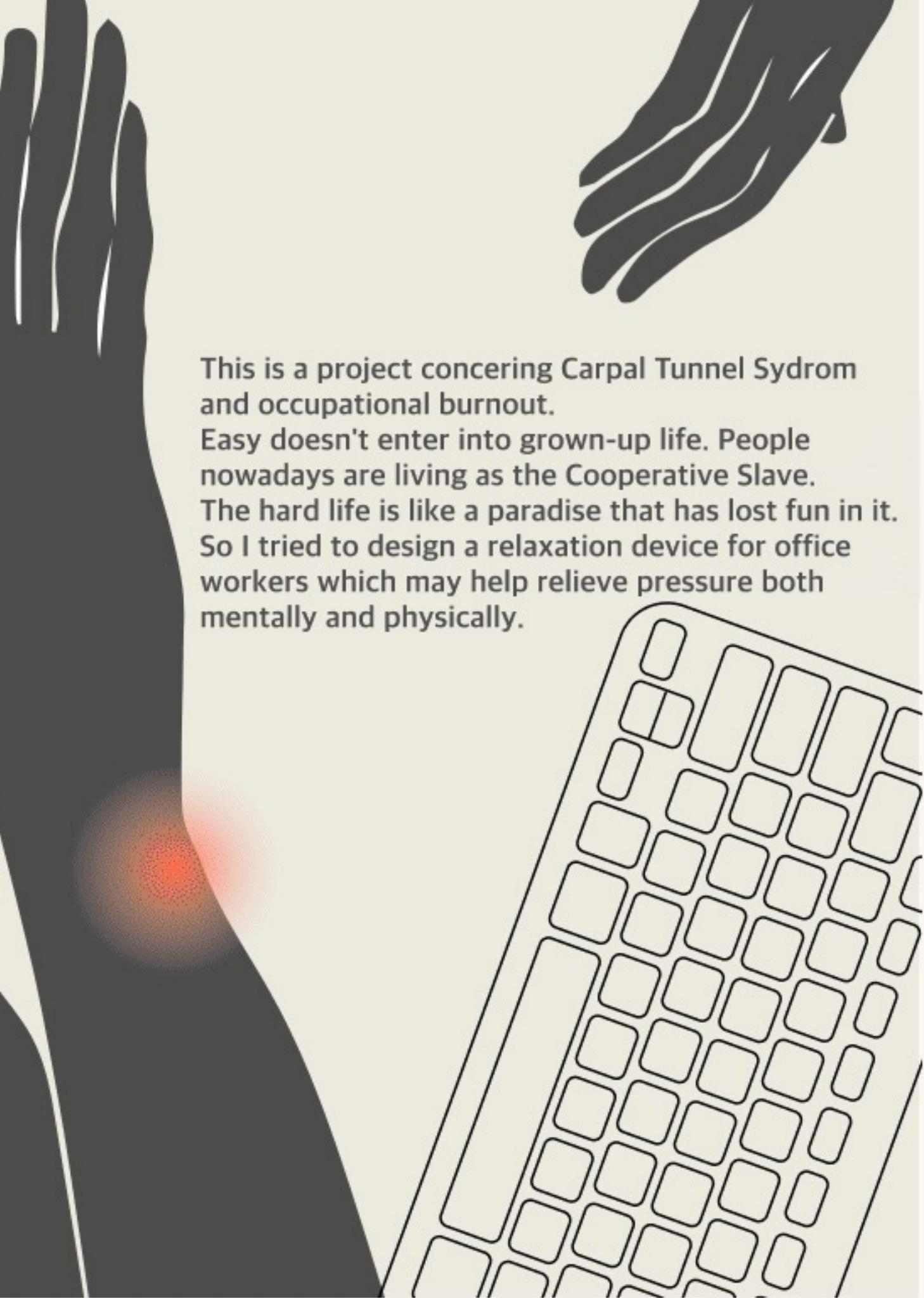


Lost Paradise



This is a project concerning Carpal Tunnel Syndrome and occupational burnout.

Easy doesn't enter into grown-up life. People nowadays are living as the Cooperative Slave. The hard life is like a paradise that has lost fun in it. So I tried to design a relaxation device for office workers which may help relieve pressure both mentally and physically.

| BACKGROUND



There was a time when I was overwhelmed by heavy work. And one day, after work, I found my right hand was too painful to pick up chopsticks. I went to the doctor who told me it was Carpal Tunnel Syndrome, commonly known as 'mouse hand', which is usually caused by long-time mouse use. Although I recovered after few days' relax. But I still feel kind of depressed and wronged that my heavy work has damaged my physical and mental health.

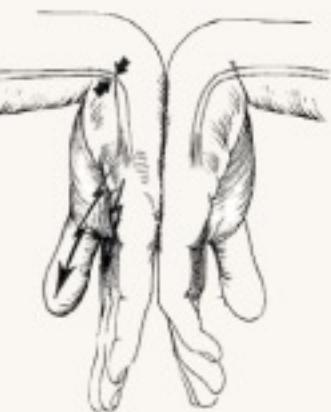
| How can we save ourself from the heavy workload ?

| Carpal Tunnel Syndrome

Carpal tunnel syndrome (CTS) is caused by pressure on the median nerve. When it is compressed, the symptoms can include numbness, tingling and weakness in the hand and arm. To put it simple, it is the hand pain caused by repeating the same movement for a long time, such as typing, mouse clicking and squeezing the nerves of the wrist.



| CTS Testing Method



Instructions:

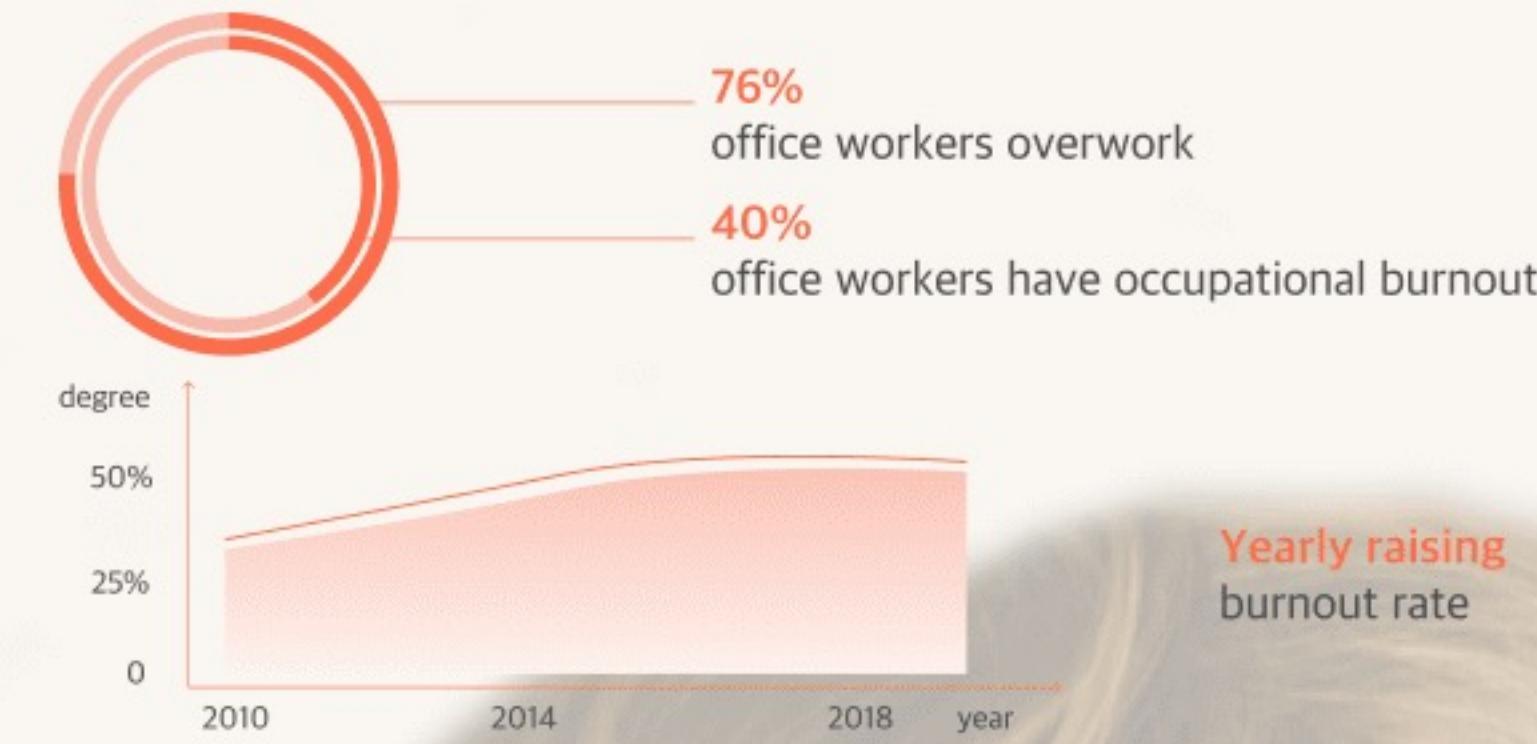
Flexes your wrists manually and holds together for one minute.

Result:

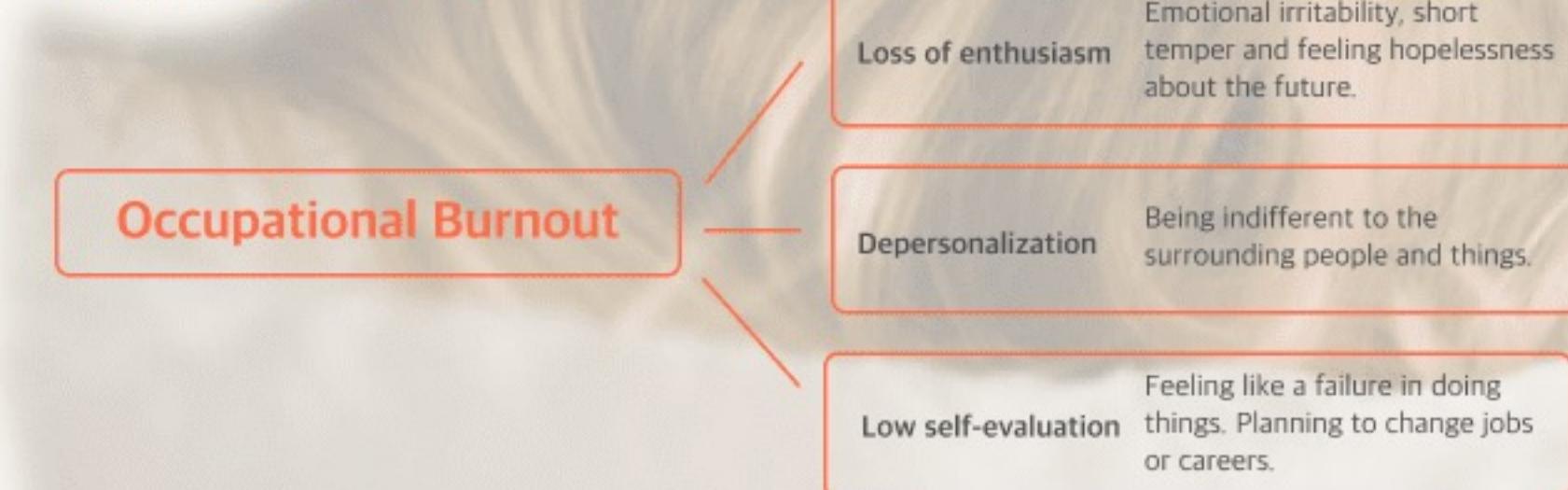
Positive test elicits tingling in thumb, index finger, and middle and lateral half of the ring finger and is indicative of CTS.

| Occupational Burnout

According to the World Health Organization (WHO), occupational burnout is a syndrome resulting from chronic work-related stress, with symptoms characterized by "feelings of energy depletion or exhaustion". Different from physical exhaustion, the stress comes from psychological exhaustion.



| 3 main symptoms

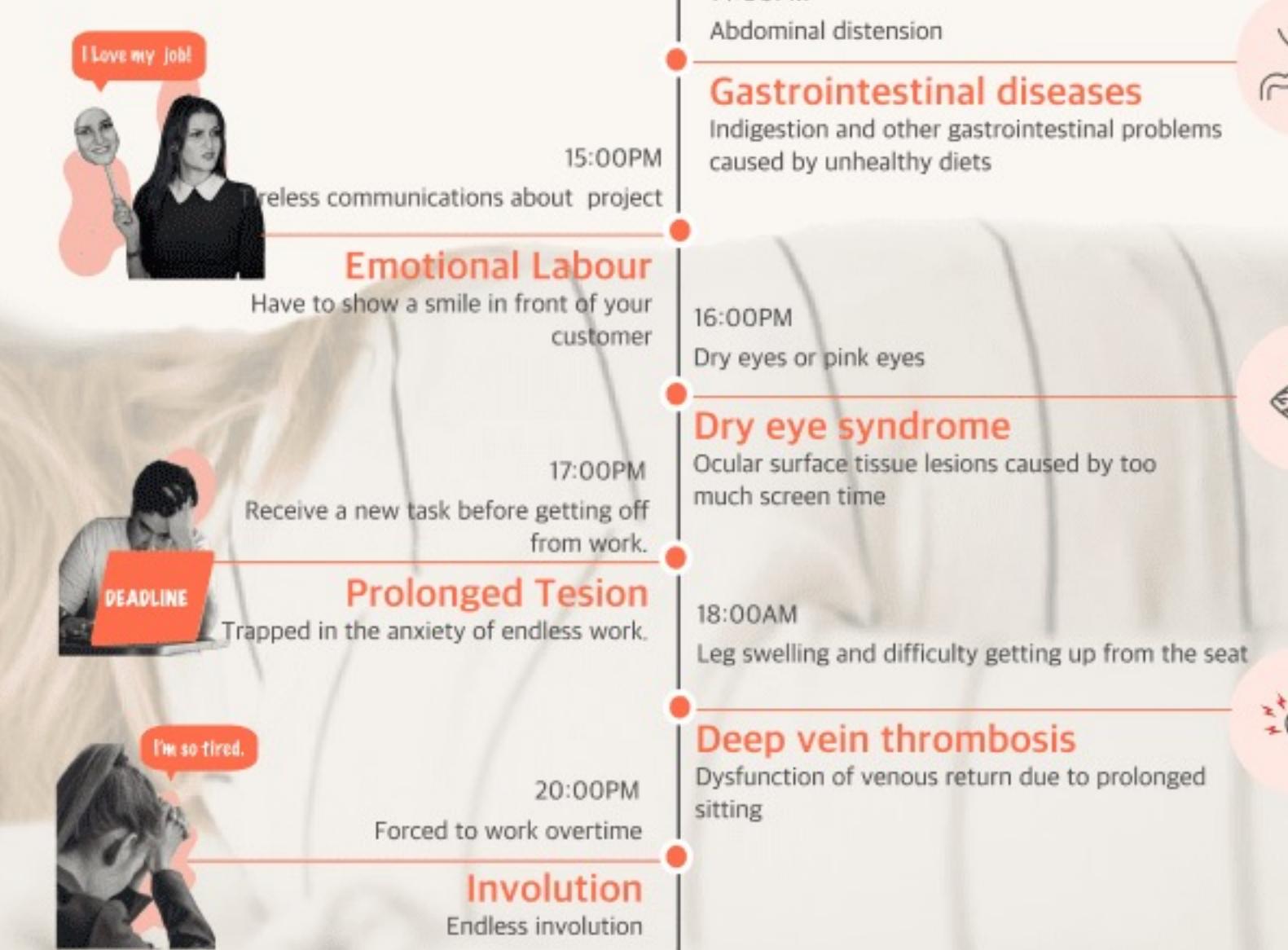


| Work Pressure

| Mental Pressure



| Physical Pressure



| INTERVIEW



• Have you ever feel burnout at work?



• What do you do to release pressure?



• Do you have pain in your hand after using mouse?



• What do you do to deal with your pain?



• What relaxation facilities do you like in your office?

a. It's severe

b. Yes

c. A litte bit

d. No

a. Snack or food

b. Exercise

c. Computer games

d. Talk to others

e. Others

a. It's severe

b. Yse

c. A litte bit

d. No

a. Go for a treatment

b. Follow online videos to do hand training

c. Massage

d. Nothing

a. Gaming equipment

b. Equipment for emotional ventilation

c. Massage chairs

d. Green plants

| Interesting serendipity— Fidgeting

Quite a few interviewees mentioned that they have Fidgeting Symptoms when they are stressed at work. Fidgeting, which means to make continuous, small movements that may annoy other people.

Principal : It distracts part of the brain which has become bored so that other parts can pay attention to what we are reading, hearing or seeing.

Survey shows that the more "fidgeting" employees are in their seats during work hours, the lower the chance of getting illness and low rate of mortality.



| BEHAVIOR MAP

Phase	Morning		Noon		Afternoon	
Sub-phase	Enter the state	Inefficient working state	Lunch	Break	Efficient working state	lying down on the job
Behaviour	<ul style="list-style-type: none"> Eat Breakfast Paid Shit 	<ul style="list-style-type: none"> Doze Off Dawdling Work 	<ul style="list-style-type: none"> watching drama while eating 	<ul style="list-style-type: none"> playing games chi-chat 	<ul style="list-style-type: none"> meeting and discussion overcoming difficulties 	<ul style="list-style-type: none"> work summary waiting to get off from work
Emotion						
Pain Point	<ul style="list-style-type: none"> It is easy to get sleepy in the morning, and people are not efficient in their work and are prone to procrastination. Hence a lot of tasks will be piled up in the afternoon, which cannot be finished despite working overtime. 		<ul style="list-style-type: none"> There is no good way to relax after lunch, basically you can only sit there and play with your phone. It is not easy to fall asleep during the lunch break. However, you'll feel sleepy after that. 		<ul style="list-style-type: none"> It's easy to forget to rest when the mind is focused on work. Don't dare to play with mobile phone openly when you are dawdling for fear of being caught. It's hard to kill the time after work. 	
Opportunity	<ul style="list-style-type: none"> Simple games can help employees wake up their brains and switch to working mode as soon as possible. 		<ul style="list-style-type: none"> After eating, several colleagues can play a device or a game, be it collectively or individually, to enhance the familiarity between them. At the same time, it can help food digestion and relax their minds. 		<ul style="list-style-type: none"> The device can be placed in a public area such as the pantry room, where staff can have a play when they pass by. The relaxation equipment of the company allows its staff to use it for free and at their convenience. 	

Conclusions :

- Employees are sleepy in the morning and they cannot work efficiently. They work intensely in the afternoon and get fatigued easily.
- Pantry room is the most frequent place for employees besides their desks.
- The pantry room can be a place for relaxation.

| INSPIRATION

• Exercising method for CTS

CTS could be cured by some hand exercise. Mainly gesture are the wrist and finger movement. And I tried to link the gesture to the common movement in our daily life.



• Gesture 1—Wrist movement

First is the movement of wrist. Basically, you just need to rotate your wrist repeatedly.



• Gesture 1—Palm movement

The second is the movement of palm. Basically, you just need to close your hand and then open it repeatedly.



• The principle of cute aggression

The sight of a cute doll can stimulate the brain to secrete a large amount of dopamine. However, you may faint if you are too excited. Therefore, a gentle pinch on the face of the cute doll can stabilize the hormone emission and release the stress. Autonomous sensory meridian response



• Bubble wrap popping

paper ball crumpling and other destructive behaviors can make people feel satisfied and have a sense of achievement.



• Lost Paradise

The burnout of the working person is the breakdown that reveals the feeling of depression as if they have lost all their fun. The Lost Paradise is full of binary oppositions, such as constraints and breakthroughs, and they are irreconcilable.



Workplace is like a lost paradise, full of contradictions. It is not only a means of livelihood, but also a Shura field. It is not only a battlefield for achievements, but also a hell of despair.



"There's only one heroism in the world: to see the world as it is and to love it."

• May there be a paradise,
For those being tortured by life to remove their masks temporarily, To allow them to have a moment of joyful dreams. That will be good.



| DESIGN PROCESS

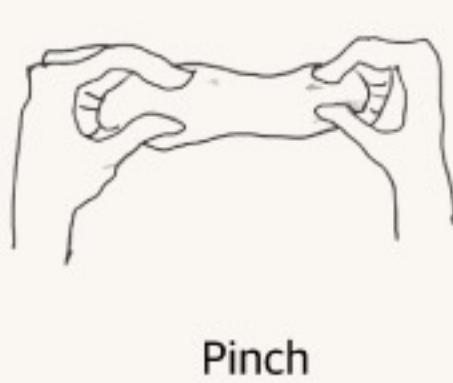
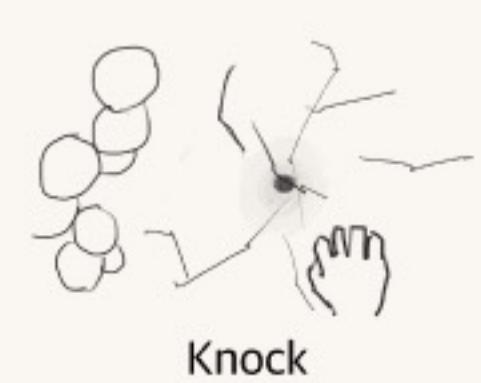
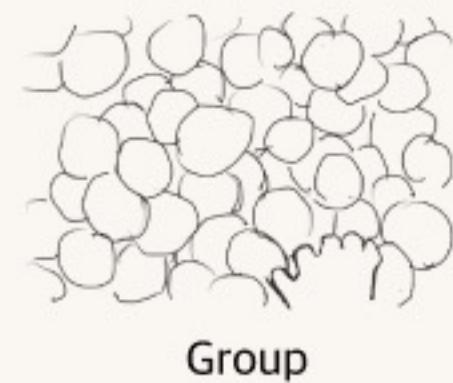
Option 1—Finger Dance

Although there are a lot of dynamic effects associated with exercise, these effects are relatively independent, and it is difficult to link them together.

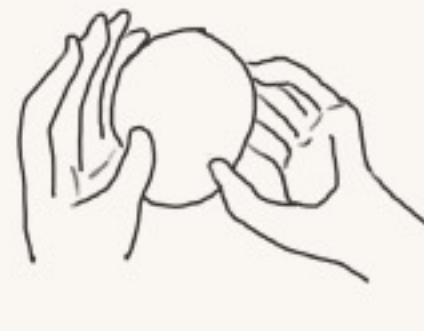
Therefore, I have designed a set of finger exercises to relieve the symptoms of CTS. Here we no longer use concrete objects as visual effects, instead, a virtual ball is used to guide the whole exercise.

• Dancing sketch

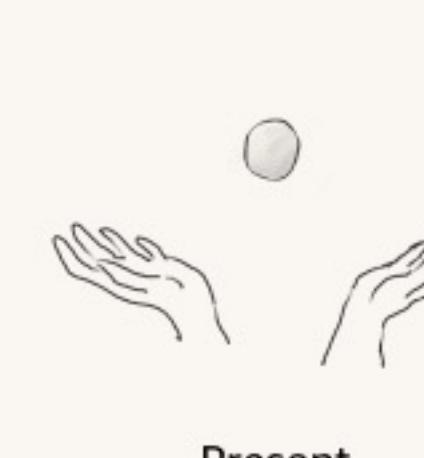
• Search



• Explore



• Recreate



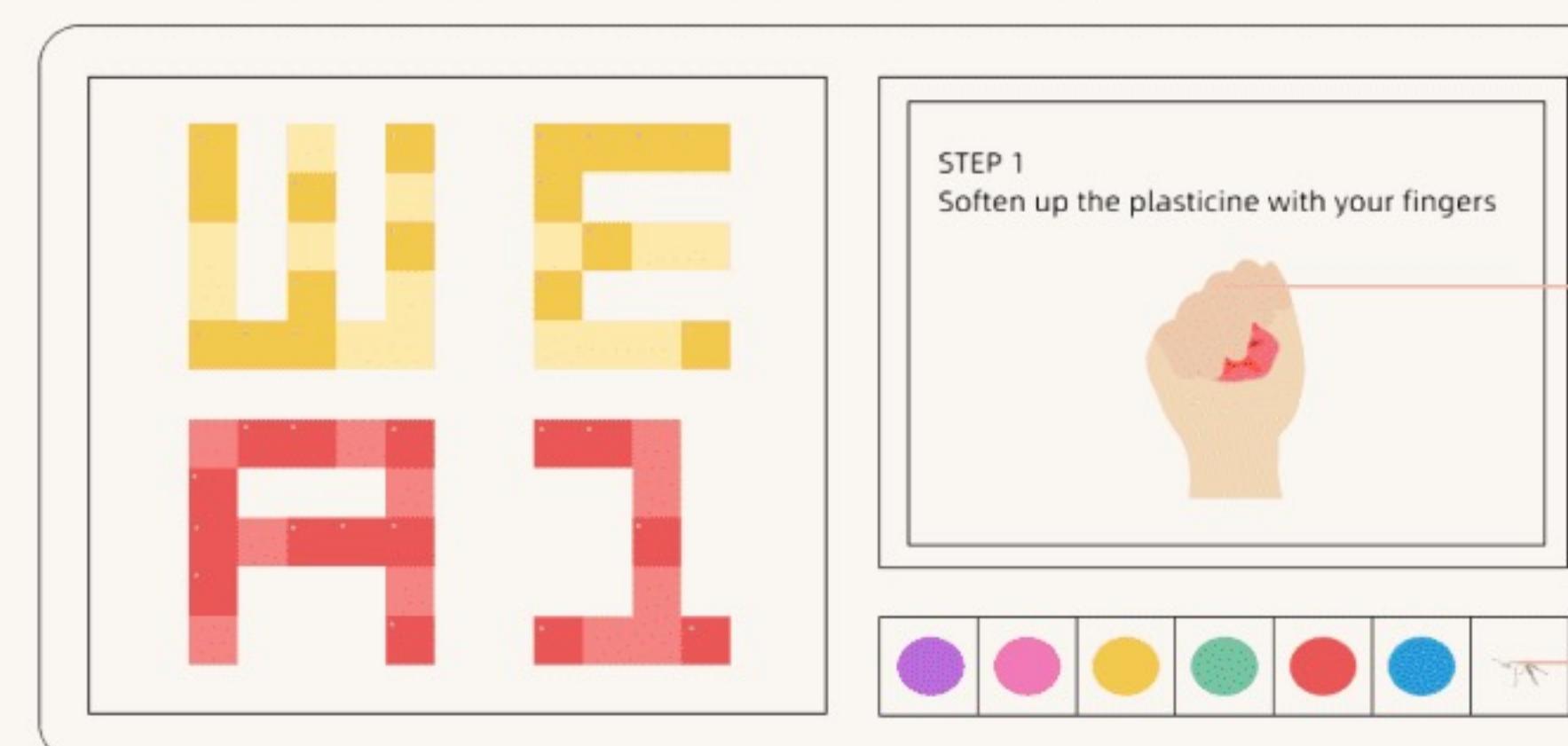
• Gather

• Sway

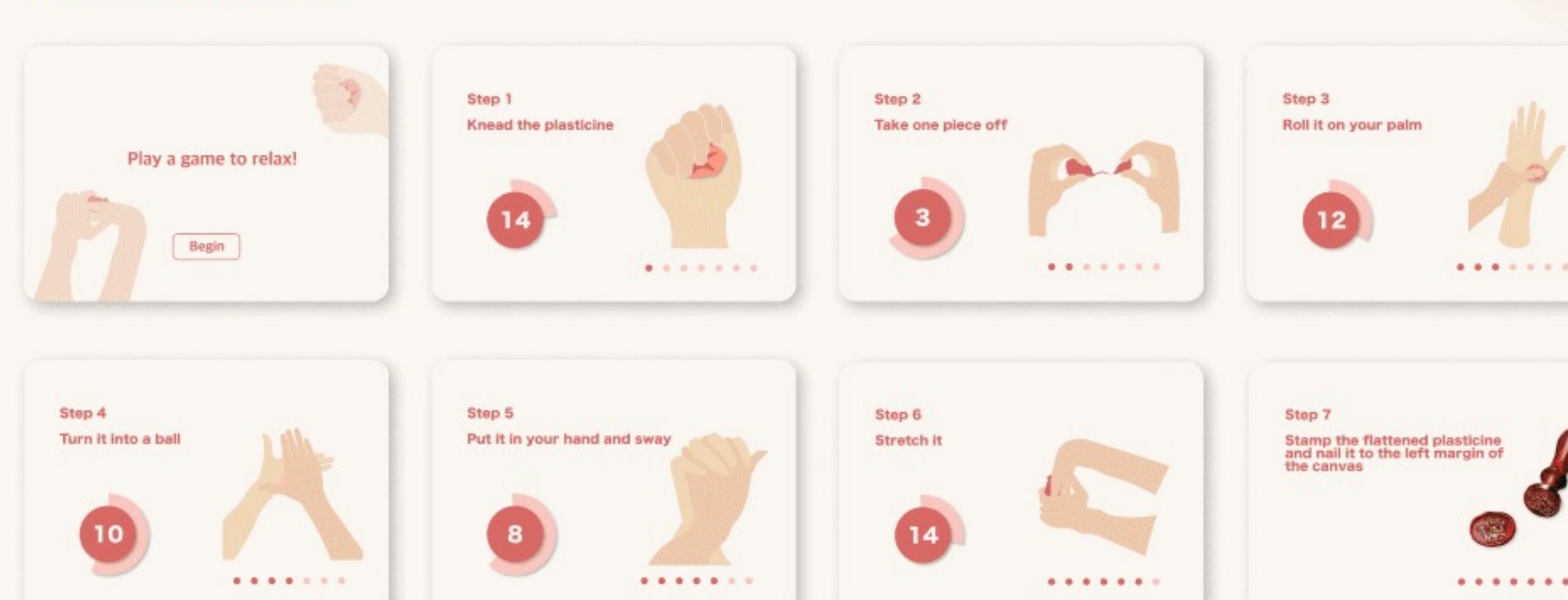
• Present

Option 2—Plasticine Game

Plasticine is added as an interactive medium for hand exercises, so as to improve the sense of interaction and ensure the exercise result. In addition, it combines with the workplace. The output is used to form a display board, which can reflect the corporate culture and enhance interaction among employees.



• Screen instructions



• Instruction

The screen shows the instructions of how to exercise your hand with plasticine.

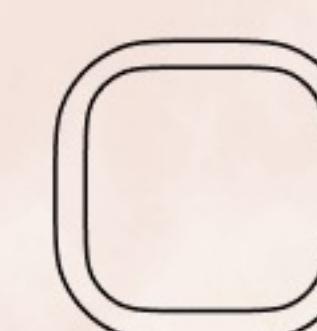
• Seal & Pin

It is made of plasticine with a pin to affix it onto the wall.

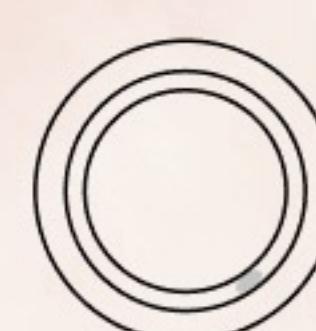
Final—Rolling Ball

I have studied some hand rehabilitation equipment and try to get inspiration from it. I would like to design a physical interactive device for exercise and relaxation.

• Button design



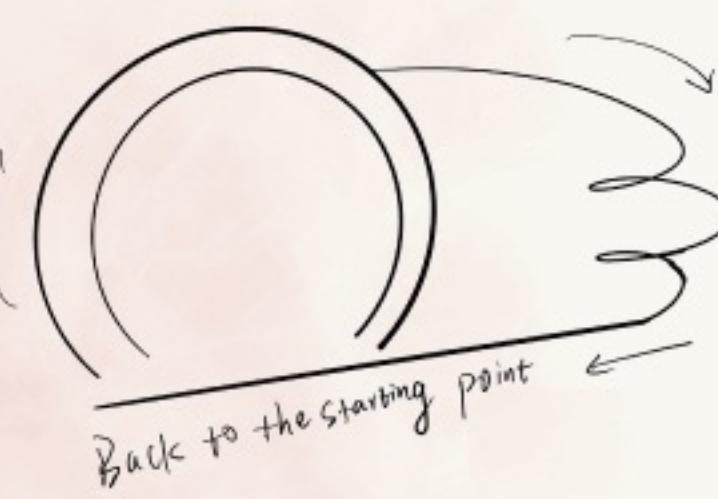
Front view



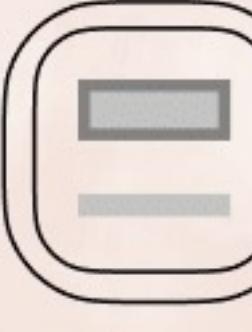
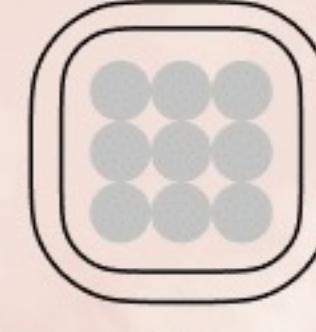
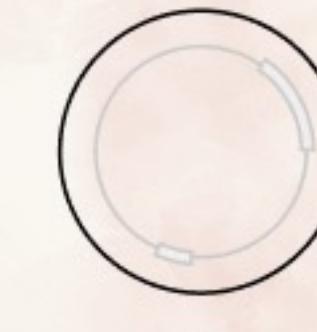
Side view



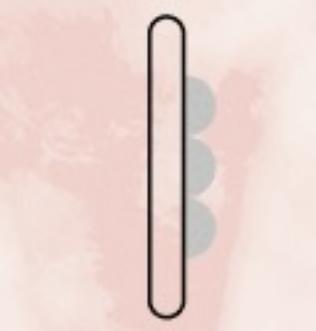
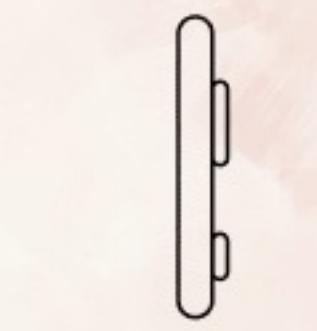
• Sketch



Front view



Side view

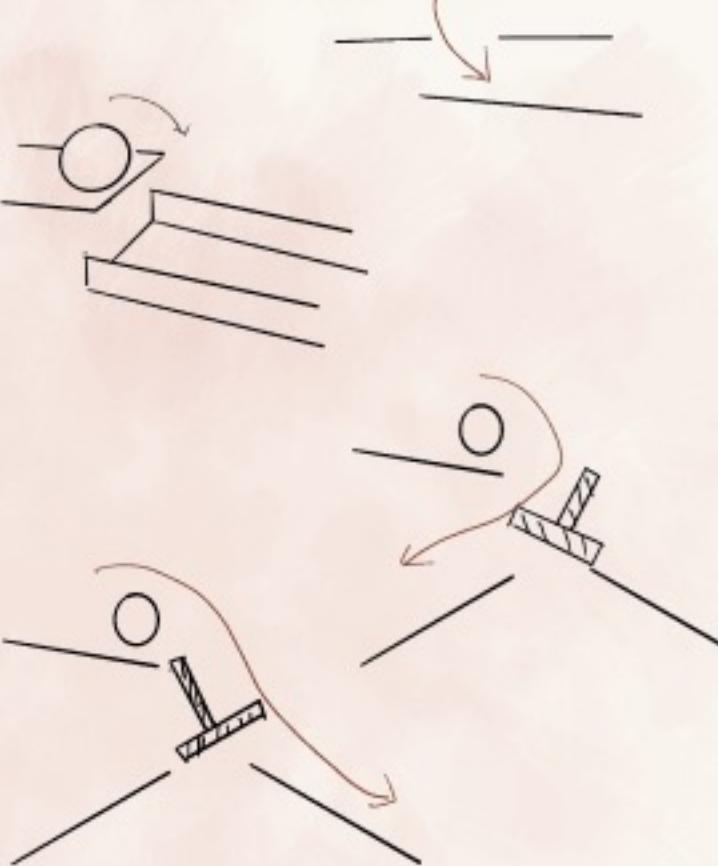


Stretch

Rotate the fingers

Massage the palm

Stretch

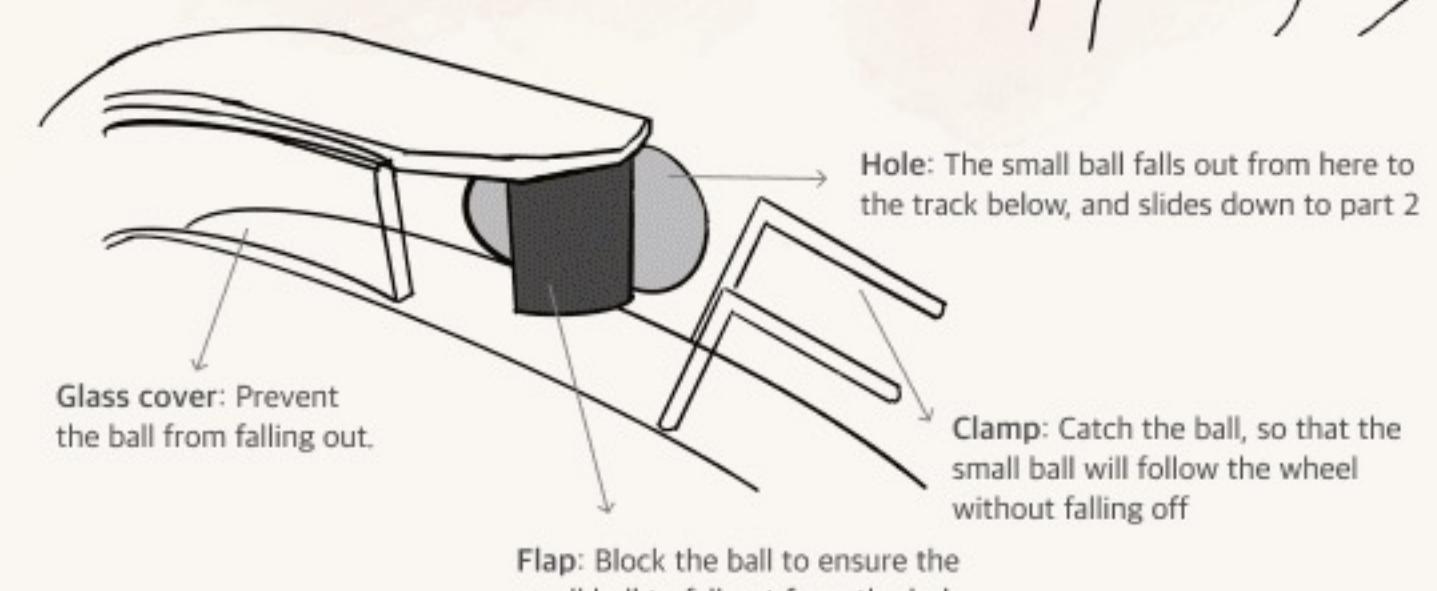


| PROTOTYPE

This is a four-part game device. A small ball is used to guide the whole process. If operate from left to right, the small ball sliding down from the rightmost spiral track will trigger the device to raise a flag, and the game is over.

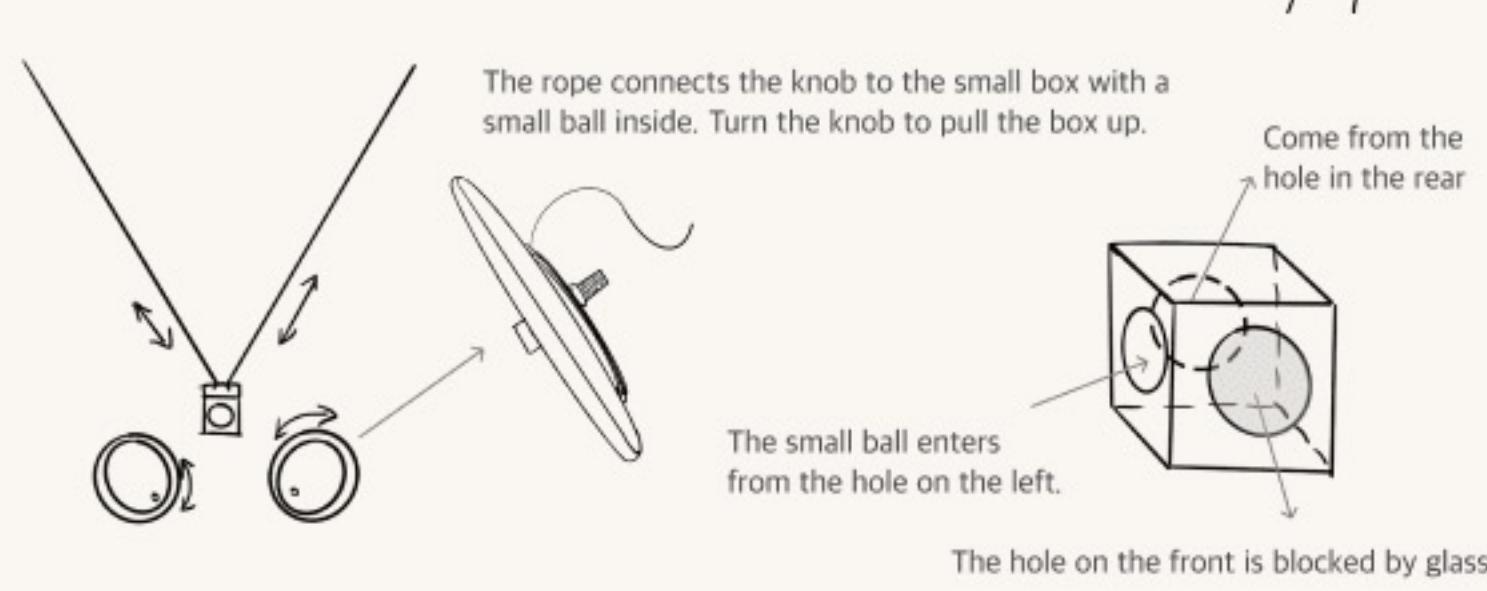
• Part 1 Rotary table

Action: Hold the knob, turn the wheel, and rotate the ball to the upper hole.
Targeted body part: Wrists and forearms



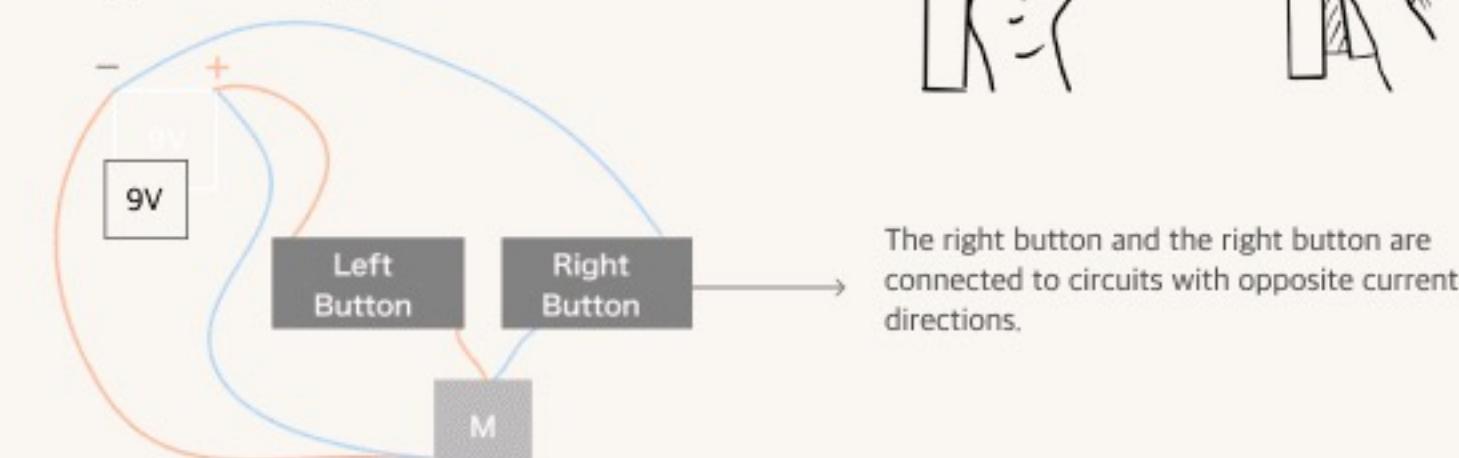
• Part 3: Lifting plate

Action: Press the knob on the left to move the box (with a ball to the upper left; vice versa on the right).
Targeted body part: Wrist



• Part 2: Labyrinth

Action: Press the button on the left to make the wheel rotate clockwise; vice versa on the right.
Targeted body part: Wrist

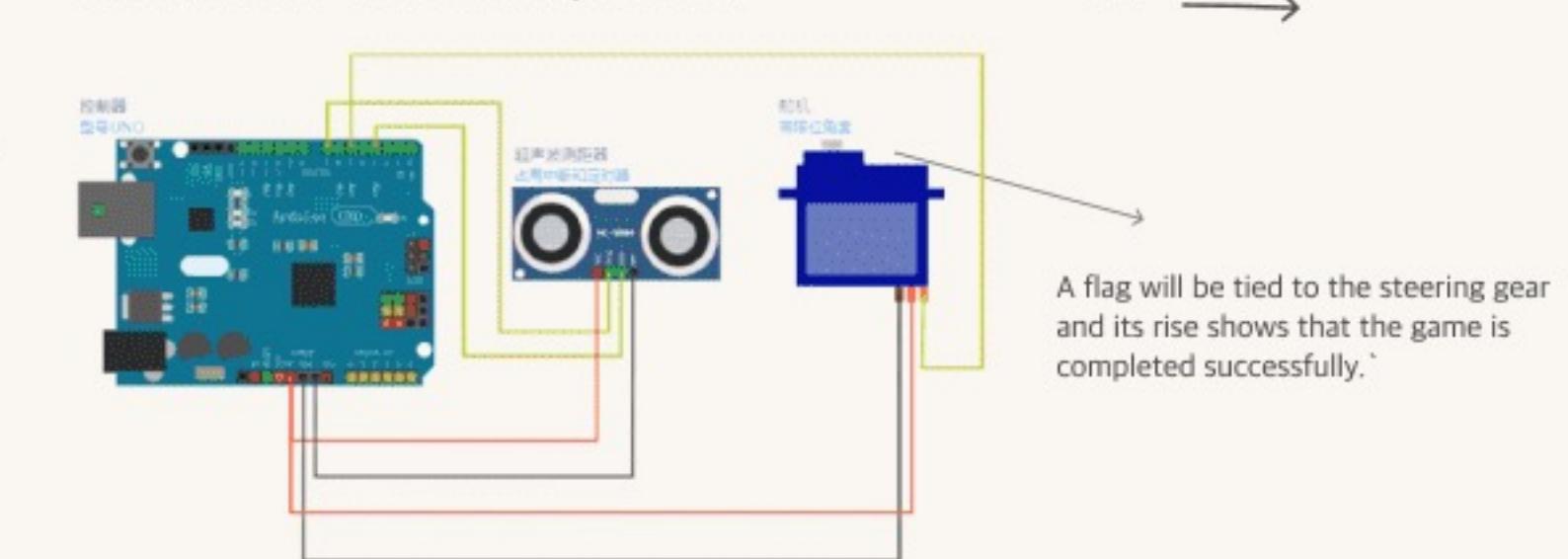


Principle of the turning wheel

When the direction of the current changes, the motor rotation direction will change accordingly.
When the button is pressed, the circuit will be closed, and the motor will drive the wheel to rotate.

• Part 4: Steering gear and small flag

Action: Pull out the flap in the box by hand and the ball will fall to the lower track and roll to its initial position.



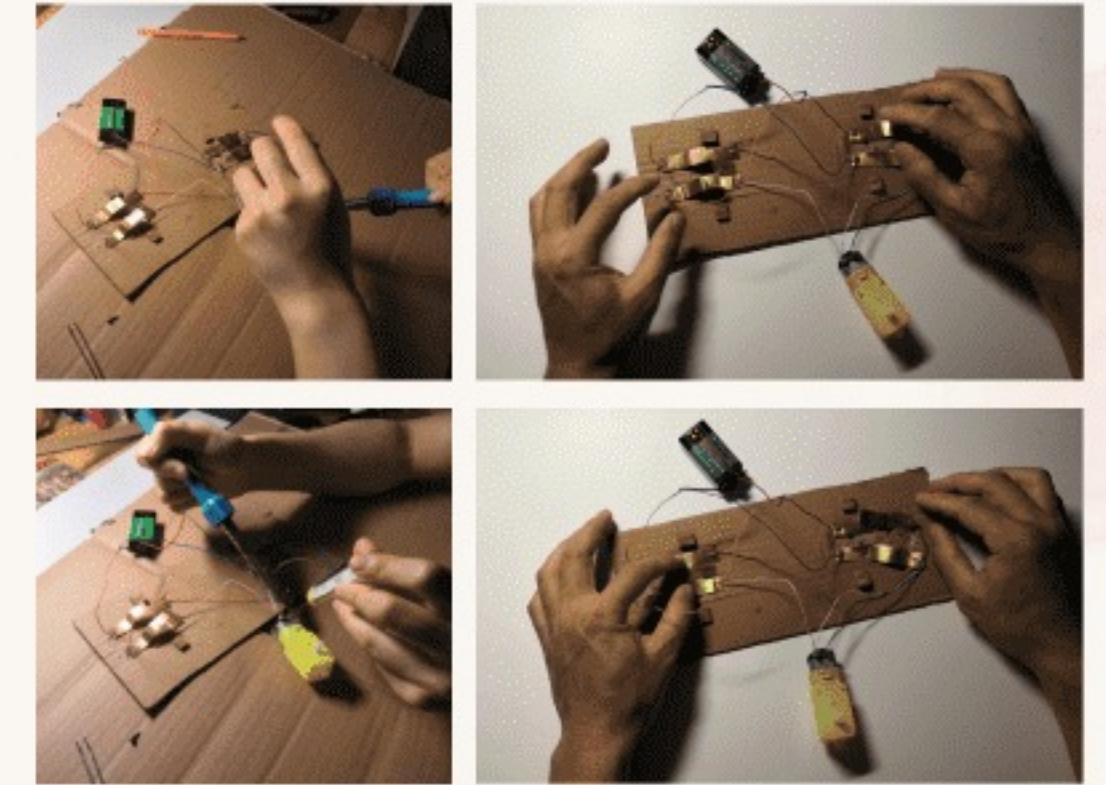
Steering gear + ultrasonic detection device

When the distance of the object and the ultrasonic device is less than 6cm, the steering gear will turn from 0 to 90 degrees, and the flag will rise.
When the object falls and the distance between them is more than 6cm, the steering gear will turn back to 0 degrees and the flag will fall.

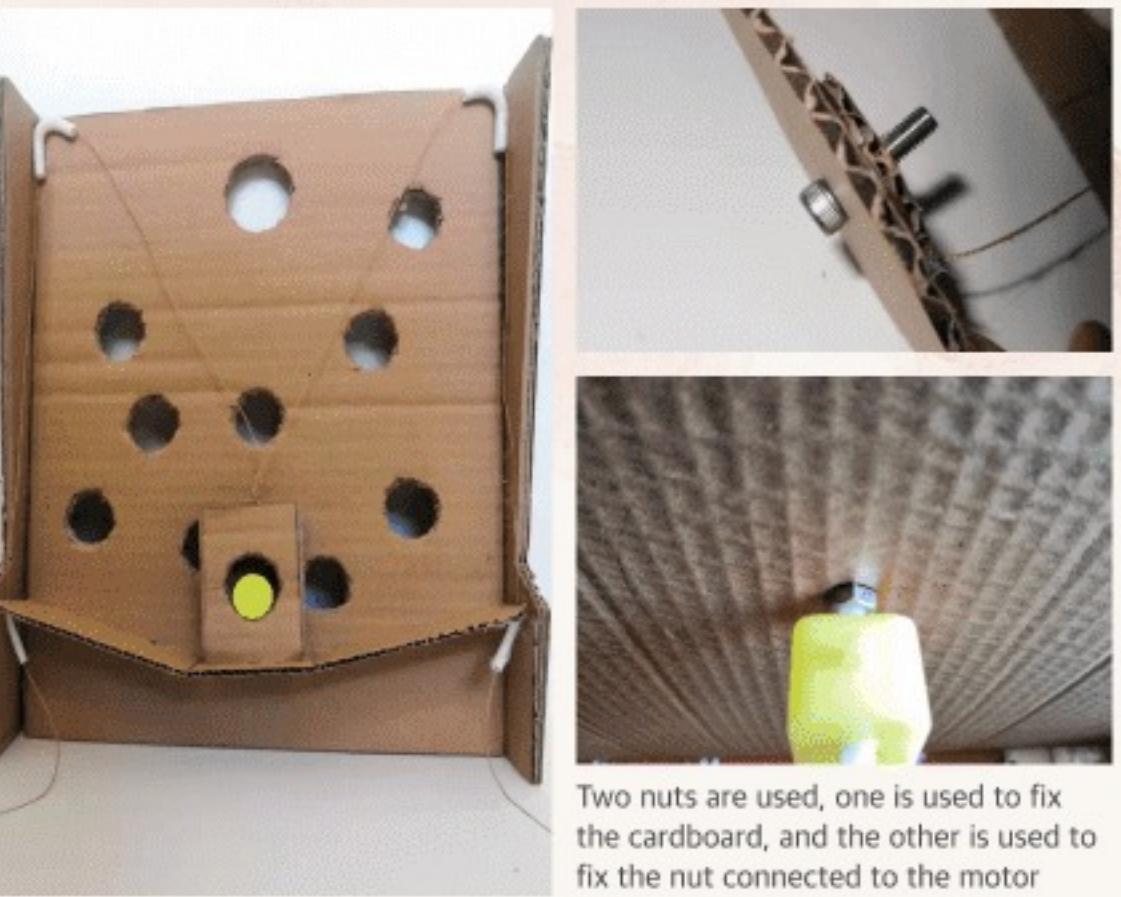
| MODELING

• Part 2 modeling

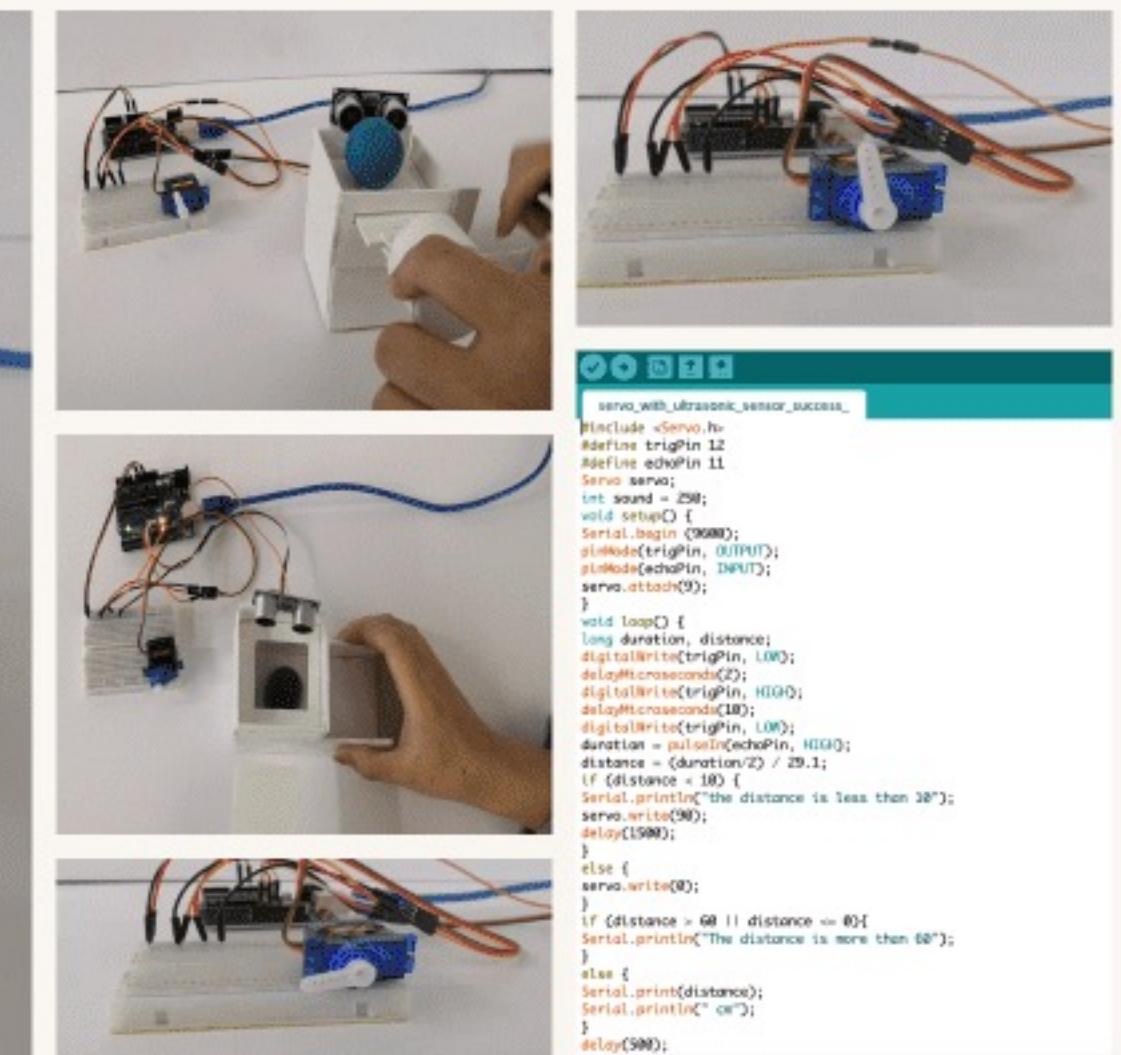
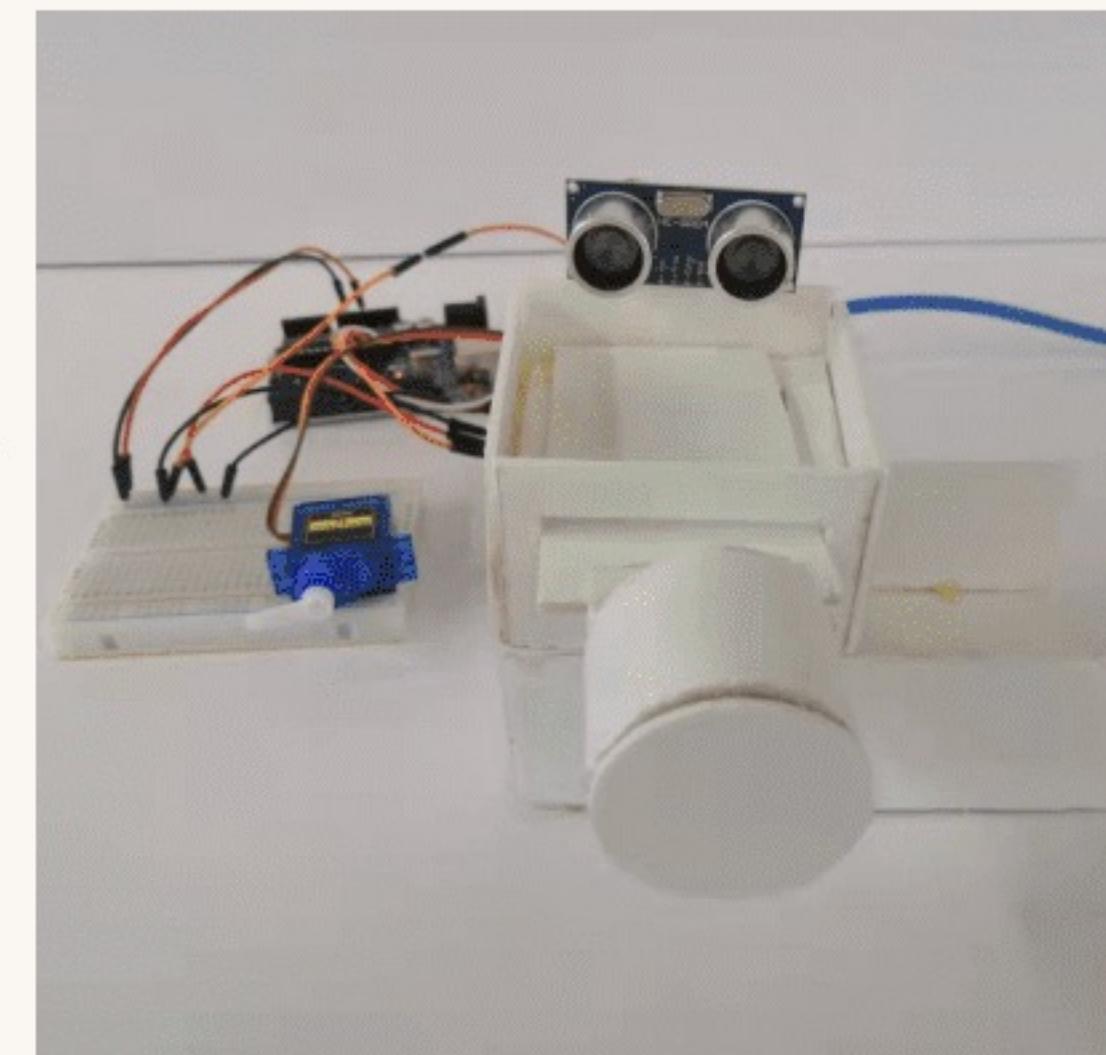
Two switches are made to simulate two buttons. Switch closed, then circuit is connected, and then motor rotates.



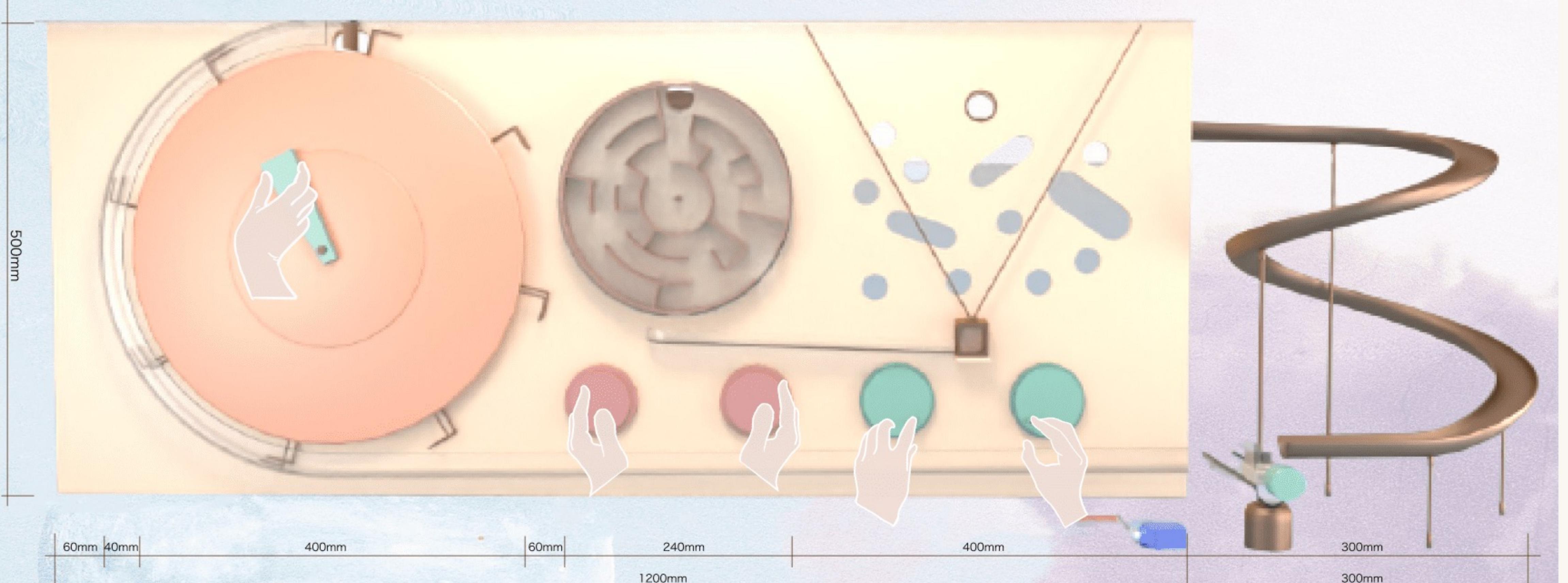
• Part 3 modeling



• Part 4 modeling



| PRESENTATION

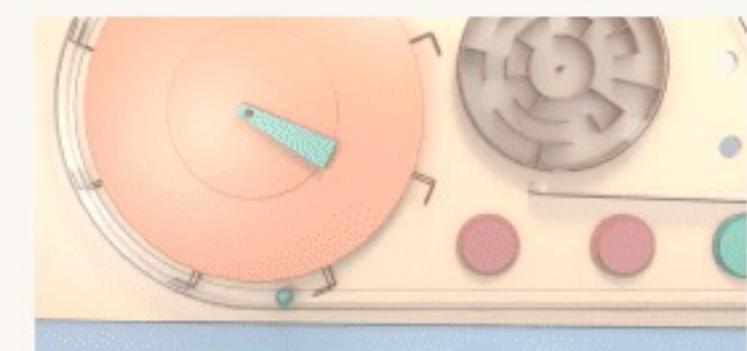


Learnings

In this project, starting from the mouse clicking hand and emotional burnout in daily life, the causes are studied and design solutions are provided.

The whole design process was very tortuous. To achieve the goal of exercise and pressure relief, I have tried various forms of interaction, which has greatly deepened my understanding of interaction devices. I've picked up a lot of new skills during this process, such as research methods, how to transform ideas into feasible solutions, using Arduino to control steering gear, C4D modeling, some mechanical principles and device design. Of course, there are also regrets as well. To summarize, this process of solving complex problems has given me a great sense of growth and accomplishment.

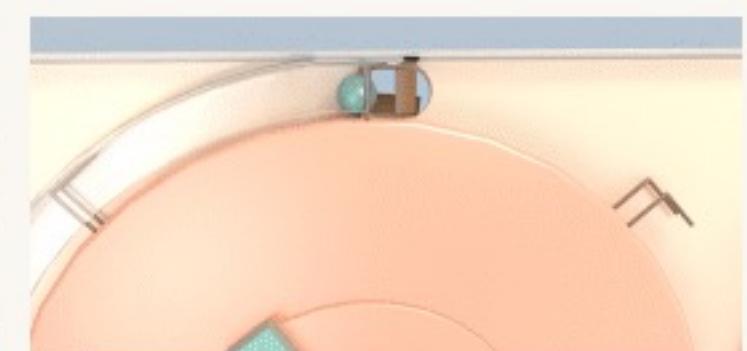
| STORYBOARD



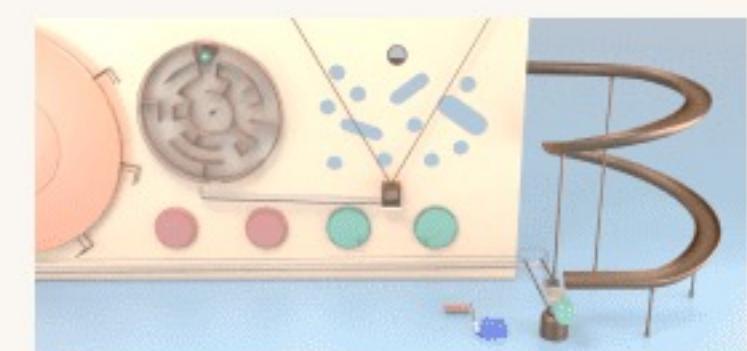
- Spin the ball on the track



- The ball follows the wheel and goes upwards.



- The ball falls from the hole below



- Enters part 2



- Press the button to turn the wheel



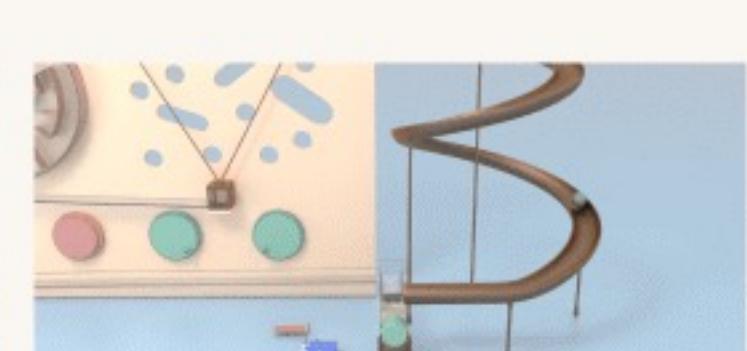
- Slides down the track into the small box of part 3



- Turn the knob to let the ball fall from the top hole.



- Ultrasonic triggers the rotation of the steering gear to raise the flag

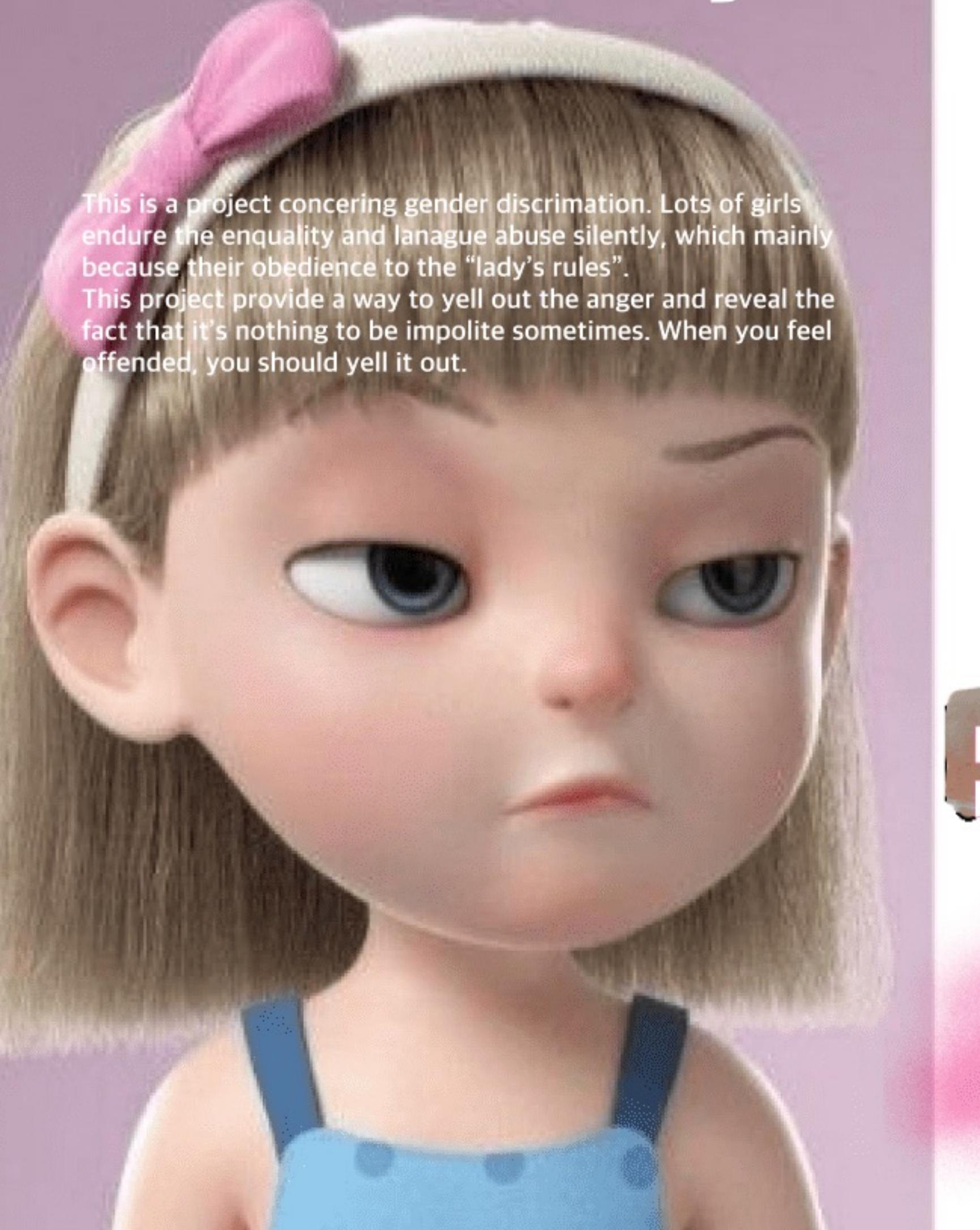


- The ball rolls back to the starting point

Video Link

Google drive : <https://drive.google.com/file/d/1H6wQivCqVYgqK3YVMVg-m-2uf7rc4v/view?usp=sharing>
YouTube : <https://youtu.be/RCbZsDEisn4>

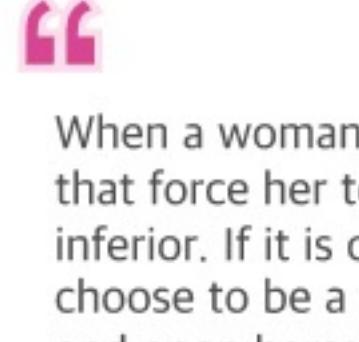
Immodest Lady



This is a project concerning gender discrimination. Lots of girls endure the inequality and language abuse silently, which mainly because their obedience to the "lady's rules".

This project provide a way to yell out the anger and reveal the fact that it's nothing to be impolite sometimes. When you feel offended, you should yell it out.

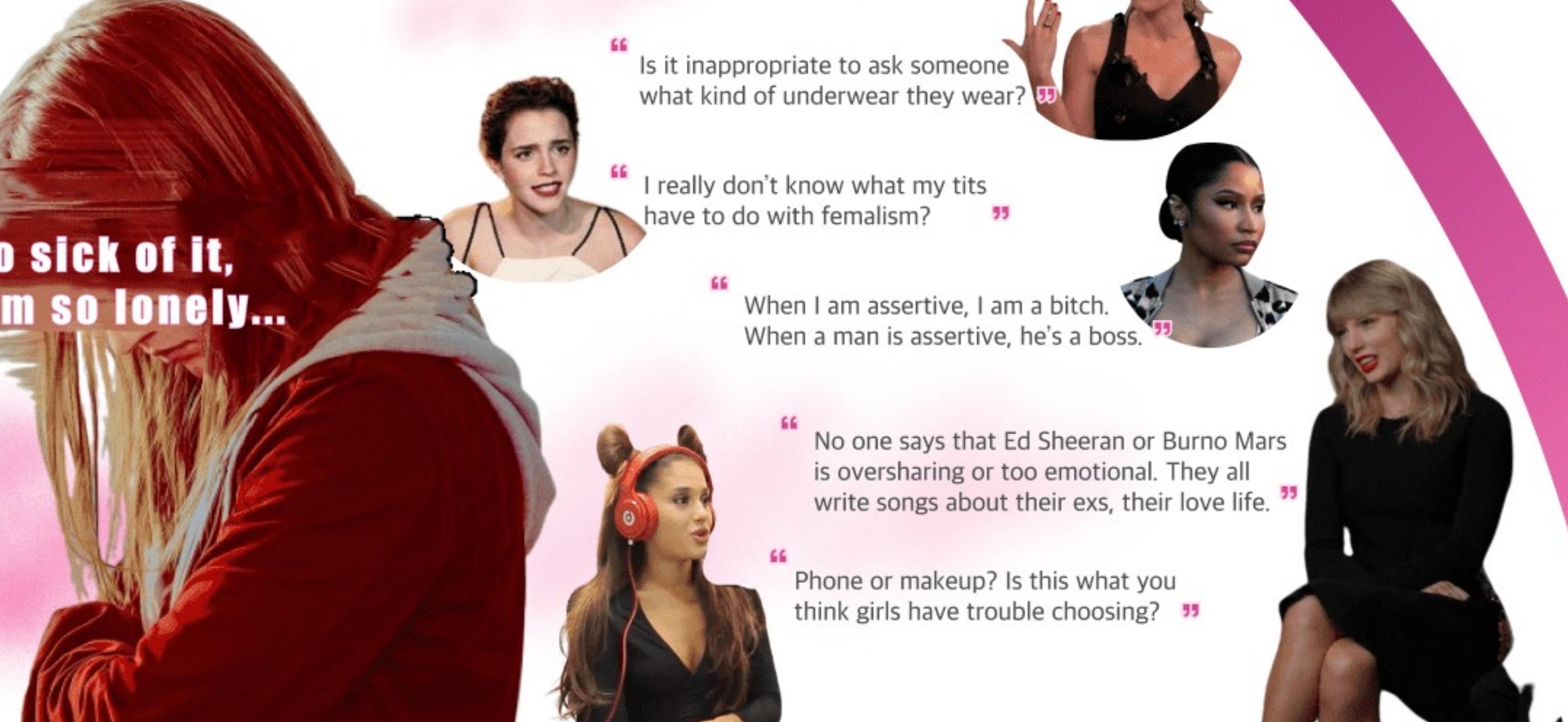
I BACKGROUND



Le Deuxième Sexe
Simone de Beauvoir

When a woman feels inferior, it is actually the norms that force her to be a feminine woman that make her inferior. If it is out of her spontaneous choice, she will choose to be a complete individual, a subject, a free consciousness, and open herself to the world and the future; If such a choice means that she has a masculine tendency, it is better to say that the so-called feminization actually hurts a woman and makes her an incomplete person.

Cause you're a girl you should/shouldn't



Childhood

In Asian countries, there is still a strong preference for sons, and daughters are despised from the moment they are born.

Teenage

43.4% were told they had no talent for science
32.6% were teased about their height and weight
24.1% often felt discriminated against by teachers
10.4% were told that they didn't need to study well

Adulthood

Adult women are mainly attacked or discriminated against in the workplace and in relationships and marriages. They not only need to compete for jobs with higher abilities, but also imply that they will not be affected by their fertility;

86.6% female college students suffered from recruitment discrimination

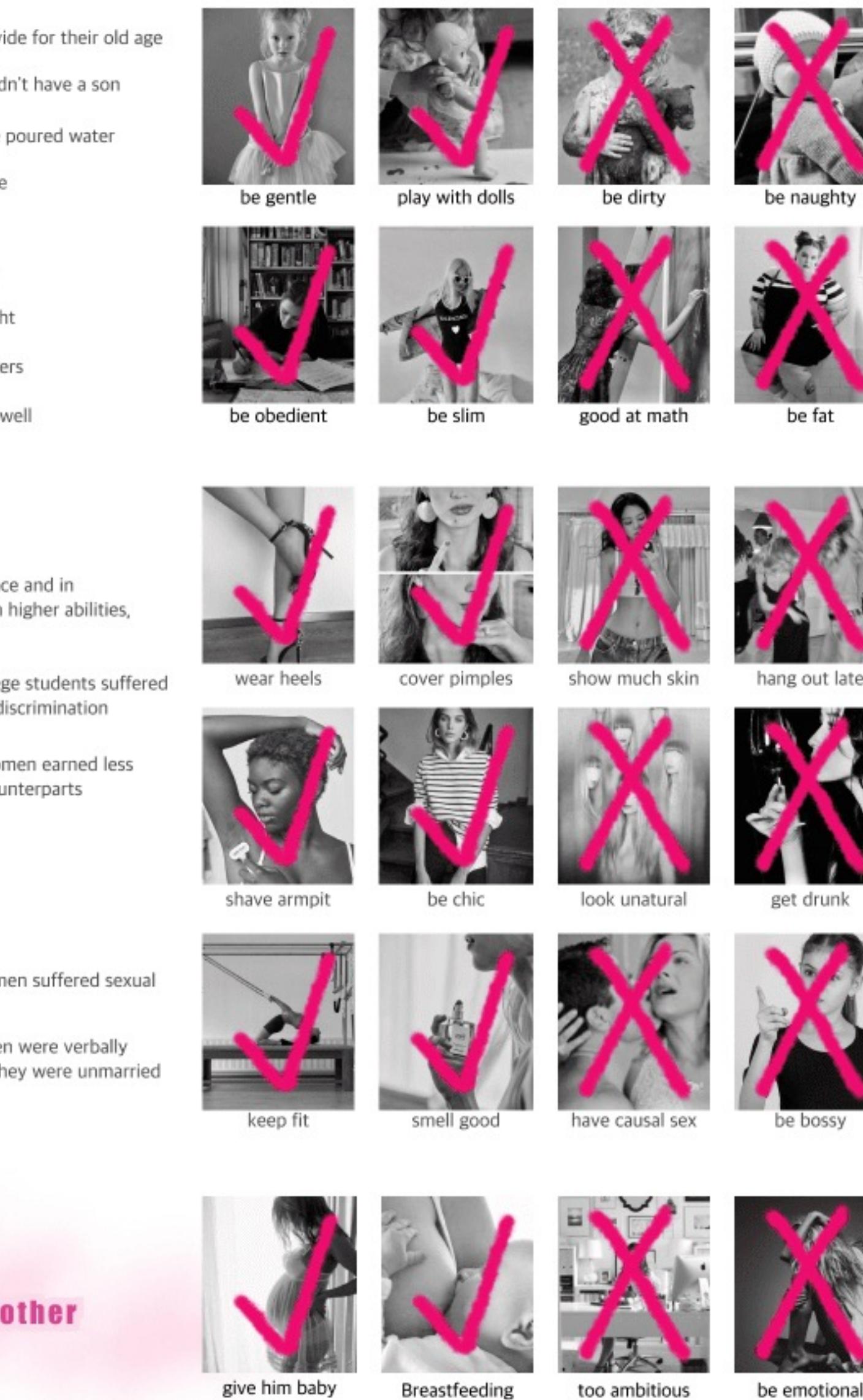
76.2% working women earned less than their male counterparts

66.5% working women suffered sexual harassment

57.9% single women were verbally attacked because they were unmarried

Wife & Mother

39.7% believed raising sons was the way to provide for their old age
36.4% believed they would be bullied if they didn't have a son
33.1% thought a married daughter was just like poured water
32.9% believed families needed male labor force



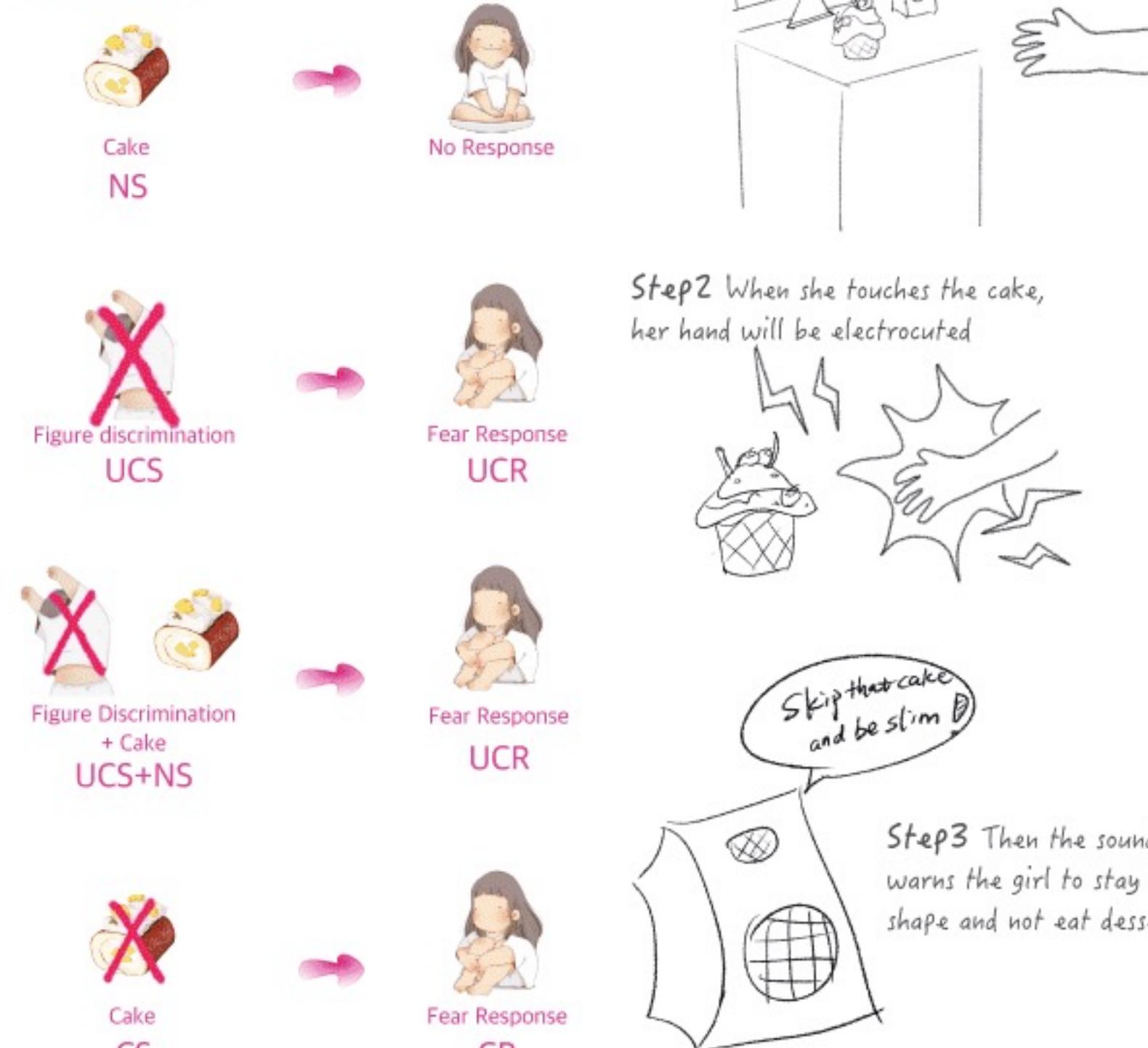
I DESIGN PROCESS

Optional 1 Little Robert's cake

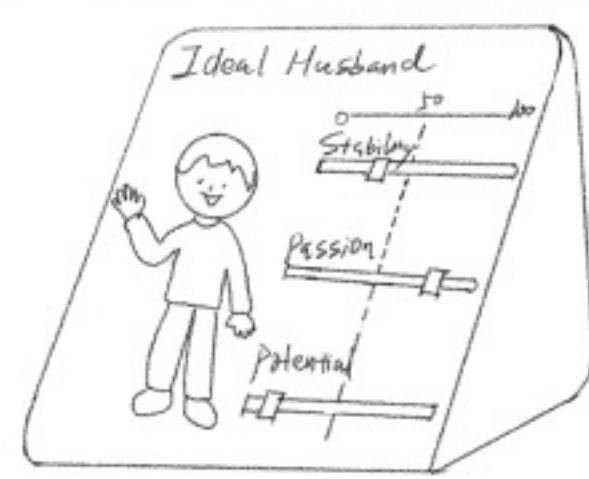


The growth process of women is also seen as a "little Robert experiment" with a long time span. The precondition of "because you are a girl, what should you do" has been with the girl for a long time. If women resist or question, they are yelled at; If you do what you're told, you'll be loved.

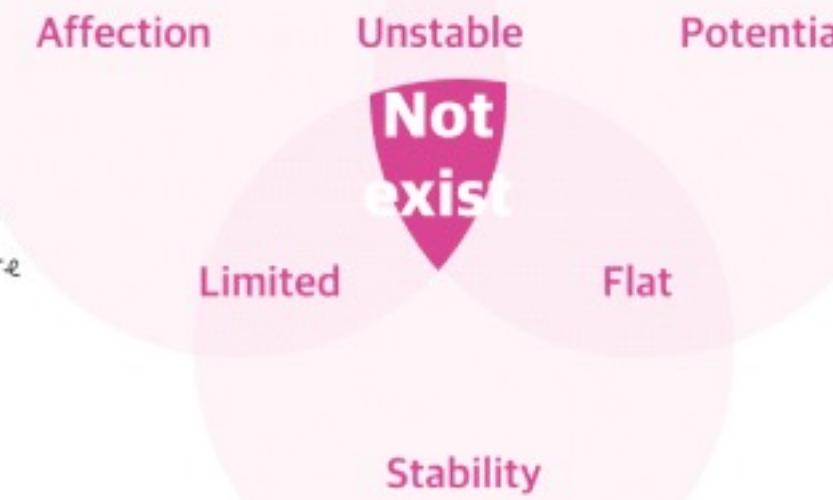
Body discrimination against women can make them conditioned to eat desserts, and naturally associate desserts with gaining weight



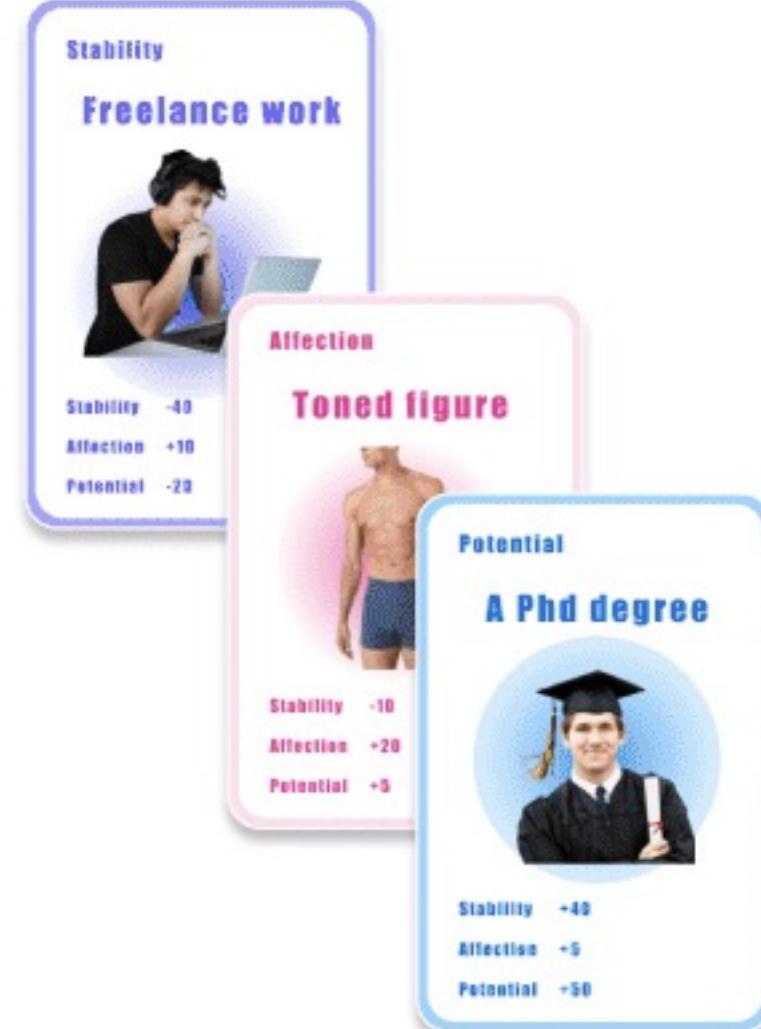
Option 2—Ideal Partner



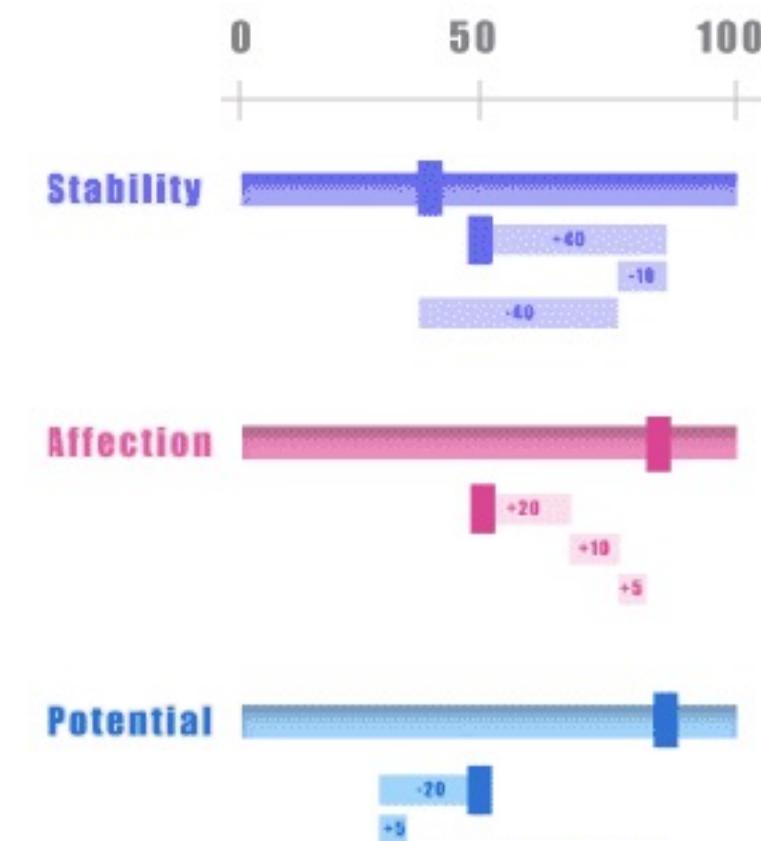
Here, male characteristics are divided into 3 major aspects. Girls select the conditions they are satisfied with from the condition card and add them to their "husband". For each condition selected, there is corresponding bonus points or minus points for each of the three traits. If a trait is reduced to zero, the game fails because there is no "perfect" husband.



Step1 Find your favorite card from all the trait cards and place them together. Here are three cards as examples.



Step2 Add the points of S, A and P on each card. If one item has a score of 0, the game is over. S, A and P all start at 50 points



Step3 The ideal husband of this participant is: a freelance and a doctor with a good figure. Low stability is low and fairly high affection and potential

Final—Immodest Lady

However, I still prefer women themselves to speak out for the discrimination and injustice they suffered. In real life, women often put up with it because they "have to be polite," "have to be ladylike," and "have to control their emotions". But anger is actually a very normal emotion, and women do not need to deliberately hold back their anger just because they are women. Therefore, I hope that by creating an interactive doll with a sense of contrast, it can express the repressed emotions of women on the one hand, and break the stereotype of "what women should be like" on the other hand.

How to break the wretched cycle of girls' Tolerance



SKETCH

Step1 Lisa is sitting for talk



Step2 you can tell Lisa what she should do

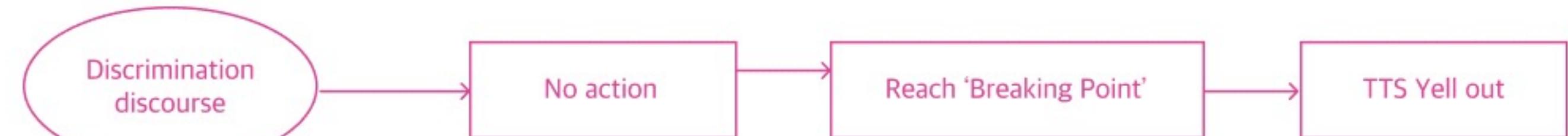


Step3 Lisa shout at you when she can't bear it anymore



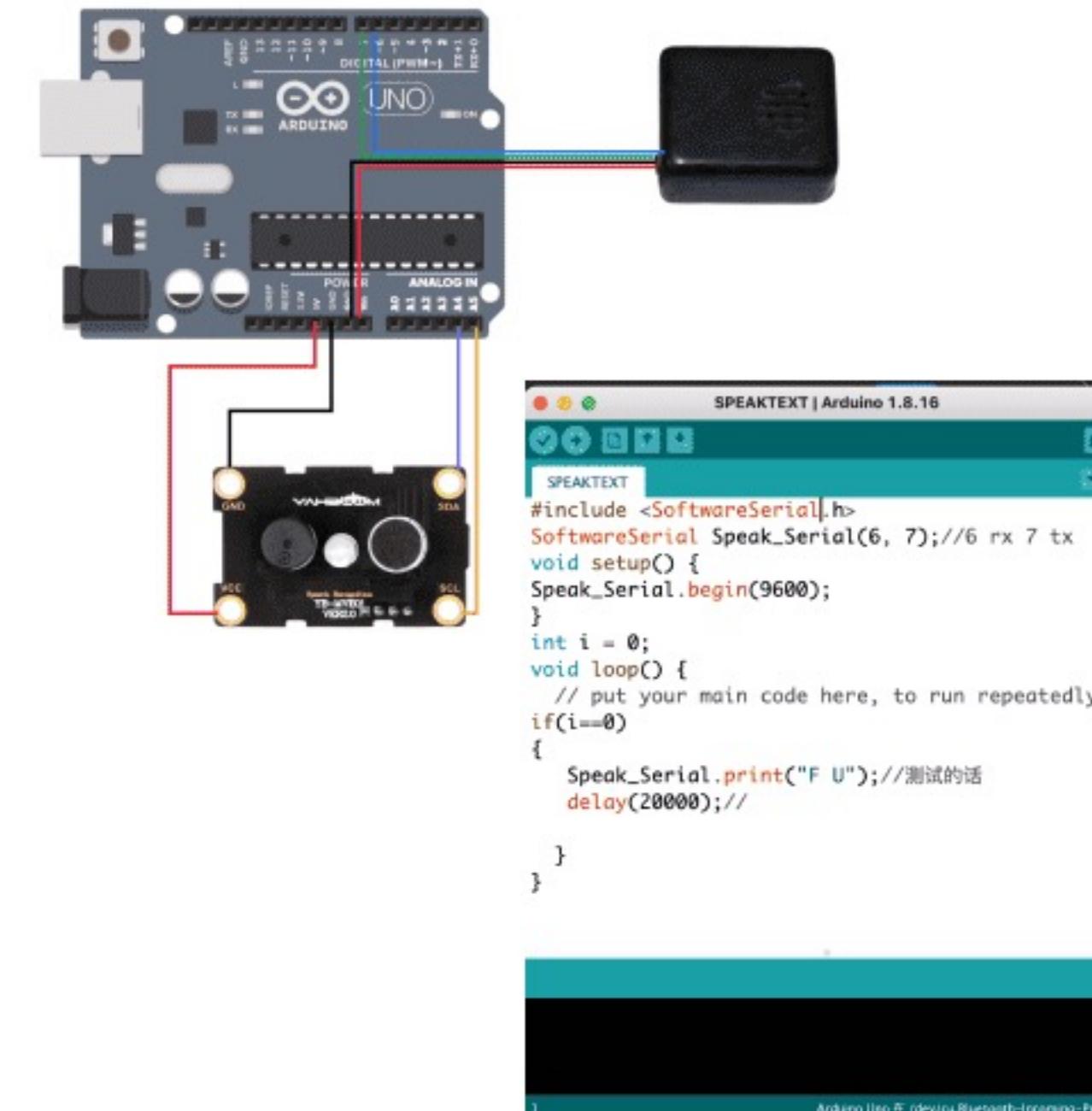
TECH

Arduino speech recognition module and TTS text to speech module are used for voice interaction. Set up feedback statements for typical utterances in the program.



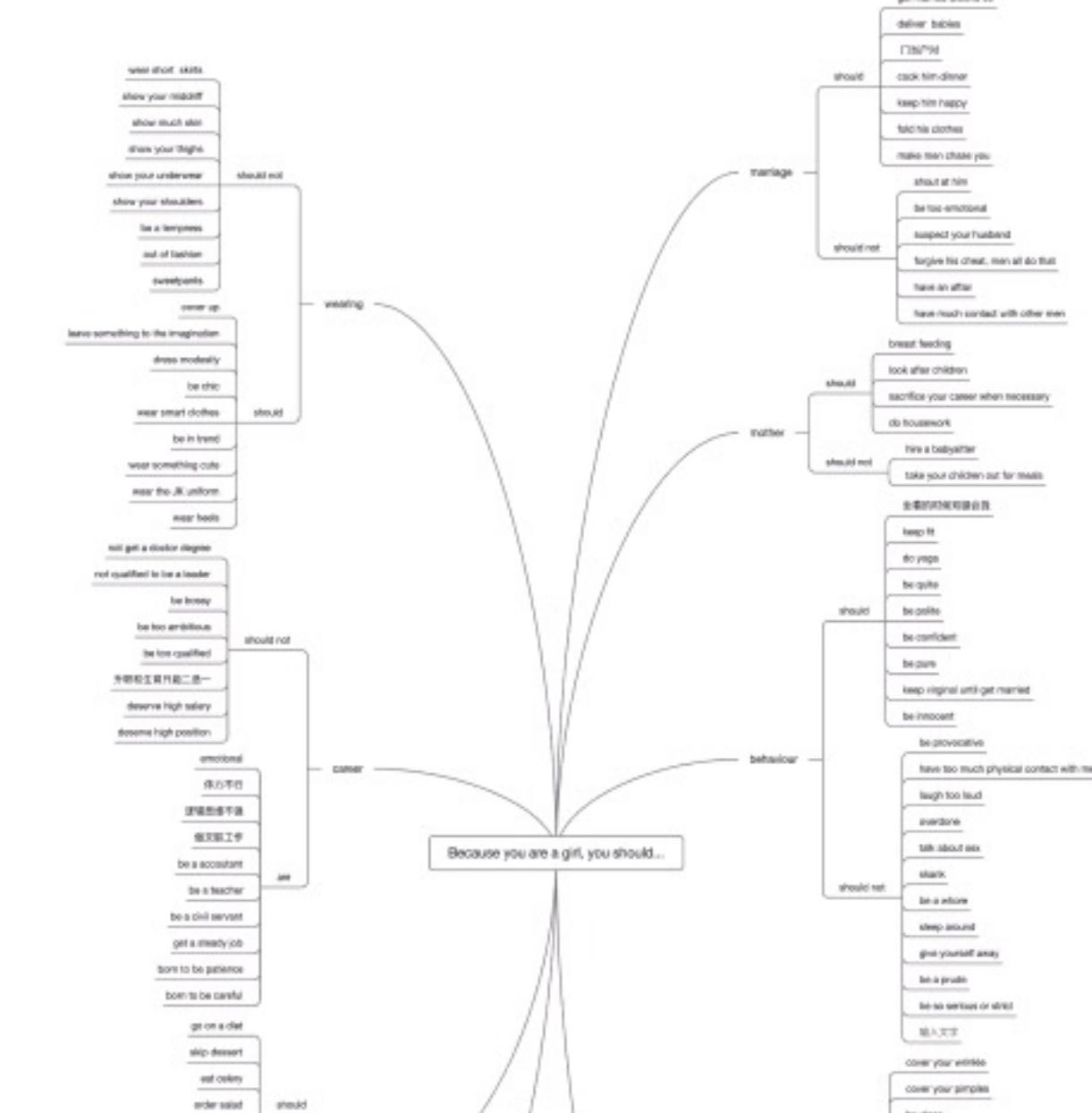
Coding

The speech module recognizes the content of the speech, and the TTS broadcasts it according to the set statement.



Corpus

I have compiled a corpus from the seven aspects, "should do", "should not do", "behavior", "appearance", "wearing", "career", "diet" and "entertainment" that women often hear.



PRESENTATION



Talk to Lisa



Video Link

Google drive : <https://drive.google.com/file/d/1i2QfeQPXdbLDROxVXnO4xQetmovDZ4KN/view?usp=sharing>
YouTube : <https://youtu.be/JYemQFH00j4>

ADDICTION LAB

Favourite music

Music Preference

"What do you feel comfortable socializing with? -- Comfortable and not awkward silence." Instead, we have a group of like-minded friends chatting online, while offline we feel lonely. Therefore, I studied two high-frequency behaviors of people, namely, listening to music and drinking coffee. I tried to provide a new way of social communication by making coffee through music. Let people in the daily busy life can have more chance to make friends offline.

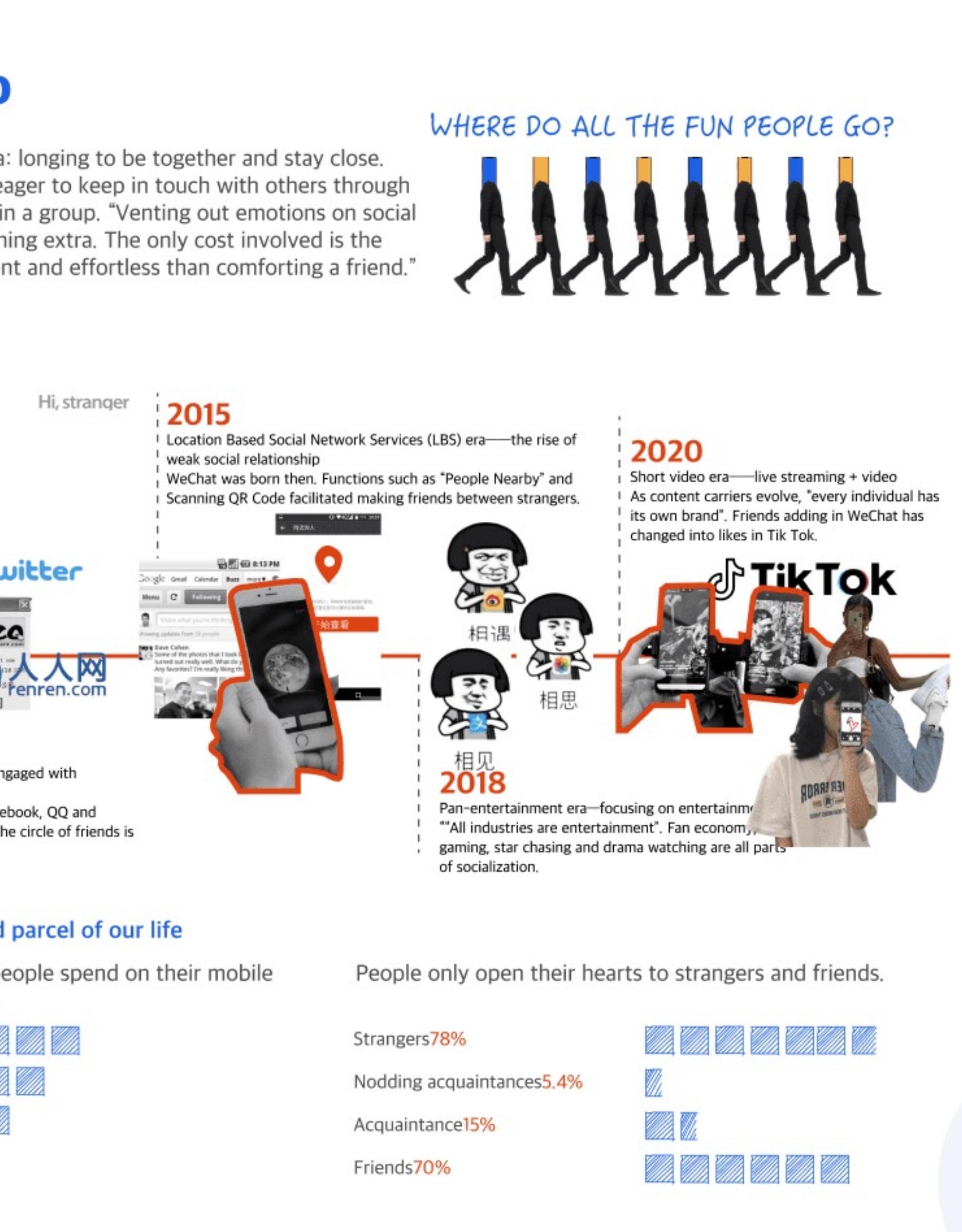
Personal Coffee ?

Addiction to music and coffee?
Get your own coffee with your favourite song!

ALONE TOGETHER
Brewed in addicts

I BACKGROUND

People are always at a dilemma: longing to be together and stay close. However, they are happy and eager to keep in touch with others through social platforms even they are in a group. "Venting out emotions on social platform does not need something extra. The only cost involved is the time for typing, which is efficient and effortless than comforting a friend."



- Music software as means of socialization

Among various leisure and entertainment apps, young people like to use music software to relax themselves.

- The truth behind the story is:

Most people seek to expel their loneliness through the Internet, but they have reached a dead end.

Feel lonely → turn to Internet for comfort → get more lonely → Keep on Internet for comfort

63.6% feel spending too much time online makes them introverted.
57.3% feel indulgence in social media makes them feel more lonely.

- Accurate matching ≠ a good matching.

Matching is easy, but it's not easy to get a friend you can have a good chat with.

Some girls often have more than 50,000 likes on a social platform, but she can't find someone suitable to be her boyfriend.

Some boys give 1,000 likes a day, but they get no reply from girls.

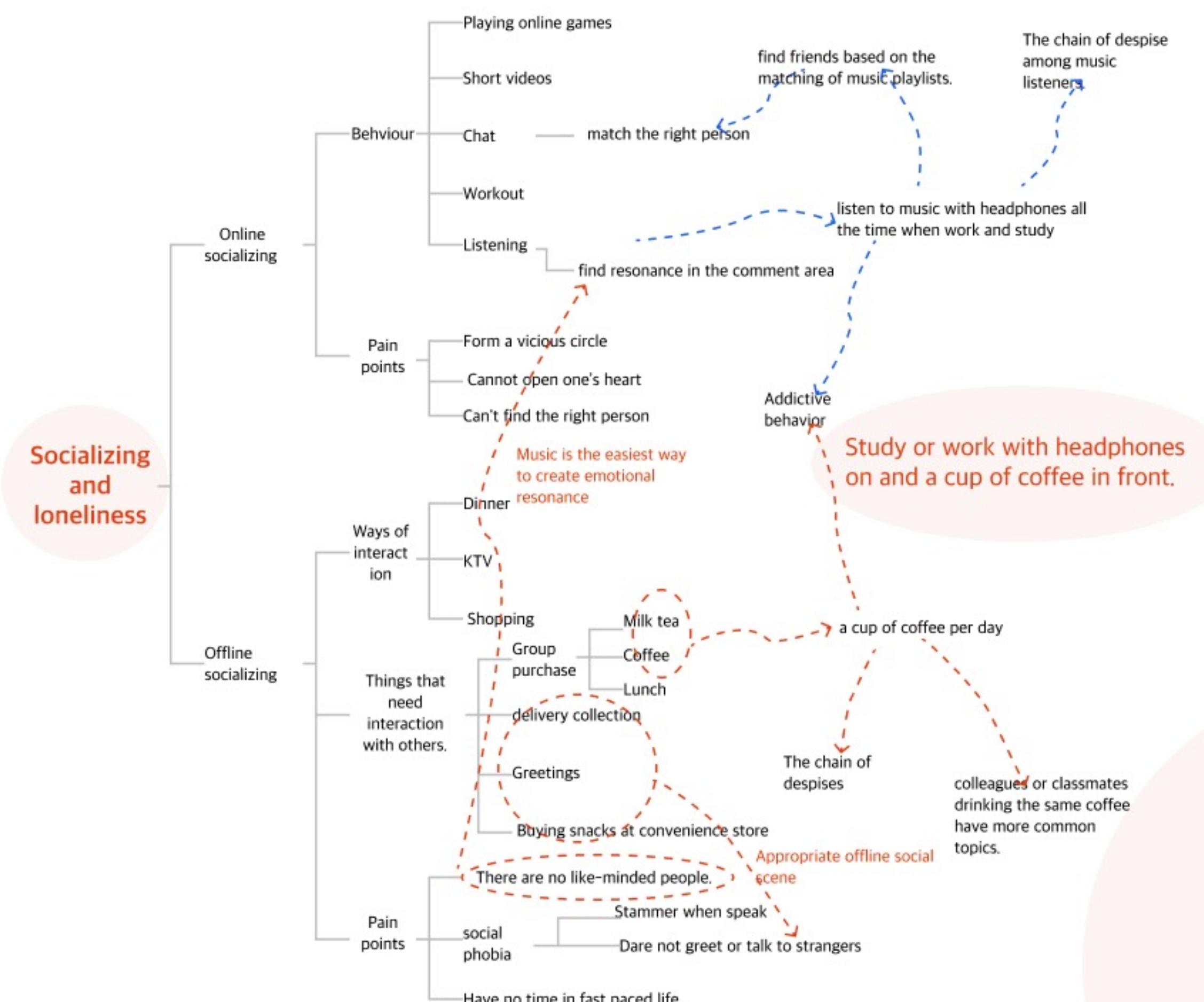
Their inner world is like a closed and isolated tank.

Young people like to get in touch with the outside world to expel their loneliness. But superficial contact cannot go into each other's heart.

From "talking about everything" to "nothing to talk about", the only difference is online and offline.

GOALS

Online social leisure has become a way of life. Since we cannot escape from this digital world, why not create some offline interaction experiences in combination with online leisure and entertainment? Through this way, people can move their eyes away from the screen and take a look at the real world.



RESEARCH

After sorting and analysis, I would like to make a related design based on music, the most common way of socializing for contemporary people, and drinking coffee, an activity most people do when offline. Research on music listening and drinking coffee has been conducted.

• Can't live without music

- 65.3% listen to music anytime, anywhere.
- 57.3% listen to music while exercising.
- 41.5% listen to music before sleep.
- 35.2% listen to songs when feel bored.

Music has become an indispensable part of young people. It accompanies them every moment regardless of whether they are sad, in a daze, exercising or sleeping...

• Like to put a song on a loop

About 59.8% like to put a song on a loop.

"Sometimes a song has been on a loop for more than a week, so I no longer care what it is, it has been burnt into my brain and while I concentrate on my work."

"My mood during that time is hidden in this song. There is nobody around me can understand my feelings."

• Different taste of music cannot be accepted

About 60.8% will not make friends with people who share a different taste of music.

"I will make friends based the music playlist, and it will be a bonus if we share the same playlist."

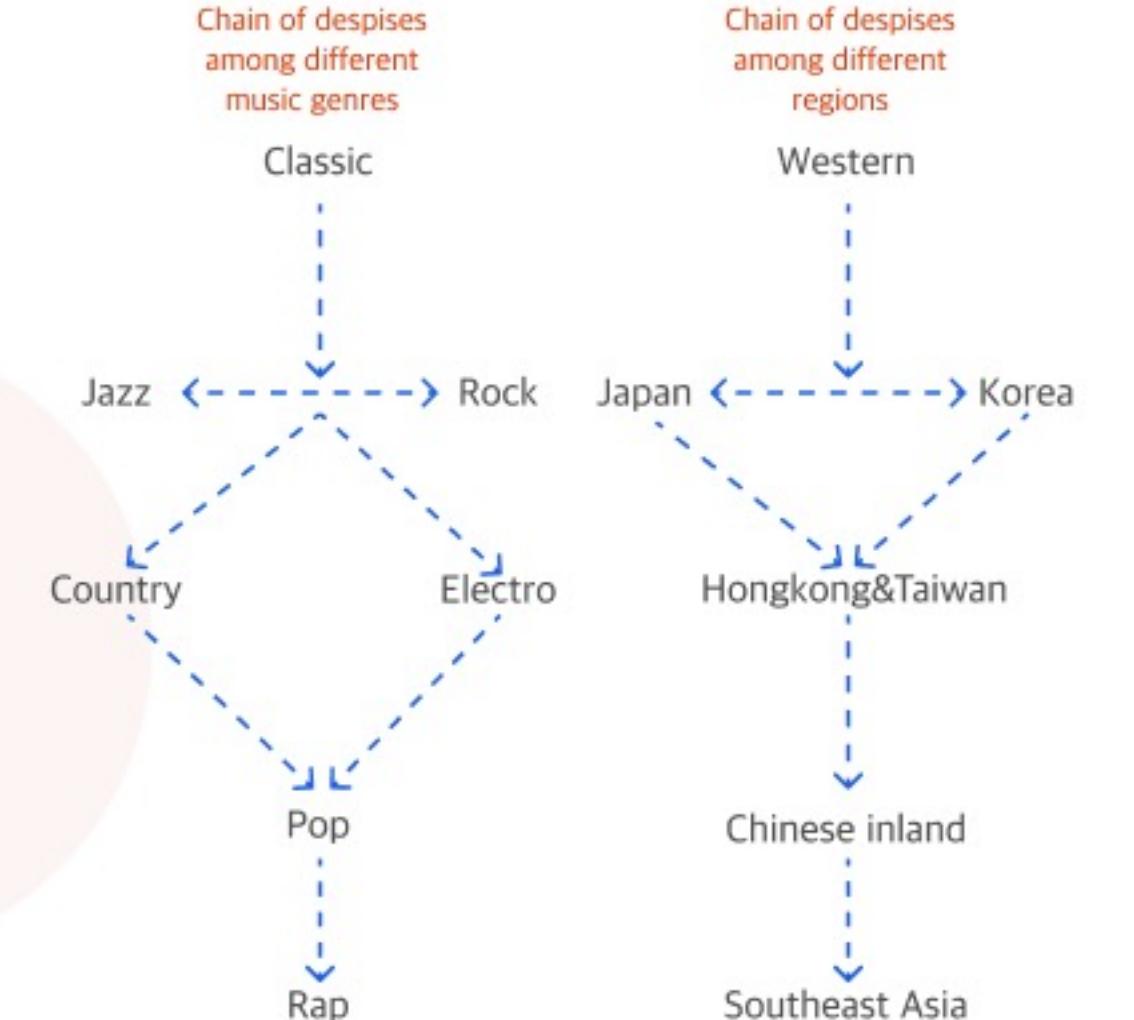
"The most embarrassing thing in KTV is that we don't share a single song on their lists. They sing theirs and we sing ours, and we dislike each other."

• Reasons for music listening

- 75.4% Relieve stress
- 62.8% Improve concentration
- 35.5% Kill boredom
- 33.6% Chase stars

Music has become an indispensable part of young people. It accompanies them every moment regardless of whether they are sad, in a daze, exercising or sleeping...

• The chain of despises among music listeners



• Coffee has become a daily necessity

- 44.2% multiple cups per day
- 15.8% One cup per day
- 3.0% 3-5 cups per week
- 37.0% 1-2 cups per week



"Coffee is the life-saving energy water."

"Every afternoon, when the sun shines lazily on us, coffee becomes the ornament of our workplace when we are juggling between dawdling and work."

"Excessive coffee consumption every day makes me anxious. Look at the dark circles under the eyes. Our life depends on coffee."

• Coffee face-judger

Trend followers prefer good-looking coffee when buying.

- 68.4% Store decoration style
- 57.1% Brand cultural and creative
- 45.4% Coffee taste
- 38.7% Waiting time
- 20.1% Coffee packaging



"The poetry and the dream place in life are actually the sense of ritual. Exquisitely decorated stores and coffee make beautiful photos possible, and we are also willing to pay for the sense of ritual."

"Once in a while, I will find a quiet and nice coffee shop. Maybe the price is a little higher, but if the quality and environment win my heart, I will consume there. It is very suitable for reading."

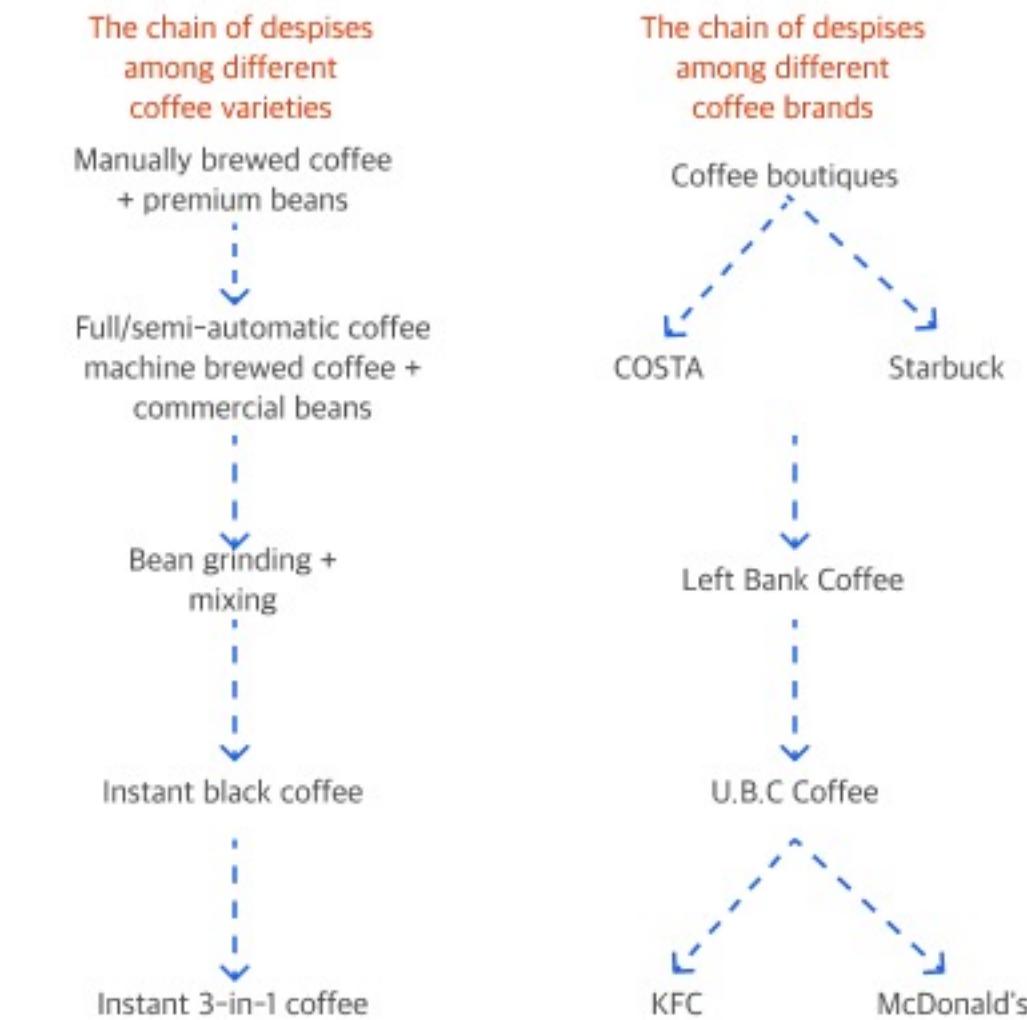
• Going to high culture coffee shops

About 33.3% of offline coffee consumers are trend followers. Trend followers: Young people who love to chase trends. They like to check in online celebrity coffee shops and trendy coffee shops on off days.

Their consumption motive is mainly social entertainment.

- 82.2% For social entertainment
- 23.4% Lose weight
- 21.0% For meals
- 18.5% Refresh mind
- 10.9% Like coffee taste

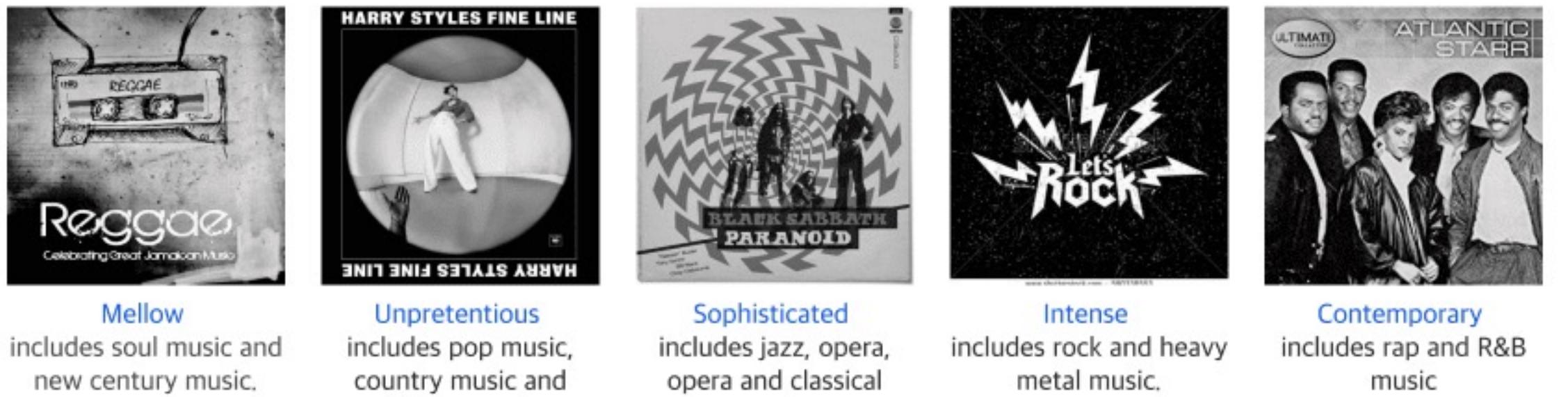
• The chain of despises in coffee



SURVEY

Theoretical support

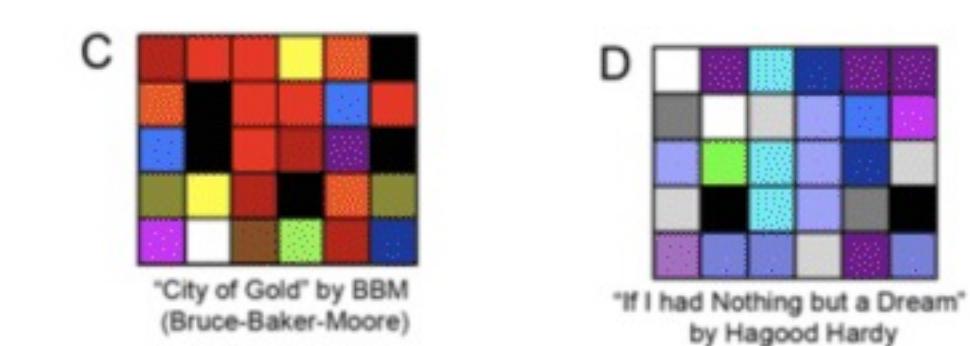
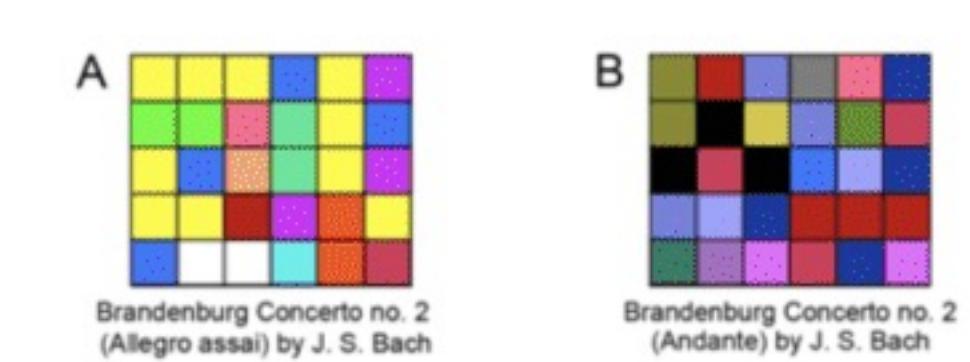
Research shows that people's music preference can be summarized according to the "Music Preference Model"



We need to visualize the music preferences if we want to help people find friends with similar musical tastes. Colors are the best way of visualization.

Does music have colors?

Palmer and Schloss conducted an experiment on music colors. They prepared four pure music songs with different styles for 30 participants. They found that the overall color difference of the four tunes was obvious, meaning that the music does have colors.



Verify

• Step1—Data reparation

- Data on GTZAN Genre Collection have been chosen to conduct music color research. It consists of 1000 audio tracks each 30 seconds long. It contains 10 genres, each represented by 100 tracks.
- Match the 10 genres to the 5 categories of MUSIC preference model.
- For each genre, a short duration of music is randomly chosen as the test music and embed it into the questionnaire.

- | | | | | |
|--|--|--|----------------------------------|---------------------------------------|
| <input type="checkbox"/> Mellow | <input type="checkbox"/> Unpretentious | <input type="checkbox"/> Sophisticated | <input type="checkbox"/> Intense | <input type="checkbox"/> Contemporary |
| <input checked="" type="checkbox"/> Reggae | <input type="checkbox"/> Country | <input type="checkbox"/> Classical | <input type="checkbox"/> Rock | <input type="checkbox"/> Classical |
| | <input type="checkbox"/> Disco | <input type="checkbox"/> Jazz | <input type="checkbox"/> Metal | <input type="checkbox"/> Blues |

• Step2 Make color card

- The color palette used by Palmer and Schloss is suitable for this project. However, considering the user experience of the mobile version, black, white, and gray are removed from the palette so that the test results will be clearer.



• Step3 Make questionnaire

音乐是什么颜色的呢?

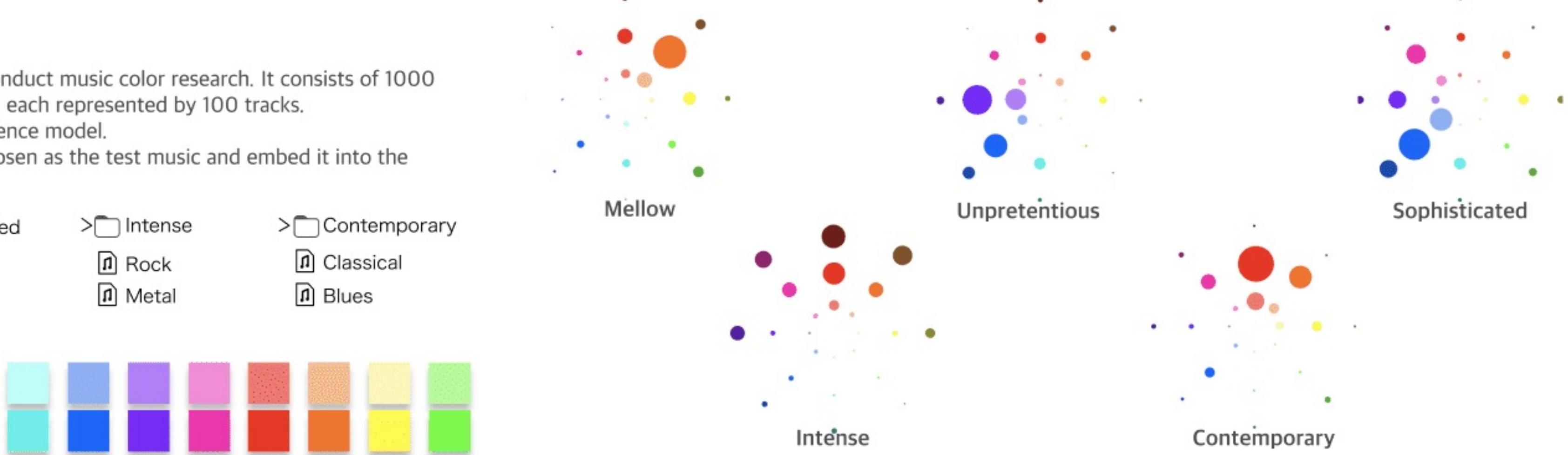
感谢您能抽出几分钟时间来参加本次答题，现在我们就马上开始吧！

1.你觉得这只音乐片段是什么颜色?

reggae.00019.wav



Step4 Visualize results



CONCLUSIONS

Based on survey results, the characteristics of the demographic have been summarized as follows:

Age : 20-30

Occupation: office workers, freelancers, etc.

Coffee drinking habit: Almost every day. Like to check in trendy cafes

Coffee requirements: high value, good taste

Music listening habit: Listen to music anytime, anywhere

Pain points: There is a requirement for the music taste of friends, and minded friends.

Social characteristics: active online, social phobia offline

Social pain points: indulging in social networking; Feeling empty and lonely without mobile phones; Difficult to find like-minded people in real life.



CONCEPT

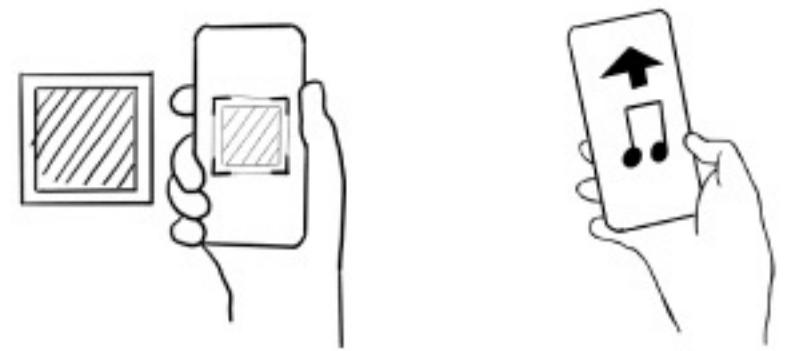
Since coffee and music can get people addicted, the project will use coffee to find like-minded people. When a song is uploaded, the system will recognize its genre and brew a type of coffee to match the style of the song. Different music genres have different colors of coffee. During collection, they can communicate and interact with coffee as the topic.

Music preferences and coffee

- For the convenience of implementation, the results obtained from the questionnaire "What color is the music?" are directly used in this project. To facilitate coffee brewing, orange color corresponding to Mellow is replaced by the brown color of latte, and the dark color corresponding to Intense is replaced by gray.



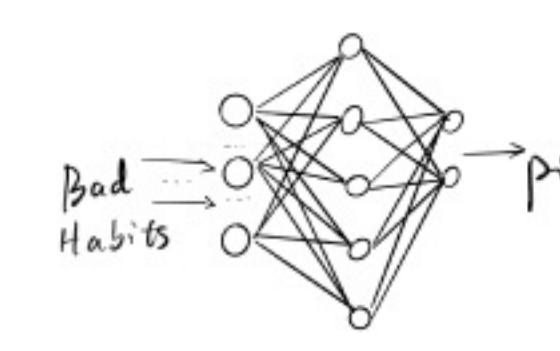
Sketch



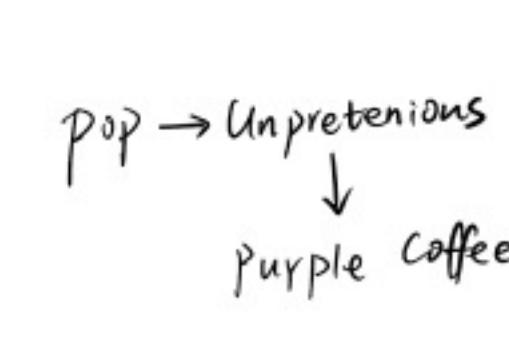
- Scan the QR code to access the main page.



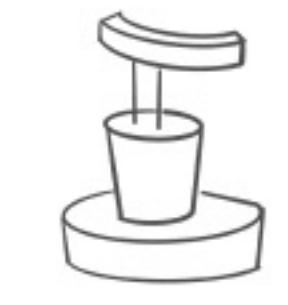
- Upload the favorite song.



- Identify music genre with the neural network algorithm



- Match music preference with coffee type



- The coffee machine brews coffee accordingly.



- Confirm the recognition result



- Collect coffee and interact with people around

WORK FLOW

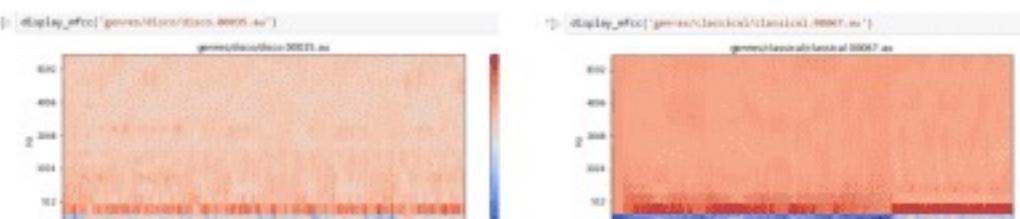


Neutral Networks algorithm for music genre identification

- Librosa - Python library for audio and music analysis and Mel-frequency cepstral coefficients are used to connect to the neural network for music recognition. The 1000 music clips of the survey "What color is the music?" are used here to test the model.

Visualize music

- Write an auxiliary function to display MFCC
- Use specshow in librosa library to plot MFCC values into spectrograms



```
# MFCC Visualization
def displayMfcc(song):
    y_=librosa.load(song)
    mfcc = librosa.feature.mfcc(y)
    plt.figure(figsize=(10,4))
    librosa.display.specshow(mfcc, x_axis='time', y_axis='mel')
    plt.colorbar()
    plt.title(song)
    plt.tight_layout()
    plt.show()

# Visualize a song randomly
displayMfcc('../genres/blues/blues.00000.wav')
```

MFCC standardization

- The value of MFCC may lie between -250 and +150, which is too large. It is converted to a value between -1 and 1.
- To ensure that the amount of data input to the neural network is the same, only the first 25000 MFCC values of each song are selected.

Split data

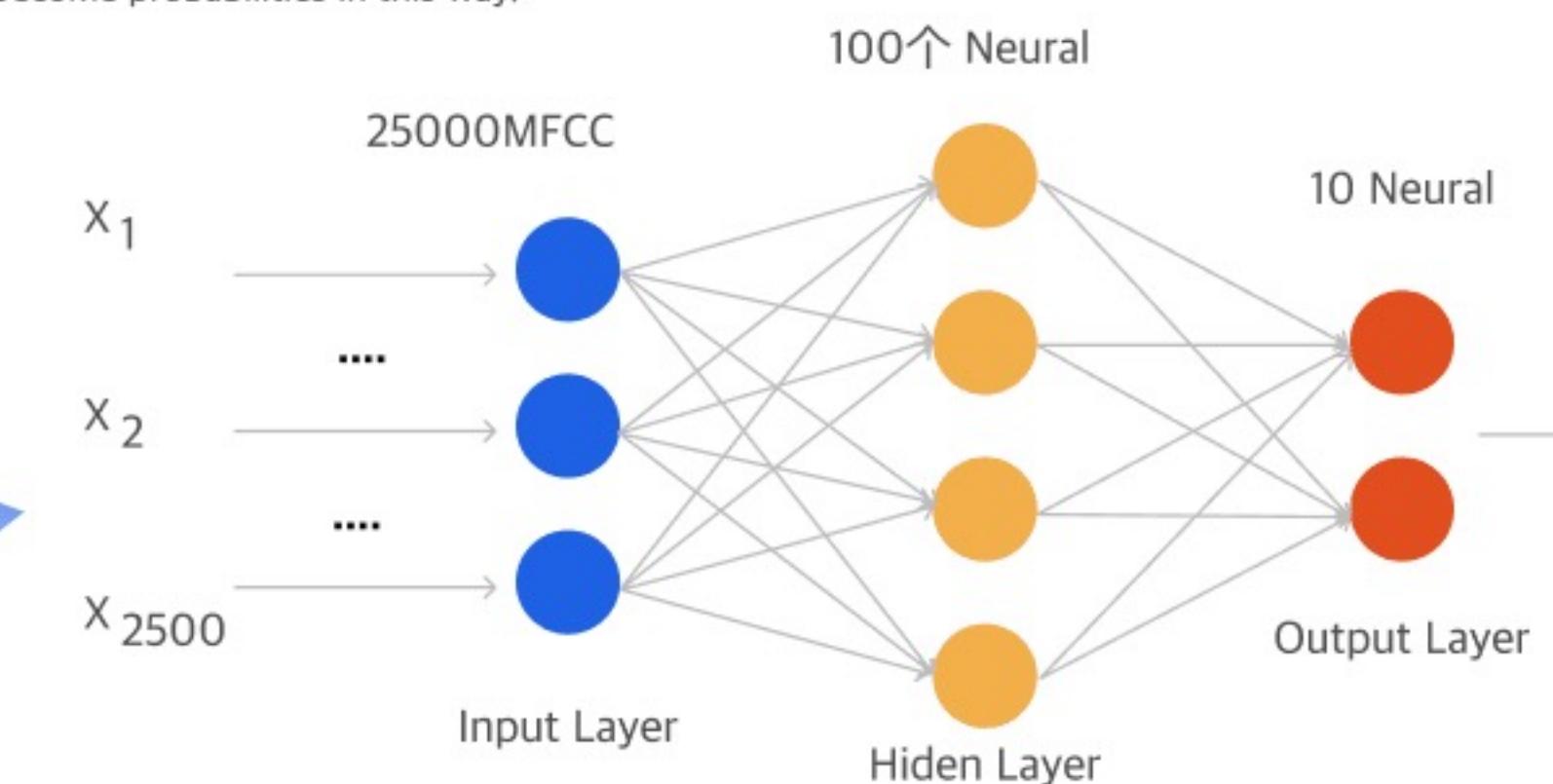
- Eighty percent of the data are randomly selected as the training set, and the remaining 20% as the test set.

```
# Extract MFCC values
def extractFeaturesSong(f):
    y_=librosa.load(f)
    #get MFCC
    mfcc = librosa.feature.mfcc(y)
    # MFCCStandardization
    mfcc /= np.amax(np.absolute(mfcc))
    return np.ndarray.flatten(mfcc)[25000]

# Split data
alldata =
np.column_stack((features,labels))
np.random.shuffle(alldata)
splitidx=int(len(alldata)*training_split)
```

Build neural network

- 2500 MFCC values are used as the input layer, and the Hidden Layer performs a weighted summation of its weights and deviations, and then runs the relu activation function. Relu takes any value less than 0 as 0, and any value higher than 0 as the value itself.
- After outputting to 10 neurons, use softmax to normalize the output results so that they can add up to 1. They eventually become probabilities in this way.



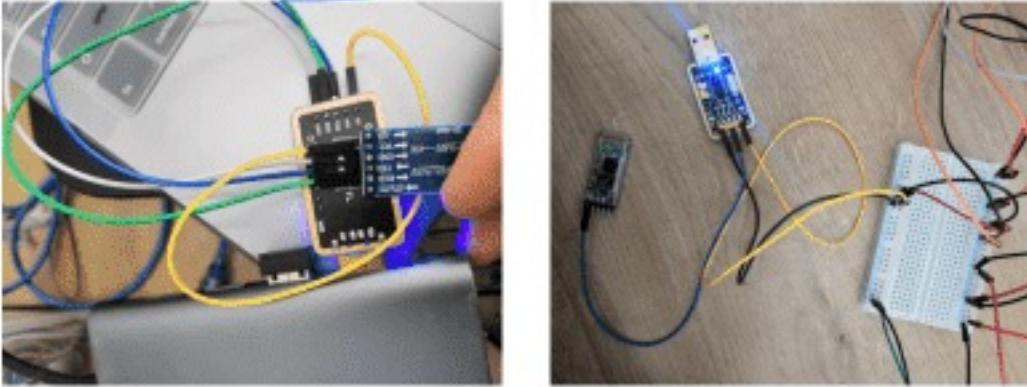
The recognition result will be the music genre that has the highest probability to match the neurons.

- The score of Accuracy is about 50% while the accuracy of random guessing is only 10%.
- This proves the matching accuracy of Accuracy.

WORK FLOW



Connect Arduino with phone



```
void loop() {
int i;
unsigned char temp;
while (mySerial.available())
{
temp=mySerial.read();
if(RcvEn){Rcv_data[RcvCnt++]=temp;if(RcvCnt>1)
(RcvEn=0;Serial.write(Rcv_data[0]);Serial.println());}
else if(temp==FrameHead) {RcvCnt=0;RcvEn=1;}
}
if(Rcv_data[0]==Sophisticated)
(Sophisticated_coffee);Rcv_data[0]=';';
if(Rcv_data[0]==Contemporary )
(Contemporary_coffee);Rcv_data[0]=';';
if(Rcv_data[0]==Intense) {Intense_coffee();Rcv_data[0]=';';
}
if(Rcv_data[0]==Mellow) {Mellow_coffee();Rcv_data[0]=';';
}
if(Rcv_data[0]==Unpretentious)
(Unpretentious_coffee());Rcv_data[0]=';';
}
```

Arduino brew the coffee

Circuit diagram

Linking Process



Definition Code

```
#include <SoftwareSerial.h>
SoftwareSerial mySerial(9,10);
#define FrameLead
unsigned char Rcv_data[2];
unsigned char RcvCnt=0;
unsigned char RcvEn=0;
// define linking
#define coffee_rel 2
#define blue_rel 3
#define red_rel 4
#define white_rel 5
#define grey_rel 6
//Communication Protocol Definition
#define Sophisticated 's'
#define Contemporary 'c'
#define Intense 't'
#define Mellow 'm'
#define Unpretentious 'u'
```

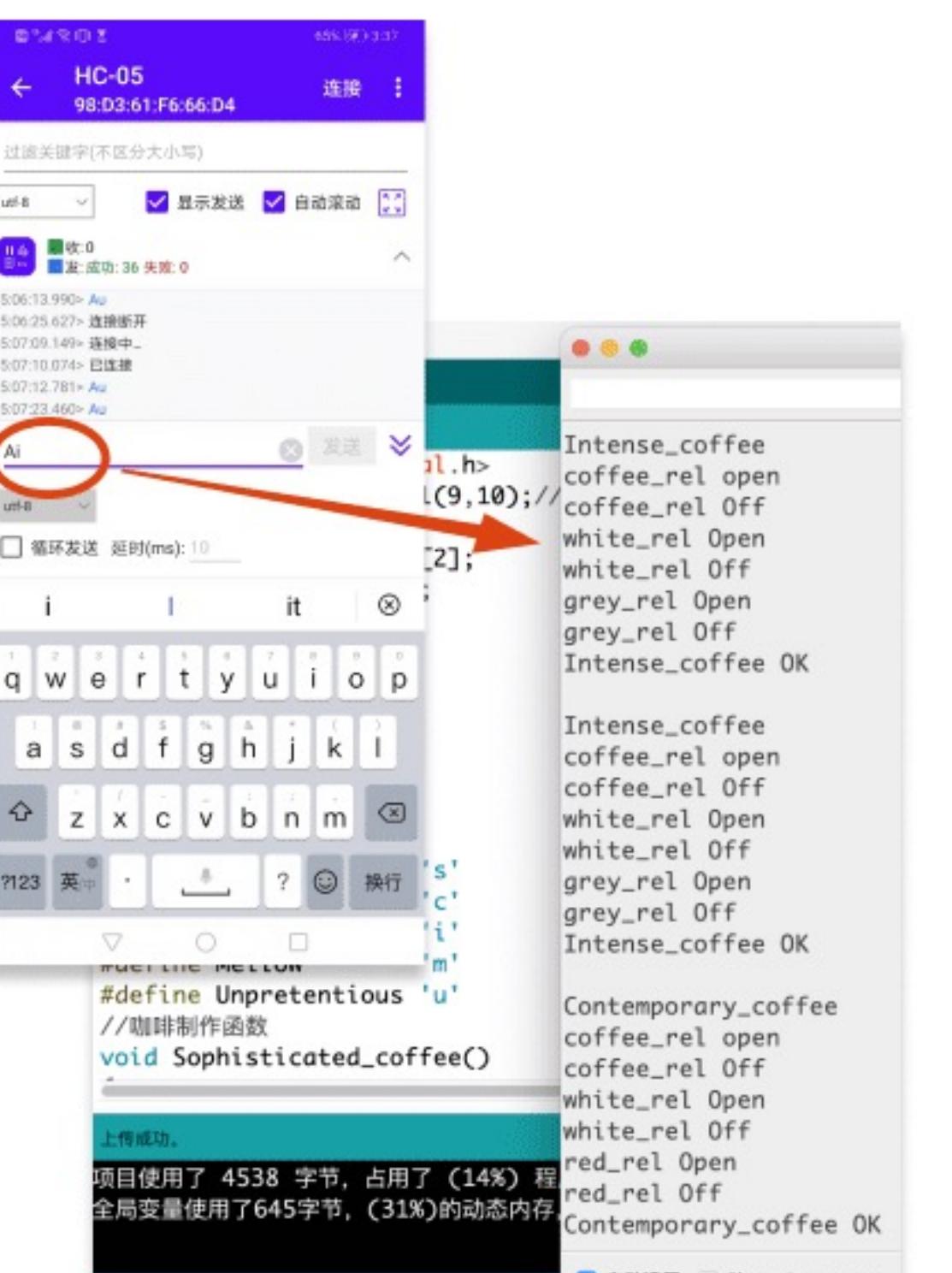
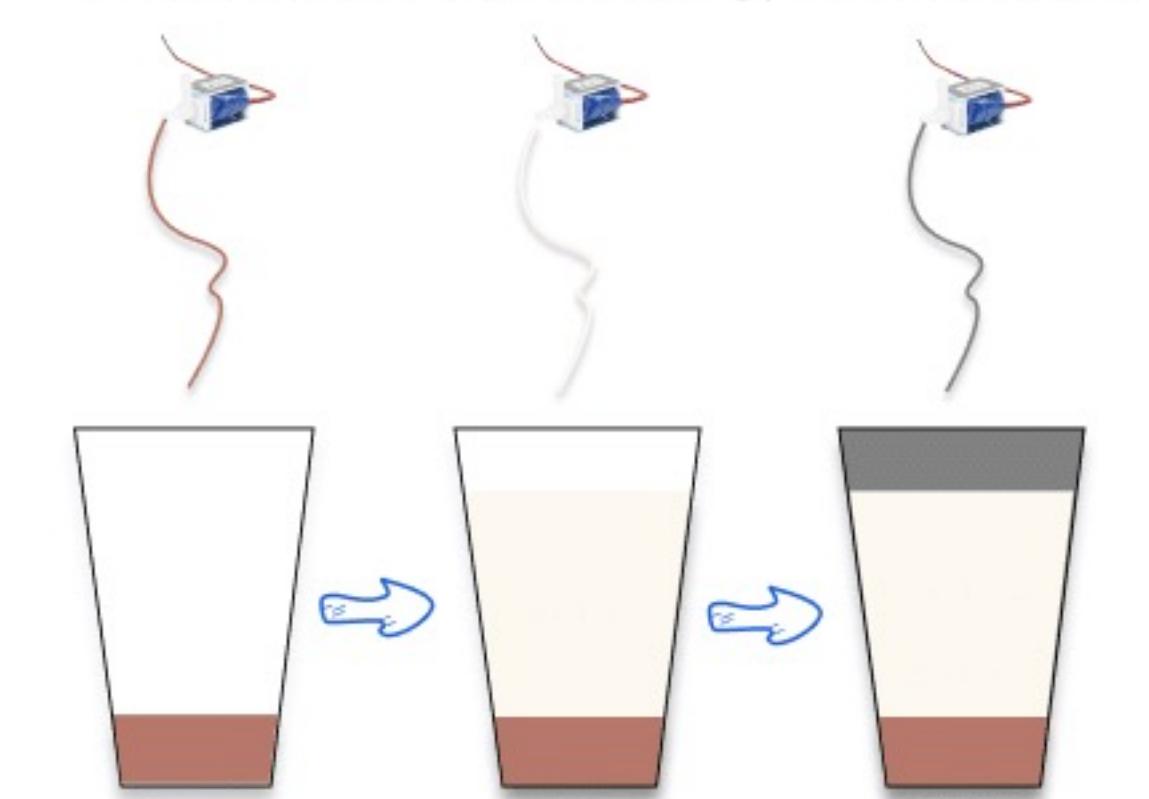


How coffee is made

- Open the valves in the sequence of coffee-milk-colorant and pour into the cup.
- According to the size of the coffee cup, set the total filling time to 7 seconds, 1 second for coffee, 4 seconds for milk, and 2 seconds for colorant.
- There is no colorant in Mellow, so release the milk value for 2 more seconds.

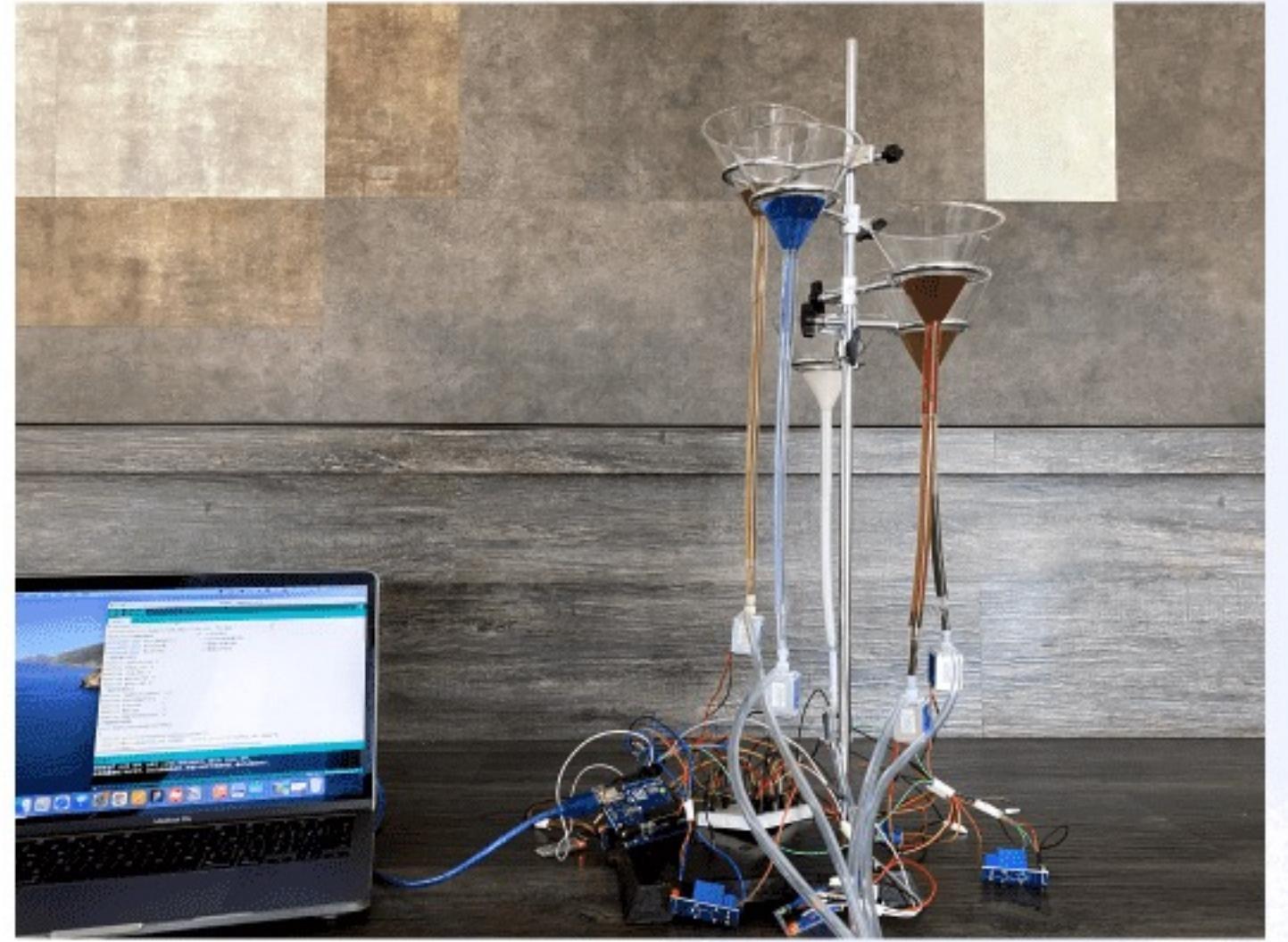
Coding

Here we use the Intense coffee brewing process for illustration.



- The other four coffees are made on the same principle, with the exception of opening a different valve at the third step.

EXPERIMENT



Here we use sophisticated musical as the preference type and have a try.



First open the coffee value of the machine to let it flow down.

Second, open the milk value to add milk.

Finally, open the blue value to add the blue liquid.

APP

01 Home Page



02 Upload



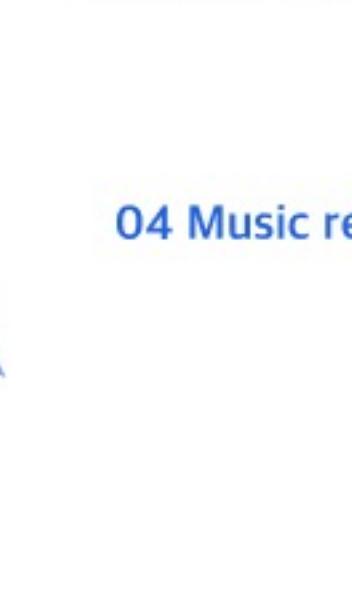
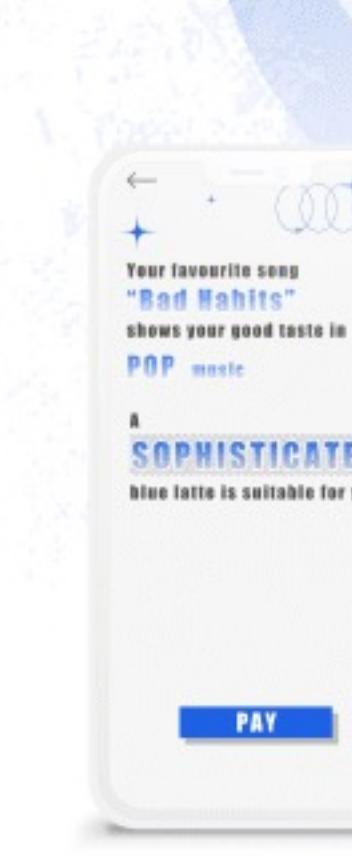
03 Upload songs via a third-party music platform



04 Music recognition

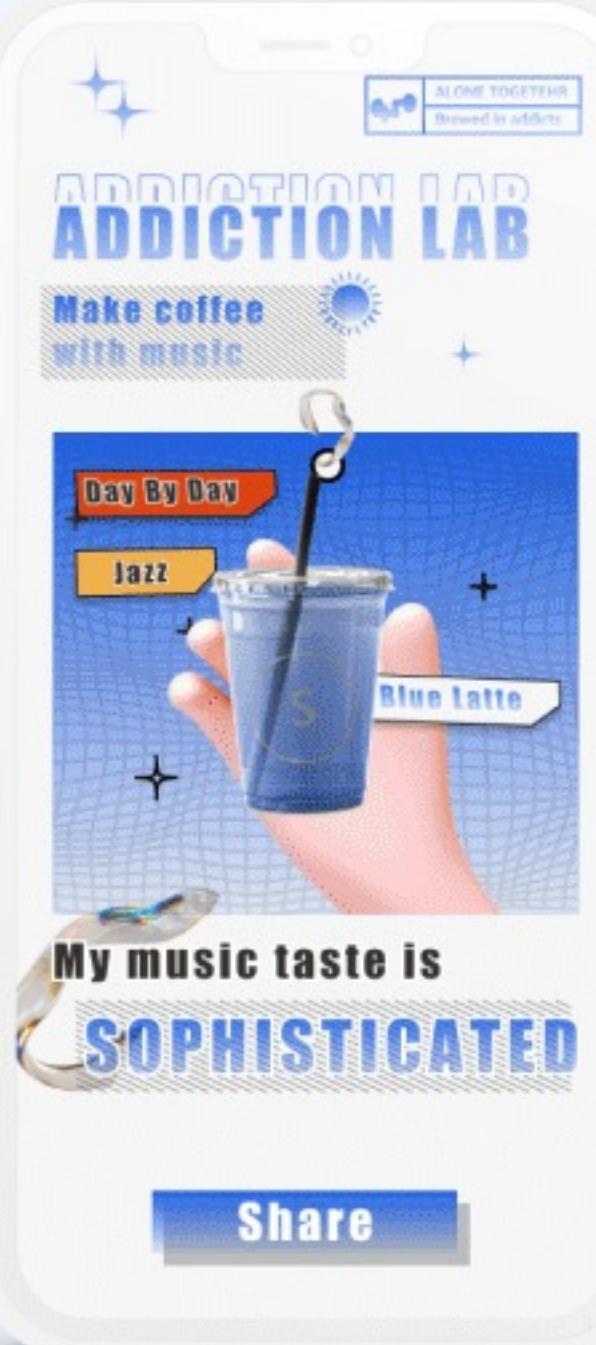


05 Recognition result



07 Generate a customized poster

Different music preferences will generate different posters and coffee types.



The user uploads the song Bad Habits, The system recognizes it as Pop music, SophisticatedIt will be set as sophisticated in music preference They system will recommend blue latte Upon the completion of its production, the app will generate exclusive posters for him to share on social media such as WeChat moments.

