

BREATHE LIKE YOU

—— The final project of Advanced Physical computing

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From CCI Creative Computing

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Video URL

<https://youtu.be/OAuP475TpXw>

Github URL

<https://github.com/YutianWeii/Physical-Computing-Final-Project>

Our Proposal

10.28 -11.4

*Have we ever noticed the difference of our physiological state?
Are we breathing at the same frequency as others?*

We would like to discuss the connections between people in social relationships.

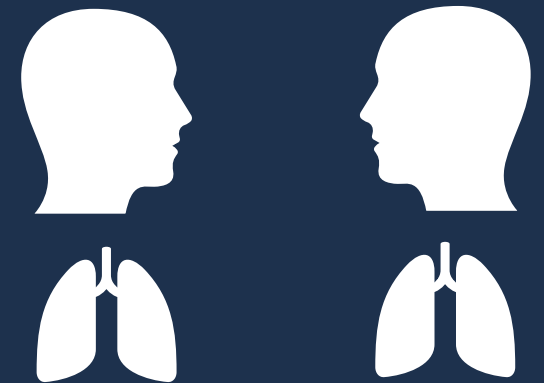
When we breathe on the same frequency as each other, can we be close to each other's state of being, sense each other's emotions, or even be able to read each other's mind?



Inspiration:

Marina Abramović

The Artist Is Present:
March - May 2010



Our Lasted circuit diagram 11.2 -12.6

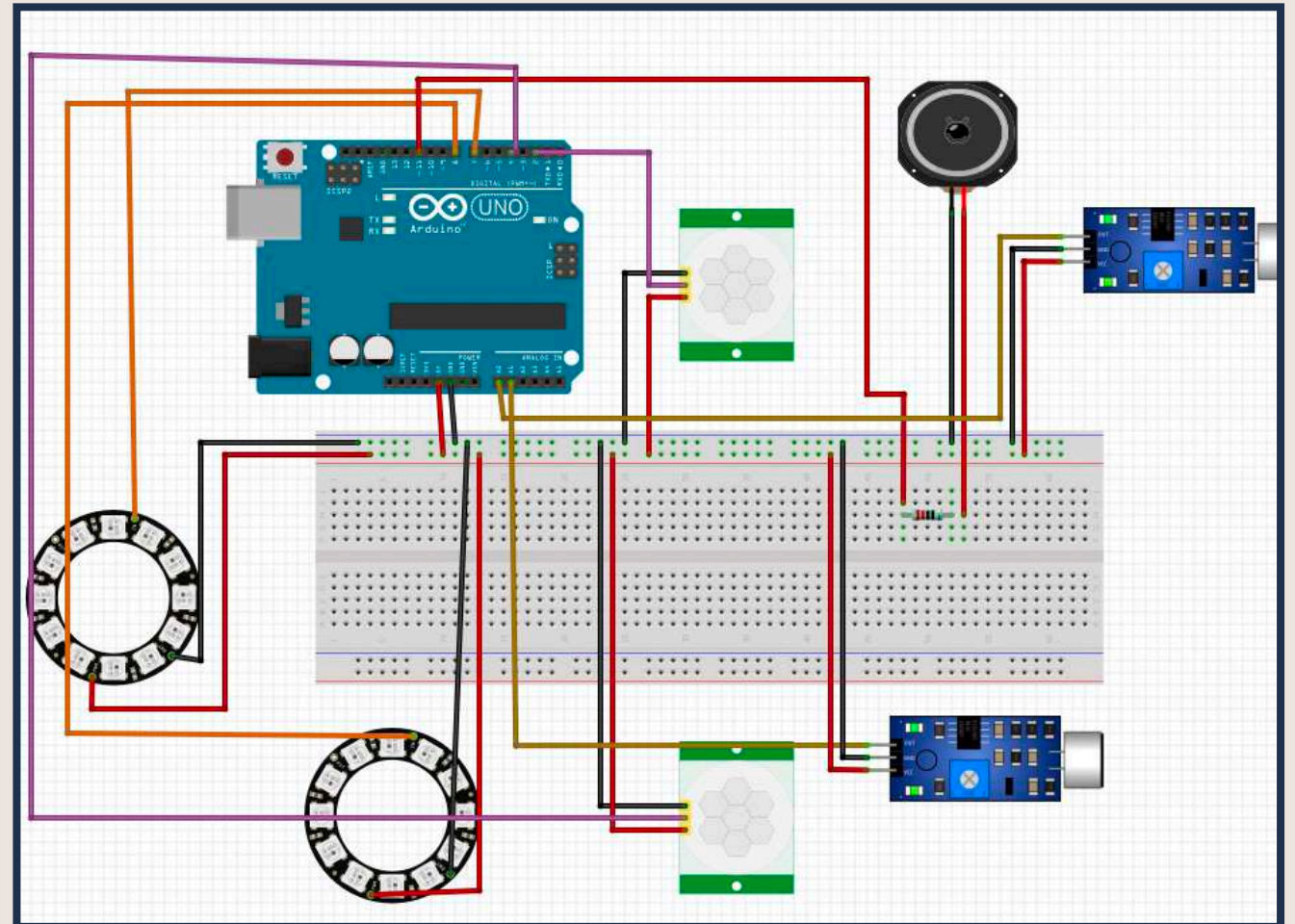


Input

1. Two PIR sensors - When the audience approaches, the installation starts to work
2. Two analog sound sensors - Calculate the rate of breathing

Output

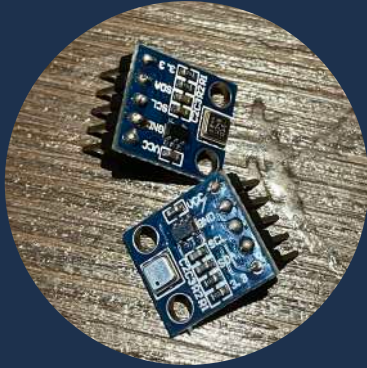
1. two LED rings - Display the breathing rate by alternating between light and dark
2. one speaker - Make noise



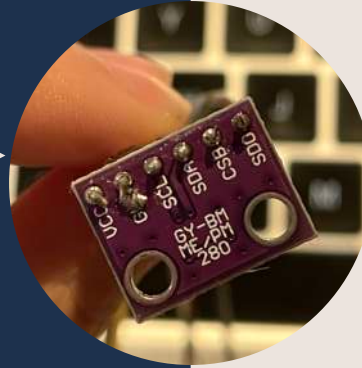
Sensors 11.10 -12.6

During tests, we found that some of the sensors did not work as we would like them to and replaced them.

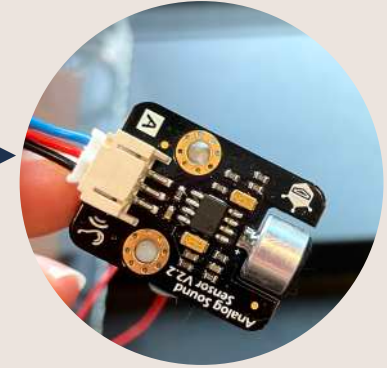
5



BMP 180 air pressure sensor



BME 280 air pressure sensor



analog sound sensor



DC motor



servo



speaker

After changing our sensors, we modified the code.



Lasted Code 11.4 -12.6

```
#include <Adafruit_Sensor.h>
#include <Adafruit_NeoPixel.h>

#define PIRPINA 2
#define PIRPINB 4
#define LEDPINA 7
#define LEDPINB 8
#define BUZZER 12

#define NUMPIXELS 12 //number of pixels on the light

int cnt = 0; // To calculate the time it takes for two people to breathe at the same rate
int thresholdVal = 20; //To distinguish between breathing in and out. When the pressure is greater than thresholdVal, it means there are people in front of the installation.

Adafruit_NeoPixel pixelA(NUMPIXELS, LEDPINA, NEO_GRB + NEO_KHZ800); //set up the neo pixels
Adafruit_NeoPixel pixelB(NUMPIXELS, LEDPINB, NEO_GRB + NEO_KHZ800);

/*Functions that control the pixels*/
void set_Light_A_On();
void set_Light_B_On();
void set_Light_A_Off();
void set_Light_B_Off();

void setup()
{
  Serial.begin(9600);

  /*set up the pinmodes*/
  pinMode(PIRPINA, INPUT);
  pinMode(PIRPINB, INPUT);
  pinMode(LEDPINA, OUTPUT);
  pinMode(LEDPINB, OUTPUT);
  pinMode(BUZZER, OUTPUT);

  /*set up the pixels*/
  pixelA.begin();
  pixelA.show();
  pixelA.setBrightness(50);

  pixelB.begin();
  pixelB.show();
  pixelB.setBrightness(50);

  digitalWrite(BUZZER, LOW);
}
```

```
void loop()
{
  int pirValA = digitalRead(PIRPINA);
  int pirValB = digitalRead(PIRPINB);
  Serial.print("pirA:");
  Serial.println(pirValA);
  Serial.print("pirB:");
  Serial.println(pirValB);

  int pressureA = analogRead(0);
  Serial.print("pressureA:");
  Serial.println(pressureA);

  int pressureB = analogRead(1);
  Serial.print("pressureB:");
  Serial.println(pressureB);

  if (pirValA == HIGH && pirValB == HIGH) //There are people in front of both installations
  {
    if (pressureA >= thresholdVal && pressureB >= thresholdVal) //The two people are both breathing
    {
      set_Light_A_On();
      Serial.println("light A on");

      set_Light_B_On();
      Serial.println("light B on");

      cnt++;
    }
    else if (pressureA < thresholdVal && pressureB < thresholdVal) //The two people are both not breathing
    {
      set_Light_A_Off();
      Serial.println("light A off");

      set_Light_B_Off();
      Serial.println("light B off");

      cnt++;
    }
    else if (pressureA >= thresholdVal && pressureB < thresholdVal)
    {

```

```
      set_Light_A_On();
      Serial.println("light A on");

      set_Light_B_Off();
      Serial.println("light B off");

      cnt = 0;
    }
  }

  else if (pressureA < thresholdVal && pressureB >= thresholdVal)
  {
    set_Light_A_Off();
    Serial.println("light A off");

    set_Light_B_On();
    Serial.println("light B on");

    cnt = 0;
  }

  if (cnt >= 3) //The two people have been breathing at the same rate for a while
  {
    tone(BUZZER, 0); //To stop the noise

    delay(5000);
    cnt = 0;
  }

  else if (cnt < 3)
  {
    digitalWrite(BUZZER, HIGH);
    tone(BUZZER, 1000);

    delay(100);
  }

  Serial.print("cnt:");
  Serial.println(cnt);
}
```

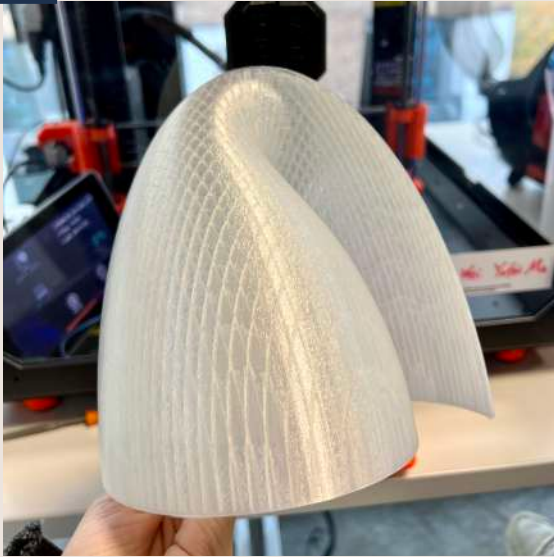
```
void set_Light_A_On()
{
  for (int i = 0; i < NUMPIXELS; i++)
  {
    pixelA.setPixelColor(i, pixelA.Color(255, 255, 255));
    pixelA.show();
  }
}

void set_Light_B_On()
{
  for (int i = 0; i < NUMPIXELS; i++)
  {
    pixelB.setPixelColor(i, pixelB.Color(255, 255, 255));
    pixelB.show();
  }
}

void set_Light_A_Off()
{
  for (int i = 0; i < NUMPIXELS; i++)
  {
    pixelA.clear();
    pixelA.show();
  }
}

void set_Light_B_Off()
{
  for (int i = 0; i < NUMPIXELS; i++)
  {
    pixelB.clear();
    pixelB.show();
  }
}
```

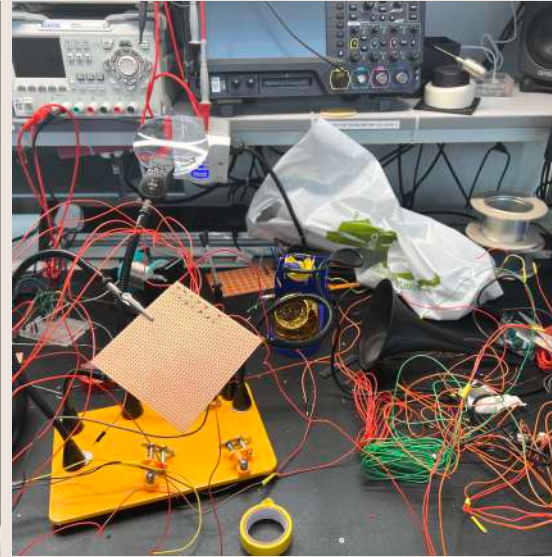
Production Process 11.20 -12.6



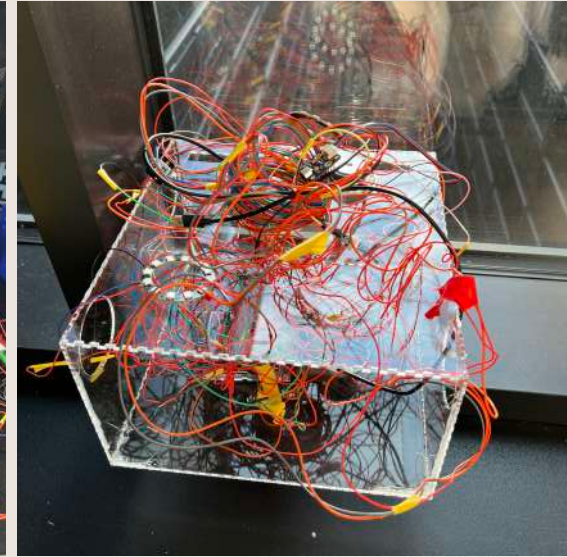
3D printing - two lights



3D printing - two horns
Buy two microphone stands

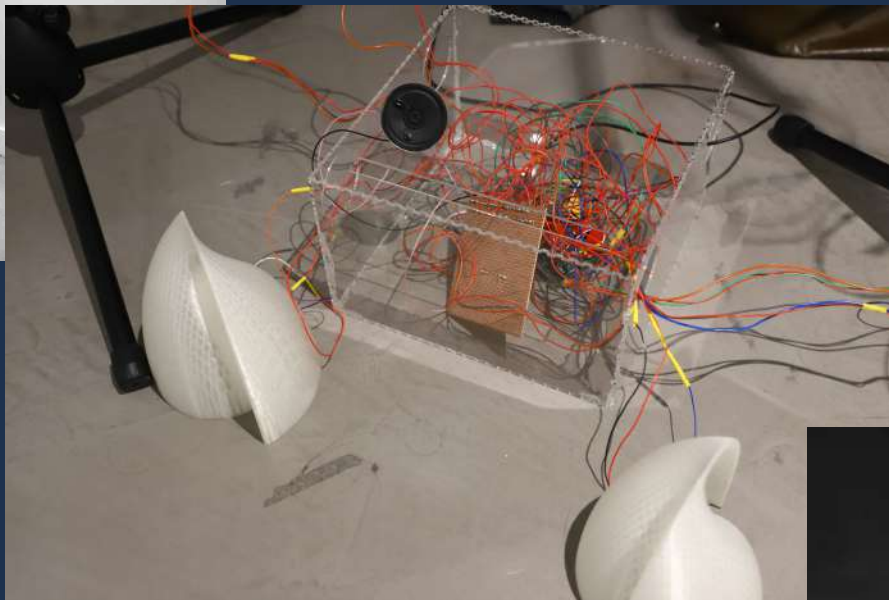


soldering



laser cutting - a box

It took us two weeks to finally create the installation. There were over ten failed 3d printing attempts, one failed laser cutting attempt and over thirty soldering attempts on the wires.



Our Installation

Finished by 12.7

The video of our presentation: <https://youtu.be/OAuP475TpXw>



Future Possibility



As language becomes lacking, new ways of socialising emerge in society, with people using less words and limbs and changing to "breathing socially".



The development of a product of the same frequency breathing device might be used in the disabled community as a bridge to the deaf and dumb.



Since our sensors are analog sound sensors, they can not only calculate the breathing rate but also reflect non-human sounds. Objects around us (such as electrical devices and vehicles) and our pets can all be harmonised with our sound to achieve a more comfortable relationship.

THANK YOU FOR WATCHING!



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