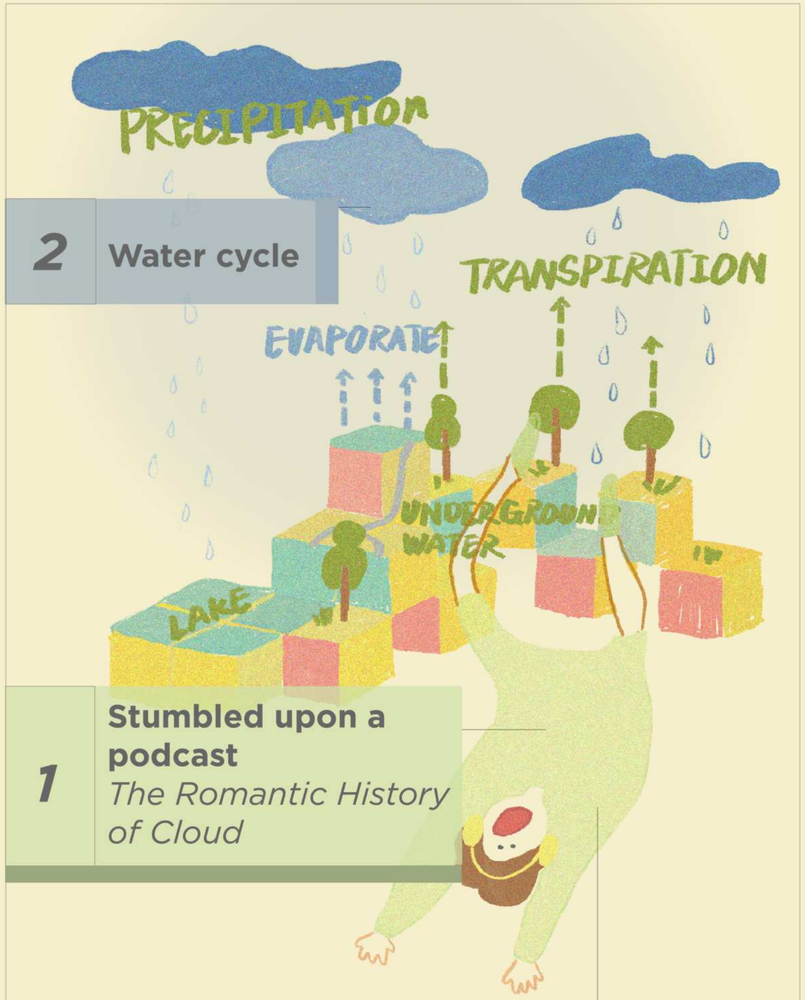
01

COLOURWEATHER

Helping children aged 3-6 to better learn about natural weather through play

Colourweather project focuses on children aged 3-6 years old's cognitive understanding of natural weather and multi-sensory experience of weather while playing with toys. The toy consists of two main parts, a hands-on play part and a colour recognition weather collection part.

INSPIRATION



2 Water cycle

1 **Stumbled upon a podcast**
The Romantic History of Cloud

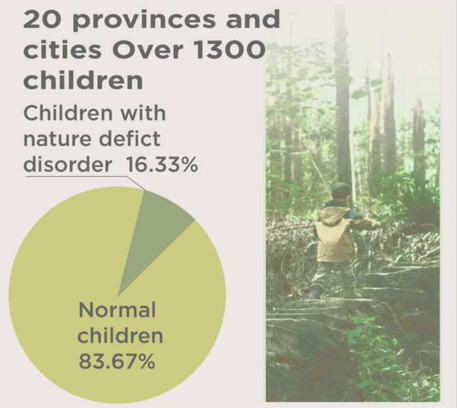
3 **Children's perception and love of nature have significantly decreased**

BACKGROUND

1 **Many children have natural deficiencies**

20 provinces and cities Over 1300 children

Children with nature defict disorder 16.33%



3 **Average daily use of weekend electronics**

Status of Nature Education for Chinese Children

Predisposition to nature-deficit disorder, such as poor concentration, poor emotional regulation and environmental adaptation, and lack of curiosity about nature.

2 **Reasons for lack of curiositv about nature**

Children are confined indoors by heavy schoolwork

Attracted by the colourful and rich contents of various electronic products

4 **Amount of exercise per day**

11.27% Outdoor sports are almost

18.61% More than 1.5 hours of outdoor exercise

68.12% Less than one hour of outdoor exercise

42% Inability to concentrate well in class

USER SURVEY

Interview some kids about natural weather

Thunder, rainbows, hail.

The science teacher taught me.

It will rain when the ants move.

Watch and learn about the weather at Archie's Kindergarten

Make my own paper cups weather

Wind is the flow of air

Refraction of rainbow light

When it rains, it's water vapour that gets cold and turns into tiny droplets.

No weather related toys

Knowledge of natural weather among 3-6 year olds

75% Know that it thunders, rains and snows, but not much more

50% Do not know or cannot explain the basic principles of formation

Access to nature for 3-6 year olds

35% Teachers or parents teaching at school

Dull and uninteresting

40% Watching popular science TV and books

Too flat

15% Experience for oneself

Not scientific enough

10% (sth. or sb) else

0 Played with weather-related toys (with homemade props)

How to Enhance children's knowledge of natural weather through play?

CONCEPTS

01Entertainment&Fun
Match the game style that children like

02 Educational nature
Learn natural weather related concepts through playing

03 Multi sensory integration& proactive exploration
By manually collecting weather elements and then synthesizing different levels of weather. Deepen children's impression of weather formation in this way.

1.Put the collected material particles into a synthesizer
2.Observe the animation effects of combining different materials.

	What can children feel?	What children can learn?
1 Temperature	Touch temperature change/Thinking about temperature-appropriate attire	The concept of temperature
2 Wather	Water flow	Precipitation and the water cycle
3 Optical	Changes in light	Particles in the air environmental pollution.
4 Dust	Dust motes fly	Refraction of light
5 Wind	Degree of windiness	The power of the wird
6 Home screen and Compostion		

Design a small screen to play short weather stories or animations to introduce different meteorological phenomena and weather changes in a vivid way.

IDEA DEVELOPMENT

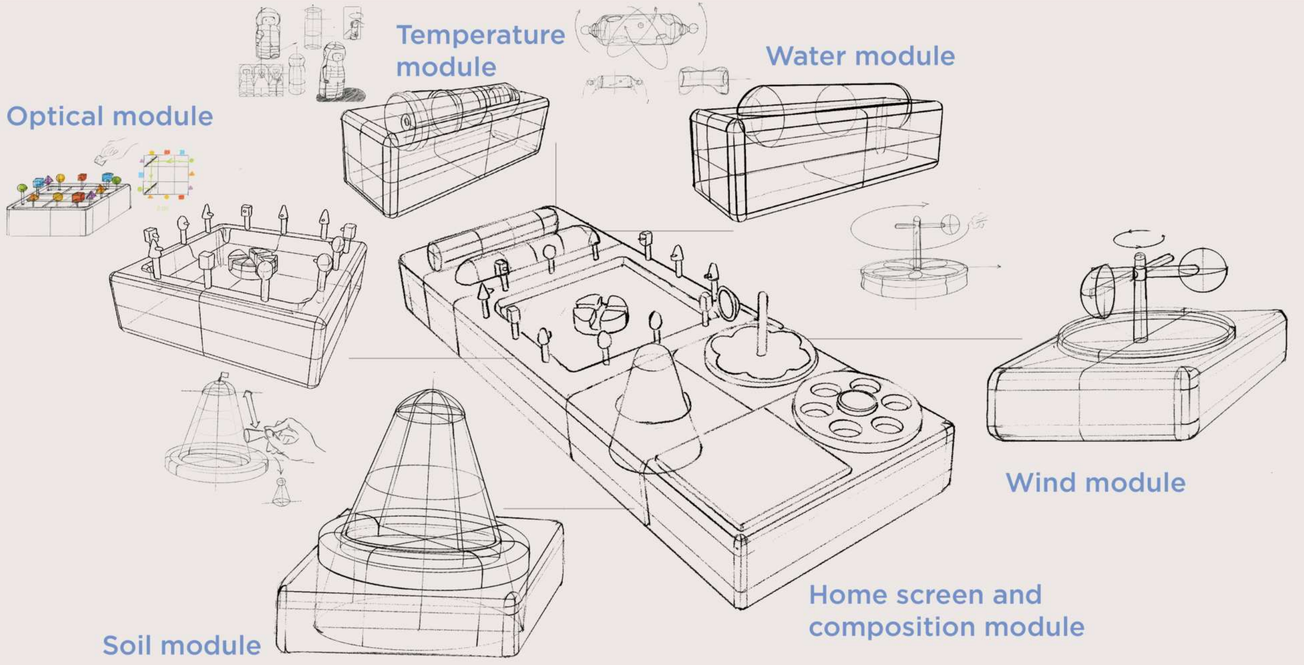
1 Inspiration

Log texture

Closely related to weather

Manual operation

Module combination

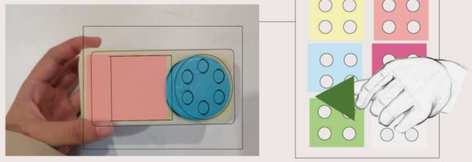


2 Test

Sand high-density foam molding and use ultra-light clay for details

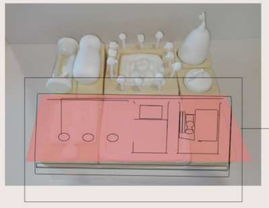
Plan 1 ✗

Requires installation of color recognition sensor



Six color recognition sensors identify the color particles of each module individually.

Plan 2 ✗

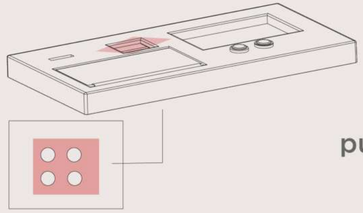


However, the area is too large and cannot be identified easily.

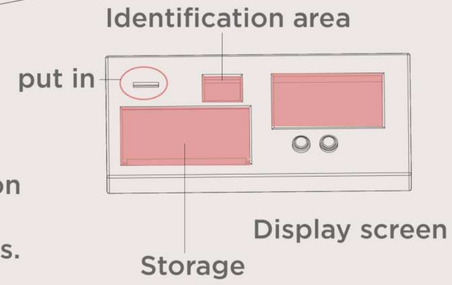
Enlarge the main screen and constituent modules to be equal in size to the rest of the modules.

Plan 3 ✓

Determine the shape of the module by deducing the final draft.

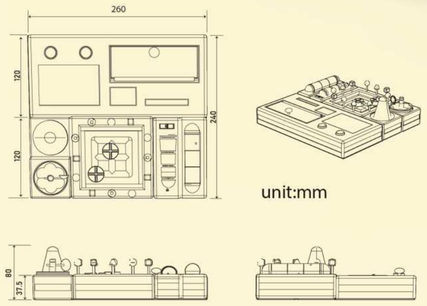


Reduce the identification area and increase the area for storing particles.



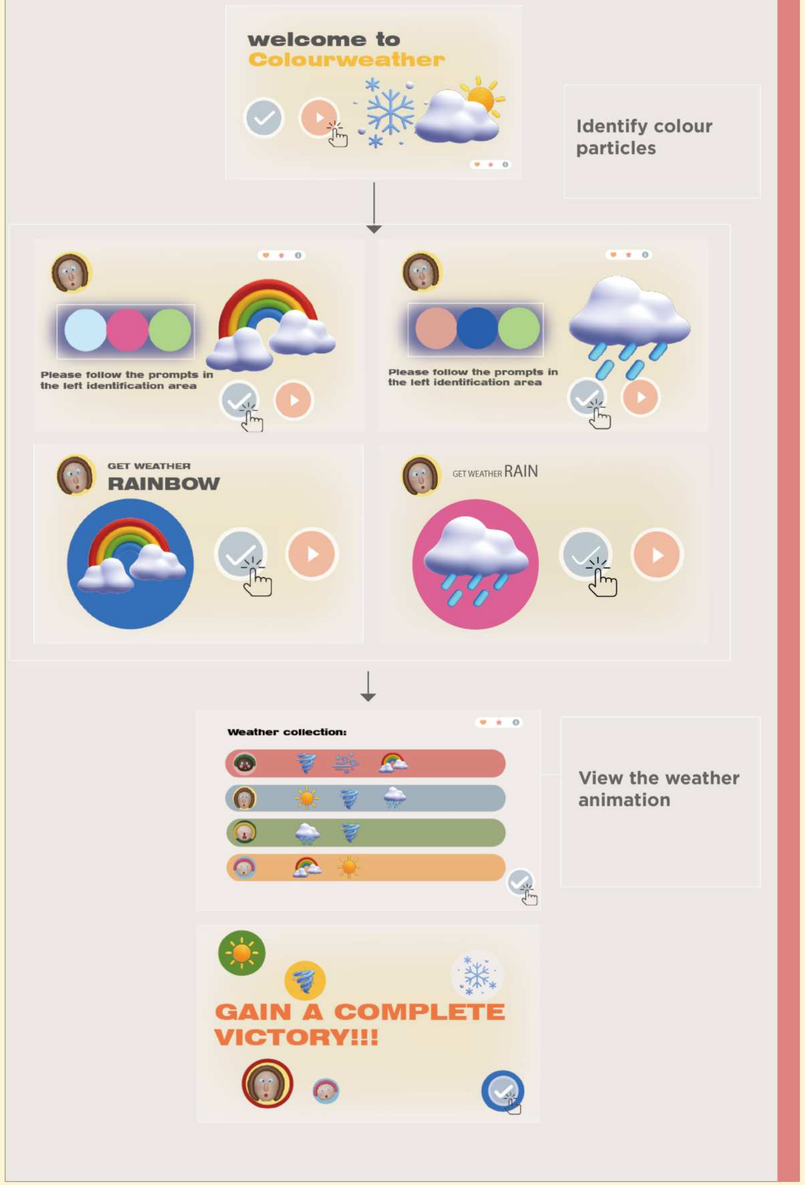
RENDERGRAPH

Three View



unit:mm

UI/UX Design

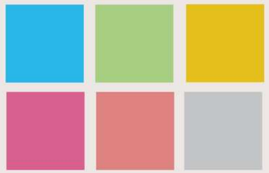


STORYBOARD

1

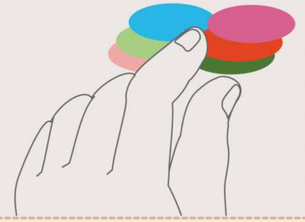
Roll dice

2

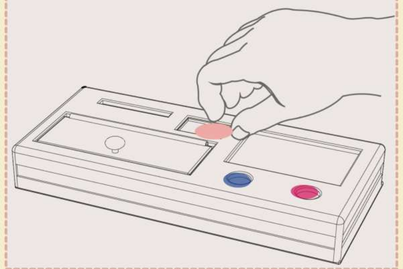


Start game

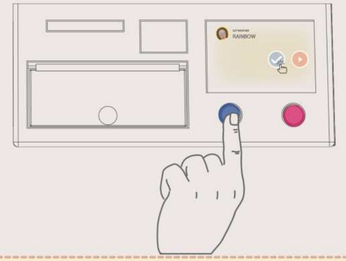
3 Collect elemental particles



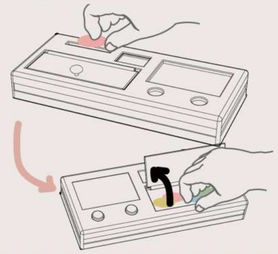
4 Identify

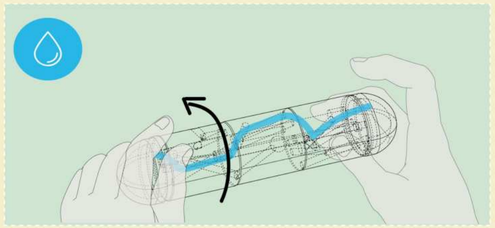


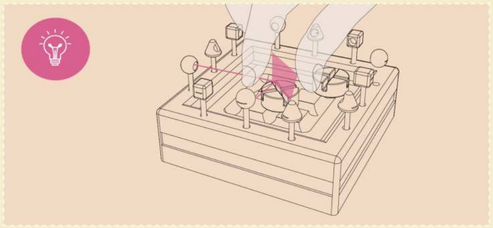
5 Generate animation

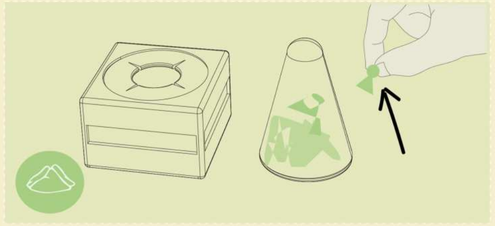


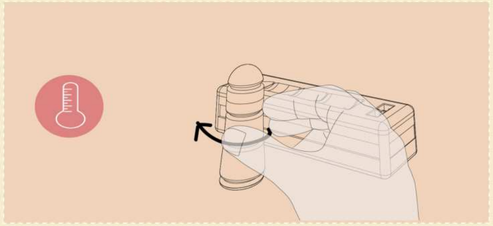
6 Game over & Recycle granular elements

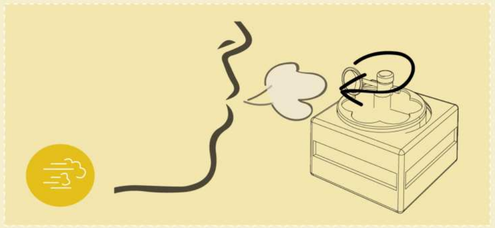


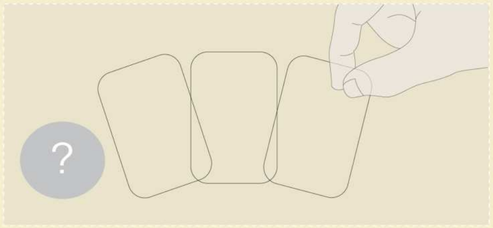










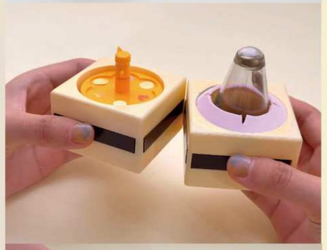


Identify rules

Weather Types	Wind	Temperature	Humidity	Sunlight	Dust	Others
Rainbow			Little water	Light	Little dust	
Rain		Low	Water aturation		Little dust	
Snow		Low	Water aturation			Cloud, friction of water molecules
Haze	Breeze		Water aturation		Lots of dust	
Lightning			Moderate amount of water			The air contains ice crystal nuclei

Weather Types	Wind	Temperature	Humidity	Sunlight	Dust	Others
Cloud		Low High	Water saturation		Little dust	
Hail	Air convection	Low	Little water			
Sand dust	Strong wind		Dry		Lots of dust	
Typhoon	Stable updraft cyclone	Moderate				
Sunset			High	Light	Little dust	

FINAL PRODUCTS



FEEDBACK

PIPI

5 years old

"It was so much fun to be able to synthesise different weather and feel like a little wizard!"

- ✗ There are many small parts, which are easy to lose and need to be replaced.
- ✗ Add some long-term goals or challenges to make the toy more sustainable and keep your child interested for a long time.
- ✓ Add storage module
- ✓ Updates added

02

TTT

The tree of transformation

At the head of the village, the great tree is like a living history book carrying historical memories and prayers. It has witnessed the rise and fall of the village and carried the wishes and prayers of countless generations of villagers. Combining such historical heritage with future technology, we envisioned an innovative design - 3D printed lignin technology tree.It leads us to think about how future technology can inject vigour and wisdom into our lives while passing on history. It carries mankind's aspiration for the future and reverence for tradition, and becomes a bridge connecting the past and the future, bringing new hope and vitality.

INSPIRATIONS

TIME LINE

Urbanisation

From the second half of the nineteenth century to the middle of the twentieth century, China's urbanisation was unevenly developed as a result of invasions by world powers, as well as being plagued by warlordism.

Prior to the founding of China in 1949 and the reform and development of China in 1978, China established a social structure with a dichotomy between urban and rural areas, which led to a long period of stagnation in urbanisation.

It was only after the reform and opening up that the process of urbanisation in China accelerated significantly, with the urban population rate rising from 17.92 % to 30.42 % **between 1978 and 2000.**

China's urban population exceeded 50 per cent **in 2011,** surpassing the rural population for the first time, and urbanisation has entered a key stage of development. **By 2021,** the urbanisation rate of the resident population will reach 63.89 per cent. This value has also been on an upward trend in the future.

Trees

In the midst of war, many ancient trees were destroyed by invaders and many were burned or cut down, and in natural disasters and famines, people who had no food at all gnawed on the bark.

The "First Five-Year Plan" (1953-1957) achieved rapid growth of the national economy and laid a preliminary foundation for my country's industrialization. The vigorous development of industry has led to serious damage to the ecological environment, and many vegetation have been destroyed.

During the Great Leap Forward period of China's iron smelting **（1958-1960）**, many plants were forced to be destroyed for fuel, and many ancient trees were not spared.

From 2015 to the end of 2021, the National Afforestation Committee will carry out and complete the second census of ancient and famous tree resources to further promote the protection of ancient and famous trees.

-Status of Ancient Trees in China

They are the joint remains of nature and culture, living artefacts.

Within the national census (unit: plants)

50,819,000

Cluster (unit: plants)

38,606,000

Scattered (unit: plants)

1,221,300

Growth environment	Growth situation
Poor	Weakened state
68,500	**157,700**
Extremely poor	Endangered state
2,600	**26,300**

Urban (unit: plants)

246,600

Countryside (unit: plants)

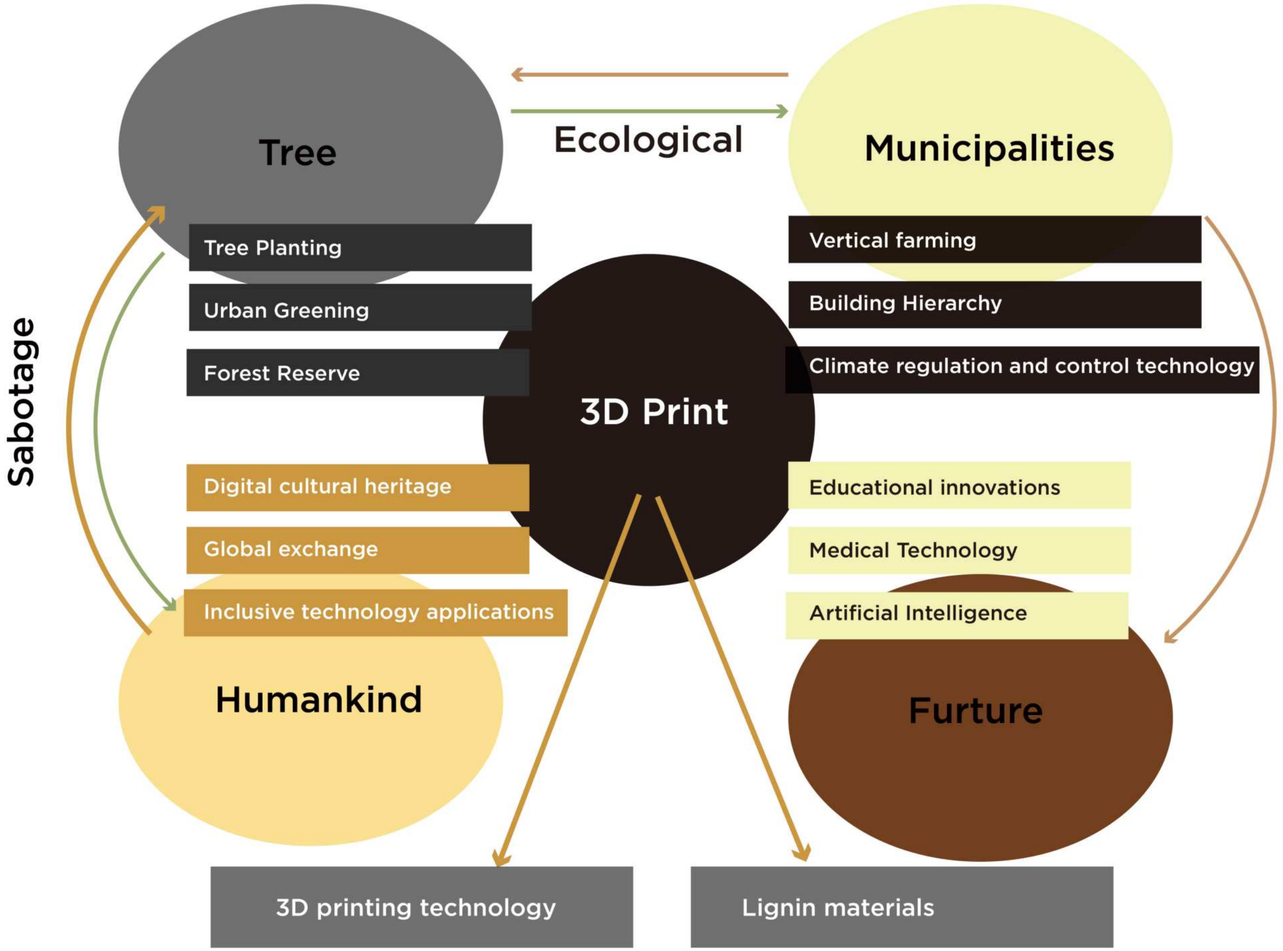
4,835,300

Questionnaire survey

50s ~00s Chinese people's memories of village trees in their hometowns

- 50s~60s 78%
- 70s~80s 65%
- 90s~00s 33%

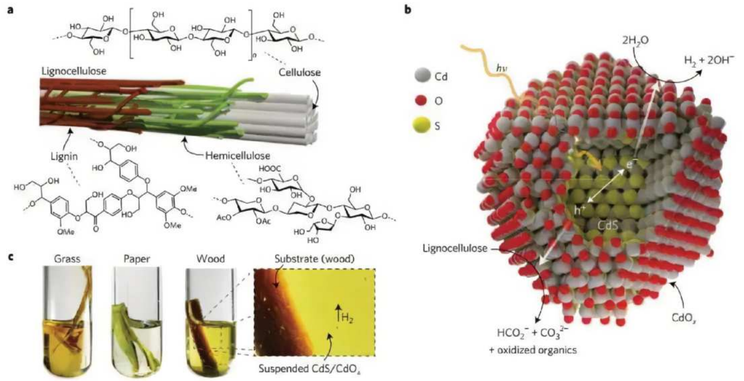
MIND MAP



- Choose the suitable 3D printing technology for lignin material, such as FDM, SLA, SLS, etc.
- Printing speed, resolution, print size and other technical parame-ters.
- Different types of lignin materials: learn about the various available lignin 3D printing materials.
- Strength, durability, colour and texture of the material.

EXPERIMENT

Lignin



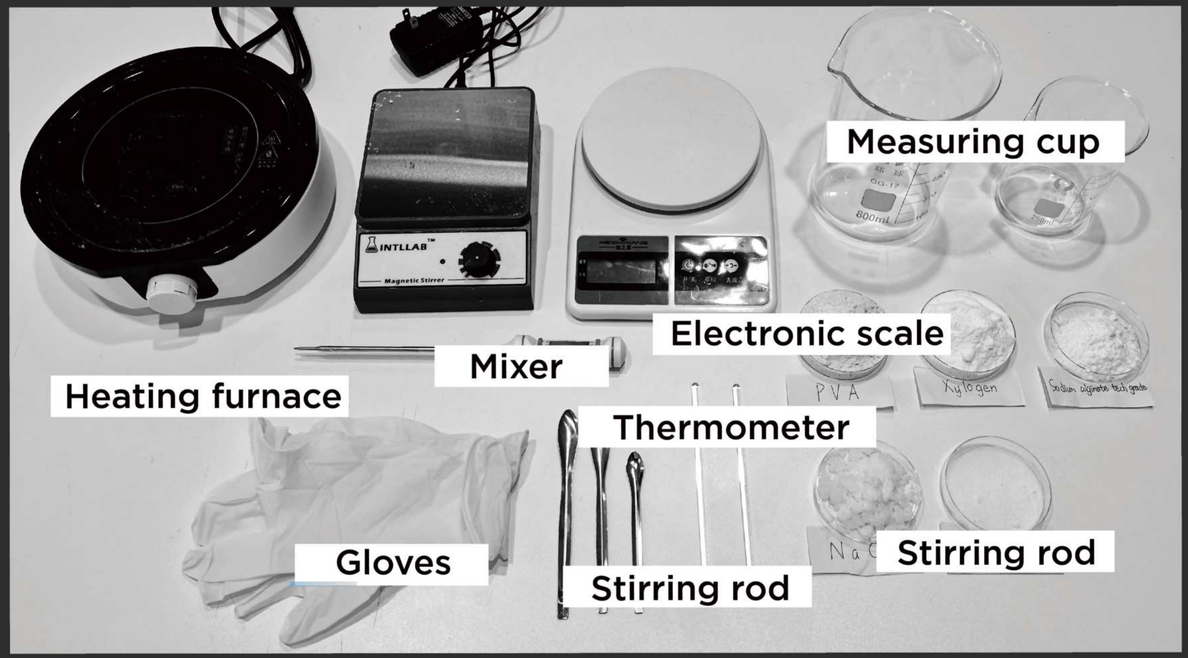
Lignin is widely available and can be prepared from fibres such as bagasse.

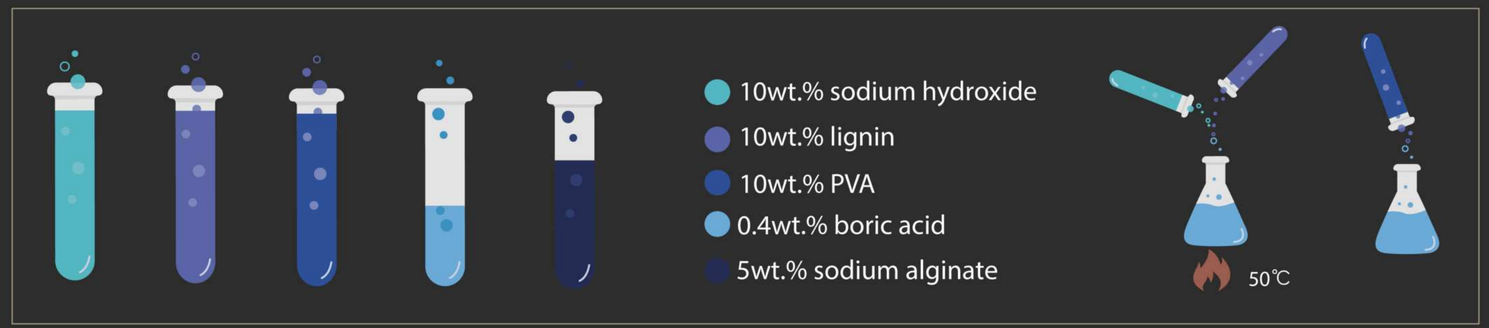
Experiment procedure

We conducted tests in professional laboratories.

Using lignin as the main raw material, it is dissolved in NaOH alkaline solution to form a lignin solution. Add polyvinyl alcohol, sodium alginate, boric acid and other materials to configure printing ink.

Experimental Preparation Materials

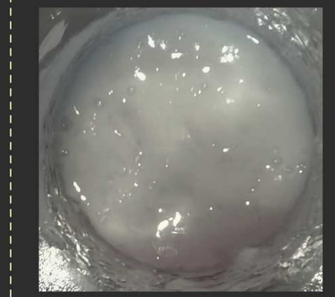




Weigh

Prepare an Alkali ne Solution

Preparation of PVA solution



Mixture 1

Mixture 2

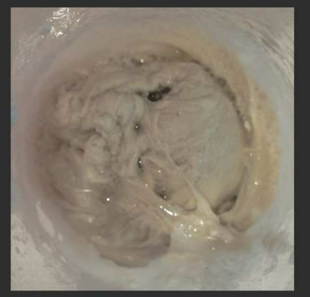
- Prepare the PVA solution and the alkaline solution prepared by NaOH and lignin respectively to obtain mixture 1 and mixture 2

Mixed solution 1 solution 2

Add sodium alginate and boric acid

Add sodium alginate and boric acid

Mixture 3



Mixture 4

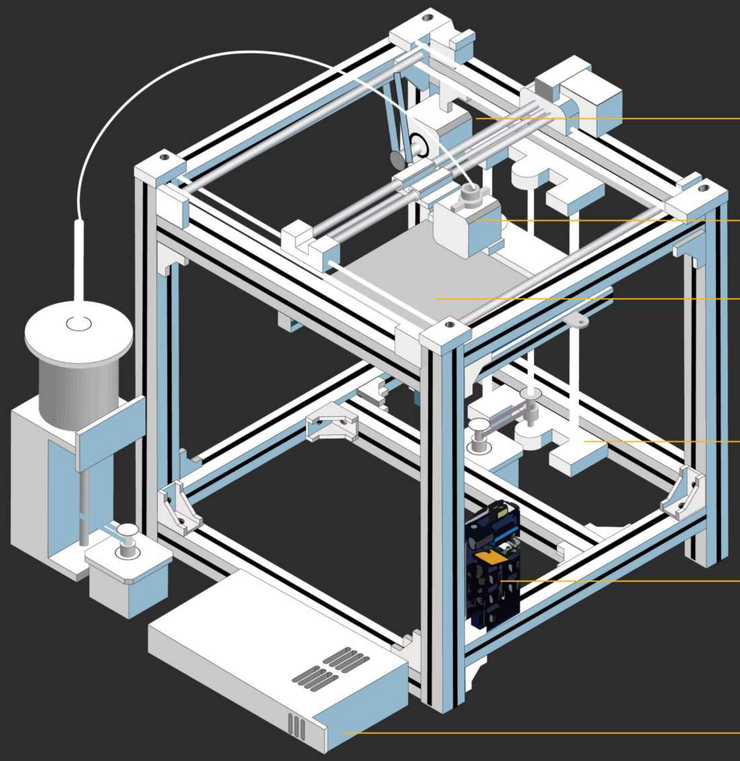
- Solution 1 and solution 2 were mixed at 90°C to give mixture 3, and sodium alginate and boric acid were added. Mixture transformed into Mixture 4

concentration 1 concentration 2 concentration 3 concentration 4 concentration 5 concentration 6

- The final result is 6 different concentrations of printing ink.

ASSEMBLY OF THE PRINTER

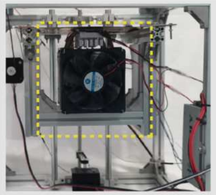
We bought the materials ourselves, including: aluminum profiles, stepper motors, pcb boards and other parts for assembly and software burninga



Extrude

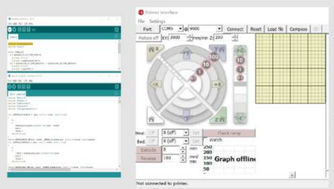
The extrusion equipment uses a Rogowski tube plus a 3D printed extrusion tube because of the low fluidity of pva.

Refrigeration



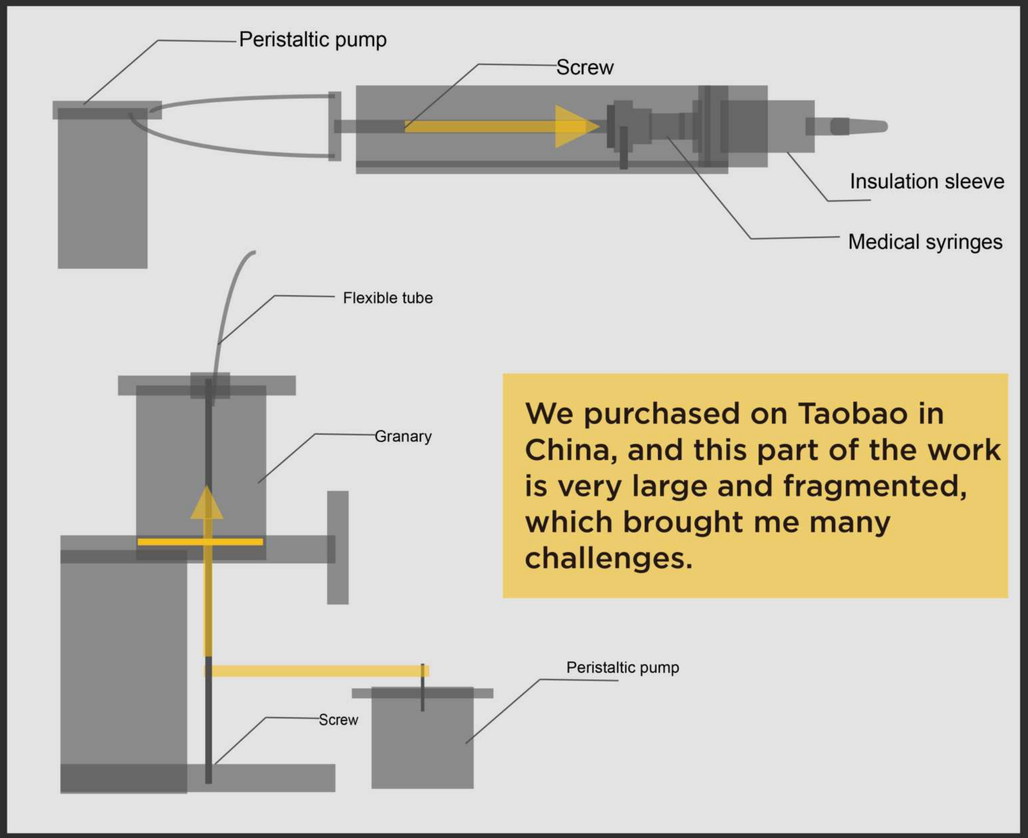
A total of 4 semiconductor chips can reduce the temperature of the platform to -20

Coding

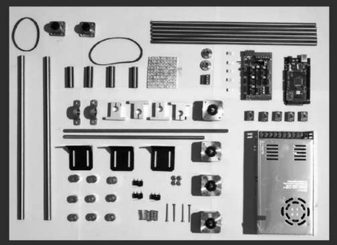


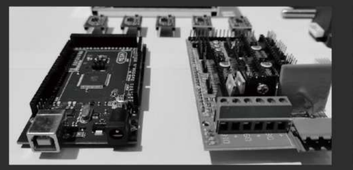
The melin on github is used for rewriting and burning.

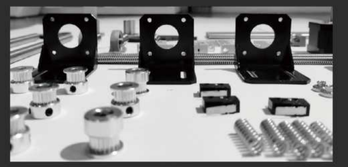
Silos for storing print materials



We purchased on Taobao in China, and this part of the work is very large and fragmented, which brought me many challenges.

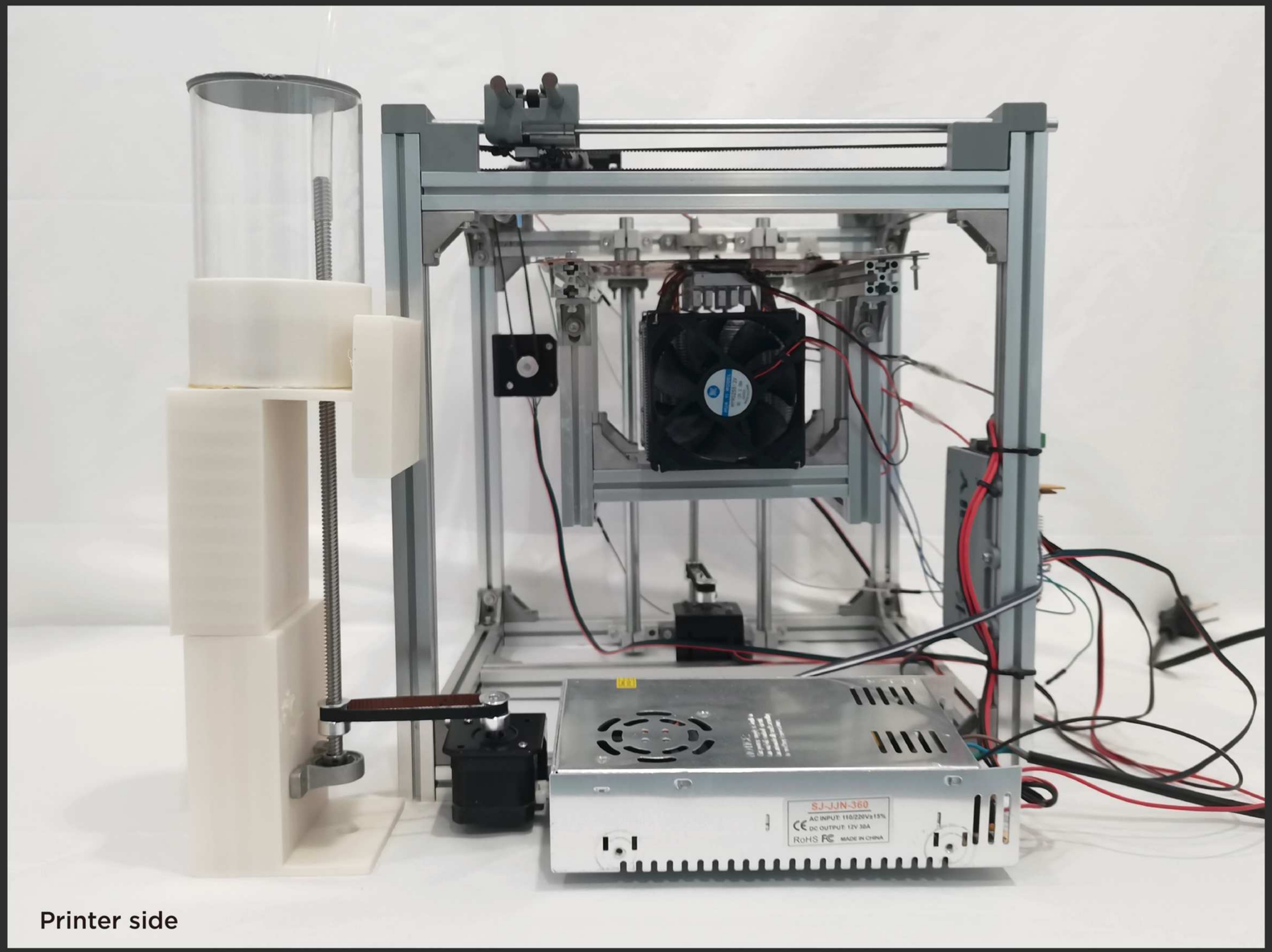




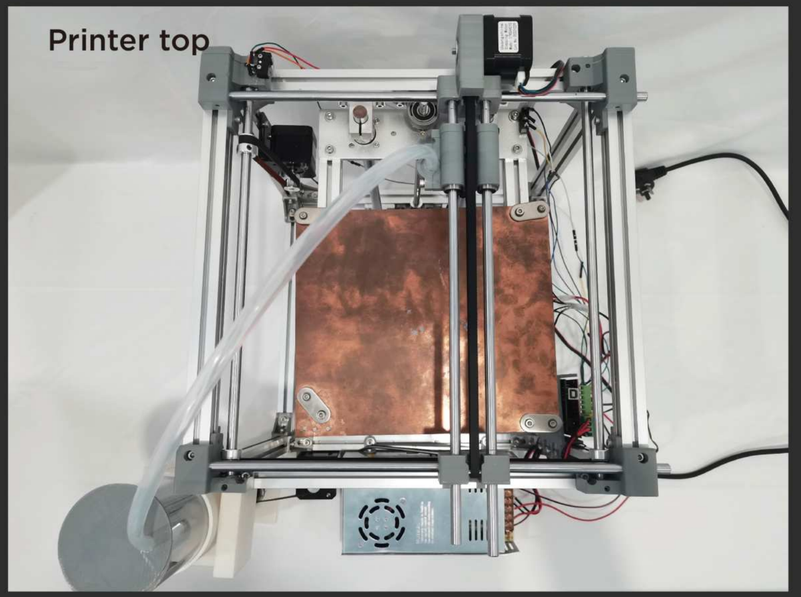


Component

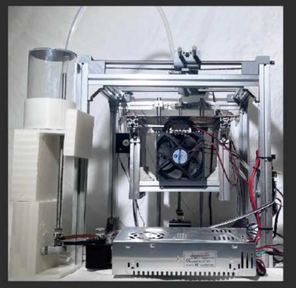
OUTCOME

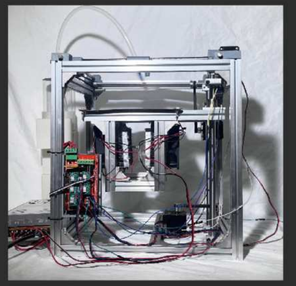


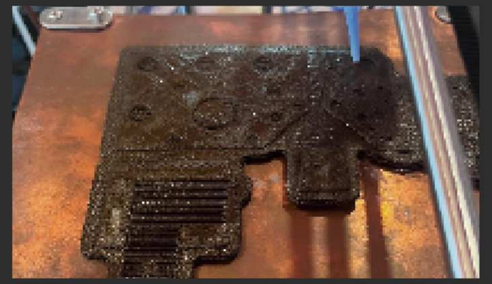
Printer side



Printer top







03

AFFECTION EHCHIO SOFA

For live-in couples

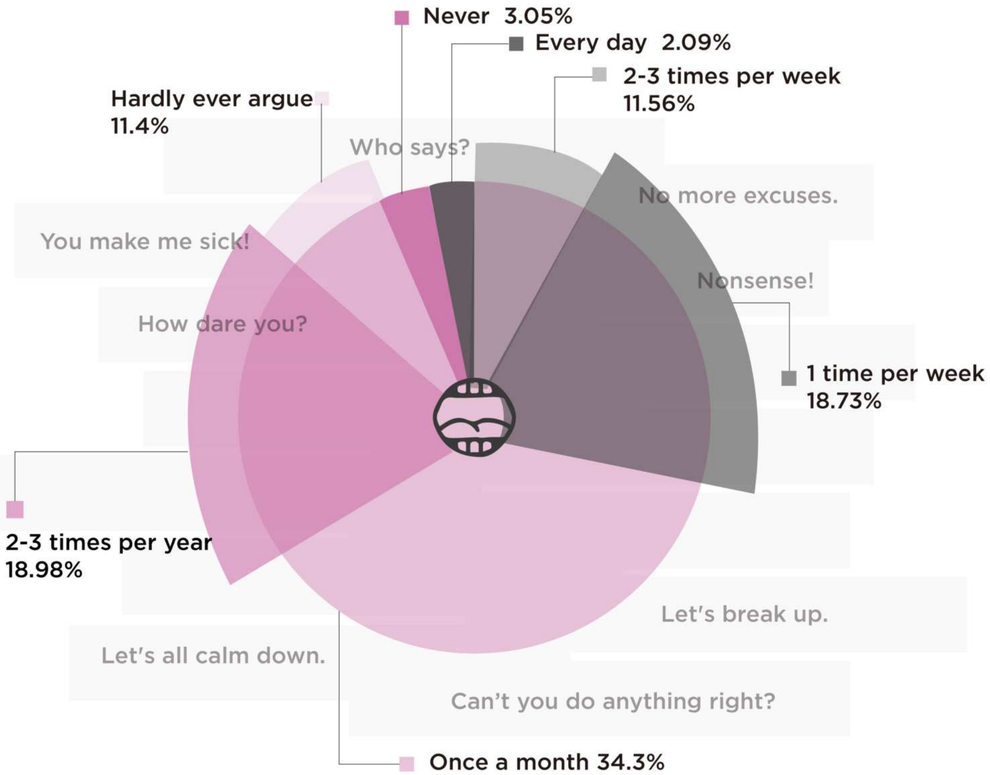
The aim of this project is to design an innovative sofa that not only serves as home decoration, but also as an emotional communication centre for couples' life. By introducing colour-changing technology and multi-functional design, the sofa will become a repository of information about the couple's life, recording and connecting their love journey.

BACKGROUND

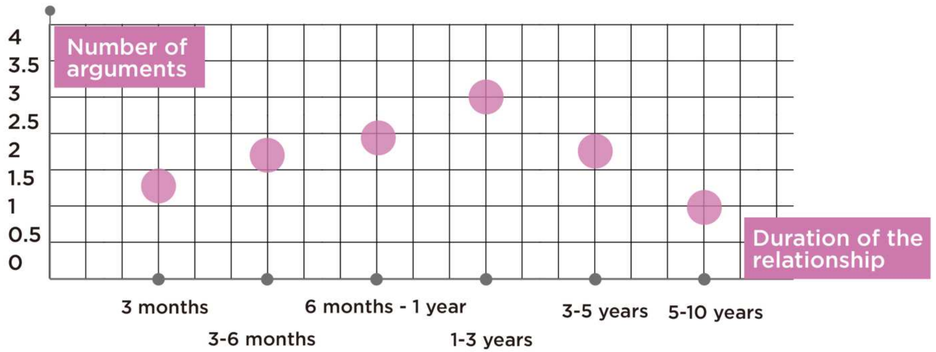
In a survey conducted by a Chinese media in 2023, 77.8% of the respondents accepted cohabitation. In a survey on people of different ages who had experienced cohabitation before marriage, the post-90s generation accounted for as high as 63.8%.

It has become a general trend for young couples to live together before marriage, but living together will expose various life problems and may lead to quarrels, which requires the couples to get along. Therefore, when couples live together, they need space for interaction as well as personal space. When they first start living together, Most couples have limited living space. It would be great if a two-seater sofa of suitable size can meet their interaction needs and personal space at the same time.

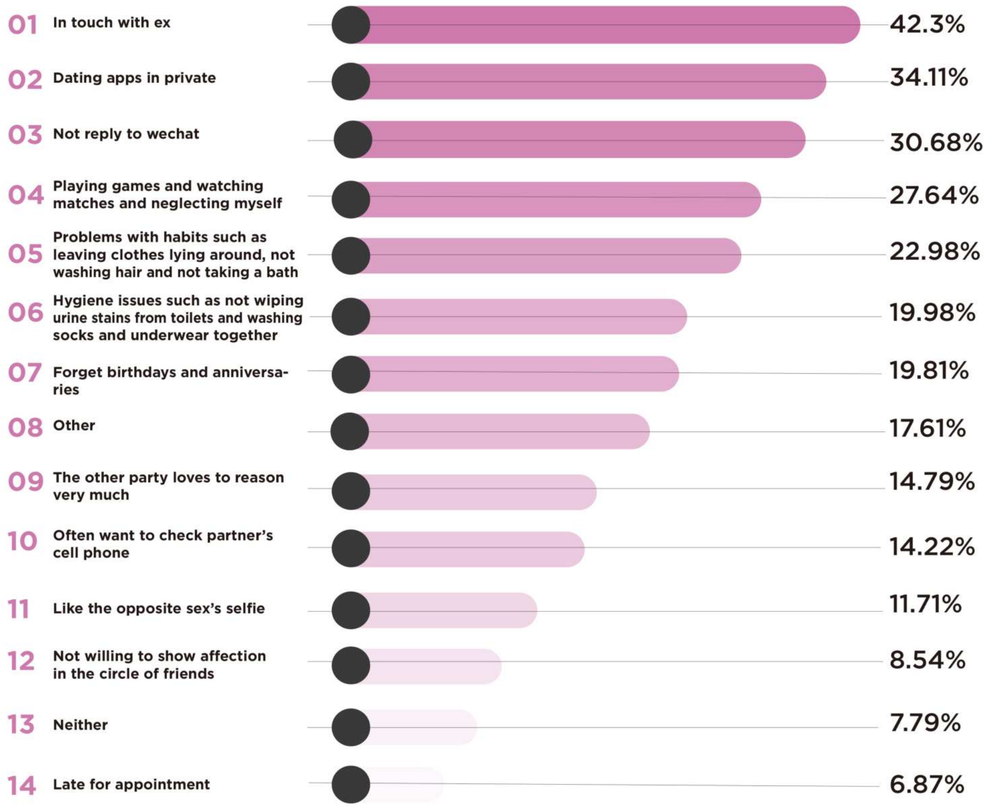
How often couples quarrel ?



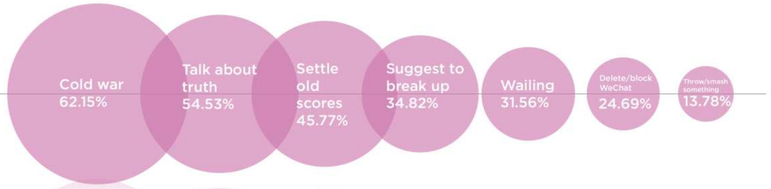
Average number of arguments per month



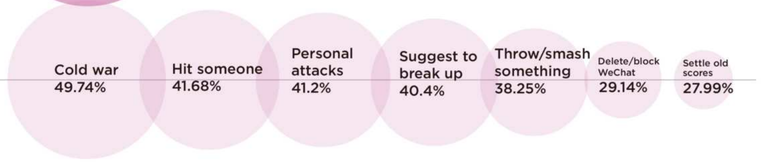
What causes couples to quarrel?



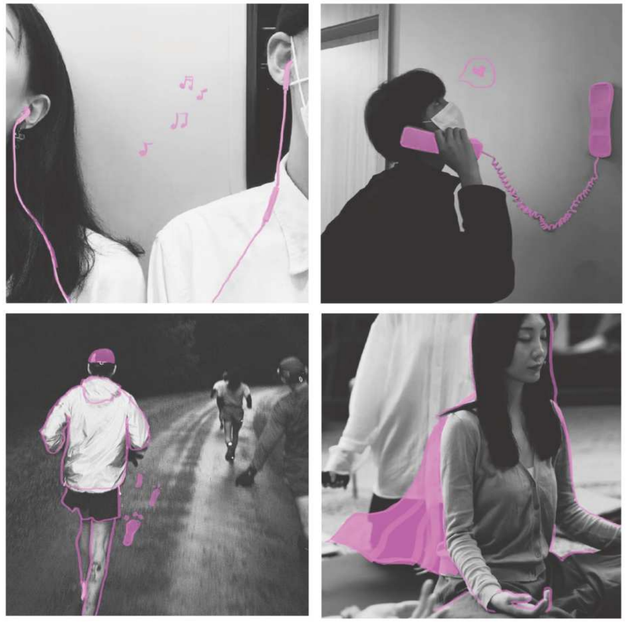
What do couples do when they quarrel?



What do couples do when they can't stand a fight?



Common ways for couples to vent after a fight



Consequences of frequent quarrels

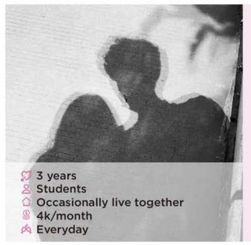
Difficulty communicating effectively.

Negative effects on mental health, including anxiety, depression, etc.

Failure to resolve the issue may result in one or both parties choosing to end the relationship.

Personal Interviews

cp1 Who wishes to remain anonymous



·Never quarrel.
·Like to dine together, go sightseeing, watch movies, watch anime, play chess, and have many similar hobbies.
·The sofa will be considered for comfort, cleanliness, appearance, practicality, and proper size (the house is relatively small)

cp2 Joyful dislike of each other Xiaodeng&Huanhuan

(Deng thinks it's once a month/Huanhuan thinks it's every day.)
·Don't spend much time together, lack of bonding.
·Huanhuan: Scold him Deng: I've come to my senses.
·Usually on the floor.
·Play cards , play Zombies games
·For the sofa, comfort first, good looks second, we hope there is a combination of a big one and a small one.

cp3 On the verge of breaking up Laoxiao&Azi

·Once a month, later on very much, once a week or even once every two or three days.
·The reasons were not listening to people, not replying to messages, not being able to communicate.
·No way to resolve it.
·Wherever it happens, the place is there, online, on the phone, in public.
·Sofa choice is large, very soft, can sleep on it.

Conclusion

- Need privacy when arguing
- Arguments during cohabitation
- Young couples don't have much money.
- All will want a sofa in their small home.
- Appropriate size.
- Suppleness.
- Have their own space.
- It's okay to lie down.

MATERIAL ANALYSIS

Colour-changing materials

Thermochromic materials

Fabrics change colour with temperature changes, reversible temperature change fabrics return to colour when the temperature recovers, irreversible fabrics leave a mark.

Photochromic materials

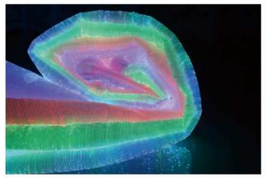
The colour will change with the change of light, usually after ultraviolet irradiation will produce fluorescence, commonly used in banknote detection and anti-counterfeiting.

Hydrochromic materials

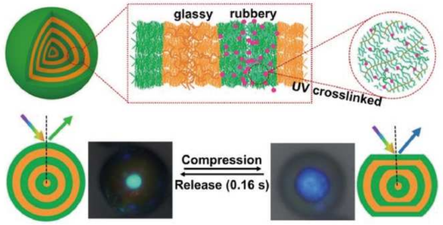
Water discolouring fabrics, generally change colour or pattern when exposed to water, usually reversible, commonly used in swimwear fabrics.

other

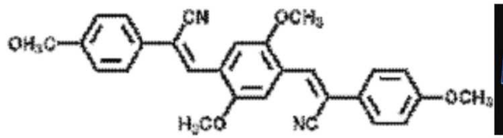
There are also electronic fabrics or fibre optics that can change colour electrically, often with smart sensors.

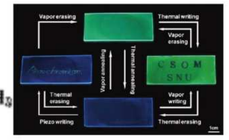


Piezochromic materials



Essentially, it is the pressure that affects the microstructure, e.g., the pressure perturbs the electronic energy levels, generates phase transitions and defects, and the pressure produces various molecular structural isomorphisms, etc., which result in changes in the position and shape of the electronic absorption spectra of the compounds.





Material from other sections

Pros:
1.Modern sense, suitable for modern style home.
2.Not easy to deform, strong ability to resist pressure and weight.

Cons:
1.Cold feeling and may need to be padded or upholstered to improve comfort.
2.Prolonged exposure to high humidity may produce rust.

Pros:
1.Naturally beautiful and provides warmth.
2.Lightweight and easy to move around.
3.Available in a wide range of woods such as oak, pine and birch with different textures and colours.

Cons:
1.Some woods may be sensitive to humidity and temperature and require proper maintenance.
2.Some hardwoods may be more durable but also cost more.

Pros:
1.Combines the beauty of solid wood with the stability of plywood.
2.Relatively low cost, but with some durability.

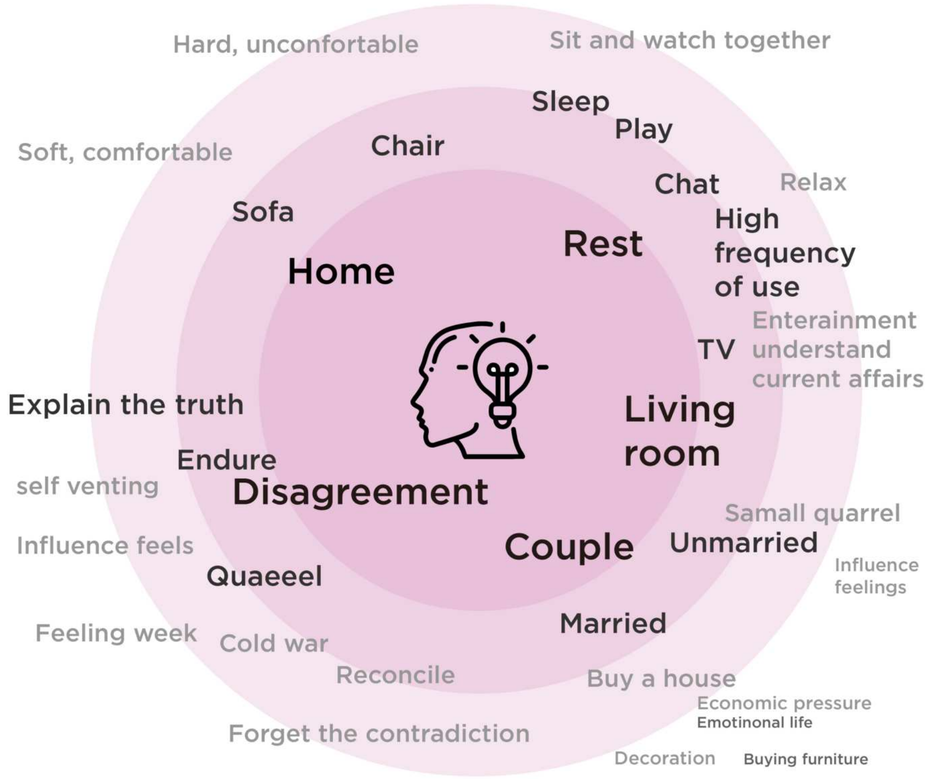
Cons:
Surfaces may be susceptible to damage and need to be treated with caution.

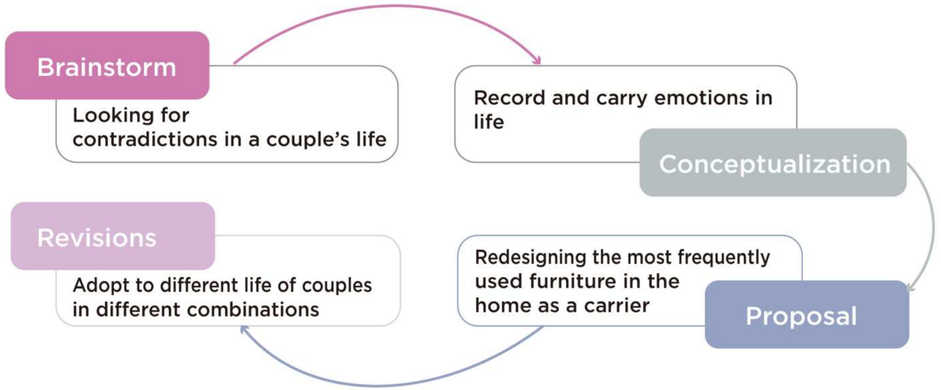
Pros:
Natural, lightweight feel for outdoor or decorative use.

Cons:
Not suitable for large or furniture that requires strong support.

Conclusion Considering the general economic situation of young couples, cheaper metal materials were chosen as the frame, and metal is also suitable as a carrier for colour-changing paint.

MIND MAP





CONCEPT

Improvement of family conflicts and enhancement of diversity of uses

Design logic

Furniture of the future?

The future of furniture will no longer be just a piece of furniture, for the sofa to sit is just the basic function, in order to meet the basic needs of people need more meaning and function to attract people!

AffectionEcho Sofa

A future sofa?

The sofa becomes a carrier of content rather than seating, and the sofa is no longer the usual seat in the traditional sense, but an emotional support.

Meeting different needs through combinations

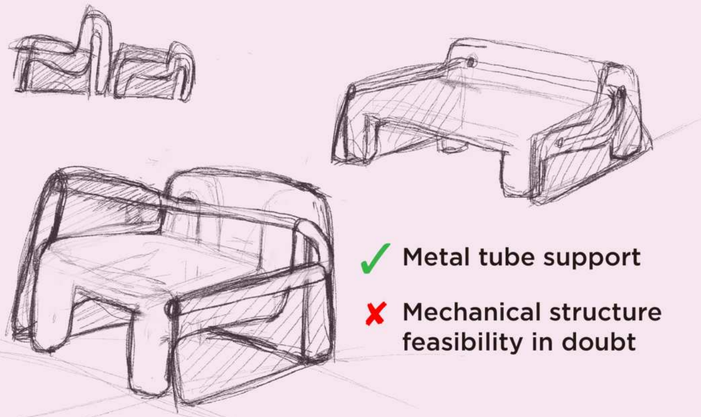
Eyewitness to Love

It is both a symbol and a witness of love.

The sofa becomes a repository of information about the couple's life records through colour changes and various functional combination states, responding to different life situations and connecting the relationship in order to keep it moving forward.

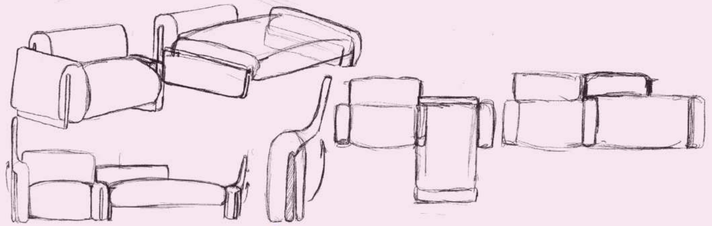
SKETCH

01 Foldable



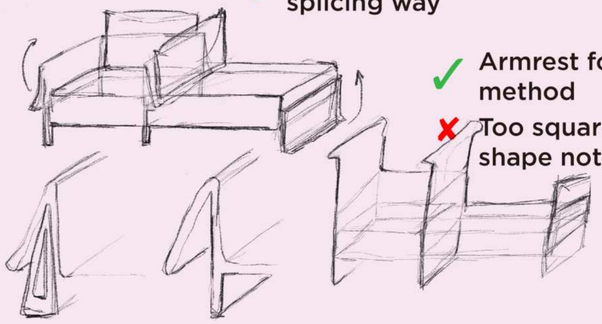
✓ Metal tube support

✗ Mechanical structure feasibility in doubt



✓ Combined splicing approach

✗ Soft packages hinder the splicing way



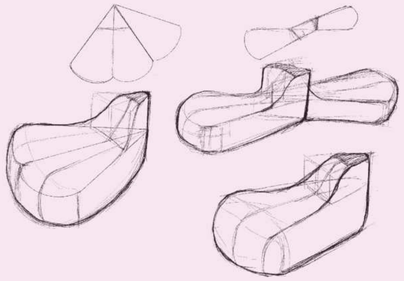
✓ Armrest folding method

✗ Too square in shape not soft

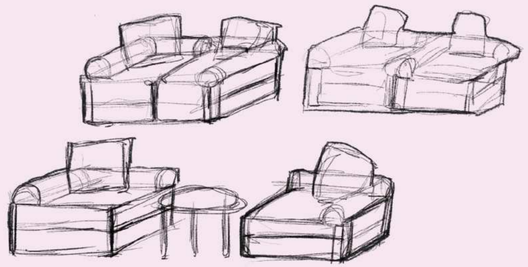
02 Streamline

✗ Insufficient functional differentiation

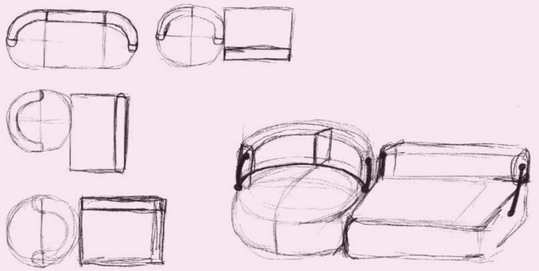
✗ Lack of discolouration areas



03 Combinatorial

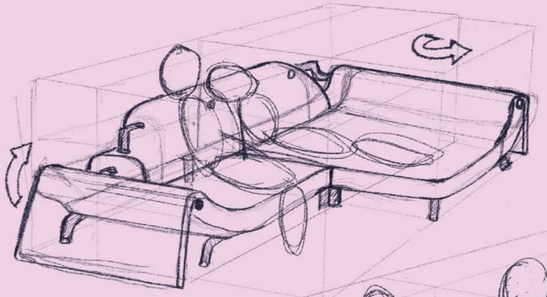


✗ Cushion movement



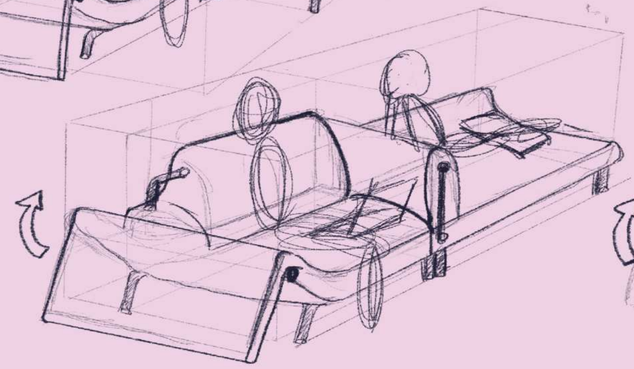
✗ Square-round combinations do not connect smoothly

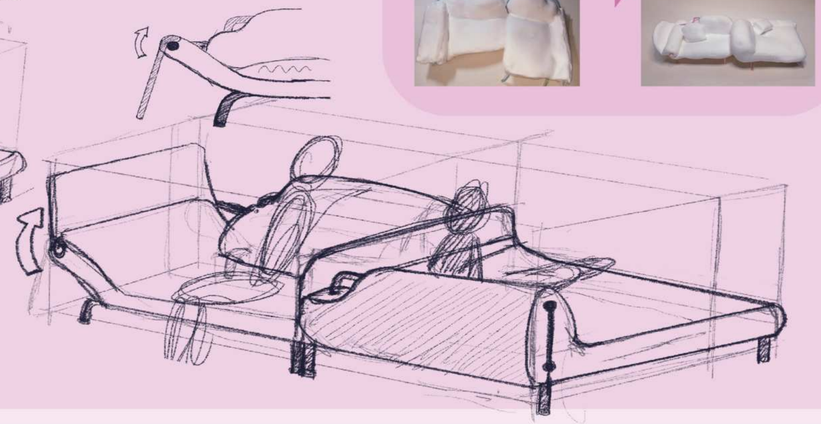
04 Final design



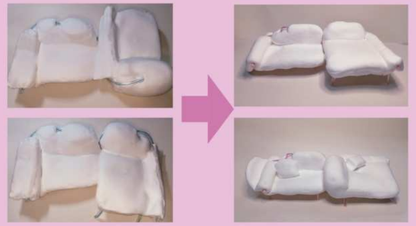
✓ Fulfils three different functional requirements

✓ Colour change + support All-in-one



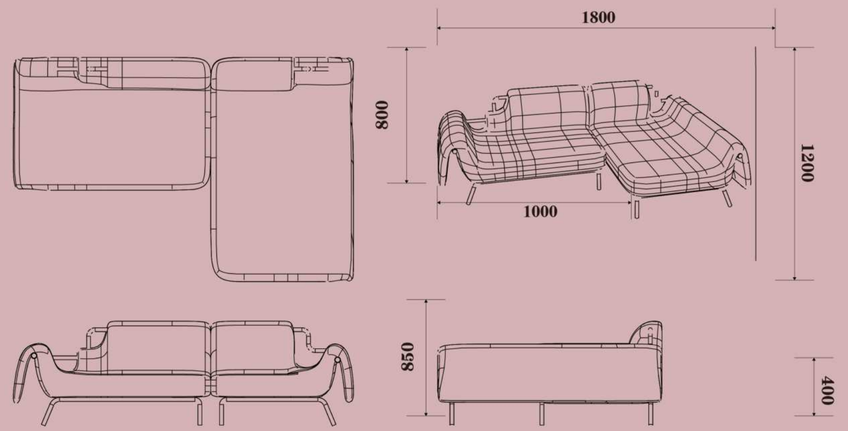


Model sketch

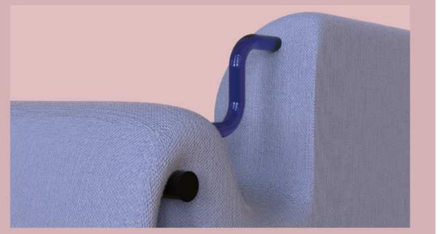


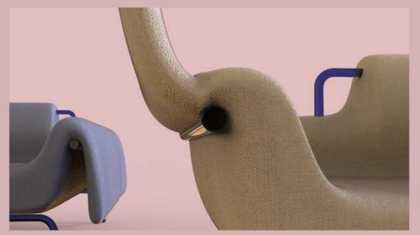
RENDERINGS AND DETAILS

Dimension figure



The metal supports that run the length of the sofa change colour on impact.





Foldable armrests can be adjusted according to different usage conditions.

A. Love each other

B. Working together

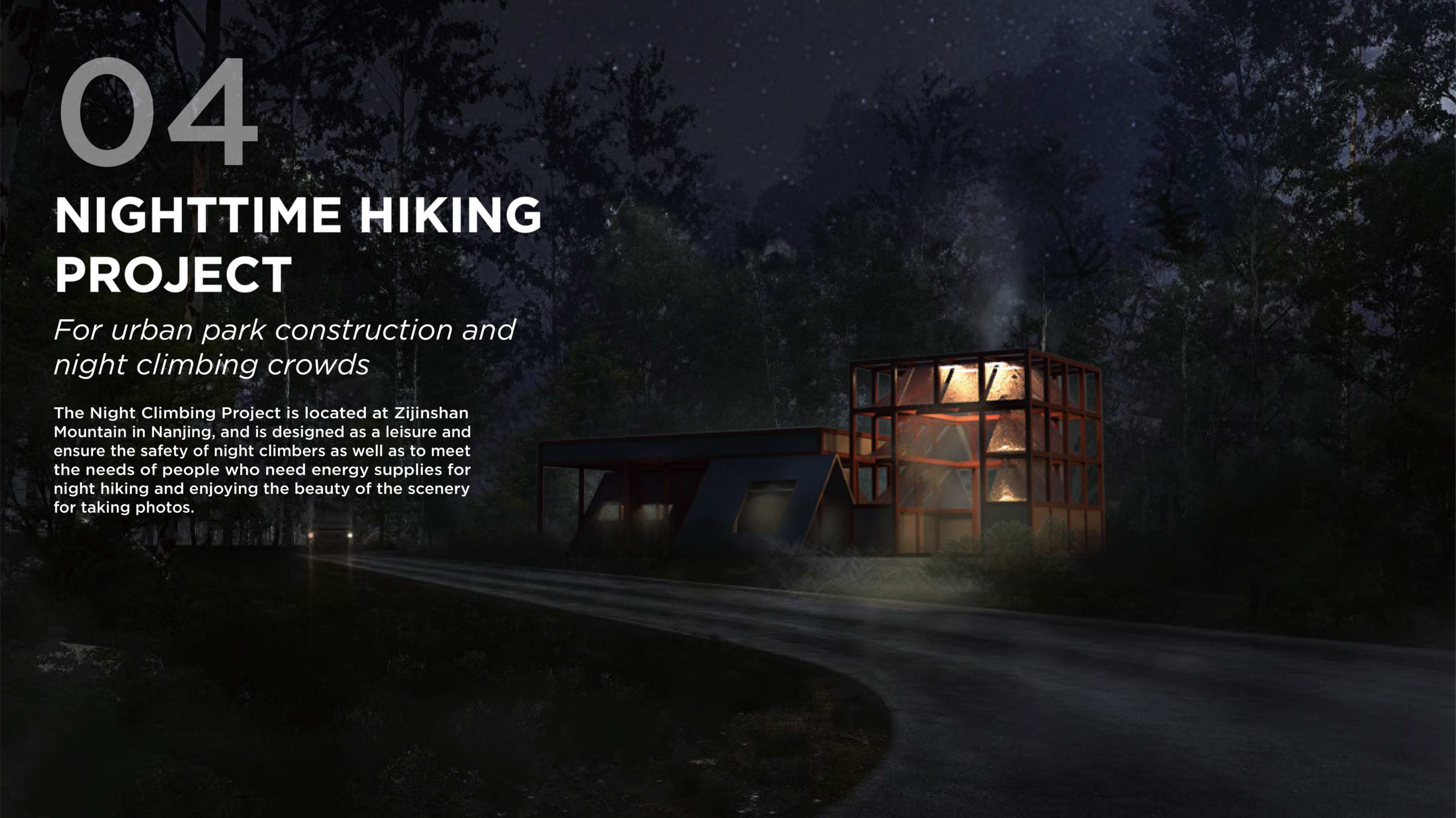
C. Cold war

04

NIGHTTIME HIKING PROJECT

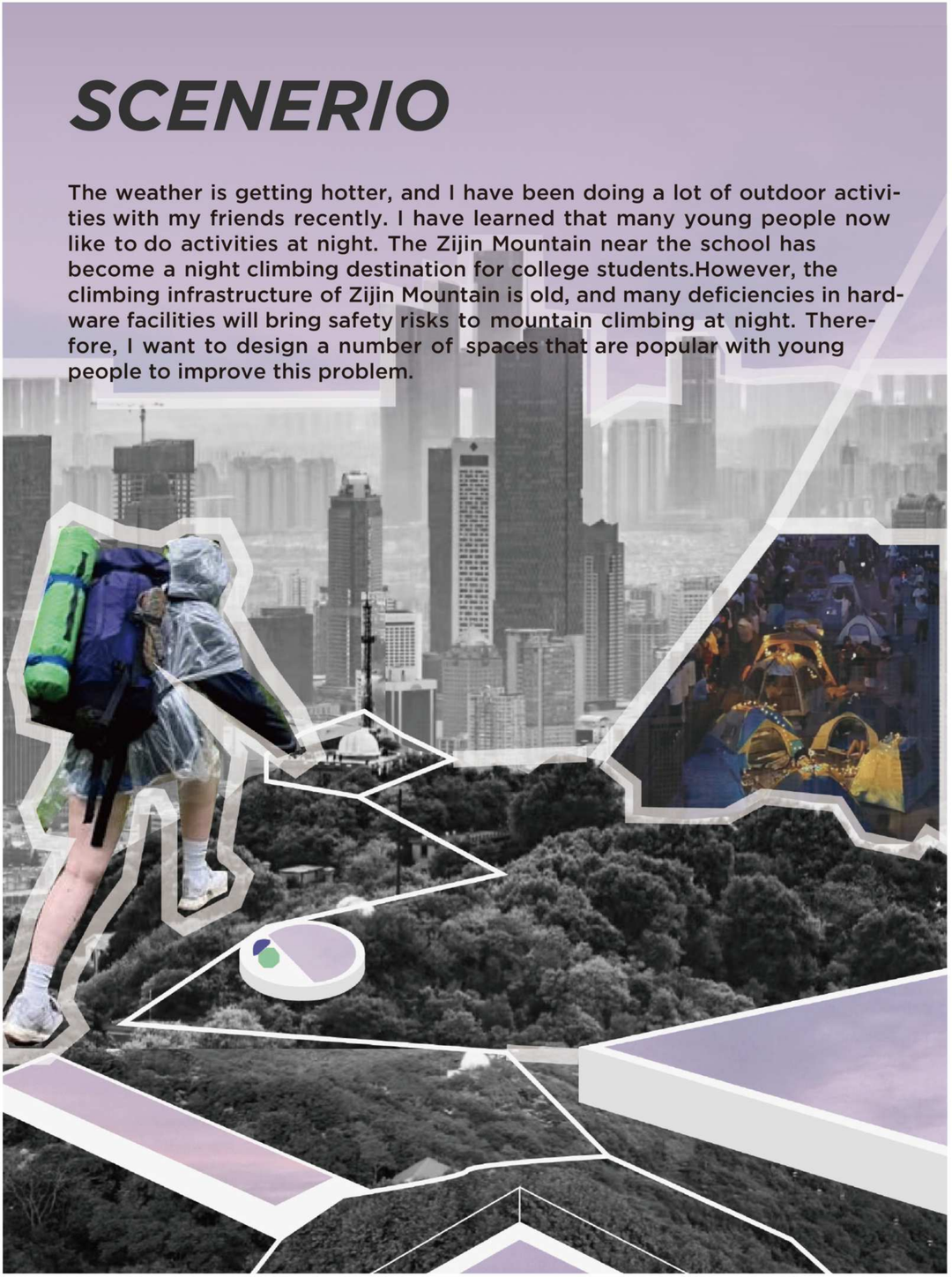
For urban park construction and night climbing crowds

The Night Climbing Project is located at Zijinshan Mountain in Nanjing, and is designed as a leisure and ensure the safety of night climbers as well as to meet the needs of people who need energy supplies for night hiking and enjoying the beauty of the scenery for taking photos.



SCENERIO

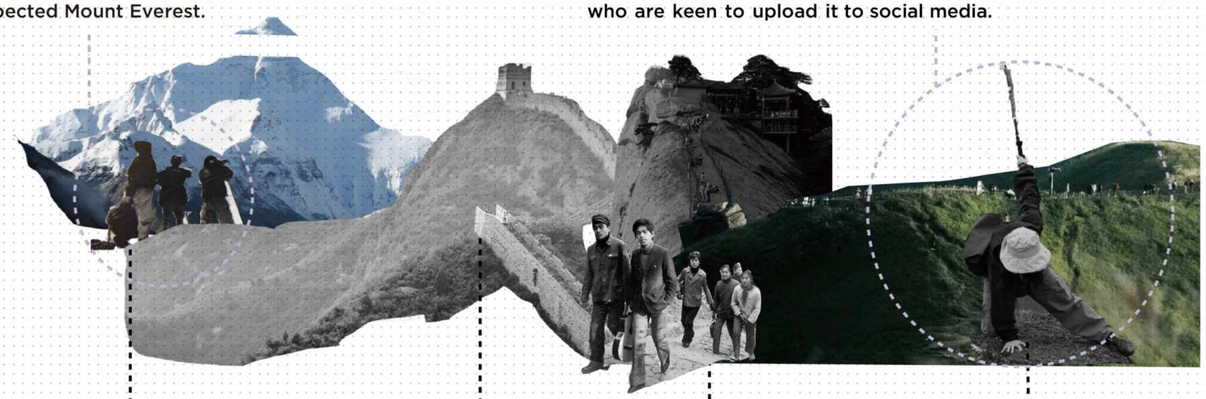
The weather is getting hotter, and I have been doing a lot of outdoor activities with my friends recently. I have learned that many young people now like to do activities at night. The Zijin Mountain near the school has become a night climbing destination for college students.However, the climbing infrastructure of Zijin Mountain is old, and many deficiencies in hardware facilities will bring safety risks to mountain climbing at night. Therefore, I want to design a number of spaces that are popular with young people to improve this problem.



How often couples quarrel ?

In the 1960s, a Chinese mountaineering team inspected Mount Everest.

This is a popular photo pose among young people hiking at night, who are keen to upload it to social media.



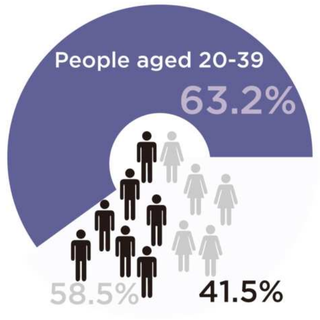
Mountain climbing has been a popular physical fitness sport since ancient times.

In modern times, the Chinese peoplestill maintain their enthusiasm for mountain climbing. At the end of the 20th century,many famous mountains were included in tourist attractions, and the entertainment nature of the mountains became even stronger

Night climbing has become very popular among younger people in recent years, with "climbing buddies" being widely circulated on social media.

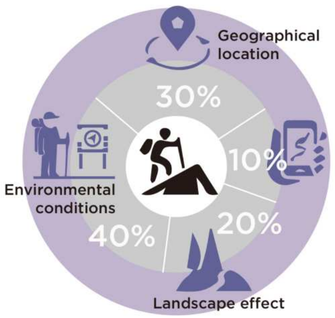
DATA

Through the analysis of the motivations and influencing factors of the target group (mainly college students and office workers aged 20-39), it can be seen that when climbing mountains at night, they often consider more about the distance between the mountain and home, the safety when climbing, and the beauty of the scenery.



Crowd proportion

Crowd motivation

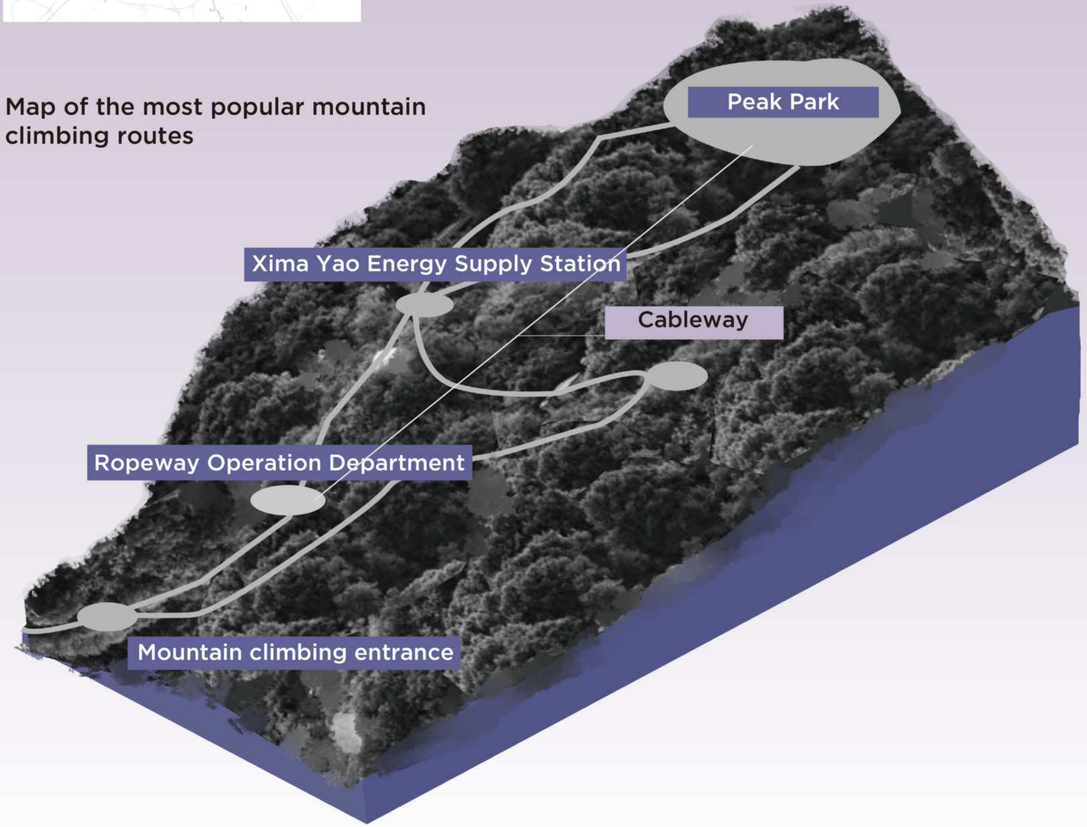


Factors considered

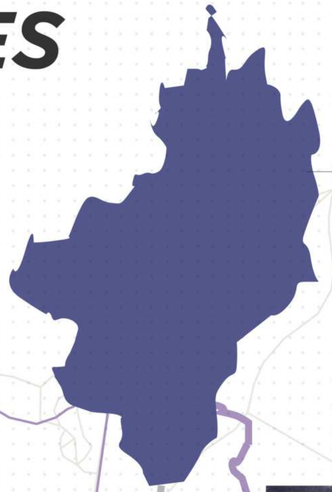
SITE

Zijin Mountain is located in the eastern suburbs of Xuanwu District, Nanjing City, Jiangsu Province. The maximum length of the mountain from east to west is 7 kilometers, and the widest point from north to south is about 3 kilometers. The plane is an equilateral triangle with the tip facing north, covering an area of about 20 square kilometers.

Map of the most popular mountain climbing routes



FACILITIES



Platforms on the top of the mountain park.

There is a KFC and two snack bars on the top of the mountain. The snack bar is shaped like The snack bar is shaped like an ordinary bungalow with no sense of design.

There are few resting spaces on the hiking trails, and there is a lack of more private spaces.

The hiking trail is paved with ordinary stones, with moderate steps. There will be a larger platform about 100 meters apart with one or two stone chairs for resting.

There are snack shops and parasols set up in Xima Yao and the ropeway operation department for climbers to rest and replenish their supplies,but the snack shops are al old-fashioned Chinese-style shabby bungalows.

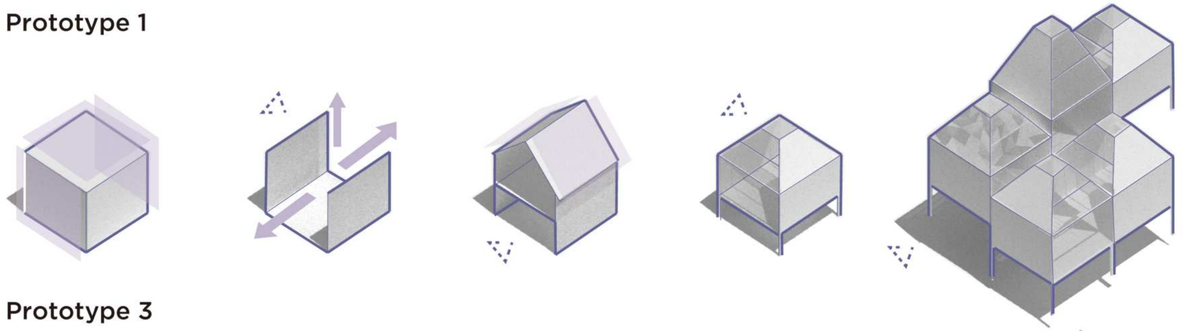
A newly built spacious and gentle cement road without any other facilities and some unmodified earth platforms.

There is also a pedestrian-only viewing trail about 200 meters to the entrance of the hiking trail. There is a parking lot at the entrance of the hiking trail.

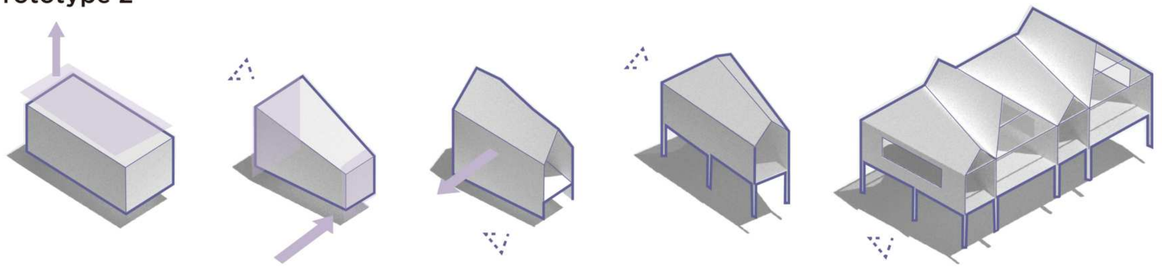
The starting point is near the Baima Park bus station. The transportation is convenient, the road is wide.

DESIGN PROCESS

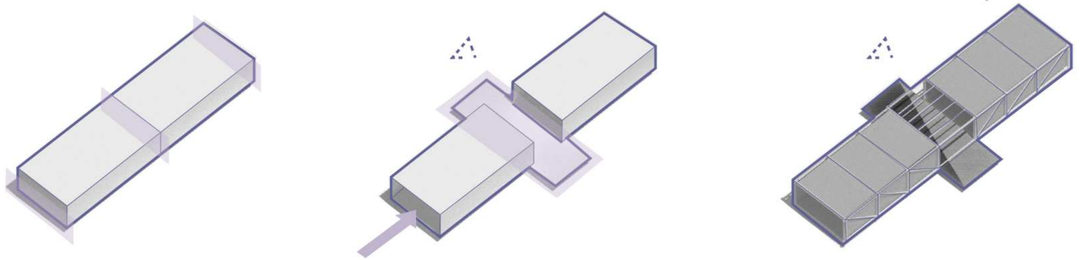
Prototype 1



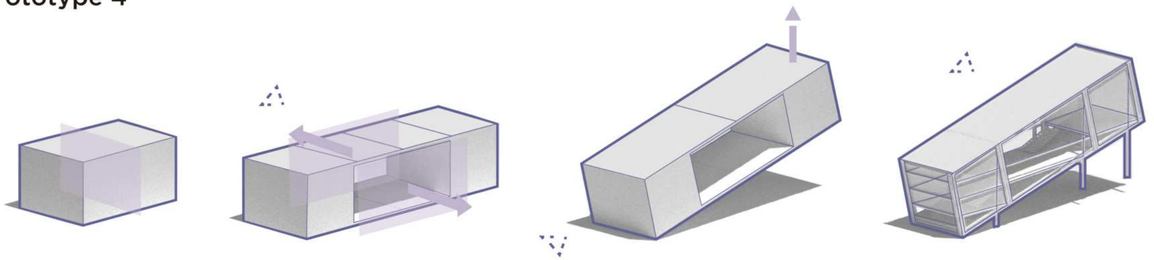
Prototype 2



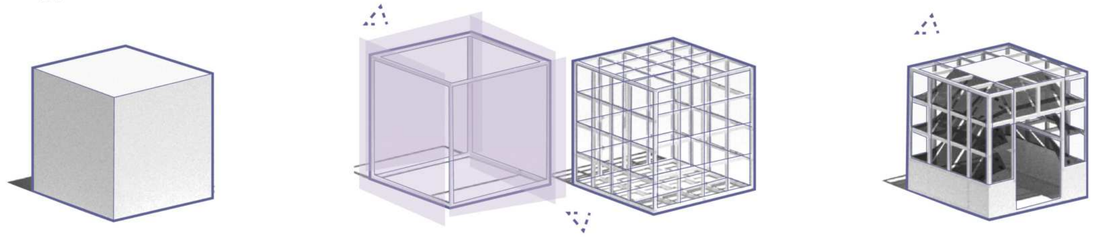
Prototype 3



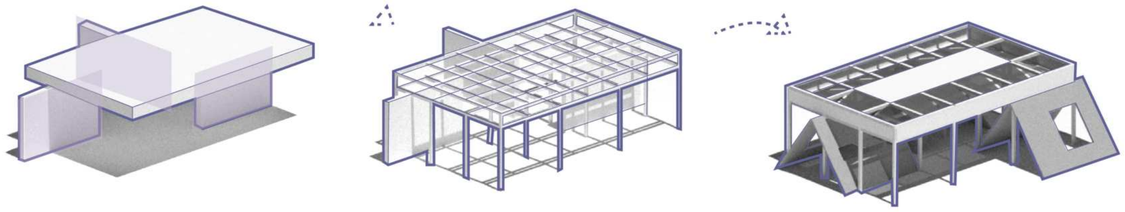
Prototype 4



Prototype 5

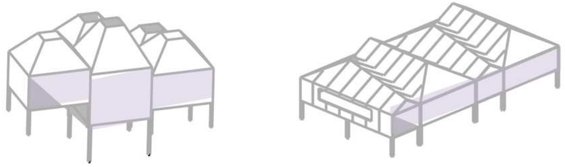


Prototype 6

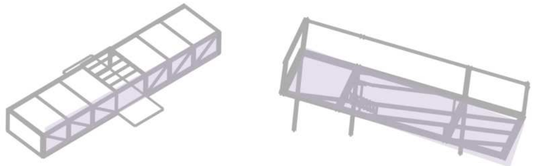


DESIGN PROCESS

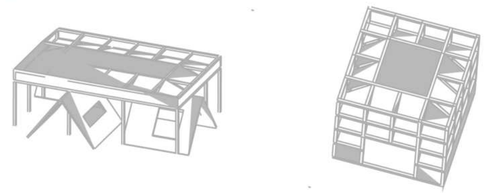
I View from the Peak



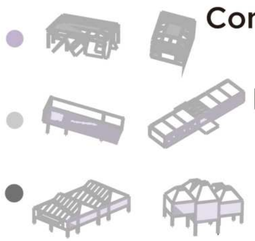
II Hillside Recreation



III Climbing platform resupply



MASTER PLAN



Two popular hiking trails have been selected as the main planning area. The trails pass through two rest platforms to reach the summit park, which has a viewing platform, and on the way there are energy resupply stations and rest stops distributed on both sides of the road, with catering and retailing available at theenergy resupply stations.

A total of six kinds of leisure and interactive spaces are designed, two kinds of viewing space at the top of the hill retain the style of Jiangnan ridge, with a broad view, two kinds of rest stations can be adapted to different slope inclination angle set on both sides of the hiking trail to flexibly cope with a wide range of conditions, and two kinds of energy stations are based on the modelling of the traditional old snack shops, giving up the concept of the wall surrounded by a combination of the tarpaulin modelling, which retains the sense of life, but also adds more modern elements of the urban area.

ELEVATION 1

ELEVATION 2