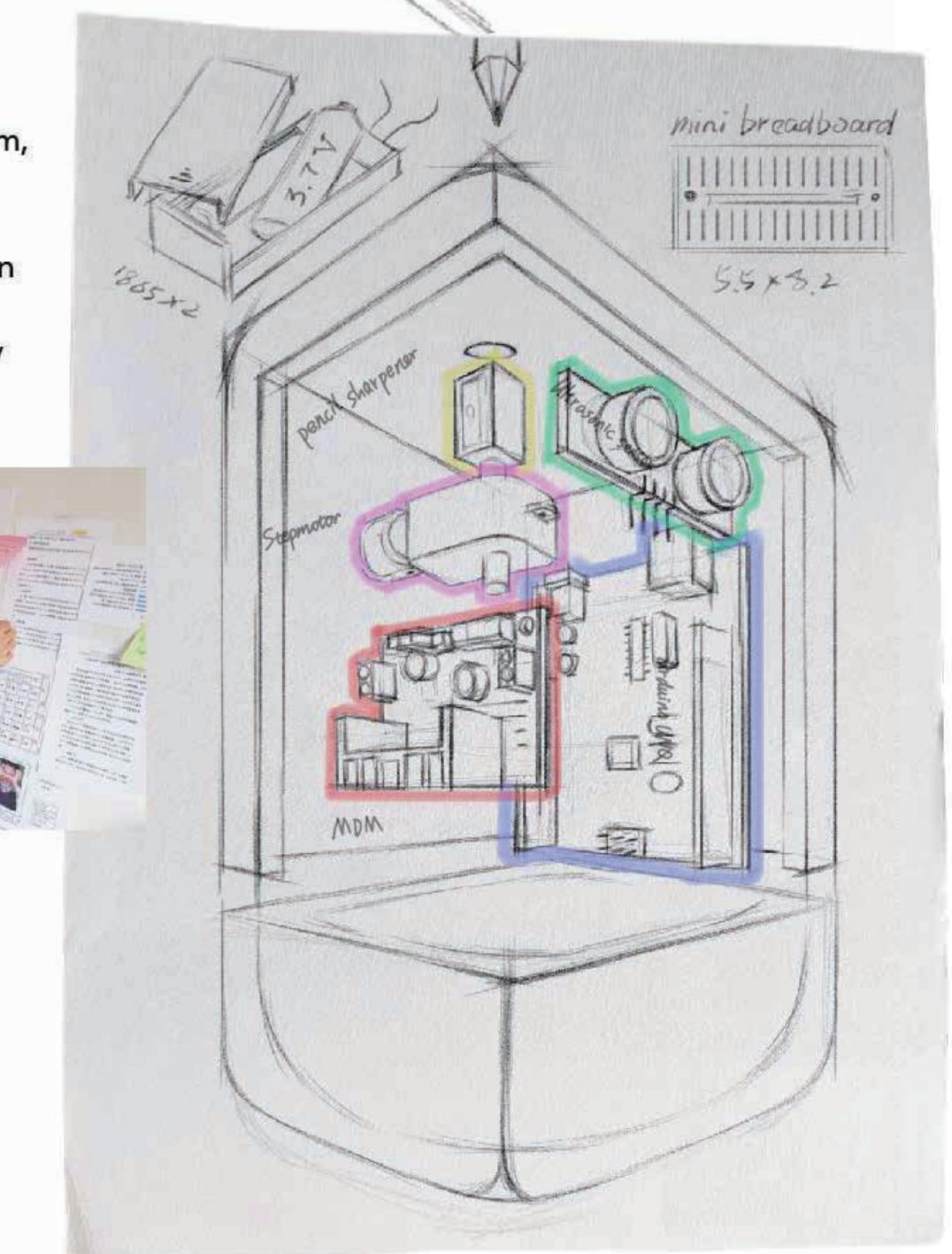
Testing the Ultrasonic Sensors



Testing the Stepmotor



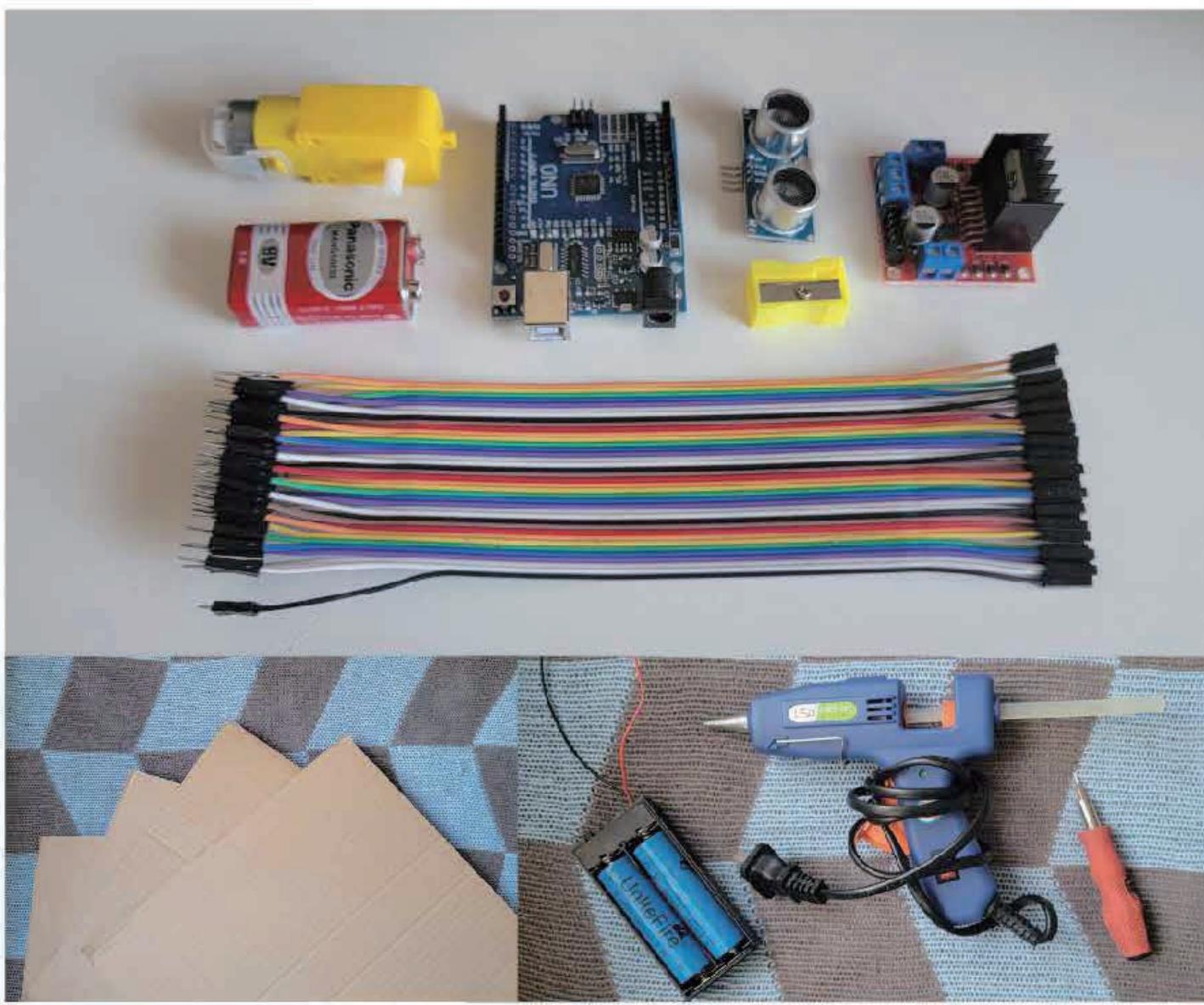
Overall Material



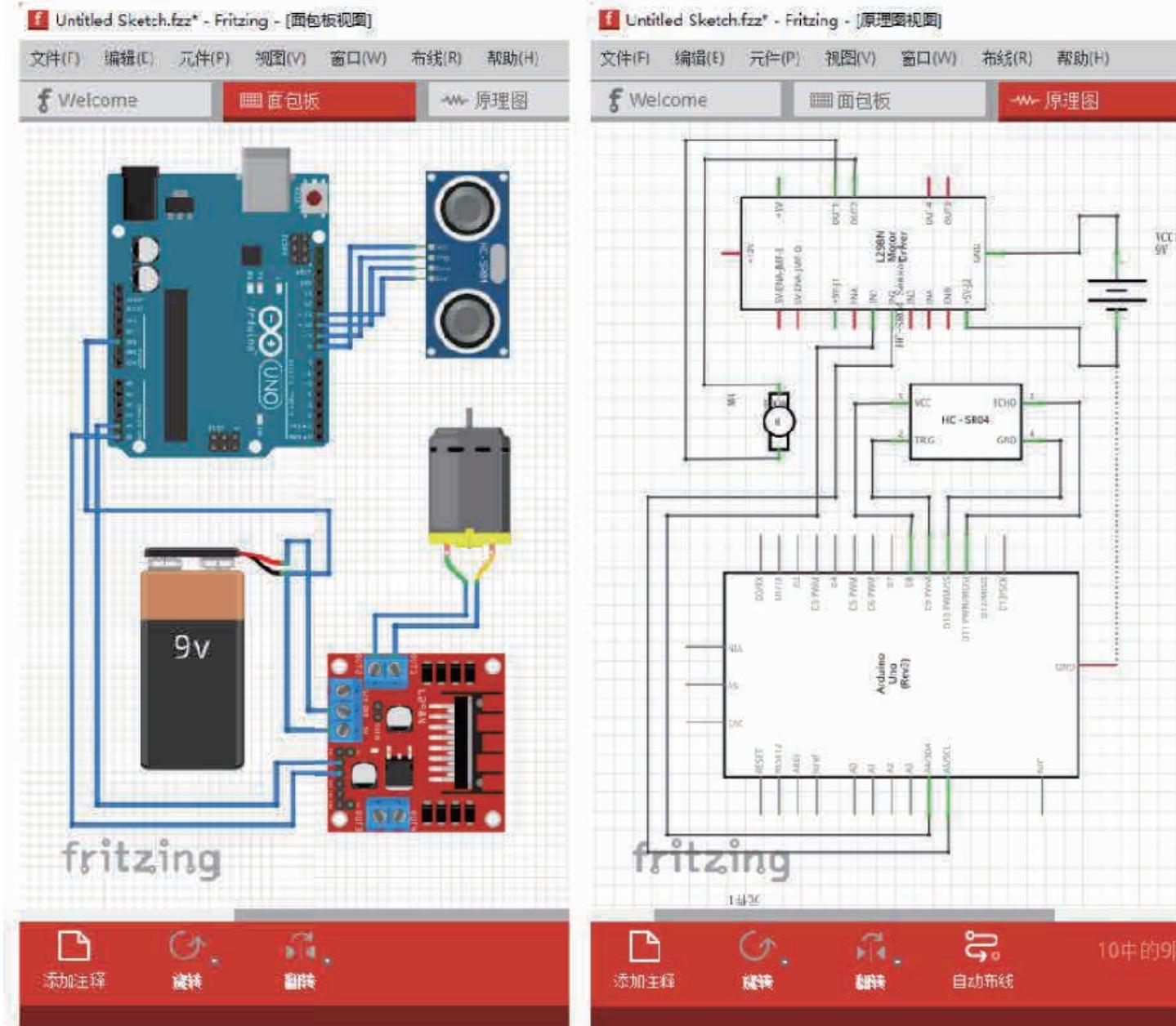
Decomposition Draft of The Installation

OUTCOME

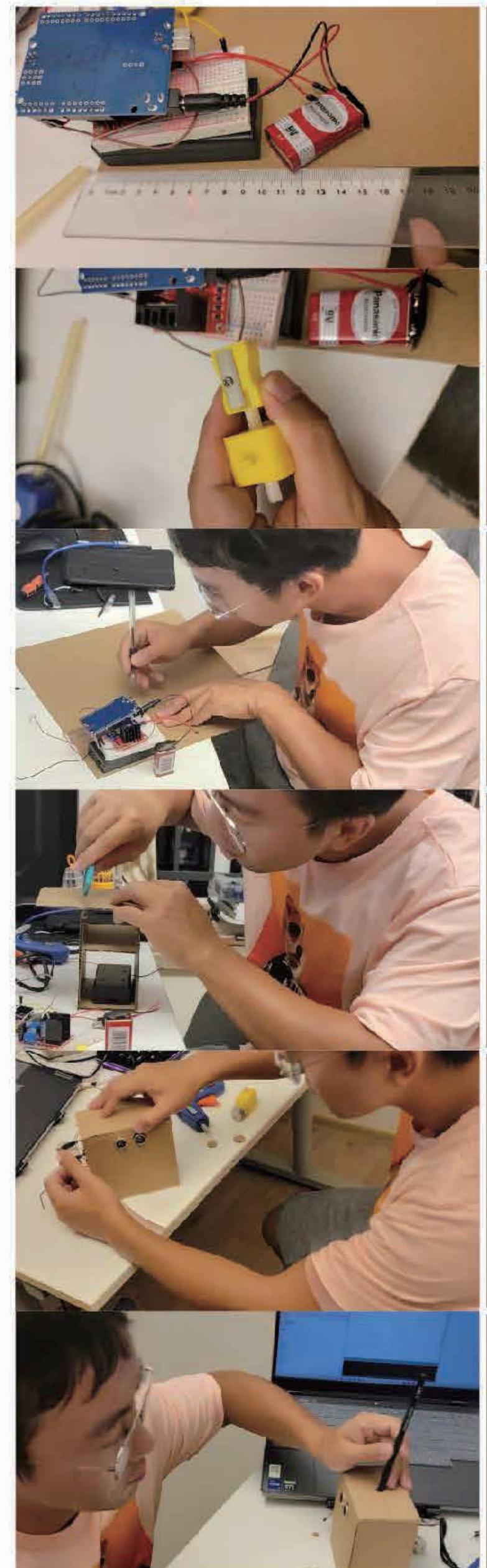
Components



Fritzing Circuit Schematic Diagram



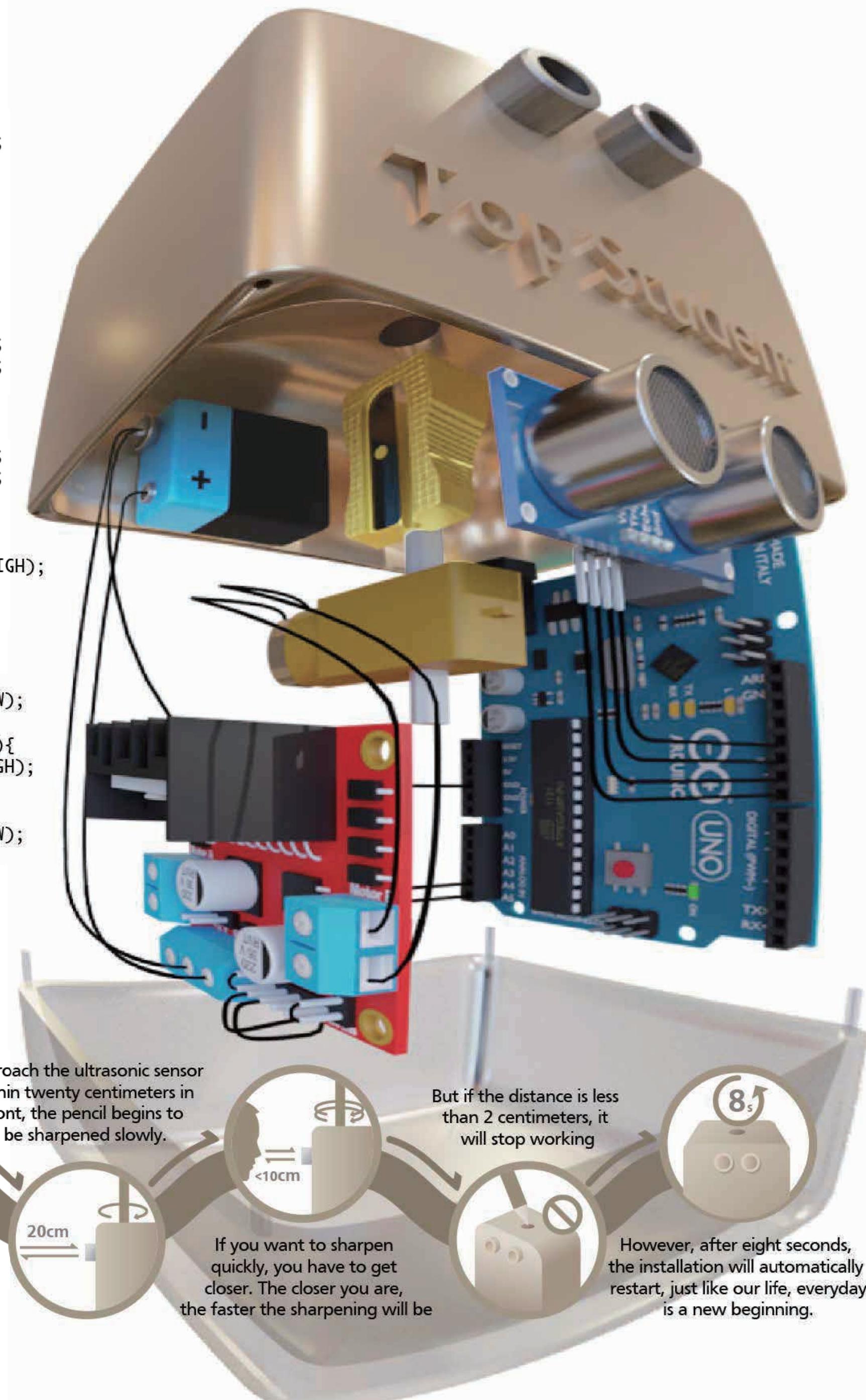
Assembling



Coding

```
void setup() {  
    Serial.begin(9600);  
    pinMode(A4,OUTPUT);  
    pinMode(A5,OUTPUT);  
  
    pinMode(8,OUTPUT);  
    pinMode(9,OUTPUT);  
    pinMode(10,INPUT);  
    pinMode(11,OUTPUT);  
  
    digitalWrite(8,HIGH);  
    digitalWrite(11,LOW);  
}  
  
void loop() {  
    digitalWrite(A5,LOW);  
    digitalWrite(9,HIGH);  
    delay(100);  
    digitalWrite(9,LOW);  
  
    int t = pulseIn(10,HIGH);  
    int d = t*0.034/2;  
    Serial.println(d);  
    delay(500);  
  
    if (d>20){  
        digitalWrite(A4,LOW);  
    }  
    else if (d<=20 & d>2){  
        digitalWrite(A4,HIGH);  
    }  
    else if (d<=2){  
        digitalWrite(A4,LOW);  
        delay(8000);  
    }  
}
```

Use Process



BACKGROUND

This project was designed for the Huxi campus library of Sichuan Fine Arts Institute during my volunteer experience as a librarian. Users in the library can use this app to search for books and scan the QR code on the book to obtain relevant information and borrow it. In addition, the app offers an interactive VR indicating arrow to assist users finding books.

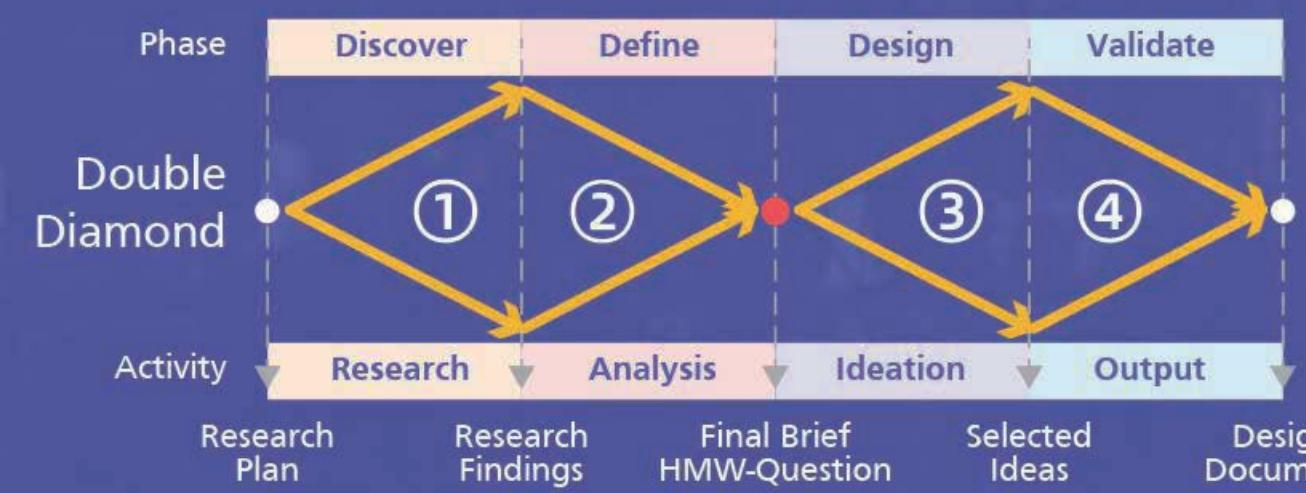
Aims:

- To improve the efficiency of the working process.
- To augment users' AR experience during the visit.
- To enhance the efficiency of book delivery.

SWOT Analysis

Strength	Opportunities
<ul style="list-style-type: none">• The library covers an area of twenty thousand square meters. More than 4 thousand students on campus have the necessity to use the library.	<ul style="list-style-type: none">• Sichuan Fine Arts Institute has realized that students need a better experience of borrowing, reading and studying in the campus library and has increased its focus on redesigning the service app.
<ul style="list-style-type: none">• The library is sponsored by the government, so there is no need to think about beneficial issues.	<ul style="list-style-type: none">• Guangzhi Library 2019 Upgrading Project has proven that intelligent transformation can help libraries enhance their efficiency.
<ul style="list-style-type: none">• The library provides a wide range of resources for us to conduct in-depth research.	<ul style="list-style-type: none">• Sichuan Fine Arts Institute needs a good case of student-oriented system to flaunt their cutting-edge campus environment.
Threats	Weaknesses
<ul style="list-style-type: none">• Some students will not choose to go to the library when they can acquire resources online.	<ul style="list-style-type: none">• The library app is very limited in personalization.
<ul style="list-style-type: none">• The most popular trend among students is downloading PDF versions of books, which only takes a few minutes compared to borrowing books from the library that can take up hours.	<ul style="list-style-type: none">• The library is too big to find resources users need.• Lack of space for users to exchange ideas.

Methodology



- ① Observation
Literature Survey
Interview
Questionnaire
- ② Persona
Concept Selection
Create insights
Comparative Analysis
Usability Test
- ③ Blueprint
Design Development
Design Opportunities
Information Architecture
Adapt Ideations
- ④ Storyboard
Prototyping
Feedback & Iteration
Modification

The Main Functional Areas



Initial Idea

There are millions of books in the campus library, but users struggle to use this library in many aspects. I joined the organization system and interviewed relevant staff and students to design and develop an app for users and to improve the efficiency of the library.

LIBRARY AR APP OF SICHUAN FINE ART INSTITUTE

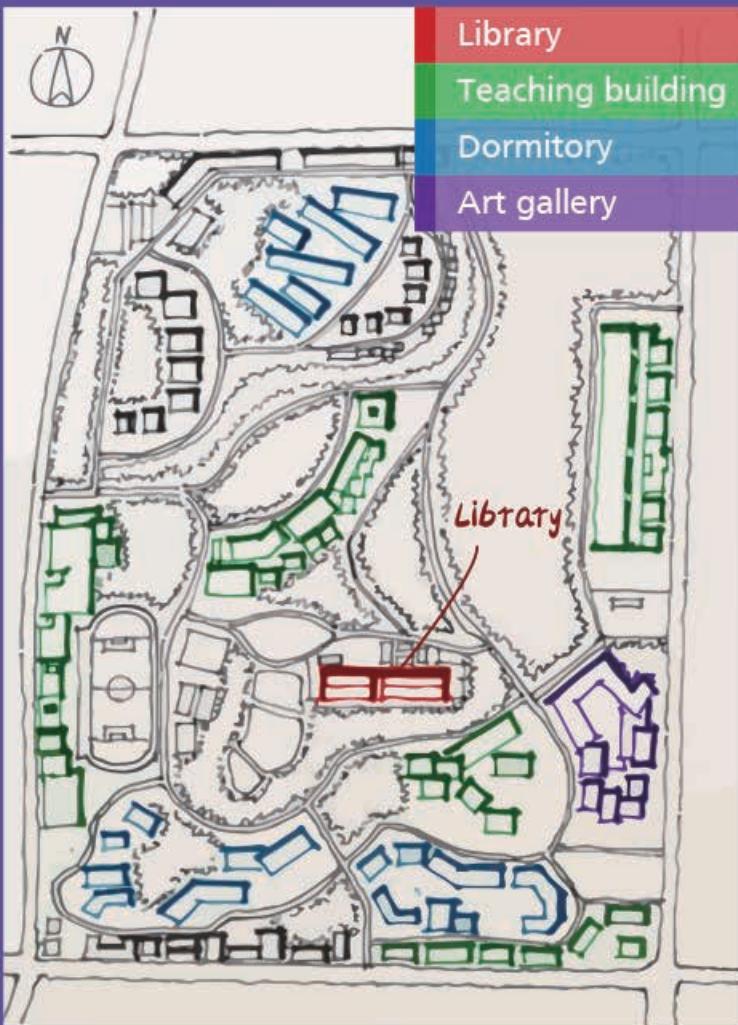
An app delivers a more efficient way to borrow books and provides other relevant services on campus for students and teachers.

Interaction Design
Service Design
UX Design

Individual Project
January – May. 2019

RESEARCH

Geography



Demography of Sichuan Fine Arts Institute

From the Huxi campus report, an average of 800 users visit the library every day. The overall age structure is biased towards campus students and the remaining people involved were teachers and professors, accounting for nearly 10% of the users.

Walking distance from the library on campus

The library is surrounded by several picturesque green landscapes and a lovely pond. People like to walk around it, as it is located in the centre of the campus because it is easy for everyone to come by. For anyone who wants to visit it, it takes less than 9 minutes to walk to the library.

Interviews



Deng Dan Age: 26
Position:
Undergraduate in game design at Sichuan Fine Arts Institute

It may be helpful to scan the QR code to locate the book we need in the library. I struggle to search for the books I want sometimes.



Li Maoan Age: 38
Position:
Staff of the Huxi campus library of Sichuan Fine Arts Institute

I have been working here for over two years. I'm tired of answering recurrent questions over and over again. We want a better service system to serve our users.



Mr. Jones Age: 36
Position:
Teacher of animation design at Sichuan Fine Arts Institute

As a teacher, I use this library a lot, and I think the app may be able to add intelligent voice explanation capabilities to serve people who are not Chinese.

Questionnaire

This questionnaire was distributed to 50 people (male 22, female 28) who were in the library. It mainly focused on the AR assist and people-oriented system built for the library.

Why do you come to the library?

- Self study
- Borrow books
- Do research
- Meet friends
- Kill time

How often do you come to the library?

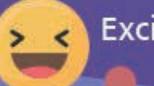
- Everyday
- More than two times a week
- Once or twice a week
- A few times a month
- Depends on mood

When it comes to upgrading the system, in which aspect do you think the library has the opportunity to develop?

(How Might We bring an efficient library to users?)

- Make it more fun and interactive, increasing users' immersive feelings
- More accessible information should be seen on the app before we use the system.
- How about making more signs in different sections of the library? It is too complicated.
- Make it easier for the staff to work in the library, because they are constantly inundated with questions from visitors.
- Add a sense of modern intelligence. Users like to be served by technology.
- More rooms should be made for people who need to have a conversation with others.

User Journey Map

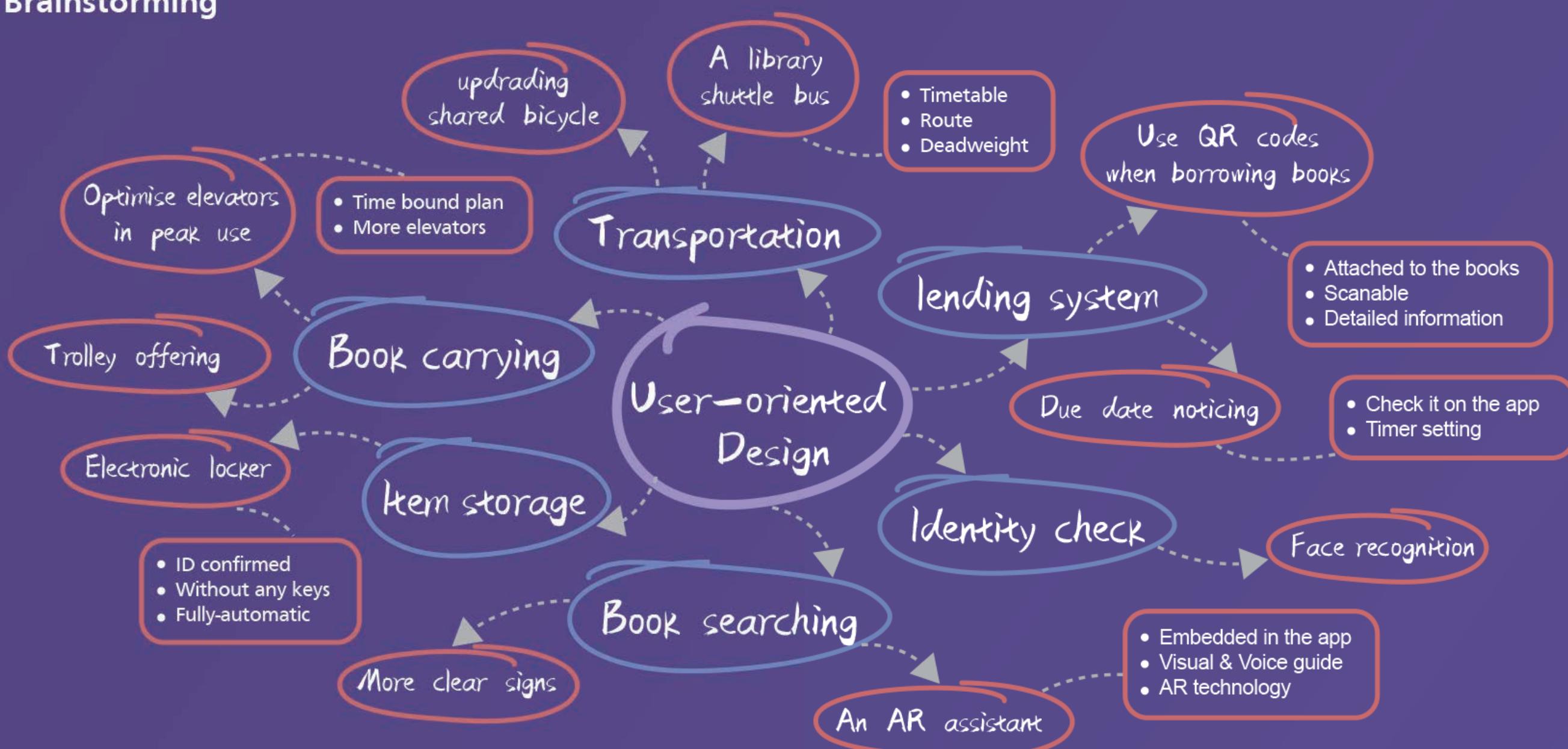
	In the dorm	Dorm - Campus	Campus - Library	Library - Bookshelves	Bookshelves - Service desk	Service desk - Leave
Doing	 Make a list of books that need to be borrowed  Leave the dorm	 Take a walk or bicycle  Pass through the campus	 Through the security check  Return borrowed books	 Show ID card to the librarian  Use the locker	 Check the list  Go upstairs  Go downstairs	 Get to the service desk  Registering the books on the ID
Thinking	<ul style="list-style-type: none"> I need to borrow some reference books for my assignment I need to write down all the books I need, in case I forget. 	<ul style="list-style-type: none"> I should better go to the library earlier before it gets crowded. Taking a bicycle would be quicker, but I like to wander on the campus. 	<ul style="list-style-type: none"> I got to the library, but I can't go in directly. I have to show them my student ID first to prove that I'm a student here. I forgot to renew the books I borrowed before and it's past the return date. I had to pay a fine for each day it's over due. 	<ul style="list-style-type: none"> I finally got in. Let me see where I should go. There is no guide map except for a pamphlet. It's cute. This library is so big. It's so hard to find the books I want. It has six storeys, it's going to take forever! 	<ul style="list-style-type: none"> I finally found them, but I can barely see my feet, it's impossible to go downstairs like this. Ok, I arrived at the service desk, but she needs to see my ID again? I don't have a third hand. 	<ul style="list-style-type: none"> Eventually, I got the books I wanted. I really need to remember the return date this time. Oh, my bag feels very heavy now.
Feeling	 Excited  Anxious	 Happy  Joyful	 Confused  Surprised	 Happy  Tired	 Upset  Happy	 Tired  Worried
Pain point	<ul style="list-style-type: none"> I want to know if the book I want is available in the library before I go. I can't remember to take the book I borrowed with me sometimes. 	<ul style="list-style-type: none"> Sometimes I can't find a shared bicycles when I don't want to walk. It's pretty hot when walking on campus during summertime. 	<ul style="list-style-type: none"> Only one old female staff stands there to check IDs, but she's slow. It is not convenient to go through the security door with my bag, and many people lose their locker key in the library. 	<ul style="list-style-type: none"> There are only two elevators, and there are always queues during rush hour. Some books were classified incorrectly. It's available to be borrowed but I can't find it. 	<ul style="list-style-type: none"> I don't like to be asked to show my ID card repeatedly, it's unnecessary and inefficient. It always takes a long time to register the books in one's name. 	<ul style="list-style-type: none"> It's inconvenient to get my bag from the locker when I carry many books in my arms. Carrying this heavy bag is not easy for me. I wish I can use a car to get back.
Opportunity	<ul style="list-style-type: none"> It is necessary to check the books that the library have before the users go. There should be a timer for users who always forget the due date. 	<ul style="list-style-type: none"> Need a convenient method of transportation on the campus A library app could be used to check the condition of the library. 	<ul style="list-style-type: none"> The locker should be upgraded to open without a key since people keep losing it. Renewing books should be managed more simple for users. 	<ul style="list-style-type: none"> The location of books need to be discovered more easier. Set up an AR assistant to help users find the books they want. 	<ul style="list-style-type: none"> The registering process needs to be simplified by reducing some unnecessary identification checks. Optimise the use of the elevators so that users can move the books conveniently and safely. 	<ul style="list-style-type: none"> When it comes to borrowing many books at a time, users can't remember the return date for each book. To be able to take as many books as possible effortlessly.

Summary

- An interactive system is needed to enhance the users' experience and attract users' interest.
- Staff wish to have a VR assistant to help them answer the basic questions from users.
- Users long for an app that represents their personal needs. An app provide advice and instruction for novice.

CONCEPT

Brainstorming



Service Blueprint

Customer Journey		Set off	Transportation	Access	Search	Loan Registration	Success	Leave
User Actions		Download and open the library app to check the available books in the library and make a list. Check the location of the shuttle bus to avoid waiting	Go to the library using the shuttle bus, enjoy the beautiful view of the campus and get off the bus at the library stop	Gain access to the library, through the face recognition device. Use the library app to open a locker. Scan the QR code to return the books.	Enter the name of the book in the search bar on the app. Wait for a second, the AR assistant will show you a three dimensional arrow which points to the location of the book. Follow the guide to the location and it also shows you the relevant books on your trip.	When you reach the book you want, you can register the book by yourself. Just put the QR code of the book in front of your phone and scan it. It would be recorded under your name automatically.	Take the books you borrowed and reopen the locker to take your bag, put your books in the bag and go through the security door	A due date timer is set by itself. Check the location of the shuttle bus. Put your bag and books on the bus then take it till you get your place.
Evidence		App store The library app Real-time updated system	Campus shuttle bus Positioning system Route planning	Face recognition system Electronic locker Fast return process	Library positioning system AR technology Likes and recommends	QR code Phone Scanner Upgraded register system	Electronic locker Fast security control Face recognition system	Delivery service Positioning system Return date remainder
Line of Interaction		Description of the books and the library information	The real-time location of the shuttle bus is showed on the app	Provide users fast access experience through technology	The AR assistant helps users work more efficiently. Provide intelligent recommendations	A convenient self-service book lending system Fast book lending experience	Provide intelligent, efficient process	Provide convenient service, Provide reminder
Front of Stage Interactions		Upload the library information and service details	Map display Vehicle tracking Bus arragement	Face registration Recognition system Statistics on the user	Book arrangement Equipment development AI algorithms	Self-service lending system Information arrangement Equipment maintenance	User management Develop the identity testing	Feedback system User information arrangement
Line of Visibility		App designer Marketing specialist Frontend developers Backend developers	Shuttle bus Vehicle supplier Bus driver Other relevant staffs	Technology developer Develop tool Equipment supplier System manager	Voice supplier 3D designer Information management staff QR code sticker	App designer Technology developer Information entry staff	Locker supplier Security equipment supplier	Applet developer Shuttle bus Locator
Back of Stage Interactions								
Line of Internal Interaction								
Supporter								

Concept Selection

Concept 1

- Arrange the shuttle bus to run on the campus loop every day. Students and teachers can use it for free at any time to help them carry books.
- The app can locate the location of the shuttle bus and the time it takes to arrive at the nearest address in real-time, so users don't have to wait.

Concept 2

- Students and teachers complete registration online. After verifying the identity through the app, there is no need to verify the identity again when entering the library.

Concept 3

- The augmented reality assistant will lead you directly to the location of the books after you enter the books you want to find, saving you time for searching.

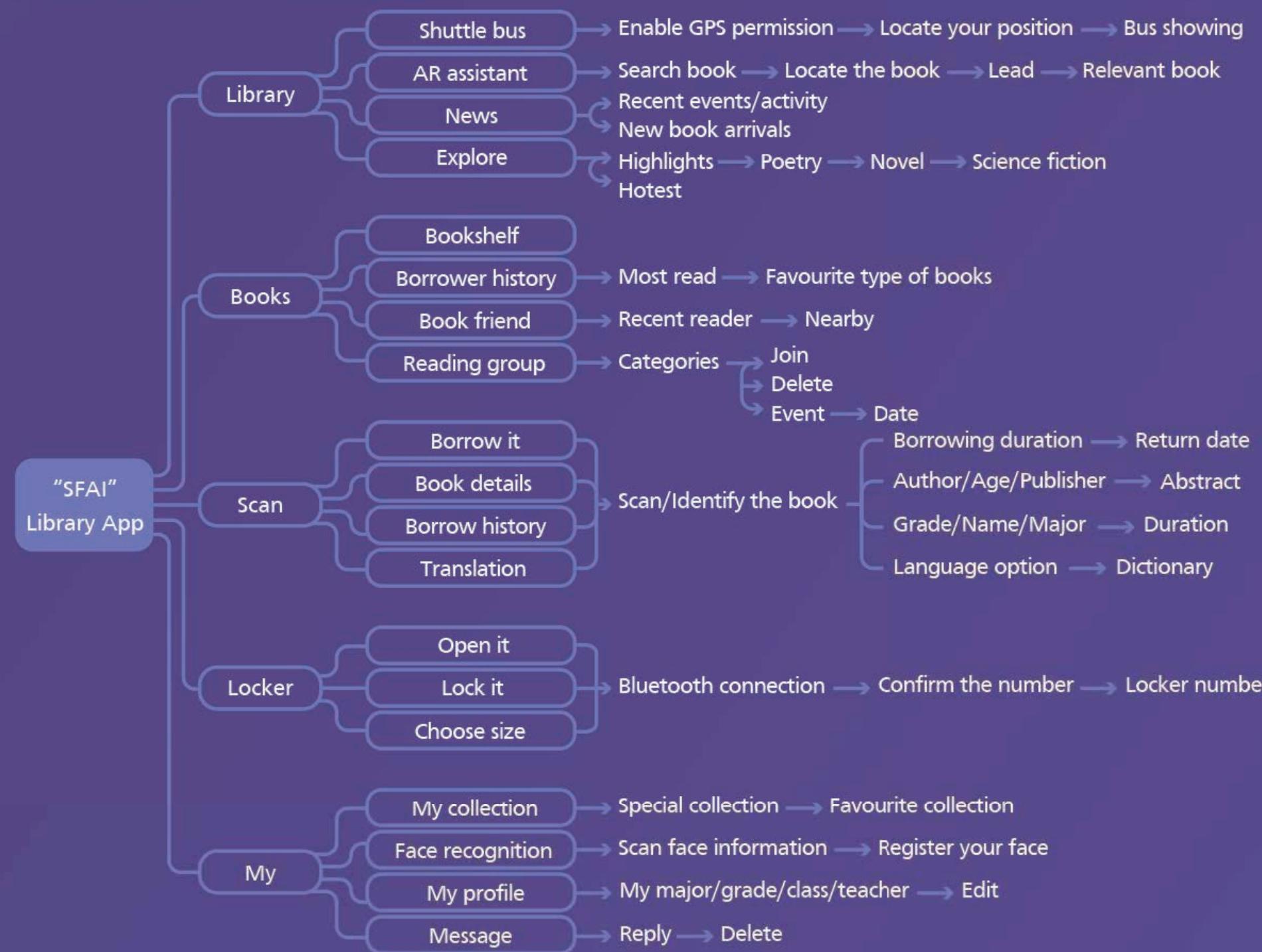
Concept 4

- A QR code is attached to the back of each book. After scanning the QR code, the user can get detailed information about the book and the historical borrowing records. In this way, you can meet friends who share the same interest in the books and allow students to discuss together.

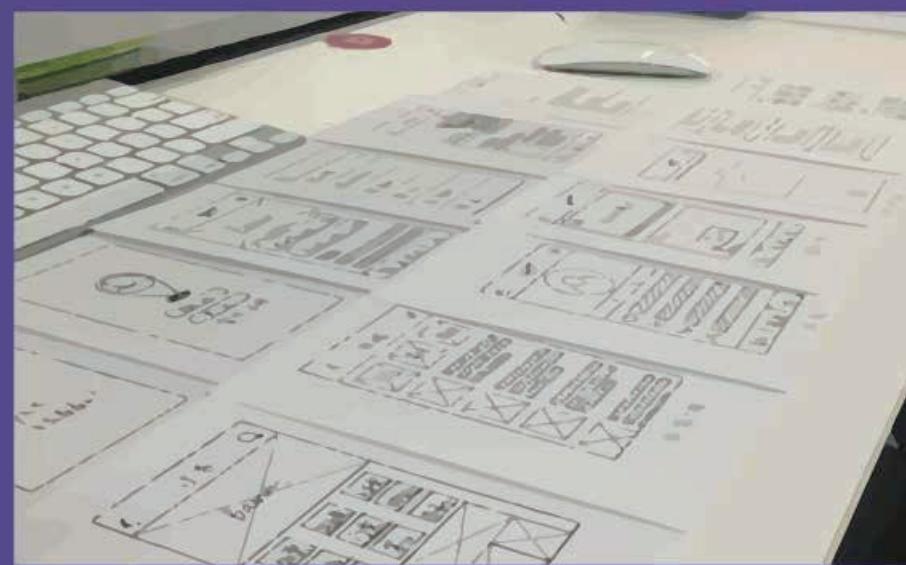


FINAL DESIGN

Information architecture



Low-fidelity Prototype



1. Interface

Some aspects of the app's interface design could be improved, such as layout, proportion and navigation. We should not design the operation process to be complicated.

2. Legibility

For legibility, it's very important that information be easy to tell apart. Clear icon images are convenient for users to understand fast where to go.

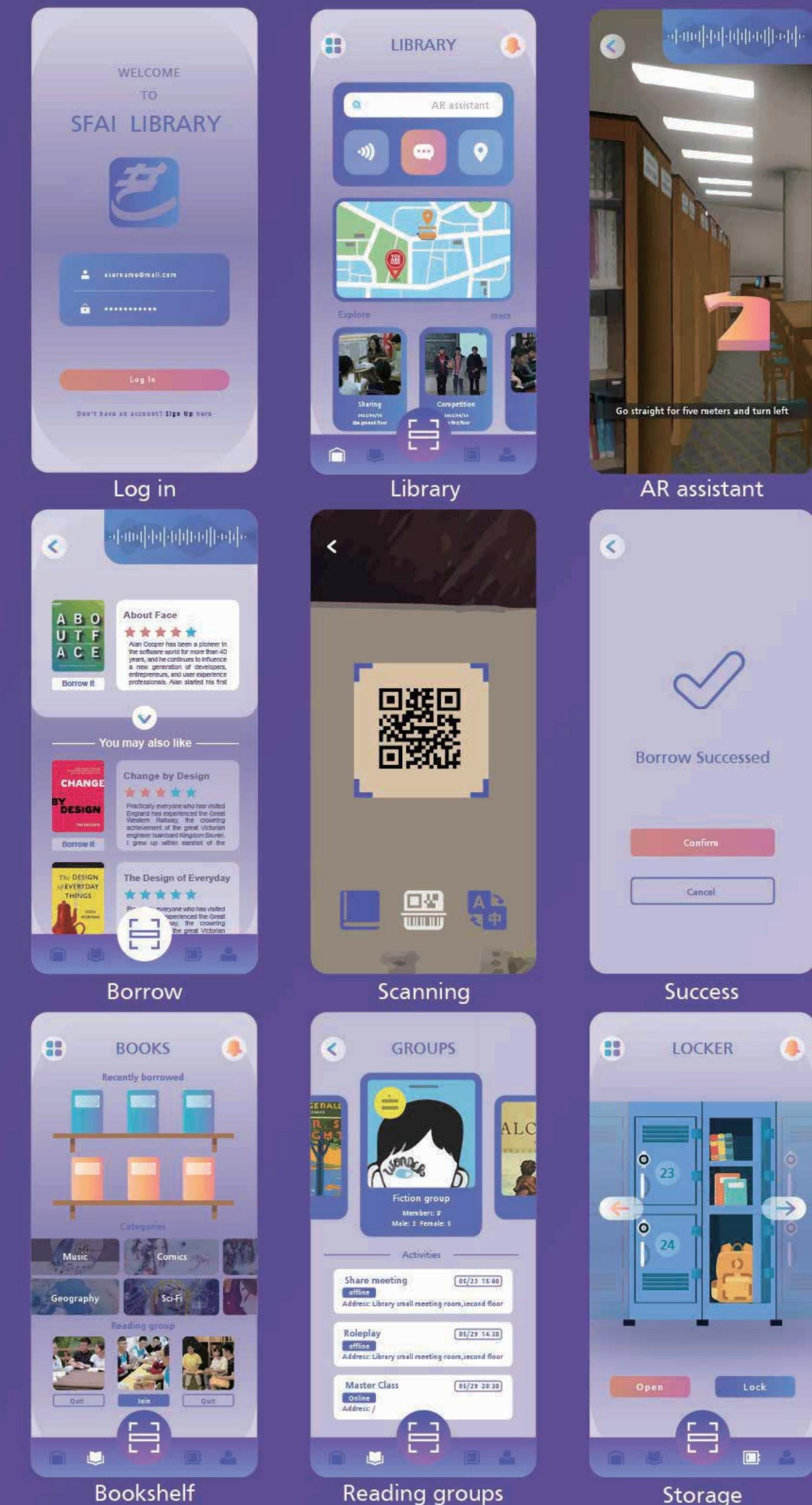
3. Connectivity

Each function in the software is applied around the library, making it easy for users to reach and connect.

User testing



High-fidelity Prototype



User Benefit



Can't figure out the sections and always struggle to find the books



There are always queues during rush hour, and books are heavy.



A lot of people keep losing their locker keys in the library



Books are too heavy to carry on the way back

Now



VS

The AR assistant would locate the books and no more time wasted



VS

With just a simple scan, the book is borrowed under your name.



VS

Using electronic lockers, takes away the inconvenience of keeping keys safe



VS

With a shuttle bus, books can be delivered anywhere on campus

Advantage

- Through the QR code, the whole process of borrowing and returning books becomes very smooth and fast.
- With face recognition, users do not have to repeatedly verify their identity information throughout the process.
- AR assistant makes even the longest book-finding process smart and efficient.

BACKGROUND



The aging of the population involves an increasing number of elderly and a shortage of newborns. Therefore, most elderly are doomed to look after themselves. Especially those who cannot afford a care worker.

There are many problems that we urgently need to solve:

- How can we satisfy the empty-nesters' emotional needs?
- How can we enable the single elderly to have sufficient resources to take care of themselves?
- How can we improve their life quality?

The elderly that have children

48.7%



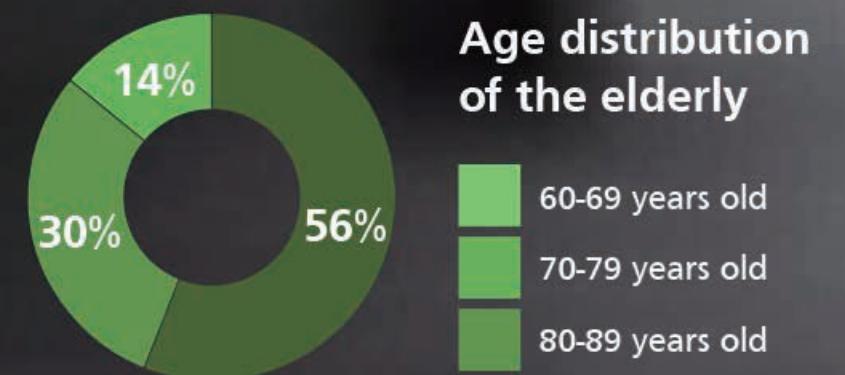
Empty-nesters

51.3%

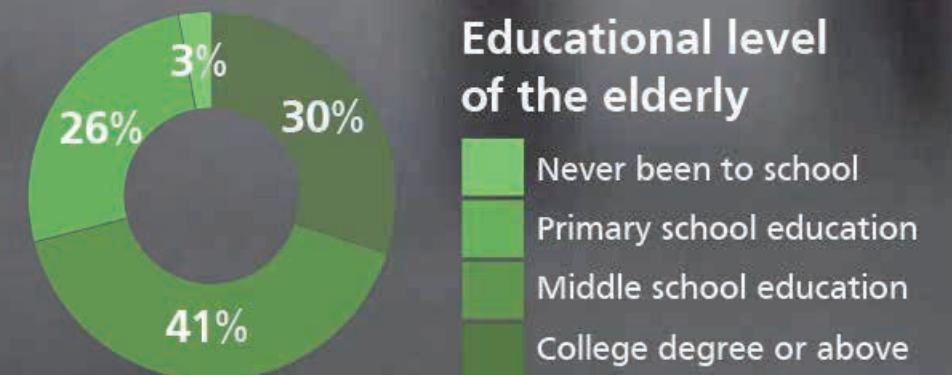


The proportion of people over 60 years old is **18%**

The natural population growth rate is **0.34%**



The elderly population aged 60 to 69 accounts for a large proportion, and these people have little self-care ability



The education level of the elderly is generally low, and that's why they are bound to be targeted by scammers.

241,000,000
People over 60 years old

51.3% of elderly population are empty nesters and 16% are childless

The current level of market-based investment and operation of pension funds is low, with less than 20% of the funds in the market



Rural pensioners receive less than \$200 per month per capita



A large number of pensions have been invested in bank term deposits, which are under long-term pressure to depreciate in value



Suicide rates among the childless elderly are increasing every year

Consequences of population aging

A small number of young people support a large number of elderly



More government funding goes to elderly



Older people stay in the job market and fewer opportunities for younger people



More business opportunities in service industry



Socio-economic growth becomes slow
Greater demand for elderly care services.



National productivity declines



Insight

According to the survey data I collected, empty-nesters account for 51.3% of the elderly population and it leads to many significant issues in the elderly population. For the contemporary elderly population, financial issues are a hassle for them.

OLMMUNITY

Most countries in the world are confronting the problem of population ageing. The elderly cannot be looked after properly. Currently, the population ageing is getting severe. Many elderly are living alone.

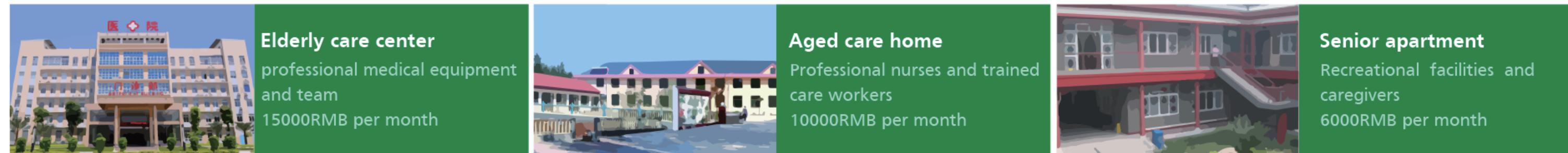
Service Design
UX Design

Individual Project
March. 2022

EXPLORATORY RESEARCH

Field research

I investigated several elderly stakeholders and observed their backgrounds and interpersonal relationships. Through interviews, I obtained and sorted out the overall portraits of the elderly. I learned that the elderly who live alone have many inconveniences in the social aspect. Some elderly go to nursing homes, and some go to rehabilitation centres, but they don't always live there. The main reason is the high level of consumption because they cannot afford it in the long term.



Interview

I interviewed the hospital's care workers, nurses and elderly and find out many problems in their daily life.

Target users		Jiang Hailan 76Y.OLD and His wife 72Y.OLD		Suffering from brain atrophy and hemiplegia Half-disabled and half-deprived Mainly accepting daily living care and health monitoring	Hospital spending is so high that their pensions and savings can't afford it for a long time, so they often choose to stay in the hospital for treatment after their condition worsens and leave before they fully recover.	
		One and a half years	Expenses: 4500rmb per month			
Stake-holders		Care worker ZhangMing 41Y.OLD	Mainly care for half-disabled elderly	The number of employees is not enough, and most people are reluctant to take care of the elderly. Wages are too low, compared to other service industries, caring for the elderly is more difficult. Nursing workers lack professional knowledge, and they are basically on the job after a few hours of training. Young nurses are more willing to go to big hospitals, and nurses in there are generally older than other hospitals.		
		Nurse MaRui 29Y.OLD	7 years nursing experience			
New to this hospital		Wage: 5000rmb per month	Responsible for the medical problems of half-disabled elderly Manage the safety monitoring of the elderly, medication for health checkups.			

Questionnaire

To better understand the current status of elderly people. I published a survey questionnaire in Hubei TCM Hospital. I chose a group aged from 60-75 to investigate living conditions.

1.What do you think the cause is of the aging problem?

Low / declining birth rate 20 votes

2.How many people in your family can support you?

4 2 votes

3 7 votes

2 17 votes

1 22 votes

0 18 votes

Summary (What do they need)

Longing for company

When their children grow up, they will move out of the house and live on their own. In China, most people spend very little time with their parents after starting work.

Enough money in the future

As prices continue to rise and the currency continues to depreciate, the elderly are worried that their current savings are not enough for the rest of their life.

Secure life

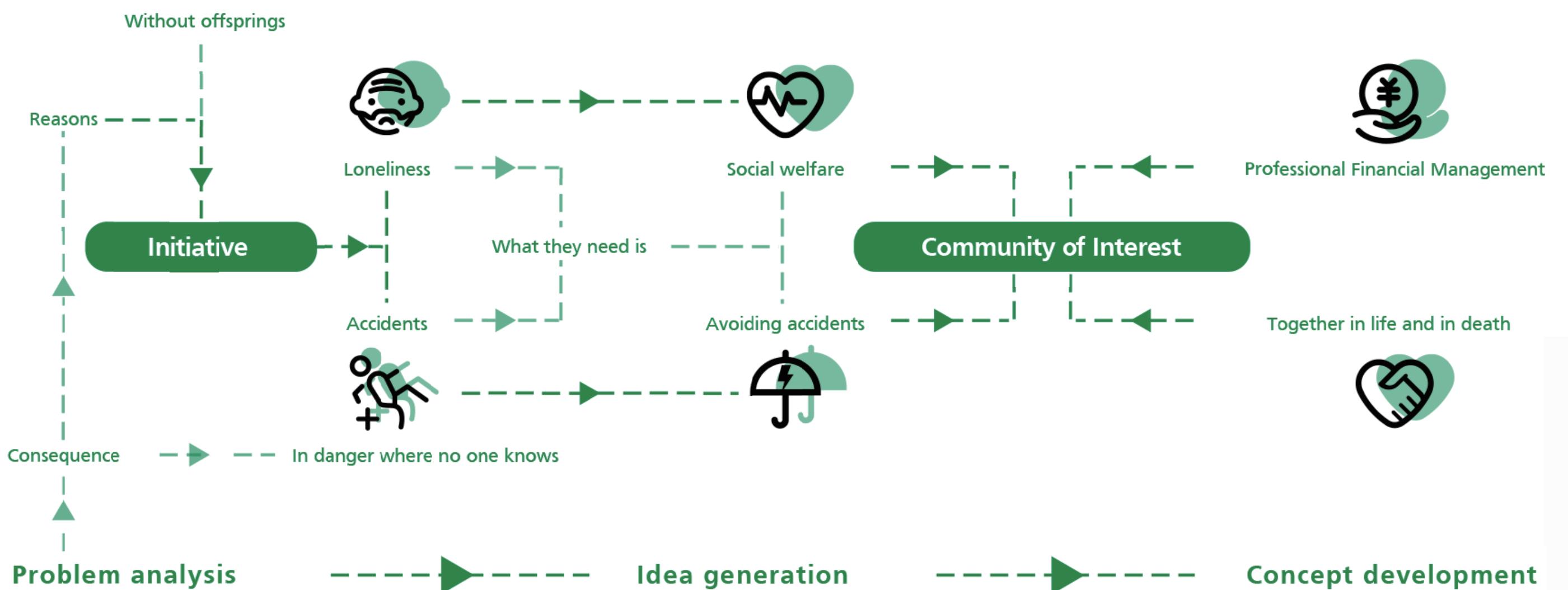
Many elderly people have lost their children, and many elderly people's savings have been defrauded by scammers. The elderly need a secure life.

Competitive Analysis

Brands					
Features					
Action List	✓		✓		
Private Service	✓	✓	✓	✓	✓
Weekly/Monthly Report	✓	✓	✓	✓	✓
Data Visualization	✓	✓	✓	✓	✓
Ranking	✓	✓			✓
E-Shop	✓	✓		✓	
Customization			✓	✓	✓
E-Community	✓				
E-Wallet	✓	✓	✓		✓
Safety	✓	✓	✓	✓	✓
Usability					
	Alipay	PingAn Bank	Golden Butler	Doctor Lilac	Tencent stocks
Strengths	Large platform/ Many users/ Comprehensive	High financial/ High professional	Customized service/Focus on health investment	Professional in medical field/ Large group of Doctors	Comprehensive information display/ Professional investment advice
Weaknesses	Complicated operation process/ Small fonts	Few pension investment program	No user comment/ No direct feedback from customers	Expensive	The layout is tight/ Too complex for elderly people

CONCEPT

Brainstorming

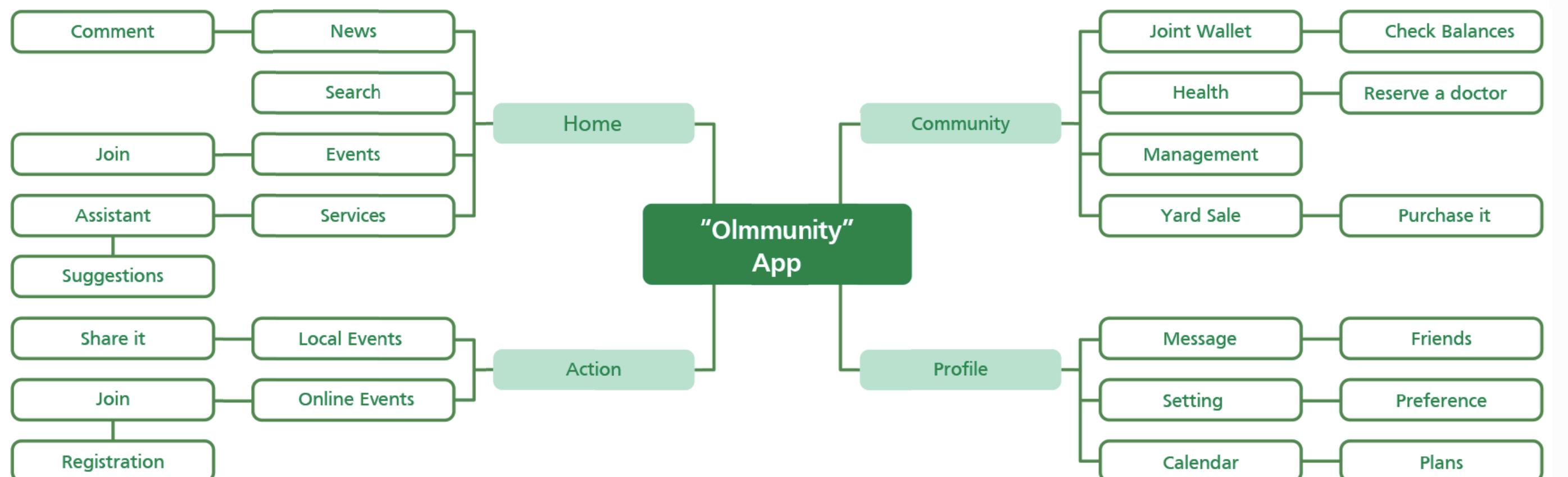


Problem Statement

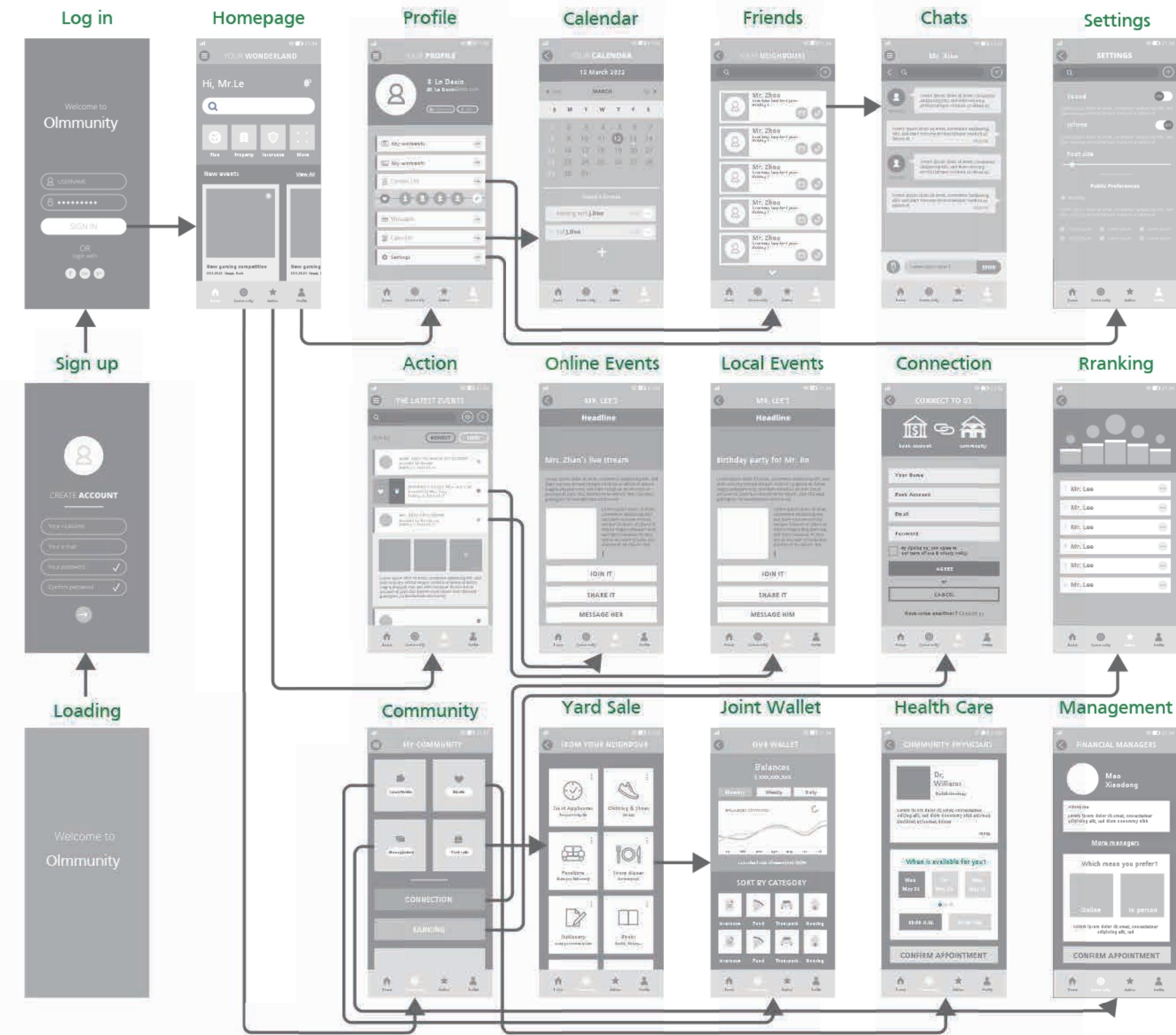
In the future, with the increase of the elderly population and the reduction of the proportion of young people, the number of elderly people living alone/single elderly will inevitably increase.

The shortage of labour force will become a hindrance to the development of the society, and the problem of old-age care will become more serious. The country and society need more service personnel for the elderly, otherwise social conflicts will become more and more serious.

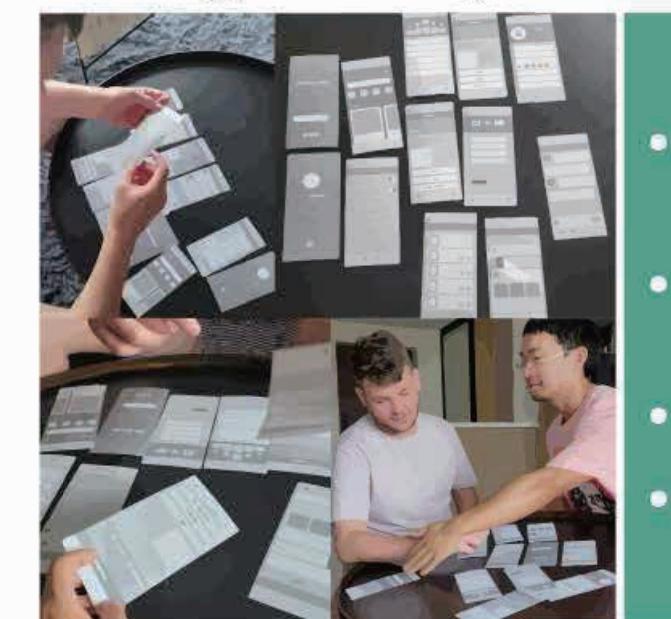
Information Architecture



Low-Fidelity Prototype



Prototype Testing

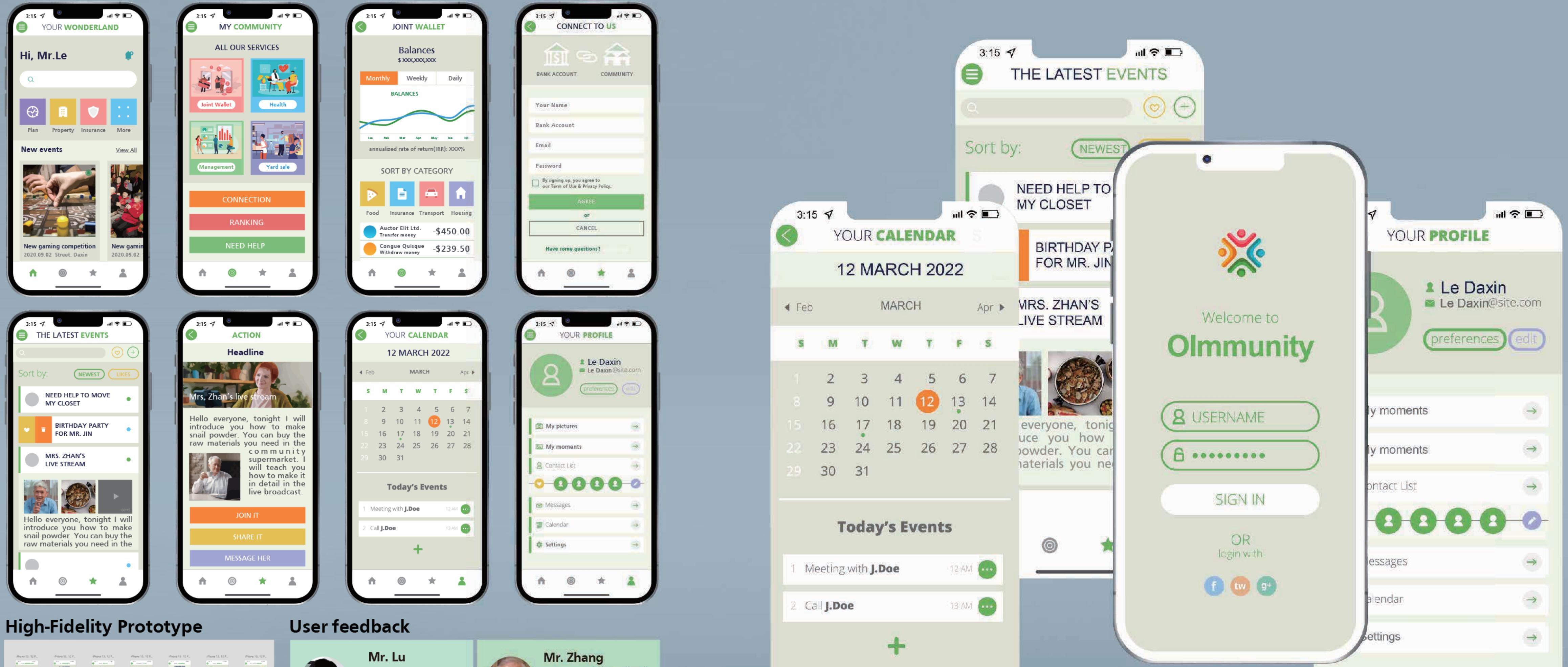


- Advantages**
- This app forms a community that like a joint venture firm connects everyone physically and mentally.
 - The relationship between every person in the community can be very relaxed and trustworthy.
 - Instant health check for everyone in the community.
 - Yard Sale sector benefits the Joint account.

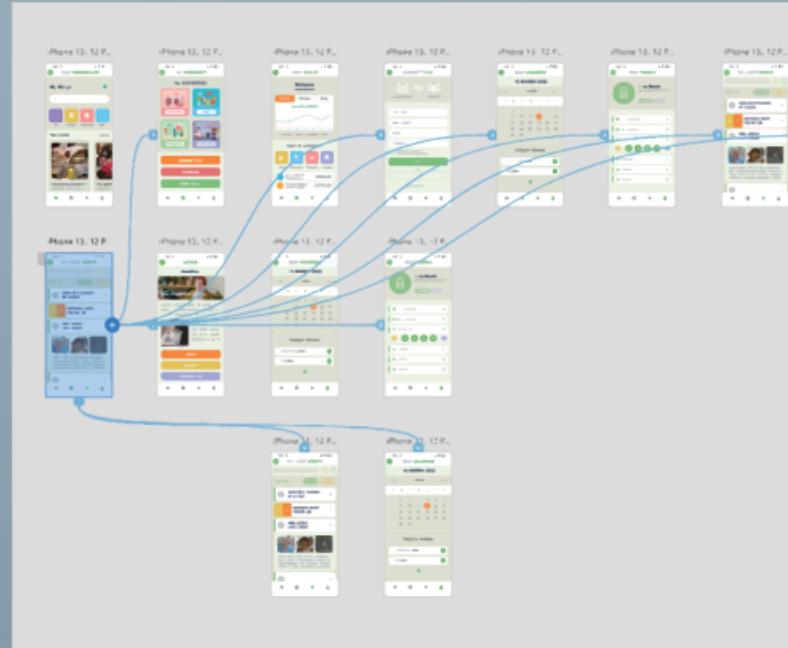
- Problems**
- The joint wallet should provide the detailed information about every expense and return.
 - This app needs a logo.
 - Fonts are not big enough.

FINAL OUTCOME

Main function interface



High-Fidelity Prototype



User feedback

Mr. Lu
40 years old, Chef
1 child and wife
2 old parents

I can see the profunding impact that this app will bring to the elderly community. They need more help to be taken care of. I hope one day I'll be able to find somewhere I can feel belonging if I can no longer take care of myself.

Mr. Zhang
69 years old, Retired
4 children, widower

I have four kids, but I do feel lonely sometimes. Who knows, maybe one day all my children will leave me. I cannot predict the future, but I think this is a good idea to build solidarity in the community.

BACKGROUND

Scenario interactive training system (SITS) is the latest human-computer rehabilitation equipment produced by Buffalo Intelligent Rehabilitation for TCM hospital of Hubei Province. Patients can achieve multi-functional rehabilitation training goals by completing game tasks.

It not only brings fun to the patients but also provides the training data for each session so that doctors can conduct targeted treatment for patients.



SITS

A rehabilitation training system provide patients a good personalised treatment.
Relieve doctors and nurses from countless data filing work flow.

Interaction Design
Product Design

Team Work
Game Design, Product Manufacture

My Roles
User Research, UI/UX design, Kinect Coding, Product Appearance Design

 ≈ 1.71 billion
people worldwide have
musculoskeletal disease

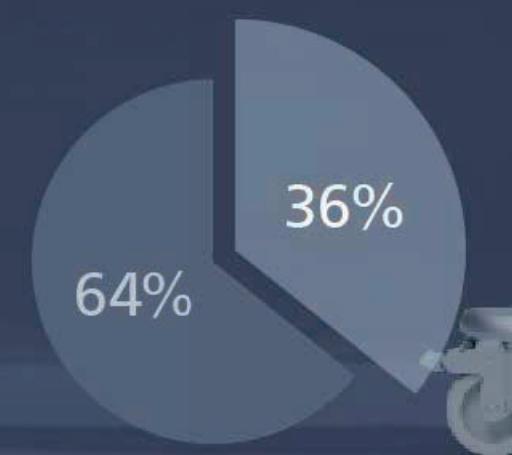
Musculoskeletal disorders has different incidences in different areas and countries. China, a country with the largest population, has been suffering from this disease for a long time.

Global Market Size (billion USD)



The Ministry of Health of China requires tertiary rehabilitation hospitals to be equiped with rehabilitation training equipment, and secondary rehabilitation hospitals to be equiped with motion control training equipment. The purchase of rehabilitation training equipment by hospitals has become a rigid need.

Prevalence Rate



The prevalence of musculoskeletal disorders in the elderly over 60 years is 36%, with a prevalence of 23% in men and 49% in women.

Insight

The prevalence of musculoskeletal disorders increases with age, and this problem is bound to become more severe in the foreseeable future. Hospitals' procurement of rehabilitation training equipment will become a rigid demand.

RESEARCH

Interview

1.What do you value the most in rehabilitation training?

“ From my perspective, I think targeted rehabilitation training is one of the most important features. ”

“ I think quick and effective training is what all patients need. I want to get back to being healthy as soon as possible. ”

“ As a son, I hope my mom gets the best treatment. The most valuable thing to me is safety. ”

“ I like that rehabilitation training has timely feedback. I'd like to check my condition at any given moment. ”

2.What is your biggest concern about rehabilitation equipment?

“ My muscles are very weak and I am worried that I will not be able to use the rehabilitation equipment properly. ”

“ I think money is the biggest concern for me. I believe most of the patients are not very rich, so we care about the cost. ”

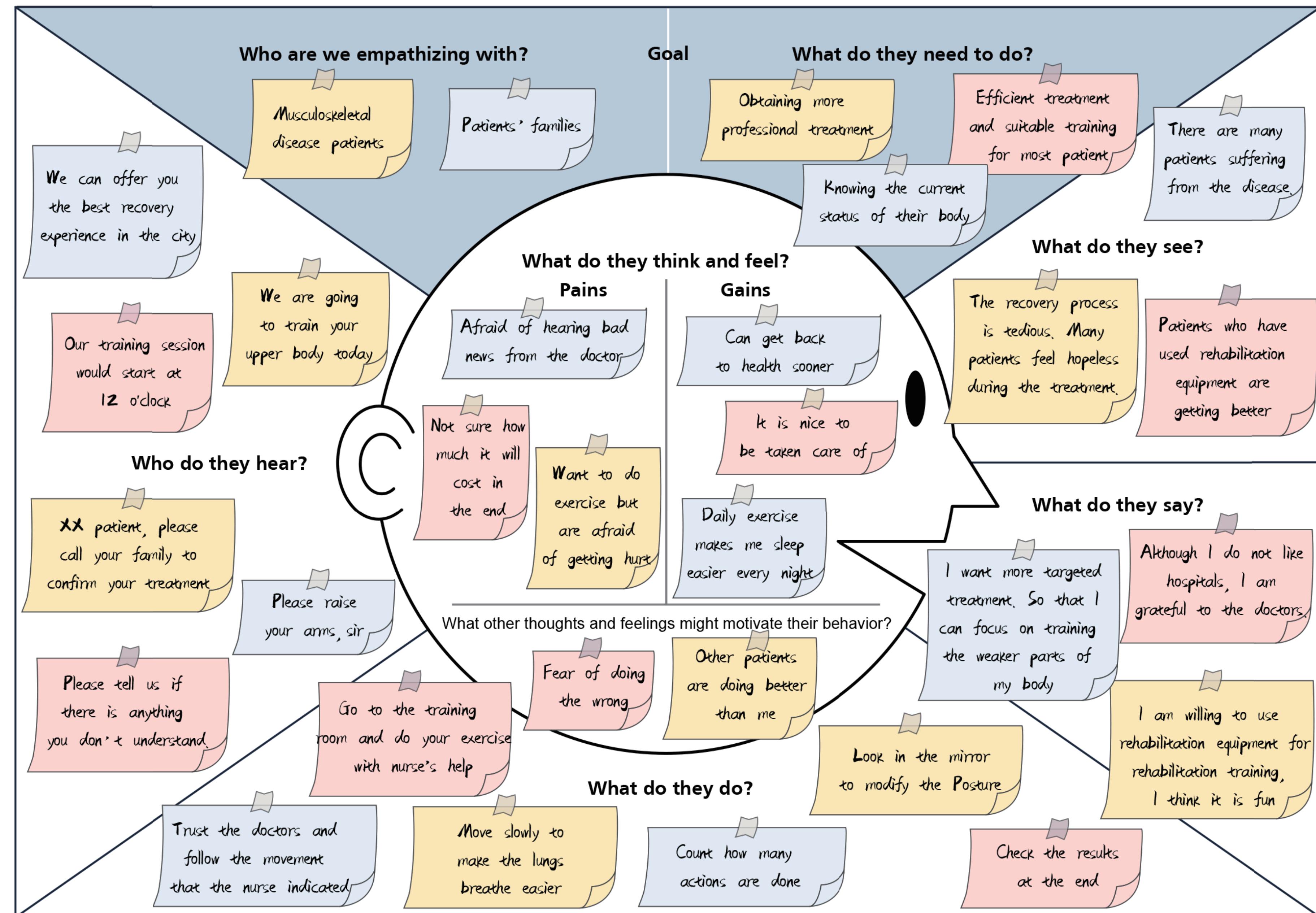
“ I have tried many other rehabilitation training sessions before. Does this equipment really make a difference? ”

“ I'm more worried about whether it's safe for children and whether they're too short to use it. ”

Summary

- Everyone's situation is different and everyone requires a different treatment plan.
- Patients like to know the real-time condition of their bodies when doing rehabilitation training.
- The treatment process is always torturous, and the patients want to relieve the torment of the training.

Empathy Map



ANALYSIS

Perception Gap

Patients & Their families

- I have become incapacitated to the extent of 75% or more and I can't walk without help, this is terrible.
- When the doctor and the nurse inundated with countless patients and cases, they can't do anything but wait.
- Once you enter the hospital, you will find that time goes so slowly.
- Sometimes I want to see my latest training result, but the nurse isn't always there to help.
- I really hope I can do more for my mom during the recovery process. But most of the time, it's just boring training repeated again and again in the hospital.

Main Pain Point

Feel

Boring

Spending a long time in the hospital, seeing nobody but the doctor and the nurse. It is bad for their mental health.

The recovery treatment is afflicting. It's just the same training repeated, again and again, that drives people crazy.

Negative emotions of patients also effect other patients.

Opportunities

New technology

The patients could have spent less time on rehabilitation. The latest technology allows people to train more effectively as well as quicker than traditional treatment method.

Doctor & Nurse

- We have professional medical staff to lead patients for rehabilitation training no matter what condition they are in. But sometimes, we don't have enough staff to help our patients, so they may need to wait.
- I hope to know more about the patients, such as their past medical history, practice history, in advance.
- Most patients need to spend a long period recovering their bodies. The process makes people suffer for sure.
- There are too many patients who need to be looked after. All of their data has been kept in the doctor's office. It's safer for patients' privacy.

Equipment manufacturer

- Through intelligent voice assistants, our equipment can replace some of the duties of nurses and doctors, making work easier for the staff.
- Our rehabilitation equipment could reduce treatment duration greatly.
- We have to make sure that patients need what we produce. We believe our product could ease patients' pain and disease.
- Our equipment can store billions of patients' data. Only the doctor and the patient have the right to check them.

Persona



Patient

Name: Liu Qin
Age: 65

"I'm a little bit anxious, cause I can barely see the progress."

Goals

- Can live my life by myself
- Relieve my pain
- Can accelerate the treatment
- Know the current condition of my body

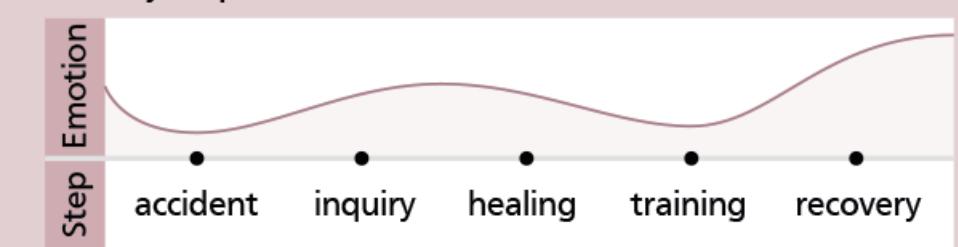
Positive active

- Actively engage in rehabilitation training.

Negative active

- Easy to give up training therapy.

Journey map



Doctor

Name: Dr. Wan
Age: 30

"We are often inundated with repeated mission, it's tiring."

Goals

- Help patients buck up again
- Shorten time of treatment
- Know more about the patients
- Can work more efficient and help more patients.

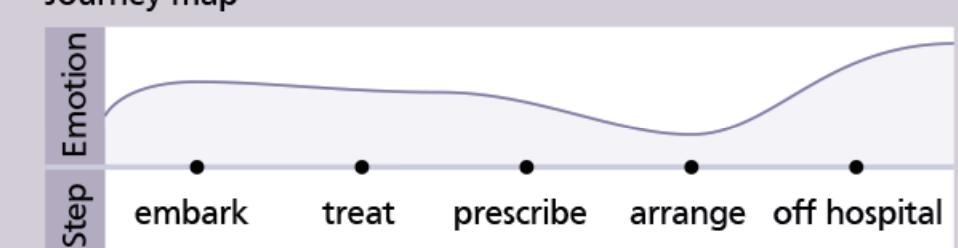
Positive active

- Develop a recovery plan for the patient

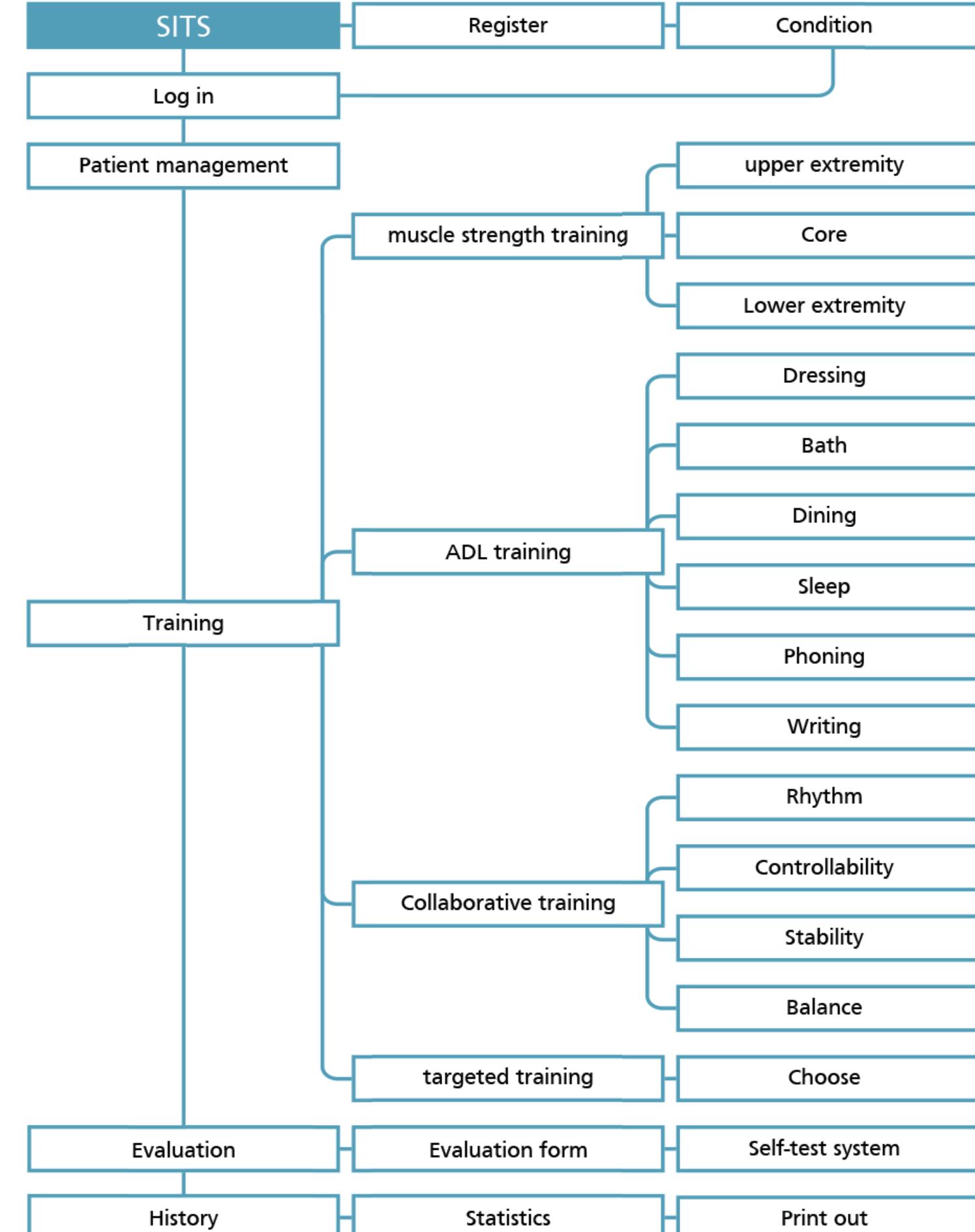
Negative active

- Plan a simple traditional training program

Journey map



Information Architecture



How Might We

How might we help patients get a better experience of treatment?

To help doctors and nurses to reduce their unnecessary work, so that they should have more time to look after the patients.

To improve the efficiency of the hospital and augment the usage of technology.

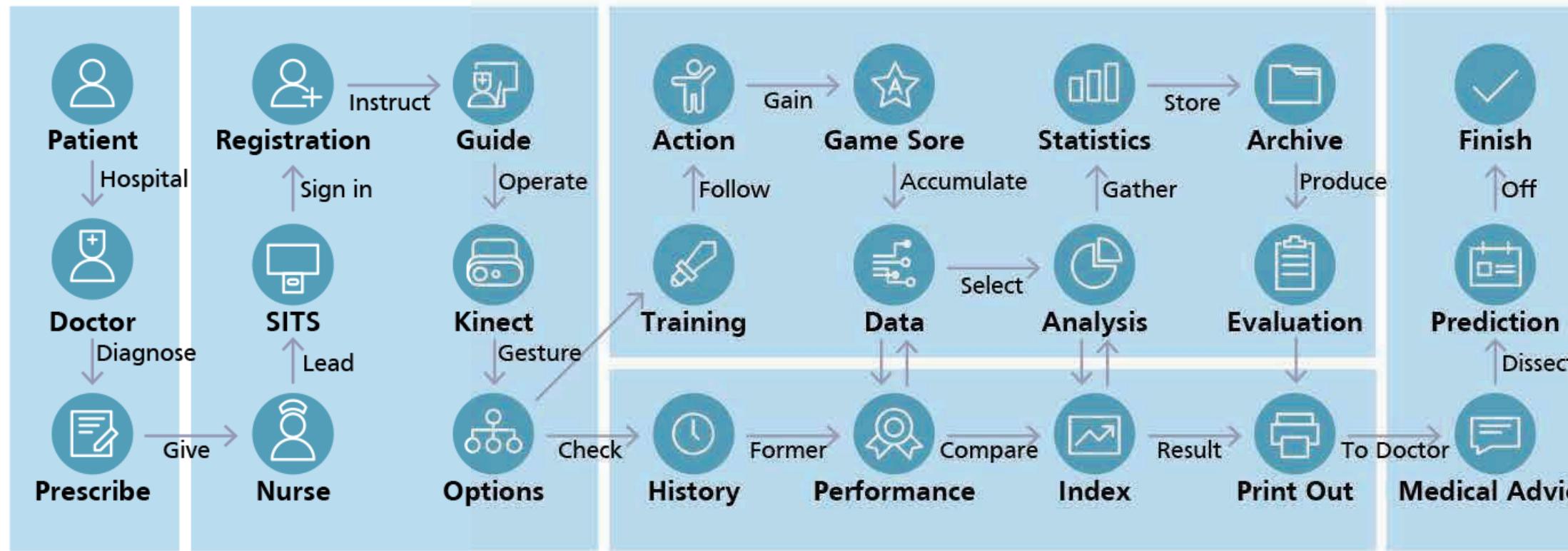
To change the current rehabilitation training session to be more fun and everybody would love to do it.

To make patients get the better ADL(activities of daily living) training.

To establish the new equipment's credentials of improving the process of patients' rehabilitation.

FINAL DESIGN

User Flow



UI Design



1. Log In

At first, patients need nurses to register their information in the system for the first time.

2. Start Training

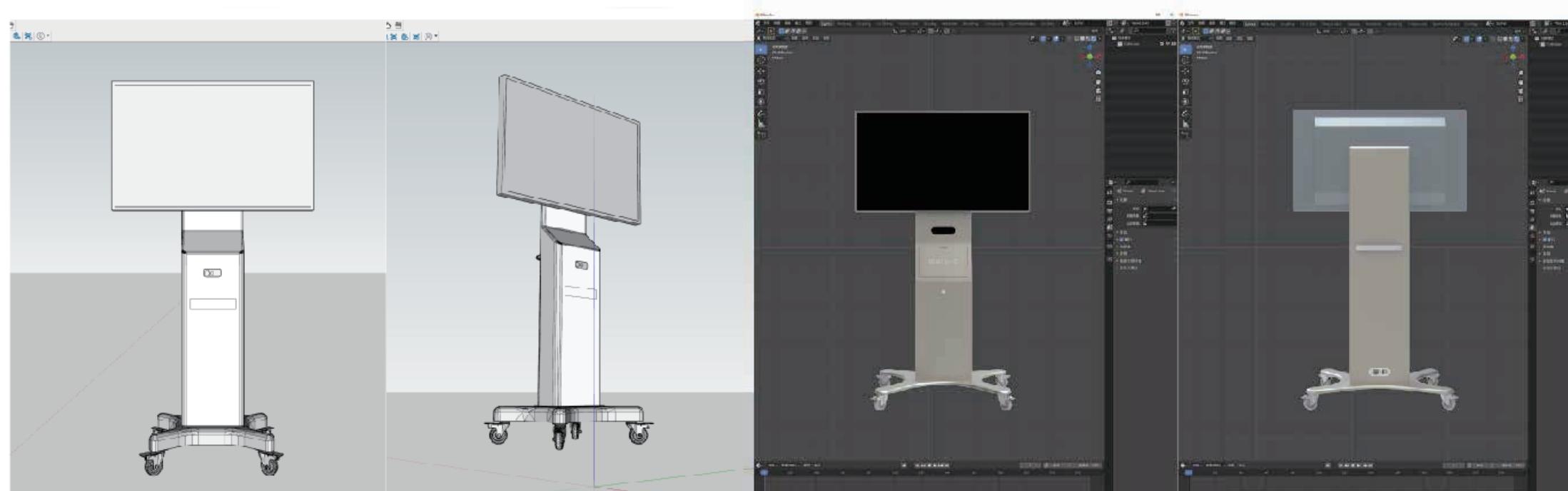
After adjusting the Kinect to the patient's body, the training session may begin. Follow the instructions that are shown on the screen, and try your best to gain the scores.

3. Evaluation

Every training session generates one evaluation form for the doctor to review whereby he can give the patient correct advice.

4. Finish

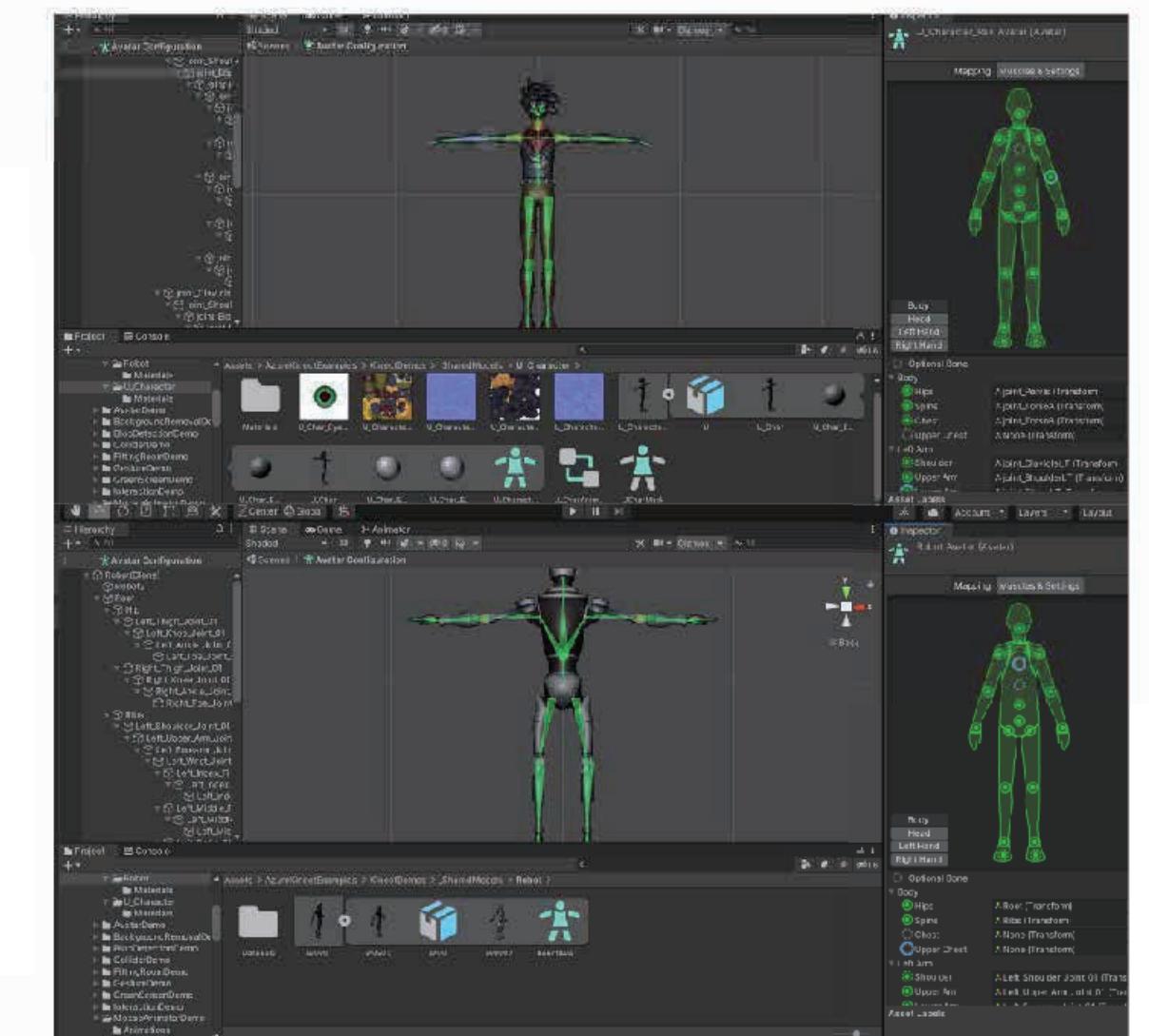
Product 3D Model (SketchUp & Blender)



Game Design



Unity 3D & Kinect



User Testing



Coding

Get body space position

```

public class KinectPositionController : MonoBehaviour {
    // 1. 获取设备
    // 2. 调用KinectManager方法
    // 3. 读取用户ID
    // 4. 获取人体空间坐标
    public GameObject person;
    private KinectManager manager = null;
    private long userID = 0;
    private bool gestureCancelled = false;
    public void Start () {
        manager = KinectManager.GetInstance(); //调用KinectManager方法
    }
    // Update is called once per frame
    void Update () {
        //读取KinectManager方法取出用户的userID(第一个成功追踪的)。尚未设有检测用户，因为
        //UserID = manager.GetPrimaryUserID(); //读取用户的userID
        if(userID != 0 && manager.IsIntialized())
        {
            Vector3 vec = manager.GetUserPosition(userID); //参数入体空间位置
            print("User Position:" + vec); //打印人体空间坐标
            person.transform.position = vec;
        }
    }
}

```

Kinect Bone tracking

```

public class KinectJointController : MonoBehaviour {
    public GameObject sphere; //圆球
    private KinectManager manager = null;
    private GameObject[] joints; //关节对象
    private bool isCreate = false; //是否创建
    private long userID = 0;
    // 使用 this 为初始化
    void Start () {
        manager = KinectManager.GetInstance(); //调用KinectManager方法
    }
    // Update is called once per frame
    void Update () {
        userID = manager.GetPrimaryUserID(); //读取用户ID，如果未设置用户ID
        if(userID != 0)
        {
            if(isCreate == false)
            {
                manager.DetectGesture(userID, int userID);
                joints = manager.GetJoints(userID); //添加关节到身上保持同步
            }
            else
            {
                manager.Update(userID, int userID);
            }
        }
    }
}

```

Feedback

Interaction

It's an excellent intellectual assistant for our staff, and it gives our patients impressive training experience. I think every hospital should have this good helper.

Treatment

My doctor told me this is good for my treatment. After training on it for one month, it really works. I find my legs have become more flexible since I used them.

Benefit

SITS has received very good responses, patients have received more effective treatment, and the doctor's treatment process has become easier.