Hardware Wiring Guide

This document details the electrical connections between the ESP32 and the various health sensors.

⚠️ Important Safety Notes

- **Voltage Warning:** The MAX30102 and DS18B20 operate on **3.3V**. Connecting them to 5V will cause permanent damage.
- **MQ-3 Heater:** The MQ-3 requires **5V (VIN)** to power its internal heater.
- **Common Ground:** Ensure all sensors share a common ground with the ESP32.

1. Summary Pinout Table

Component	Component Pin	ESP32 Pin	Logic Level	Notes
MQ-3	VCC	VIN (5V)	5V	Heater Power
MQ-3	A0	GPIO 36 (VP)	3.3V (Scaled)	Requires Voltage Divider
DS18B20	VCC	3.3V	3.3V	
DS18B20	DATA	GPIO 4	3.3V	4.7kΩ Pull-up required
MAX30102	VIN	3.3V	3.3V	
MAX30102	SDA	GPIO 21	3.3V	I2C Data
MAX30102	SCL	GPIO 22	3.3V	I2C Clock

2. Component Detailed Wiring

MQ-3 Alcohol Sensor

The MQ-3 output ranges up to 5V. Since ESP32 pins are only 3.3V tolerant, a **voltage divider** is used.

- **VCC:** Connect to ESP32 `VIN` (5V).
- **GND:** Connect to ESP32 `GND`.
- **A0 (Analog):** Connect to the high side of the voltage divider.
- **Divider Setup:** 1. Place a **10kΩ resistor** between MQ-3 `A0` and ESP32 `GPIO 36`. 2. Place a **10kΩ resistor** between ESP32 `GPIO 36` and `GND`. *This scales the ~5V signal down to ~2.5V.*

DS18B20 Temperature Sensor

- **VCC (Right Pin):** Connect to ESP32 `3.3V`.
- **GND (Left Pin):** Connect to ESP32 `GND`.
- **DATA (Middle Pin):** Connect to ESP32 `GPIO 4`.
- **Pull-up Resistor:** Place a **4.7kΩ resistor** between the `DATA` pin and the `3.3V` rail.

MAX30102 Pulse Oximeter

- **VIN:** Connect to ESP32 `3.3V`.
- **GND:** Connect to ESP32 `GND`.
- **SDA:** Connect to ESP32 `GPIO 21`.
- **SCL:** Connect to ESP32 `GPIO 22`.

3. Passive Components List

- **1 x 4.7kΩ Resistor:** Pull-up for DS18B20.
- **2 x 10kΩ Resistors:** Voltage divider for MQ-3 protection.
- **1 x 100uF Capacitor (Optional):** Placed across `VIN` and `GND` to suppress power spikes during WiFi initialization.