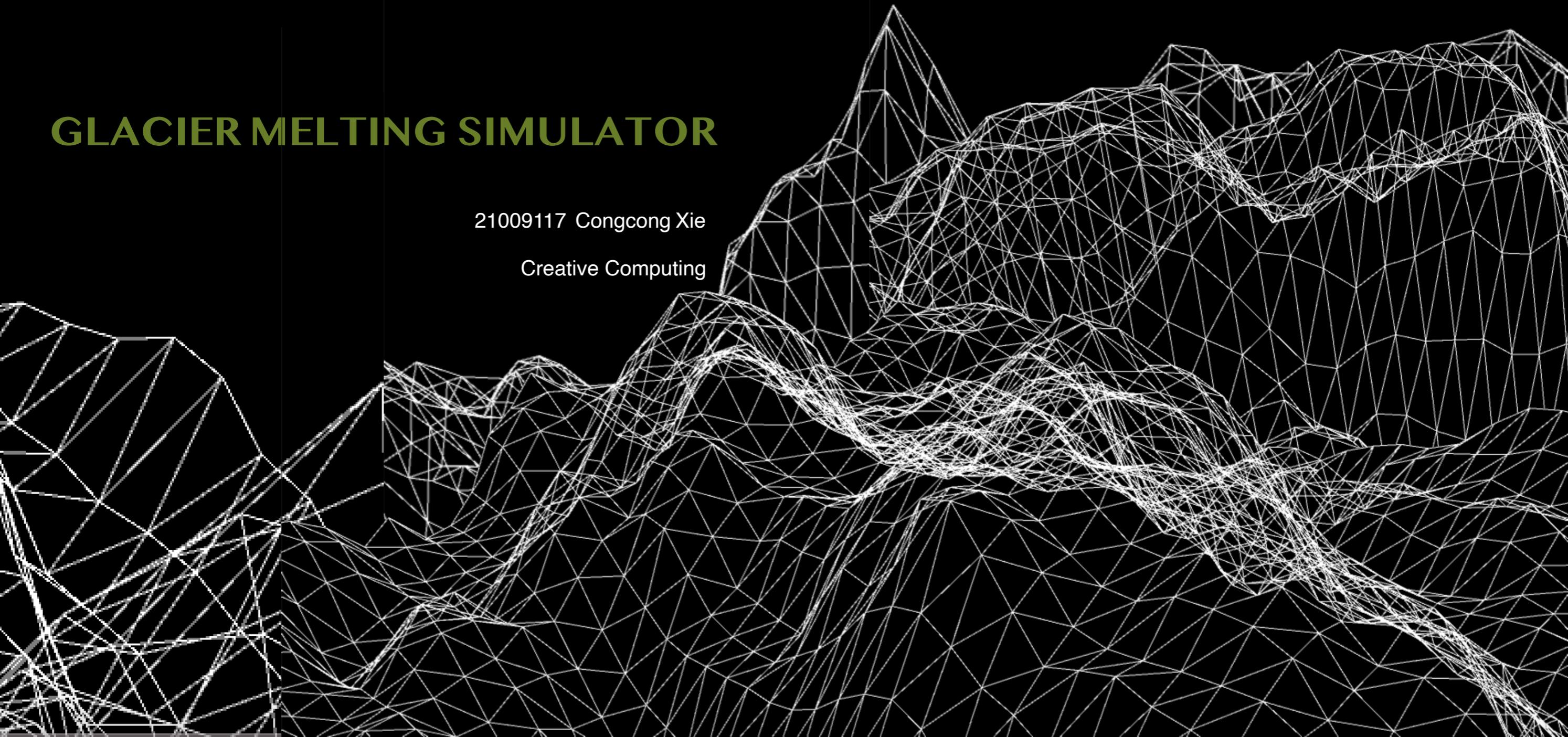


GLACIER MELTING SIMULATOR

21009117 Congcong Xie

Creative Computing

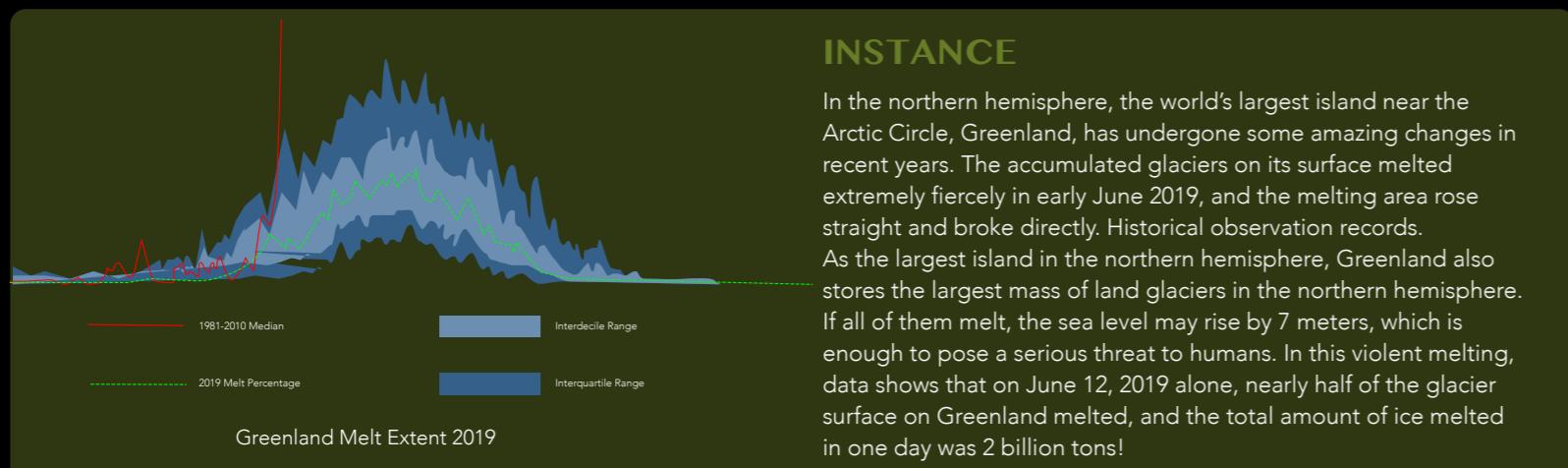


BACKGROUND

Because of the continuous environmental pollution, the earth has been seriously damaged, and the ecological system and the sustainable development of human beings have also been seriously threatened. Everyone should establish an awareness of environmental protection, and everyone has the responsibility to contribute to environmental protection.



Because people burn fossil fuels, view forests and burn them to produce a large amount of carbon dioxide, that is, greenhouse gas, which causes the earth's temperature to rise, which causes the melting of glaciers and the rise of sea levels, which endangers the balance of ecosystems and human survival.



INSPIRATION

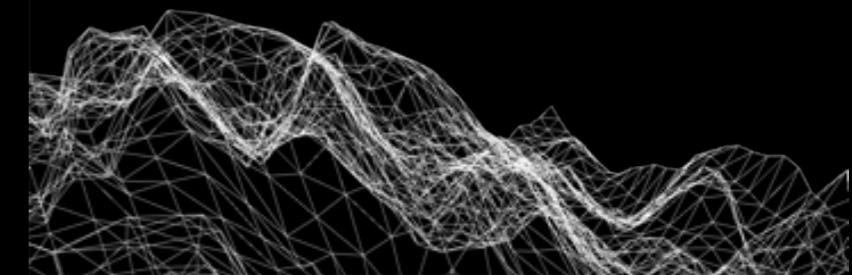
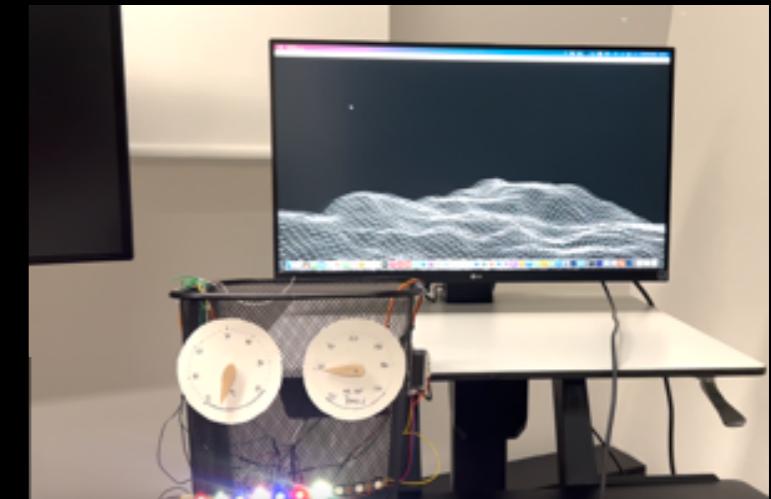
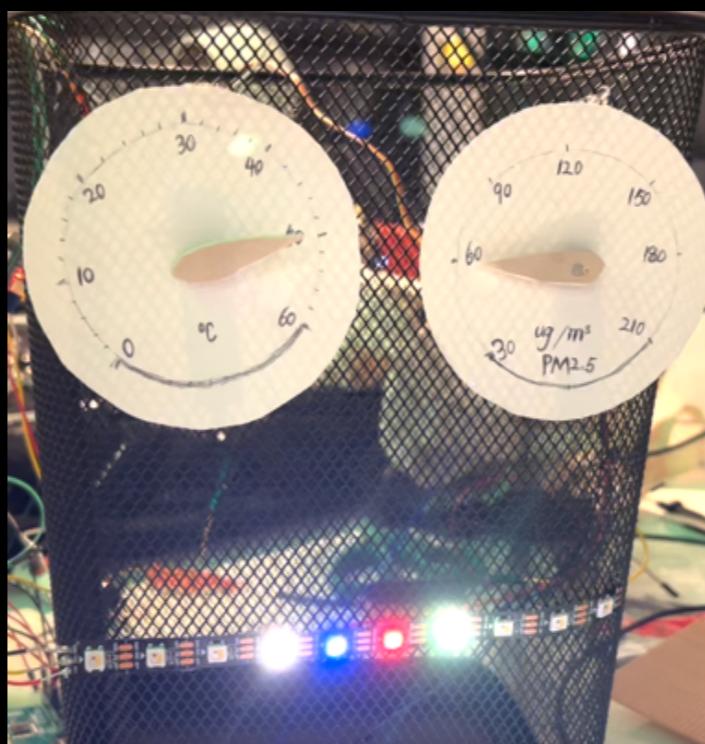
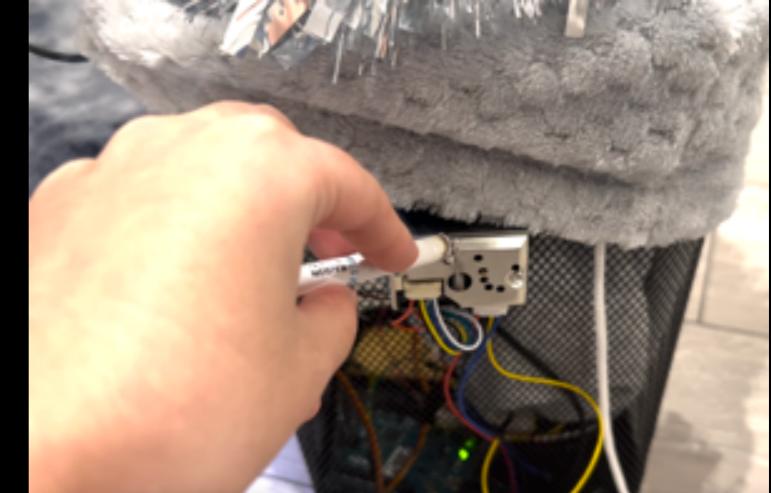
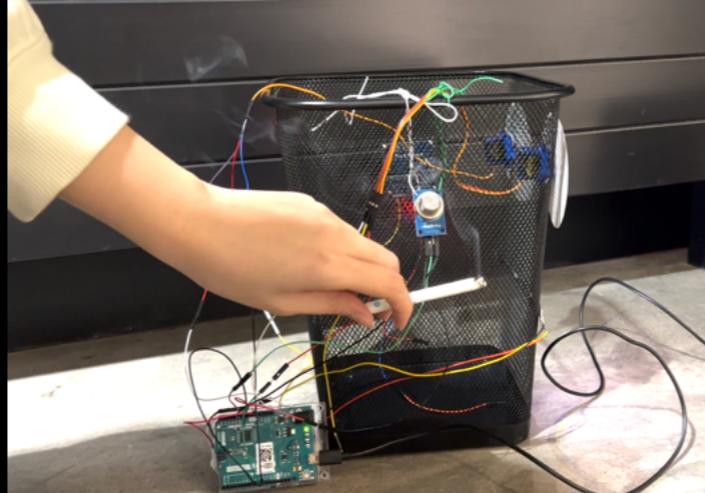
I have seen a picture before, showing a polar bear stepping on crushed ice and nowhere to go. This picture shocked me deeply, because from this picture, I can almost see the future of mankind itself: nowhere to go. The rapid melting of glaciers around the world brings about the first problem to the earth's ecology is the destruction of polar animal habitats. When the polar bear cannot walk freely on the glacier, that is when the species is getting closer and closer to extinction. When penguins cannot thrive in Antarctica, that is when we will never see them again. When the number of these animals decreases sharply, it also means that the living environment of human beings is also deteriorating sharply. The source of all this is environmental pollution, so I want to build a device that simulates the melting of glaciers, so that people can intuitively experience this phenomenon, thereby enhancing people's environmental awareness.



PROJECT INTRODUCTION

Most people have no idea about the melting of glaciers. In most people's minds, it is just a word, but they don't know how much harm it brings. Because people are very far away from glaciers, the sea level rises by 1-2 mm every year. Most people seem nothing, so I want to imitate this phenomenon in the form of a device, so that people can intuitively feel the changes of glacier melting and sea level rise, so as to enhance people's environmental awareness.

After the smoke sensor receives the smoke signal, it causes the left steering gear to rotate. The pointer on the steering gear indicates the temperature rise on the temperature dial. At the same time, the 5 LED lights on the left gradually light up, indicating that the temperature rises. When the PM2.5 sensor receives After the dust signal, the steering gear on the right is caused to rotate, and the pointer on the steering gear rotates on the PM2.5 dial, indicating that the value of PM2.5 increases, and the 5 LED lights on the right gradually light up. When the temperature and PM2.5 value increase, the Processing program is triggered, and the effect of the melting of the glacier is demonstrated. When the smoke gradually dissipated, the steering gear turned back to the original point, the LED light gradually went out, and the glacier on Processing stopped melting.

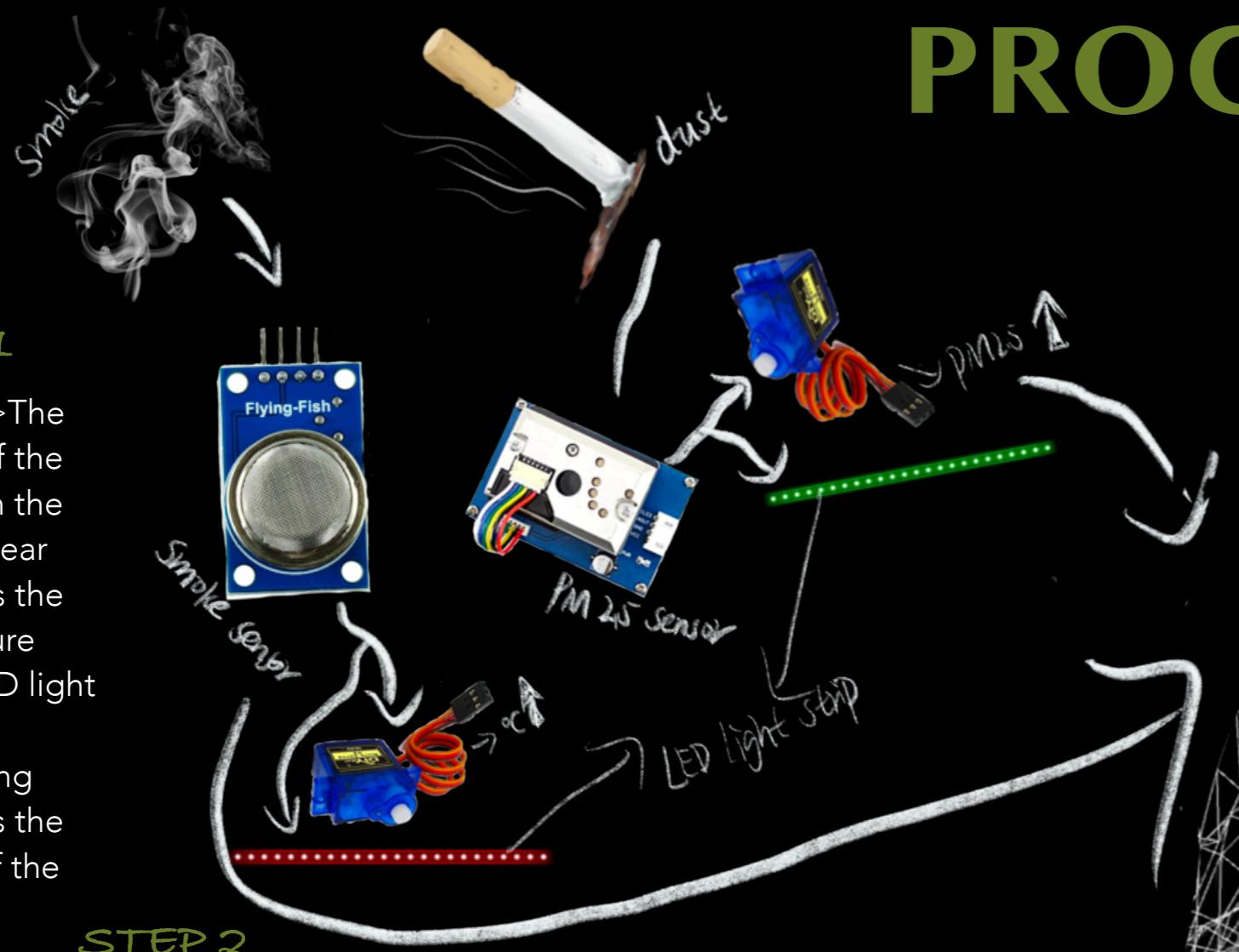


PROCESS

STEP 1

Smoke--->The rotation of the pointer on the steering gear represents the temperature rise--->LED light is on---

>Processing represents the melting of the glacier

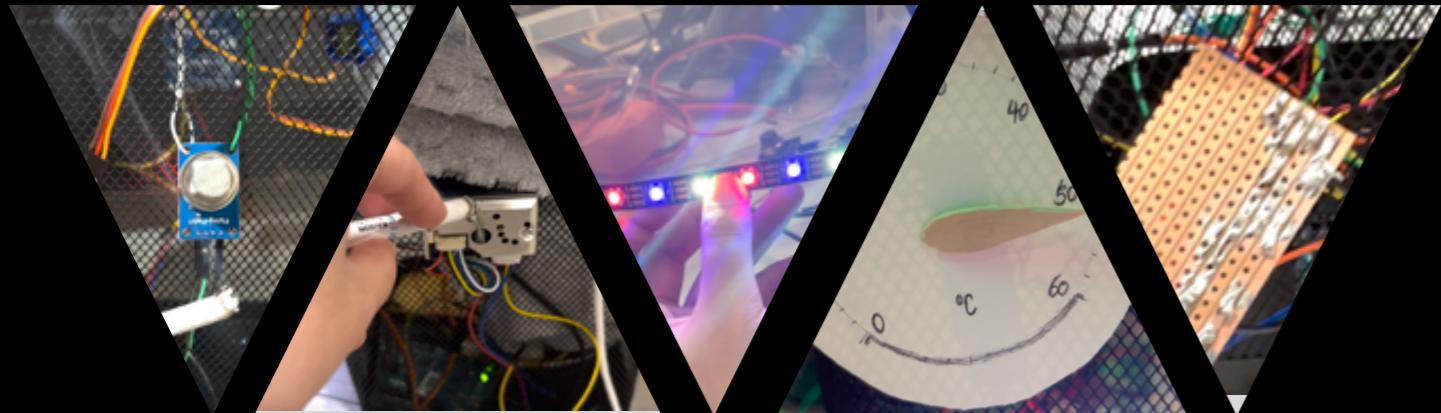
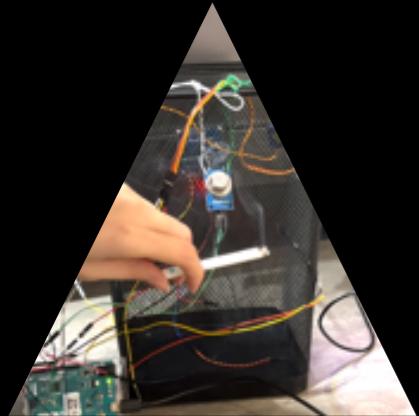


STEP 2

Dust--->The rotation of the pointer on the steering gear represents the increase of PM2.5--->LED lights are on--->Processing speeds up work, which means glaciers melt and accelerate



PROCESS 2

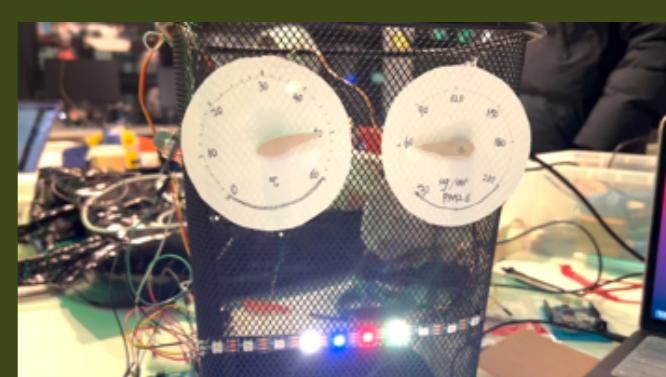
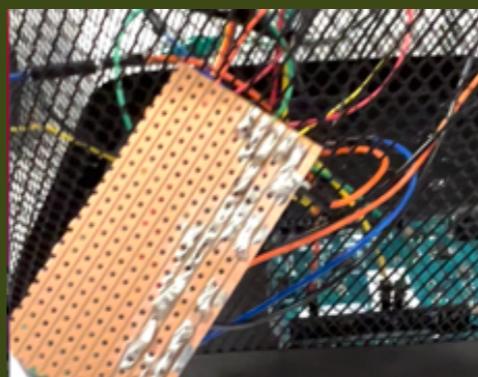


PROBLEM

- 1.Uno board power supply is insufficient
- 2.An error occurred in the welding of the hole plate
- 3.LED light strip code does not work according to instructions
- 4.The steering gear rotation angle is wrong
- 5.The value of the smoke sensor is too large when there is no smoke

SOLUTION

- 1.External 5V power supply
- 2.Re-welding
- 3.Find the standard code of the light strip
- 4.Adjust the dial
- 5.Find the standard code through the purchase link



CODING

Arduino



```
Dust | Arduino 1.8.16

Dust
//for sg90
#include <Servo.h>
#define PIN_SERVO 9
#define PIN_SERVO 18
Servo myservo,myservo2;

//for ws2812
#include <Adafruit_NeoPixel.h>
#ifndef __AVR__
#include <avr/power.h> // Required for 16 MHz Adafruit Trinket
#endif
#define PIN 8
#define NUMPIXELS 10
Adafruit_NeoPixel pixels(NUMPIXELS, PIN, NEO_GRB + NEO_KHZ800);
#define DELAYVAL 50

int count = 180;
int val = -10;
int angle = 0;
//for gp2y0100
int measurePin = A5;
int ledPower = 2;
unsigned int samplingTime = 280;
unsigned int deltaTime = 40;
//for mq2
int MQ2=0;
int val=0;
Adafruit_NeoPixel strip = Adafruit_NeoPixel(60, PIN, NEO_RGB + NEO_J)
void setup(){
  Serial.begin(9600);
  //for gp2y0100
  pinMode(ledPower,OUTPUT);
  //for ws2812
  #if defined(__AVR_ATtiny85__) && (F_CPU == 16000000)
  clock_prescale_set(clock_div_1);
  #endif
  pixels.begin(); // INITIALIZE NeoPixel strip object (REQUIRED)
  //for sg90
  myservo.attach(PIN_SERVO);
  //for mq2
  pinMode(MQ2,INPUT);
  #if defined (__AVR_ATtiny85__)
  #if (F_CPU == 16000000) clock_prescale_set(clock_div_1);
  
```



```

  // End of trinket special code

  strip.begin();
  strip.setBrightness(50);
  strip.show(); // Initialize all pixels to "off"

}

void loop(){
  colorWipe(strip.Color(255, 0, 0), 50); // Red
  //for gp2y0100
  digitalWrite(ledPower,LOW);
  delayMicroseconds(samplingTime);
  valMeasured = analogRead(measurePin);
  delayMicroseconds(deltaTime);
  digitalWrite(ledPower,HIGH);
  delayMicroseconds(sleepTime);
  calcVoltage = valMeasured*(5.0/1024);
  dustDensity = 0.17*calcVoltage-0.1;
  if (dustDensity < 0)
  {
    dustDensity = 0.00;
  }

  val=analogRead(MQ2);
  if(val>300){
    colorWipe(strip.Color(255, 0, 0), 50); // Red
  }
  if(dustDensity>0.2){
    colorWipe(strip.Color(255, 0, 0), 50); // Red
  }

  // for sg90

  int angle1 = map(val,100,660,360,0);
  int angle2 = map(dustDensity,0.0,0.5,360,0);

  myservo.write(angle1);
  myservo2.write(angle2);
  Serial.println(angle1);
  // Serial.println(angle1);
  delay(500);
  // Serial.println(dustDensity);
  myservo.write(angle1);
  Serial.println(angle1);
  // Serial.println(angle1);
  delay(500);
  // Serial.println(dustDensity);

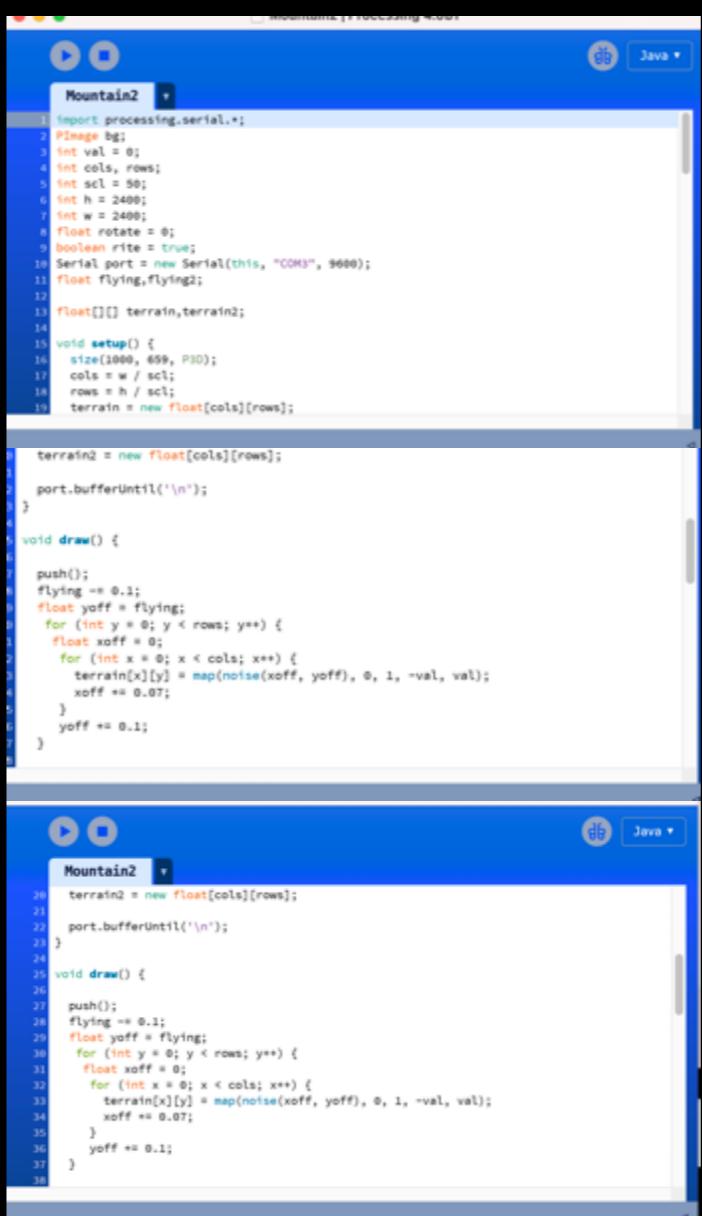
  // delay(1000);
}

void colorWipe(uint32_t c, uint8_t wait) {
  for(uint16_t i=0; i<20; i++) {
    strip.setPixelColor(i, c);
  }
  strip.show();
  delay(wait);
}

void colorWipe1(uint32_t c, uint8_t wait) {
  for(uint16_t i=0; i<20; i++) {
    strip.setPixelColor(i, c);
  }
  strip.show();
  delay(wait);
}

```

Processing



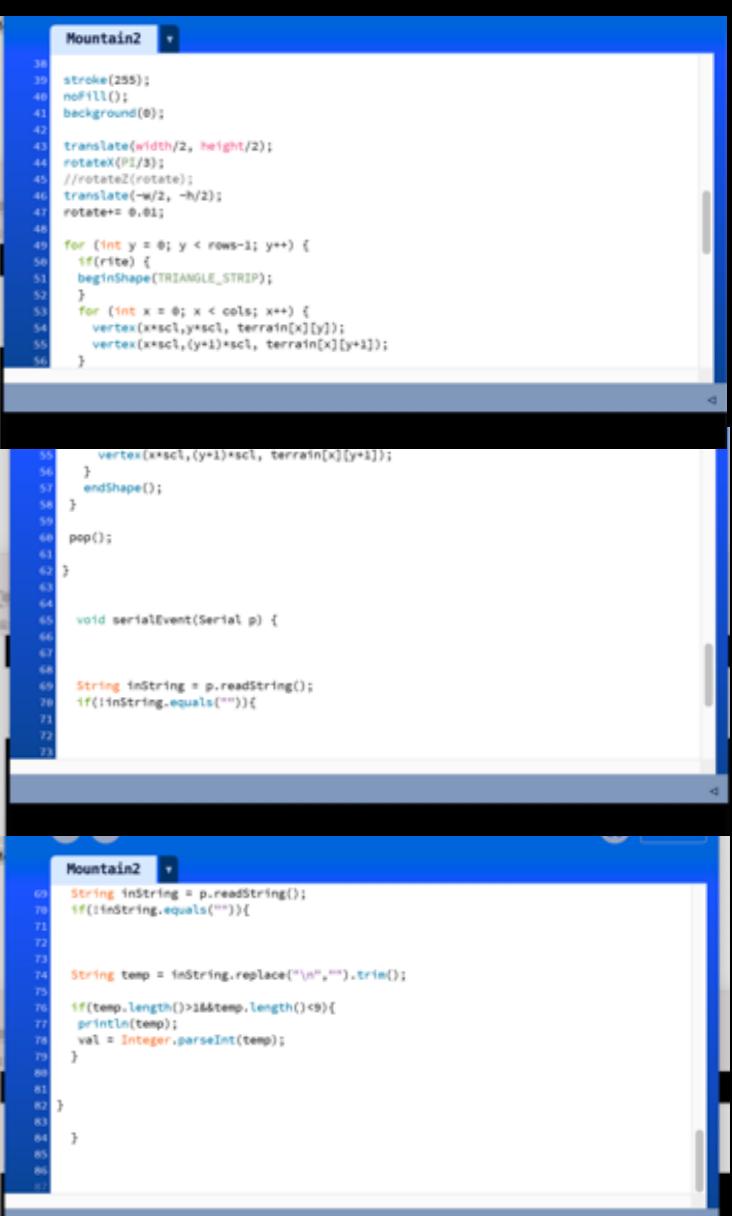
```
Mountain2 | Processing 3.5.2

import processing.serial.*;
PImage bg;
int val = 0;
int cols, rows;
int scl = 50;
int h = 2400;
int w = 2400;
float rotate = 0;
boolean rite = true;
Serial port = new Serial(this, "COM3", 9600);
float flying,flying2;
float[][] terrain,terrain2;
void setup() {
  size(1900, 650, P3D);
  cols = w / scl;
  rows = h / scl;
  terrain = new float[cols][rows];
}

void draw() {
  push();
  flying += 0.1;
  float yoff = flying;
  for (int y = 0; y < rows; y++) {
    float xoff = 0;
    for (int x = 0; x < cols; x++) {
      terrain[x][y] = map(noise(xoff, yoff), 0, 1, -val, val);
      xoff += 0.07;
    }
    yoff += 0.1;
  }
}

void serialEvent(Serial p) {
  String inString = p.readString();
  if(!inString.equals("")){
    port.bufferUntil('\n');
  }
}

String temp = inString.replace("\n","");
temp = temp.trim();
val = Integer.parseInt(temp);
}
```



```

stroke(255);
noFill();
background(0);

translate(width/2, height/2);
rotateX(pi/3);
//rotateZ(rotate);
translate(-w/2, -h/2);
rotate+= 0.01;

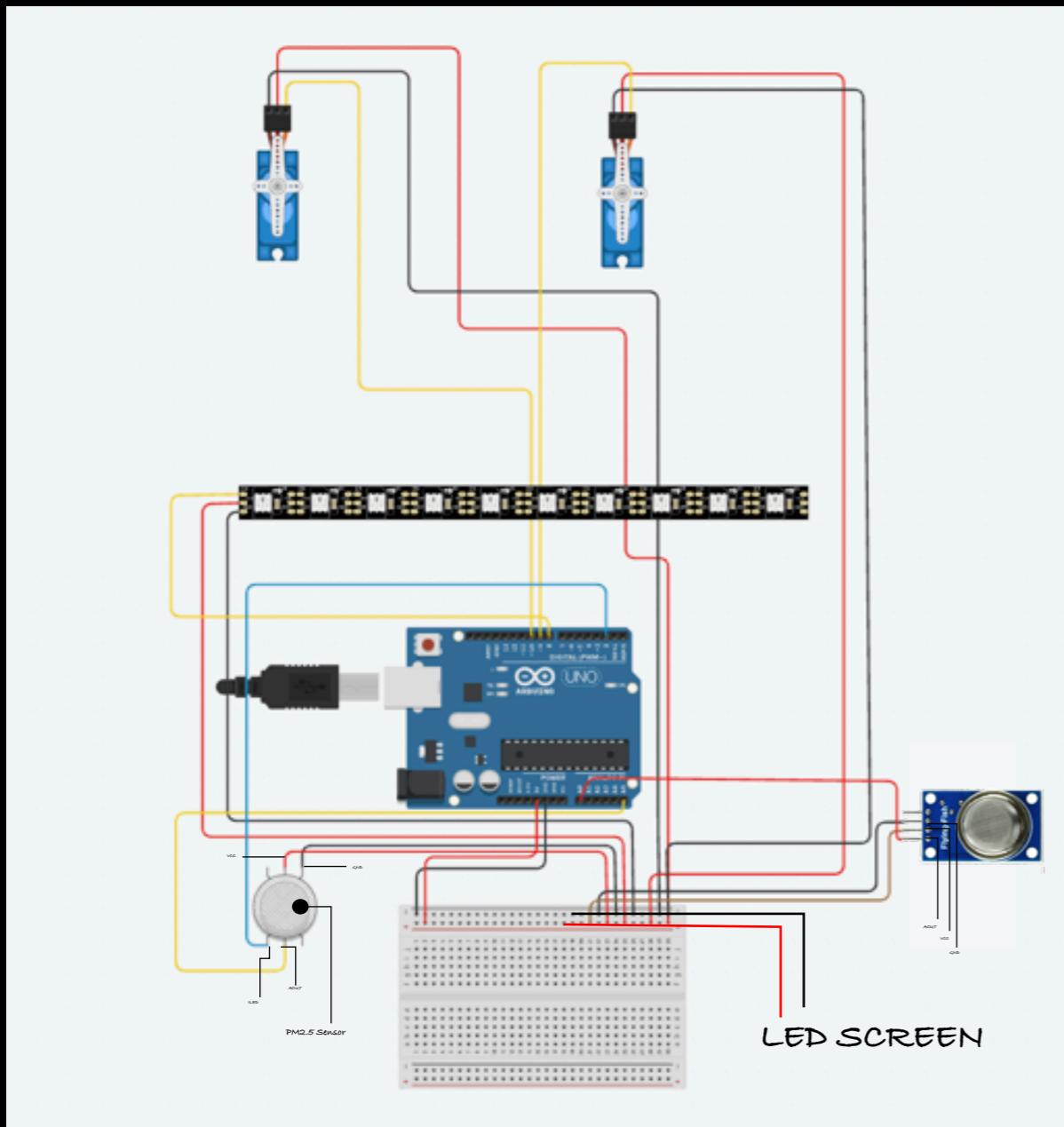
for (int y = 0; y < rows-1; y++) {
  if(rite) {
    beginShape(TRIANGLE_STRIP);
  }
  for (int x = 0; x < cols; x++) {
    vertex(x*scl,(y+1)*scl, terrain[x][y]);
    vertex(x*scl,(y+1)*scl, terrain[x][y+1]);
  }
  endShape();
}

pop();
}

void serialEvent(Serial p) {
  String inString = p.readString();
  if(!inString.equals("")){
    port.bufferUntil('\n');
  }
}

String temp = inString.replace("\n","");
temp = temp.trim();
val = Integer.parseInt(temp);
}
```

CIRCUIT DIAGRAM



FUTURE

People should raise awareness of environmental protection. This device allows people to clearly see the global temperature rise caused by air pollution, which leads to melting of glaciers and rising sea levels. I hope this device can make people aware of the harm of air pollution and improve Environmental awareness.



INPUT

Smoke Sensor

Dust Sensor

OUTPUT

Servo x 2

LED Light Strip

LED Screen

TINKERCAD URL

<https://www.tinkercad.com/things/kITkHlqlxE2-fantastic-juttuli/editel?tenant=circuits>

GitHub URL

<https://github.com/msc-creative-computing/p-comp-week-1-labs-EstheXCC>

VIDEO URL

https://youtu.be/ri1rs_P0H3M