

ESP32 Hardware Configuration

Microcontroller

- **Board:** ESP32 Dev Board
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Libraries Needed (Arduino Library Manager)

ArduinoJson
Adafruit BME280
[SQLite_Arduino](#)

BME280 Sensor (Temperature, Humidity, Pressure)

Interface: I2C
Voltage: 3.3V

BME280 Pin	ESP32 Connection
VIN	3.3V
GND	GND
SDA	GPIO21
SCL	GPIO22

Boost Module (MOSFET-Switched Power Control)

Controlled by: N-channel logic-level MOSFET

ESP32 → MOSFET	Boost Module Connection
GPIO27 → Gate	-
GND → Source	GND of Boost Module
Drain →	GND of Boost Module
Power Source	VIN of Boost Module

Notes:

- Add a 10kΩ pull-down resistor between Gate and Source
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SD Card Module

Interface: SPI
Voltage: 3.3V

SD Module Pin	ESP32 Connection
VCC	3.3V
GND	GND
CS	GPIO4
MOSI	GPIO23
MISO	GPIO19
SCK	GPIO18

Geiger-Müller Tube (LND 712) + Pulse Conditioning

Interface: Pulse detection (interrupt-driven)
Voltage: High Voltage (~400V on Anode, safe pulse on Cathode)
Pulse Read Logic Voltage: 3.3V (after conditioning)

Tube Connections:

LND 712 Terminal	Connection
Anode (+)	HV Boost Output (+400V) via 10MΩ resistor
Cathode (-)	Pulse Conditioner Input (Coupling Capacitor Side)

Pulse Conditioner:

- **10MΩ resistor** between HV output and anode (current limiting)
- **15nF coupling capacitor** connected to cathode (blocks DC, passes pulses)
- **100kΩ pull-down resistor** after capacitor to ground (stabilizes pulse)
- Output connected to ESP32 **GPIO32** (can be adjusted if needed)

ESP32 Connection:

Pulse Conditioner Output	ESP32 GPIO Pin
Conditioned Pulse Output	GPIO32
GND	Common GND

Notes:

- Interrupt is triggered on **FALLING edge** (pulse is a short negative-going spike)
- ESP32 GND, HV Boost GND, and Pulse Conditioner GND must be **shared (common)**

Serial Connection to Raspberry Pi

Interface: USB

Baud Rate: 115200

Voltage Logic: 3.3V
