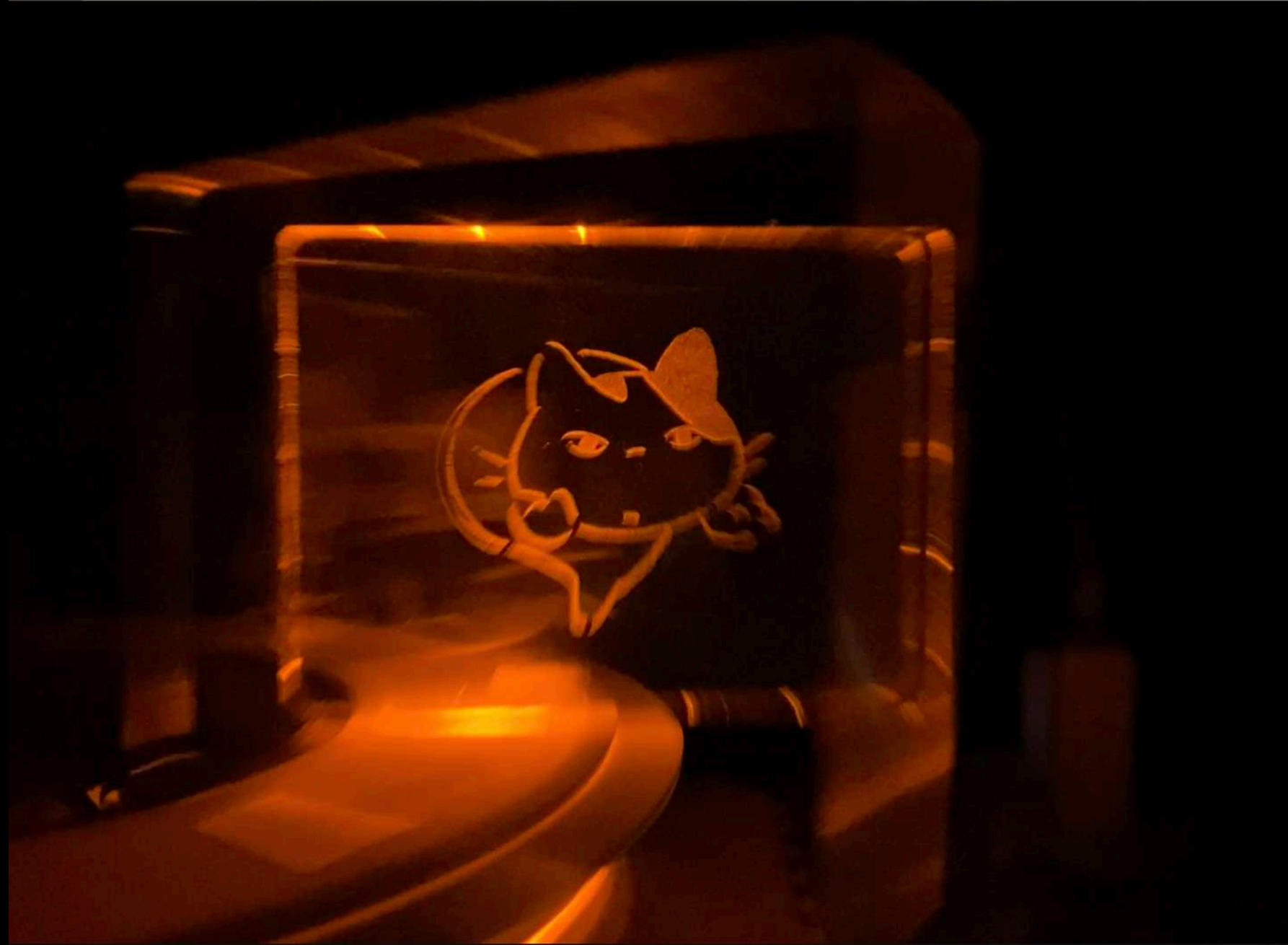
Final Project

Xianbei

Interactive installation design

This is an interaction design combining sound and visual effects. I used the principle of animation to make a moving kitten animation. At the same time, this work also adds the sound of the kitten to make the kitten more three-dimensional. When the user passes by this device, "Xianbei" will stop the user, and the user can pick up the cat toy and watch the animation of Xianbei playing.

Video link：https://youtu.be/fx_ztDrlUsc



BACKGROUND

I have a British shorthair named Xianbei. I have brought her home since she was born and she is now 3 years old. After I arrived in the UK, the Xianbei had to stay in Beijing, and I missed her very much.

I want to make a project that allows me to see and hear Xianbei in London.

In this work, I hope to reflect **the movement of Xianbei playing and the sound of Xianbei.** Let the works reflect the state of Xianbei from multiple angles, such as jumping and screaming.

RESEARCH

Animation

The more standardized definition of animation technology is the image technology that uses frame-by-frame shooting of objects and continuous playback to form motion. No matter what the subject is, as long as it is shot in a frame-by-frame manner and played continuously to form a moving **image** when viewed, it is animation.

Generally, two-dimensional animation is based on 24 frames per second to ensure smooth playback of the screen, but due to the development of modern technology, the number of animation frames does not need to reach **24 frames per second**.

Definition source：https://baike.baidu.com/item/动画/206564?fr=aladdin

Interpretation of the meaning of cat meow

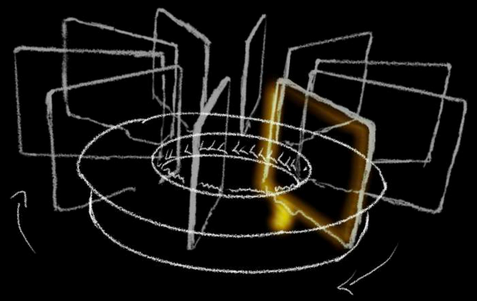
Most of the cat's purrs are purrs, which means that the cat is very **comfortable and relaxed**, and wants the owner to touch it. Generally, it may be that the cat makes such a sound when it is **in a happy mood** and recognizes its owner.

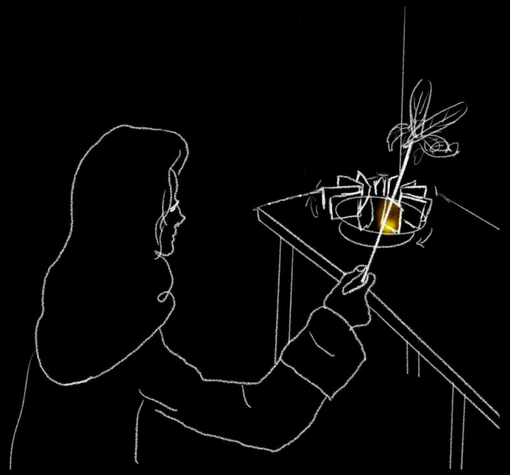
When the cat is touched by the owner, it will be very happy and will not have any sense of defense. At this time, the cat will use the sound of purring to convey its mood at the moment.

Definition source：https://baijiahao.baidu.com/s?id=1724980550808649060

DESIGN

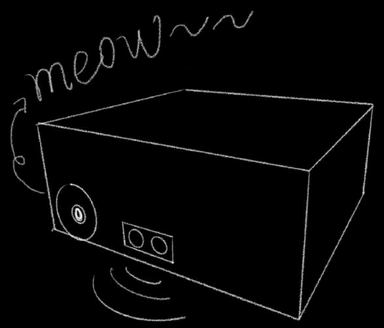
Make a **turntable**, draw the coherent movements of the cat, and drive the turntable through the motor to make the animation move, **forming a complete animation.**





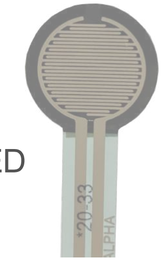
When the user picks up the **cat toy** to play with the cat, the device starts to rotate, and the user can see the kitten playing all the time.

When the user passes by the device, the Xianbei will **make a sound** to attract the user's attention. After users are attracted, they will naturally pick up cat toys and play with Xianbei.



Input 1

Pressure Sensor - Trigger the toy motor and LED lights by picking up the cat toy.



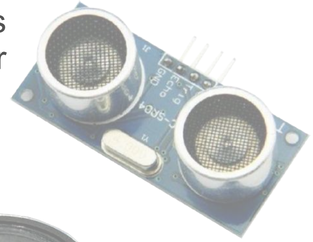
Output 1

Toy Motor - Make the turntable spin.

LED Lights - Make animations more visible.

Input 2

Ultrasonic Sensor - Used to detect the user's location and play audio when the user approaches.



Output 2

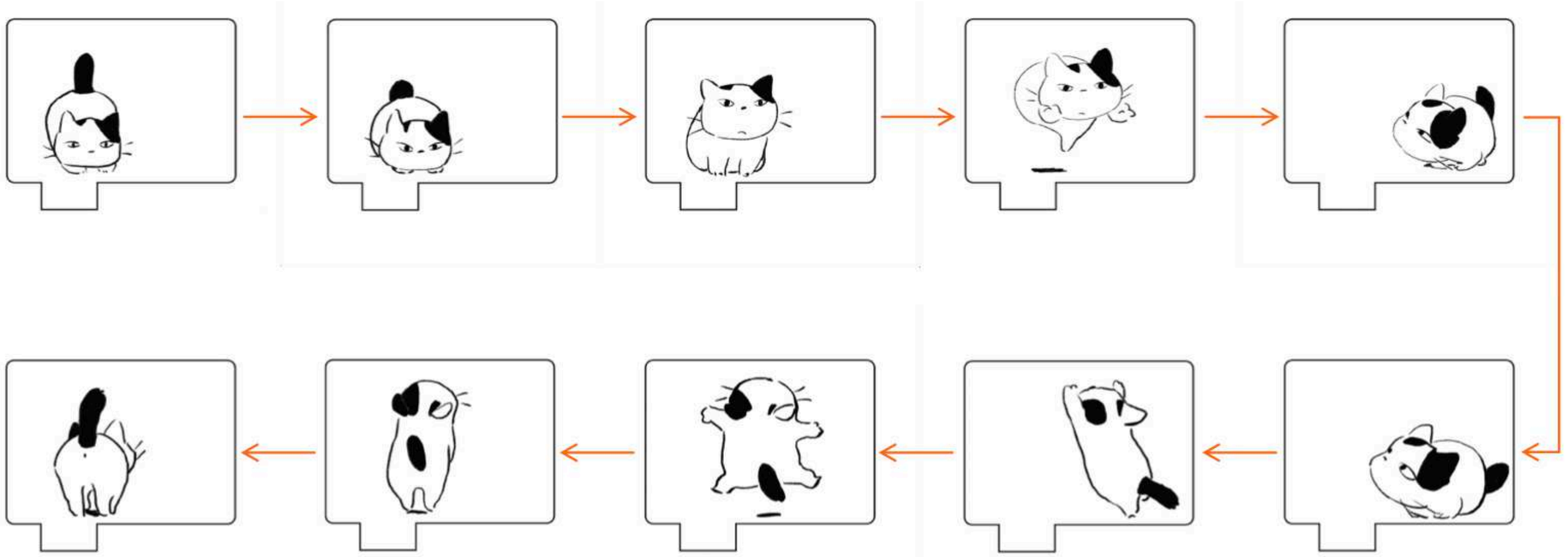
Speaker - used to play the cat's meow.

SKETCH

Animation

I drew ten coherent action pictures based on the appearance characteristics of Xianbei.

Play these ten pictures in order and at a certain speed, and the Xianbei will move in the animation.



Audio

I cut out the sound of Xianbei from the video of playing with senbei, and made it into MP3 format.

Put the produced audio into the SD card and read it through DFPlayer mini. When the user gets close to the device, the senbei can be heard.

CODING

Pressure Sensor

Set up

When the pressure sensor is pressed, the motor starts and the LED lights up.

```ino
#include <Servo.h>
Servo myServo;

int IN1 = 3;
int IN2 = 5;
int analog = A0;
int LED = 13;

void setup() {
  Serial.begin(115200);
  Serial.println("start!");
  pinMode(IN1, OUTPUT);
  pinMode(IN2, OUTPUT);
  pinMode(analog, INPUT);
  pinMode(LED, OUTPUT);
  myServo.attach(12);

}
void loop() {
  int analog_value = map(analogRead(analog), 0, 1023, 0, 1000);
  Serial.print("analog_value:");Serial.println(analog_value);
  myServo.write(analog_value);
  if (analog_value  >= 5) {
    digitalWrite(IN1,1000);
    digitalWrite(IN2,LOW);
    digitalWrite(IN2,LOW);
    digitalWrite(LED,HIGH);
  }else{
    digitalWrite(IN1,LOW);
    digitalWrite(IN2,LOW);
    digitalWrite(LED,LOW);
  }
}
```

Ultrasonic sensor

Set up

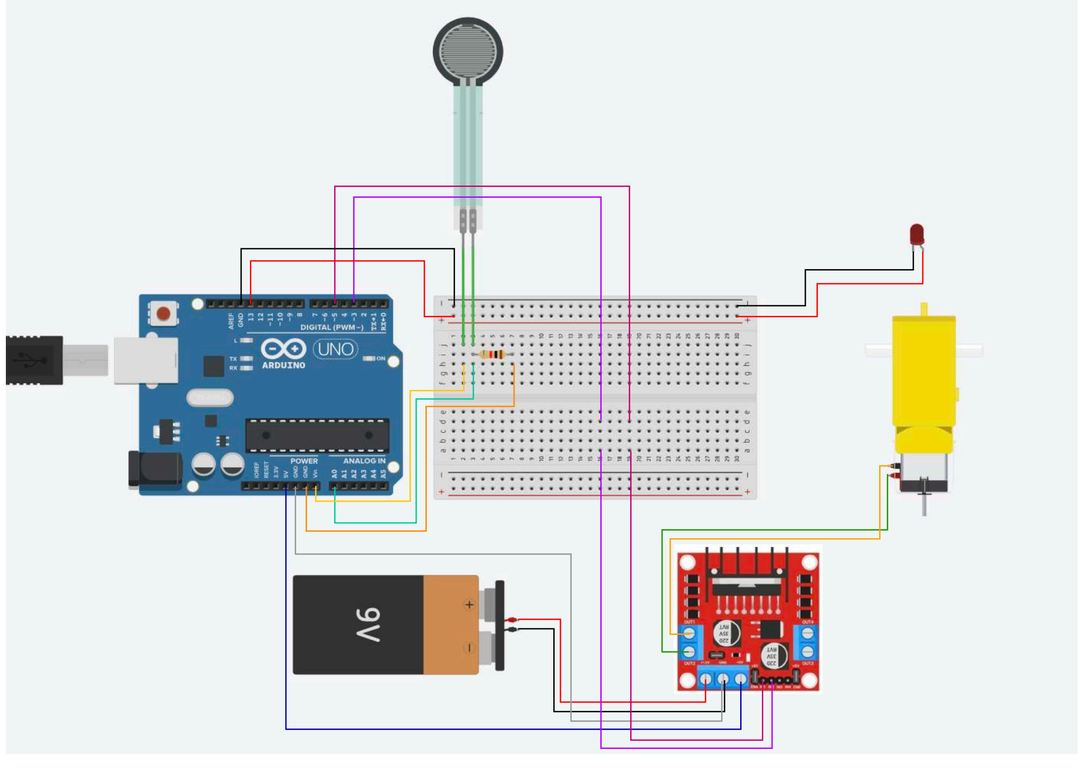
When the user is less than 50 away from the device, the audio is played.

```ino
#include <SoftwareSerial.h>
#include "Arduino.h"
#include "SoftwareSerial.h"
#include "DFRobotDFPlayerMini.h"

int Trig = 2;
int Echo = 3;

SoftwareSerial mySoftwareSerial(10, 11); // RX, TX
DFRobotDFPlayerMini myDFPlayer;
void printDetail(uint8_t type, int value);

float DisTance();

void setup()
{
  Serial.begin(115200);
  mySoftwareSerial.begin(9600);
  pinMode(Trig, OUTPUT);
  pinMode(Echo, INPUT);
  Serial.println();
  Serial.println(F("DFRobot DFPlayer Mini Demo"));

  if (!myDFPlayer.begin(mySoftwareSerial)) {  //Use softwareSerial to communicate with mp3.
    Serial.println(F("Unable to begin:"));
    Serial.println(F("1.Please recheck the connection!"));
    Serial.println(F("2.Please insert the SD card!"));
  }
  Serial.println(F("DFPlayer Mini online."));
  myDFPlayer.volume(20);  //Set volume value. From 0 to 30
}

void loop()
{
  float Distance = DisTance();
  Serial.print("Distance:"); Serial.print(Distance); Serial.println("cm"); delay(50);
  if (Distance <= 50) {
    Serial.println(33);
    myDFPlayer.play(1);  //Play next mp3 every 3 second.
    delay(5000);
  }
  else if ( Distance > 50) {
    Serial.println(22);
  }
}

float DisTance() {
  digitalWrite(Trig, LOW);
  delayMicroseconds(2);
  digitalWrite(Trig, HIGH);
  delayMicroseconds(10);
  digitalWrite(Trig, LOW);
  float distance = pulseIn(Echo, HIGH) / 58.00;
  return distance;
}
```

CIRCUIT

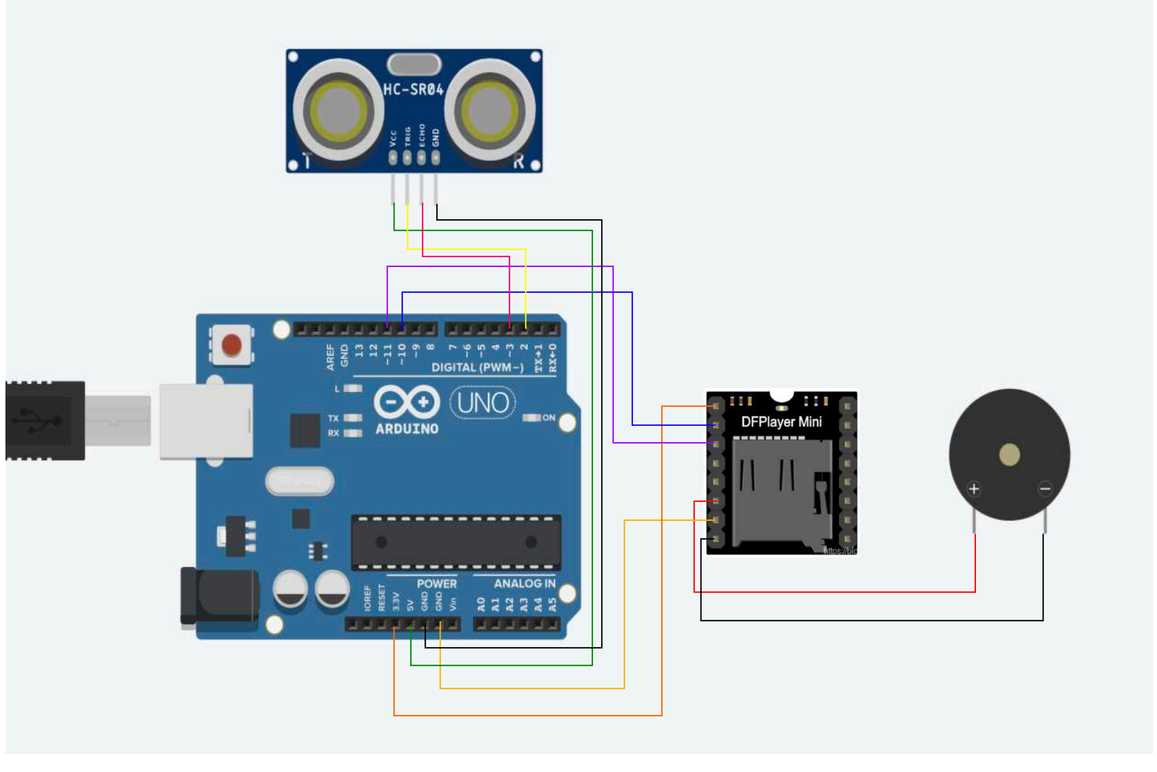
Pressure Sensor

This is a circuit diagram of using the L298N to run a toy generator, and at the same time light up the LED bulb.



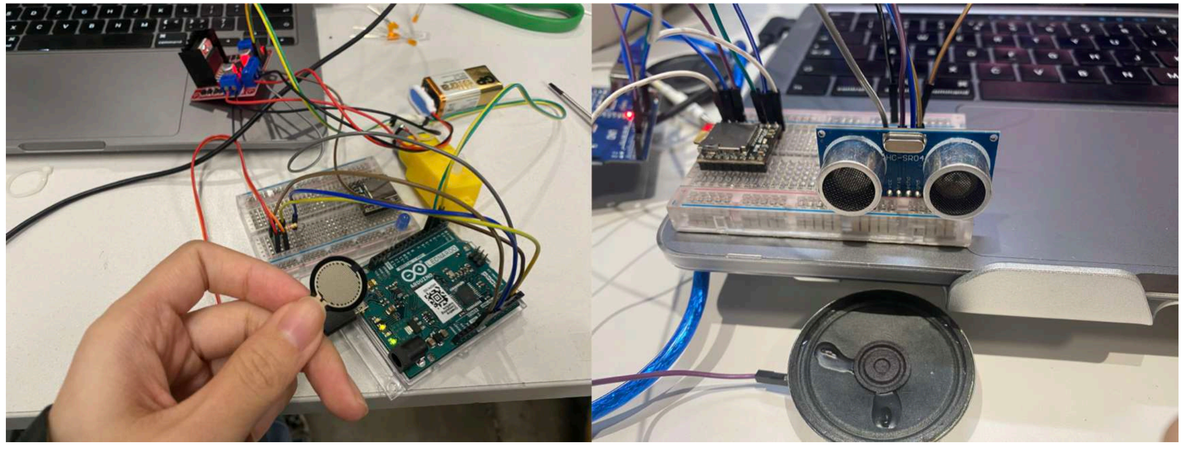
Ultrasonic sensor

This is a circuit diagram of using DFPlayer mini to read SD card and play mp3 files in it.



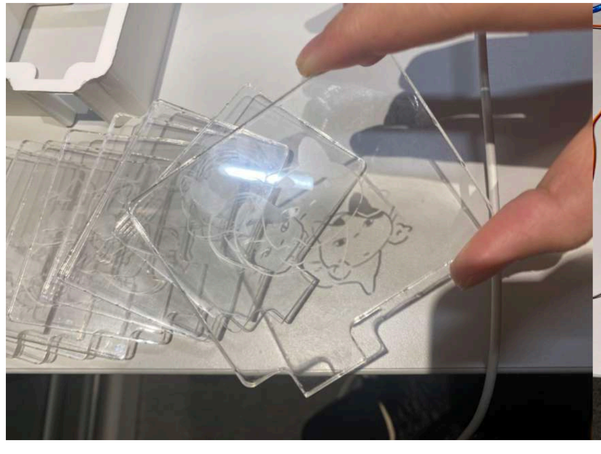
PROCESS

Test code

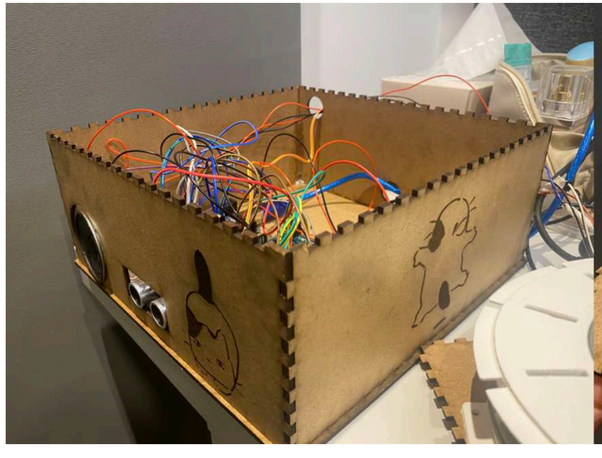


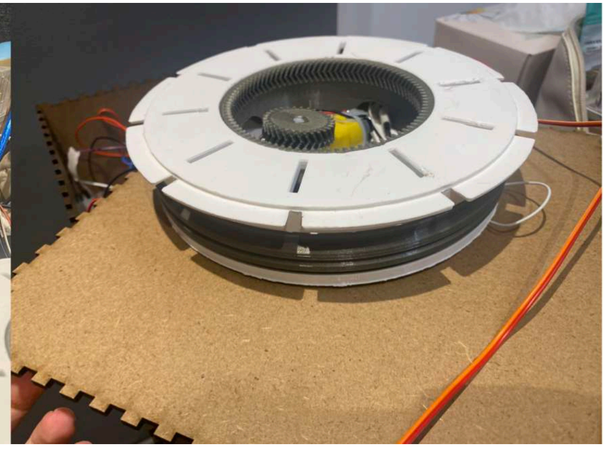
3D printing and laser cutting

Prepare drawing board and cat toys



Assembly lines and models





EXHIBITION

The finished product is complete.
When the user walks past the device, the senbei will beep. Users can watch the animation of senbei playing when they pick up and buy toys.