

TAU

Video Link
<https://youtu.be/RirvhJJkZnI>

A MACHINERY PLANT

An Dong, Yu Wang, Runyi Liao, Yaqi Han

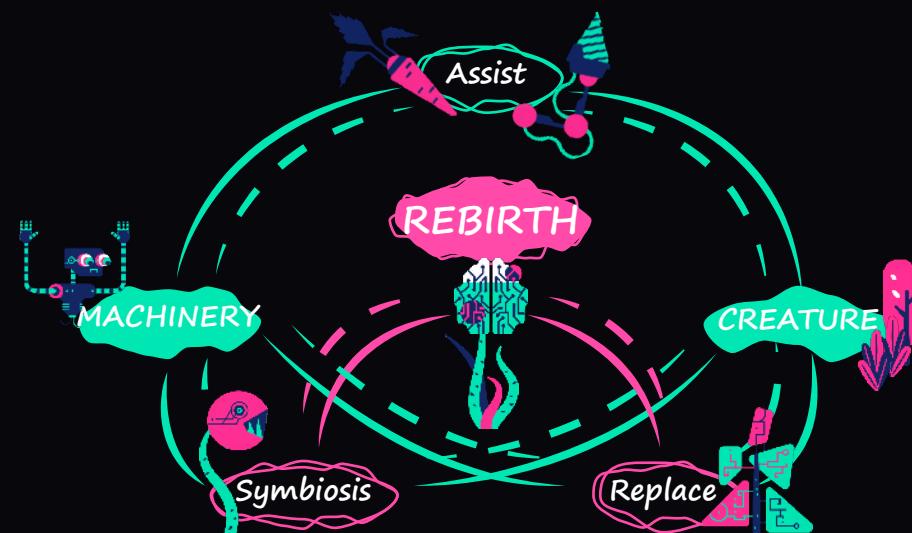
INSPIRATION

Human beings have been trying to use technology to rewrite the original destiny of living things. Such as cloning sheep and installing mechanical prosthetics on humans. Compared with the research done on animals and humans, there are very few studies on the combination of plants and machinery.

SO IN THE FUTURE, HOW WILL MACHINERY AND PLANTS BE COMBINED ?

DESIGN BACKGROUND

With the gradual deterioration of climate and environment in the future, there may be less and less suitable environment for plants to grow, so their morphology is likely to change greatly.



USER RESEARCH

Interview



The extinction risk to plants could be worse than previously thought, according to multiple reports. So, what plants in the future will look like? We talked to a few people about how they envision the future of plants.

Questions

Will plant forms change?

How will people grow plants?

IN THE FUTURE

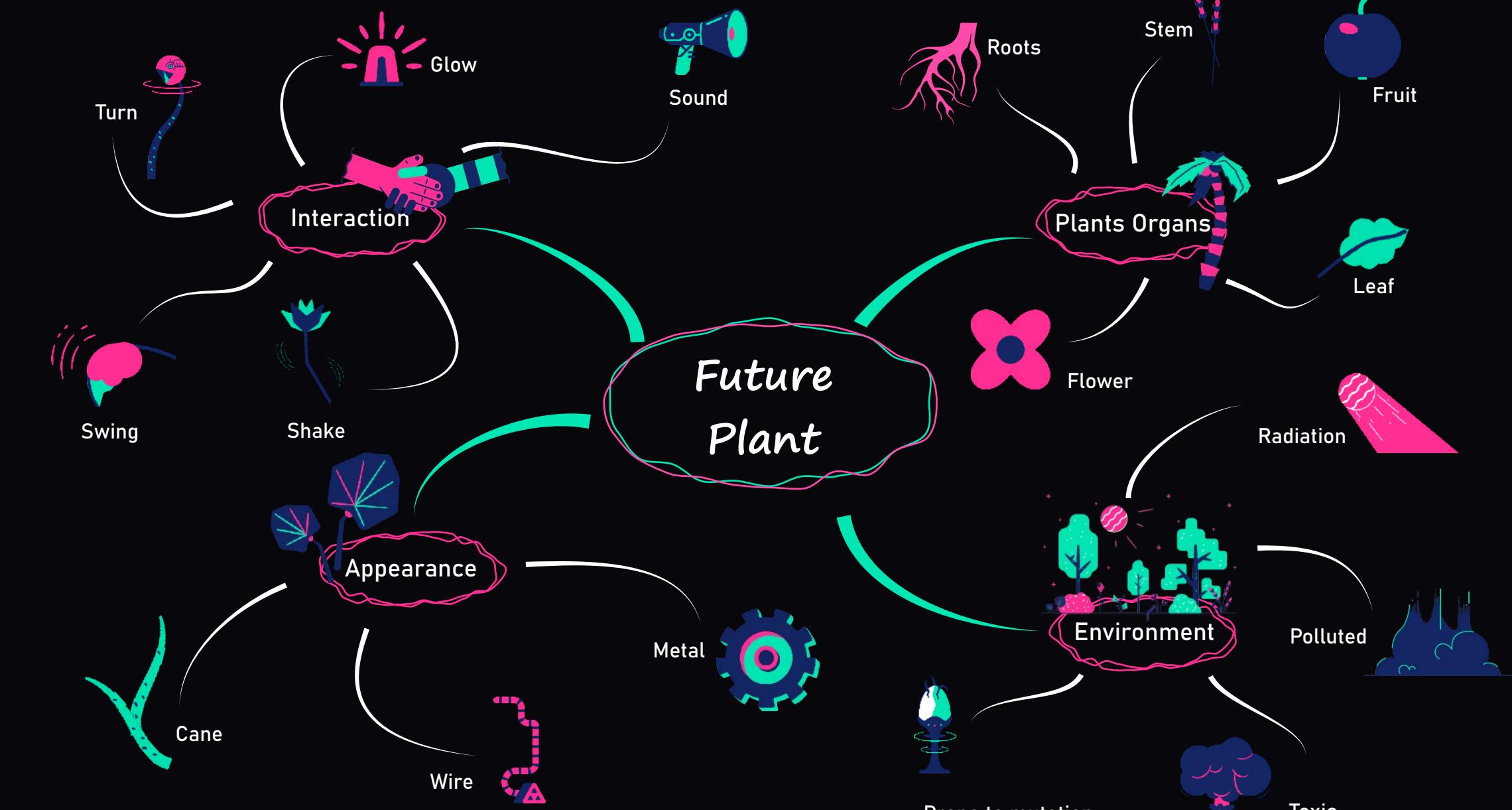
What will the environment be like for plants?



The interviewees ranged in age from 19 to 35, and they came from different countries and regions.

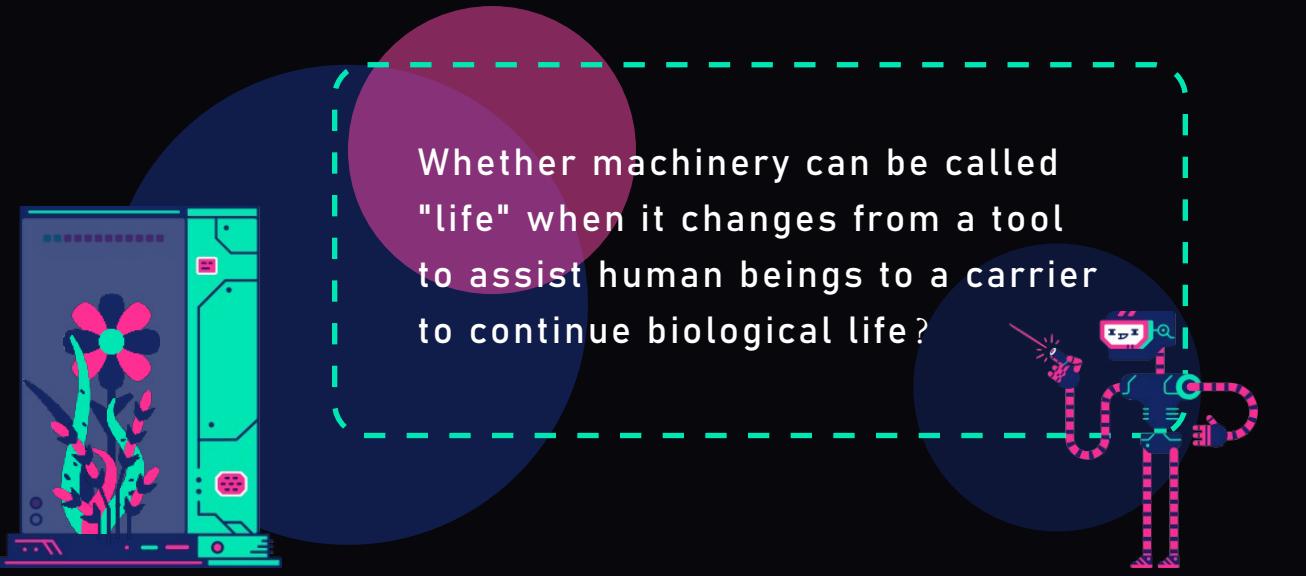
BRAINSTORMING

Result of Interviews

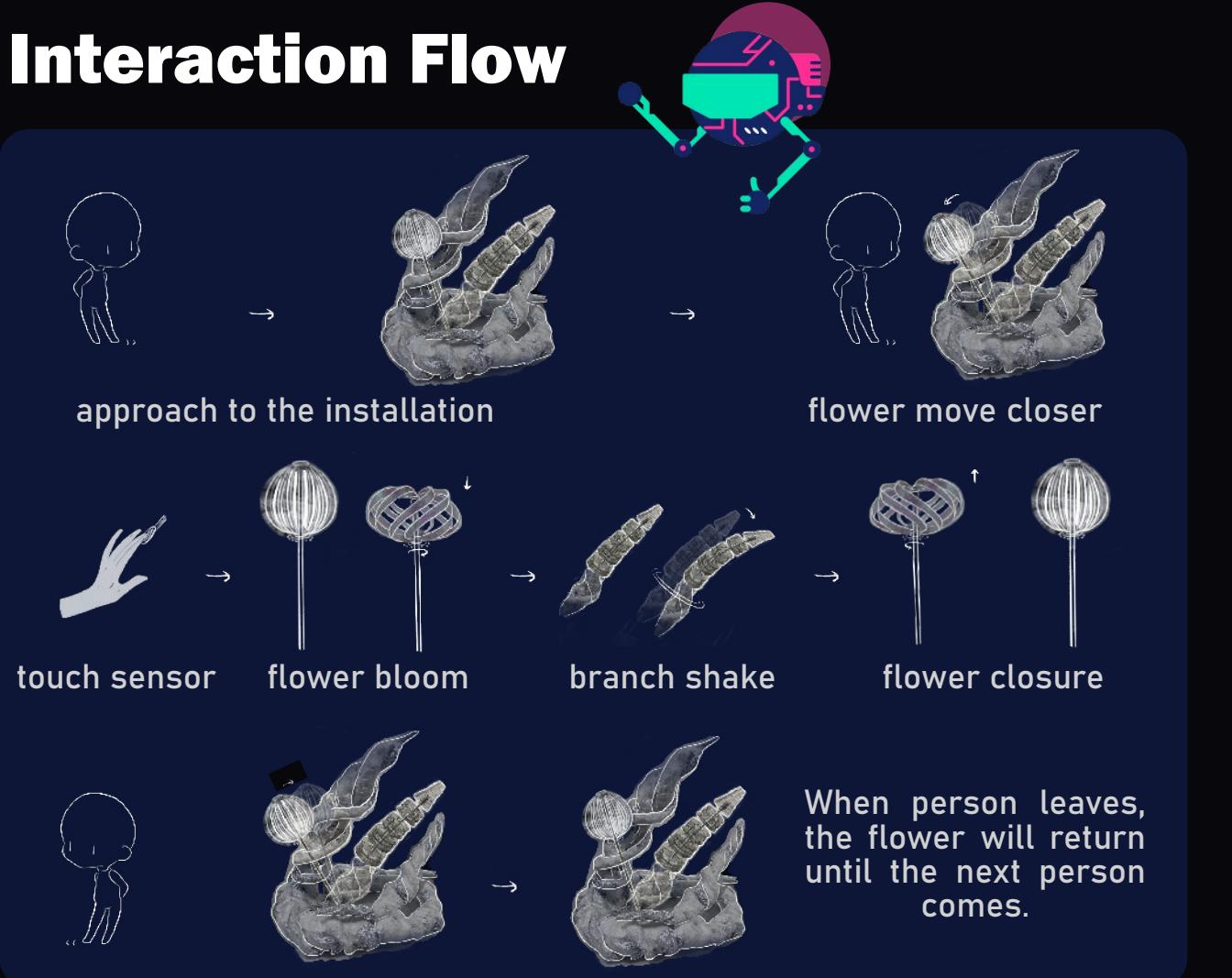


In the end, we chose to make a mechanical device with a combination of mechanical and dead wood. There is a branch on it that can interact with people, and a flower that can open. Use tinfoil, clear or mirrored acrylic sheets to create metal textures.

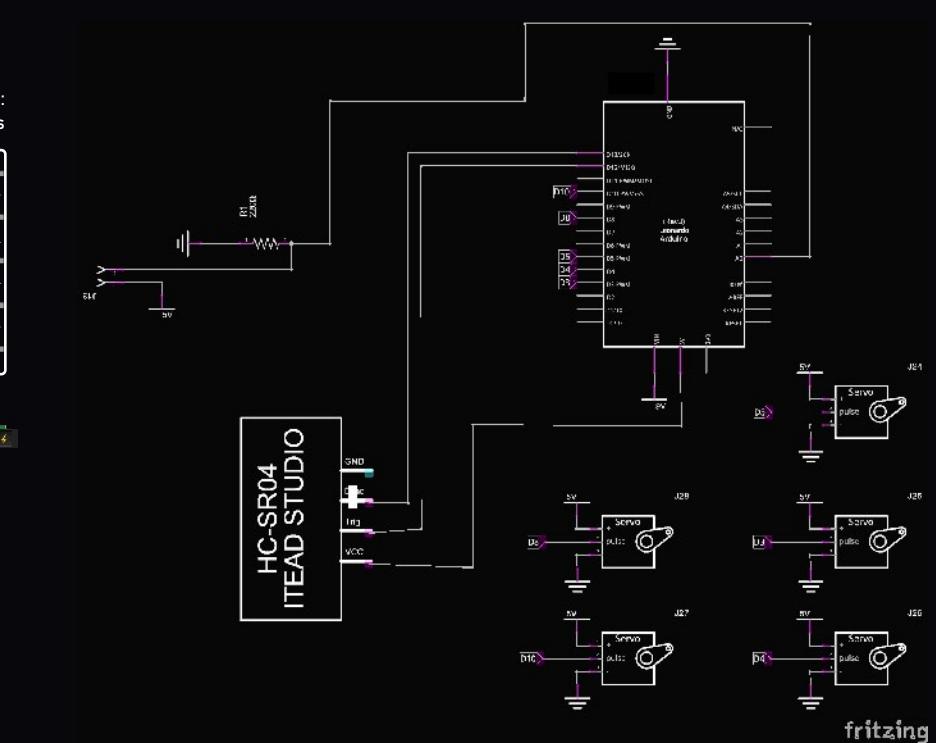
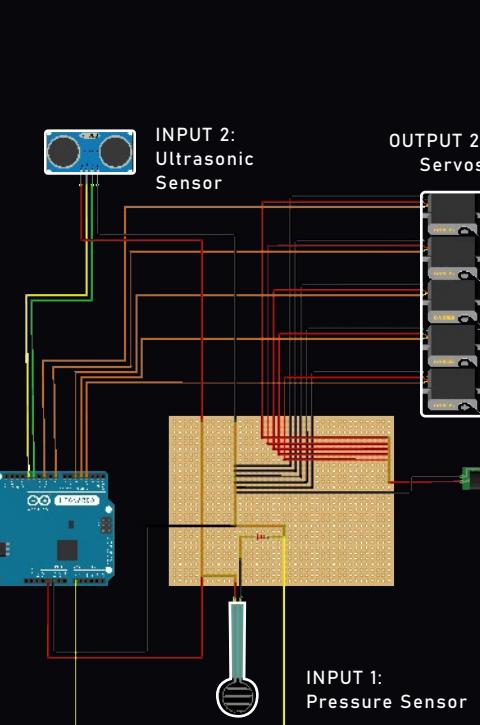
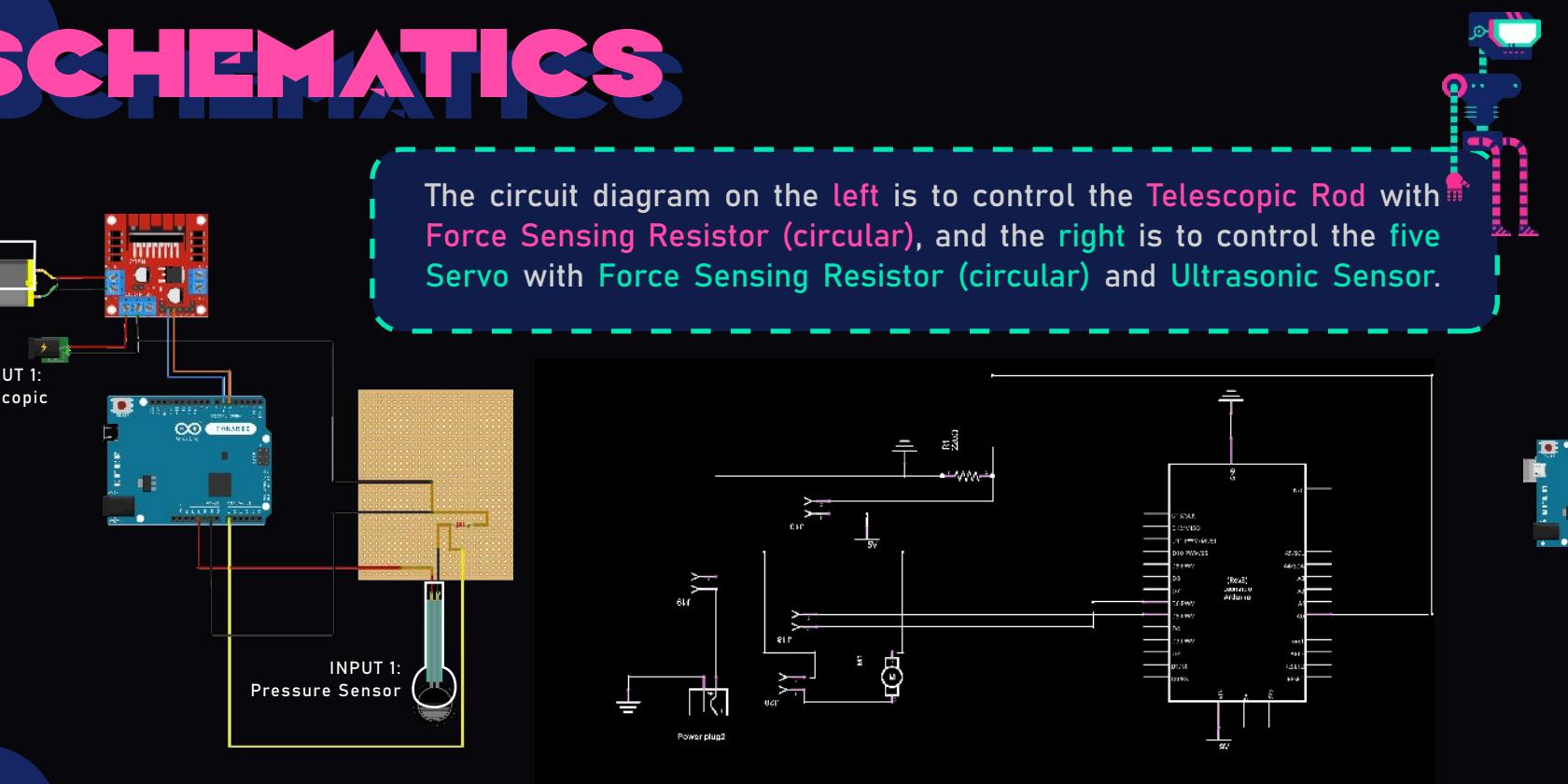
DESIGN CONCEPT



Interaction Flow



SCHEMATICS



CODING

```
servo 5
if (dist > 200)
{
    Dist = Dist;
}

if (Count < 3) {
    Average[Count] = Dist;
} else if (Count >= 3) {
    Val = Filter(Average, (sizeof(Average) / sizeof(Average[0])));
    Count = 0;
}
// dist = Get_Dist();
Serial.print("Distance:");
Serial.print(Val);
Serial.print("cm");

servo 5
#include <Servo.h>
#define posMin 70
#define posMax 100
int fsrPin = 0; // the FSR and 10K pulldown are connected to a0
int fsrReading; // the analog reading from the FSR resistor divider

//pin 3, 4, 5 control the three servos to make the branches move
int s1pin = 3;
Servo serv1;
int s2pin = 4;
Servo serv2;
int s3pin = 5;
Servo serv3;

//Pin 8 controls servo4 to turn the flower
int deg8;
int degMax=180;
int degMin=0;
int s4pin = 8;
Servo serv4;

//Pin 10 controls servo5 to turn the branches of the flower
int s5pin = 10;
Servo serv5;

//Acoustic sensor module
const int TrigPin = 13;
const int EchoPin = 12;
int pos = posMax;
static int dist;
static int Average[3] = { 0 };
static int Average_Dist = 0;
```

```
void loop(void)
{
    digitalWrite(TrigPin, LOW);
    delayMicroseconds(10);
    digitalWrite(TrigPin, HIGH); // Maintain a high level for 10 milliseconds to generate a pulse
    digitalRead(EchoPin, HIGH); // Read the width of the pulse and convert it to distance
    dist = pulseIn(EchoPin, HIGH) / 50.00;

    if (dist < 200) //Filter processing
    {
        if (dist <= 200)
        {
            Dist = dist;
        }
        else if (dist > 200)
        {
            if (dist > 200)
```

```

        {
            if (deg == degMax) {
                pos = posMax;
            } else if (pos == posMin) {
                for (pos = posMax; pos > posMin; pos--) {
                    serv4.write(pos);
                }
            } else if (pos == posMin) {
                pos = posMin;
            } else if (deg < 100) {
                if (pos < posMax) {
                    for (pos = posMin; pos < posMax; pos++) {
                        serv4.write(pos);
                    }
                }
            }
        }
    }
}
```

```
    int filter_sum = 0;
    for (int i = 0; i < length; i++)
    {
        filter_sum += Buf[i];
    }
    return (int)(filter_sum / length);
}

servo 5
static int Average_Dist = 0;
static int Count = 0;
int Val = 0;
```

```
void setup(void)
{
    Serial.begin(9600);
    serv1.attach(s1pin);
    serv2.attach(s2pin);
    serv3.attach(s3pin);
    serv4.attach(s4pin);
    serv5.attach(s5pin);
}
```

```
void loop()
{
    //Control the flower rotation
    serv4.write(deg);
    delay(27);
}
```

```
int filter_val = 0;
for (int i = 0; i < length; i++)
{
    filter_val += Buf[i];
}
return (int)(filter_val / length);
}

servo 5
bool Motor_Flag = false;
```

```
void UpO()
{
    analogWrite(Motor1, 152); //Set the rising voltage
    analogWrite(Motor2, 0);
}

void DownO()
{
    analogWrite(Motor1, 0);
    analogWrite(Motor2, 152);
}

void StopO()
{
    analogWrite(Motor1, 0);
    analogWrite(Motor2, 0);
    delay(2000);
}

if (Motor_Flag == true)
{
    DownO();
    delay(5000);
    StopO();
    Motor_Flag = false;
}

delay(2000); //The electric rod is held in this position for 2 seconds
```

```
else if (Press_Val <= 20 && Motor_Flag == false) //The electric rod rises for 5 seconds
{
    UpO();
}

else if (Press_Val <= 20 && Motor_Flag == false) //If it has been lowered and the pressure is less than 20
```

Initialize the parameters and obtain the sensor values



```
Electric_Push_Rod.ino
StopO();
Motor_Flag = false; //Set flag to false when the electric push rod is lowered
delay(2000); //The electric rod is held in this position for 2 seconds
```

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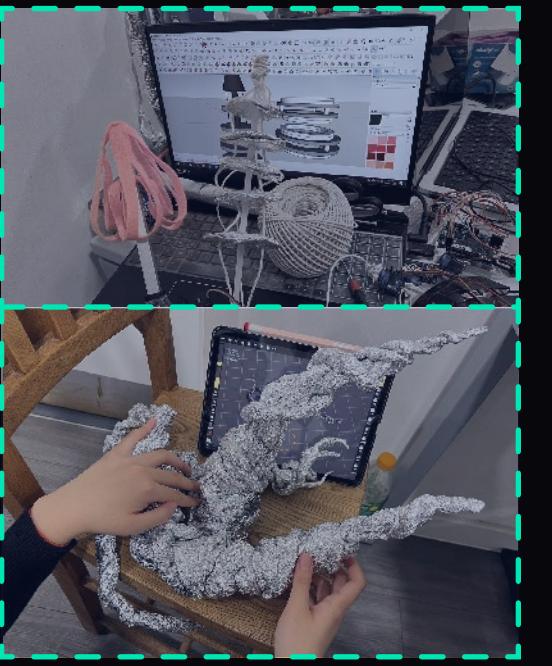
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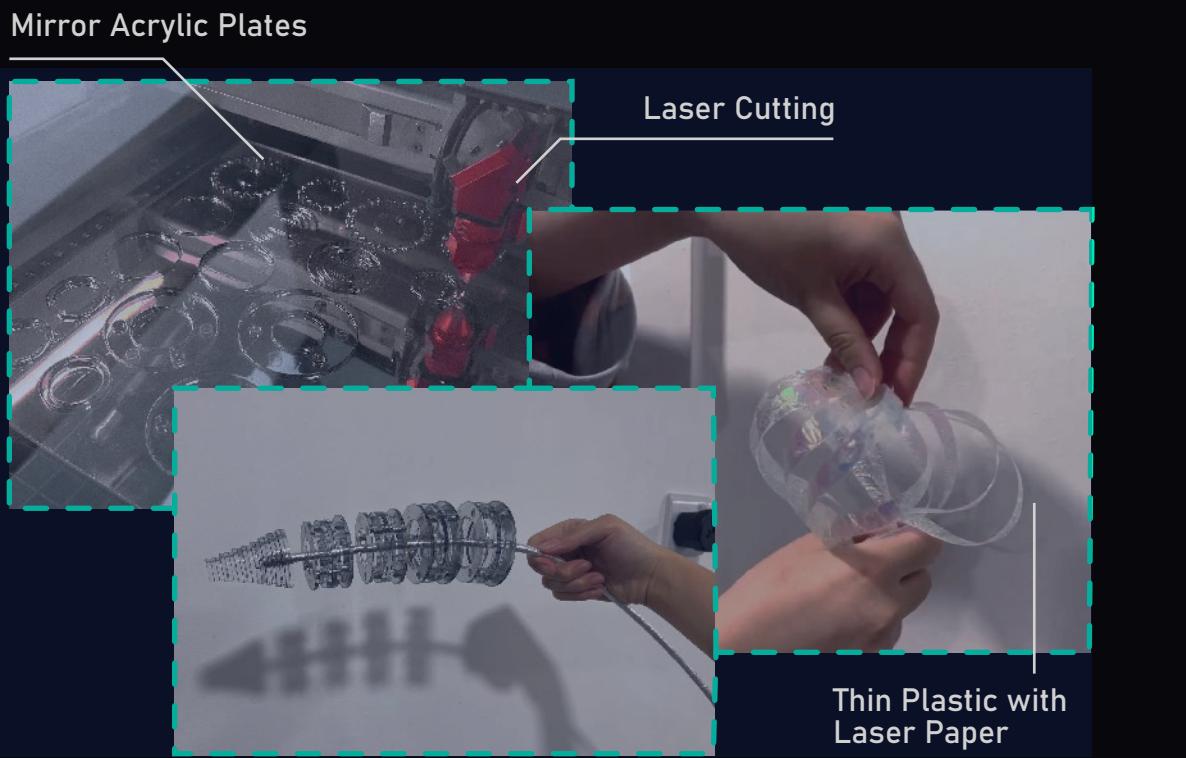
else if (Press_Val <= 2
```

WORKING PROCESS

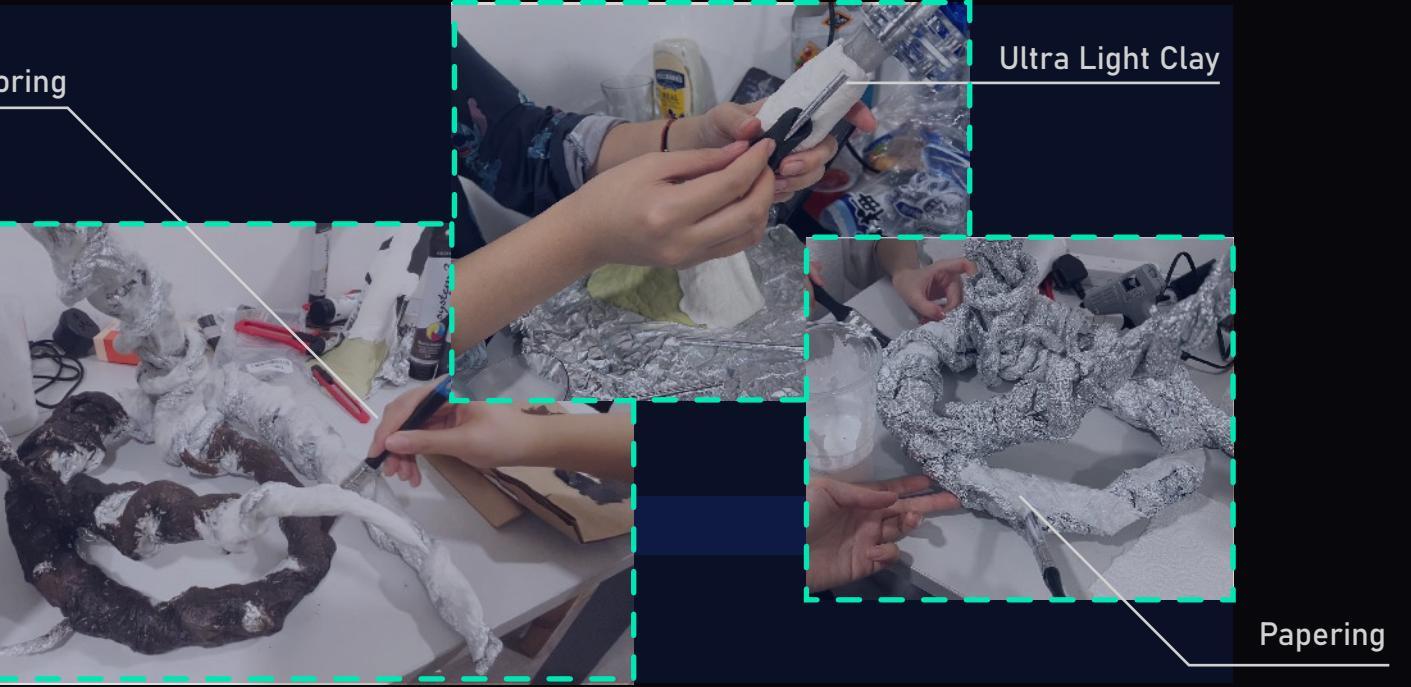
Model Making



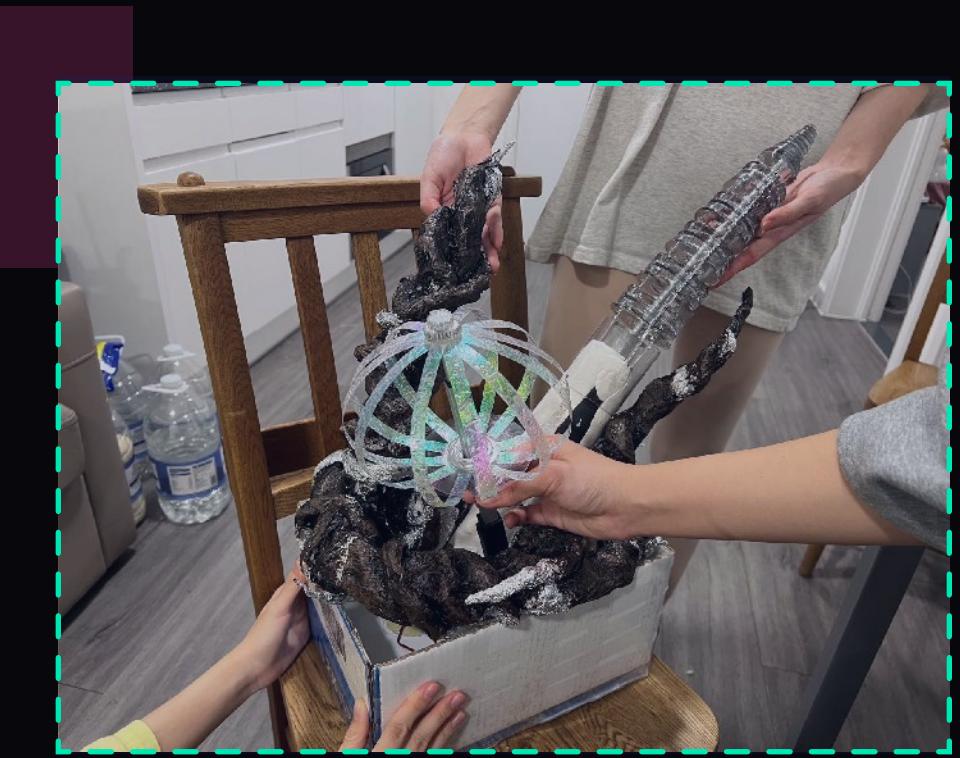
Prototyping



Main Part Production



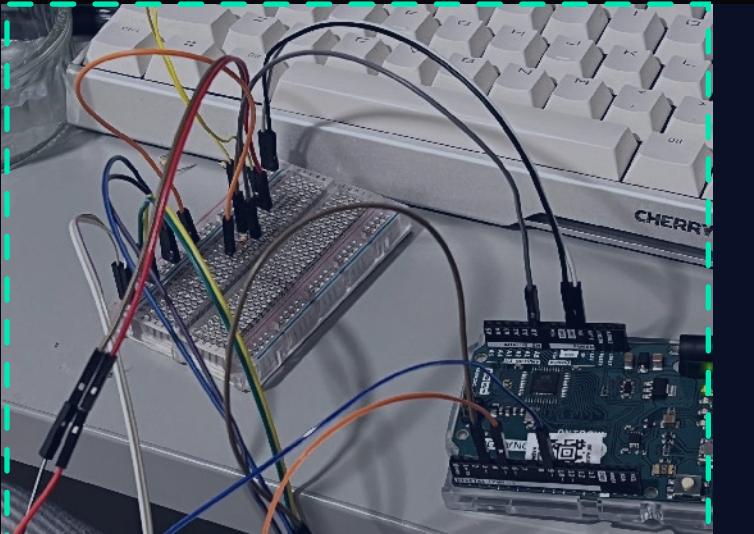
Making the Backbone



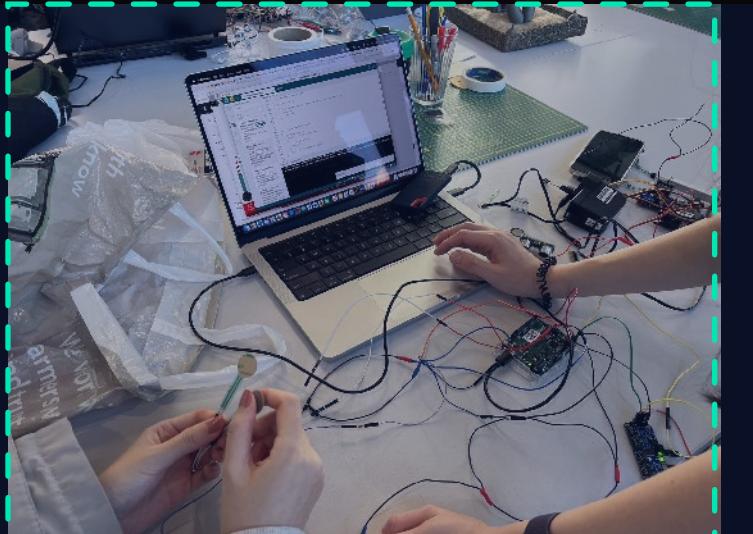
Assemble

Circuit Testing

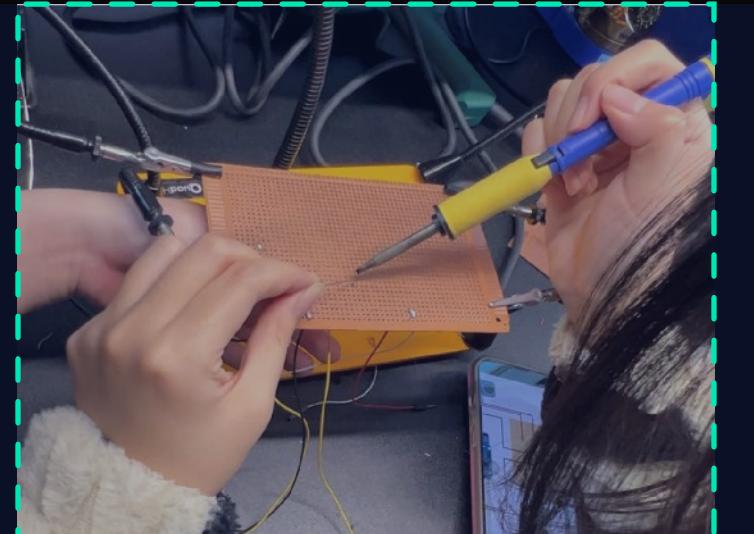
Originally we wanted to use the PCA9685 servo driver module to operate the five servos, but as this did not work out in our tests, we ended up using two arduino's for the whole project.



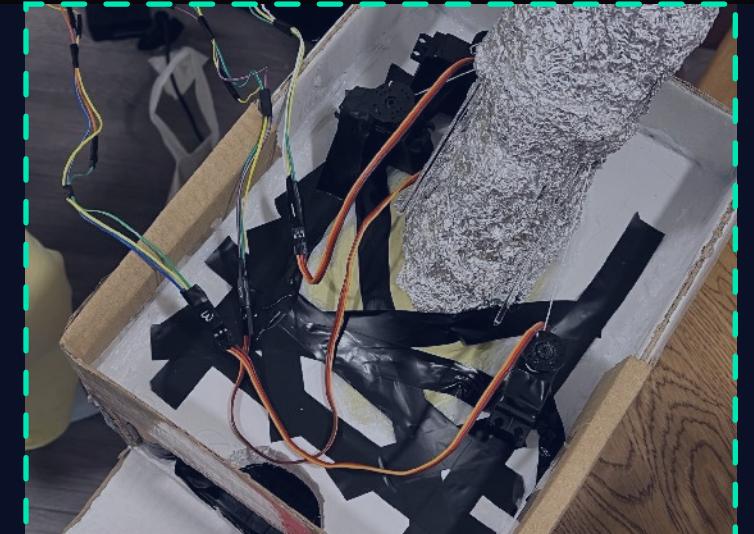
Connecting Circuit



Testing Circuit



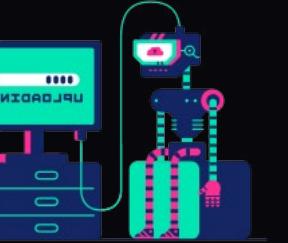
Weld



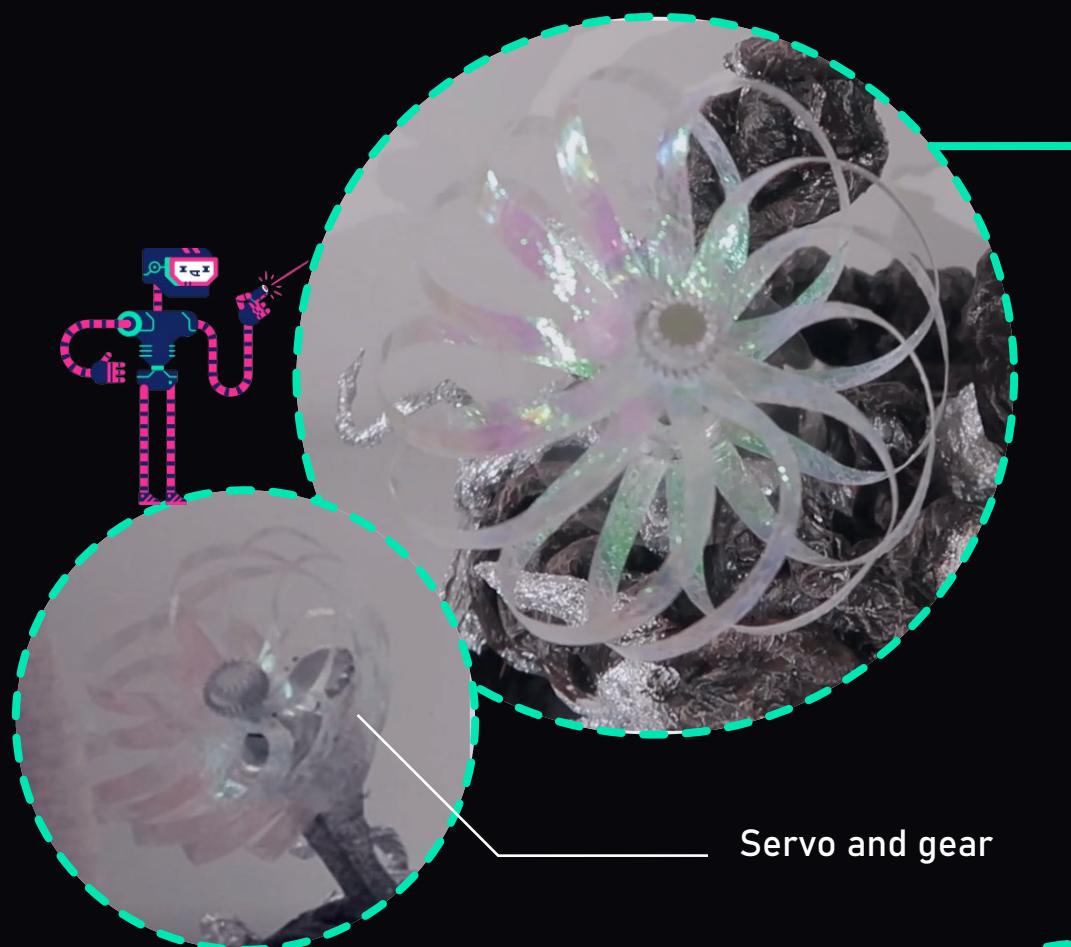
Assemble



Final Test



FINAL OUTPUT



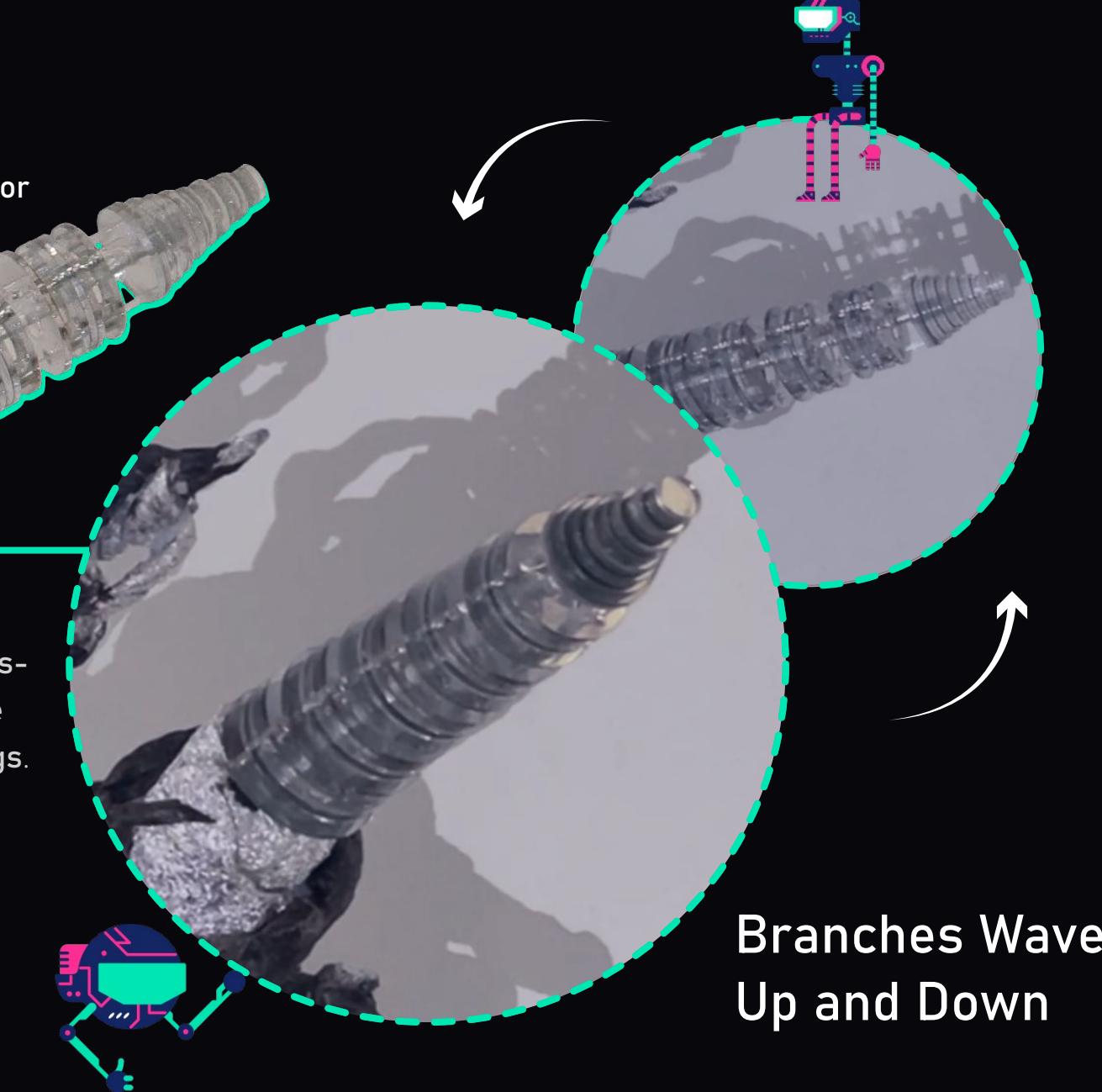
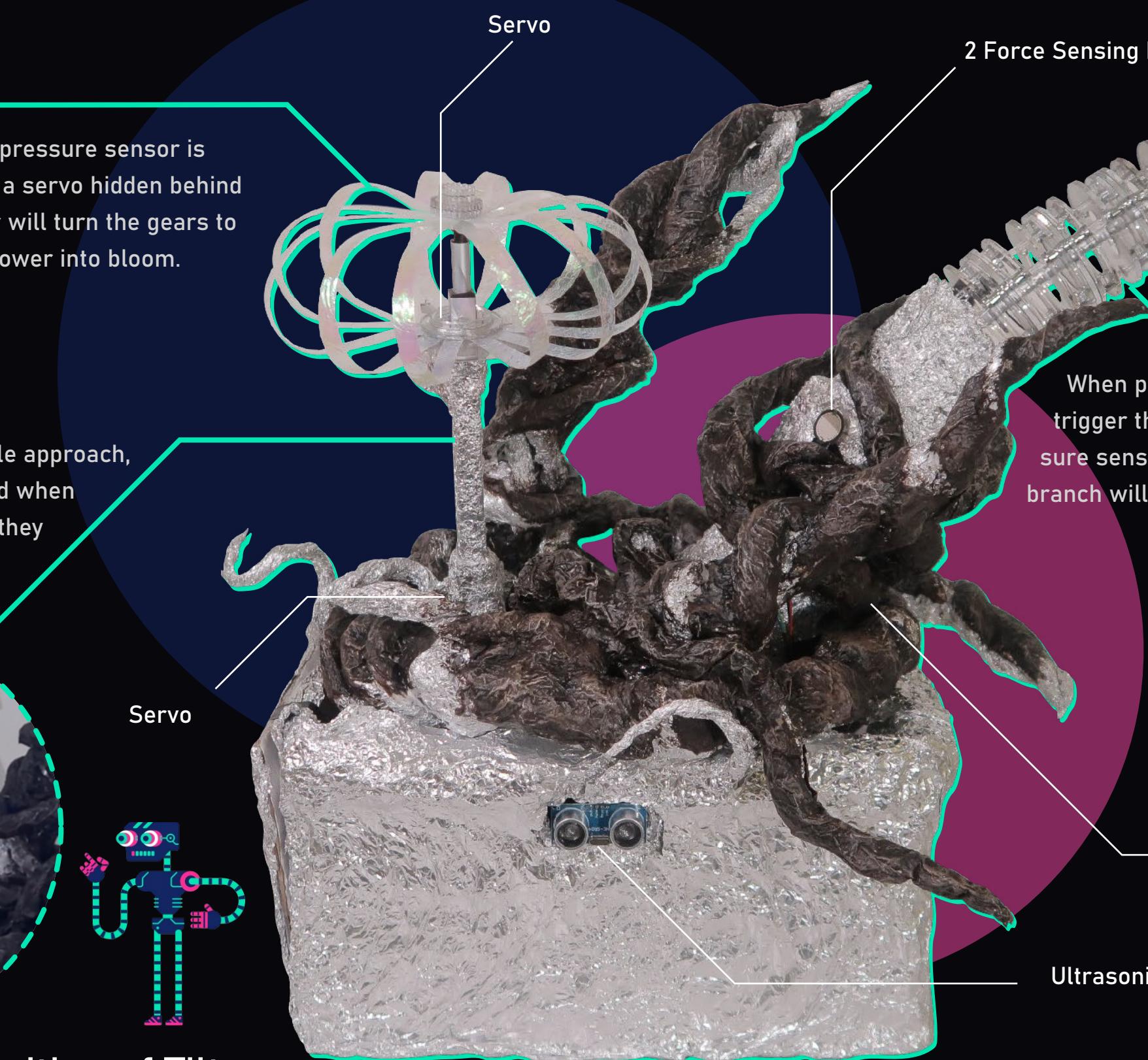
Initial Position



Position of Tilt

When the pressure sensor is triggered, a servo hidden behind the flower will turn the gears to turn the flower into bloom.

When people approach, they tilt, and when they leave, they return.



VIDEO LINK:
[HTTPS://WWW.YOUTUBE.COM/WATCH?V=RIVHJKZNI](https://www.youtube.com/watch?v=RIVHJKZNI)