TRACK-WATCH PRESENTATION

INTRODUCTION

This project presents Track Watch, a smart system that helps monitor daily activity and basic health data. It uses an ESP32 microcontroller and includes a heart rate sensor, accelerometer for movement tracking, and a temperature sensor. All information is shown clearly on an OLED display, making the watch easy to use and practical for everyday health monitoring.

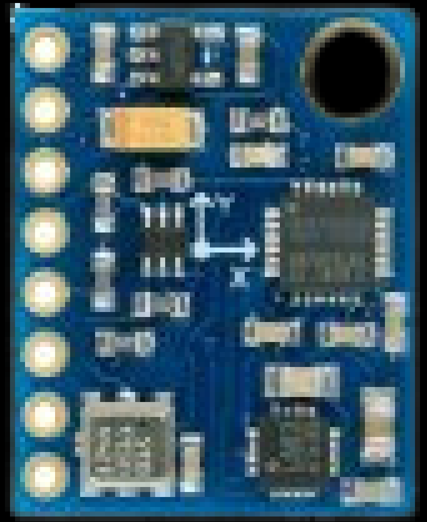
PROBLEM

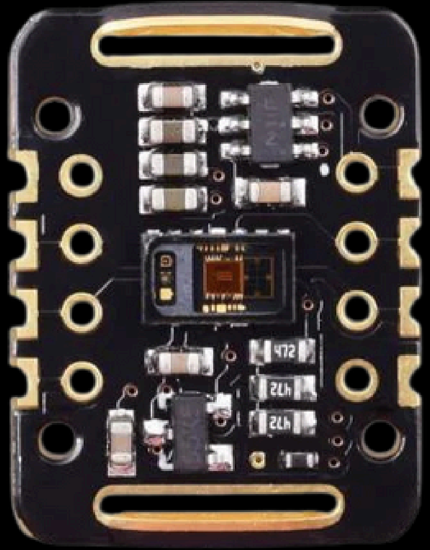
- The first problem was that we had not studied this topic at university yet. We only learned simple and basic ICs and logic gates.

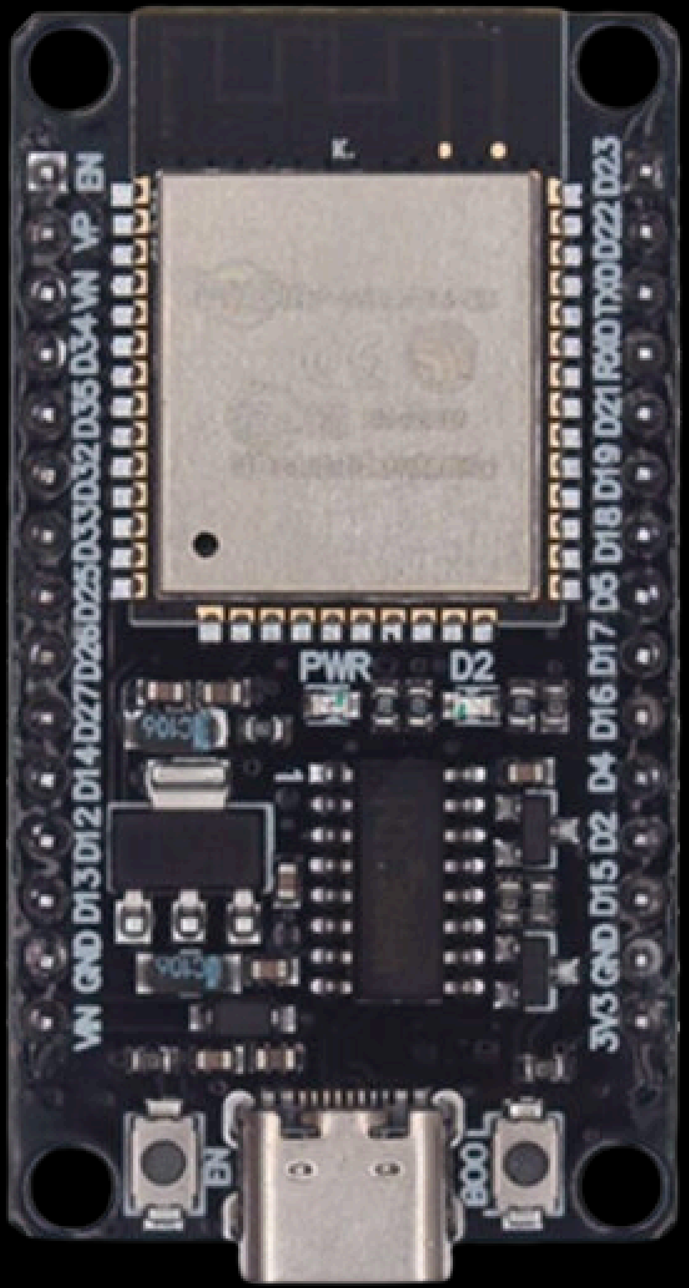
- The second problem was that we did not have a reference or example to follow, so we had to search across the internet to understand the topic and complete the work.

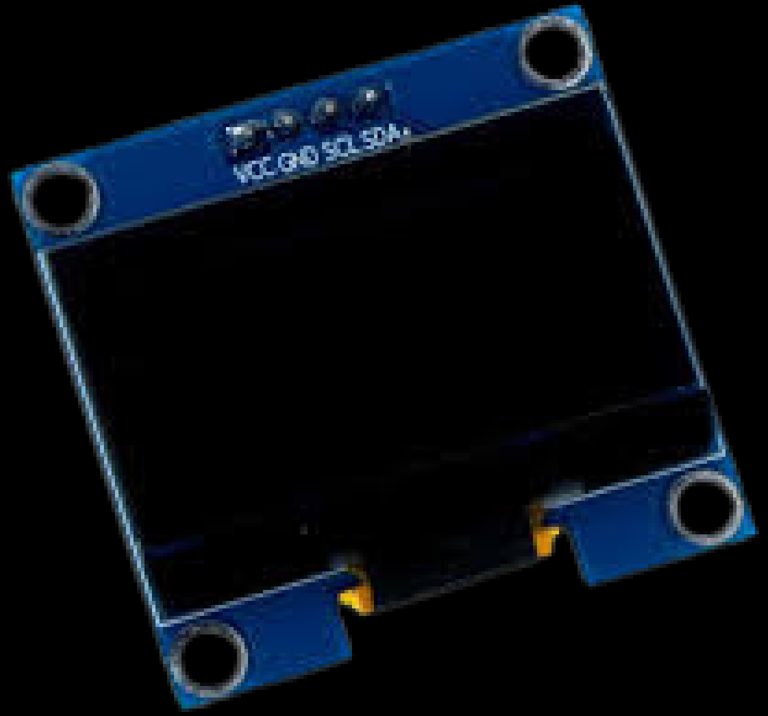
- The third problem was that we had no prior experience with ESP32 programming. We were unfamiliar with its coding environment, libraries, and how to interface it with hardware components.

ELECTRONIC PARTS

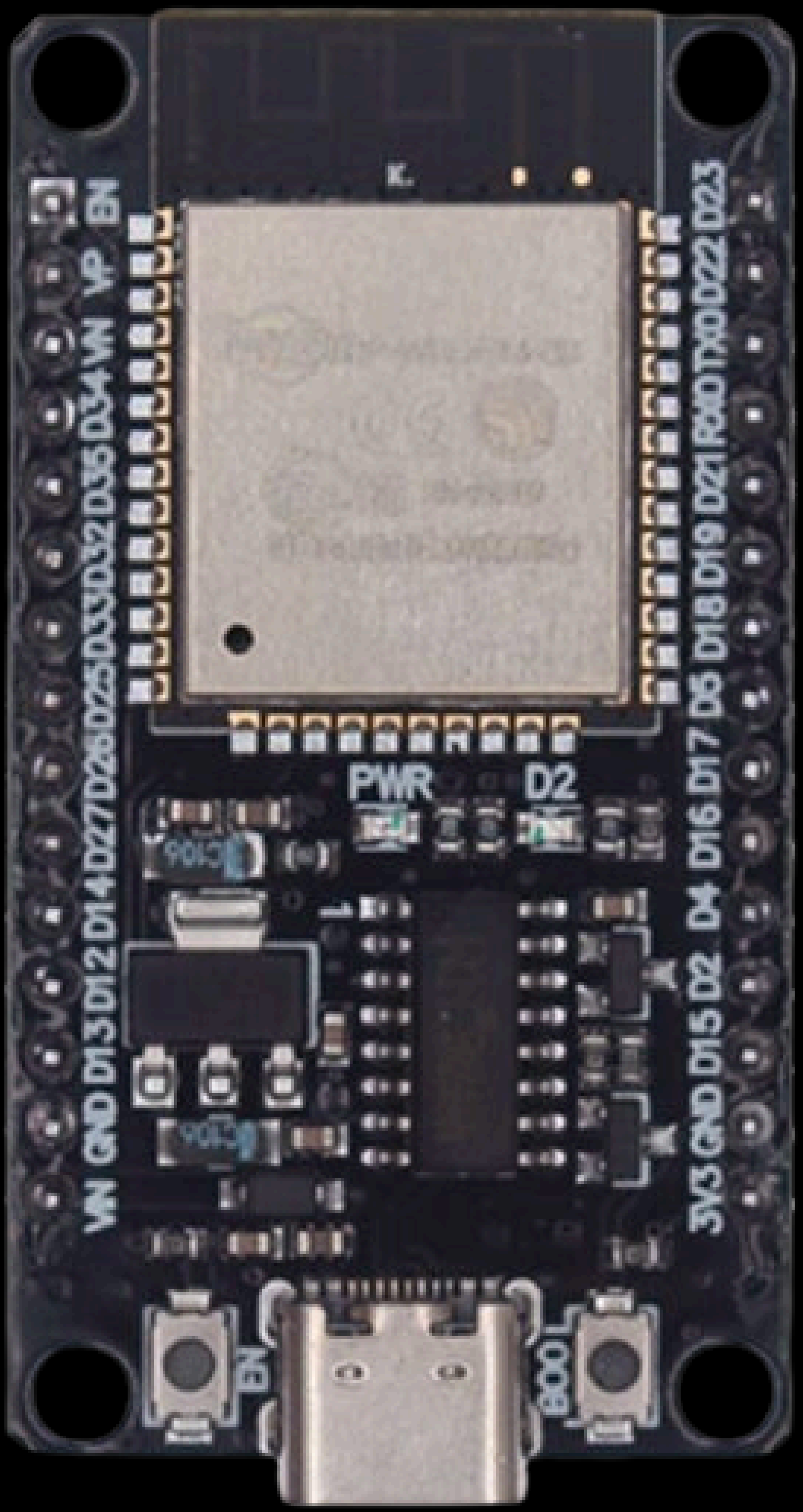








ESP32


EN
VP
VN
D34
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GND
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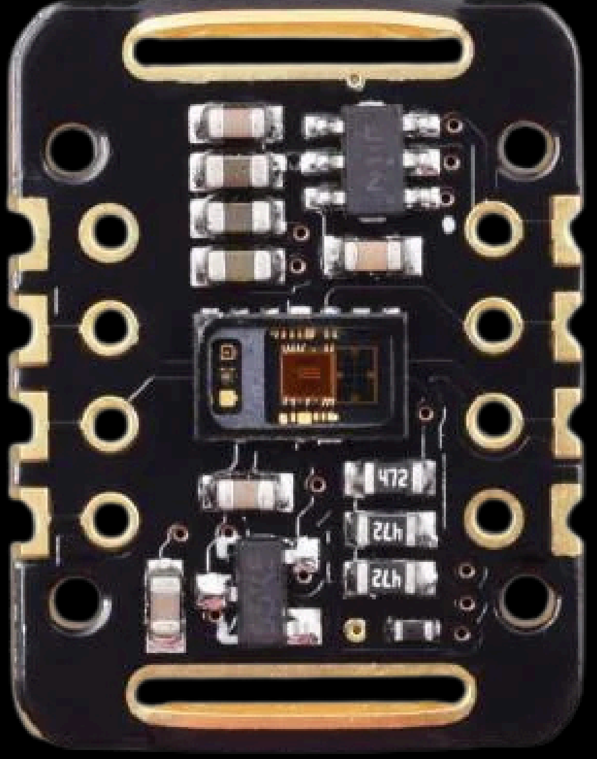
D22
TXO
RXO
D21
D19
D18
D5
D17
D16
D4
D2
D15
GND
3V3
PWR
D2
EN
BOOT

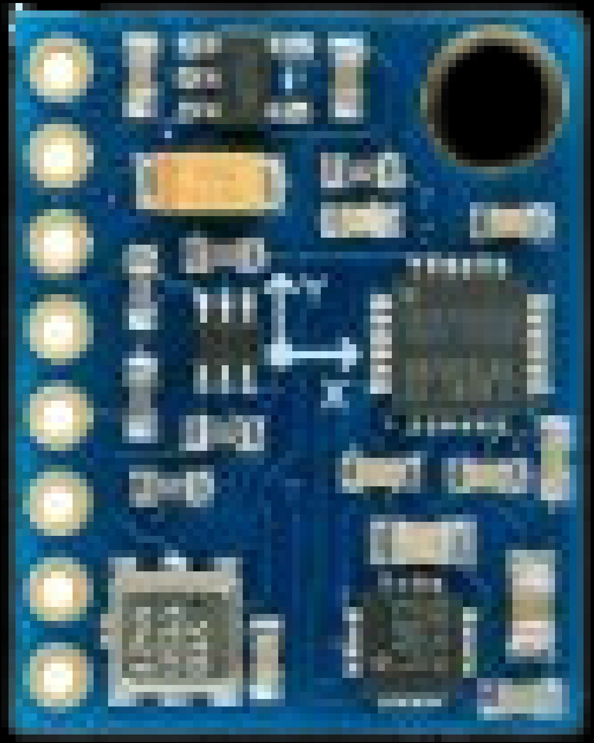
SENSORS

BLUE OLED DISPLAY

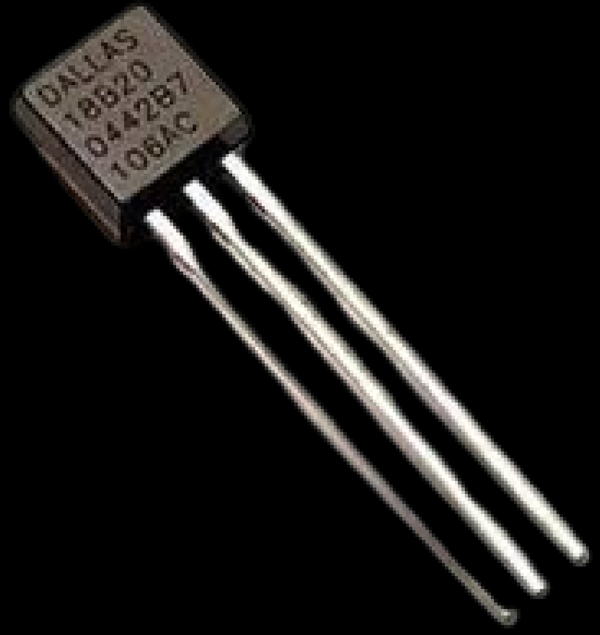
MAX 30102



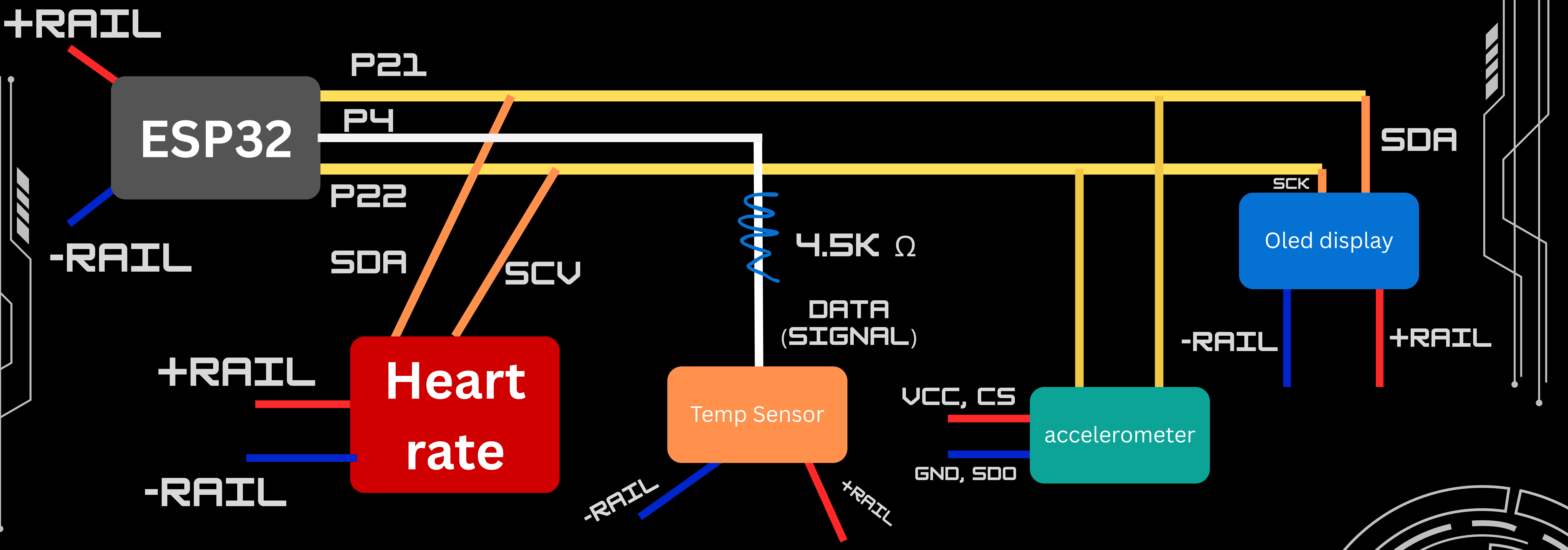
MPU-6050 3-AXIS



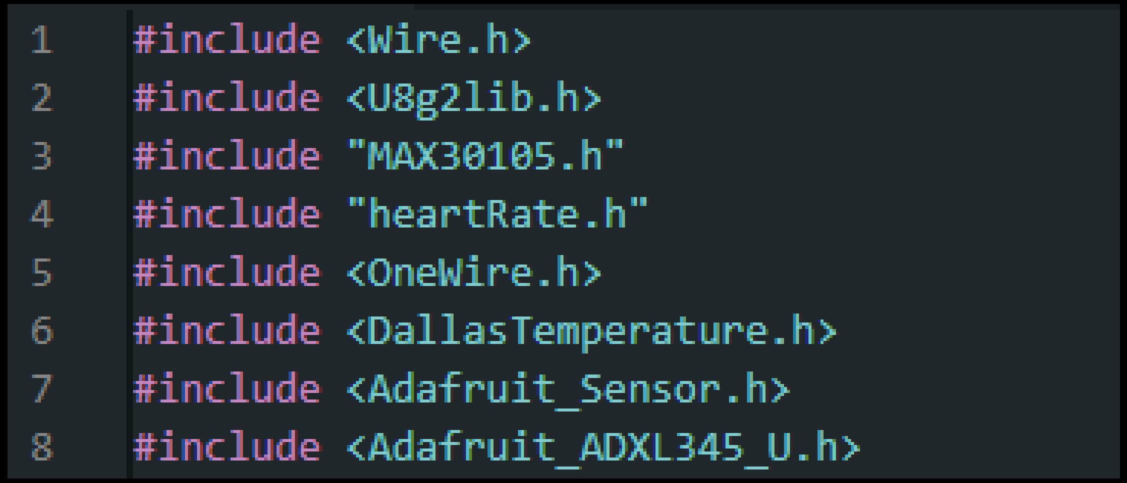
DS18B20



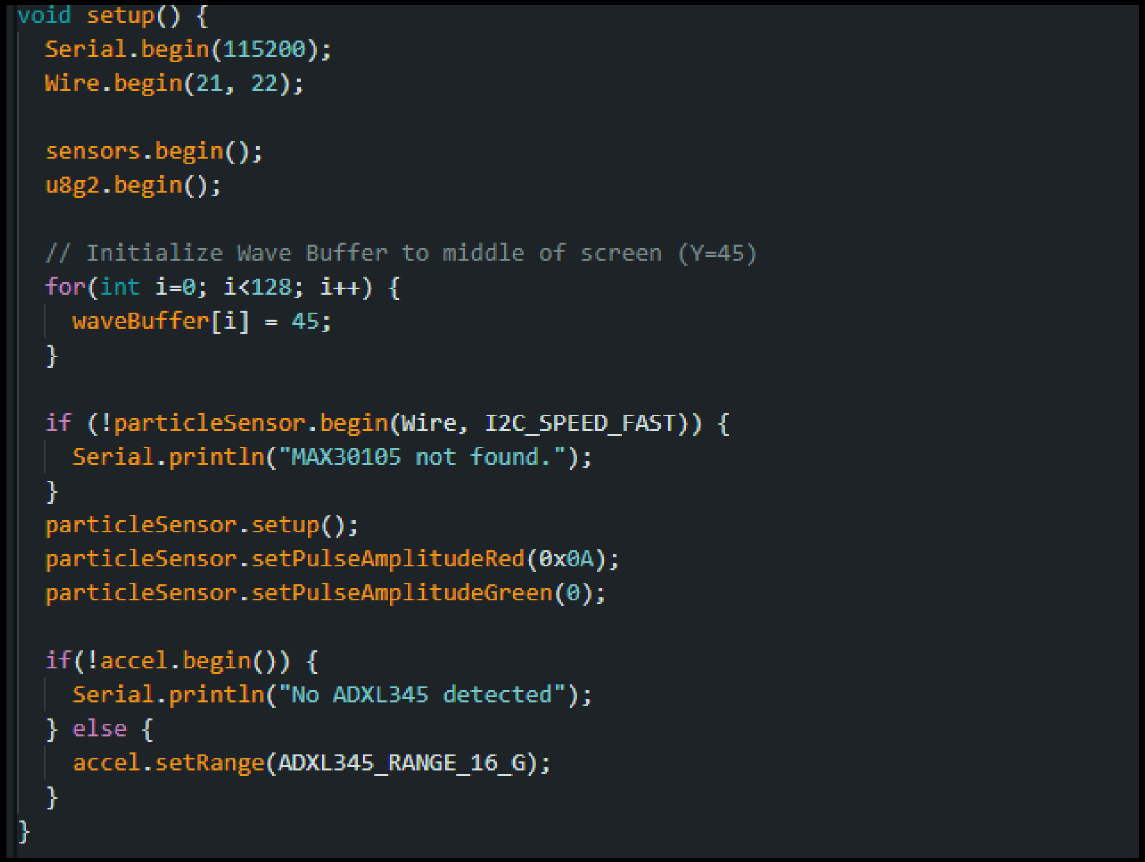
CONNECTIONS



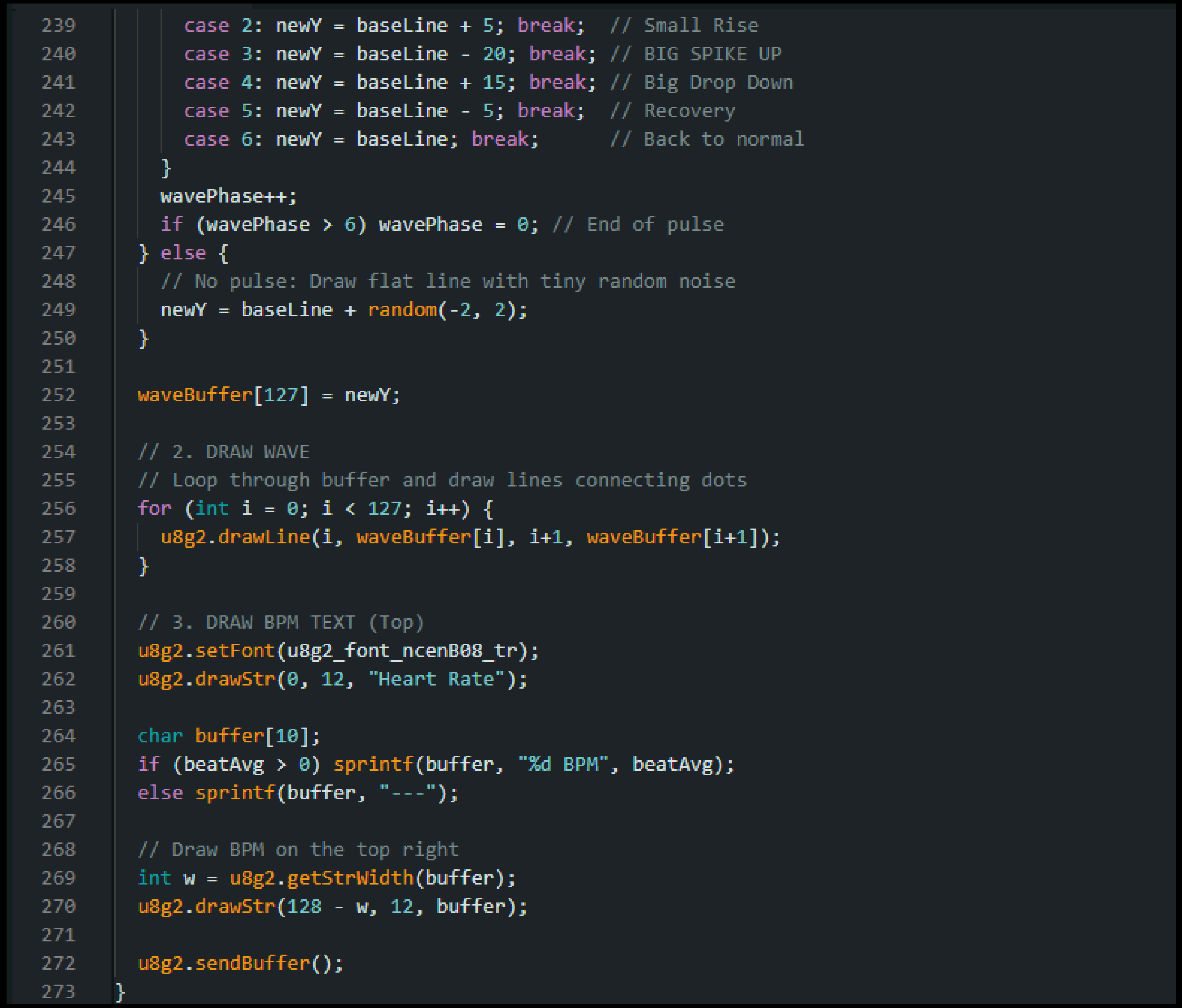
CODING PART



```
#include <Wire.h>
#include <U8g2lib.h>
#include "MAX30105.h"
#include "heartRate.h"
#include <OneWire.h>
#include <DallasTemperature.h>
#include <Adafruit_Sensor.h>
#include <Adafruit_ADXL345_U.h>
```

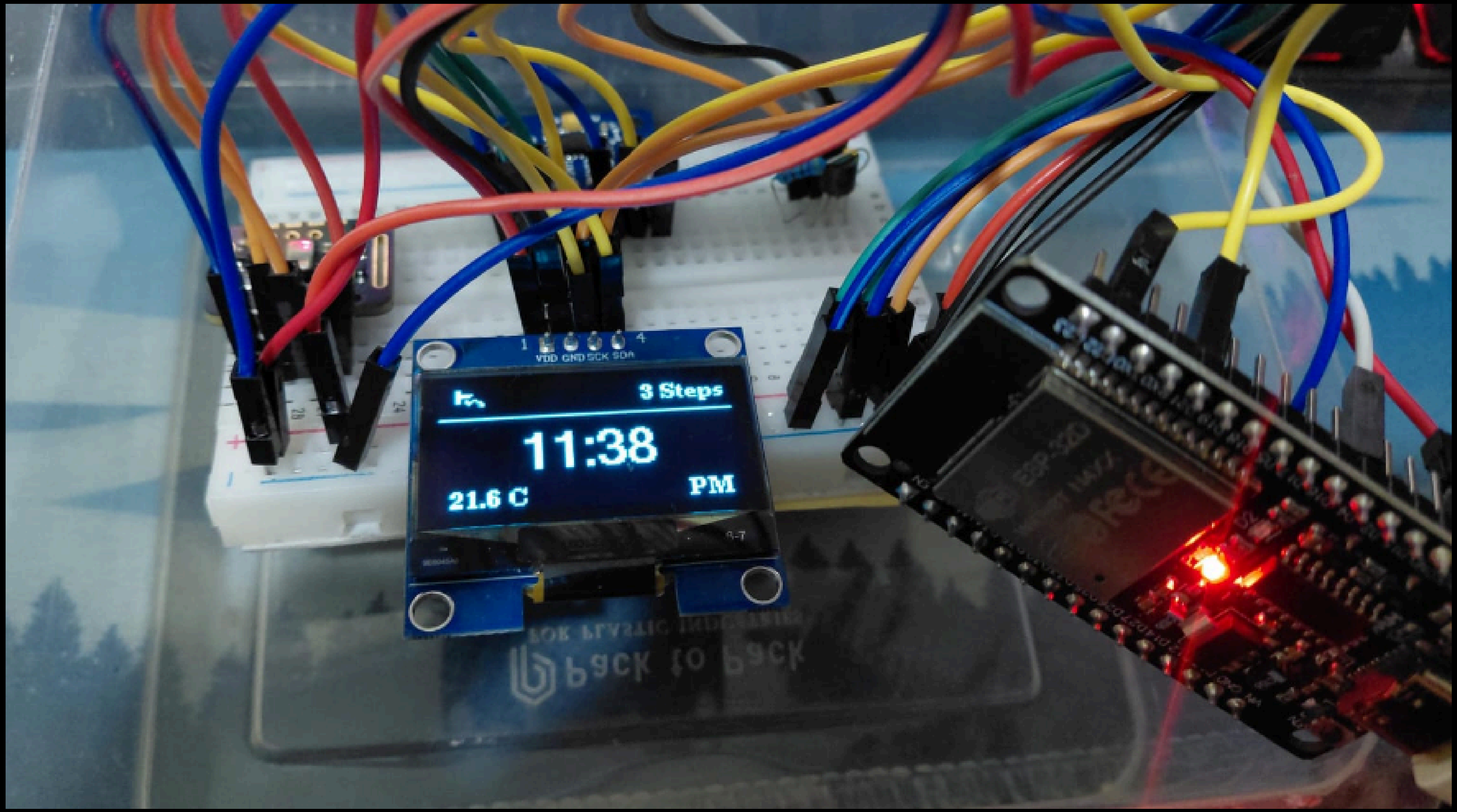


```
void setup() {
  Serial.begin(115200);
  Wire.begin(21, 22);

  sensors.begin();
  u8g2.begin();

  // Initialize Wave Buffer to middle of screen (Y=45)
  for(int i=0; i<128; i++) {
    waveBuffer[i] = 45;
  }

  if (!particleSensor.begin(Wire, I2C_SPEED_FAST)) {
    Serial.println("MAX30105 not found.");
  }
  particleSensor.setup();
  particleSensor.setPulseAmplitudeRed(0x0A);
  particleSensor.setPulseAmplitudeGreen(0);

  if(!accel.begin()) {
    Serial.println("No ADXL345 detected");
  } else {
    accel.setRange(ADXL345_RANGE_16_G);
  }
}
```



```
      case 2: newY = baseLine + 5; break;  // Small Rise
      case 3: newY = baseLine - 20; break; // BIG SPIKE UP
      case 4: newY = baseLine + 15; break; // Big Drop Down
      case 5: newY = baseLine - 5; break;  // Recovery
      case 6: newY = baseLine; break;      // Back to normal
    }
    wavePhase++;
    if (wavePhase > 6) wavePhase = 0; // End of pulse
  } else {
    // No pulse: Draw flat line with tiny random noise
    newY = baseLine + random(-2, 2);
  }

  waveBuffer[127] = newY;

  // 2. DRAW WAVE
  // Loop through buffer and draw lines connecting dots
  for (int i = 0; i < 127; i++) {
    u8g2.drawLine(i, waveBuffer[i], i+1, waveBuffer[i+1]);
  }

  // 3. DRAW BPM TEXT (Top)
  u8g2.setFont(u8g2_font_ncenB08_tr);
  u8g2.drawStr(0, 12, "Heart Rate");

  char buffer[10];
  if (beatAvg > 0) sprintf(buffer, "%d BPM", beatAvg);
  else sprintf(buffer, "---");

  // Draw BPM on the top right
  int w = u8g2.getStrWidth(buffer);
  u8g2.drawStr(128 - w, 12, buffer);

  u8g2.sendBuffer();
}
```

RESULT



CONCLUSION

In conclusion, our smartwatch combines advanced sensors and a user-friendly design to provide real-time health and activity monitoring. It not only tracks vital signs like heart rate and movement but also offers a convenient way for users to stay informed about their daily health. This project demonstrates how technology can enhance personal well-being and make daily life smarter and more connected.

THANK YOU