

# 01

P 01-12



## Sunbeam Express

Interactive Installation  
& UX design

# 02

P 13-24



## Dialogue with Light

Interactive facade design

# 03

P 25-38



## Findit

UX design

# 04

P 39-48



## Living Apart Together

Digital Media Art

# 05

P 49-58



## Paper Dancer

Material experience design



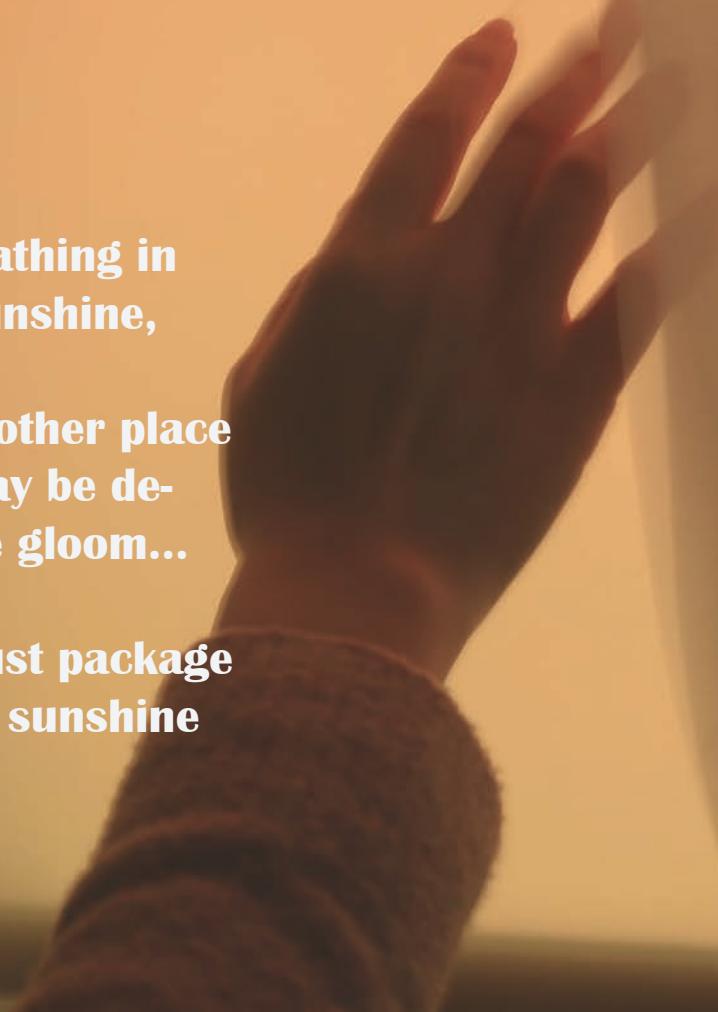
# Sunbeam Express

An express company that delivers sunlight to your room.

**When we are bathing in the warmest sunshine,**

**Someone in another place of the world may be depressing by the gloom...**

**Why don't we just package and deliver the sunshine to him?**



## Abstract

This is a project that consists of a UV data-controlled natural light-like lamp and a mobile app. On a fine day, users can catch and share the UV data via the app. When the weather is bad, users may access their own or others' shared "sunshine date" and enjoy the "natural sunlight" from the UV data-controlled LED lamp.

Team: Jialing Li / Linqian Wu / Yixuan Huang

Duration: 4 weeks

My role: Concept Design 50%, Coding 60%, Prototype of lamp 70%, Drawing 50%, Vedio Shooting & Editing 100%



## Sunshine and mental health



Sunlight cues special areas in the retina, which triggers the release of serotonin.

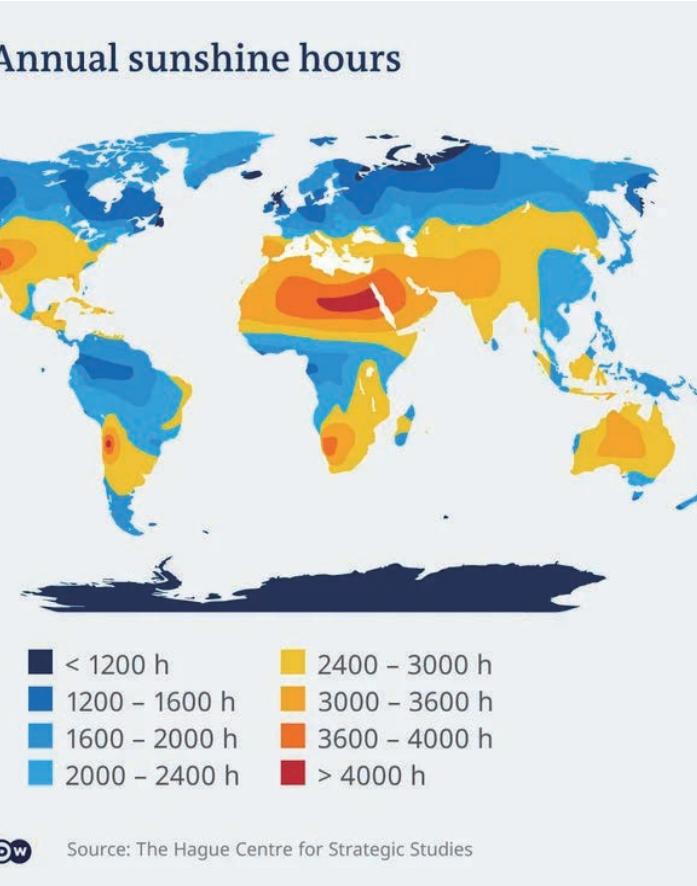


According to the Mayo Clinic, decreased sun exposure has been associated with a drop in serotonin that can lead to SAD. People are more likely to experience SAD in the winter when the days are shorter and the nights are longer.

Exposure to sunlight can also benefit those suffering from nonseasonal depression, premenstrual dysphoric disorder, and in pregnant women with depression, according to the Journal of Psychiatry & Neuroscience. Anxiety-related disorders and panic attacks have also been linked with changing seasons and reduced sunlight.



## What is "Sunbeam Express" and who will need it ?



"Sunbeam Express" is a platform combining with smart illumination that allows people to catch and deliver sunlight to others who lacks of sun exposure.

According to the data of Hagua Centre for Strategic Studies, more than 50% of the world has an annual sunshine hours less than 2400 hours.

A recent study [1] suggests that insufficient sun exposure is a significant public health problem.

Meanwhile, other studies in the past decade indicate that insufficient sun exposure may be responsible for 340,000 deaths in the United States and 480,000 deaths in Europe per year, and an increased incidence of breast cancer, colorectal cancer, hypertension, cardiovascular disease, metabolic syndrome, multiple sclerosis, Alzheimer's disease, autism, asthma, type 1 diabetes and myopia.

[1] Insufficient Sun Exposure Has Become a Real Public Health Problem  
Alfredsson et al. - International Journal of Environmental Research and Public Health - 2020

# The inadequacy of existing products - Light Therapy Lamps

We surveyed the relevant products on the market and found that although these products have their own features, they all **lack interactivity**.

Product Name	Theralite Aura Bright Light Therapy Lamp	Bios SkyView Wellness Table Lamp	Philips SmartSleep Wake-Up Light Therapy Alarm Clock	Philips goLITE BLU	VAVA LED Bedside Lamp
Type of Lamp	Light Therapy Lamp	Wellness table lamp	Lumiled Luxeon Rebel	High power LED	Multifunction Night Light:
Strength	<ul style="list-style-type: none"> <li>- Height and angle are both adjustable</li> <li>- 4 Light setting.</li> <li>For light therapy or task lighting</li> <li>- Keep your energy lamp-up, lift your spirits and mood</li> </ul>	<ul style="list-style-type: none"> <li>- Merge beauty and science with our patented BIOS SkyBlue® circadian technology</li> <li>- Four different modes Sunrise,Daytime,Sunset and Nighttime</li> </ul>	<ul style="list-style-type: none"> <li>- Simulated sunset and sunrise and choice of 5 different natural wake-up sounds</li> <li>- FM radio, tap snooze and automatic dimmable display</li> <li>- Improve your mood in the morning</li> </ul>	<ul style="list-style-type: none"> <li>- Mimic the natural energizing power of daylight</li> <li>- Light and durable go-anywhere design with protective pouch</li> <li>- Fights energy dips, fatigue and winter blues</li> </ul>	<ul style="list-style-type: none"> <li>- Multifunction Night Light</li> <li>- Adjust the brightness by long-press or change the color by light touch</li> <li>- Made from toy-grade ABS materials with a pleasant haptic</li> <li>- Memory Function and Temperature Control</li> <li>- Strong Build &amp; USB Convenience</li> </ul>
Interactive	X	X	X	X	X

# How we make it different

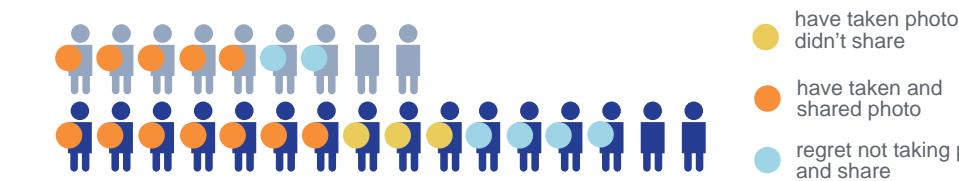
## - 1. Research : How does sunshine touches our hearts?

In the medical area, the relationship of sunlight and human health has been demonstrated by a large number of scholars. But on the spiritual side, there's no clear answer to how sunlight touches human hearts. Hence we invited 25 people that is diverse in age, sex, and background **to describe their most remarkable experience of sunshine**, for designing a meaningful solution to recreate the surprise that sunshine gives. As a result of our interviews, to recreate a desirable sunshine, we found that there are **three key points** that we need to address in our design:

### Share-able



In their memories, **16** people said they were in company with family or friends and admitted **it is a important factor of happiness** along with the sunlight.



**21 of the 25** respondents thought it is meaningful to record the sunshine by photo, **15** of them have taken photos and **12 have shared the photo** they took with friends or social media platforms.

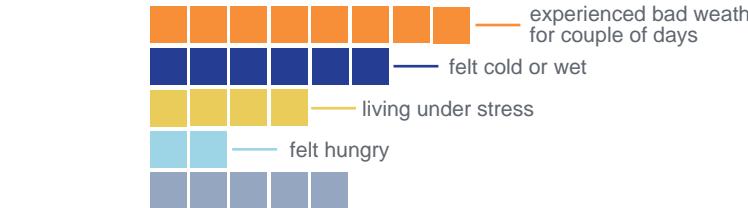
### Unpredictable and changeful

**23** respondents said the unpredictability of the sun's changes created many surprises. They were able to recall other details of the sun's change in addition to warmth.



### Sudden, sharp contrast

When we asked about the situation before the sunshine appeared, most respondents **recalled negative feelings**, such as a previous period of cold, wet weather, being hungry or tired, or live under stress for days, etc. The appearance of sunlight created **a sharp sensory contrast** to these unpleasant feelings.



# How we make it different

## - 2. Ideation :

### Thoughts

#### Share-able

How might we create a feeling of sharing by "Sunbeam Express"?



#### Unpredictable & changeful

How might we simulate the daily changes of natural sunlight?



### Inspiration

### Ideas

Allowing people to **attach messages** with the delivery of sunshine to promote social interactions.



Interactive device



**Mobile APP**

We decided to add a customized social function to the designed mobile platform, enabling users to attach anonymous or non-anonymous messages when they deliver and receive "sunlight"; Whether to display of personal contact information or not is fully up to users themselves.

### Solution

Not to "simulate", but to **record and reproduce** the real changes of natural sunlight over daytime.



Light Sensor



**UV Sensor**

We decided to capture real changes of sunlight by UV sensor instead of simulation. The data captured will be processed to control an artificial sunlight, giving it the variability of nature.

### Solution

#### Sudden, sharp contrast

How might we make the sunlight surprise people?



# The System



((@))  
UV Sensor

#### Sunshine

Use the ultraviolet sensor to obtain the ultraviolet value of the outdoor sunlight and transmit it to the user APP.



#### Sunlight database

Users can store and share their own sunshine values, as well as search and use the sunshine values shared by others to form a social relationship based on sunshine sharing.

Feedback  
↔

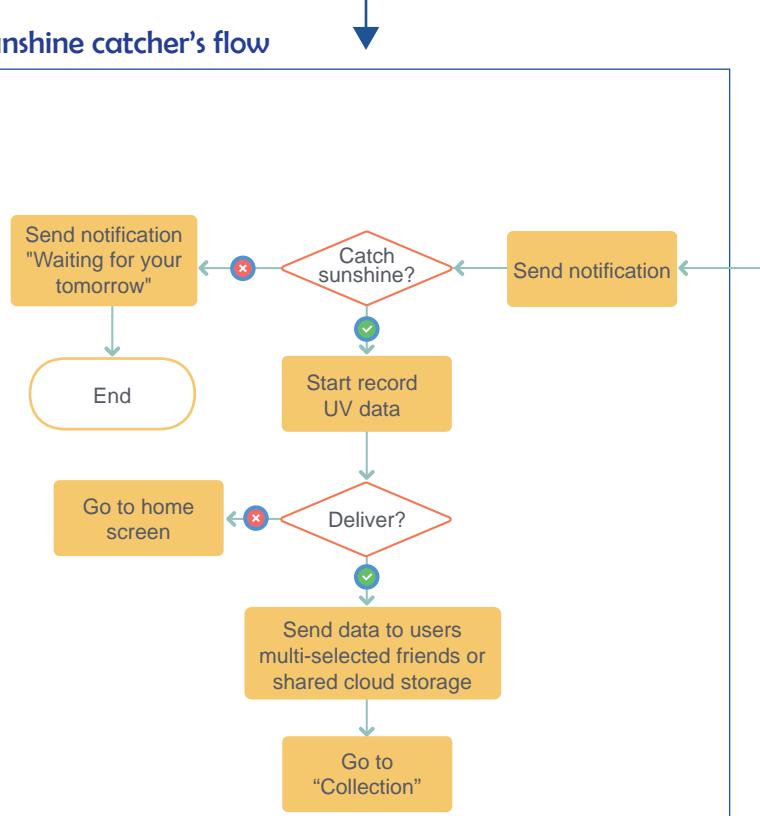
Obtain data



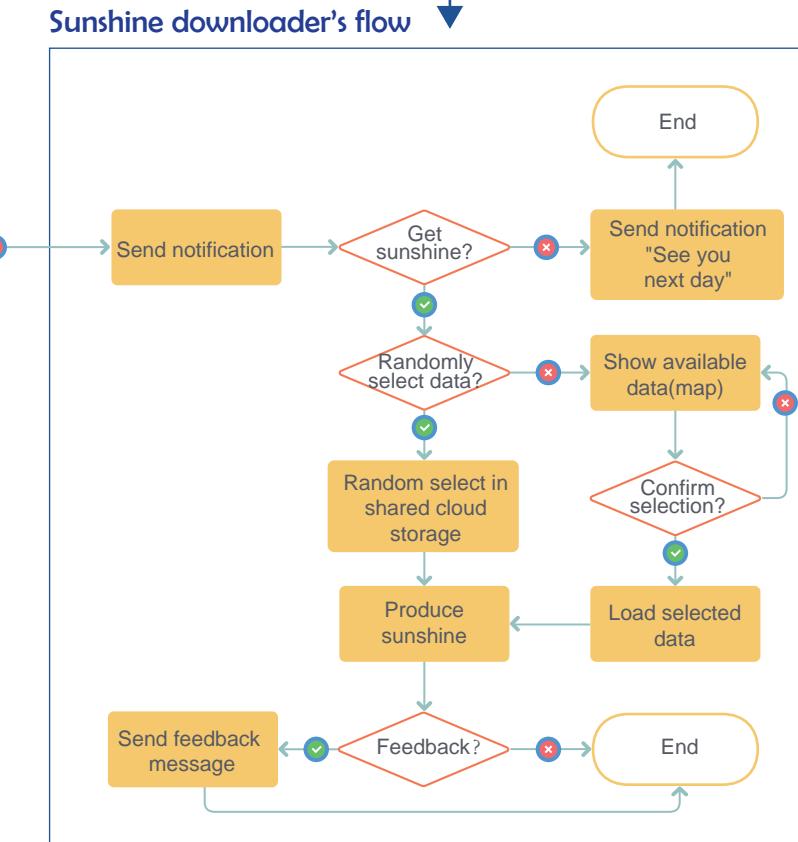
#### Window-shaped illumination

The sunlight value stored in the mobile phone APP can control the lighting and change of the indoor sunshine lamp, and you can feel the warm indoor sunlight in any weather.

#### Sunshine catcher's flow



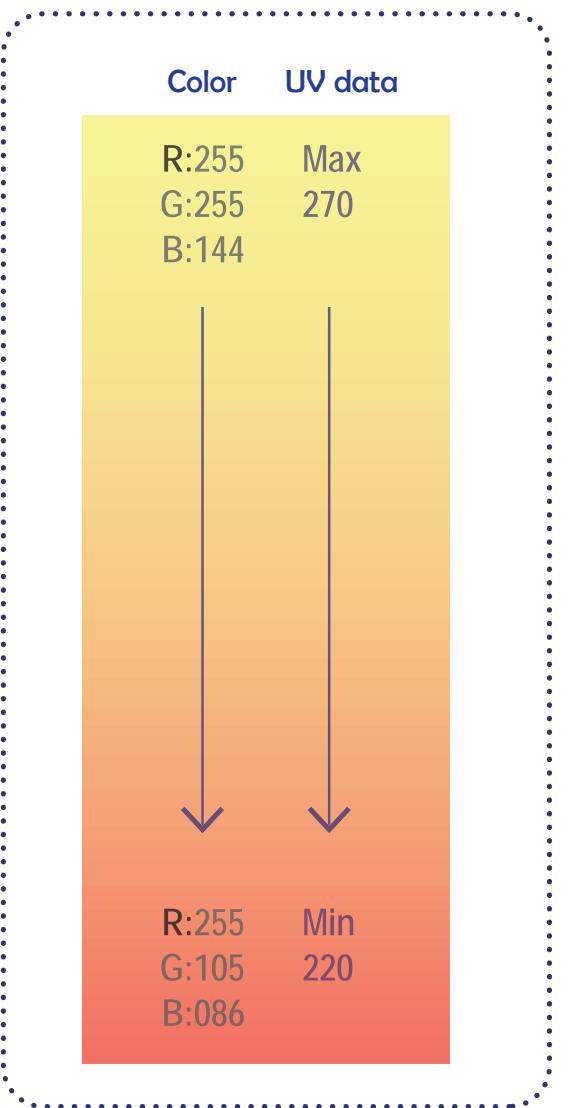
#### Sunshine downloader's flow



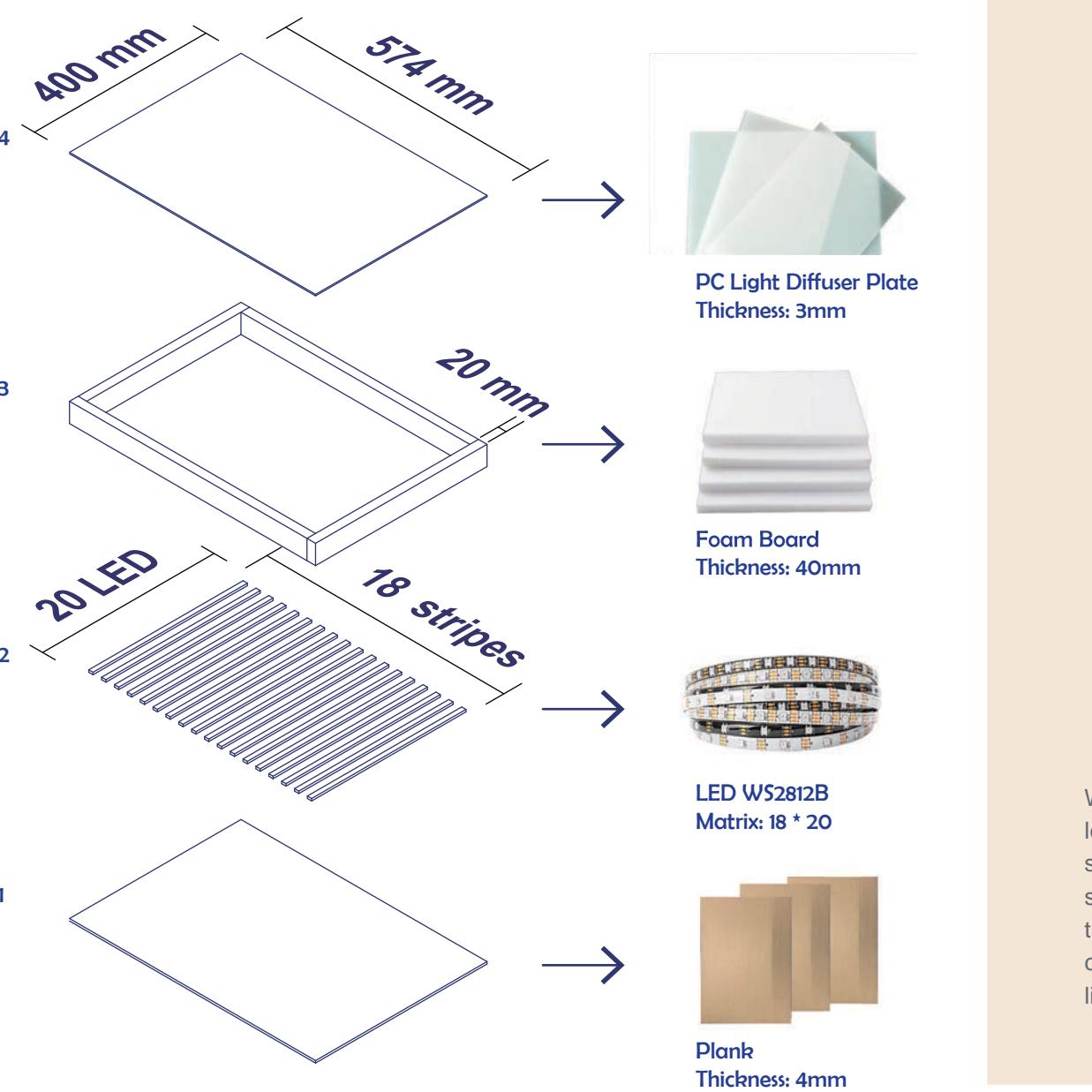


# UV data controled LED “Window”

## The color range of Led



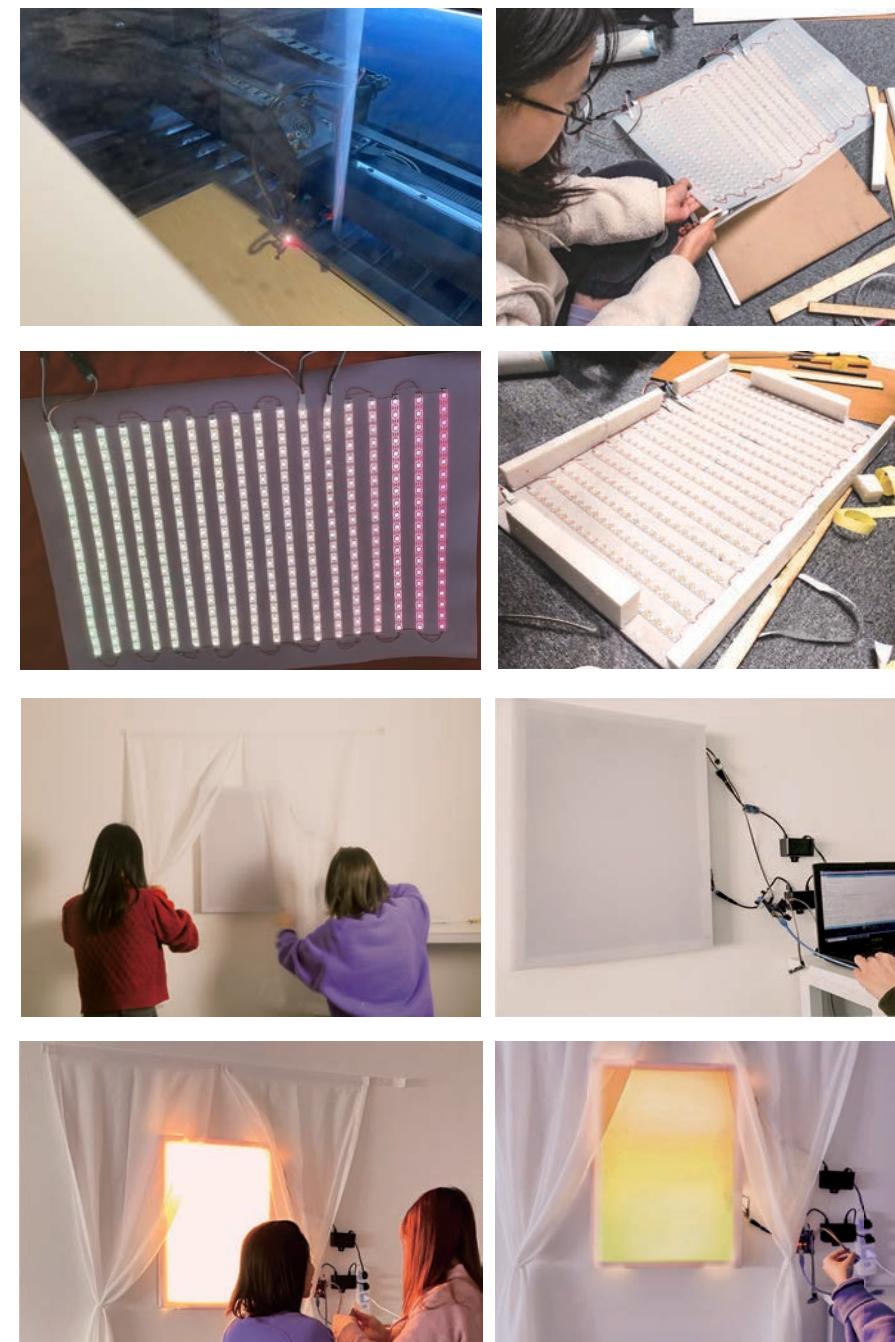
## Structure and size of Lamp



## Prototype by Arduino



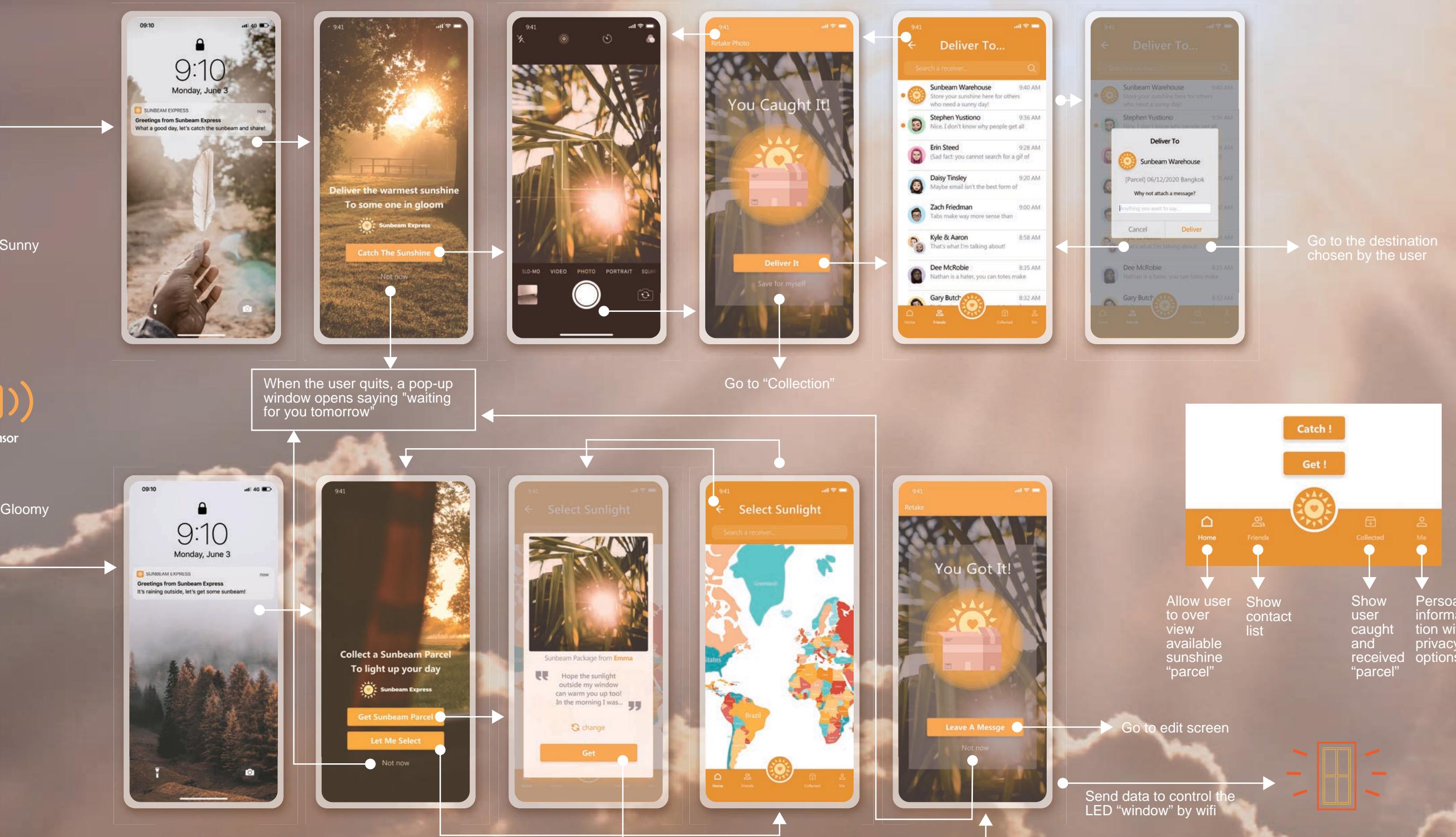
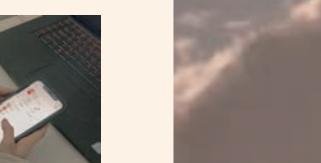
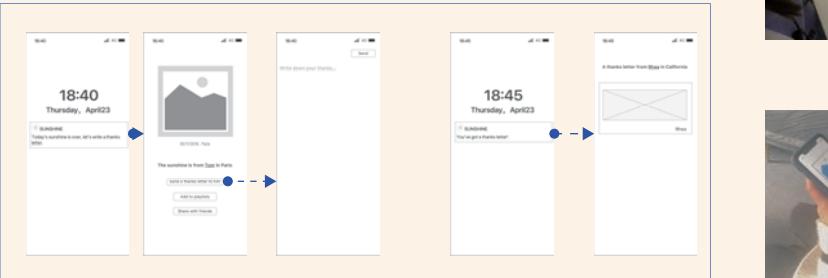
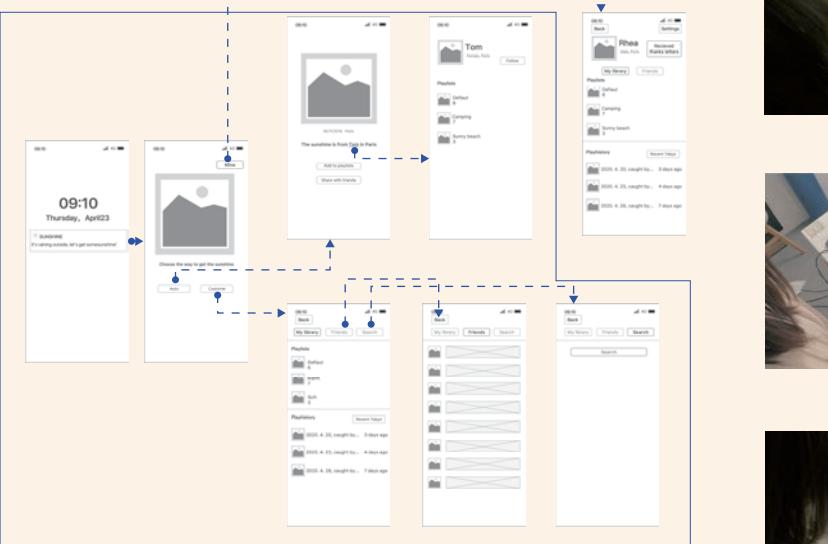
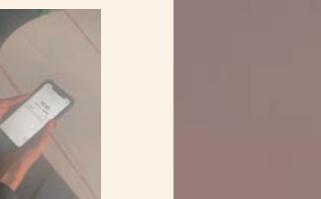
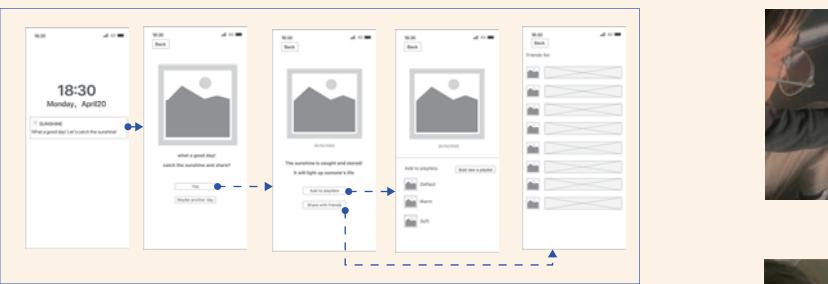
## Implementation and Testing





# Prototype of APP

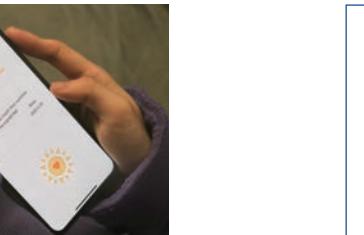
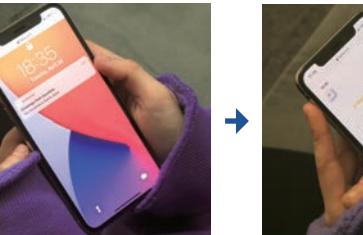
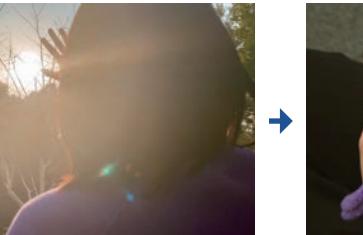
We invited five people to do user testing with a rapid prototype to make improvements. As a result we found several usability problems and reduced unnecessary screens and jumps.



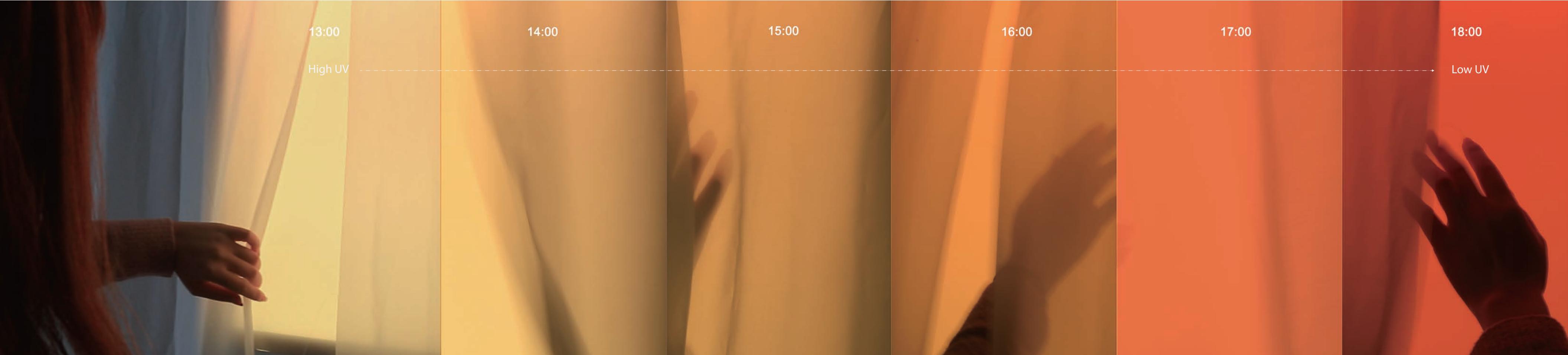
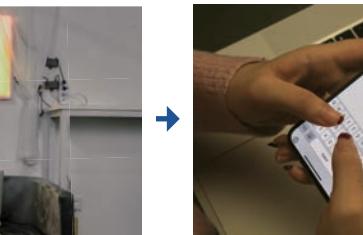
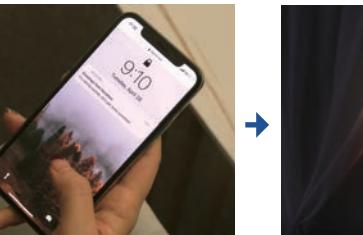
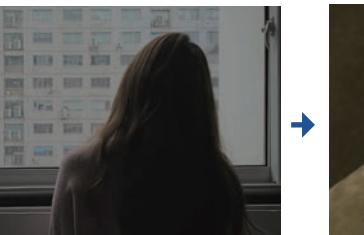
# Sunbeam Express Journey



Catch and share  
the sunshine



Get and use the  
sunshine





# Dialogue With Light

This is a responsive facade that can be changed according to different behaviors of people and natural light.

Team: Jialing Li, Xinyi Guo, Xingzheng Qiu

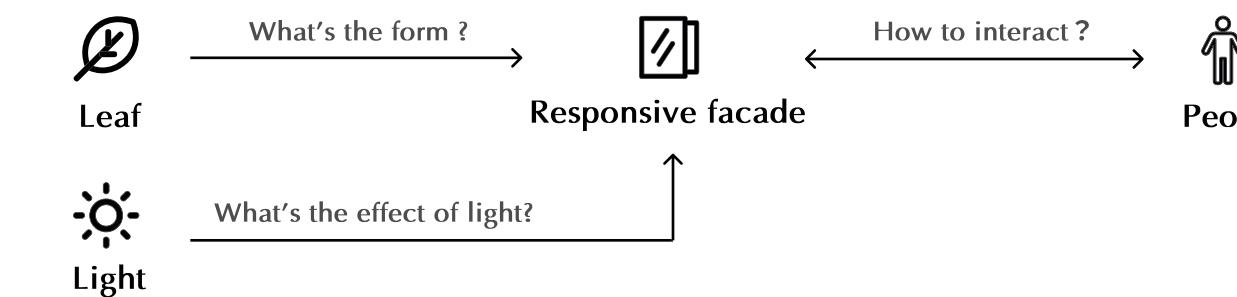
Duration: 3 weeks

Toolkits: Rhino / Grasshopper / Machine Learning / P5.js / Arduino / Laser cutting / Figma

## Abstract

There are many high-density old communities in China, it is difficult for these spaces to get enough light, which has a negative impact on people's lives and physical and mental health. I hope to improve the light environment of these spaces through the design of responsive facade. I bring light into these spaces according to the reflection and refraction of the mirror paper. The program uses machine learning technology to enable the curtain wall to respond to human movements and light, so as to achieve the purpose of enhancing the spatial light experience, aesthetics and interactivity.

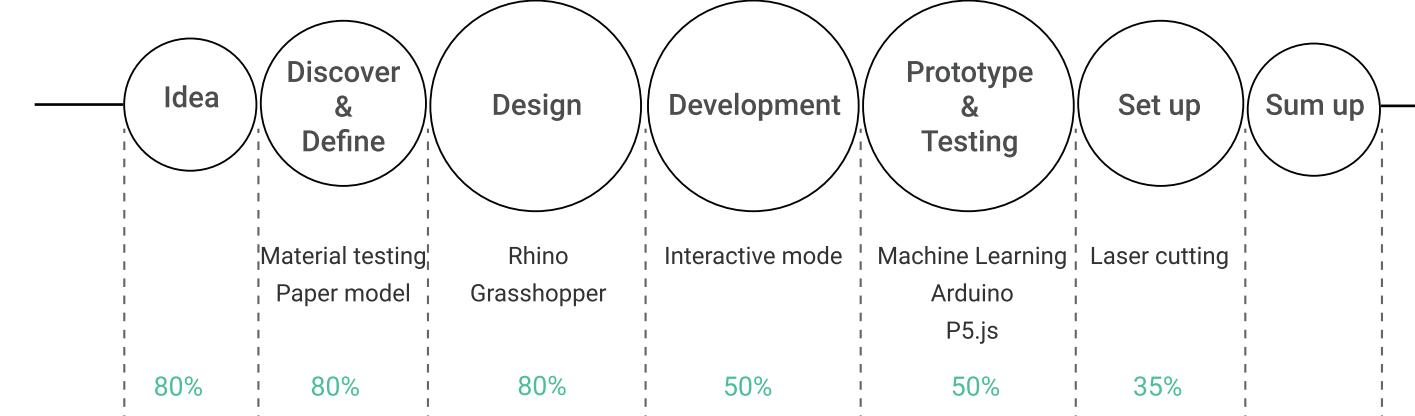
## Design questions



1. How to build the relationship between natural light and leaves in the urban space through the design of the curtain wall?

2. How to use artificial intelligence to realize human-space interaction and human empathy to nature?

## Design Process



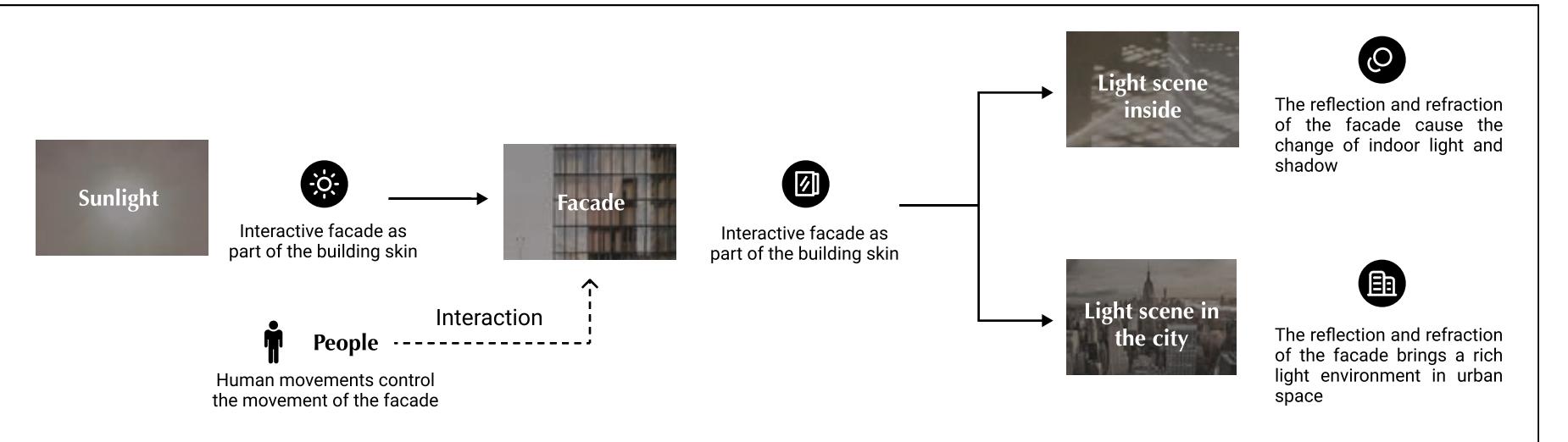
## Background

During my practice in old communities in China, I found that the density of buildings in these communities is too high, which makes **daylighting very difficult** (Figure 1). At the same time, in the process of communicating with many children in the community, I found that they are very **interested in interacting with light** (Figure 2). A handful of well-lit corners, therefore, became their "secret bases" (Figure 3). Inspired by these experiences, I hope to design an interactive device that can interact with light and people, and **bring interesting and vivid light to these spaces**. (The following photos are taken during my community practice)



## Design proposal

People control the movement of the facade, and the movement of the facade leads to changes of light environment in the indoor and outdoor.



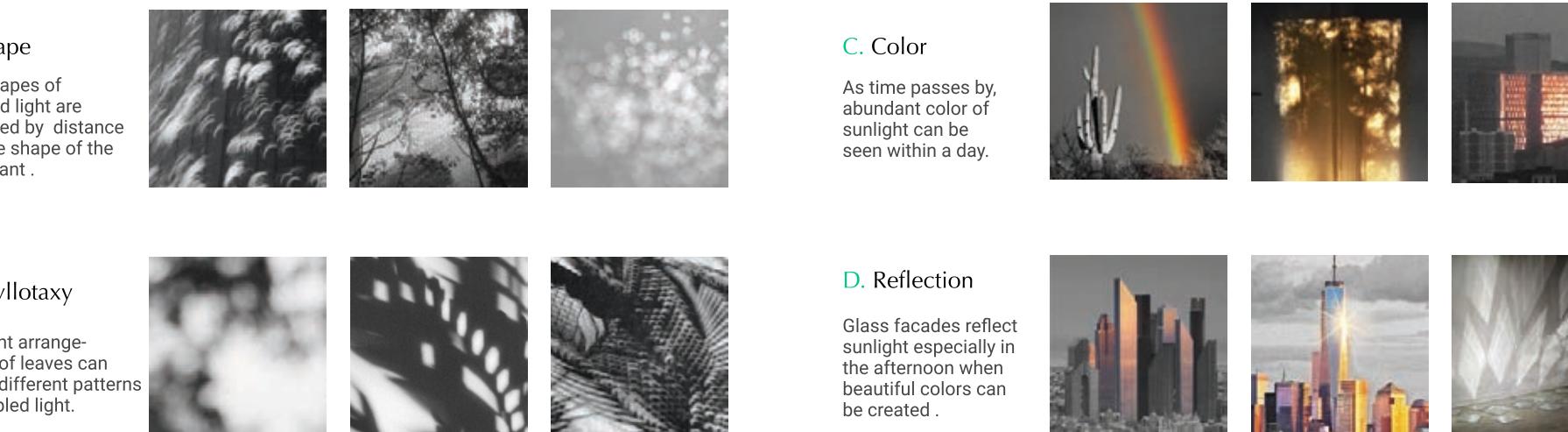
## Inspiration

The light and shadow formed by the interaction of light and trees in nature, **the wind blows and then the light and shadow shake**, these natural scenes are the source of inspiration for the design. Analogy to the dynamics of light and shadow in nature, I hope to **use artificial intelligence technology** in the design to control the change of light and shadow, so as to realize the reshaping of the light environment of urban space.

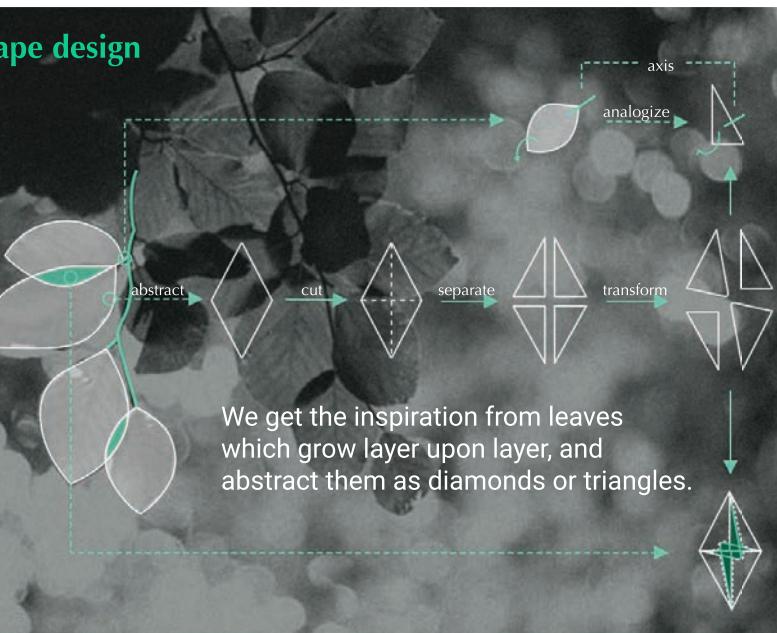


## Research on factors affecting the dappled light

We conduct research on natural factors affecting the dappled light from which we get our inspiration.

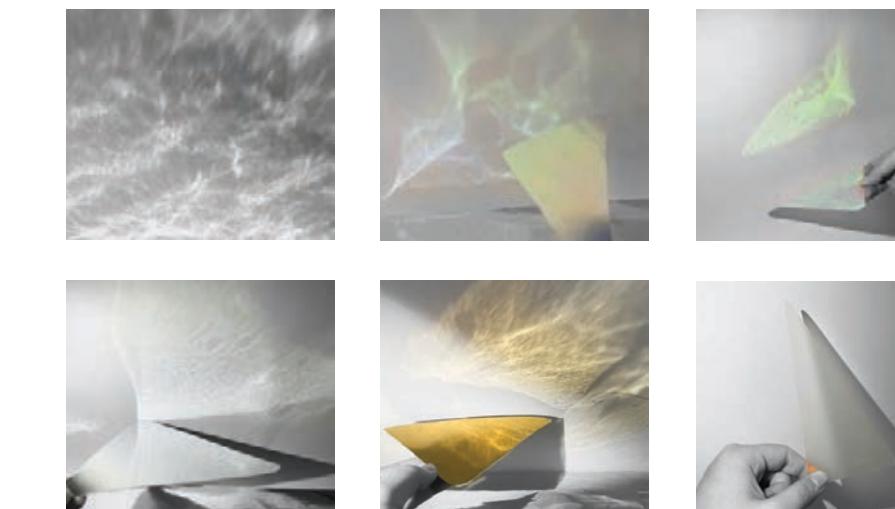


Explore suitable design forms and materials based on the natural factors above.



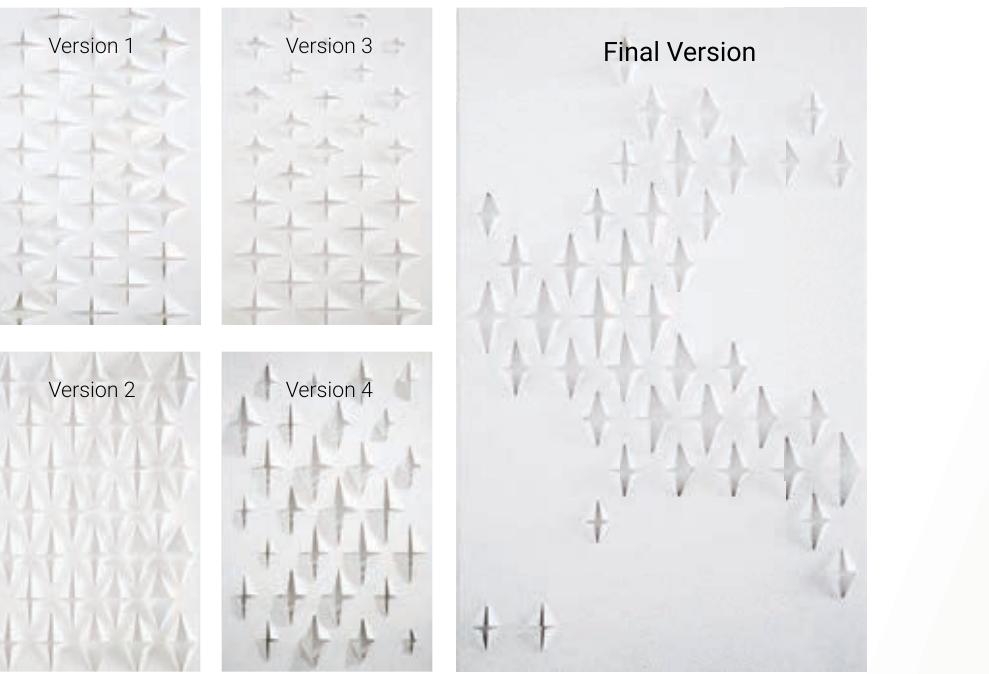
## Material testing

We tested four types of material to reflect different colors of light.

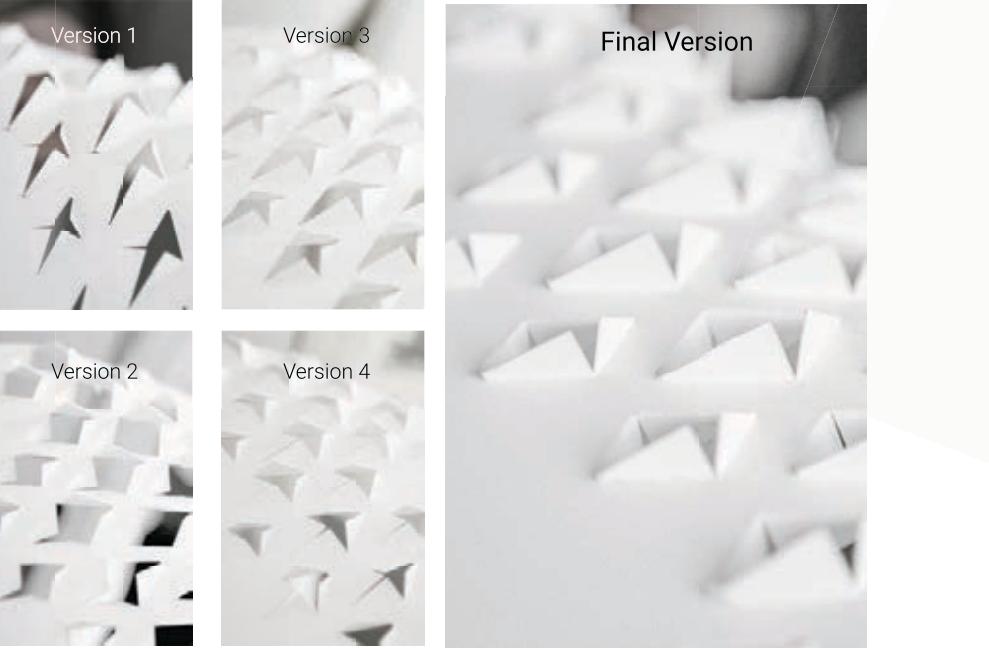


## Paper model research

– Facade form –

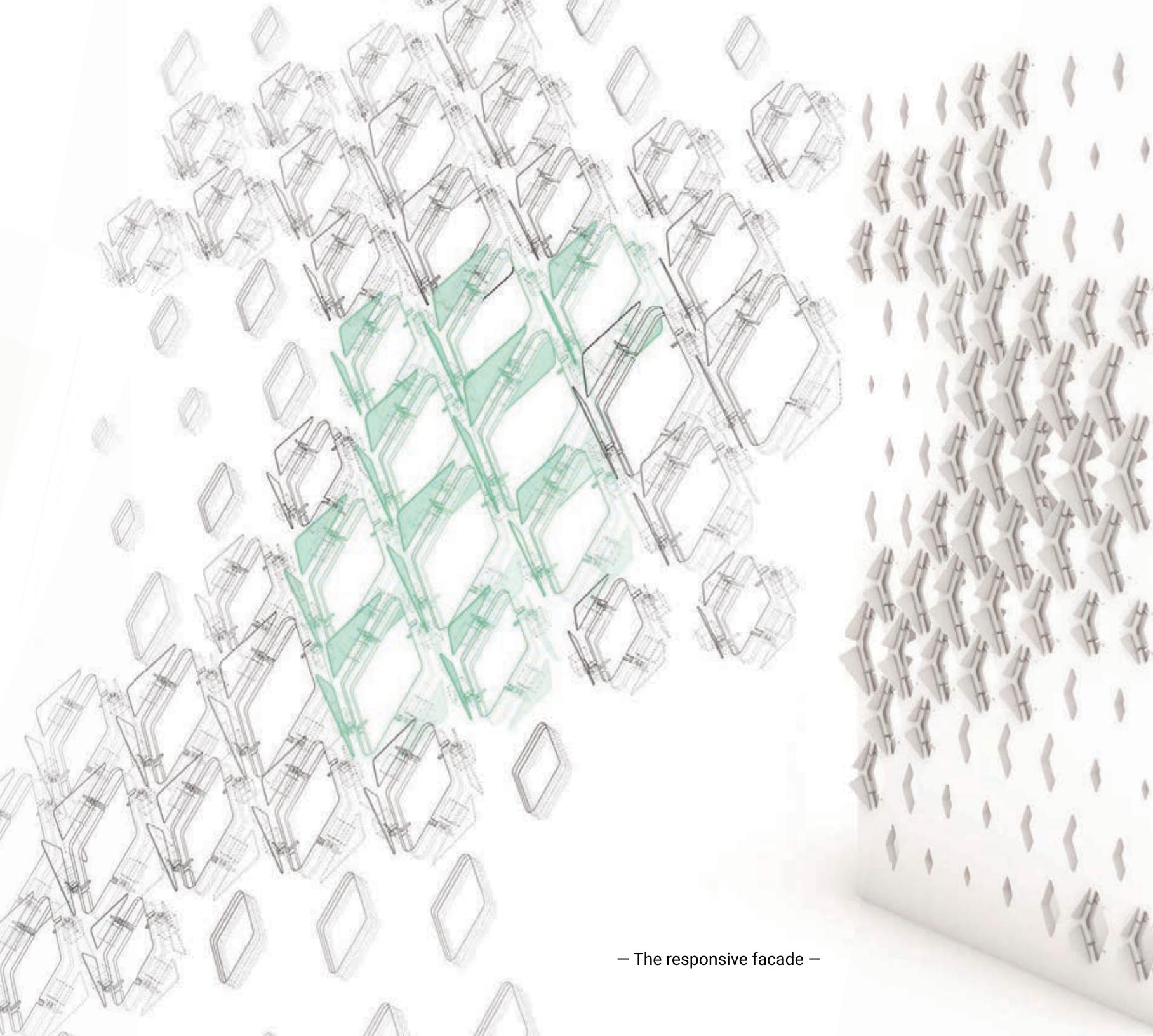
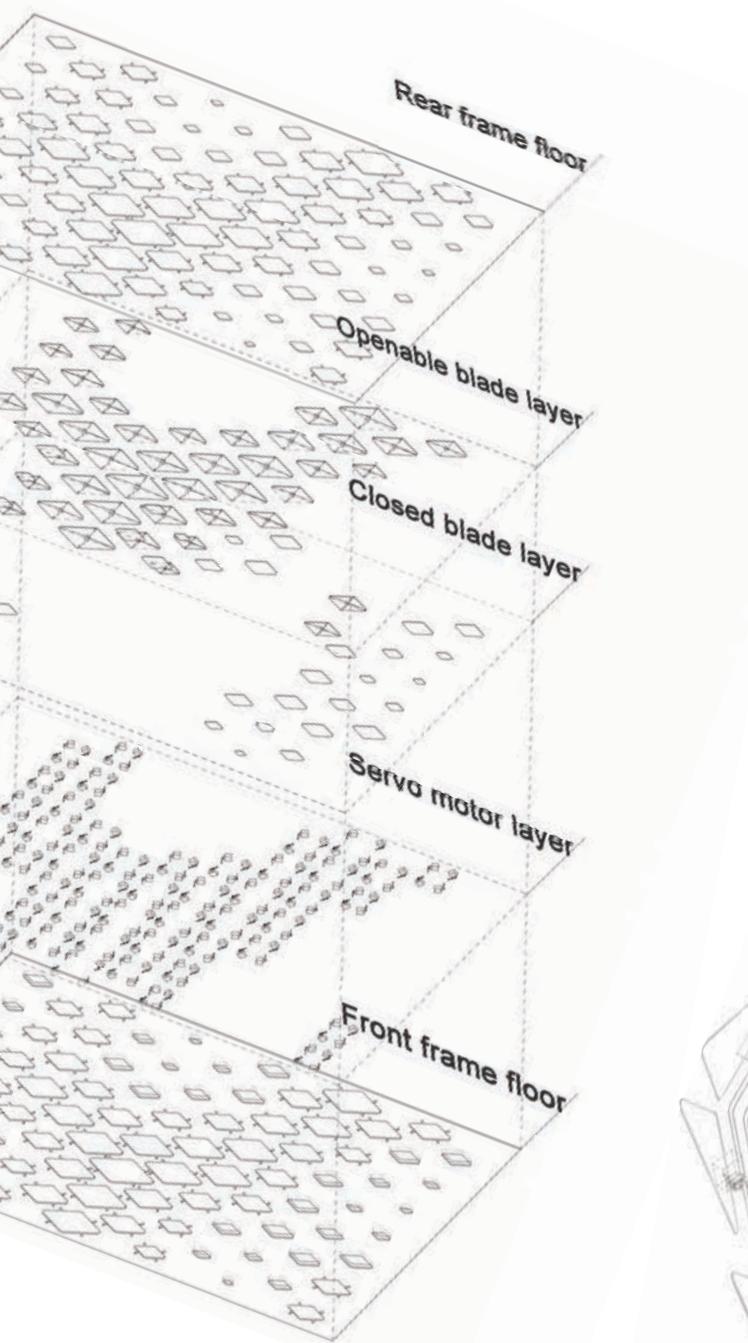


– Blade opening and closing mode –



## Design

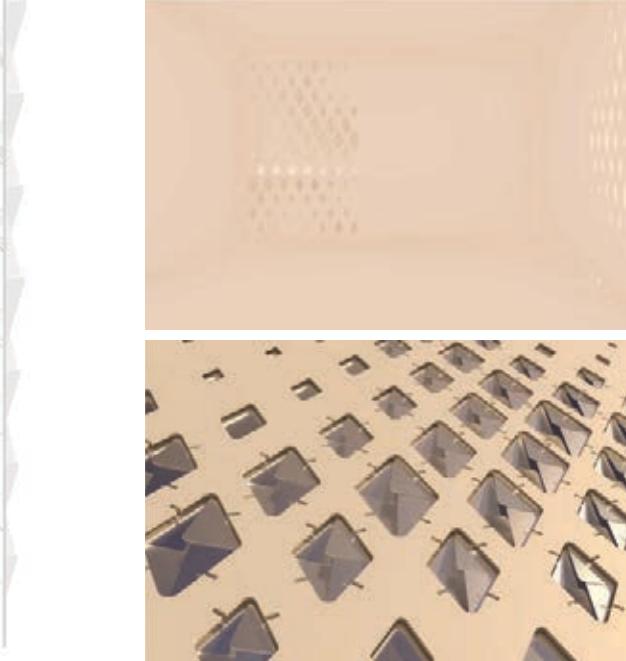
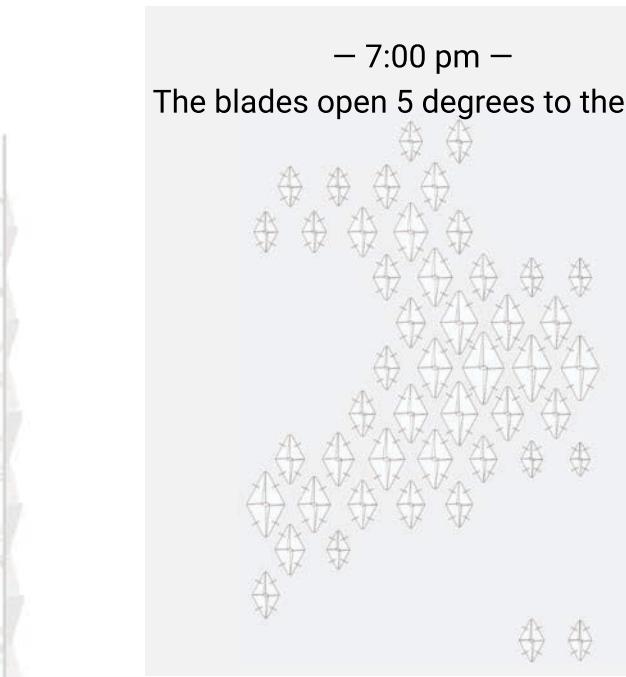
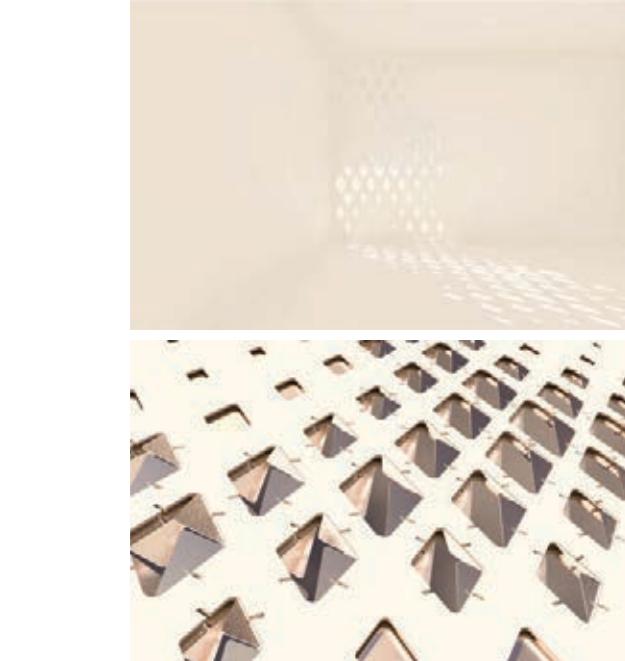
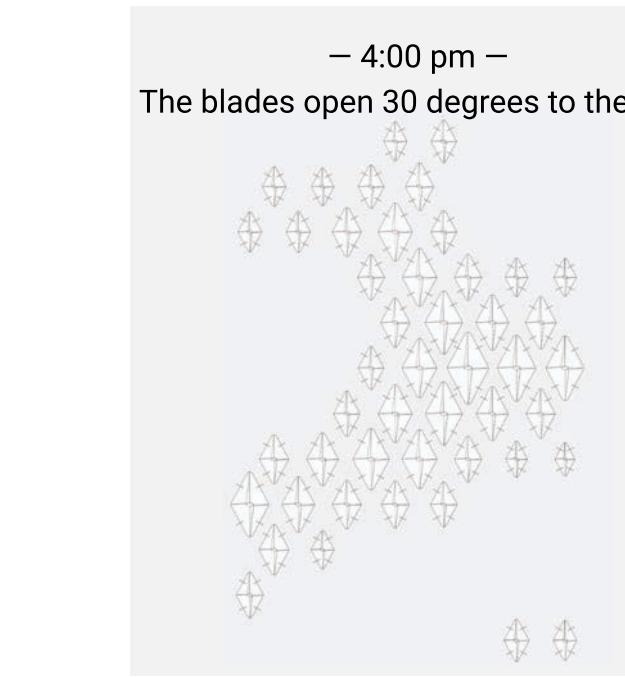
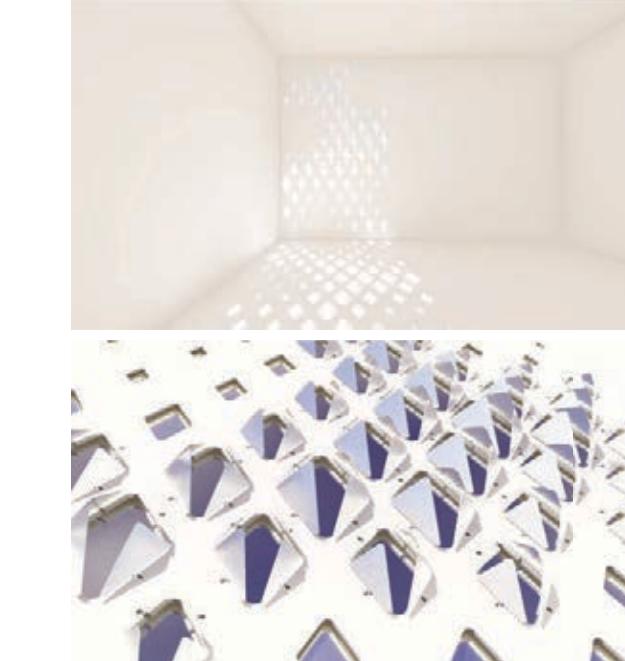
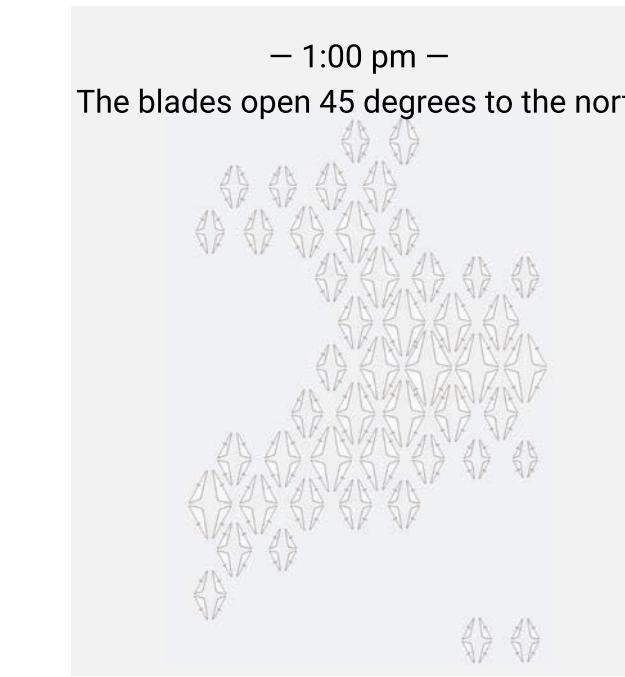
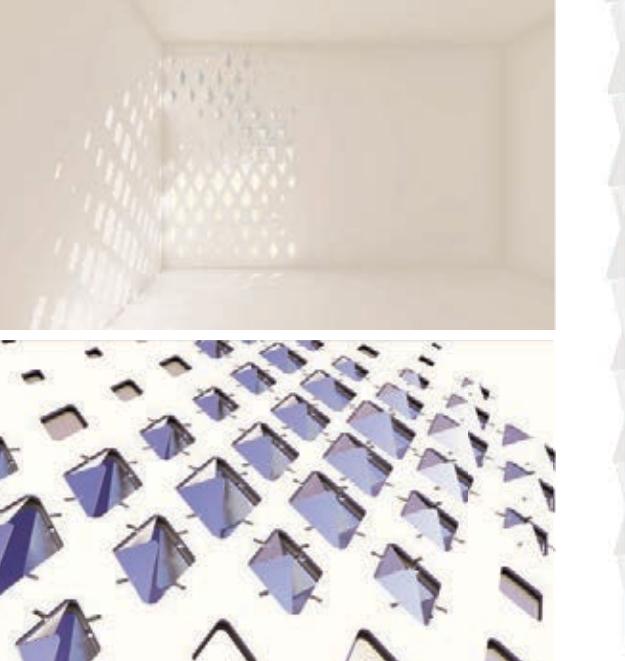
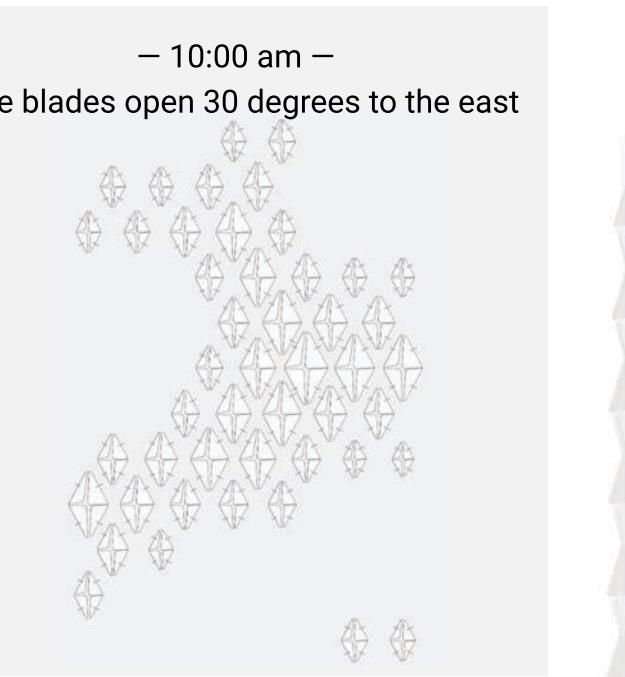
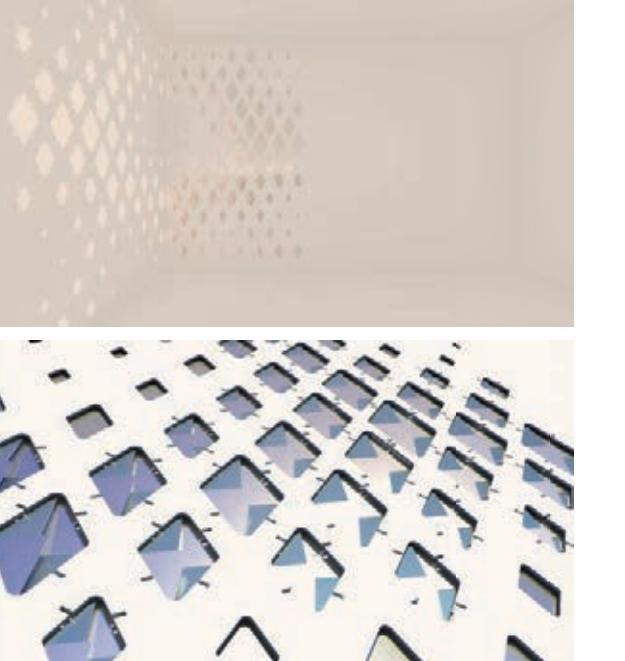
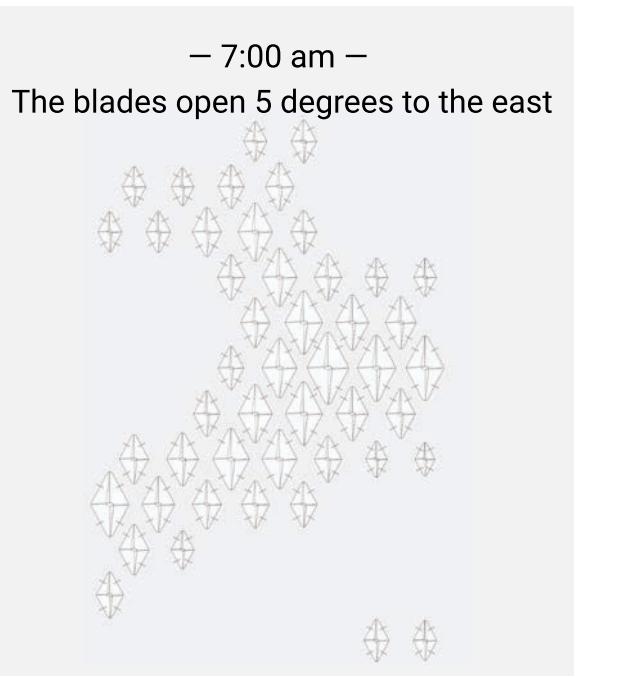
– The structure of the interactive facade –



– The responsive facade –

## Interaction mode

### 1. The states of the facade in different time



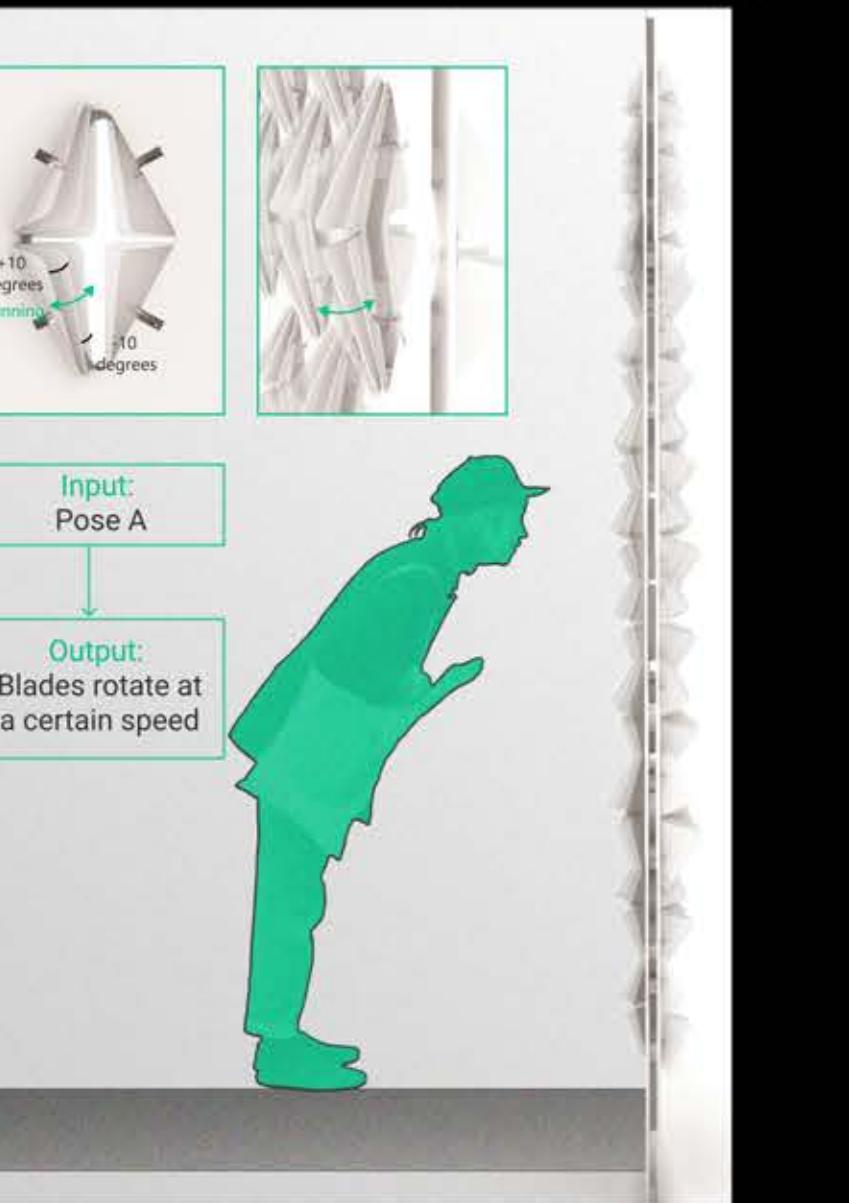
## Interaction mode

## 2. Interactive facade responds to human movements

**When there is no one in front of the facade,  
the blades are still at the angle of the corresponding period.**



there are people in front of the facade,  
are fanned within the range of 20 degrees from the existing angle.



## **My Research & Testing**

## Learning

et



Arduino to

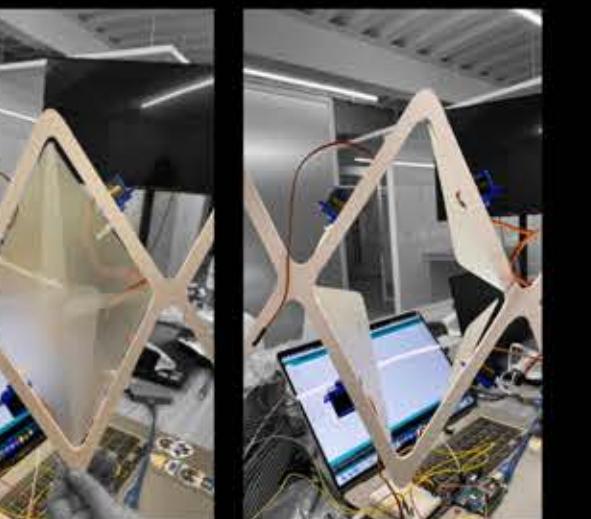
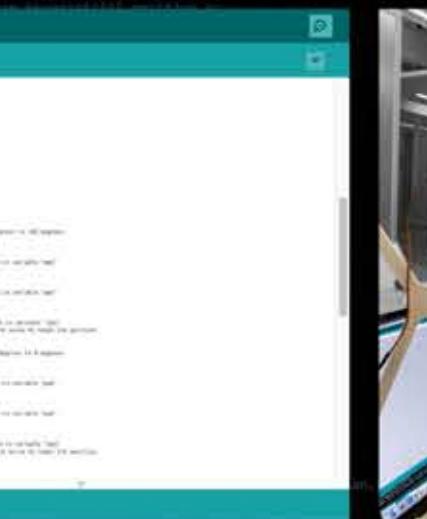
The screenshot shows the 'Serial Control' application interface. At the top, it says 'P5 SERIAL CONTROL' and 'Available for running and receiving of input, transmission'. Below that is a 'Info' section with 'Available ports list:' and two entries: 'idevtry/bluetooth-incoming Port <--' and 'idevtry/libmodem/M4409 <-- connected'. A 'Reconnect Ports' button is below this. The next section is 'Your public IP address: 192.168.3.178'. Then there's a 'Connect' section with 'Select Port:' dropdown set to 'Serial Port 1' and a 'Connect' button. At the bottom, it says 'Control Panel: /dev/idevtry/BlueSerialDongle'.

```
Starter Code
Starter code will be generated when you click
Imports. Copy-paste below code to get started.
Don't forget to import @serialPort!
```

Refer to [@serialPort](#) for more example code.

```
let serialPorts = [
  '/dev/tty.Bluetooth-IncomingPort',
  '/dev/tty.SLAB_USBtoUART'
];
let serials = [];
let data = [];

function setup() {
  createCanvas(window.innerWidth,
    windowHeight);
  let i = 0; i <
  serialPorts.length; i++ {
    let newPost = new
    p5.SerialPort(i);
    newPost.open(serialPorts[i]);
    newPost.on('connected',
      serverConnected);
    newPost.on('list', gotList);
    newPost.on('data',
      postData.bind(this, i));
    newPost.on('error',
      serverError);
    newPost.on('open', gotOpen);
    newPost.on('getClose',
      gotClose);
  }
  sociale.push(newPost);
}
```



P5

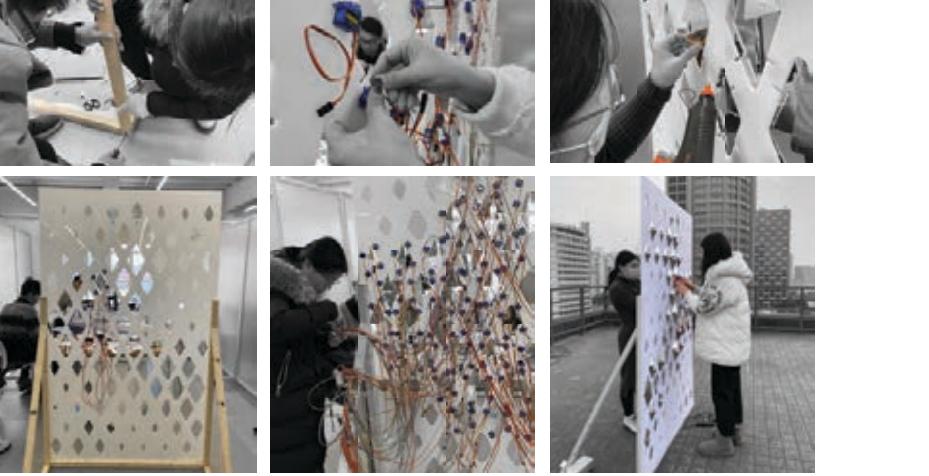
## Construction process

Acrylic frame board    Servo motor

Blades

Install the wooden bracket for the 1.5m x 1.8m x 4mm acrylic board cut by laser. Stick 188 motors on the acrylic board in a clockwise direction, and connect each motor with a 1-meter wire.

Paste mirror paper and laser paper on the surface of 188 blades, and then glue the blades on the rotating shaft of the motor.

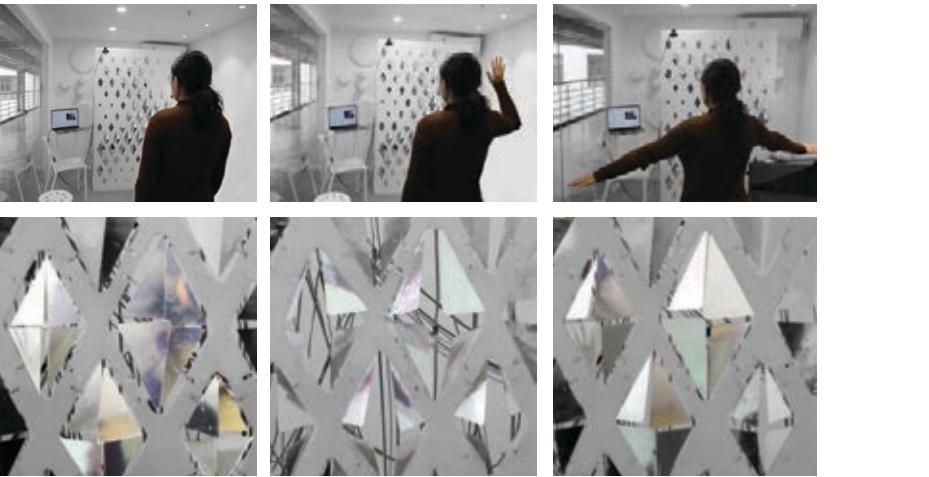


## Outcome display

Pose A

Pose B

Pose C





# Findit

Findit is an intelligent system that relies on MR technology and mobile phone devices, uses light spot positioning and personalized voice tags to help low-vision people recognize and find daily objects more conveniently, in familiar and unfamiliar environments.

Type: Individual Project

Tutor: Cen Zhang

Duration: 6 weeks

My role: Research 35%, Concept 80%, System Desgin 35%, Testing 35%, Application Dsiplay 100%, Drawing 60%, UX Design 50%

Watch Full Video:

<https://resume.fangfranksun.com/assets/Findit.mp4>



## Who was the subject of the study?

The main target group of this study is **low-vision people**. Low vision is a condition where one has a visual impairment that adversely affects daily activities and cannot be corrected with glasses or contact lenses<sup>1</sup>. Unlike blind people, low-vision people have **functional vision** and use their vision extensively in daily activities. The **photosensitivity** of this group is an important prerequisite for the project.

## Why do we design for low-vision people?

1. Impaired vision causes many obstacles to the lives of people with low vision.
2. Among the visually impaired people, people with low vision who are not completely blind account for the largest proportion and have the greatest demand.
3. People with low vision have limited vision, combined with the design of MR equipment can empower them, improve the utilization of vision, make life more convenient.

There are **253 million** visually impaired people in the world, **86%** of whom are **low vision** rather than blind.



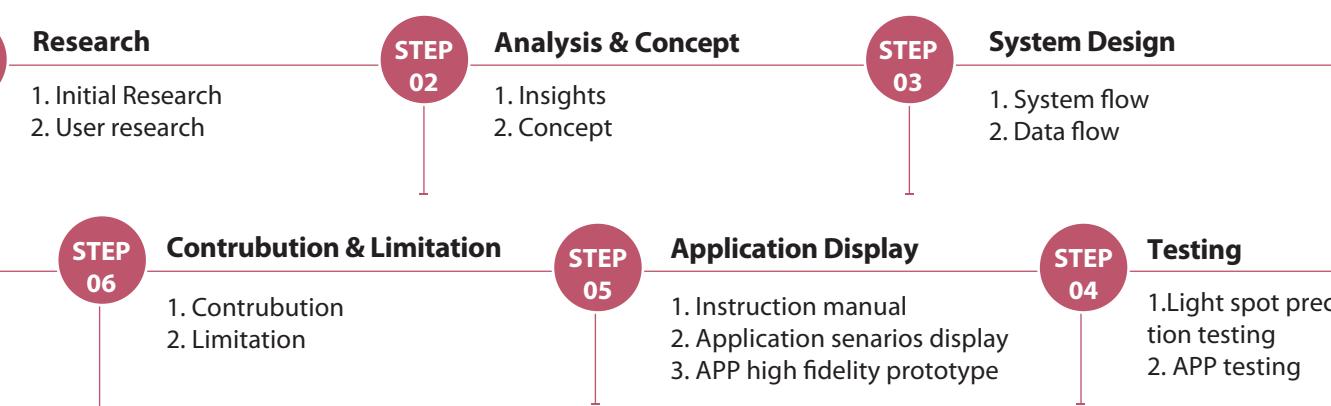
## Why do we design for low-vision people to identify items?

Unable to identify and locate objects is one of the **biggest obstacles** faced by people with impaired vision. If this problem can be effectively solved, their lives will be more **independent, convenient and safer**. At the same time, it can also **reduce the worries** of family and friends of people with low vision.

## How do we help the low-vision people to identify items?

Using the light perception ability of people with low vision, combined with **MR technology**, **smart glasses** are used to replace human eyes to **locate and identify items**, and the **information of items** is converted into voice and light spot signals that people with **low vision** can **perceive and read**. The user controls the device by **voice**. All item information is stored in the equipment **database**, including network shared databases and local personalized databases. As long as the item information stored in the local database can be identified, the local database can be manually entered or loaded by the network database. Users can **add personalized voice tags** to items through the glasses, and their **relatives and friends** can also enter item information through the **mobile APP**.

## Design Process



## Initial research

### 1. What is the visual field of low vision people ?

People with impaired vision can be divided into four types according to their vision<sup>2</sup>, as shown below. Their vision can be summarized as: Cloudy vision; An inability to see shapes; Seeing only shadows; Poor night vision. The main target group of this study is low vision people with Blurry or hazy vision. The vision situation is: can perceive the intensity of light, can distinguish color blocks, but can not see the shape and details of objects.



### 2. Related product research

We studied the existing smart devices used by visually impaired people, and classified and summarized them according to the technologies adopted, as shown in the figure below.

Technology Category	Auditory	Touch	Human Assistance	Sight Enhancement	Machine Vision
	Product				
Summary	Aiman Voice Tag Flashlight	Braille tag Dot smartwatch TACTILE TABLET	Aira Explorer Be My Eyes	OXSIGHT & Epson smart glasses VR X2 MR (ThirdEye) SeeingVR: a New Toolkit from Microsoft HTC Vive VR headset Apple AR SightPlus2 AR (GiveVision) ForeSee++	StairLight Relumino Wayfinding AR Canetroller Cognitive Augmented Reality Assistant MR Image alt tags Facebook Seeing AI Vision AI CueSee
	The form of voice is the most accustomed and convenient way for visually impaired people to receive information. However, the existing products are troublesome to make and complicated to operate.	Only knowing the location of the object can produce touching behavior, which is helpful for identifying the object, but not very helpful for finding the object.	The way to rely entirely on remote help is low efficiency, remote help cannot provide real-time help, and it is easy to burden relatives and friends. The visually impaired need to be more independent.	It fully and effectively utilizes the functional vision of people with low vision, empowers their vision. But there is no function specifically for finding things.	Machine vision relies on machine learning to store huge amounts of information, and using this technology to help visually impaired people find items would be very helpful.

**Insight 1**  
There are few research and products that use vision to help people with low vision find things.

**Insight 2**  
Using visual enhancement technology is the fastest way to help people with low vision find things.

**Insight 3**  
Appropriate support and care from friends and family without undue burden is very important for people with visual impairment. The product should take care of their psychological needs at this level.

**Insight 4**  
Phonetic labels are needed by visually impaired people.

## User research

### 1. Life observation of people with low vision

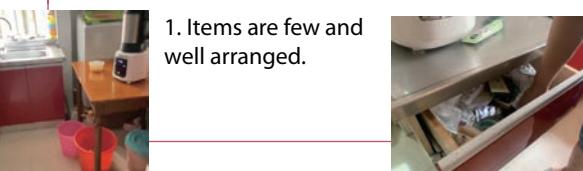
Through a day of coexistence and observation, we have come to the conclusion that Shen Chunlan ( a low-vision person) have 3 problems in finding items in her daily life.



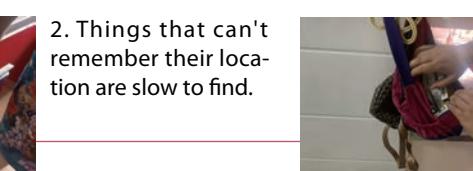
Name: Chunlan Shen  
Age: 58  
Vision: congenital cataract. left eye 0.05 , right eye 0.03.  
Can perceive light and color.  
Occupation: Operating a family-style massage parlour  
Living condition: Living alone



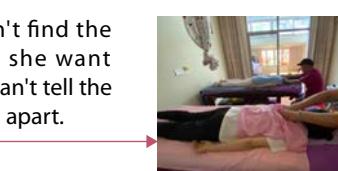
1. Items are few and well arranged.



2. Things that can't remember their location are slow to find.



3. She can't find the medicine she want because can't tell the packaging apart.



4. Work and life overlap in a 35 square meters space, rarely go outdoors environment. Rarely go out.

### 2. We interviewed people with low vision and their families online and offline

Interview people with low vision and their families online and offline respectively to understand their status and problems in finding things in life.



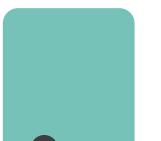
**1. How do you look for items in unfamiliar environment ?**

I don't know what's in front of me in an unfamiliar environment. so I can only recognize one by one by touching or ask someone else for help.



**2. Does light perception help in your life ?**

Light perception is helpful in finding doors, sensing weather changes and identifying whether the phone is locked or not. But to be honest, if we can't recognize the item, light perception is of limited help in my life.



**4. What concerns do you have about helping visually impaired family members?**

We really want to be able to help them, but because of the emotional subtleties, we don't know how to be able to help just enough.



**3. How does it feel when you can't find items ?**

I often get anxious because I can't find things, and I don't want to always ask for help and put others in trouble.



**8. Insight 8**

The residual light perception plays a limited role and is not fully utilized.



**9. Insight 9**

Visually impaired people have higher self-esteem and desire for independence.



**10. Insight 10**

Family and friends want to help the visually impaired, but often they are unable to.

## Personas

### People with low vision

#### Linshun Ma



Age: 26  
Location: Shanghai  
Sex: Female

Occupation: Masseur  
Relationship: Unmarried, Live with parents  
Visual acuity: Congenital cataract with light perception

*"If I can find things independently and quickly like a discerning person, It will save me and my kith and kin a lot of trouble..."*

#### Pains

- Slow to find items
- Can't find items in moved or forgotten locations
- Don't know what's in front of me in a strange environment
- Don't want to bother my family and friends

#### Goals

- Find items quickly
- Can find items easily if the item is moved or forgotten
- Independently recognize items in a strange environment
- Establish positive connections with friends and family

### Relatives of low-vision people

#### Yucai Wu



Age: 48  
Location: Shanghai  
Sex: Female

Occupation: High School Teacher  
Relationship: Living with a daughter with low vision

*"I want to help my daughter in an appropriate way to facilitate her..."*

#### Pains

- Due to work often can not accompany my daughter
- My daughter is very sensible but there is a gap
- The discordance of time and distance prevented me from giving my daughter timely help

#### Goals

- Real-time and non-real-time remote help to match each other's time
- Personalized care embodiment

## Insight & Solution

Based on the 10 insights previously studied, four core design strategies are derived.

#### Insight 1

There are few research and products that use vision to help people with low vision find things.

#### Solution

**Lightspot**  
Recognize and locate objects and convert item information into light spots that can be seen by people with low vision.

#### Insight 2

Using visual enhancement technology is the fastest way to help people with low vision find things.

**Voice tag**  
People with low vision can make voice tag for items. Besides, they can control glasses equipment by voice.

#### Insight 5

Visually impaired people try to simplify their belongings and rely on memory to find things.

**Open source database**  
Item database supports people with low vision to store large amounts of item information.

#### Insight 3

Appropriate support and care from friends and family is very important for low-vision people.

**Remote help**  
Family and friends of the people with low vision can provide remote support and help.

#### Insight 9

Visually impaired people have higher self-esteem and desire for independence.

**Items**  
Go to an unfamiliar environment will feel very insecure, rarely go out, narrow life.

#### Insight 8

The residual light perception plays a limited role and is not fully utilized.

#### Insight 4

Voice information are very helpful in people with low vision in their lives.

#### Insight 6

The visually impaired often cannot distinguish similar items and cannot find them.

#### Insight 10

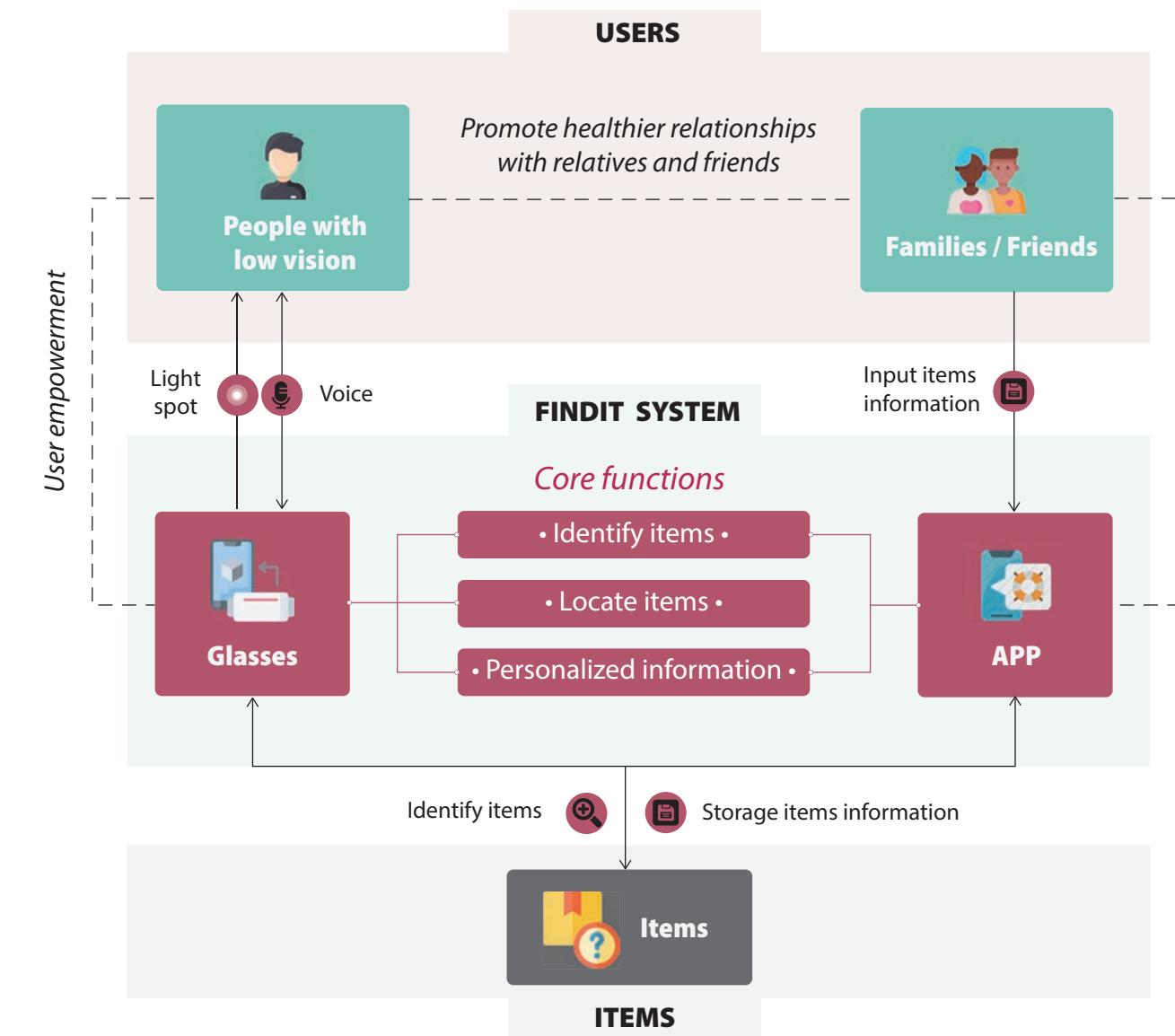
Family and friends want to help the visually impaired, but often they are unable to.

#### Insight 7

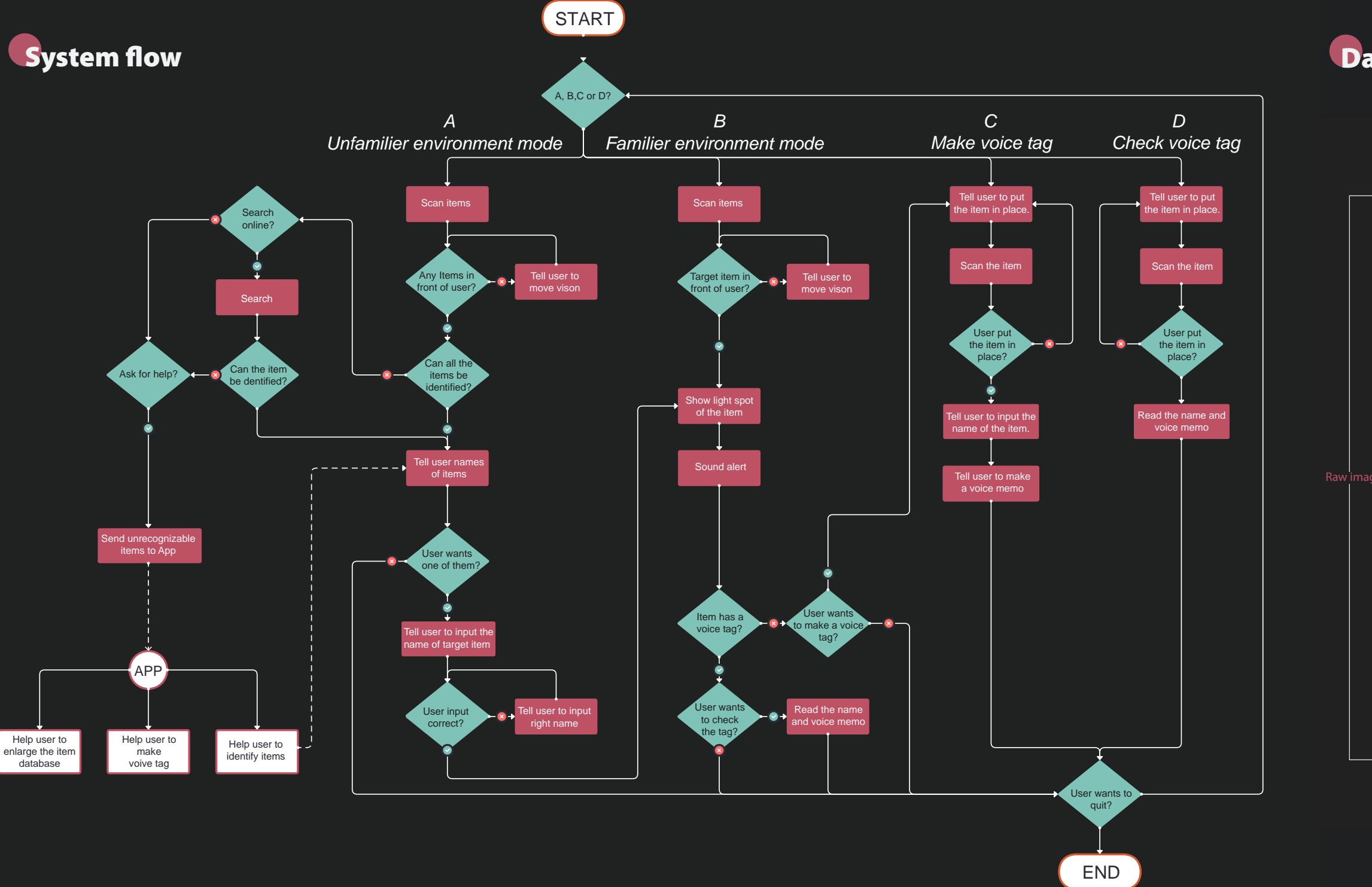
Go to an unfamiliar environment will feel very insecure, rarely go out, narrow life.

## Concept

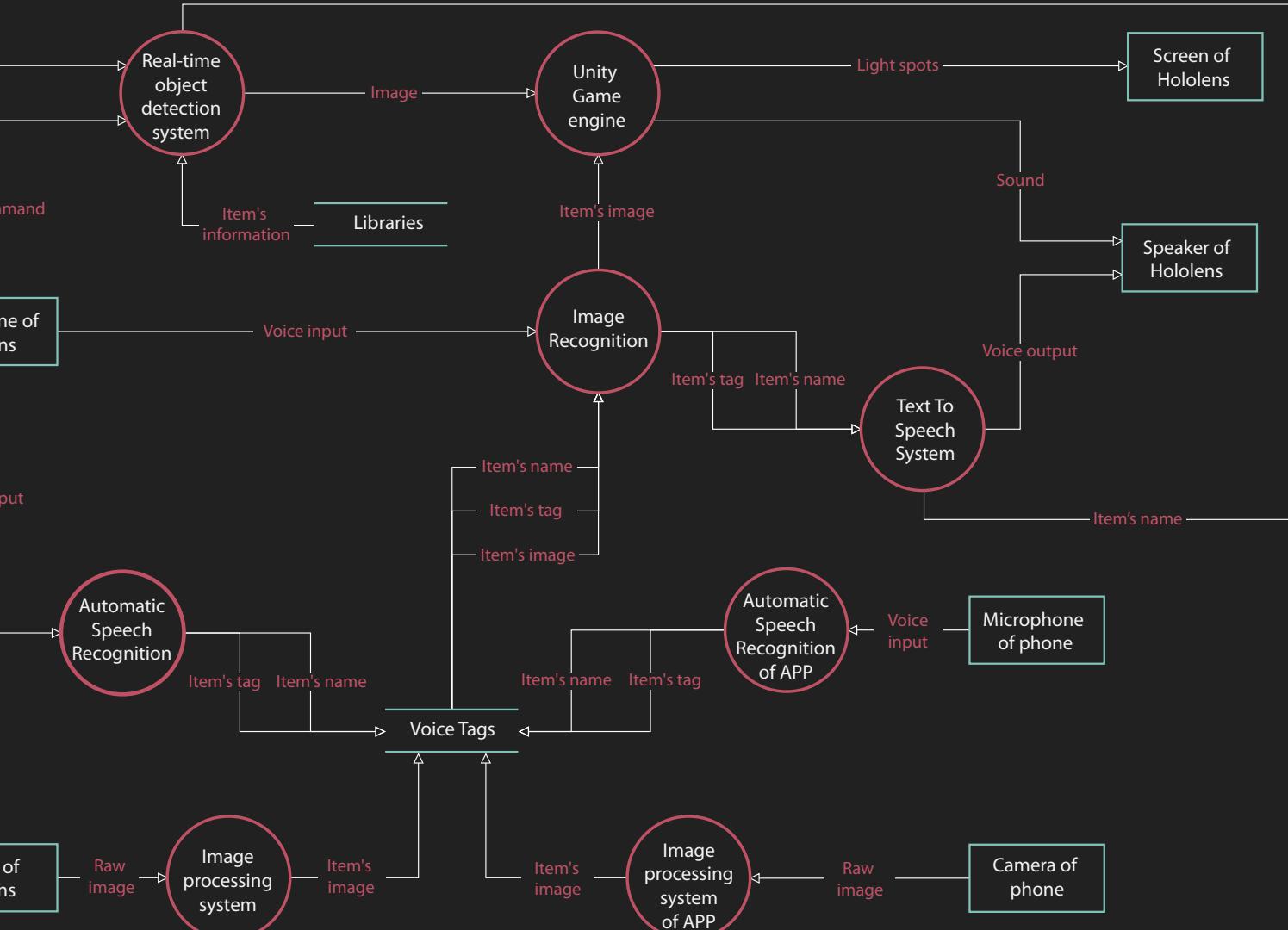
Based on solutions, discuss and conceive the design concept of the product system. The following figure mainly illustrates the relationship between the functions, hardware devices, user population and identification objects included in the entire product system. In the end, the product value including user empowerment, remote assistance, and optimization of the relationship between users and relatives and friends is constructed.



## System flow

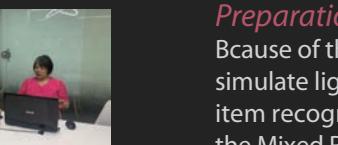


## Data flow



# Light spot perception testing for low-vision people

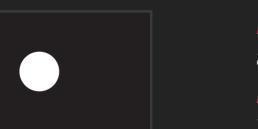
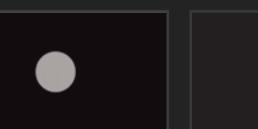
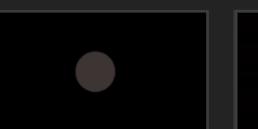
Ms. Chunlan Shen helped us to complete the light spot perception test. Her vision is as follows: congenital cataract. left eye 0.05, right eye 0.03. Can perceive light and color.



## 01. Light spot brightness perception

**Process:** We create a light spot in HoloLens (Hololens has 10 levels of brightness adjustment), then let the subject recognize the light spot and perceive the brightness of the light spot.

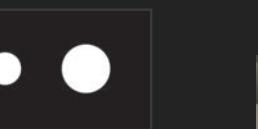
**Results:** 1. The light spot can be clearly identified  
2. Need to adjust the light intensity for different users



## 02. Light spot size perception

**Process:** We create 2 light spots in different size, then let the subject recognize them.

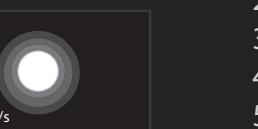
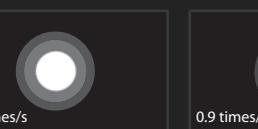
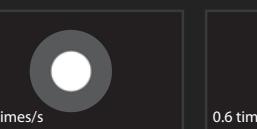
**Results:** The subject can easily identify the size of 2 light spots.



## 03. Light spot flashing speed perception

**Process:** We create 1 static light spot and 3 light spots with different flashing speeds, then let the subject recognize them.

**Results:** 1. Flashing light spots can be identify easier than static one.  
2. Flashing too fast can cause discomfort to the user's eyes



## Conclusion:

1. Using light spot to location item is feasible
2. The distance of the object can be judged by the change of the light spot size
3. Flashing light spot is better than static one
4. The brightness and flashing speed of the light spot needs to be adjustable
5. Using HoloLens as a carrier has some hardware deficiencies

## 04. Light spots & object recognition simulation

### Preparation:

Because of the limitation of our technology and project time, we use a relative easy method to simulate light spots and objec recognition. In general, we use Vuforia engine to complete the item recognition part, and use Unity to achieve the presentation of light spots. Then we use the Mixed Reality Toolkit to generate application and publish it to HoloLens.



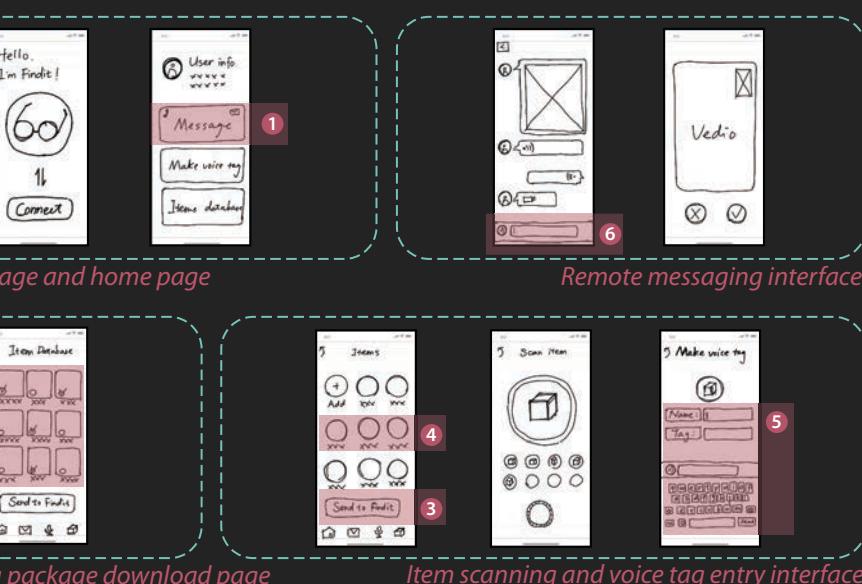
**Process:** We let the subject wear HoloLens to experience the process of identifying objects and positionning item with light spots.

**Results:** 1. Using light spot to locate item is really more convenient than touch.  
2. It is difficult for people with low vision to capture the light spot when the distance is very close, because the HoloLens camera is on the forehead not eyes.  
3. Beacuse of the limitation of Hardware, the light spot sometimes shows discoloration, truncation, and delay.

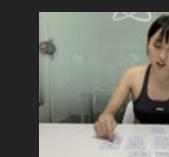


# User interface design and testing for relatives and friends of low-vision people

## Low Fidelity Prototype



## User testing



1 The information of database may not be enough. I think it would be better if the number of items in the database could be displayed.

2 If there is a message, I should be able to see it in the main menu, and then I will click to check it.

3 I think this button is a bit redundant. It is more convenient to send directly after adding the voice tag.

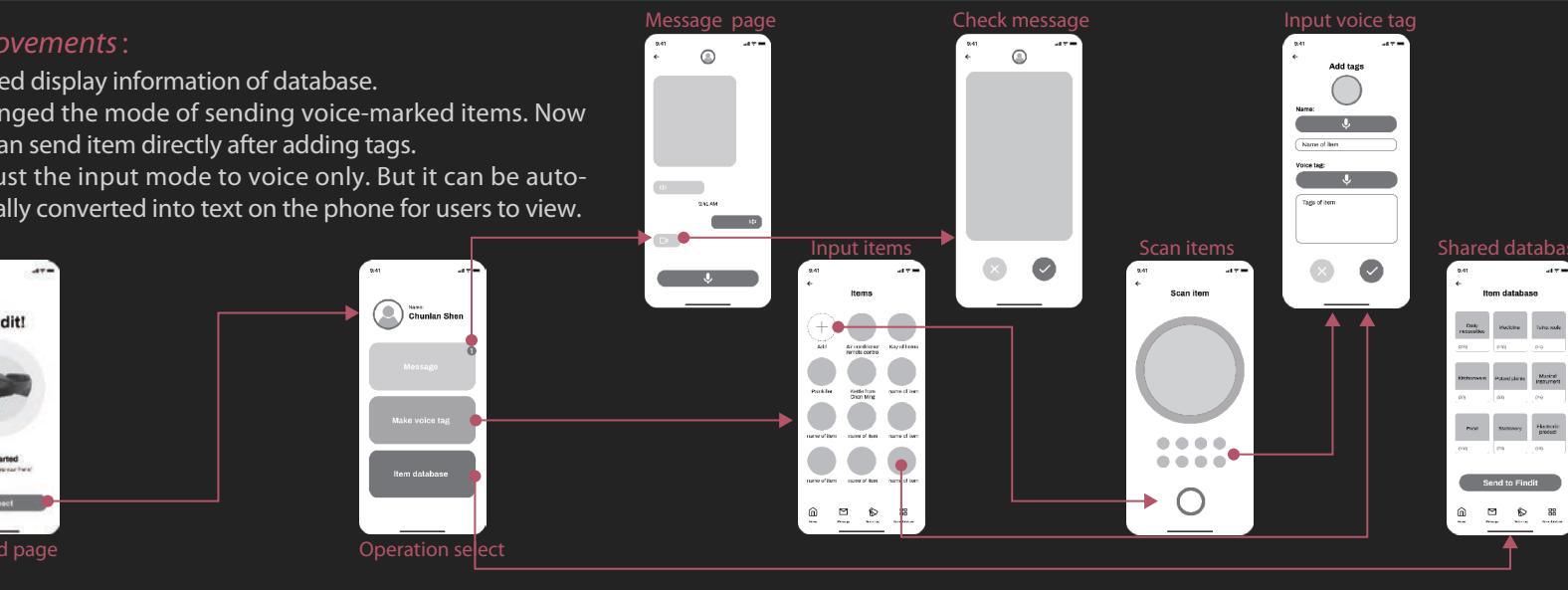
4 For items that have been entered before, the function of adding voice tags again should be considered.

5 Voice is friendly to blind people, while text is friendly to App users. But it would be confusing to have text and voice input methods at the same time.

## Middle Fidelity Prototype

### Improvements:

- 1.Added display information of database.
- 2.Changed the mode of sending voice-marked items. Now user can send item directly after adding tags.
- 3.Adjust the input mode to voice only. But it can be automatically converted into text on the phone for users to view.

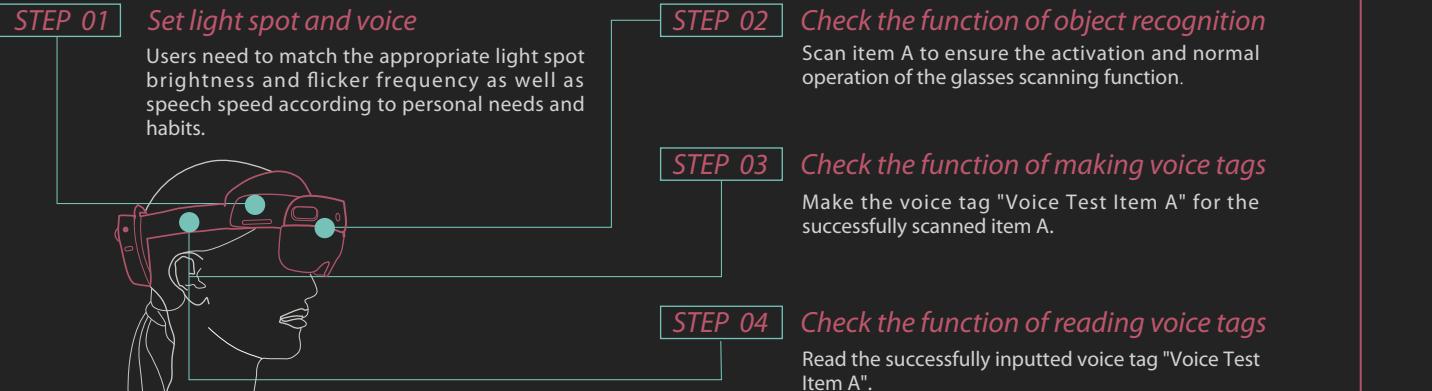


## Instruction manual

When using the product for the first time, the user needs to prepare and learn for operation according to the following steps. The process must be completed with the assistance of staff or relatives and friends. After completing all setting and checking content as instructed, users can start using the product.

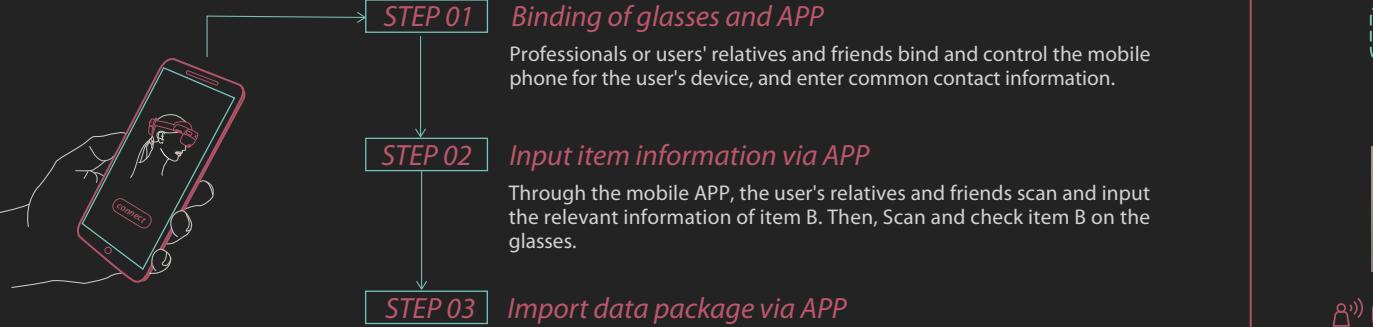
### Findit Glasses for low-vision people

- After opening FINDIT, the user completes the following four steps of setting and testing with the assistance of professionals or relatives and friends.



### Findit App for the relatives or friends of low-vision people

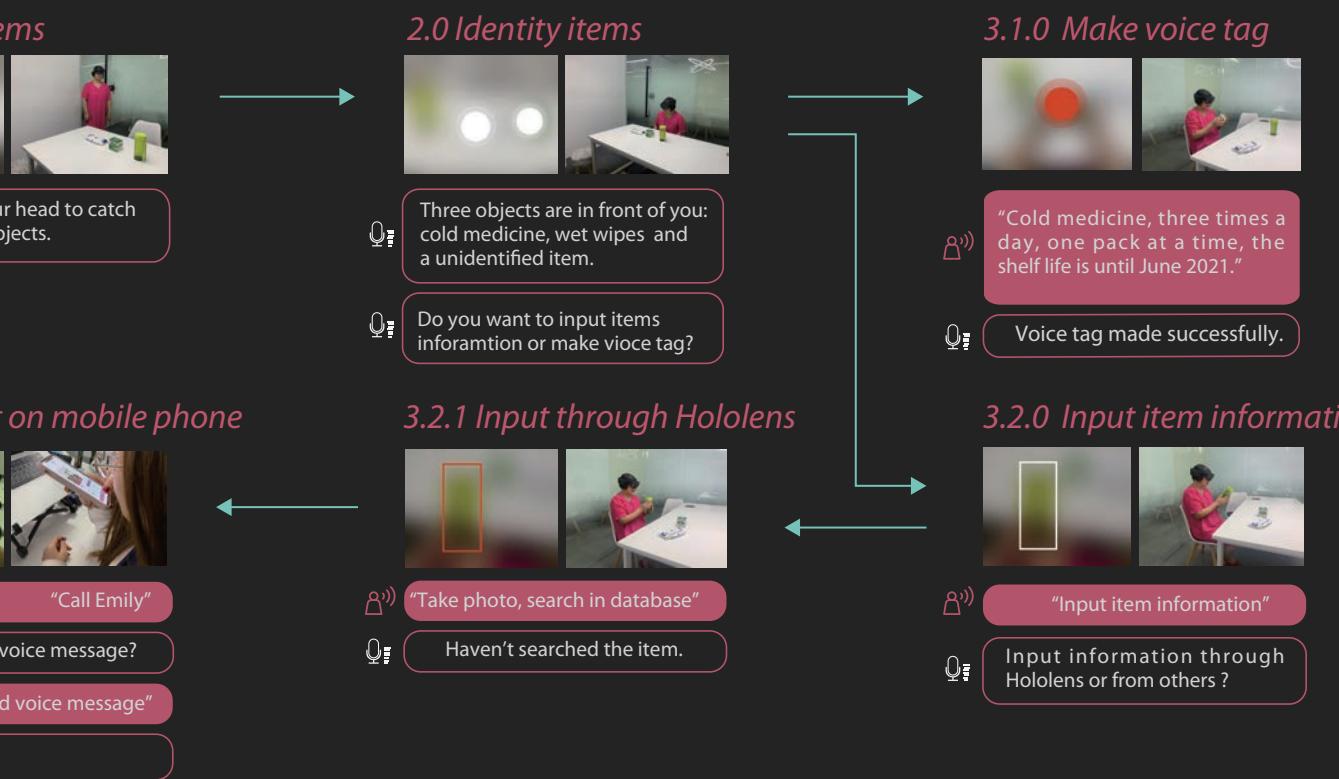
- The user's relatives and friends need to follow the steps below to complete the operation of the mobile APP.



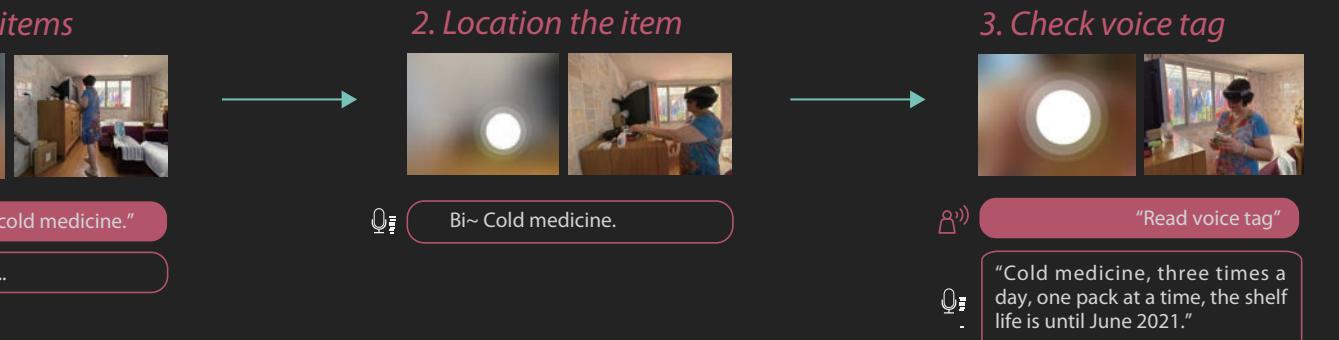
• Supplement: Items A, B, C are test-specific models provided by the product.

## How low-vision people use Findit Glasses in two different scenarios?

### Scenario 1: Unfamiliar environment



### Scenario 2: Familiar environment



According to the test results, we designed the application process and scenarios of the product. The application scenarios are divided into familiar scenarios and unfamiliar scenarios.

We once again invited Ms. Shen Chunlan to experience and give feedback on the entire use process. The prominent problem in the experience lies in the hardware of the device itself, including the following two aspects:

1. The Hololens lens is above the head and the field of view is narrow, and the user cannot accurately place objects within the visible range of the lens;
2. The light spot in the Hololens is unstable, sometimes absent and delayed.

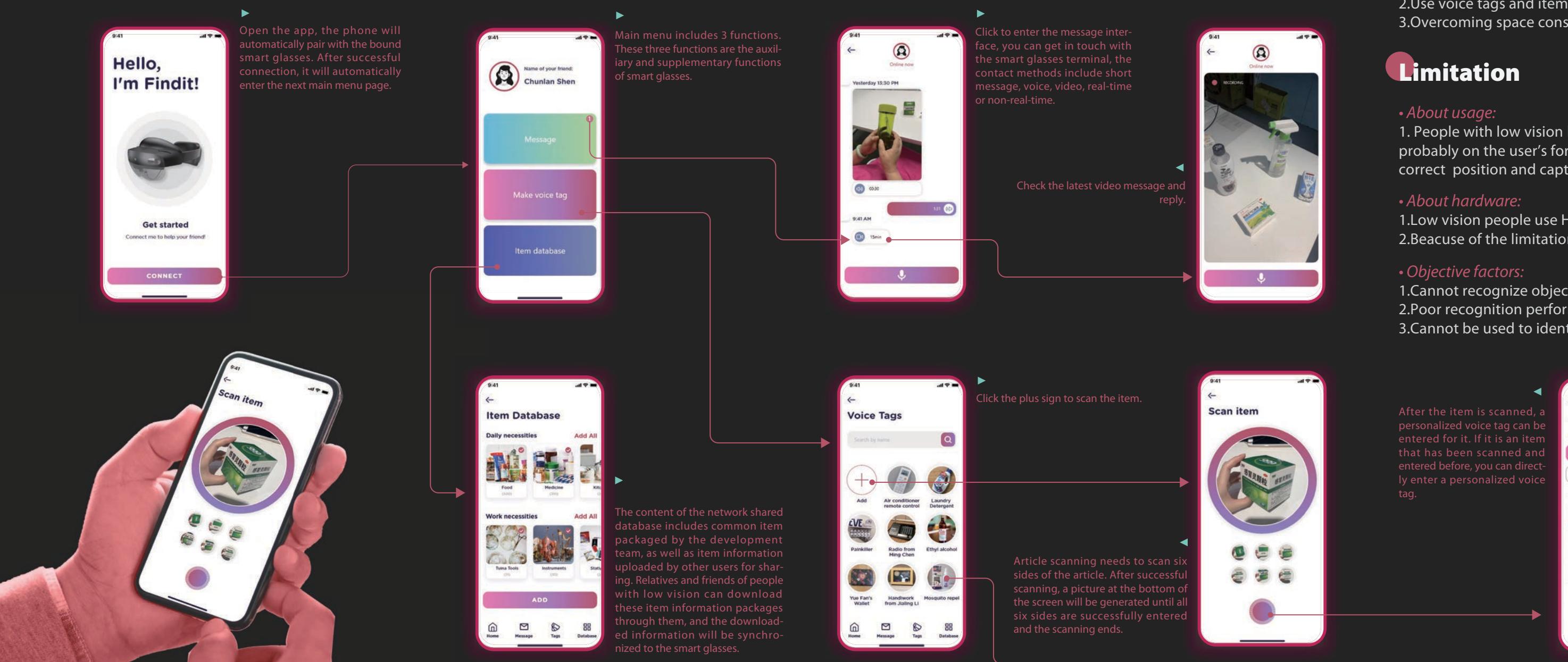


**Machine voice:**  
Hello, I am here, what do you need?

**User voice:**  
Hi,Findit!



## APP for relatives and friends of low-vision people



## Contribution

- Take advantage of the limited vision of people with low vision to help them find items.
- Use voice tags and item libraries to personally meet the needs of people with low vision.
- Overcoming space constraints and using APP to enable family and friends to remotely assist the user.

## Limitation

### About usage:

- People with low vision have difficulties in making voice tags by themselves. Because the camera of Hololens is probably on the user's forehead and the user has very low vision, so it is difficult for them to place the item in the correct position and capture the complete image.

### About hardware:

- Low vision people use HoloLens itself is a kind of difficulty.
- Because of the limitation of Hardware, the light spot sometimes shows discoloration, truncation, and delay.

### Objective factors:

- Cannot recognize objects in the dark.
- Poor recognition performance in places where the light is too strong.
- Cannot be used to identify occluded objects.



# Living Apart Together

A smart mirror for lovers  
in long distance relationship

Watch the video:  
[https://resume.fangfranksun.com/  
assets/Living\\_Apart\\_Together.mp4](https://resume.fangfranksun.com/assets/Living_Apart_Together.mp4)



By Frank Sun

3 weeks

Touchdesigner / Arduino

## About

By this project, we tried to create a lite way to enhance the sense of presence for couples/lovers in long distance relationship ( LDR ).

According to the research of ICHARS, it is usual to feel alone and lonely when you are in a distance from your significant other. These emotions of missing one's partner every single day are very normal. Sometimes it is just the emptiness that one may feel and sometimes it is a loss of contact with the partner. This starts making people wonder whether they are close to their partner or not.

Therefore, we tried to create a way to make people in LDR know that they are not alone and their partner is there to back them up.

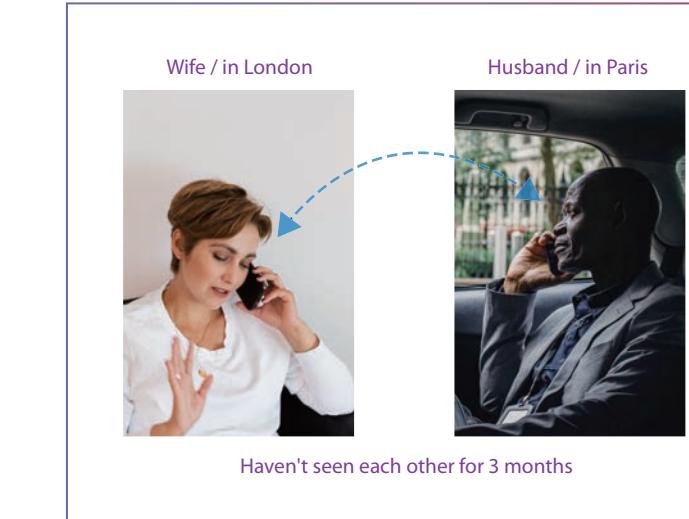
## Background

2020 the pandemic has slowed down the pace of the world. The lockdown has emphasized the hurts of loneliness. It brought us time to rethink the meaning of relationship with our loves.

1/4 of lovers are in long distance relationship in China, 3750,000 couples in the US, and 785,000 in England and Wales.

They are trying their best to resist the time to wear out their emotions.

There is always a need of new ways to create meaningful interactions to cherish the right person of our life.

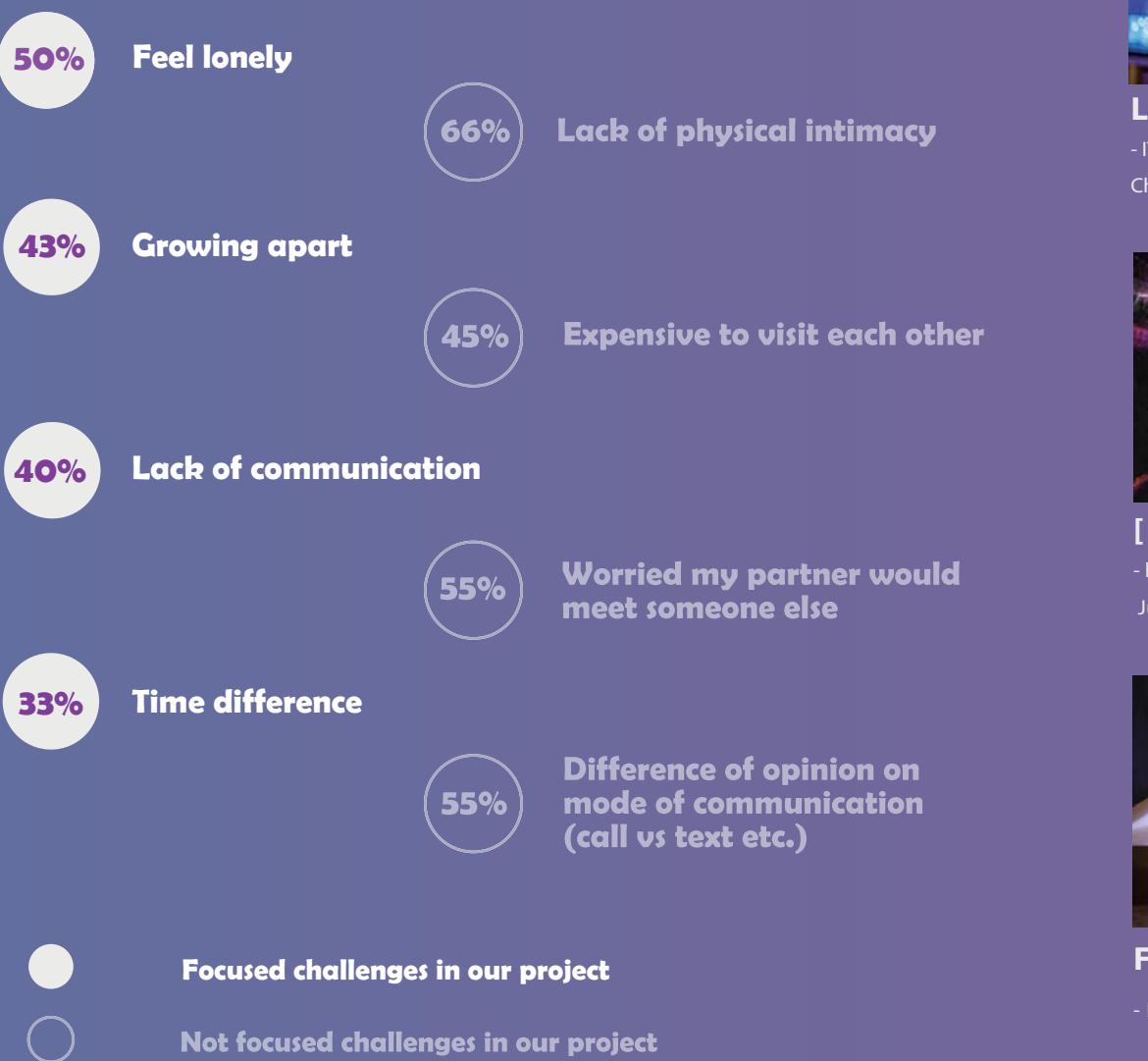


Data source:  
Survey Report on the Emotional State of Young Workers in China in 2018  
U.S. Census Bureau, Current Population Survey, 2017 Annual Social and Economic Supplement  
Office for National Statistics, UK

# Research

## The Top 8 Challenges of A Long distance relationship

A survey conducted in Oct. 2018 by OnePall with a sample of 1000 Americans who have been in a LDR

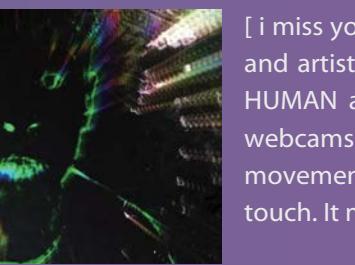


# Inspirations



### LOVE TESTING

- ITP WINTERSHOW 2017 by IVY Huang, Ella Chung and Eva Chen



### [ i miss your touch ]

- by PluginHUMAN (Dr Betty Sargeant and Justin Dwyer, the artists)

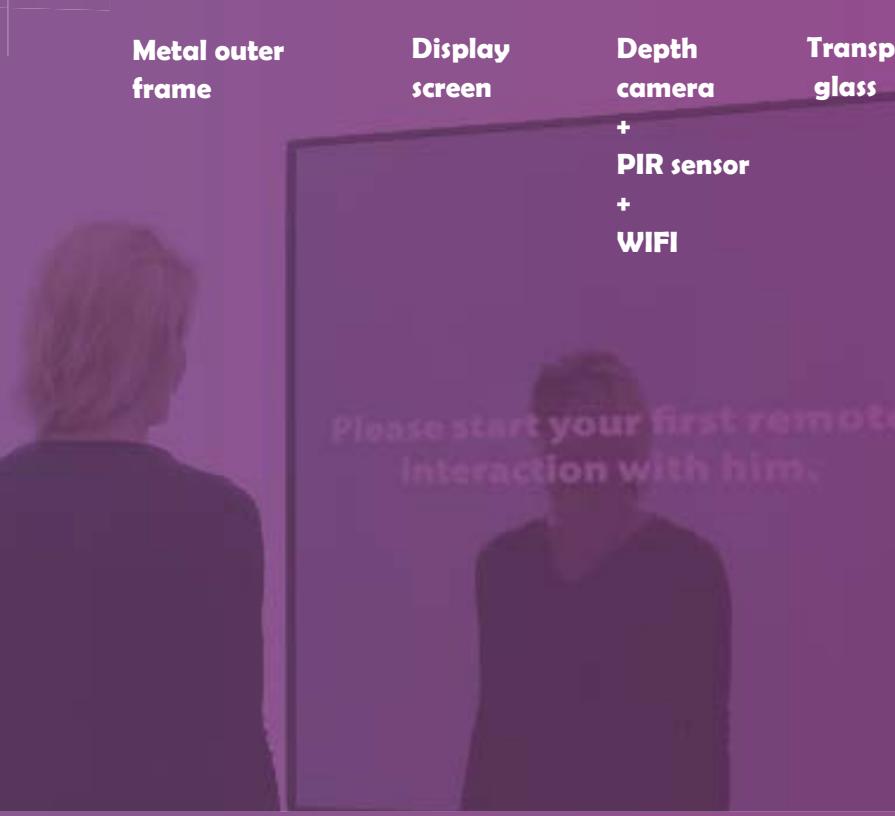
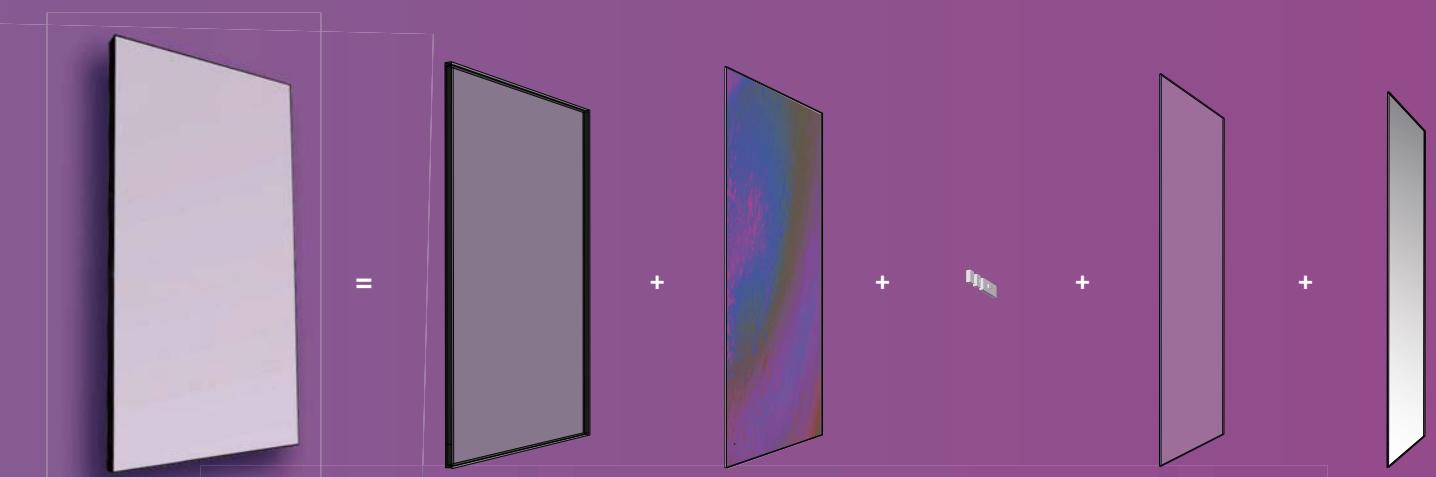


### Felt Presence

- by Luoyuxiao Lea at Zaha Digital Lab

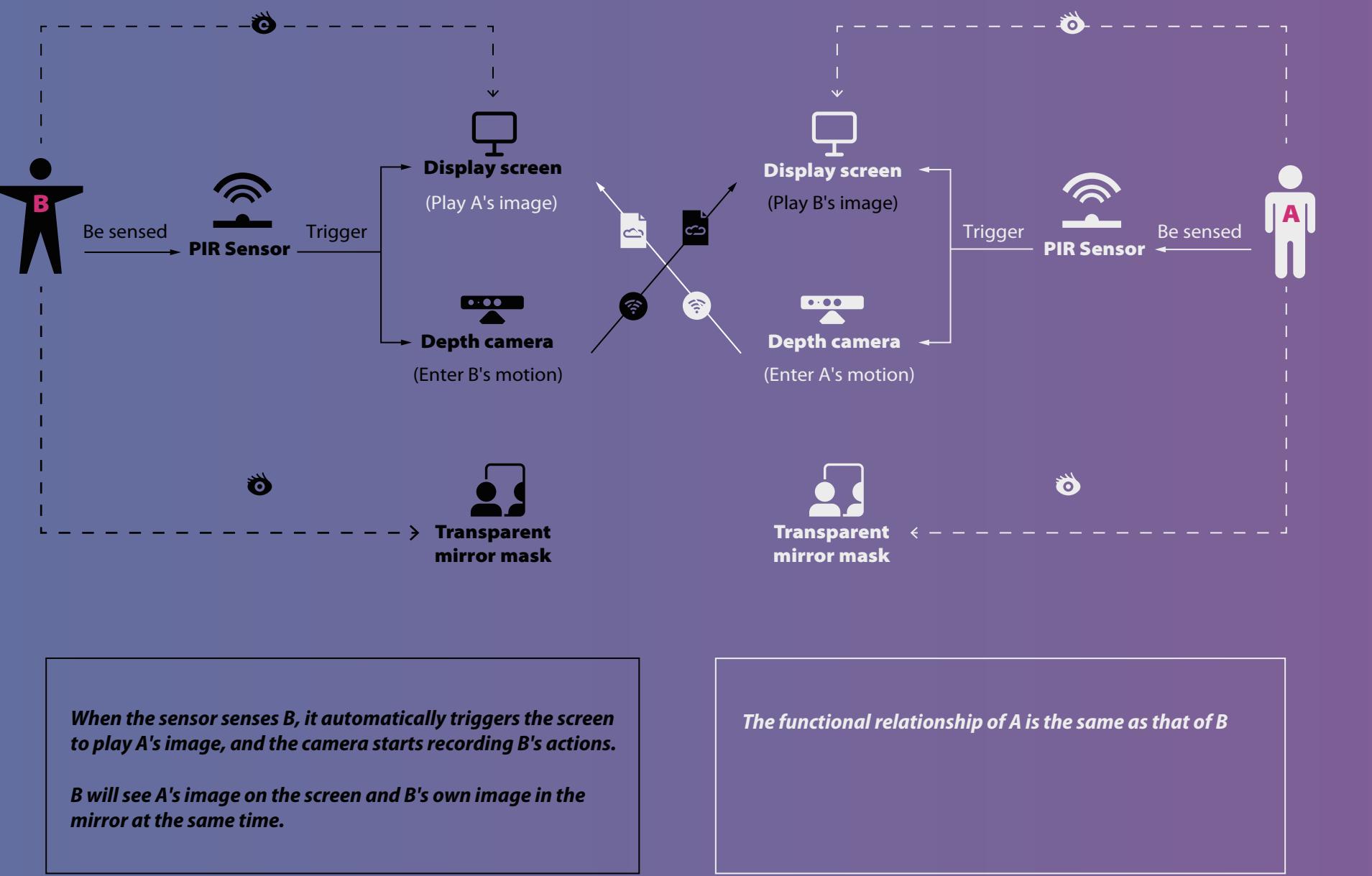
# Our Design Concept

## • A smart mirror



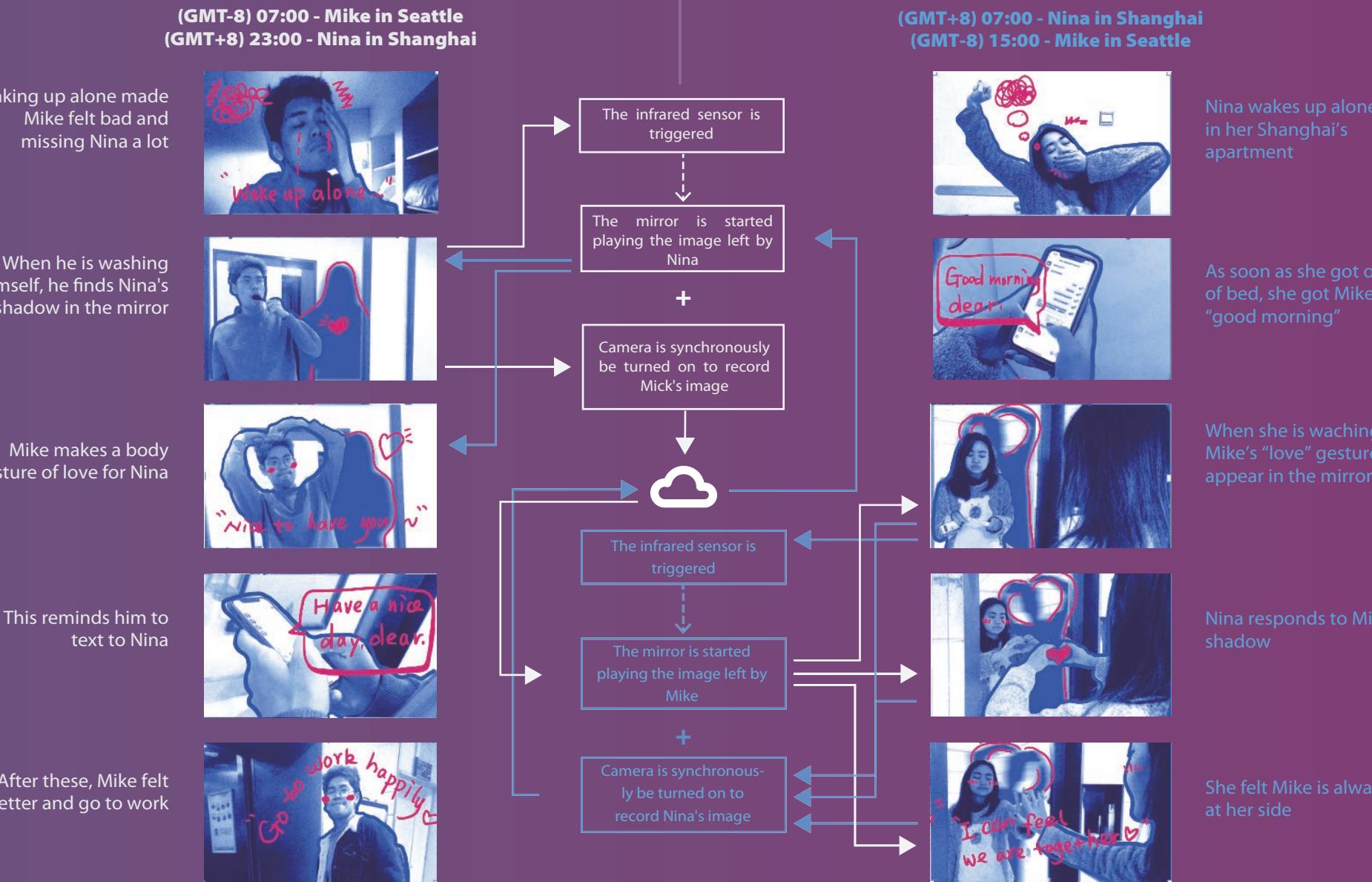
Please start your first remote interaction with him.

## • Functions and relationship of each part of the mirror



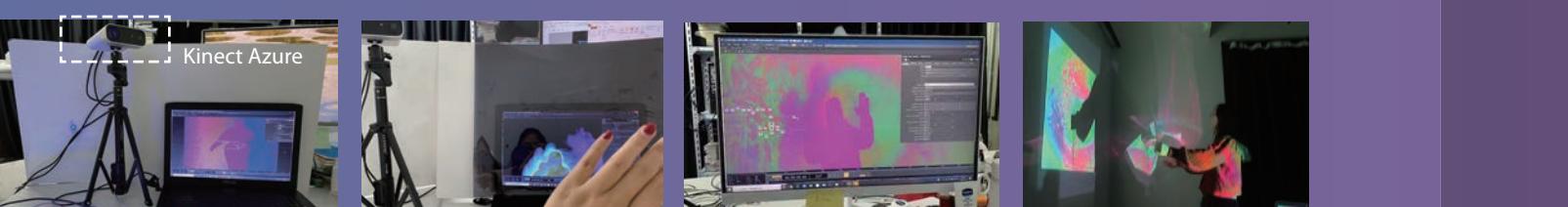
## • Mike & Nina's Story

Mike and Nina are a long-distance couple who met in college. Mike went to Seattle for his master's degree and stayed, and Nina went to Shanghai after graduation. They have been in a long distance relationship for nearly three years, and both are looking forward to moving to their partner's city in the future. Meanwhile, they also worried their relationship will change during the separation.

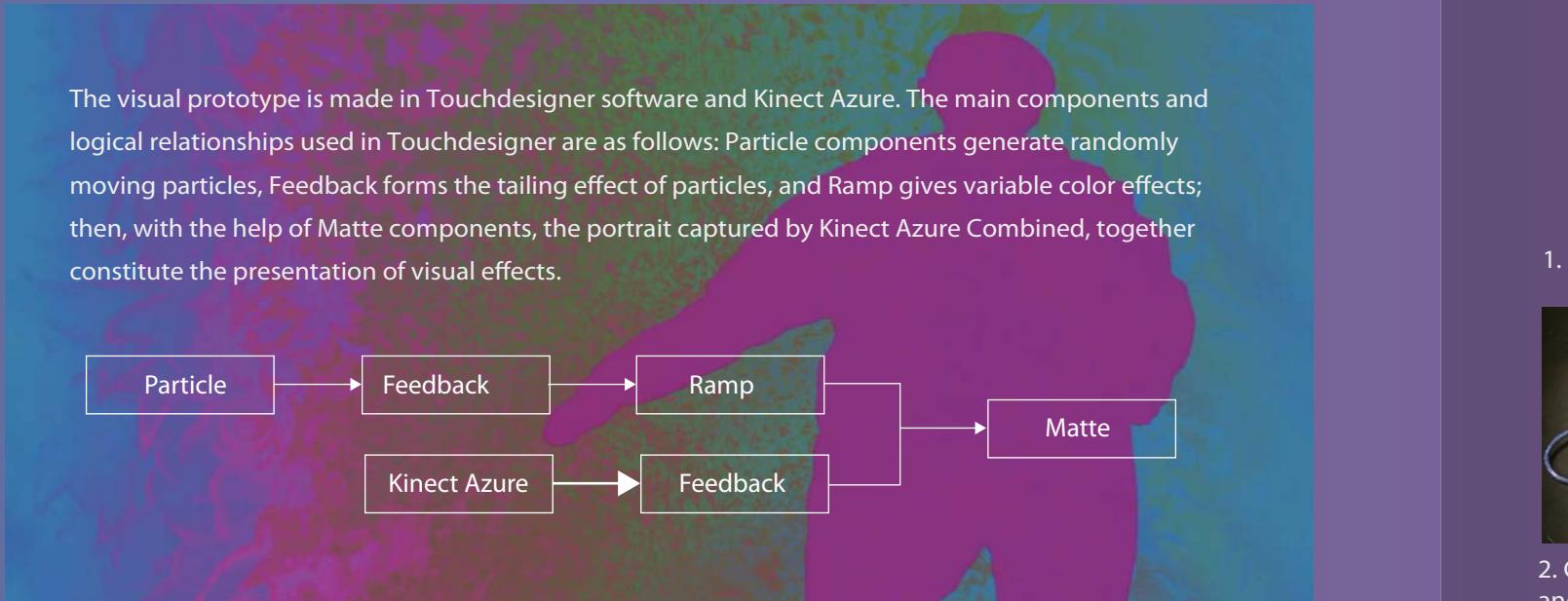


# Visual Prototype

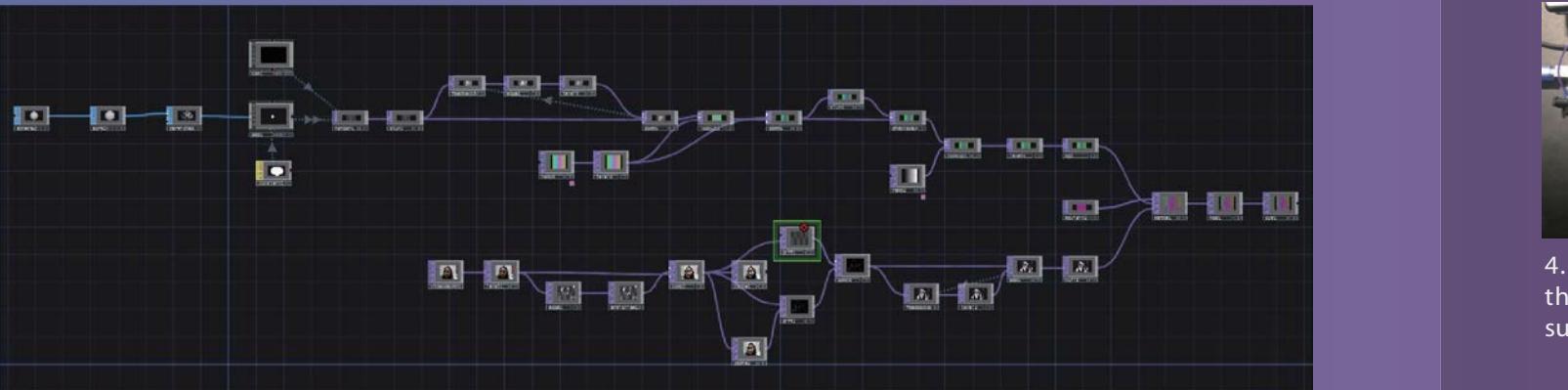
## • Visual exploration process



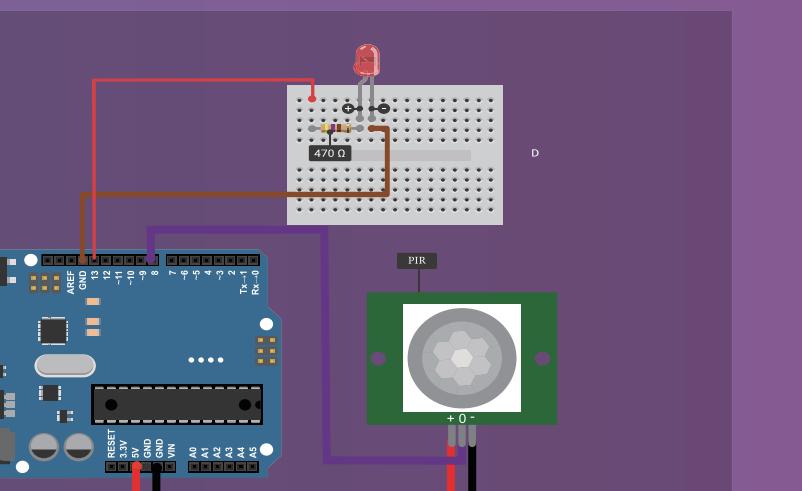
## • The final visual effect



## • Touchdesigner software interface



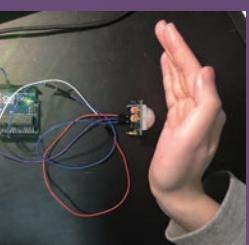
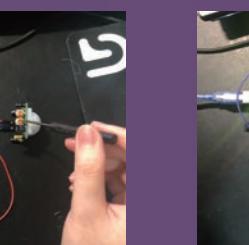
# Arduino Prototype



1. Design the circuit diagram for the project.



2. Connecting the PIR sensors and LED light with Arduino.

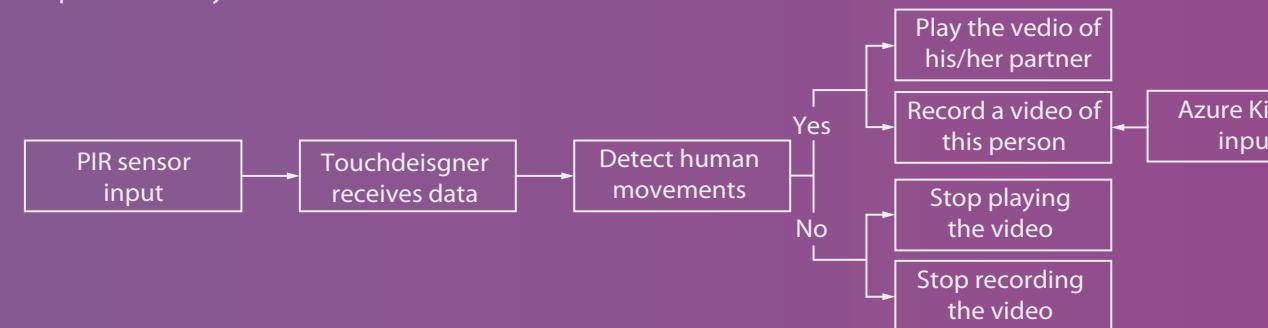


4. Adjust the sensitivity of the PIR sensor to the most suitable level.

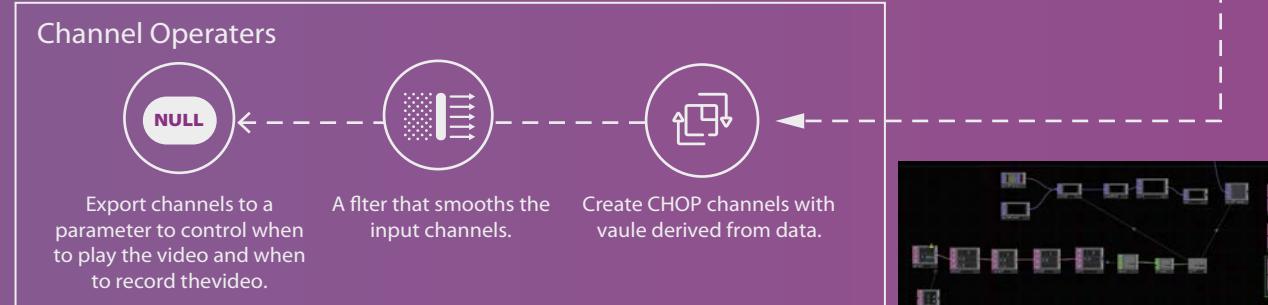
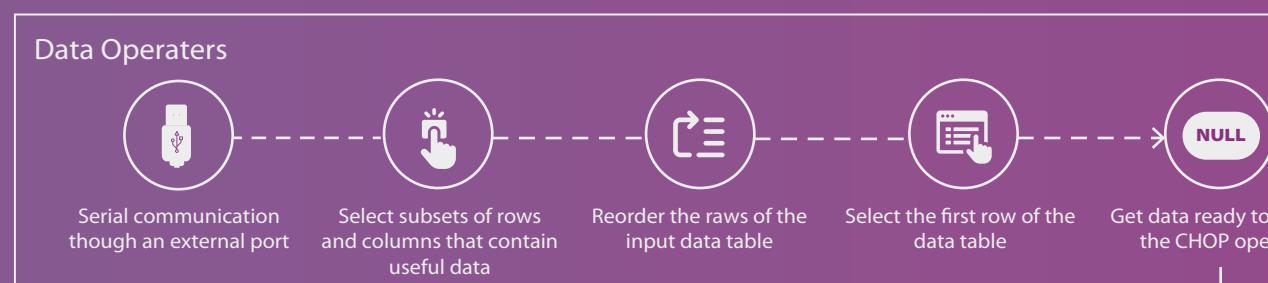
5. Make sure the blue LED lights up when the PIR sensor detects human motion. Finish connecting.

# Touchdesginer Control

In this project, the PIR sensor is the input of information about human movements. The PIR sensor will trigger two activities at the same time if it detects human movements. One of the activities is to play the video of the user's partner automatically. The other is to capture user's motion using Azure Kinect and automatically generate a video, which can be sent back to the user's partner. If the sensor can not detect human movements, those two activities will stop immediately.

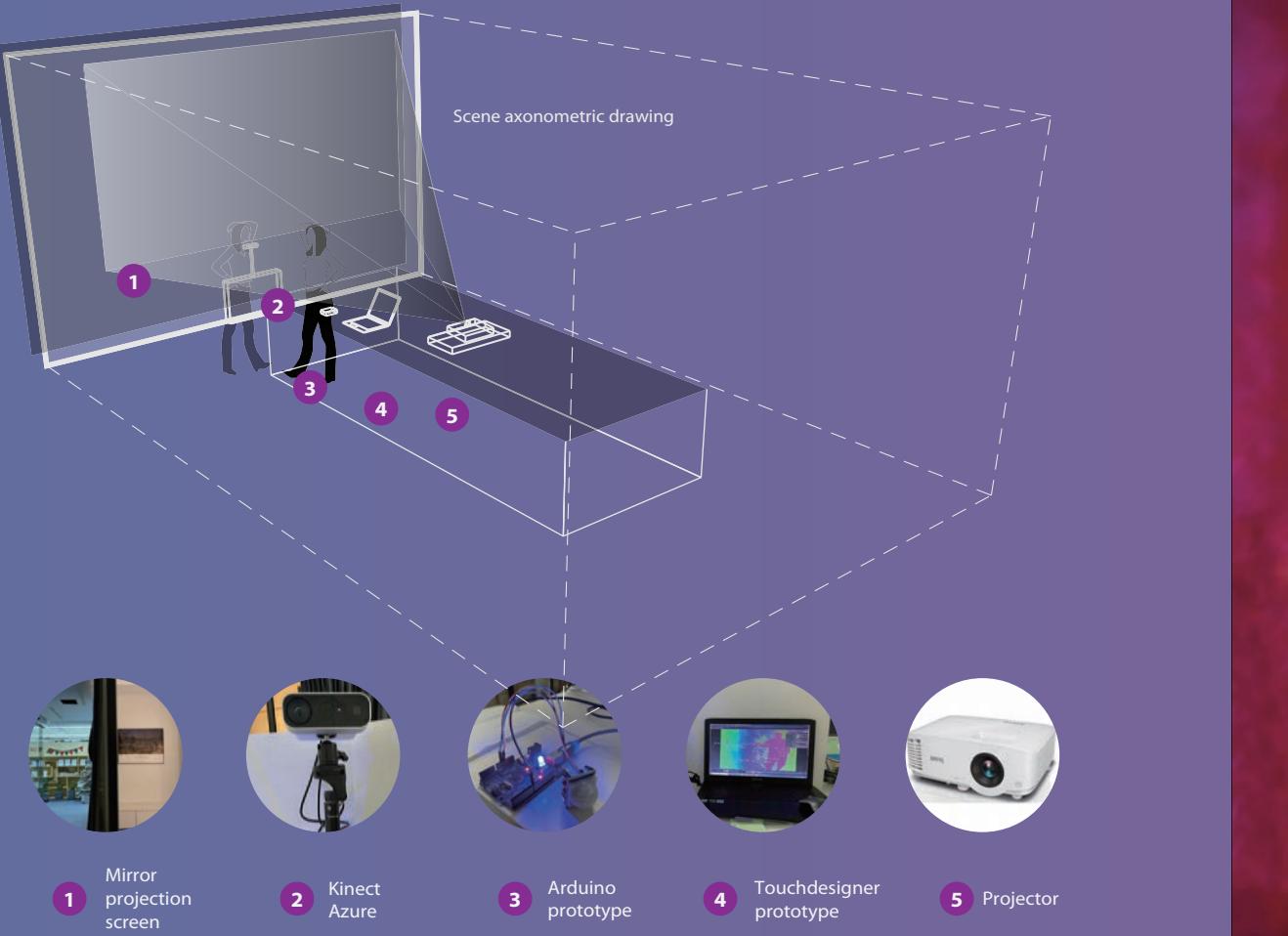


While Touchdesigner receives data, it can not use data directly to detect and those two activities. A preprocessing of the set of the data table is needed. We need to select useful data and recorder them by using data operators. Then, create CHOP channels with data from the data operator to apply a filter to smooth the channels. Finally, we can export channels to a parameter that can control the two activities.



## Testing

The prototype was built in a classroom with a glass wall, with the purpose of restoring the expected effect of the design as much as possible. Since the A-side and B-side of the design are extremely similar, the prototype chooses one end (tester B-side) for construction and testing.



# Paper Dancer

## Material Experience Design

Type: Individual Project

Tutors: Zhou ziyu

Duration: 4 weeks

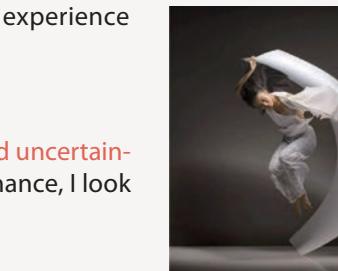
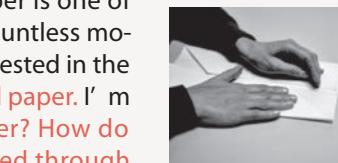
Tools: Premiere, Photoshop, Illustrator, Indesign



The research attempts to explore new ways of interaction and experience connotations between paper and people through the form of dance performance. Which is based on the existing sensory and emotional attributes of paper.

### Why research on the paper experience?

Material as one of the most important entities for designers, is highly related to our experiences. Paper is one of thousands of universal materials which occurs in human life very often, but it is often overlooked. The countless moments of interacting with paper in life triggered a series of thoughts and feelings. As a designer who interested in the materials' experiences, I wonder which kind of emotions are behind the interaction between people and paper. I'm trying to start this research by a series of questionings: which kind of experiences can paper trigger? How do common paper materials bring unconventional or novel experiences? If some emotions are expressed through paper, how could they be presented? I consider these questions are the starting point of the material experience exploration.



### Why express the experience of paper through dance?

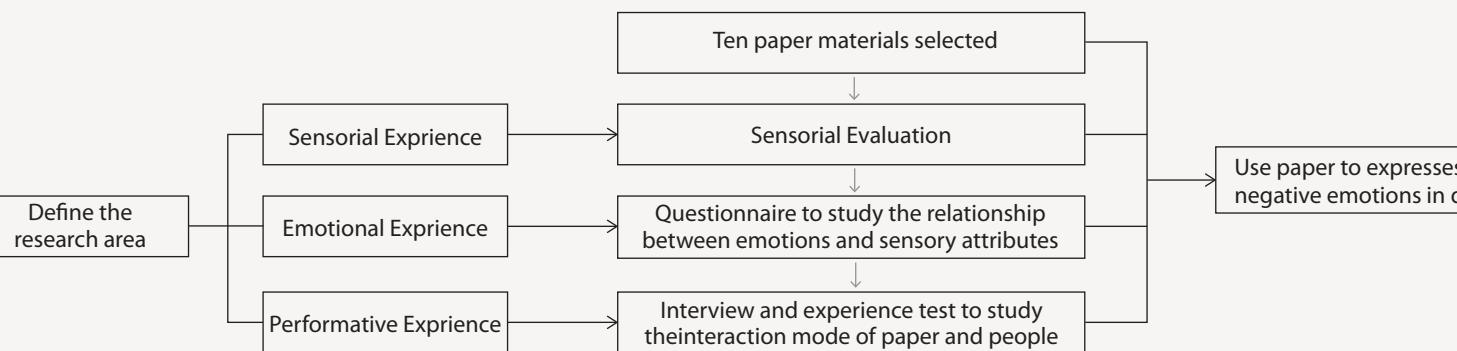
By the primary research, I understood that paper and dance both can bring a fleeting sense of beauty and uncertainty to people. Behind these poetic moments are rich and profound emotions and narratives. In this resonance, I look forward to the combination of paper and dance brings new expression and experience.

### What is the research method?

The project selected 10 most common paper types in life. Focus on their affective attributes, I evaluated and classified their basic attributes and matched them with different emotions, screened out the attributes that are most suitable for expressing positive, negative and neutral emotions, and researched on the interaction mode between people and paper in different emotions. Finally, the material experience pattern of paper had generated. To manifest and express its sensory-expressive attributes, I invited a dancer to experience the interaction between paper and narrate different material expressions. The dancers used toilet paper to perform improvisations to express negative emotions and feel the new experience brought by paper.

### Research process

→ Step 01: Understand Materials Experience → Step 02: Paper Experience Research → Step 03: Material Narrative →

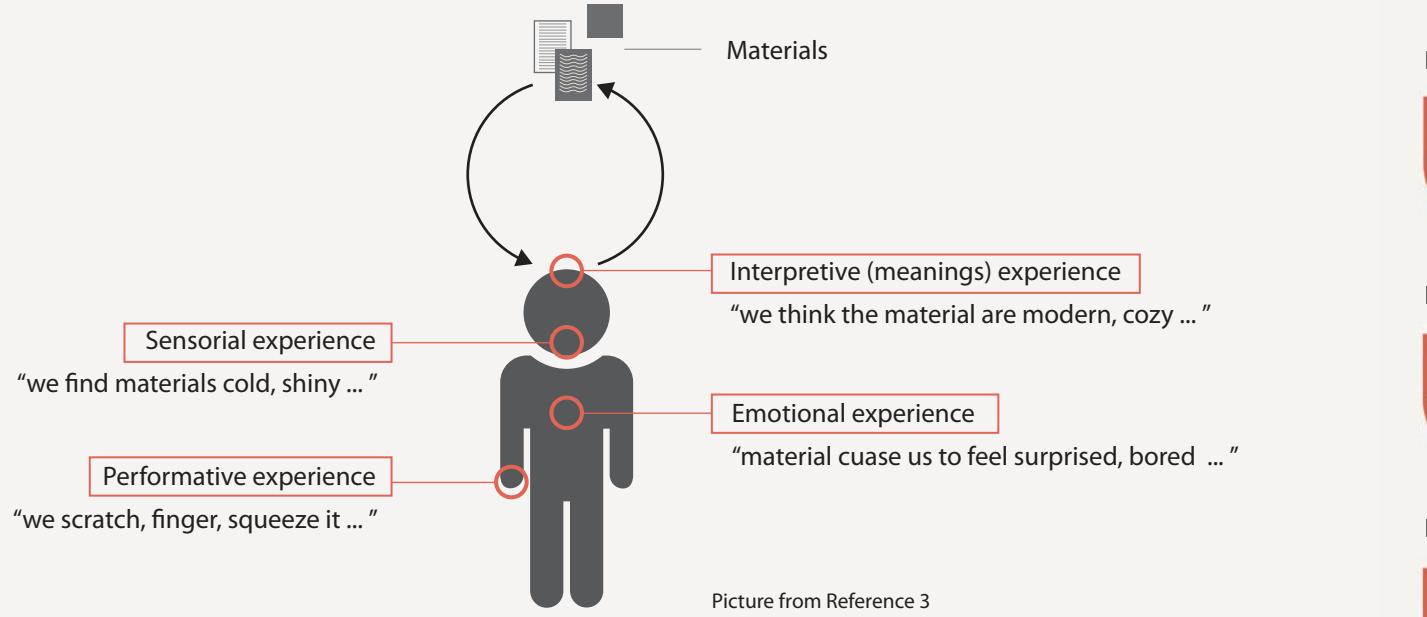


Based on the material experience research methods of previous studies, the paper's sensory attributes, emotional attributes, and performance attributes are studied separately, including negative, positive, and neutral emotions. In the end, the research chose to focus on negative emotions and use impromptu dance to narrate materials.

## Theoretical framework

### ■ What is material experience ?

The phrase 'materials experience' was first coined by Karana et al. (2008), who defined it as the experiences that people have with, and through, the materials of a product. Giaccardi and Karana (2015) defined four levels of materials experience as: sensorial, interpretative (meanings), affective (emotions), and performative. Each of these components of materials experience is highly intertwined, subject-, object-, context-, and timedependent attributes.<sup>1-2</sup> This research focuses on the innovative experience of paper in dance, so we will no longer study the functional experience of paper, and focus on discussing the remaining three experiences.



### ■ How to understand material experience ?

The relationship between materials and experience has long been emphasized in **pioneer philosophical works**. Physical interaction with materials, or at least the aesthetic experiences that derive from hands-on manipulation of materials, **can positively influence the creative process**. In the field of art, Focillon and Dewey emphasized the unique role of material engagement in one's process of thinking and reflecting.<sup>4</sup>

Reference:

1. Karana, E., Barati, B., Rognoli, V., Zeeuw van der Laan, A.: Material driven design (MDD): A method to design for material experiences. *Int. Journal of Design*, 9(2), 35-54. (2015)
2. <http://materialsexperiencelab.com/>
3. Karana, E., Pedgley, O., & Rognoli, V. (Eds.). (2013). *Materials Experience: fundamentals of materials and design*. Butterworth-Heinemann.
4. Karana, E., Pedgley, O., & Rognoli, V. (2015). On materials experience. *Design Issues*, 31(3), 16-27.

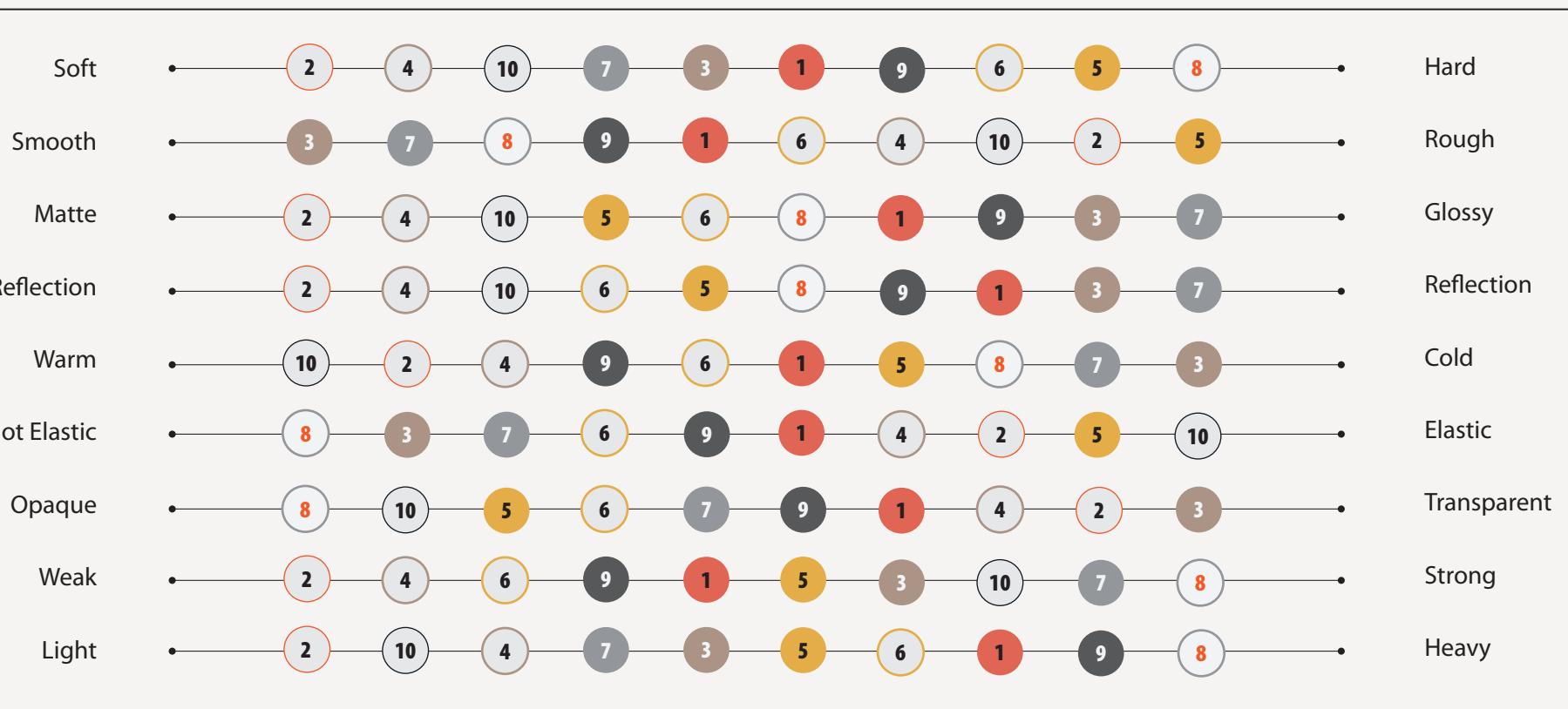
## Sensorial attributes of paper

The study selected ten common paper materials in daily life. The sensory attributes of paper are evaluated and researched through 9 indicators. The numbers in the evaluation chart correspond to the ten materials on the left.

### ■ Material selection



### ■ Expressive - sensoral evaluation



### ■ Conclusion

According to sensory evaluation, there are four types of general atmosphere for planting paper. Their sensory experience is summarized as follows.

1 Printer Paper    6 Brown Paper    9 Paper Jam

5 Fluting Paper    8 Cardboard

2 Toilet Paper    4 Rice Paper    10 Foam Paper

3 Litmus Paper    7 Silver Paper

The indicators in the evaluation form of Paper No. 1, 6, and 9 are mainly concentrated in the middle value, and the overall sensory attributes are also biased towards tough, strong and heavy, giving people a relatively tough and powerful sensory experience.

The indicators in the evaluation form of Paper No. 5 and No. 8 are biased towards soft, fragile, thin, warm, which makes people feel soft, close and fragile.

The indicators in the evaluation form of paper 2, 4, and 10 are biased towards soft, fragile, thin, warm, which makes people feel soft, close and fragile.

Paper No. 3 and 7 have obvious and prominent features, such as: the transparency of No. 3 paper and the light-reflective property of No. 7 paper, which are easier to give people a kind of innovation and uniqueness.

## Emotional attributes of paper

Based on the sensory evaluation of the ten selected papers, a questionnaire survey on the emotional attributes of the ten papers was carried out to study the inner relationship between the sensory attributes and emotional attributes of the paper.

### Questionnaire review

There are 73 valid questionnaires in this survey, most of them are design students or designers (54.79%), age range is 18-25 years (72.60%), 25-30 years (24.66%).

Female  x 52

Male  x 21

### How to describe the feeling of paper in life?

20.54% Environmentally friendly

19.17% Memorable

15.06% Complex and changeable

13.06% Fast-moving consumer goods

12.32% Tender

9.58% Many possibilities

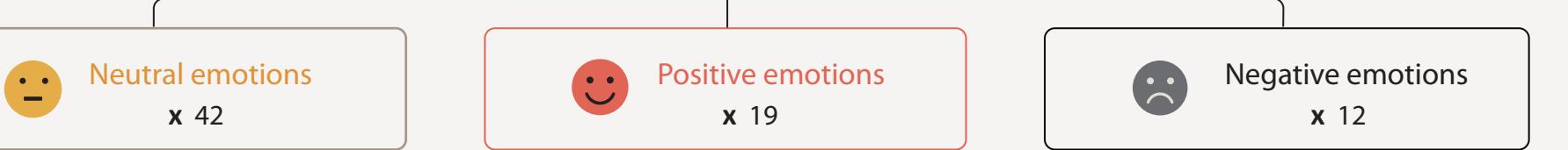
7.21% Close

3.00% Other description

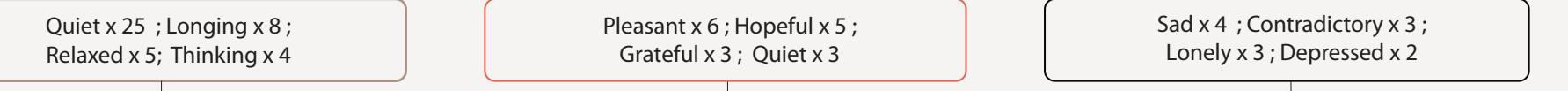
## Questionnaire on emotional experience

The research divided emotions into three tendencies: positive emotions, negative emotions, and neutral emotions. Respondents choose a specific emotion in a certain emotional trend, and choose paper suitable for expressing this emotion and describe its characteristics.

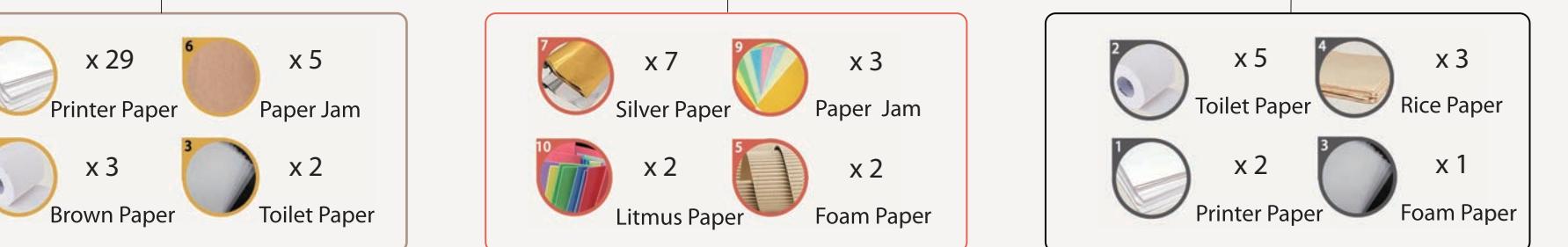
### What kind of emotion do you think these ten papers are suitable for expressing?



### What kind of emotion do you want to express?



### Which kind of paper can best express this emotion?



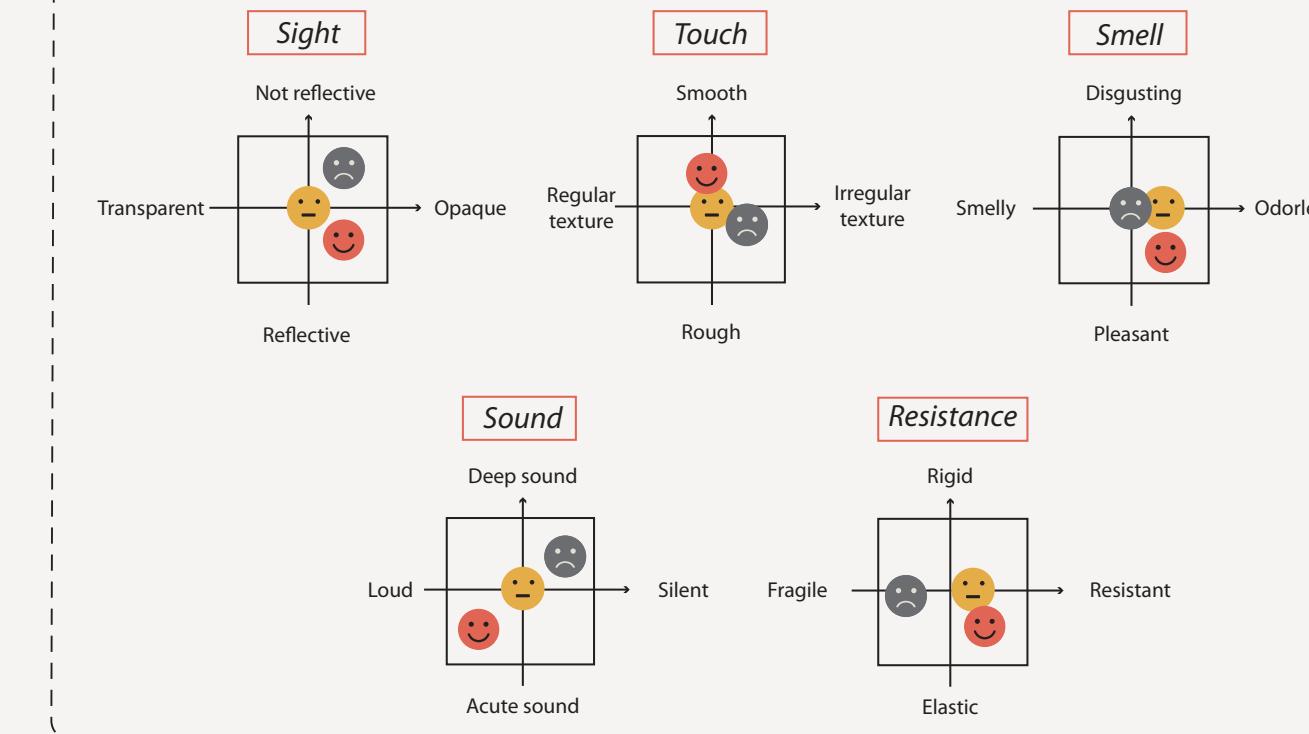
### Which characteristics of this paper are suitable for expressing this emotion?



## The relationship between emotion and paper sensory attributes

Based on 73 interviewees' perceptions of these ten types of paper, the following conclusions are obtained:

- ① Ordinary printing paper can express neutral emotions best, because among the ten types of paper, its various experiences are in the middle and average state, which brings people a sense of calm and stability.
- ② The silver paper that can convey the most positive emotions is mainly due to its smooth texture and reflectivity, which gives people a pleasant and fashionable feeling. In addition, its sporty sound also brings people a crisp and relaxed feeling.
- ③ White toilet paper is the material that best represents negative emotions, which mainly depends on its fragility, softness and a bit rough texture. It is reminiscent of the fragility and powerlessness of negative emotions.



## ■ Performative attributes of paper

### ■ Interview

PART 01: In the research on the performance attributes of paper, I first interviewed 12 respondents who participated in the questionnaire survey, hoping to dig out their stories and interactions with paper, and understand the performance attributes of paper from these interactions. Among the 12 interviewees, 4 represented negative, positive and neutral emotions respectively. The picture below lists the stories and interaction methods of 6 of them. The other 6 interviewees' understanding of the performance attributes of paper focused on common forms such as reading, writing or touching.



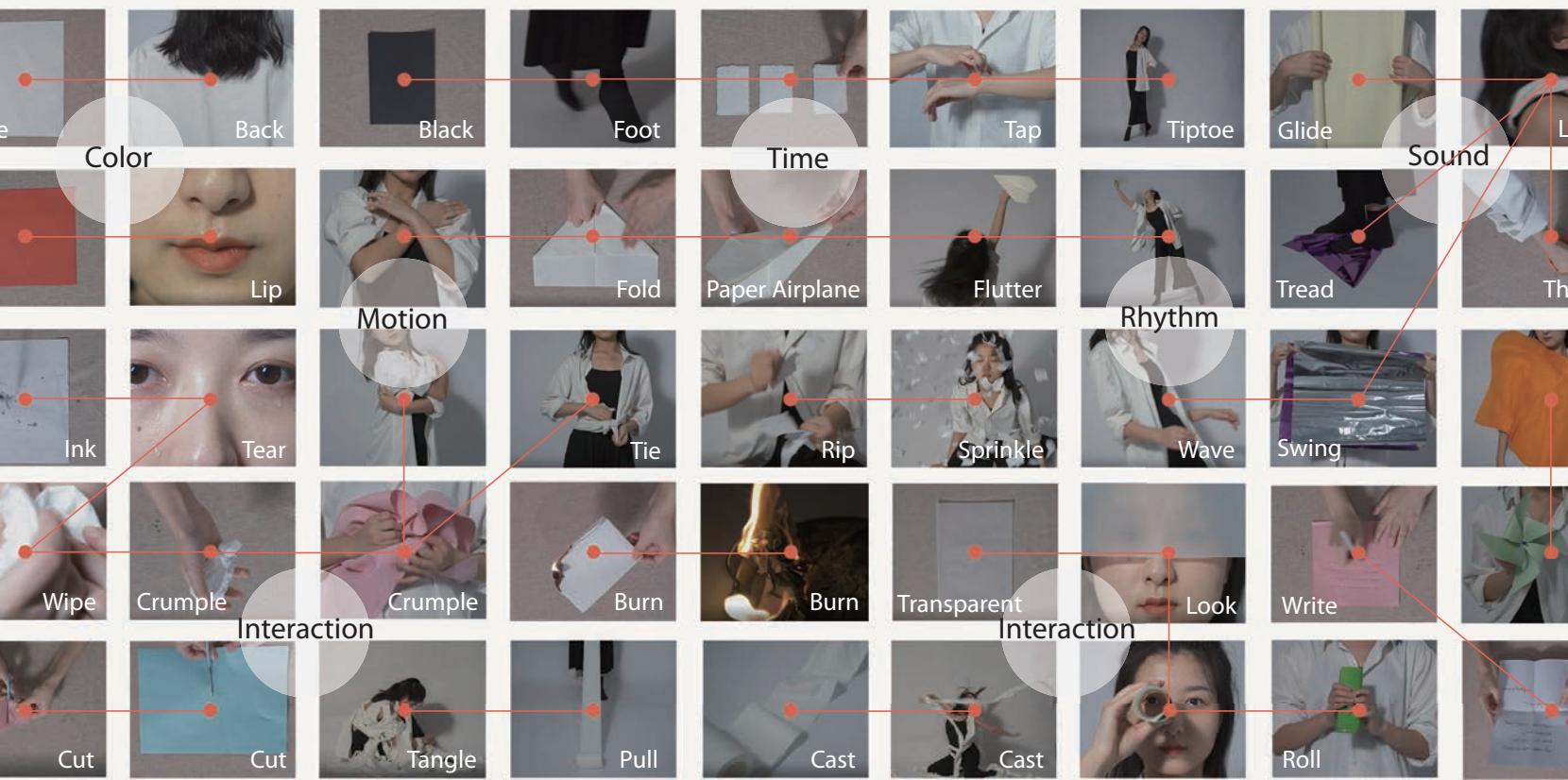
### ■ Conclusion

The way people interact with paper is complex and changeable and all correspond to specific scenes, stories, and emotions. Paper has different performance attributes in different stories. Respondents who chose positive and neutral emotions interacted with paper in a more relaxed way, closer to our daily experience. The interviewee's description of negative emotions has brought me greater touch and inspiration, and is more story-telling and breakthrough. I think this may be an entrance to experience innovation in paper materials.

## ■ Interactive experience of a dancer and paper

PART 02: The second part of the research on the performance attributes of paper is to explore and interpret the performance attributes of paper through body language.

I invited a dancer to have a paper performance experience. The dancer interacted with the paper according to her own understanding and had an association with the dance language. Finally, the dancers choose the part that best interprets the negative emotions among these interactive methods, and perform impromptu performances with white toilet paper that represents the negative emotions.



### ■ The dancer's choice of interaction method suitable for expressing negative emotions



## Material Narrative

- Description of the dancer's experience:

I have two feelings: One is that the interaction between materials and dance brings more ways to express emotions. For example: you can express struggle through the entanglement of body movements and toilet paper; express hesitation and hesitation by kneading sheets of white paper into a ball; and express release by throwing scraps of paper into the air... using the medium of paper to show dance Provide more possibilities, but also provide a more iconic way to express emotions.

The second is that the different materials and forms of paper bring more vivid feelings to the expression of dance. Just like an origami airplane floating in the air, it can express the feelings of a girl and is always a poetic situation; the soft paper is rubbed on the chest to express tender feelings; the body swings with the paper and it seems to express a free and casual feeling... As a material, the combination of paper and body movements can not only make the expression of movements more tense, but also because of the difference in the material and form of the paper itself, more situations and feelings can be expressed more intuitively and vividly.

- Description of this dance performance:

In this dance, toilet paper is like a performance prop that aids in the externalization of emotions. The soft and fragile characteristics of toilet paper are like a materialized reflection of sadness, like a visualization of sadness itself. The rhythm of the whole dance is just like the psychological journey of people facing sad emotions. At first, it was tightly enveloped by huge sad emotions, and then slowly began to try to break free. When the struggle reached the extreme, then it entered the exhaustion after the struggle. And the state of peace, and finally the sadness is digested and precipitated, people get sublimated from it, and reach a new peace of mind.

- Conclusion:

The research starts from the physical properties of paper and sensory experience to the transformation and presentation of body language. The final dance performance is composed of paper, the interaction between the paper and the dancer, the superimposition of the dancer's body movements and inner sadness, which is a concentrated explosion and presentation of emotions in a short time.

The entire project, whether it is paper, dance or research process, has been groping in a kind of uncertainty, and the final results may be diverse and there is no standard answer. The final foothold is the dancer's performance. Whether it is paper innovation or performance innovation, it is an interesting combination and exploration. The dancer's experience may be abstract and personal, but it also provides provocative concepts and visions for future material-related innovation.

