Portfolio of Shi Weizhen

Tongji University

2023.3-2023.11

PROJECTS

01
CarzCoffee
We value your time during waiting

02
Fa.World
An interactive world for Workers and Families

03
AI Vision
Coordination Guidance System for Blind Mobility

CarzCoffe

Let's collect reading cards and drink coffee.

01 Service Design x Product Design x UI Design

- Carzcoffee allows people to collect reading cards with their **mobile phones** in the coffee shop and read to help people **better spend their time** in the coffee shop, or calm the anxiety of waiting for coffee, or read with coffee, or relax after work.
- And carz coffee also encourages people to **create small cards**, providing a hotbed for creators.

Background Research

Coffee Waiting time

In a coffee shop, when buying coffee, people can't avoid waiting.

Waiting time

Waiting time is divided into production time and queuing time.

Making Steps

In store coffee production includes four steps: extracting coffee, adding milk, adding other ingredients, packaging and presentation.

Queue Waiting time

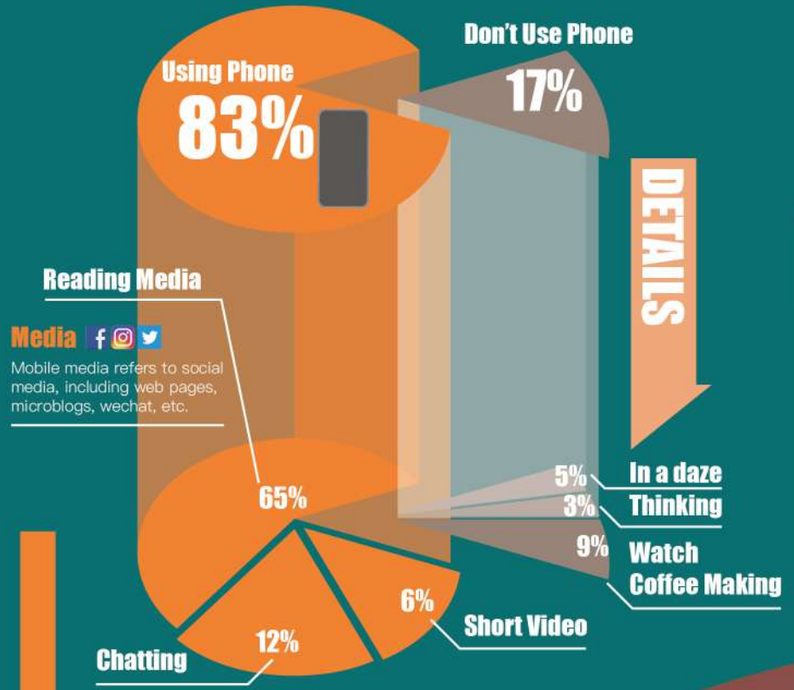
According to the actual survey, the passenger flow in the store can be divided into peak and off peak, and the queuing time is different between peak and off peak.

Waiting Before and After?

Let's capture the situation of customers before and after waiting And see what people like to do before and after waiting.

What do people do?

While they are waiting for coffee.



When waiting for coffee, the most common thing people do is to use mobile phones, and people use phones to read media the most frequently.

Interview

The clerk at the front desk of Starbucks can see the customers for a lot of time a day. They know more about the situation of customers, so I interviewed she first.

Wang Jiali, Starbucks clerk

Questions

1. Queuing Situation in Starbucks.
2. Weather you need to queue up during off peak hours.
3. Do people take away or stay after the queue?
4. What do the people who stay in the store do?

Time Difference

Peak time	Spare time
8:00 – 9:00 13:00–14:00	9:00 – 12:00 14:00–22:00

Waiting time	
Peak time	4min
Spare time	12min

Situation

People need to wait in line at Starbucks

Main population

The two main groups are office workers and students.

Wang Xinqi,office worker

I go to buy coffee Basically every day.

Boost the spirit

I usually take it away. I drink it on the road or at the company.

Refresh yourself and make sure you have enough energy for day

Xue Mengfan , Student

Q: Do you need to buy coffee every day
A: Basically every day

Environment	For studying alone. I like this environment,
Homework	do my homework and read books and often hold group discussions here .When I am tired , I will look at my phone.

Conclusion

Finding

Many times people **use mobile phones** to pass the time. Especially in the waiting time.

Moreover, people generally like to watch their mobile phones and coffee. **Few people** can only drink a cup of **coffee without doing anything else.**

Design Aim

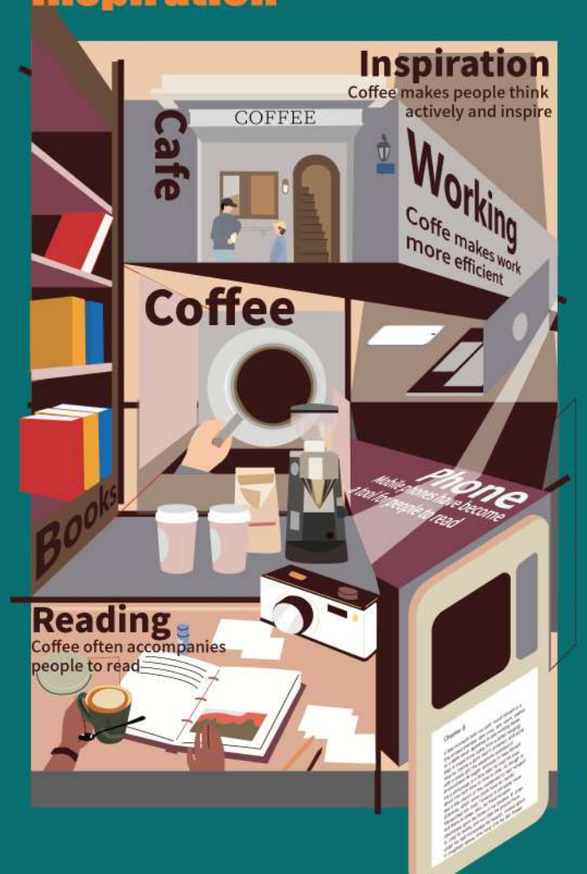
Since people like to use **mobile phones** while waiting so much, and using mobile phones at this time is just to pass the time.

I think I can do something on mobile phone reading and connect it with coffee shops to **interactive experience.**

How to do

I may find something suitable for this time on the **mobile phone** according to the **waiting time** of people in line, so as to increase the immersion of the coffee shop.

Inspiration



Ideation

A QR code and reading

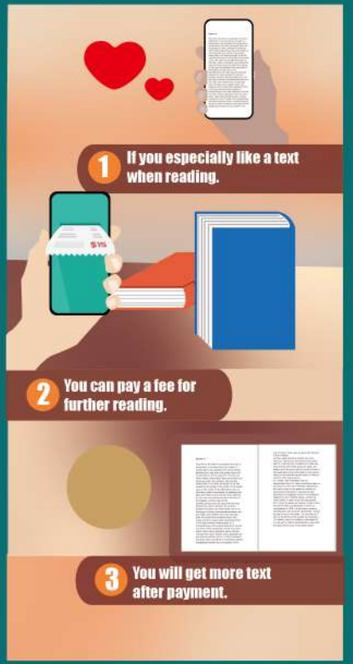
Each order can be pushed with QR code to produce an article.
The length of each article can be about 3 to 5 minutes

B Inspiration and creation

Whether you are a professional writer, a writing enthusiast, or even a passer-by, you can write down any inspiration you have.

C Read payment

You can pay a further fee to get more reading.



Comparation

A QR code and reading

- Scan the QR code to get a piece of text. The length of this text is within the **average waiting time**, so it can make you spend the waiting time better.

B Inspiration and creation

- At the same time, if people stay in the store to drink coffee, people will have more time, and people will **have inspiration** during this time.
- Whether you are a professional writer, an amateur, or just a passer-by, **you can write** your text, and your text **can be seen by others.**

C Read payment

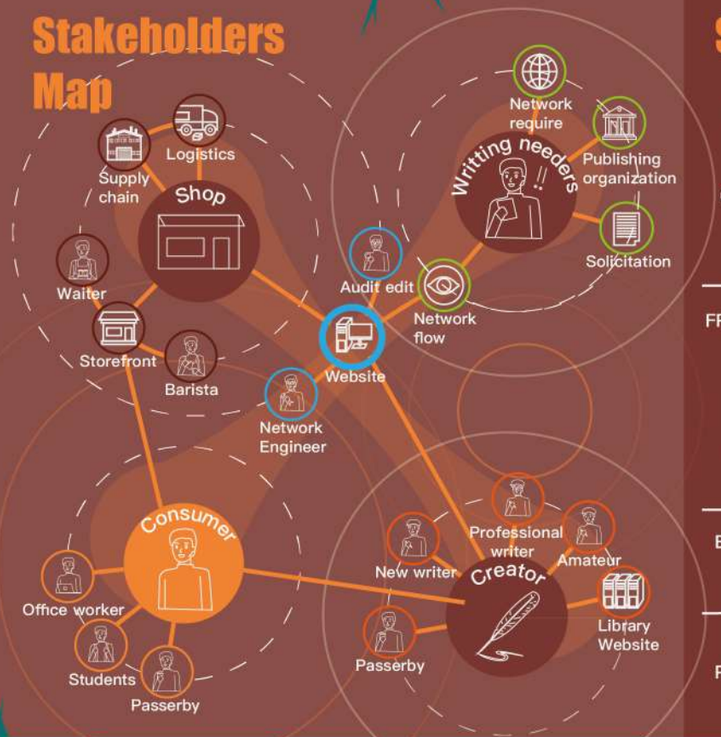
- If you like this text, you can **pay a certain fee** for further reading.
- These funds will be used to **feed back creators** or copyright owners to promote the birth of higher quality texts.

Conclusion

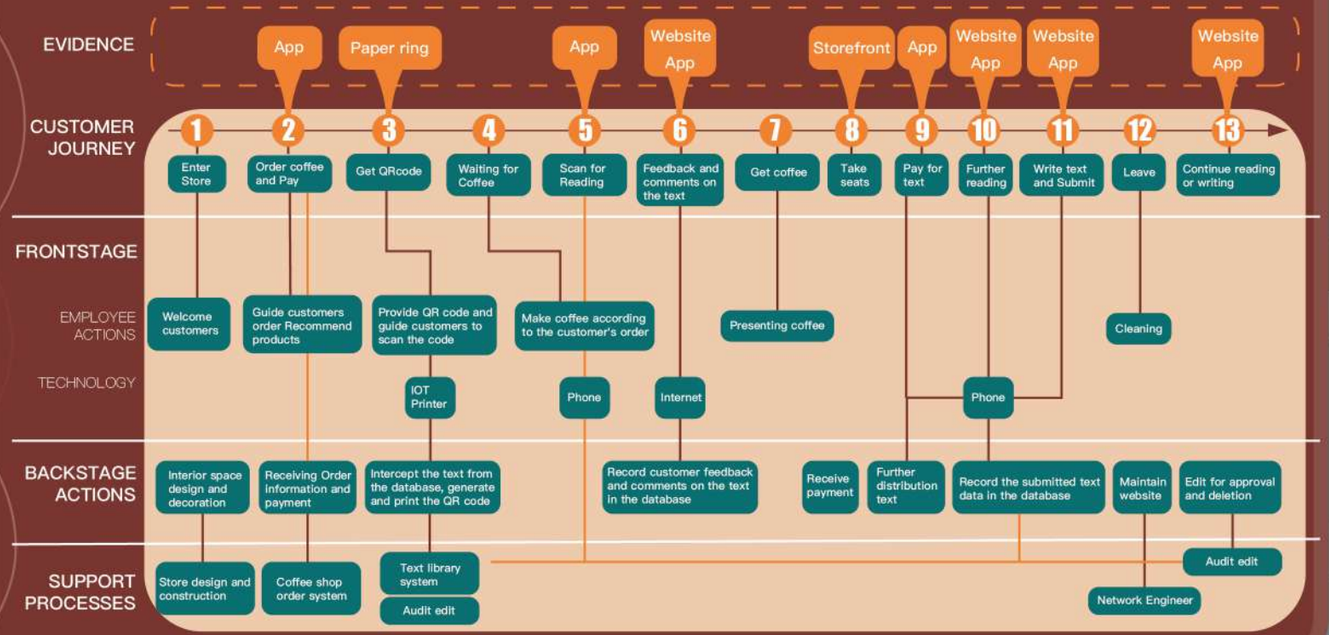
Make a **mobile application** that can read and write text, and I think you can **pay a certain fee** to read more text

Final Concept

Stakeholders Map



Service Blueprint



Cafe portrait

Atmosphere sense

Lighting

The light in our coffee shop is soft, neither dazzling nor dim, which is very suitable for reading

Smell

The coffee shop air is filled with a faint smell of coffee, so that people here can stay awake

Background music

The background music is mainly composed of gentle and elegant classical music, which gives people a quiet feeling

immersion

The coffee shop should give people a sense of immersion.

You can read here and cooperate with the equipment in the shop to give people more interactive feeling

Graphic Design

Icon

We drink coffee with reading cards, so the inspiration of the logo comes from the two actions of **reading text and drinking coffee.**

The idea of **reading a book** can be better expressed in a cup of coffee.

Paper Ring

Each time you order, you will get a printed **paper ring** with your ticket information and a QR code for code scanning. You can **fold up the paper ring** after you get the coffee.

Colourful

It has many colors to distinguish different coffees

Order number

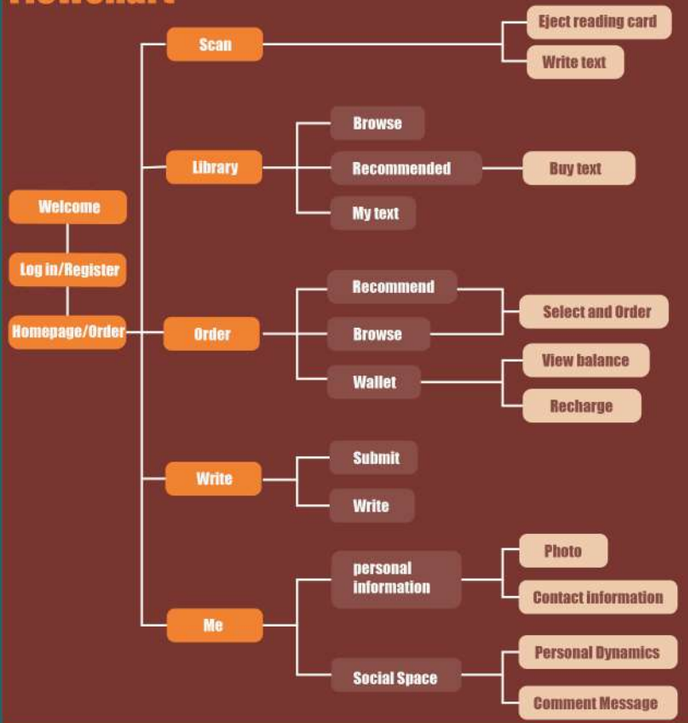
The order number will let you know if your coffee is ready

Foldable

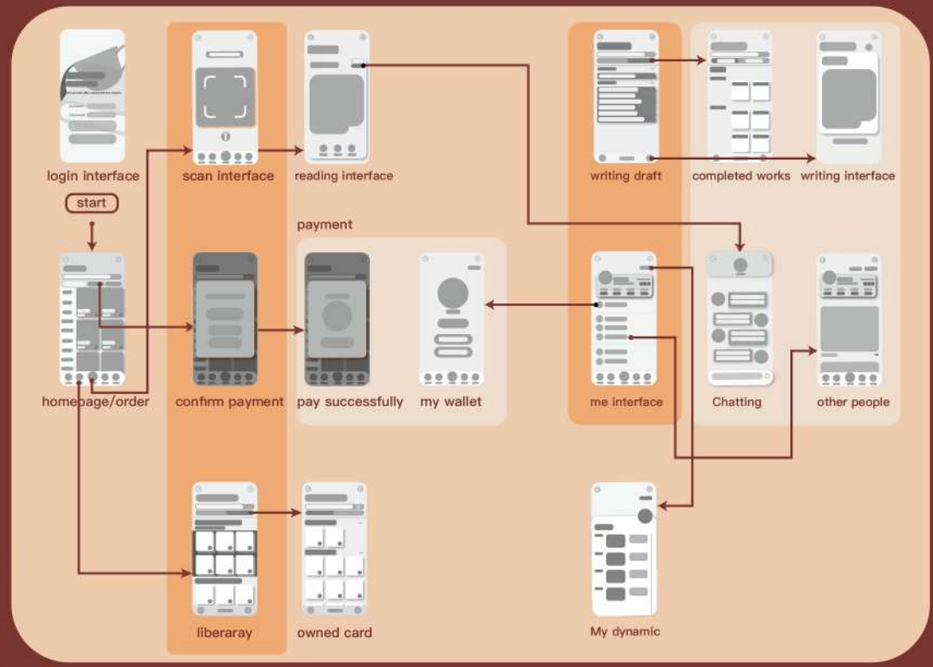
It folds up and fits over a coffee cup

App Design

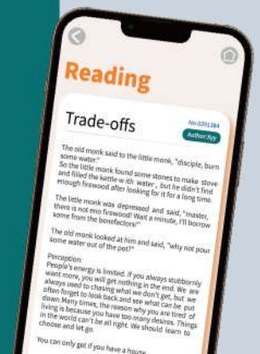
Flowchart



Wireframe



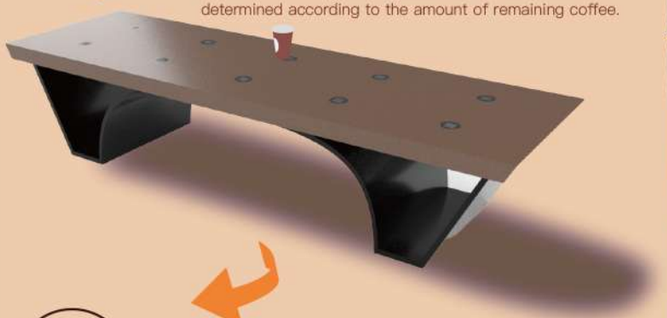
App Design



Product Design

QR code generator

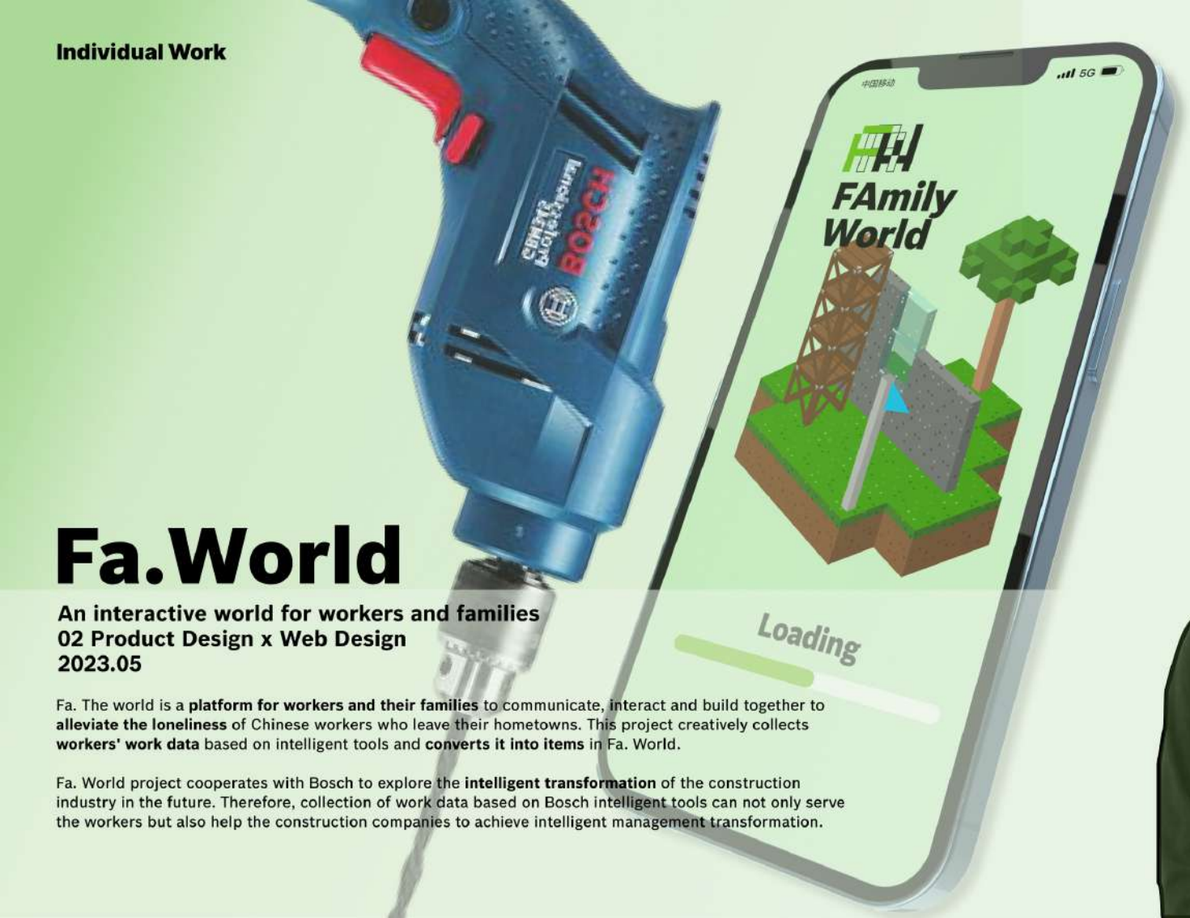
The table will **detect** the amount of remaining coffee. When the **amount of remaining coffee** is different, different QR codes will pop up, and the length of the text corresponding to the **generated QR code** will be determined according to the amount of remaining coffee.



You can get a QR code based on how many drinks are left

Userflow Screnario

Individual Work



Fa.World

An interactive world for workers and families
02 Product Design x Web Design
2023.05

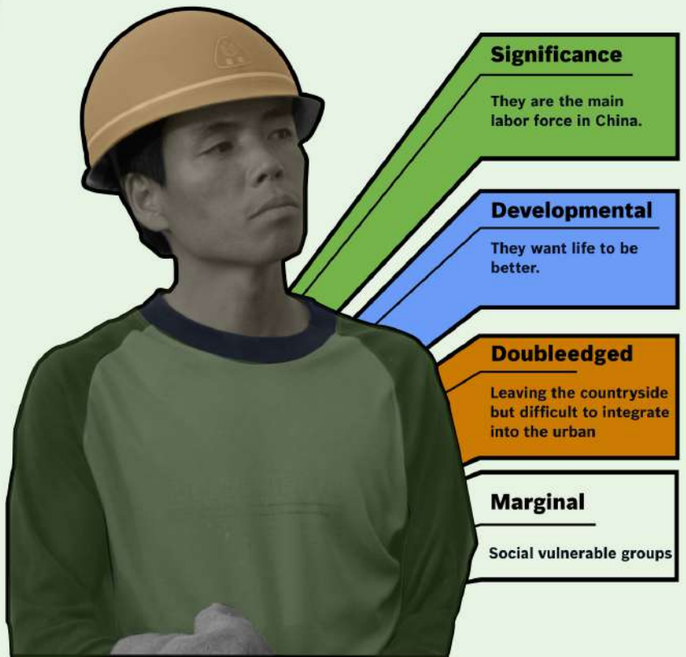
Fa. The world is a **platform for workers and their families** to communicate, interact and build together to **alleviate the loneliness** of Chinese workers who leave their hometowns. This project creatively collects **workers' work data** based on intelligent tools and **converts it into items** in Fa. World.

Fa. World project cooperates with Bosch to explore the **intelligent transformation** of the construction industry in the future. Therefore, collection of work data based on Bosch intelligent tools can not only serve the workers but also help the construction companies to achieve intelligent management transformation.

Background

Chinese Migrant Workers

The total number of migrant workers in China is 285.6 million, accounting for **more than 30% of the total working population.** They have made great contributions to social development and construction.



Significance
They are the main labor force in China.

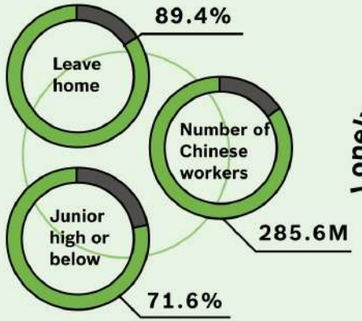
Developmental
They want life to be better.

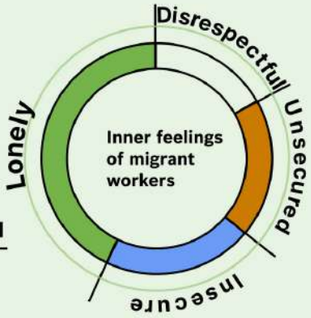
Doubleedged
Leaving the countryside but difficult to integrate into the urban

Marginal
Social vulnerable groups

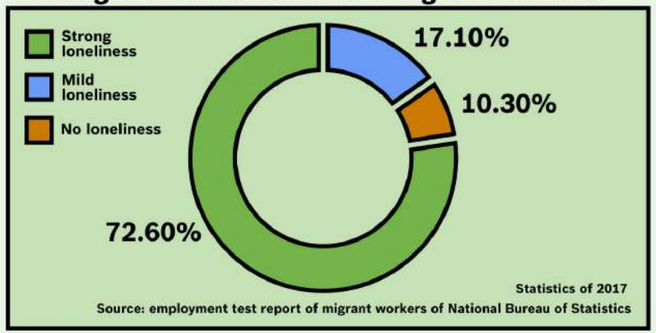
Situation Of Chinese Migrant Workers

However, they usually leave their hometowns and families, and their education and income are very low. They are vulnerable groups in society, who often feel lonely and desire security and respect. **Loneliness is their greatest feeling.**





Investigation on loneliness of migrant workers



Research

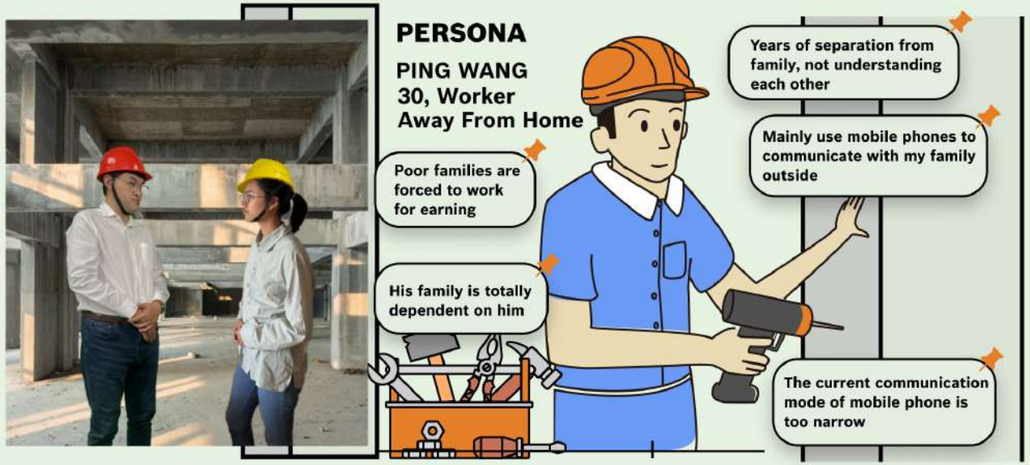
董俊良. 新生代农民工手机使用及心理问题研究[D].西南大学,2017.

Cause Analysis of Loneliness

According to the paper, it is a complex issue with many reasons for the loneliness of migrant workers. Family reasons are an important factor in the loneliness of workers.

Interview

I found a foreman, who knew the hearts of workers better, and interviewed him. He said that loneliness is common in the industry, and migrant workers feel financial pressure to work away from their families. Due to lack of experience, **the new generation of migrant workers** have not fully adapted to this situation, and will show a stronger sense of loneliness.



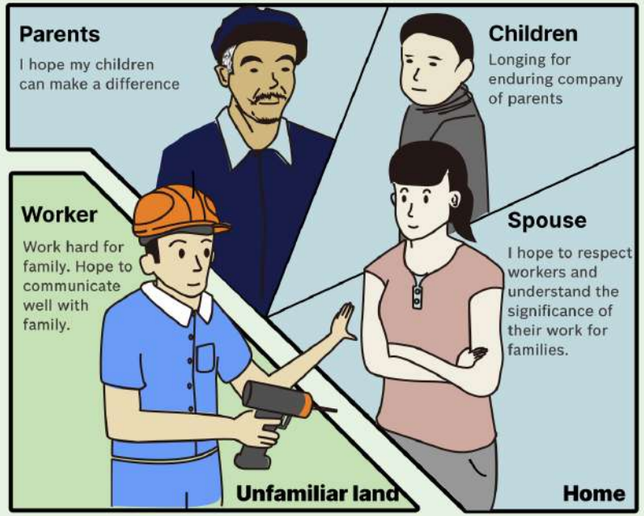
User Journey Map

Stage	Work Time			Family Time	
	Action 1	Action 2	Action 3	Action 4	Action 5
Worker	Enter the construction site to clock in	Carry out construction work	Sign out after work	Return to residence	Communicate with family (phone, video)
Feelings	😐	😕	😐	🙂	🙂
Painpoint	Usually depressed at work			Lack of means of communication	

Insight

Through research and interview, I found that the loneliness of migrant workers mainly stems from leaving their families. At the same time, due to economic pressure, **the new generation of migrant workers tend to feel more lonely.**

Families play an important role in the life and work of migrant workers. The narrow way of communication leads to **less communication and understanding** between the migrant workers and their families**, which makes migrant workers feel lonely.**

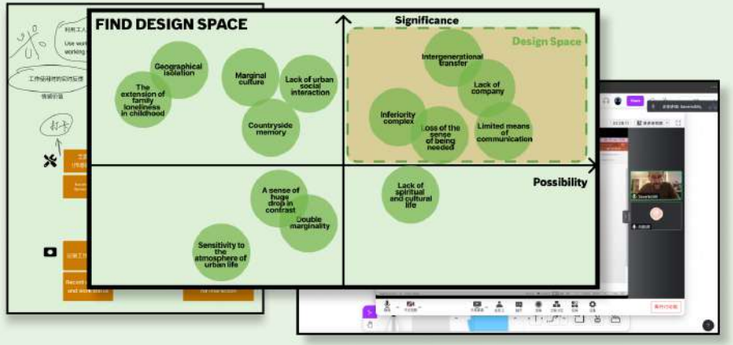


How Might We

How can we create **a new way of communication between migrant workers and their families** to help them better communicate and understand with their families, **so as to alleviate loneliness.**

Ideation & Concept

Brainstorm



Concept

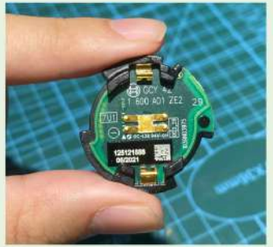
We can **collect workers' work data** through the Bluetooth module of smart tools and **convert it into items** that can **interact with families** in an interactive world (Fa. World Platform).

Bosch Intelligent Tools-Based Bluetooth Module Design

FA. World **collects work data through intelligent tool modules**. Taking Bosch as an example, the Bluetooth module, which integrates a variety of sensors, can collect a variety of data during work.

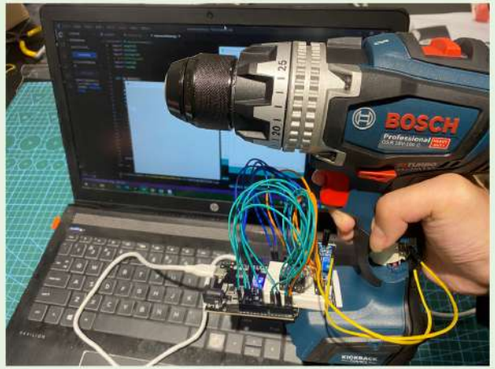
Bosch Intelligent Tools

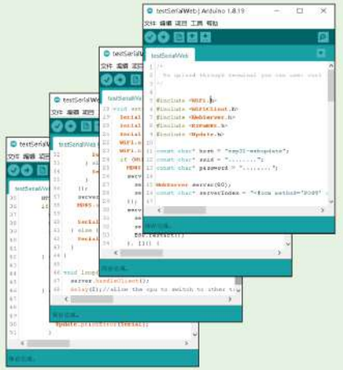
Bosch Bluetooth Module



Bluetooth Module Design（Arduino Demo）

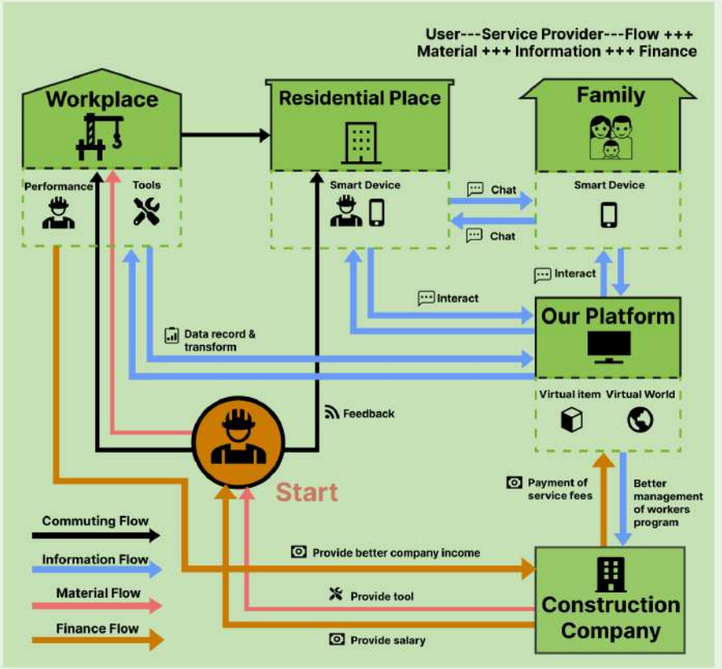
I made a prototype to collect the usage data of tools, such as usage time, acceleration, etc.





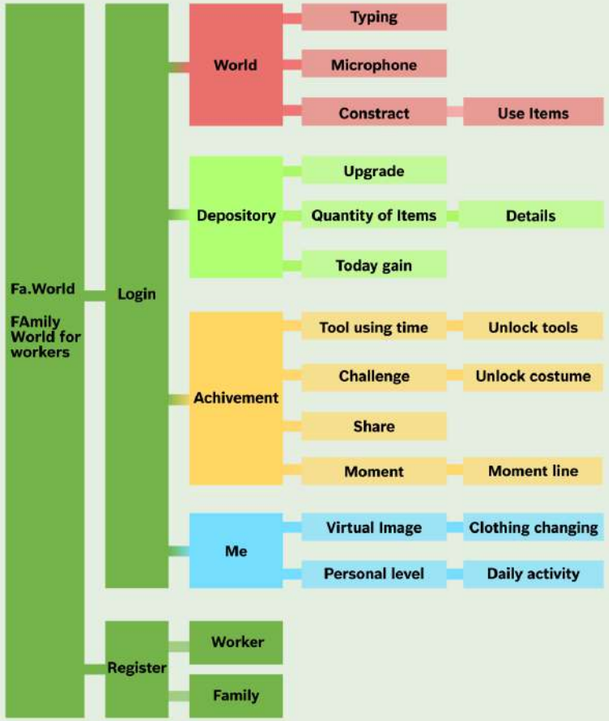
System Map

The system map shows how our design works in the existing industry. We **introduce the construction company** as the capital to promote this design. Our design is not only beneficial to workers, **but also promotes the intelligent management of the construction company.**



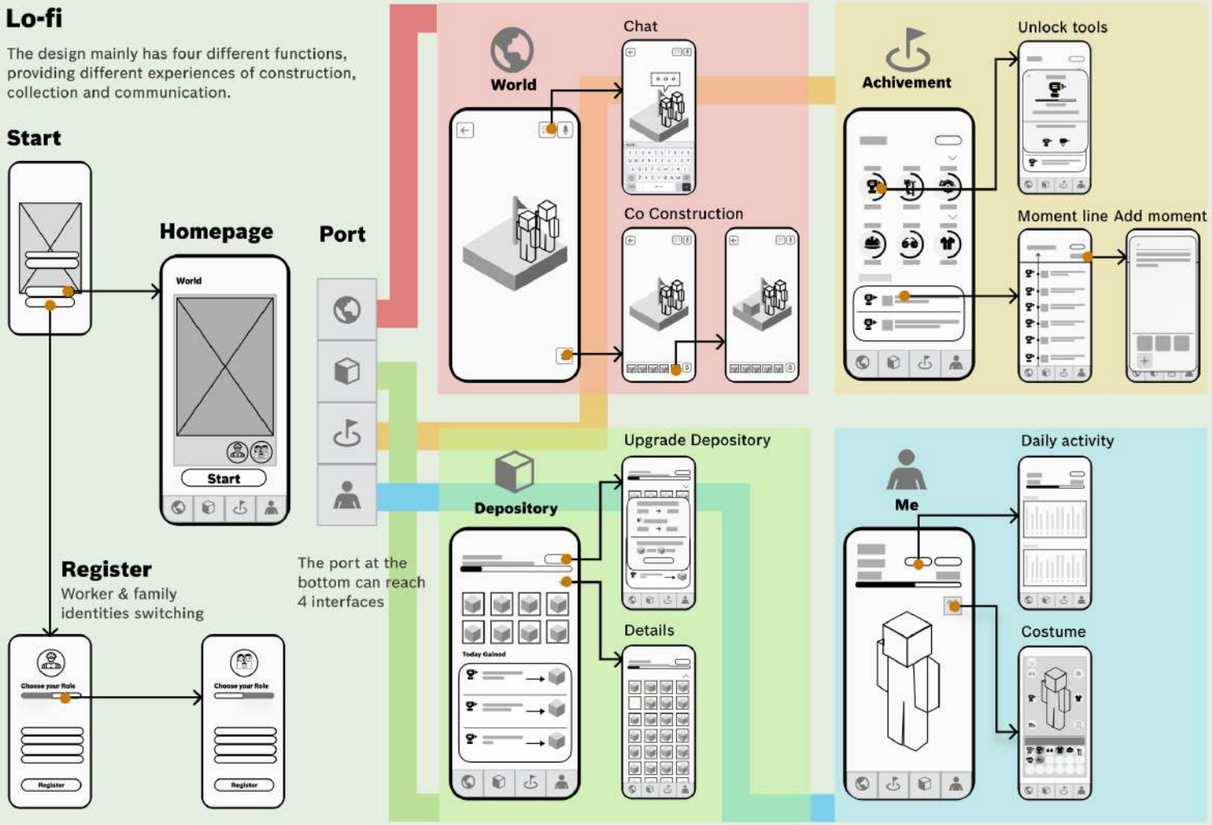
Web Design

Flowchat



Lo-fi

The design mainly has four different functions, providing different experiences of construction, collection and communication.



Style Guide

Block

I use the **block pixel style** because it is **simple** and fun to build a lot of interesting elements in line with the **built-in features** of the Fa. World.

Colour Theming

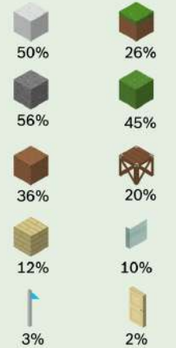
BLUE	GREEN	ORANGE
#5218FF	#74B44A	#CB7A02

Buttons

Items(Partly)

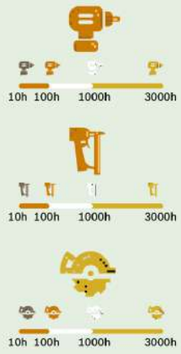
Building Items

Gain items by working certain time



Iconography

Cumulative use time of each tool can unlock cooler tools



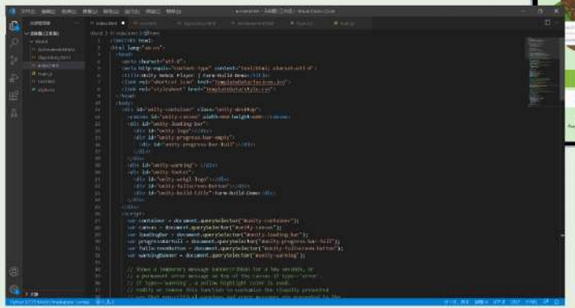
Costume

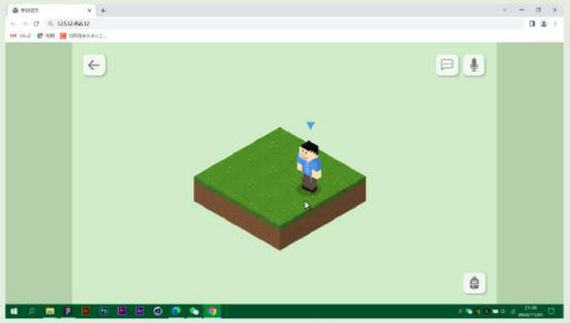
Some special conditions can unlock specific costumes

Coding & Overall

Web-based development of prototypes

Web based development ensures the same experience on different devices(Computers, mobile phones, pads, etc.).





World

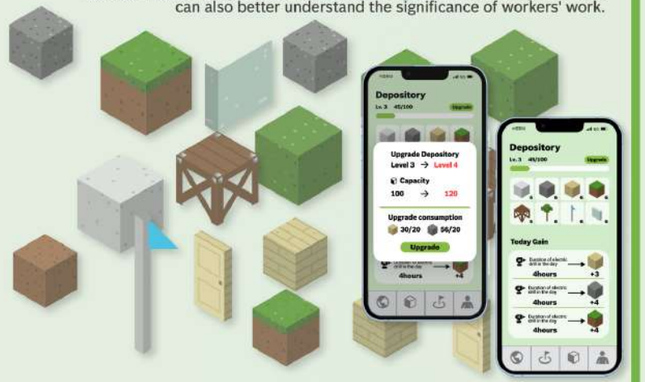
Workers and their families can build and interact together in this space, and naturally communicate with their families in entertainment.

Achievement

Workers can unlock clothes and tools by completing the challenge, and Moment line helps workers record their achievement, which makes worker's work respectable.

Depository

By collecting data from the Bluetooth module, workers and their families can see how the daily work is converted into game items. Family members can also better understand the significance of workers' work.



Me

Workers can change their personal image, which will appear in Fa. World. With cool clothes, families can respect workers' work more.

90% Interviewees show an interest in using this service

AI+Vision

Computer Vision-Based Hand-Foot Coordination Guidance System for Blind Mobility

2023.3

Even though there are many products available for the blind today, **blind individuals** continue to **face challenges in their mobility** because these products **cannot systematically fulfill** the three major needs for blind mobility: **navigation, obstacle avoidance**, and **hand operation.**

This design leverages cutting-edge AI and visual navigation technologies to cleverly **construct a system** through software and hardware, addressing the mobility needs of the blind. Additionally, it takes into consideration the often-overlooked requirement for hand operation among blind individuals, thus enabling them to **truly achieve independent mobility.**

Teamwork

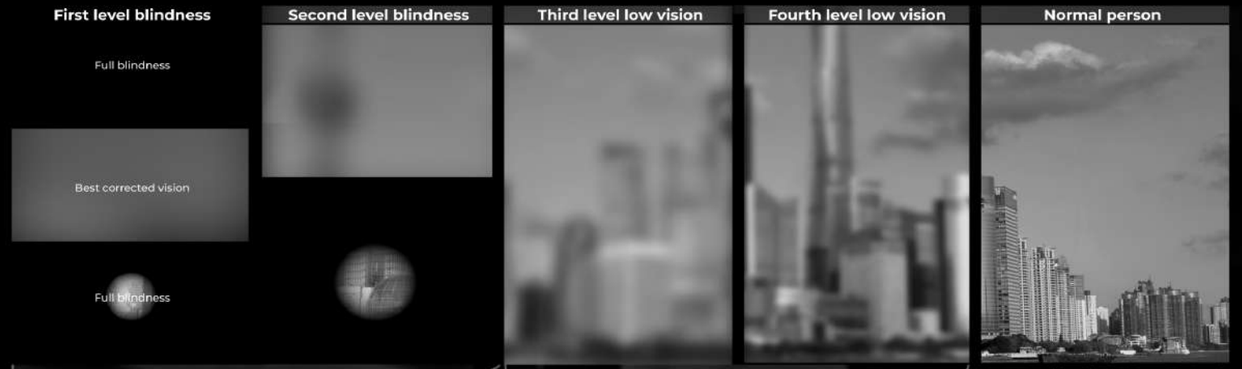
Shi Weizhen
Industrial Design

Xiang Yangyang
Digital Media

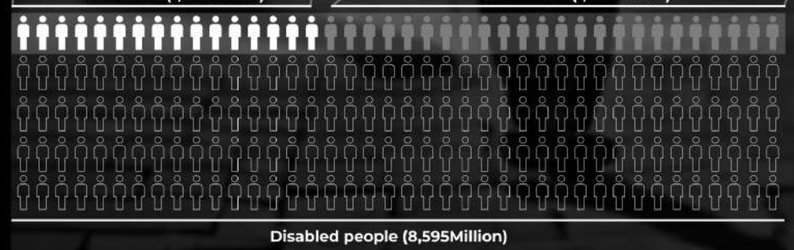
Research & Interview → Concept → Sketch & 3d model → Prototype Design → Prototype Code → Finding Acupoint Code → App

Background

Classification of people with Visual impairment



Data source: China Disabled Persons' Federation



According to the classification of the China Disabled Persons' Federation, the **visually impaired population** in China can be divided into **four levels**, of which the **first and second levels** are referred to as **blind people**, and the **third and fourth levels** are referred to as **low vision**. They occupy a major part of the disabled population.

Question

1/100

In fact, the number of the blind in China is very high, with nearly **one out of every 100** Chinese people being blind. But, why do we **rarely encounter** blind people in our daily lives?

Interview & Research

Interview

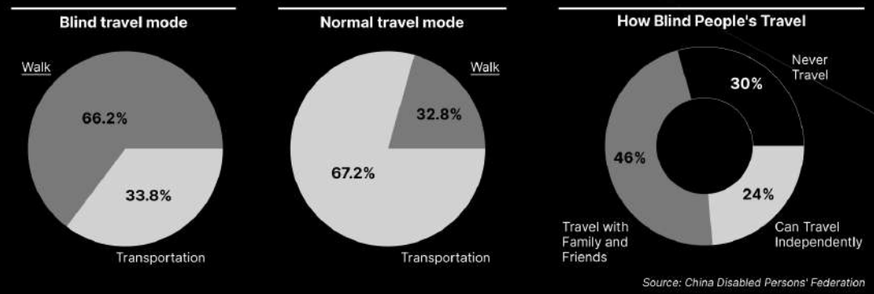
I visited a **massage parlor** run by blind employees. The founder, a member of the Suzhou Disabled Persons' Federation, has had extensive interactions with the blind community. This experience helped me explore the question of why blind individuals are rarely seen.

• 邹　园 Zou Yuan

First level blindness | founder of Fuyuan Massage | Participated in the first Suzhou Marathon in 2023 | Members of the Disabled Persons' Federation

Research

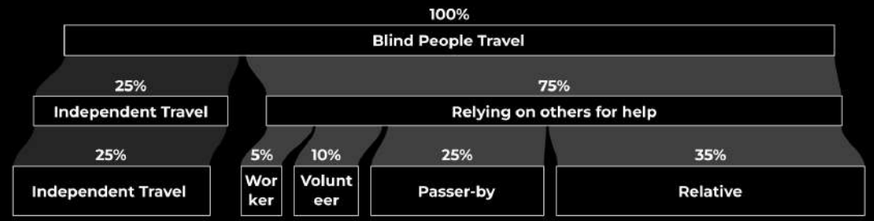
1.Research on Travel Modes for Blind People



Source: China Disabled Persons' Federation

Two-thirds of blind individuals travel **on foot**, while only **30% of the general population** do so. There must be a reason for this. Additionally, most blind people **depend on relatives** for going out and rarely have the ability to travel independently.

2.Research on the Independence of Blind People's Travel



Source: Suzhou Disabled Persons' Federation

I conducted random interviews with around 50 blind individuals at the Suzhou Disabled Persons' Federation to study their reliance on others when traveling. It appears that **people with disabilities rarely travel independently.**

Conclusion

Public Facilities: In China, the **public facilities for the blind** are very **imperfect**, such as the incomplete tactile paving and unreasonable planning, which makes it difficult for the blind to go out independently.

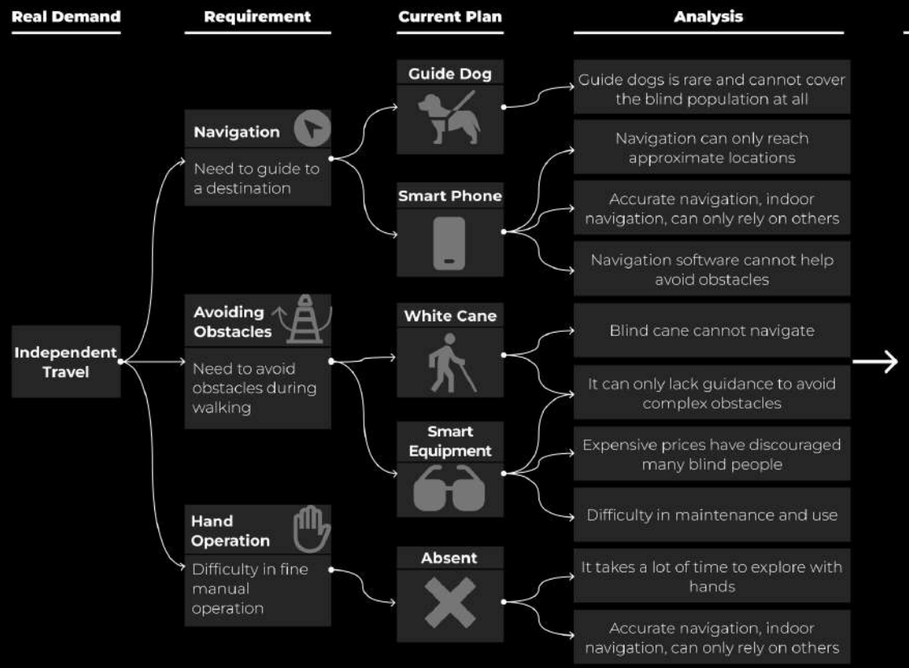
Social Support: Social support for blind people's travel mainly relies on volunteer assistance, but **volunteers are scarce.**

Product: The product's limited assistance for the blind's travel does **not allow** them to **travel completely independently.**

Analysis & Concept

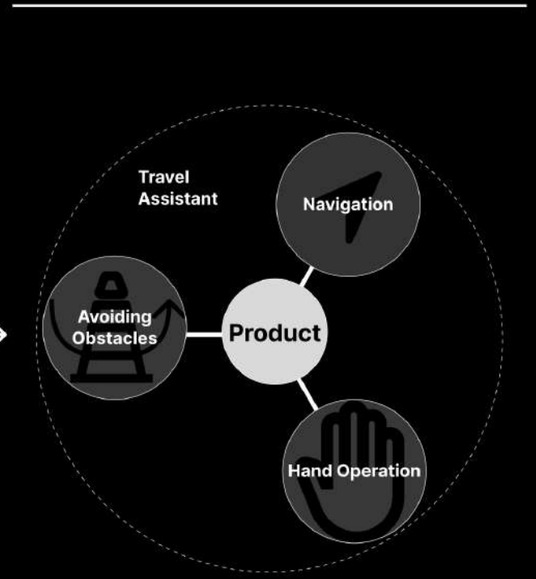
Analysis

Through interviews and analysis, it has been found that **the real need of blind people** is to **travel independently**, and the following **three requirements for this need.**



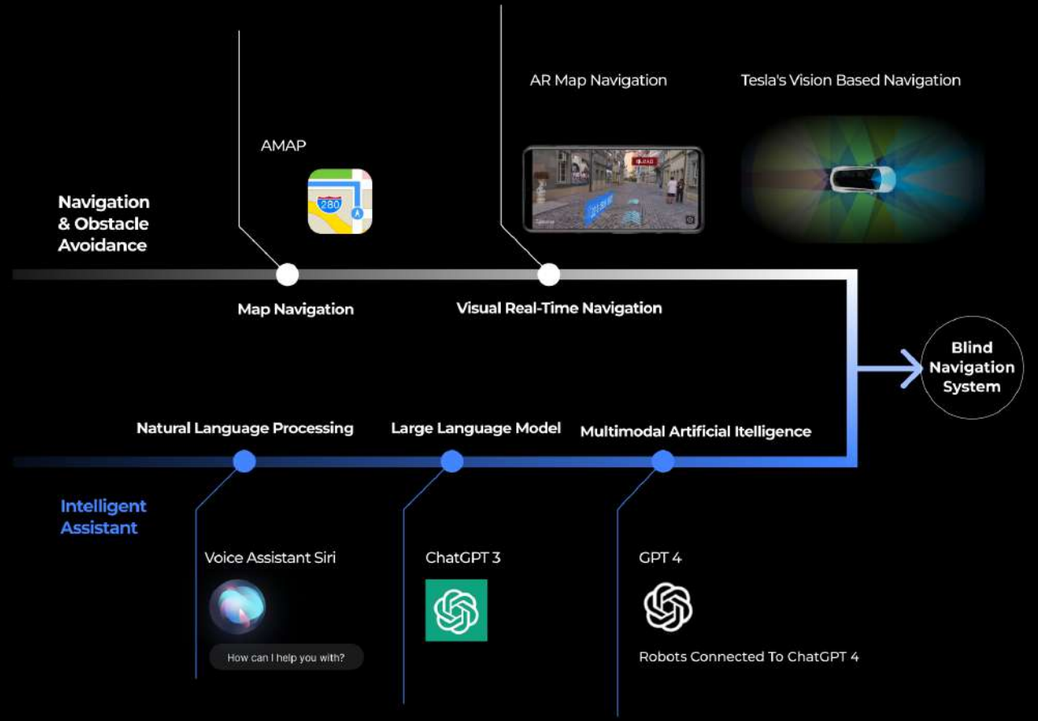
Conclusion: 3 in One

Products for blind individuals often **excel in either navigation or obstacle avoidance**, but **not both**. Additionally, there's **a lack of effective hand guidance**, hindering their interaction. Thus, there's a need for a product to **comprehensively address** blind navigation, obstacle avoidance, and manual operation requirements.



Technology Path

Such a system is more like an **assistant for blind people** to travel, replacing real people to serve blind people. The technology of such a system can be intricately interwoven by the following **two technical paths.**



Demo & Final Design

Such a system requires **vibration terminals** for guiding the coordination of hands and feet. Simultaneously, it needs **hardware to support visual processing and computation**. A **smartphone** serves as an ideal platform because almost everyone has one, and it already contains the necessary hardware components like a camera and processor.

Key Technology

Vision-Based Navigation

▲ Tesla Pure Visual Navigation

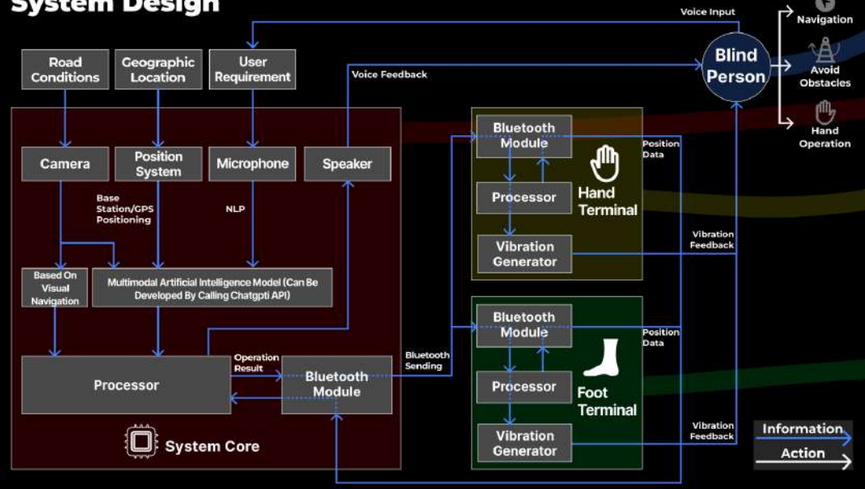
Natural Language Processing (NLP) Multimodal Artificial Intelligence

▲ OpenAI's GPT4.0 Model

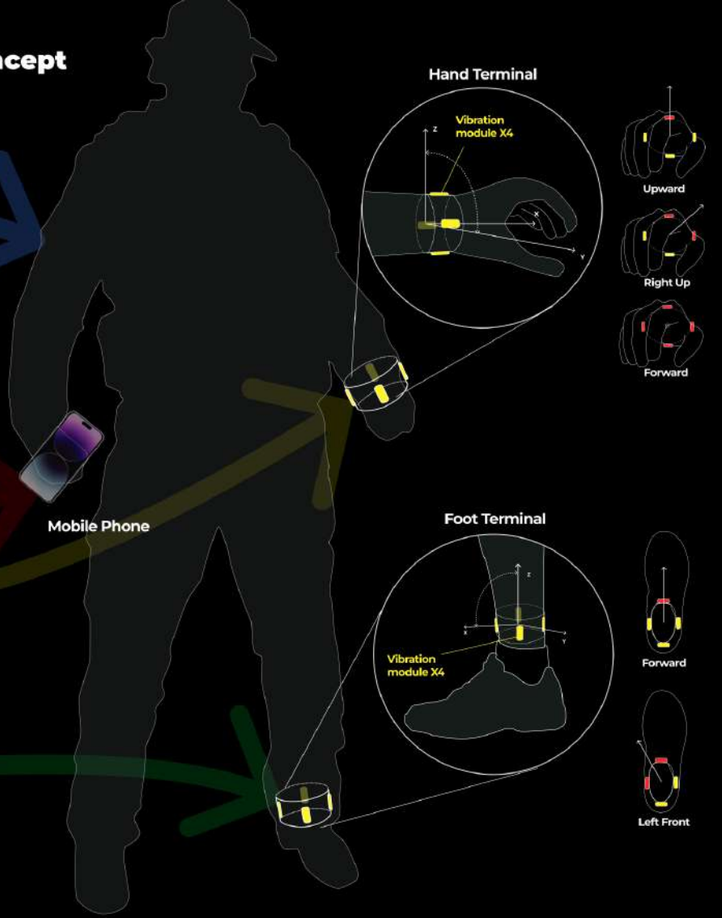
Vibration Guidance

▲ Vibration Obstacle Avoidance Equipment

System Design

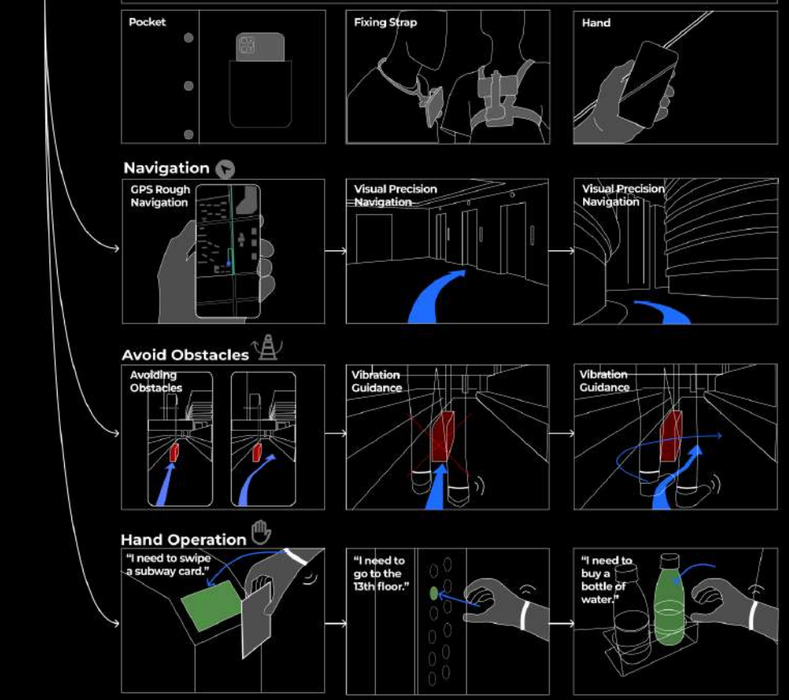


Concept



Usage

The system **is built around a smartphone.** A user just need to set up the **smartphone's visual capabilities,** either by holding it or using a fixed device, and then wear the hand and foot terminal devices. With these steps, you can enjoy **navigation, obstacle avoidance, and hand-guidance services during your travels.**

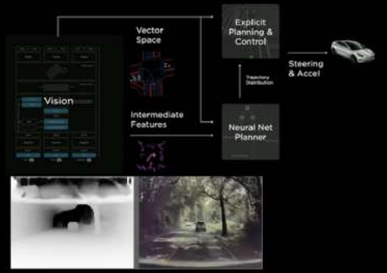


Demo & Verification

Key Technology

Because visual navigation and multimodal artificial intelligence models **require teams of engineers** to complete, **as a design student,** I am only able to verify the functionality of **vibration navigation.**

Visual Based Guidance



Multimodal Artificial Intelligence Model

OpenAI

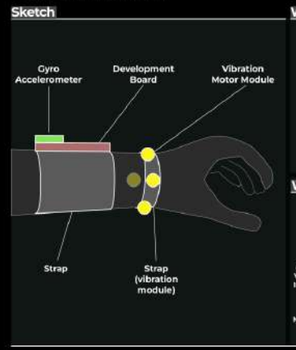
```
import openai

completion = openai.ChatCompletion.create(
  model="gpt-3.5-turbo",
  messages=[{"role": "user", "content": "Tell the world about the ChatGPT
)

print(completion)
```

Vibration Navigation

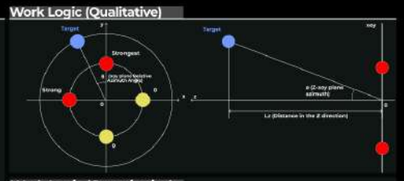
Demo Design

Hand Terminal

Sketch



Work Logic (Qualitative)



Work Logic (Quantitative)

$$M = \begin{cases} X^*Z^*K & (\alpha \geq \alpha max) \quad \text{wherein: } Z = (I/Lmax)^*(Lmax\text{-}Lz) \\ Z^*K & (\alpha < \alpha max) \quad \text{wherein: } Z = (I/Lmax)^*(Lmax\text{-}Lz) \end{cases}$$

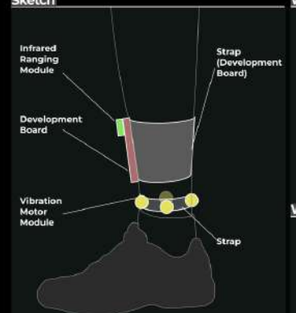
(Module Vibration Intensity)

$$X = \begin{cases} (360\text{-}4^*\theta)^*(I/360) & (0 \leq \theta \leq 90) \\ 0 & (\theta > 90) \end{cases}$$

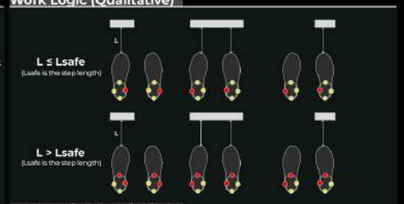
Note: **X** (xoy plane vibration coefficient), **Z** (z-direction vibration coefficient), **K** (maximum module vibration intensity), **α** (Z-oxy plane azimuth angle), **θ** (xoy plane relative azimuth angle), **Lmax** (maximum detection distance), **Lz** (distance in the Z direction), and LED light on/off logic follow the same vibration module logic.

Foot Terminal

Sketch



Work Logic (Qualitative)



Work Logic (Quantitative)

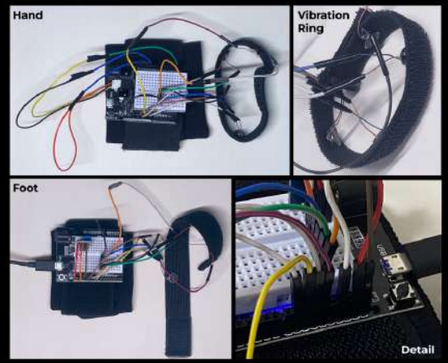
$$M = \begin{cases} 0 & (Lmax < L) \\ \dfrac{K(L\text{-}Lmax)}{Lsafe\text{-}Lmax} & (Lmax \geq L \geq Lsafe) \\ K & (L < Lsafe) \end{cases}$$

(Module Vibration Intensity)

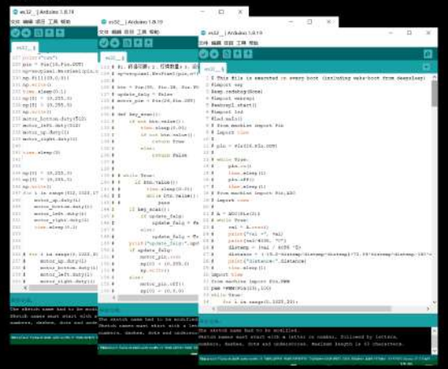
Note: **L** (distance), **K** (maximum module vibration intensity), **Lsafe** (reserved safety distance), **Lmax** (maximum detection distance), and LED light on/off logic follow the same vibration module logic.

Demo Making

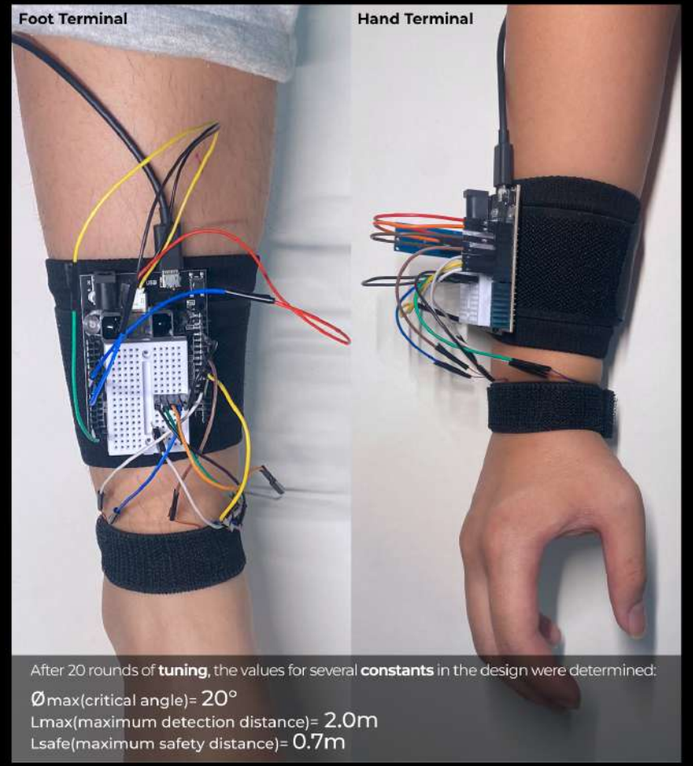
Hardware



Code



Overall Effect & Tuning



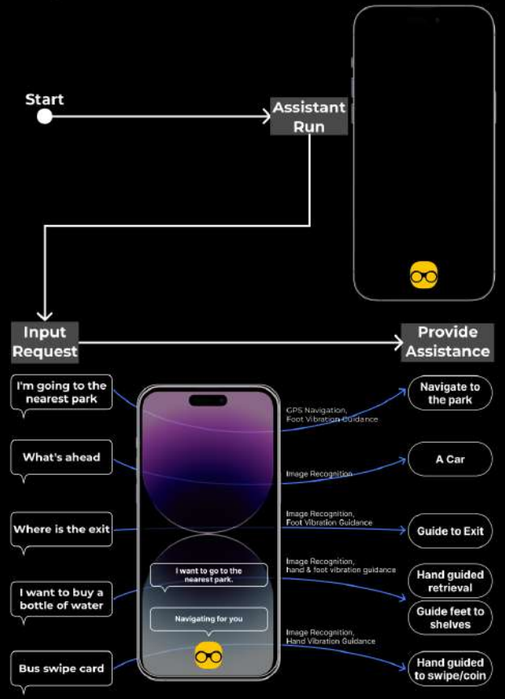
After 20 rounds of **tuning**, the values for several **constants** in the design were determined:

Ømax(critical angle)= 20°
Lmax(maximum detection distance)= 2.0m
Lsafe(maximum safety distance)= 0.7m

Demo & Final Design

App Design

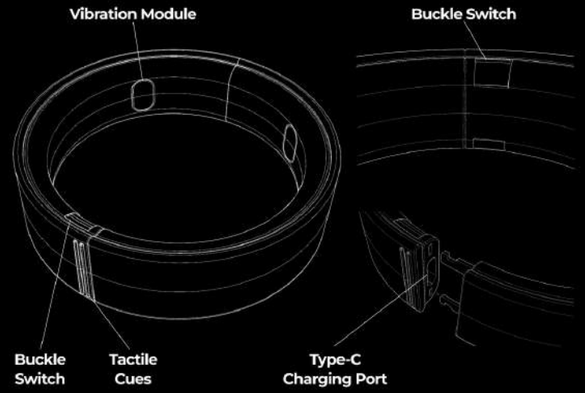
This mobile app is a mobile assistant that performs **all operations through voice.**



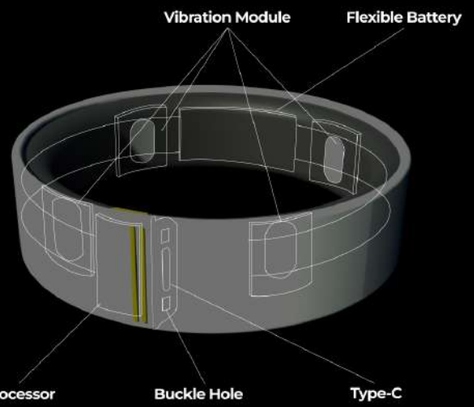
Product Design

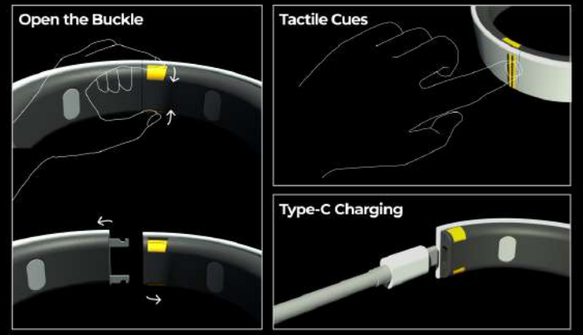
Based on the basic functions, Midjournal was used for style analysis, and the most refined style was chosen.

Sketch



Details





Overall Effect