

# INDIVIDUAL WORKS

03 2023 - 12 2023

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DIGITAL MEDIA TECHNOLOGY

# PORTFOLIO

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## 1905 IN THE AIR

VR STAGE DESIGN

11 2023

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5 2023

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USER INTERFACE AND PRODUCT DESIGN

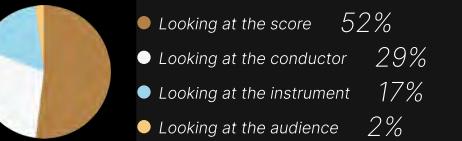
12 2023

INDIVIDUAL WORK

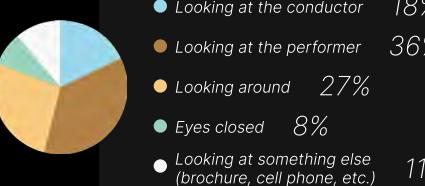
## Sitting in the Hall ...

This project is inspired by my personal experience. I love music and stage performances and enjoy the interaction between performer and audience, but I find that concerts are more homogenous than others. There is also a certain barrier to understanding the music for most audiences. I want to create an immersive scenario where the effect of the performance resonates more with the listener or viewer.

### Where do you look most of the time when playing?

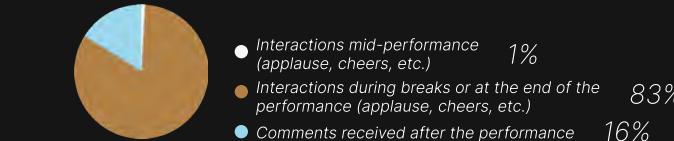


### Where do you look most of the time when watching a live concert?

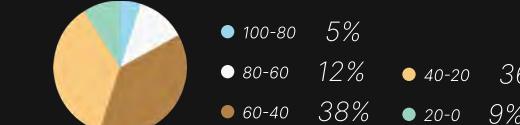


## Performers and Audiences

### Where do you think most of the feedback you get from the audience comes from?



### On a scale of 100, how would you rate the level of communication between you and the player?



## Further Research



Association in the thinking consciousness stems from the result of experience, when different viewers enter the same display space, due to the living environment, personal experience and ideological differences, often produce different associative phenomena.

### Multi-sensory experiences triggered by associative phenomena

### Virtual Reality Narrative

As a state of mind, immersion can be divided into multiple categories. Such as game immersion, spatial immersion, temporal immersion, & emotional immersion. Of these, music is the most powerful medium in terms of emotional and temporal immersion. However, because it is not reproducible, it scores low on spatial immersion and zero on play immersion (for the audience).



## Solutions

### Visualization

Creating a visual environment that echoes the atmosphere of the music and enhances the audience's spatial immersion.

### Virtual Reality

Audiences can enter the scene created by the music through a VR virtual scene and experience a more immersive sense of space.



### negative emotional interaction



### low in both spatial and interactive immersion

1905  
IN THE AIR

# "1905" Symphony No.11 in g minor

I chose one of my favorite symphonies for this scenography project, the Eleventh Symphony is a new kind of title symphony, and I think its strong images and storytelling make it the best ingredient for an immersive space.

Sometimes classical music is detached from reality, an abstract thing in and of itself. When it does tell a story, it tends to indulge in poetry or mythology in fiction.

**But with this work, Shostakovich grabs you by the shoulders and turns you to look head-on into real, concrete brutality. How close it is to you. Hearing the relentless climax of this movement can turn your stomach as though you were really there, which makes this work the prime to design a visual**

## Analyze the Music

### ■ Musical Features

Pitch, loudness, and timbre are the three main characteristics of musical sounds, and it is on the basis of them that people differentiate between sounds.

#### Loudness

The amplitude & The distance of the sounding point from the sound source

#### Pitch

The frequency of sound waves

#### Timbre

The waveform is a visual representation of that abstraction.

## Interaction

### Performers

Gesture recognition down to finger movement  
*LeapMotion*



Recognition of body movements  
*MediaPipe*



The Hermitage Square was the stage for the tragic events of 1905 and was a symbol of the old Tsar and his power. I chose it as the base scene for this entire stage and refined and redesigned it based on the layout of the original building.



### The Stage

I expanded the originally semi-circular shaped square into a (audience-centered) circle as a stage, with the aim of weakening the angle of the boundaries and creating a more immersive space.

### The Column

The Alexander Memorial Column in the center of the square is the most important landmark of Hermitage Square, so I kept this feature and simplified its shape to a column.



### 4 Chapters

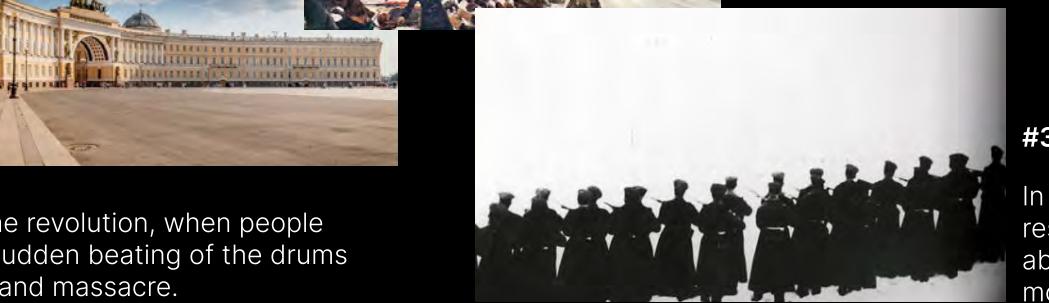
#### #1 Hermitage Square

This movement focuses on the Hermitage Square before the revolution, and the theme of the square is repeated in this chapter, revealing a desolate



#### #2 January 9th

This movement focuses on the day of the revolution, when people gather in the square to march, and the sudden beating of the drums heralds the beginning of the repression and massacre.



#### #3 Eternal Remembrance

In the third movement, the piece returns to a calm, restrained and subtle tone seems to be talking about the people's inner bitterness and grief, both mourning for the tragedy, but also the confusion of the revolution should be how to go.



### Musical Structure Analysis

Analyzing the overall structure of a symphonic work, such as alternating movements, repetition of themes, and variations.

The use and arrangement of the various instruments in the work and their roles and characteristics in the different parts.

### Instrumental use and arrangement

### Harmonic analysis

Analyzing harmonic arrangements in a work, such as chord progressions, use of intervals, and direction of voices.

Identify themes and motifs in the work, which often appear in different forms in different movements. Analyze their development and variation, as well as their function and significance throughout the work.

### Theme and Motif Analysis



### Audiences

### Brainwave emotion recognition

CNN-Based

### VR joystick haptic feedback

Pico Neo 3

### VR joystick interaction

Pico Neo 3



## The Main Scene - Эрмитаж

# Chapter 1

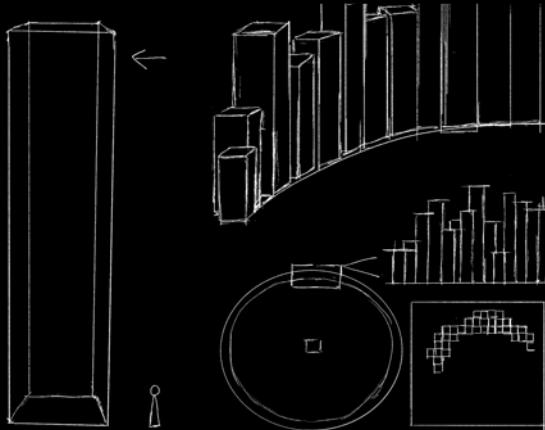
## The Palace Square

### Calm, Empty, Apprehensive

Occasional folk songs in the woodwinds are interwoven with open chords in the strings, like distant sounds drifting over still winter air.

The strings and timpani repeat the square soundtrack, revealing a desolate landscape. The horns and snare drums again wail. The flute then plays the tune of the popular folk song "Listen to the Song of the Old Convict".

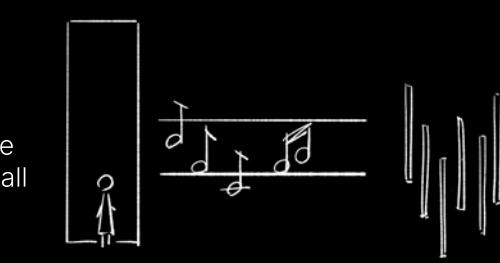
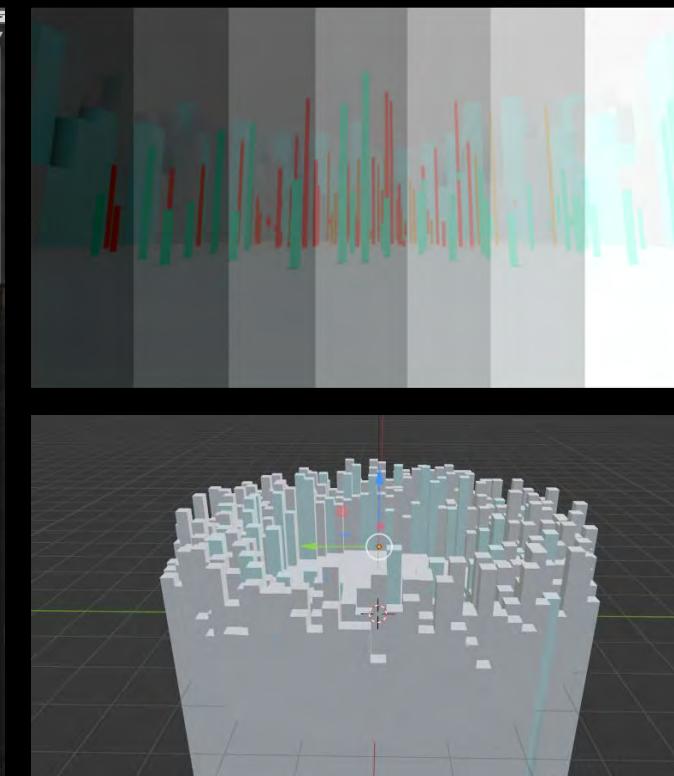
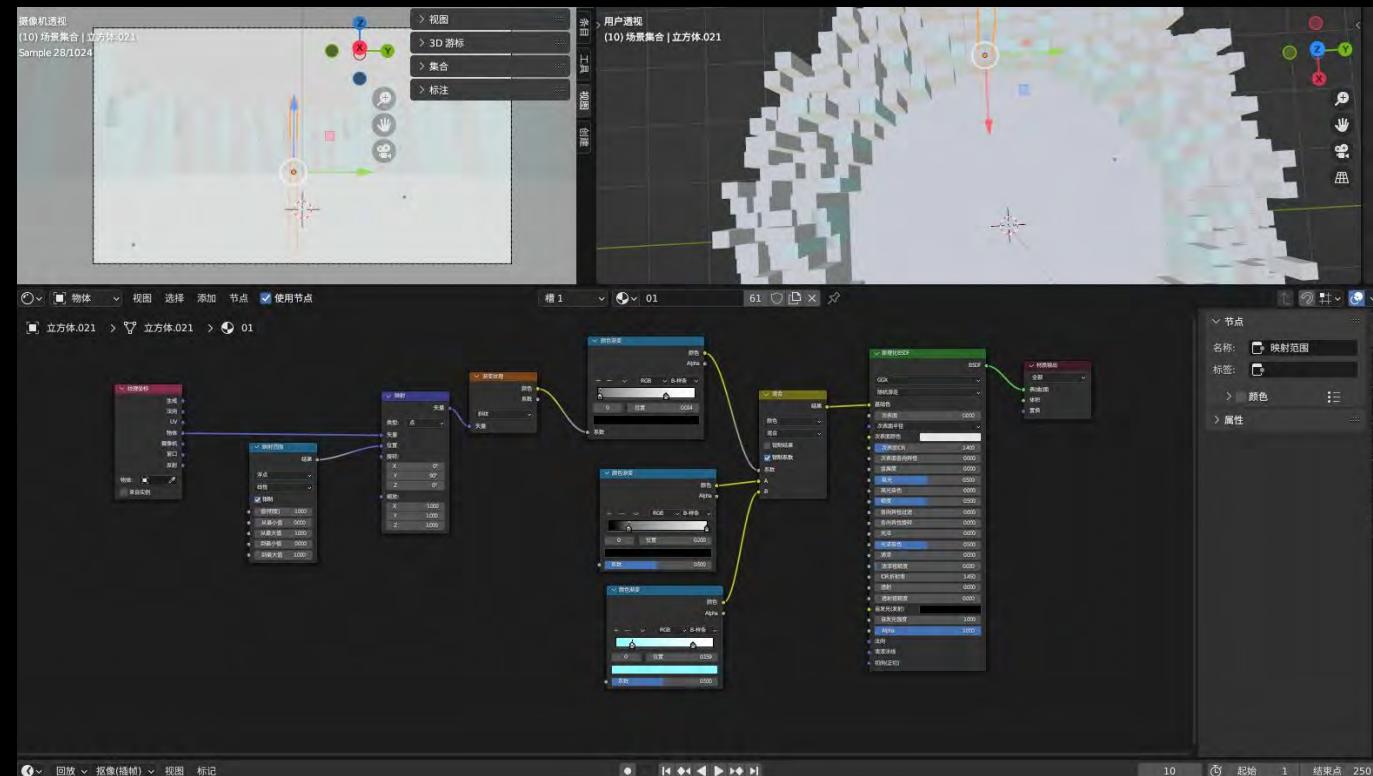
### White walls, crowds, and monuments



In this chapter, I chose thin striped cubes to represent crowds of people gathered in a square, undulating and swaying in motion to the music and the musicians' movements.

I wanted to use this movement to represent the scene when people gather in the square and call out in a chorus for an audience with the Tsar.

Using the color scheme of a real palace as a reference, I chose cyan and white for the surrounding columns. When coloring in the software, I used mapping and random to give the scene a richer way of coloring.



Also for the sake of atmosphere, I made the whole scene appear black at the beginning, only slowly lighting up as the music entered.

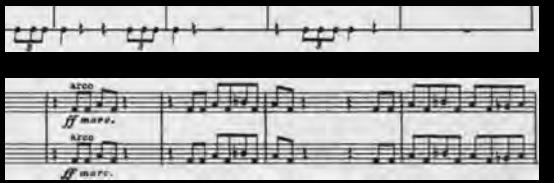
### Powerful Contrast

By always calibrating the audiences back to the calm and quietude of the opening Adagio, it ensures that the speed and fury of the violence to come is as shocking and frightening as possible.

It depicts the workers coming together and marching to the Winter Palace. While their cries for justice get more insistent, they are met with no response: the orchestra always returning to that bleak winter landscape. The people are gathered across from the line of soldiers.

### The Beginning of the Violence

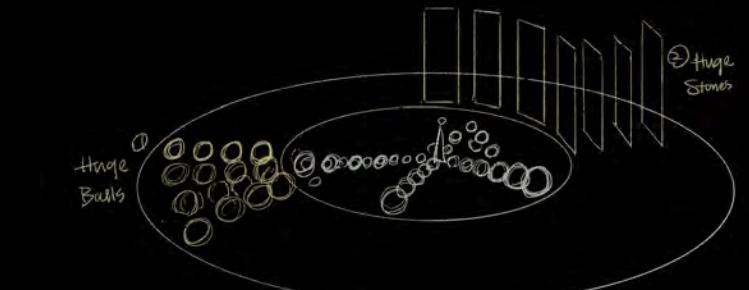
A stern snare drum announces the beginning of the violence. The triplet figure clearly imitating the rattling of the gun.



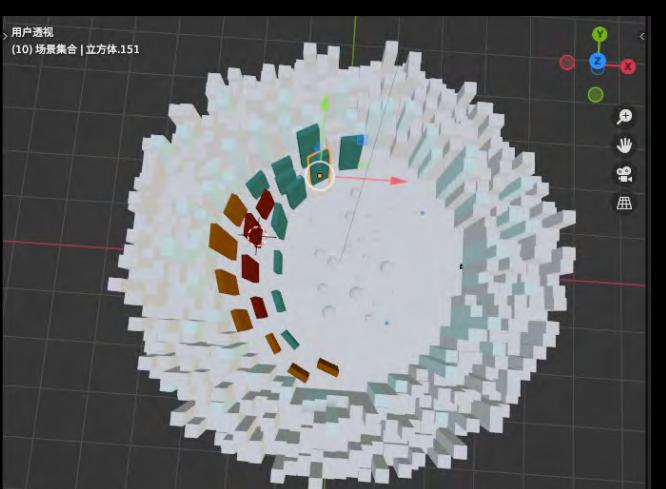
Notice the call and response between the snare rhythm and the strings just below it in the score.

Musically, these ideas are designed to interlock. The frantic motive in the strings is a direct reaction to the snare drum gunfire.

### Fugue



I initially chose to use a small sphere to represent the people surrounded in the center, and was originally only going to use a larger sphere for the imagery of the surrounding guards, but ended up choosing slices for the sense of oppression.



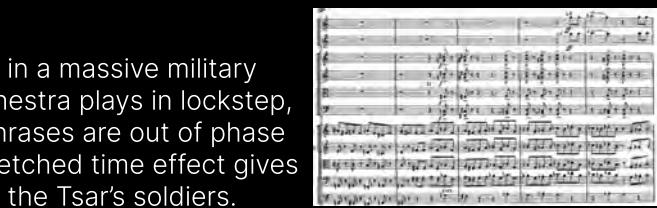
When the music reaches its climax, the "Massacre" sequence, the little ball symbolizing the gathered people is red with blood from the outside in.

# Chapter 2

## The 9th Of January



Massacre



The murder culminates in a massive military caudal theme. The orchestra plays in lockstep, but the ends of their phrases are out of phase with the pulse. This stretched time effect gives the relentless march of the Tsar's soldiers.



# Chapter 3

## In Memoriam

The tone of the third movement has been restrained and subtle, but one can still sense in it the unease and doubt that surfaced in society on the eve of the imminent collapse of the dynasty.

### Hats Off!



The melody of the song "Hear" is used in the first movement at first in its original form, and then in the author's free variations. The chords of the brass are used in the bass. Then, in the same rhythm, a brighter tune of the song is played, as if glorifying the ideals for which the martyrs gave their lives.

It is only natural that the tune of the carol should follow, developing into the climax of the Adagio's "Hats Off" theme. This is followed by the reappearance of the "Hats Off" motif, which is played in the strongest tones by the entire string section. Finally, we return to the piece itself.

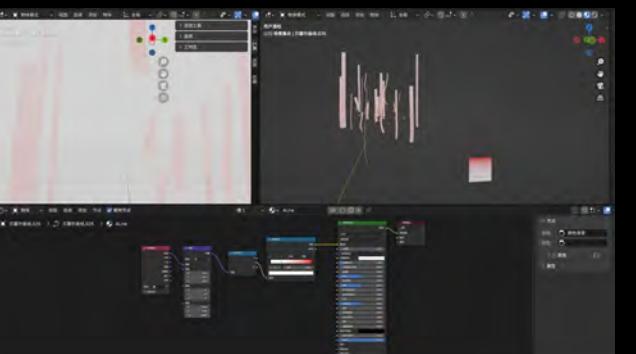
### Remember them



I wanted to use this movement to represent the scene when people gather in the square and call out in a chorus for an audience with the Tsar.

A stern snare drum announces the beginning of the violence. The triplet figure clearly imitating the rattling of the gun.

It depicts the workers coming together and marching to the Winter Palace. While their cries for justice get more insistent, they are met with no response: the orchestra always returning to that bleak winter landscape. The people are gathered across from the line of soldiers.



The theme of the last scene is alarm bells. In order to place the alarm bells as large as possible, I chose to position the columns around the stage in a lower position.

### Answers to the Revolution



As the four scenes switch, the overall lighting of the scene changes. The show begins with the break of dawn when the sky is about to brighten, by the end of Chapter 4 the tragedy is covered by fresh snow, and as the bells ring and the clouds part and the light falls, the scene takes on a brighter and more hopeful tone.

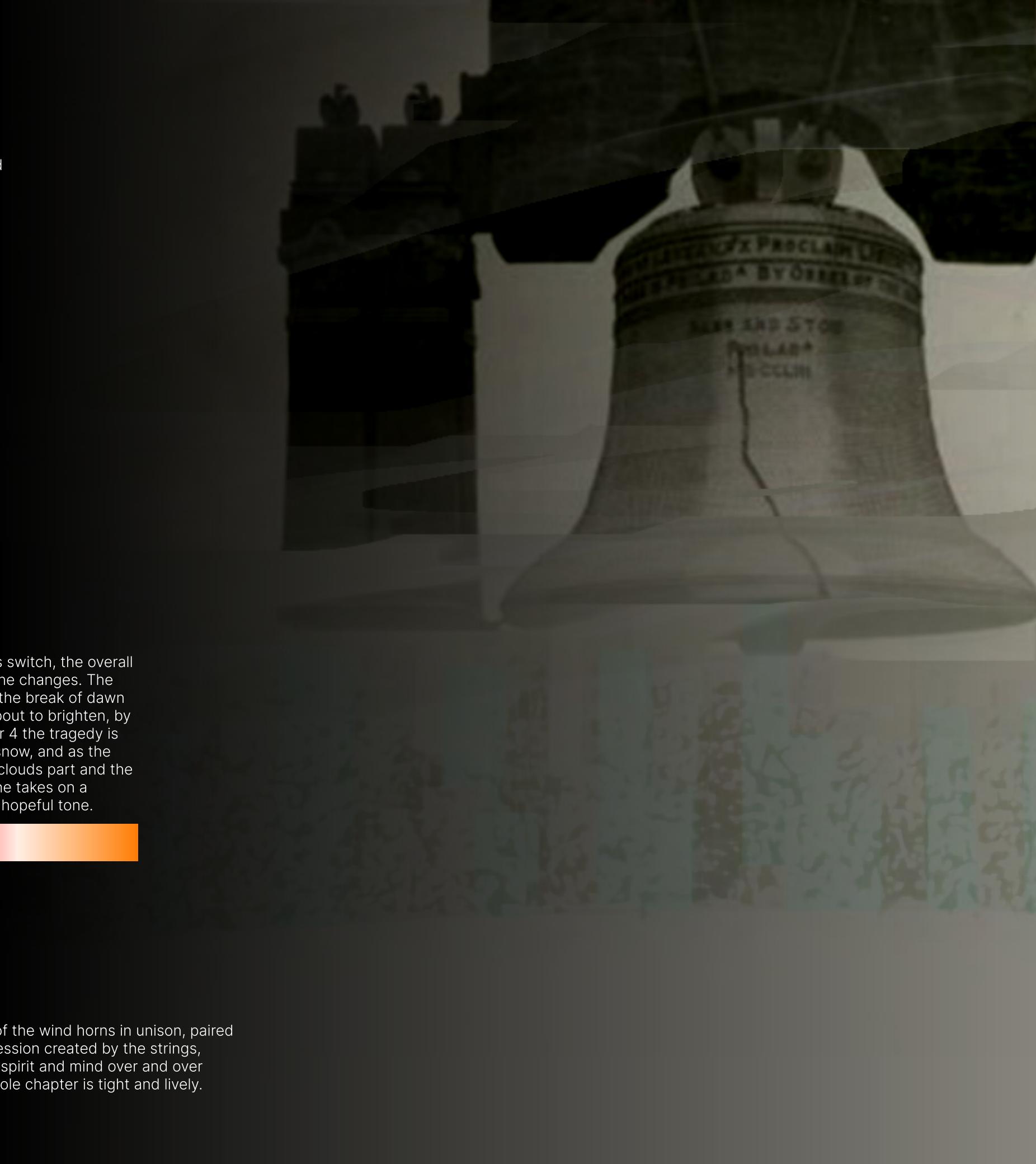


### Answers to the Revolution

The composer skillfully unites a large number of different melodies and plays the theme through melodic repetition, variation and transitions. The typical tragic climax of a Shostakovich symphony and the typical sadness after the climax are used to set the stage for the soaring theme of the finale.



The beginning of the Finale reintroduces the "whirlwind" theme of the second movement - the whirlwind movement intensifies. In its background, the horns loudly play the dominant theme of "doffing the cap", which grows wider and wider throughout, with a call to arms - heroic in character. The bells are tinkling, and the whirlwind of the people's anger will destroy the tyrant. The people are unconquerable and will fight.



TREMBLE, TYRANTS, AS YOU MOCK US! **Chapter 4**  
THREATEN US WITH JAIL AND MANACLES! **The Tocsin**  
WE ARE FREE IN SPIRIT, EVEN IF OUR BODIES ARE NOT.  
SHAME ON YOU, YOU TYRANTS! SHAME!

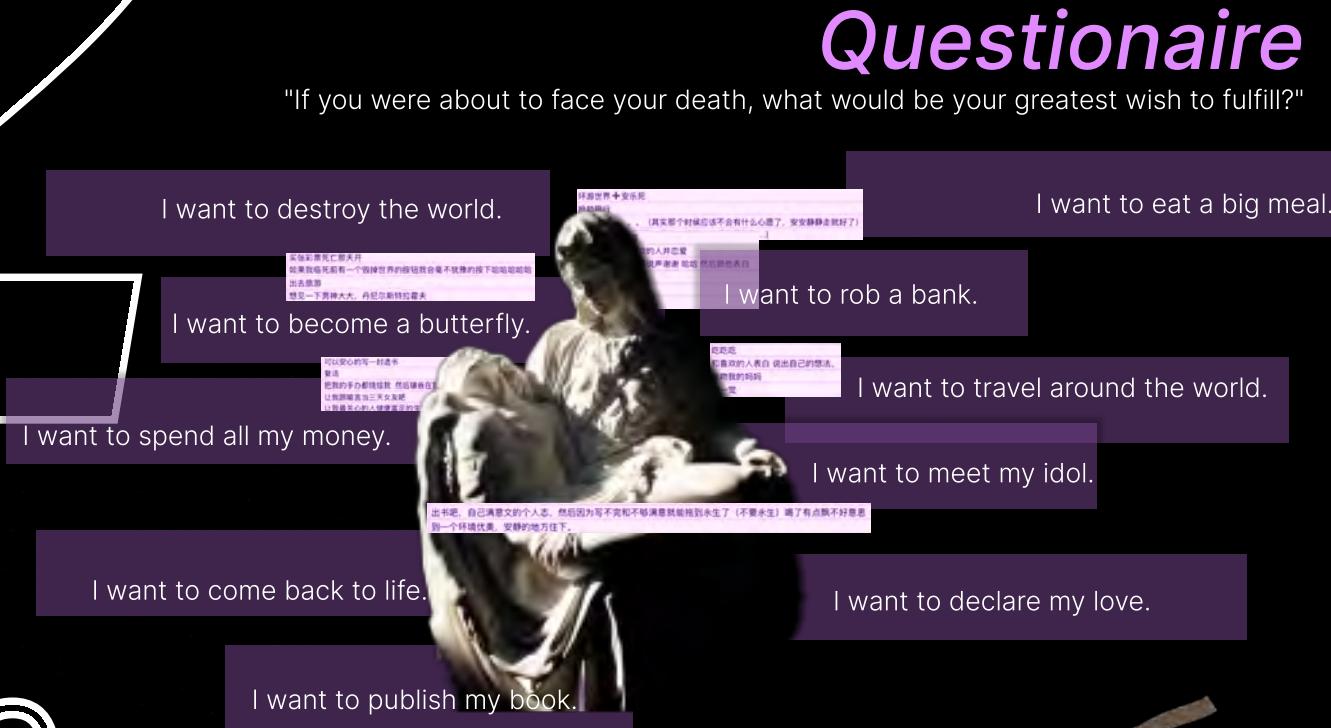
The opening of the wind horns in unison, paired with the oppression created by the strings, washes one's spirit and mind over and over again. The whole chapter is tight and lively.

# House of Happiness



## Inspiration

"Hospice care is a service to prevent and alleviate the suffering of terminally ill patients and their families, and to improve their quality of life before death. It advocates active decision-making and close contact with family members. It is an end-of-life process that gives meaning to life in the process of living in peace and happiness."



## Character Design



**AN** hopes that he can be restored to his original form, expose his witch stepmother's plot, and leave in peace.

**D** wants to go to the legendary doggy paradise where he is warm and well-fed.

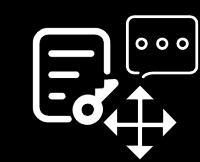


## Basic Settings



### PC and Mobile Game

We designed the game to be as simple as possible so that it can be played on both computers and mobile devices.



### Dialogue, Decryption and Movement

The main plot drive of the game relies on dialogue, while decryption and movement are the main gameplay in daily and special missions



### Role-play Game

You were a psychic in life, with the ability to mix herbs and read tarot, which allowed you to utilize your strengths even after coming to the Asylum, even surpassing the original Shinigami here in some of your abilities.

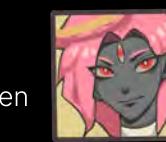
## Game Flow



The shelter is a place where all kinds of souls who cannot be reincarnated due to their strong attachment to the present life and unfulfilled wishes gather, and we, as a trainee grim reaper, act as a guide to fill the gap in their lives.



**K**'s desire is to know the cause of his death experiment and the secret of eternal life.



**A** doesn't want to go back to heaven and is looking for a way to hell.



# Level Design

## Day 1 Wake up and find yourself in underworld

On the way to the shelter.

Talk to the Grim Reaper and learn about the background and setting of the story

Enter the shelter.

The Grim Reaper will introduce you to the facilities within the asylum and the souls of those who have stayed there.

Access to the reception desk

Receiving the first soul(Guided by the Grim Reaper)

The Grim Reaper leaves.

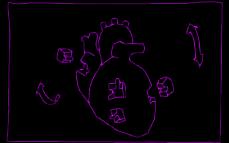
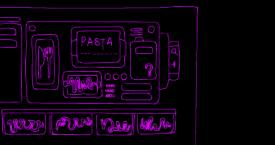
Receiving the second soul(by yourself)

Leaving the reception desk

Interacting with souls and objects in the asylum

Leaving the shelter and back to \*home\*

## Special soul story



Special Story 1: The little boy has to escape with the cursed doll while dodging an attack dropped by his stepmother.

Special Story 2: The mad scientist reverts to his own death scene after recovering from an experiment with the intern.

Special Story 3: After being abandoned, the puppy is reintroduced to the sewers, where he needs to find the food and water and avoid the dangers that hide in the shadows.

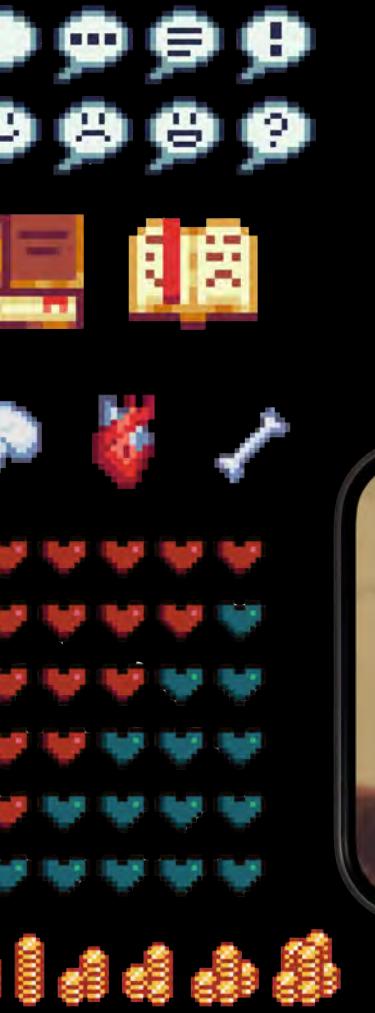


Special Story 4: The intern and Angel explore the map, accumulating sin values to help Angel go to hell.

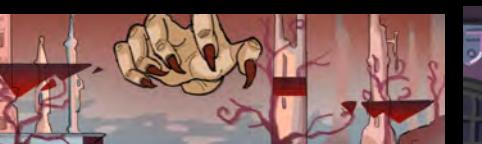
# Prop Design



# UI



# Scenes



◀

Scenes of four special levels

▲

Special Scene 3# Image improved

◀

Scene of the Shelter

## Group Members

Yuxin Li Zihan Sun Ziyu Yang Xingyu Ke



# Final Display



## Situation

Deaf people cannot hear accurately, they usually need to use sign language or writing to communicate, but not everyone can master sign language, and writing greatly reduces the efficiency of communication, which makes it difficult for deaf people to participate in normal social activities and communication.

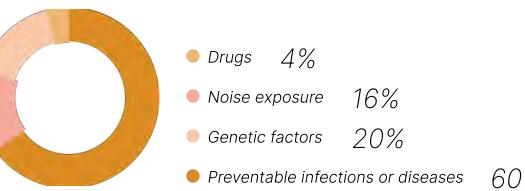


## Reference

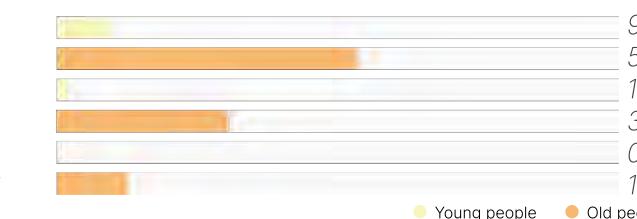
I came across this video on a website that shows how the hearing impaired can "feel" the world around them. They rely more on images, colours and dynamics than we who are more sensitive to sound, which has to be more processed for them to understand better.

## Research

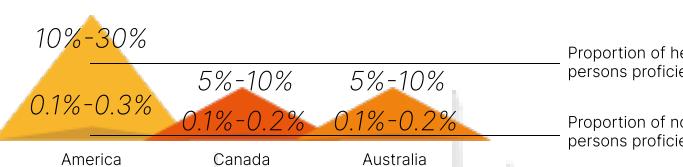
### Causes of Hearing Loss



### Level of Hearing Loss (In China)



### Popularity of Sign Language



### Color Design



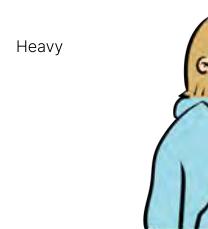
Corresponding emotions to colours and then expressing emotional communication through colour mixing.

### Music Design



By setting up music with a wide range of tones to reflect the sensitivity of the hearing impaired to a wide range of sounds.

I chose five hearing-impaired people with varying degrees of hearing impairment as my interviewees. After knowing the basic information about the interviewees, I asked them what they thought and felt about sound, music and images.



I feel vibrations.



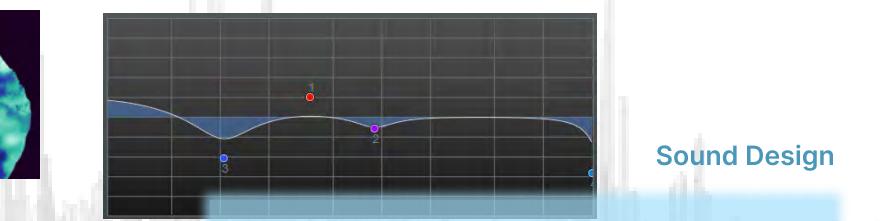
I rely on other senses.

I feel that sound is dynamic and auditory.

## Concept



### Visual Design



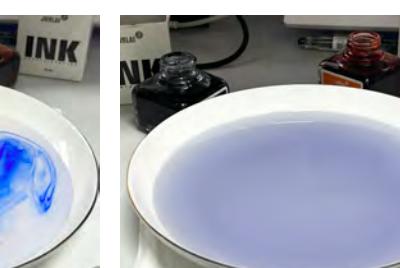
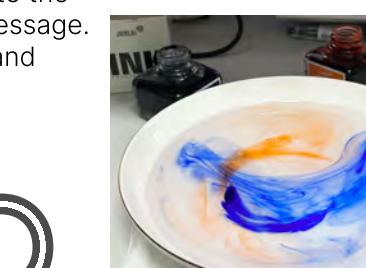
### Sound Design

By controlling the composition of the different frequency bands during composition and by adjusting the EQ equaliser to simulate the absence of high and low frequencies

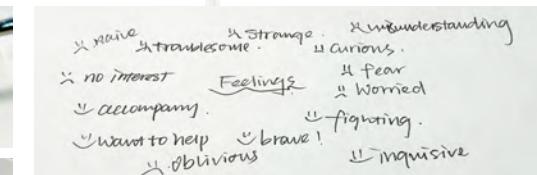
1  
I used mixture of ink to symbolize the blending of the two populations, I experimented with real ink and the mediums were chosen to diffuse tissue paper and water respectively, comparing them to finalize the visual effect I wanted.  
  
2  
I wanted a way to reflect the vibrations induced by sound, but of course it is not realistic to have the whole space or the floor vibrating, so I chose to simulate the vibrations of the water surface to convey this message. I observed the vibration of a real water surface and reproduced it in Touch Designer as a simulation.



2



2



2

Feeling	Strong	Intermediate	Weak	Accept
Red	Orange	Yellow	Green	Blue
Fear	Rage	Aggression	Cheer	Peace
Strong	Intermediate	Weak	Accept	Accept
Accept	Intermediate	Weak	Accept	Accept

Feeling	Strong	Intermediate	Weak	Accept
Red	Orange	Yellow	Green	Blue
Fear	Rage	Aggression	Cheer	Peace
Strong	Intermediate	Weak	Accept	Accept
Accept	Intermediate	Weak	Accept	Accept

## Intuition Test

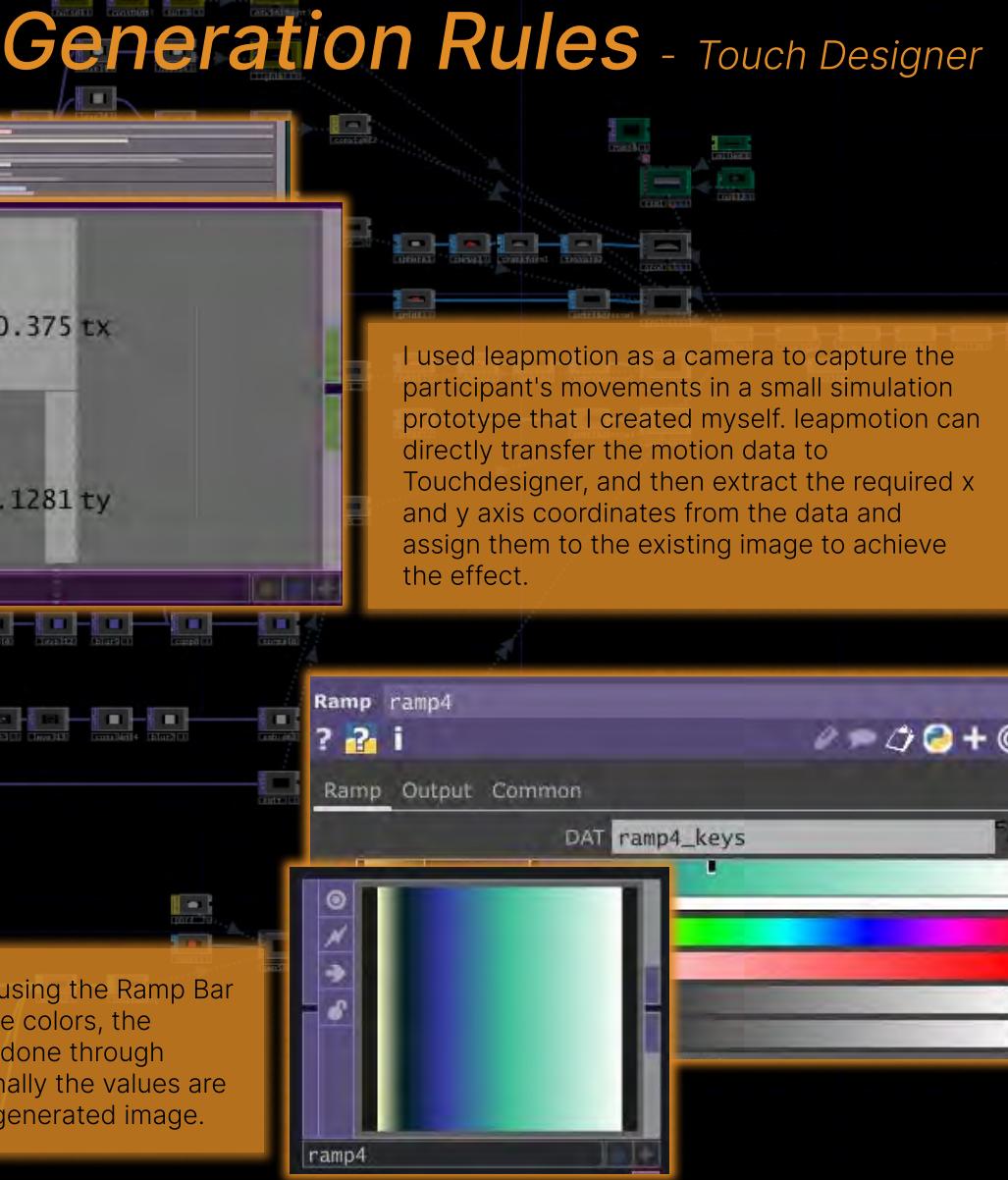
# Sound Design



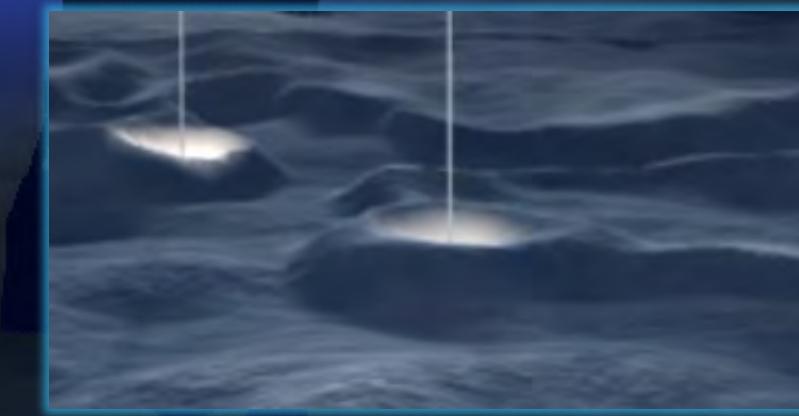
As the participant's movements changed, polyphony in the piece appeared, while the reverberation of the sound material was changed accordingly. I used the EQ controller to adjust the high and low frequencies of the sound to simulate the hearing experience of a hearing impaired person. Some parts of the sound don't sound harmonious; they are in fact intentional.

I've added some background sounds to the score, partly from sound material on the internet and partly from my own recordings. Both were processed with a simple noise reduction while being added to the score.

I wrote the melody for each group, with Mood 1 as the base and then a polyphony representing Mood 2. Through the choice of orchestration and the design of the melody, I intentionally expressed the corresponding moods in the piece.



# Final Scene



To be more immersive, the space is made up of holographic projections, the waves and raindrops on the ground are controlled by the music, and the participants are able to visually experience the change of the sound through the dynamics of the water.



The dynamic changes in color and sound on the screen are responded to by motion sensors that detect character movement. The music also changes when the sensor has detected the movement.



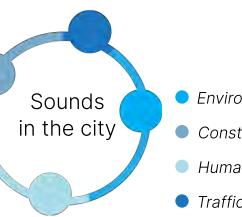
Jointly controlled by Arduino and Touch Designer, the interactive system will be controlled by motion sensors that will capture participant's movements in real time, and reflect them on a huge curved screen in front of them through dynamic inked images.



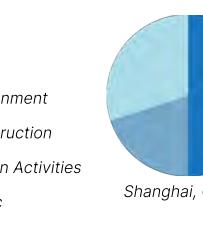
# Sound In Our Life

Sound is an integral part of our perception of the world, and we use sound to judge danger, to be aware of the tone of voice in a conversation, and to restore energy from musical and natural sounds.

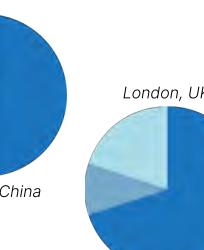
## Categories of major sound in the city



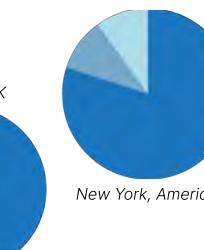
Sounds in the city  
● Environment  
● Construction  
● Human Activities  
● Traffic



London, UK



Shanghai, China



New York, America

Data source: Shanghai Environmental Noise Pollution Control Regulations, London Noise Action Plan, Urban Noise and Planning Guidance  
**Proportion of major sound in the city**

## Define

Share the feeling

Share the music

Share the feelings of sounds & music

with Sound & Music

Words may be ambiguous, but people mostly feel the same way about the same type of sound.

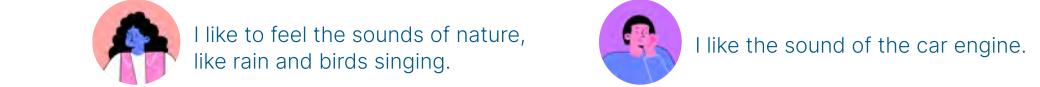
## Problem

However, recording faces many limitations, such as the limitation of recording frequency band and noise floor. At the same time, oral expression converts auditory feelings into words, which actually increases the threshold of communication.



# Sound Recording

## Interview



What's your favourite sound?

I like to listen to songs.

I like the sound of the car engine.

How do you record these sounds?

Songs are from the app, but if someone sings, I'll record it with my phone.

Usually when I make a video, I'll record the sound at the same time.

How do you describe these sounds?

I'll share it with them through the app, or I might focus on the singer's voice.

I'll describe to them the type of sound, such as birdsong, ocean waves, etc.

Recording

Record the sounds you hear, or look for similar sound clips in the clip library

Composing

Combine sound and music to create musical moments that resonate with your emotions

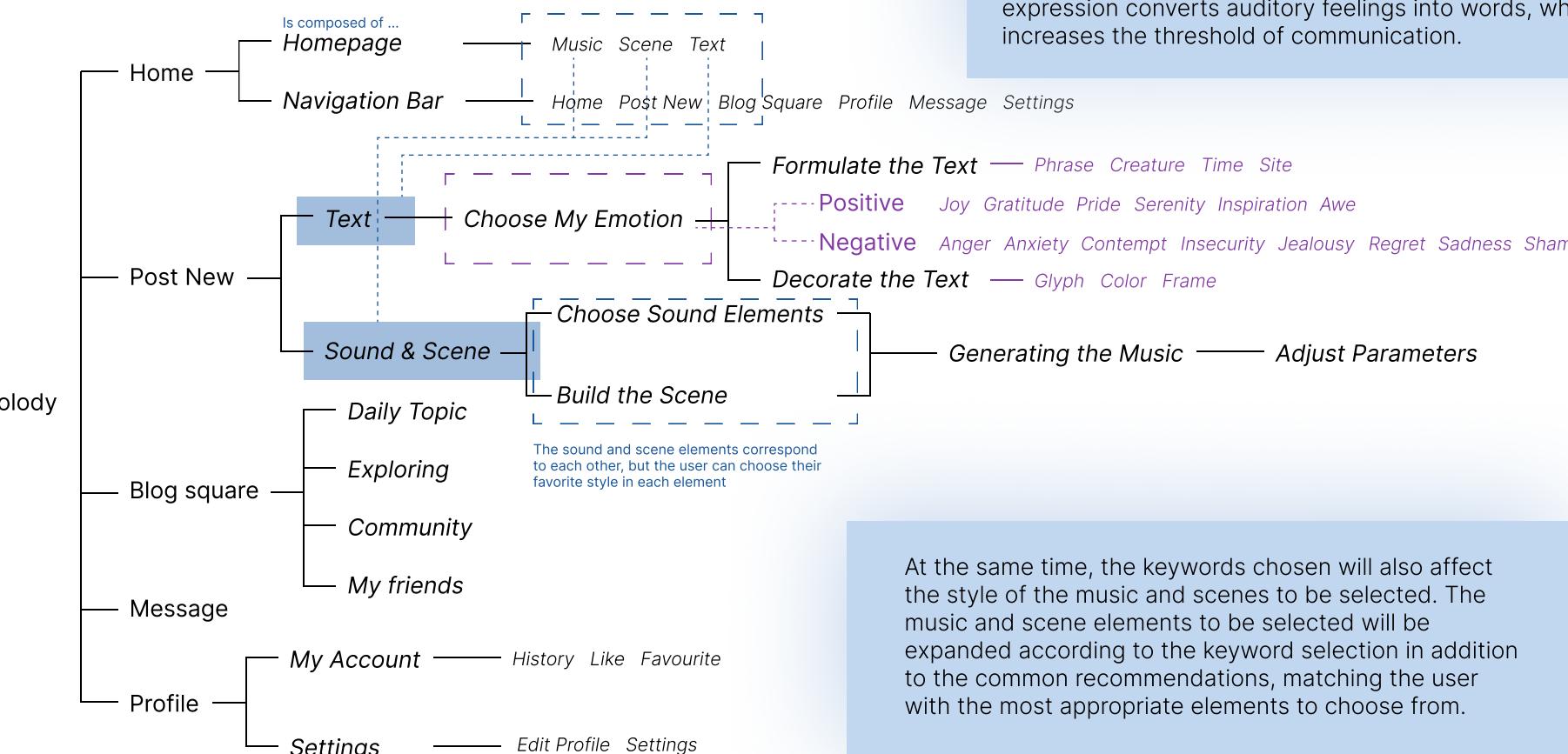
Visualizing

Aided by modeling - the combination of elements to recreate a soundscape

Sharing

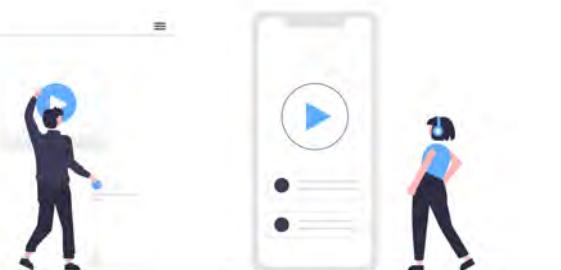
Share your feelings musically with others

# Information Architecture



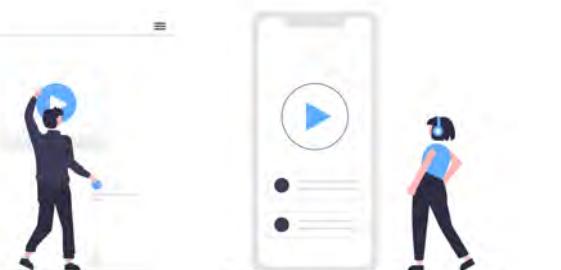
## Record the Music

I want to simplify the process of recording the sounds of people's lives by solving problems such as noise when recording on ordinary equipment. I want the application to have a library of sound effects that would allow users to match the sound they were hearing.



## Recreate the Scene

Despite the addition of sound, visual messages are still the most intuitive in social media. I want to create a system that allows users to freely combine elements to recreate the scene they were in when they heard the sound.

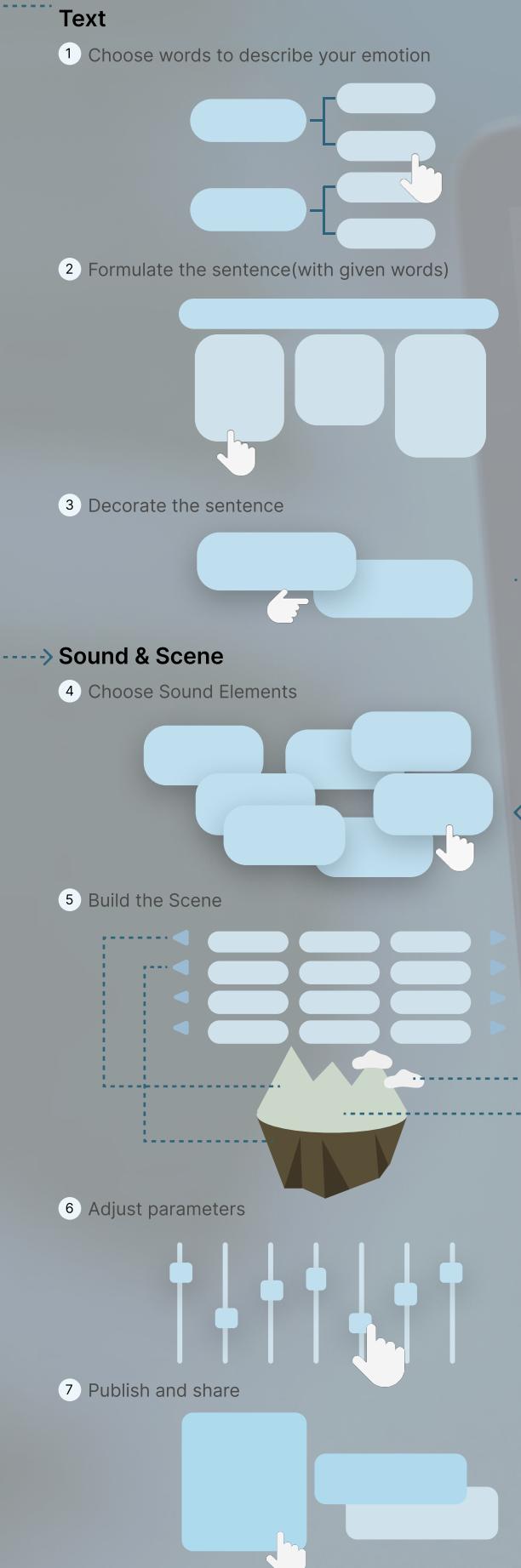


## Let users no longer be speechless

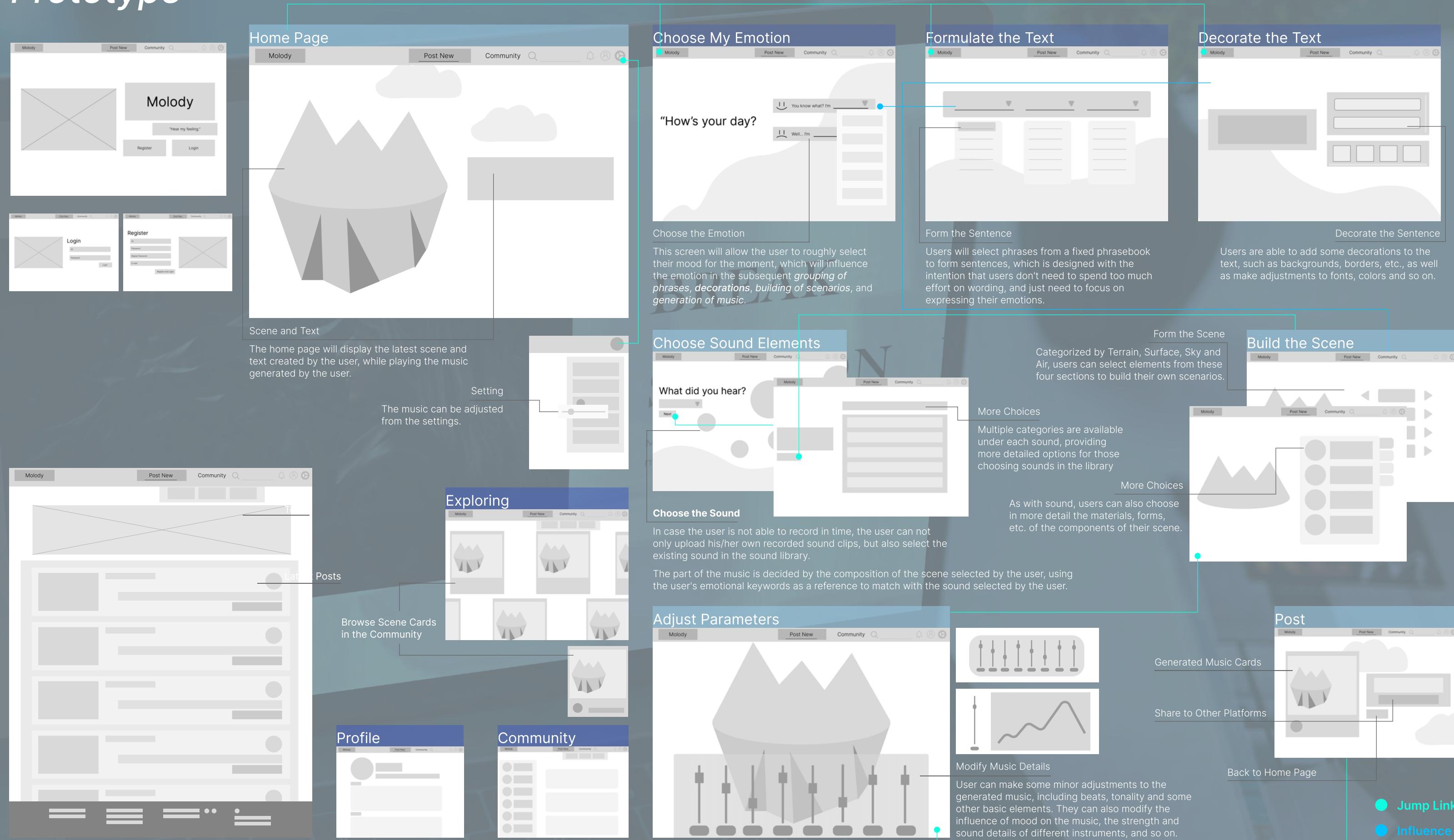
Users often feel "speechless" when they are faced with a blank dialog box. But when they are guided by questions or choices, self-expression becomes much smoother. Therefore, in the design of this application, I would like to provide users with as much detailed guidance and choices as possible to help them better record their lives.

# Ideation

# User Flow



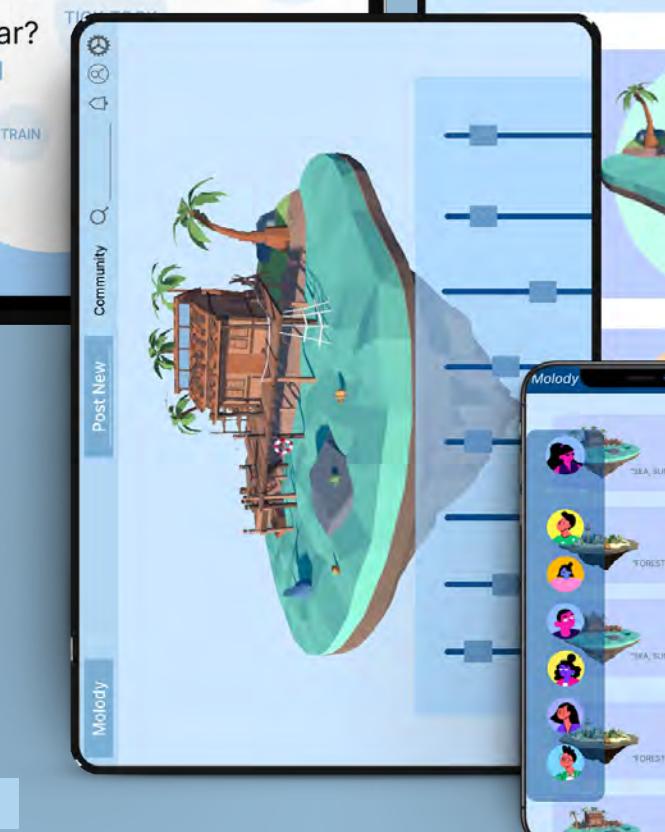
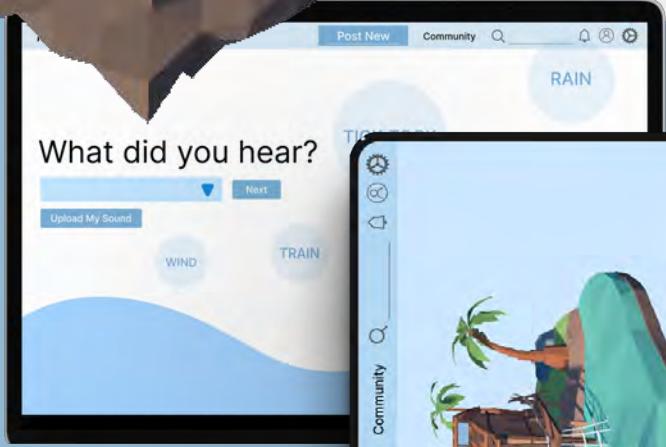
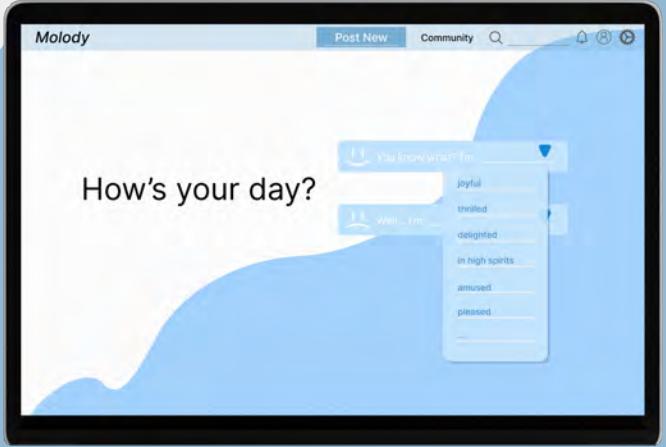
# Prototype



# Scenes Modeling and Music Design

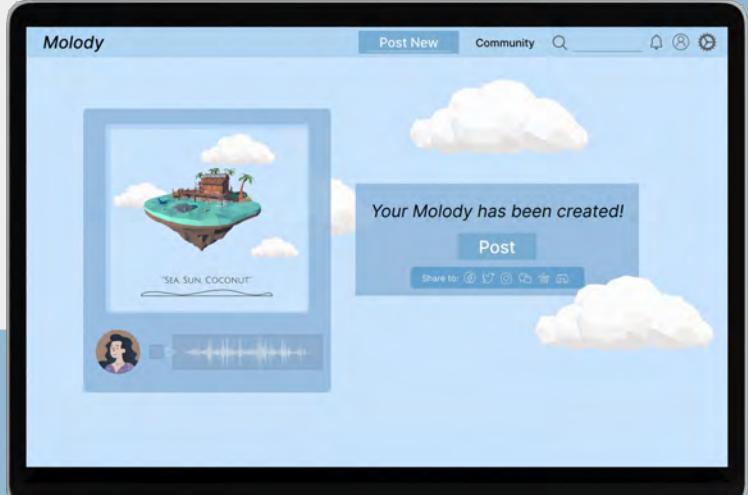


## User Interface



I divided the scene into four parts: terrain, surface, sky, and weather, and I divided a piece of music into four parts: bass, main theme, rhythm, and harmony. These eight parts corresponded to each other, and each element of the scene corresponded to a musical instrument, so that the music was generated at the same time as the user chose the elements to build the scene.

The music is influenced by the previously selected emotional keywords, and the tunes presented are different for different emotional choices.



## Typography

Aa

regular bold  
PingFang SC

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm  
Nn Oo Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz

## Color

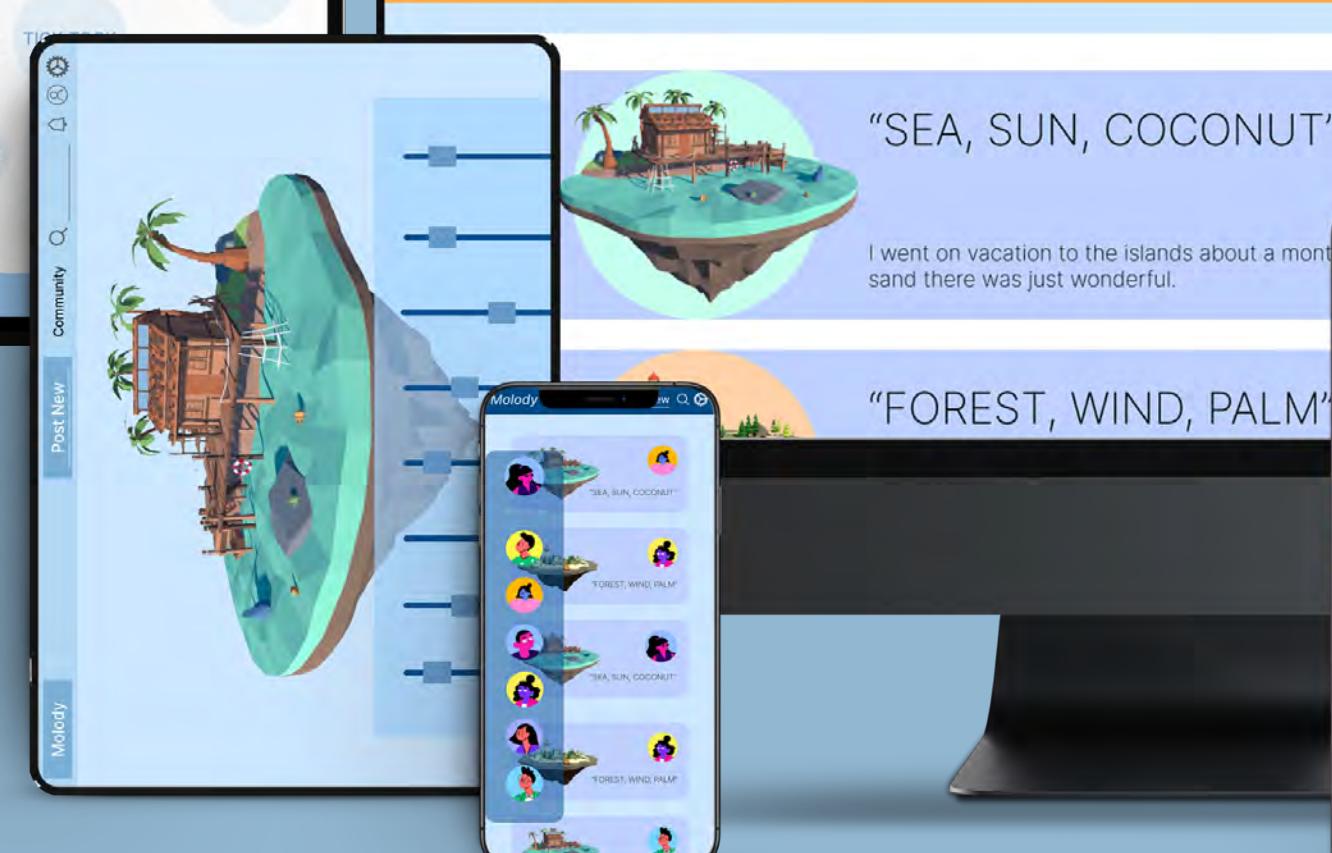
# C9E3FC

# 679AC9

# FFFFFF

# 8DAECE

# AFD4F0





# Research

## Health effects of noise in public housing environments

Prolonged exposure to irregular and high decibel noise can lead to a variety of adverse symptoms such as hearing loss and ear discomfort. These symptoms do not go away immediately and may even cause irreversible damage. Noise can also affect mental health. Noise makes people irritable, easy to get angry, difficult to concentrate, reduced quality of sleep, etc., which has a greater impact on work and study.



## Noise in public environments:

Uncertain sound source, small sound magnitude, irregular appearance time.

## Survey on peripheral noise issues

Have you ever been bothered by noise

100% YES

Do you communicate with your neighbors about noise issues

## Comparable Product Analysis



### Noise detection devices:

- ✓ can detect the sound level and sound intensity within a certain range in real time and display them
- ✗ can not realize the user interconnection function, can not be used in the community, can not meet the needs of public environment use



### Noise detection applications:

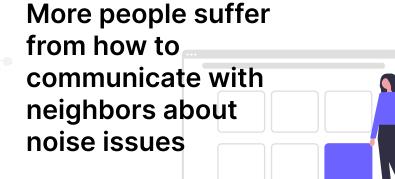
- ✓ can be used to test the noise level of the current environment and is more convenient to use
- ✗ can't realize the user interaction function, and can't remind in the public environment. And there are problems such as inaccurate measurement and mixed quality.

After comprehensive questionnaire research, data review and analysis of similar products I have summarized the following issues for public housing noise detection

Noise problems are prevalent in public living areas



More people suffer from how to communicate with neighbors about noise issues



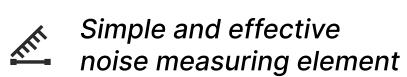
Noise detection instruments require high operational requirements



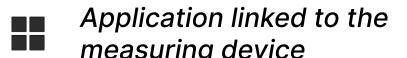
Noise detection devices do not allow for user interaction



Send Messages to Alert



Simple and effective noise measuring element



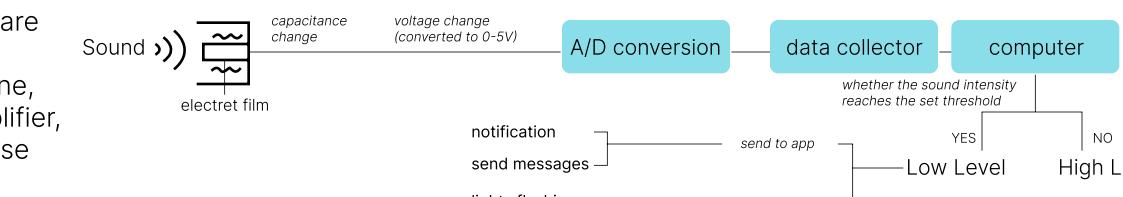
Application linked to the measuring device

We designed a measurement principle and system for noise monitoring and alerting system for apartment housing, synthesized the advantages of existing products and improved them to realize real-time monitoring and interactive alerting of noise.

## Main Modules

### Hardware

Components on the hardware testing side include: sound module (electret microphone, crystal, LM393, signal amplifier, A/D converter), Arduino base board, LEDs, display



### Transmission

Initially I chose the Bluetooth module for the transmission of measurement data, but encountered more problems:

We have chosen the UDP protocol as the transport tool after comparison, as it is more suitable for the application:

Sensors and modules will affect each other when multiple sensors are connected

Each detector terminal has to be configured with the corresponding Bluetooth module

It is not conducive to simplifying the circuit and increases the potential for problems.

1

Less system resources  
Internal LANs with stable network conditions

3

Fixed IP and port numbers

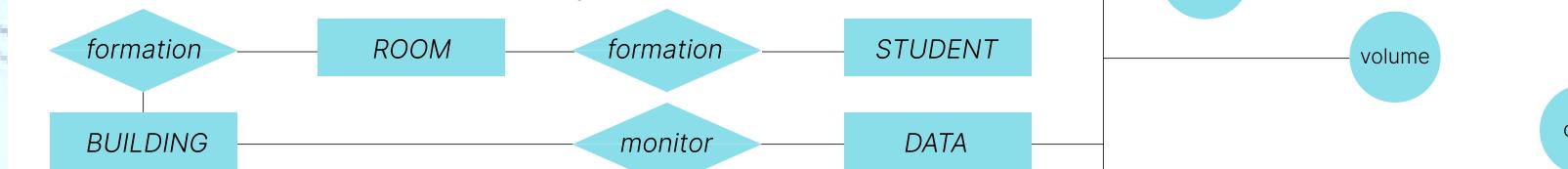
4

Higher requirements for real-time performance

### Software

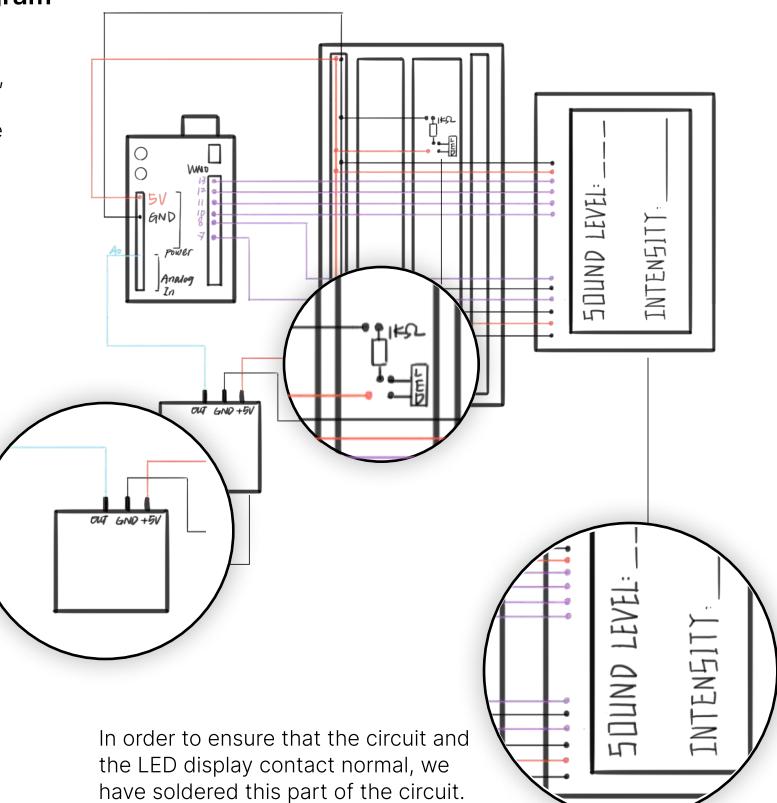
#### Database structure

Database structure E-R diagram



### Circuit Connection Diagram

In order to make the overall circuit more neat and practical, we changed to a smaller circuit board and extended the wires by using the male and female connections.



Using LM393 comparator output, good sensitivity, built-in amplifier circuit can be adjusted gain, A/D conversion can be obtained on behalf of the sound intensity of the voltage signal

In order to ensure that the circuit and the LED display contact normal, we have soldered this part of the circuit.

### Problems

# Coding

## Arduino

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(7,8,10,11,12,13); //构造函数，用来初始化LCD

int num_Measure = 1024; // Set the number of measurements 设置测试次数
int pinSignal = A0; // pin connected to pin 0 module sound sensor 引脚连接到引脚0模块声音传感器
int redLed = 5; //设置引脚
long Sound_signal; // Store the value read Sound Sensor 存储读取声音传感器的值
long sum = 0; // Store the total value of n measurements 存储n个测量值的总价值
long level = 0; // Store the average value 存储平均值
int soundlow = 70; //设置范围——低：耳语
int soundsmedium = 90; //设置范围临界值——高：正常谈话 大声喊叫就200
int flag;

void setup ()
{
    pinMode (pinSignal, INPUT); // Set the signal pin as input
    Serial.begin (9600); //设置电脑与Arduino进行串口通讯时的数据传输速率（每秒传输字节数）常用300 600 1200 2400 4800 9600
    lcd.begin(16,2); //设置显示屏宽高
}

void loop ()
{
    // Performs 128 signal readings
    for ( int i = 0 ; i < num_Measure; i ++ )
    {
        Sound_signal = analogRead (pinSignal); //读取传感器的模拟值并赋给val
        sum =sum + Sound_signal;
    }
}
```

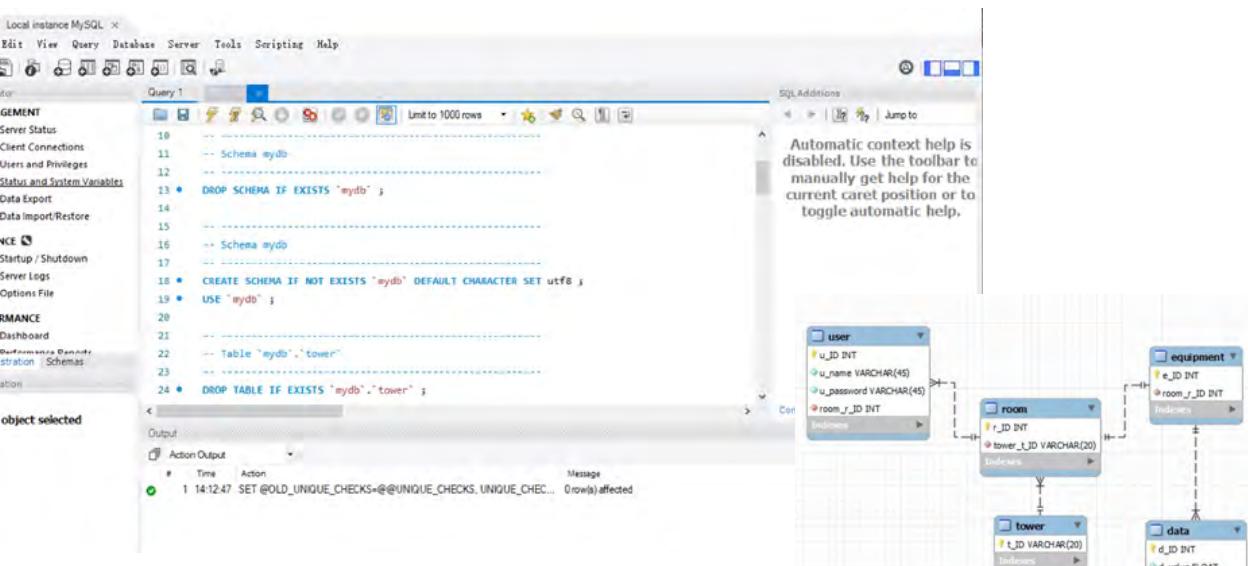
### Adjustment of measurement data to the environment

There are many factors that affect sound measurements, and great attention needs to be paid to the control of environmental variables when making measurements in the external environment. During the measurement, we noticed that the sensors were sensitive to sound in different directions, so we adjusted the hardware design and also made more precise adjustments to the measurement data and set the thresholds for alerts.

# Interface Visual

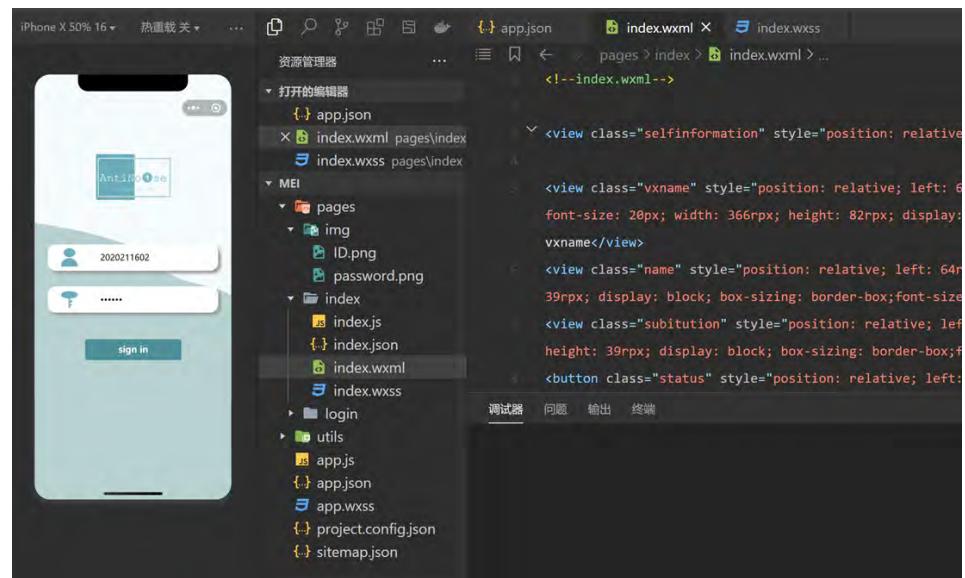


## MySQL



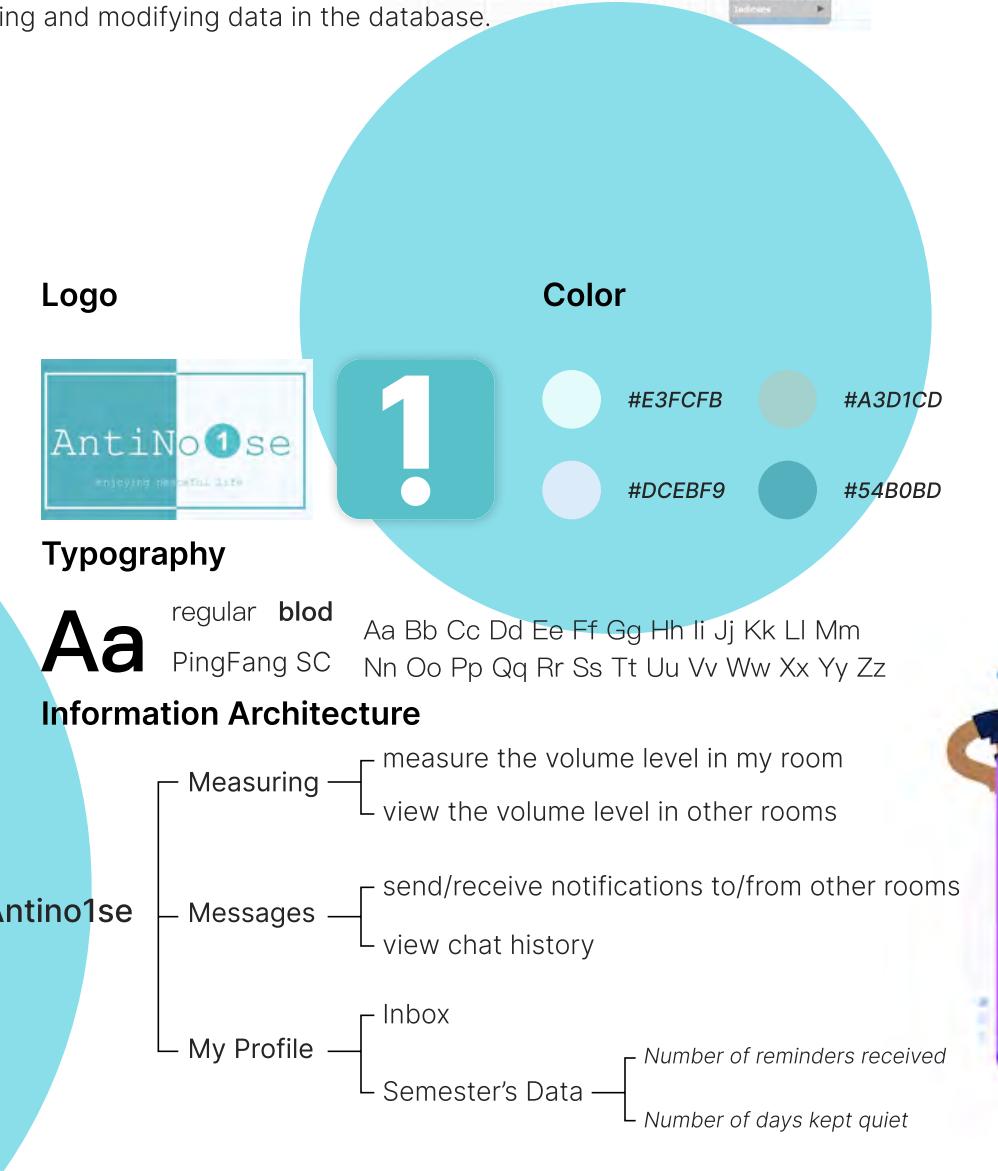
Build a database using the MySQL platform. Configure the appropriate environment, connect to Eclipse, and use the java language to realize the functions of adding, querying, deleting and modifying data in the database.

## Mini App



In the process of writing the applet, in order to the basic page jump, login, inter-user communications, the most central part of this project is how to interconnect the data collected by the Arduino with the database and the applet.

I have set up a LAN using a router, after connecting the phone and hardware to the router, I logged into the router to view the hardware ip, and the hardware can send data to the applet using the UDP protocol.



# Final Display

The final product is divided into three parts: detection terminal, CNC centre and user port. The detection terminal detects noise data in real time through sensors and reflects it to the user port through the data centre. The user can judge the source of the noise according to the applet and monitor the noise level in real time to choose whether they need to be alerted or not.

