

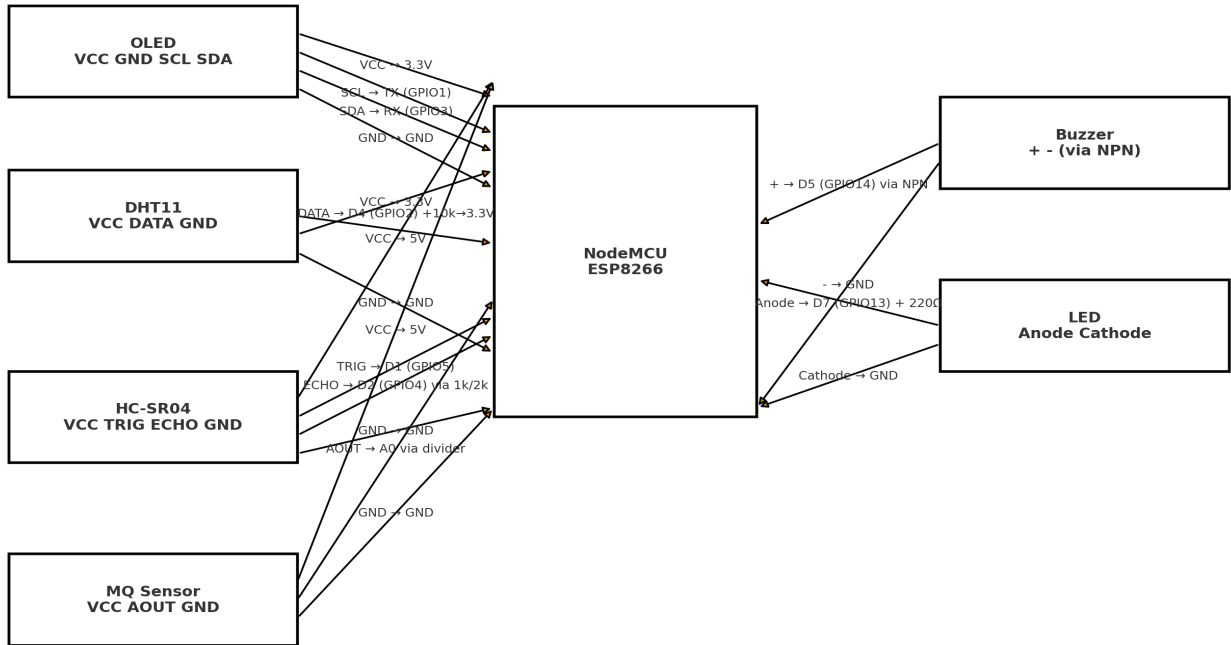
NodeMCU ESP8266 Project Wiring Guide

Complete wiring reference for NodeMCU ESP8266 project with OLED, DHT11, HC-SR04, MQ Sensor, Buzzer, and LED.

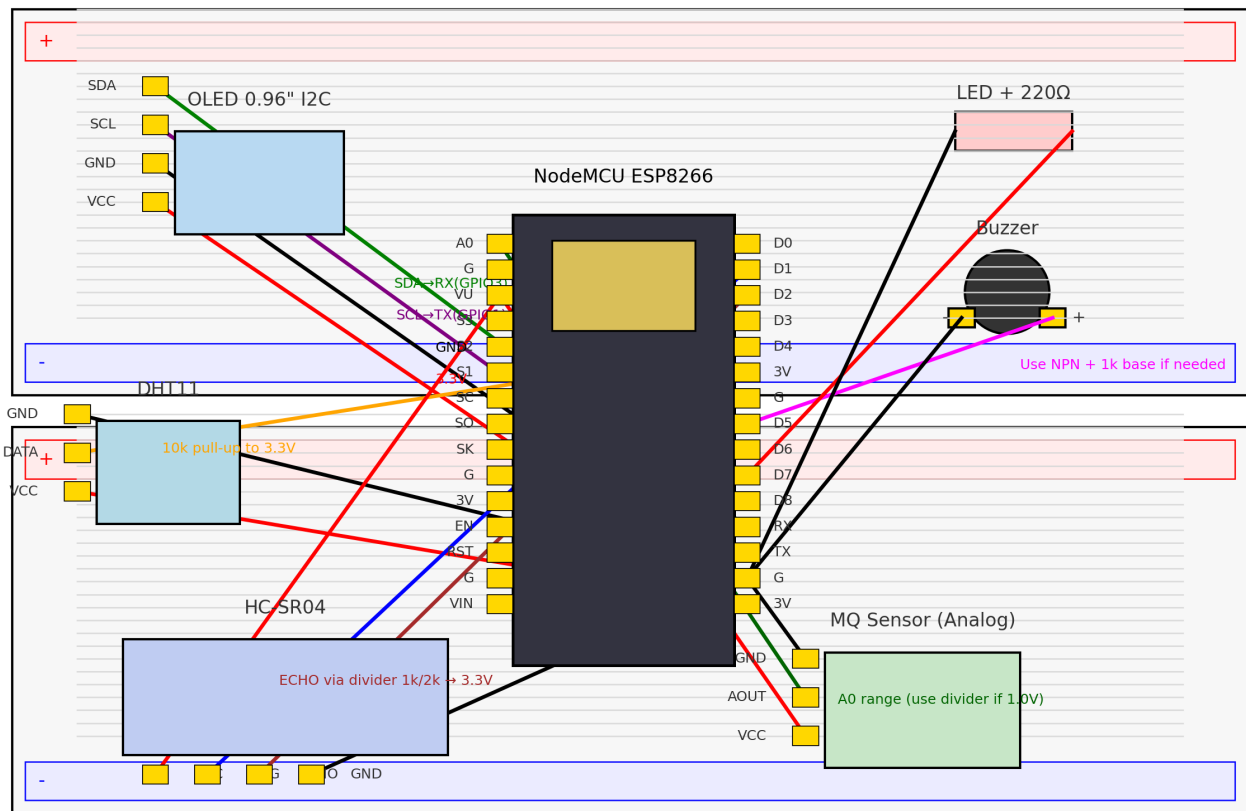
Wiring Table

| Component | Pin | NodeMCU Pin | GPIO | Notes |
|--------------------------|-----------|-------------|-----------|--|
| OLED (SSD1306 I2C) | VCC | 3.3V | | Power |
| OLED (SSD1306 I2C) | GND | GND | | Ground |
| OLED (SSD1306 I2C) | SCL | TX | GPIO12C | Clock (as per your table; typical is D1) |
| OLED (SSD1306 I2C) | SDA | RX | GPIO3 I2C | Data (as per your table; typical is D2) |
| DHT11 | VCC | 3.3V | | Power |
| DHT11 | DATA | D4 | GPIO2 | More data; add 10k pull-up to 3.3V if needed |
| DHT11 | GND | GND | | Ground |
| HC-SR04 | VCC | 5V | | Power |
| HC-SR04 | Trig | D1 | GPIO5 | Trigger |
| HC-SR04 | Echo | D2 | GPIO4 | Echo via 1k/2k divider to 3.3V |
| HC-SR04 | GND | GND | | Ground |
| MQ Gas Sensor (Analog) | VCC | 5V | | Power |
| MQ Gas Sensor (Analog) | GND | GND | | Ground |
| MQ Gas Sensor (Analog) | AOUT | A0 | A0 | ADC through divider to match A0 range (see note) |
| Buzzer (TMB12A12 active) | + | D5 | GPIO14 | Drive via NPN transistor + 1k base |
| Buzzer (TMB12A12 active) | - | GND | | Ground |
| LED (external) | Anode + | D7 | GPIO13 | Series 220Ω resistor |
| LED (external) | Cathode - | GND | | Ground |

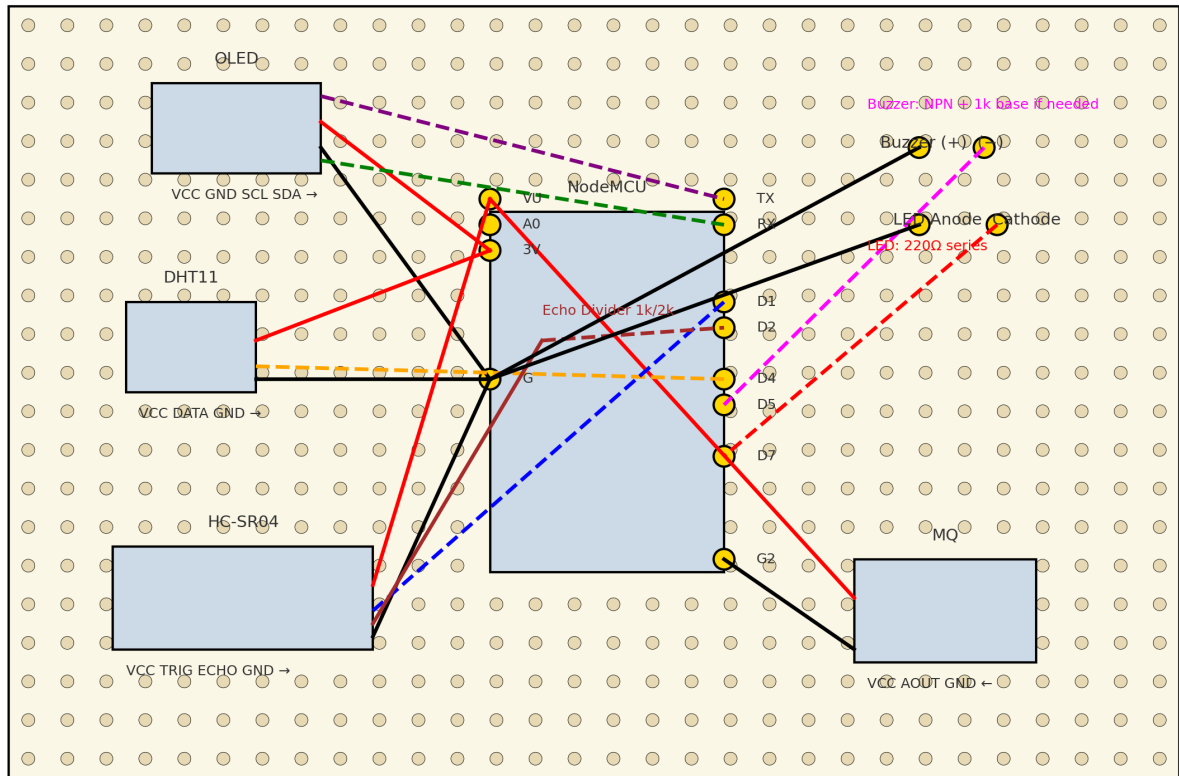
Schematic Diagram



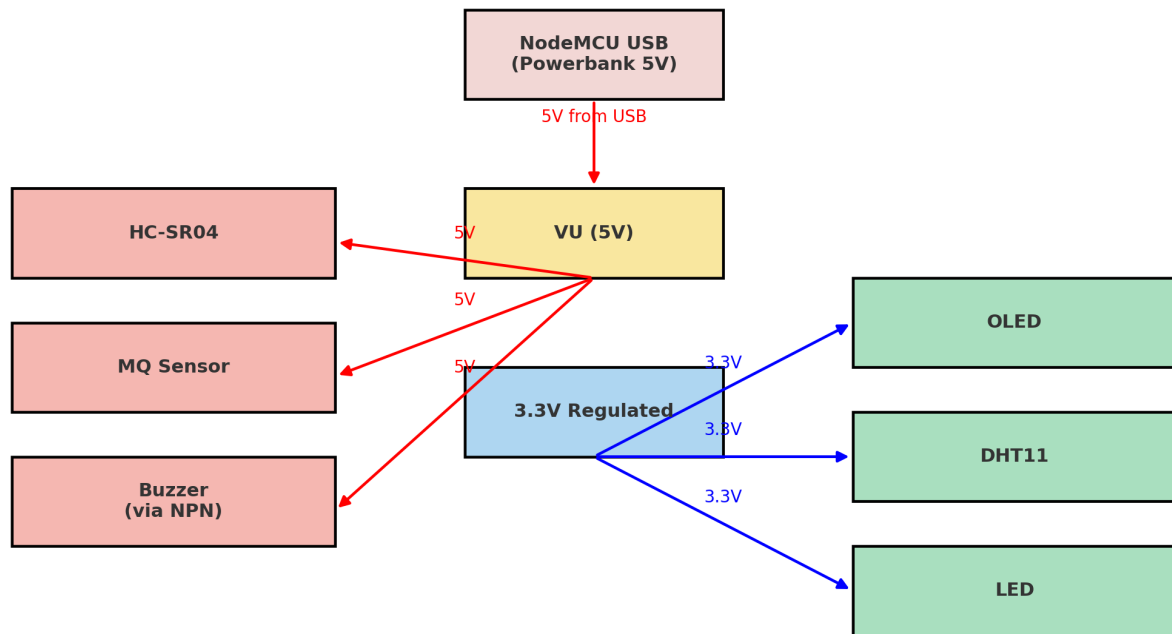
Breadboard Realistic Wiring (Prototype)



Perfboard Soldering Layout (Permanent Assembly)



Power Distribution Diagram



- Note:
- MQ & HC-SR04 need 5V from VU (USB 5V)
 - OLED & DHT11 use 3.3V regulator
 - LED on 3.3V (with series resistor)
 - Buzzer powered from 5V but driven via GPIO+transistor

Important Build Notes:

- OLED on TX/RX pins (GPIO1/GPIO3). Avoid Serial.print while OLED connected.
- HC-SR04 Echo requires a voltage divider (5V to 3.3V).
- MQ Sensor AOUT may require divider depending on NodeMCU version (1.0V vs 3.3V A0).
- Buzzer should be driven via NPN transistor + 1k base resistor, diode if coil type.
- LED should have 220 Ω series resistor.
- Powerbank ($\geq 1A$) is recommended for stable operation.

Step-by-Step Assembly Checklist

1. Place NodeMCU

- Mount NodeMCU ESP8266 on breadboard or perfboard.

2. Connect OLED (I²C Display)

- VCC → 3.3V
- GND → GND
- SCL → TX (GPIO1)
- SDA → RX (GPIO3)
- Avoid Serial.print while OLED is connected.

3. Connect DHT11

- VCC → 3.3V
- GND → GND
- DATA → D4 (GPIO2)
- Add 10k pull-up to 3.3V if bare sensor.

4. Connect HC-SR04

- VCC → VU (5V)
- GND → GND
- TRIG → D1 (GPIO5)
- ECHO → D2 (GPIO4) via voltage divider (1k/2k).

5. Connect MQ Sensor

- VCC → VU (5V)
- GND → GND
- AOUT → A0 (use divider if 1.0V A0 version).

6. Connect Buzzer

- D5 (GPIO14) → 1k → transistor base
- Emitter → GND
- Collector → buzzer negative
- Buzzer positive → VU (5V)
- Add diode across buzzer if coil type.

7. Connect LED

- D7 (GPIO13) → 220Ω → LED anode
- LED cathode → GND

8. Power Check

- Ensure common GND.
- 3.3V devices (OLED, DHT11, LED) not on 5V.
- 5V devices (HC-SR04, MQ, Buzzer) only on VU.

9. Power Up

- Plug NodeMCU into powerbank (≥1A).
- Verify modules power on correctly.

10. Upload Code & Test

- Test each module separately.
- Then integrate into your main project.