Journal: Advanced Physical Computing — "Hello Kitty"🐱
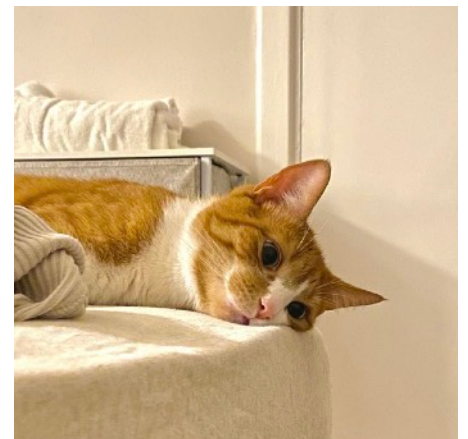
by Pinsi Wang

Team members
Pinsi Wang
Yujie Gao

Introduction:

In this project, we made a robot cat. The robot cat will have glowing eyes and make cat meowing when people pass by. The cat's tail will wag when someone touches the robot cat's head.
And the decoration light in the background will change colours when someone touches the kitty's head.

Hello, this is Ruro.

Process：

week 5：

At the very beginning, I had an initial idea.

After the covid-19, I was isolated several times. Each quarantine took at least fourteen days and I was very lonely during the quarantine. So I wanted to make an interactive robot that could do some basic activities with people. This would allow people in quarantine to be less lonely and have a companion.

I want to use a pressure sensor to control the mp3 player to make a sound when someone touches the robot. Also, I would like to install a display on the head of the robot which shows various expressions.

And then Gao and I discussed our project's topic for 3 hours. We decided to combine the two of our topics. We decided to make a robot cat that could interact with people.

With the development of technology, people's demand for artificial intelligence is getting higher and higher, and the development of technology is also progressing, and with the continuous improvement of human civilization, in the future, will our pets also be artificially intelligent? With the development of technology and the pursuit of artificial intelligence, what will the future of pets look like? In this project, we will make a robot of what we see our future pets will look like.

Firstly we wanted the robot cat's tail to wag when someone touches its head. Secondly, we wanted the robot cat to be able to meow. Finally, we wanted the robot cat's eyes to make some movement. After this, we have listed some options.

When someone touches the cat's head, the servo connected to the cat's tail will start to work, thus controlling the swing of the cat's tail. Through the working principle of the photosensitive sensor, when someone passes in front of the cat, the cat's head will start to swing, thus feeling like the cat is always staring at people passing by. Finally, there is the ultrasonic sensor, the ultrasonic sensor working process is mainly to capture when someone passes by, thus controlling the servo to open the eyes and also controlling the microphone sensor to emit the cat's meowing.

And this week, we had a presentation in class.
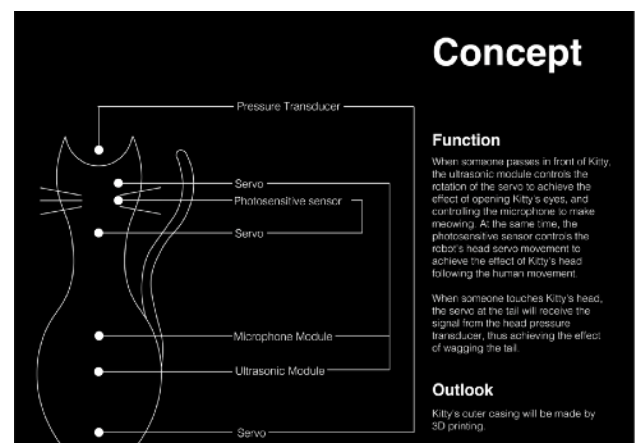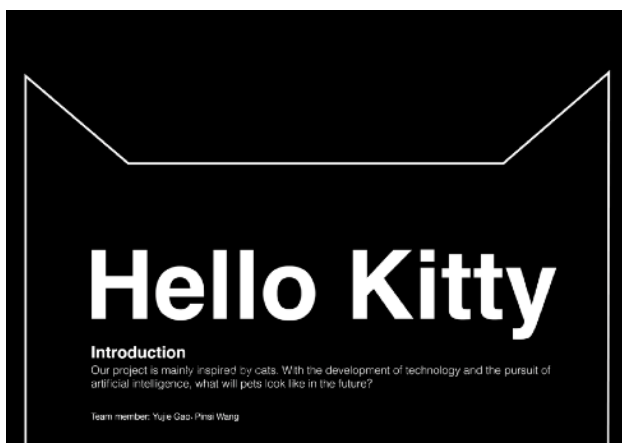
*PPT I MADE FOR OUR FIRST PRESENTATION

Week 6:

We had a presentation in class last Friday, and our professor Matt gave us a suggestion - having a tutorial with professor Agnes Cameron, she will give us some useful tips. So we signed up for a tutorial with Agnes on Wednesday, and she truly gave us a lot of help.

She gave us a really important suggestion — focusing on the two inputs and two outputs first, that is the key point. So Gao and I decided to first finish the "opening eyes" part, the "wagging tail" part and the "meowing" part of our robot. And she also told us that controlling the rotation of the cat's head with a photosensitive sensor is difficult to achieve. So we give up the "kitty's head following the human movement" part.

During the week we also had a group work split：

I sketched the cat robot, and Gao built a 3D model in C4D based on the sketch. I'll take care of the cat robot's eyes part. Gao is responsible for the cat's meowing and tail-wagging part of the cat robot.

As the project progressed, the workload for the two of us gradually increased.

And I finished the sketch of the cat robot this week. And I also built a sample model based on the sketch.
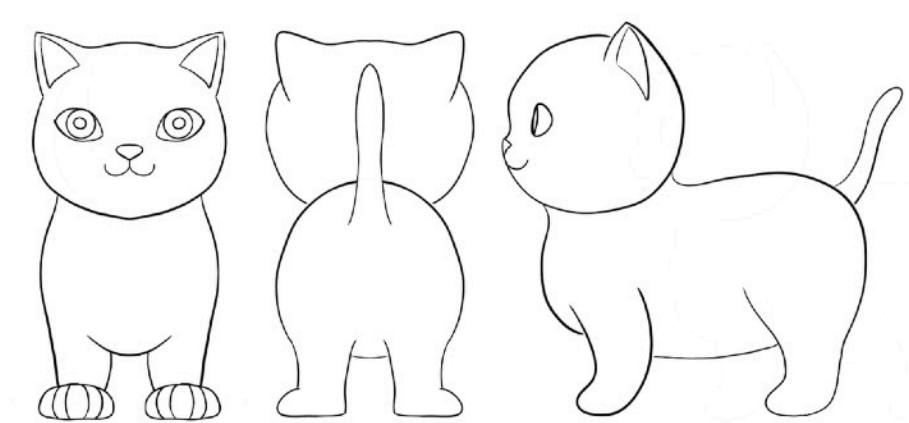
* THE SKETCH I DREW

*THE 3D SAMPLE MODEL I BUILT

Week 7:

Gao built a model in C4D based on a sketch I made and tried to 3D print it this week. I wanted to decorate the ultrasonic sensor better and wanted the tail to bend like a real tail, so I decided to use laser cutting to complete the bow and tail. I was responsible for the tail-building part.

I have studied some of the works of others with similar tail structures. After this, I drew diagrams for laser cutting.

And I also tried to use code to control the rotation of the servos to achieve the effect of the cat robot blinking, but I didn't achieve it. So I changed my way. Instead of the cat blinking effect, I used a photosensitive sensor to control two lights. At the same time, I used UV glue to make two cat eyes, which can make the cat robot look more realistic.

This week, our progress was slower. A lot of time was wasted because 3D printing failed many times.
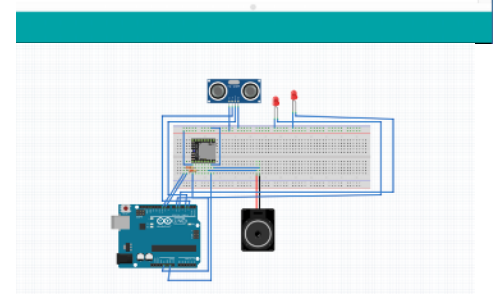
*THE PROCESS OF MAKING EYES WITH UV GLUE
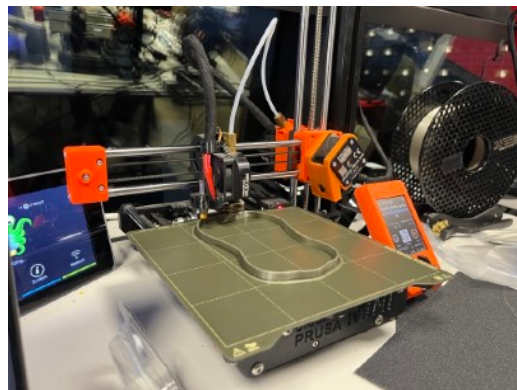
*HEART BREAKING 3D PRINTING PROCESS

Week 8:

I made the structure of the tail by connecting the cut-out parts with wire.

As Gao decided to use the tail part of the cat robot to put the servo on to rotate, it was important that the tail part can be attached to the servo. This design allows the tail to be bent and for Gao to attach the tail section to the servo.
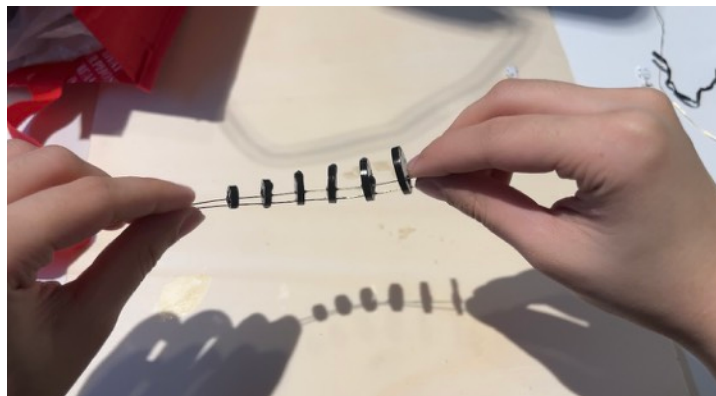
During this week, I also started to try soldering the wires to the board.

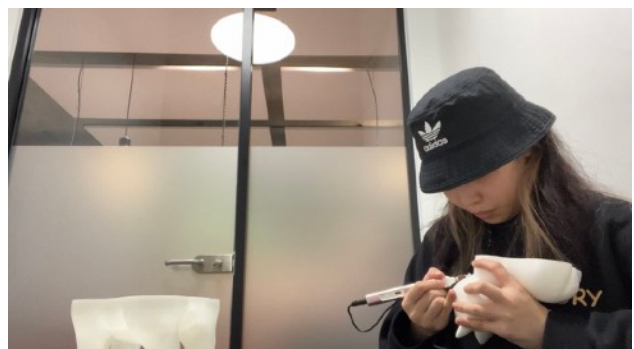*A TAIL STRUCTURE I MADE WITH LEGO
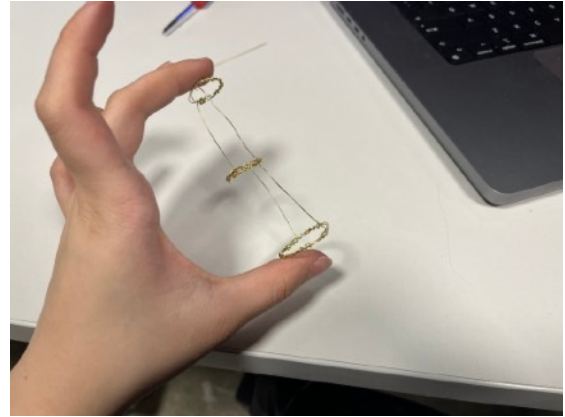
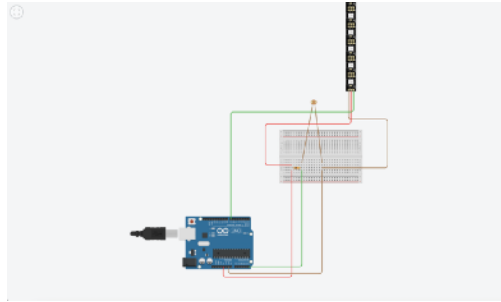

*A SAMPLE MADE OF WIRE

*FINAL TAIL STRUCTURE
https://youtu.be/4lrg3g9TBvE

The finished 3d printed model is not perfect. It had a rough surface, so I sanded the surface of the model.

```
just-light
#include <FastLED.h>
#define ADS A5
#define LED 13
#define LED_PIN     7
#define NUM_LEDS    90
int Intensity = 0;

CRGB leds[NUM_LEDS];
void setup() {
  pinMode(LED,OUTPUT);
  Serial.begin(9600);

  FastLED.addLeds<WS2812, LED_PIN, GRB>(leds, NUM_LEDS);
}
void loop() {
  Intensity = analogRead(ADS);
  Serial.print("Intensity = ");
  Serial.println(Intensity);
  delay(500);
  if (Intensity > 970){
  // Red
  for (int i = 0; i <= 29; i++) {
    leds[i] = CRGB ( 255, 0, 0);
    FastLED.show();
    delay(40);
  }

  // Green
  for (int i = 0; i <= 29; i++) {
    leds[i] = CRGB ( 0, 255, 0);
    FastLED.show();
    delay(40);
  }

  // Blue
  for (int i = 0; i <= 29; i++) {
    leds[i] = CRGB ( 0, 0, 255);
    FastLED.show();
    delay(40);
  }
  }
  if (Intensity < 970){
  }
}
```

Week 9:

After going through the last week, Gao and I had another discussion. We felt that just one cat robot was too monotonous, so we decided to add some decoration. I decided to make a cat litter for the cat robot and add a light strip to decorate it. I did this part all by myself.

First I programmed the code to make the light strip light up. The light strip is controlled by a photosensitive sensor. The photosensitive sensor is mounted on the head of the cat and when someone touches the cat's head the strip lights up with a red green and blue light in turn. When no one touches the cat's head, the strip will light up with blue light.

week 10:

During the week, I finished the cat litter.

I started by hollowing out the middle of the foam board and the hollowed-out middle was used to hold the Arduino board. Next, I laid a layer of fake grass on top of the foam board to cover the wires. After that, I made the structure of the tent out of wire and sewed the furry fabric to make a tent. Then I put the light strips into the tent. Finally, I put down some fake flower bushes as a final touch. After this, we painted all the parts and finished assembling them.
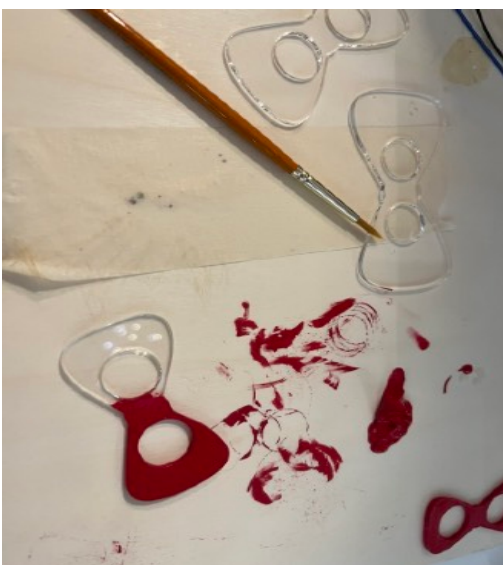
*MODEL COLOURING

Conclusion:

In this project, I learnt about the application of photosensitive sensor to control light strips and servos, and ultrasonic sensors to control lights and mp3 players, and I also mastered 3D printing and laser cutting. In the future, I hope to be able to complete the parts that we were not able to achieve in this project. Hopefully, in the future, we will be able to control the head of the robot to follow the movement of the human through code.

The project was group work. The group work exercised my ability to communicate and cooperate with others. And it has developed my ability to think independently. I hope I can have the opportunity to do group work projects in the future again.