Electronics + Microcontroller

Project Name	Exercise 1: NightLight Circuit
Our Goal	*To design a circuit that turns on an LED when the room becomes dark.*

Necessary materials

This exercise introduce you in the electronics needed to calibrate sensors. It doesn't use the microcontroller.

The circuit uses a **bipolar transistor** (BJT) and a **differential comparator.**
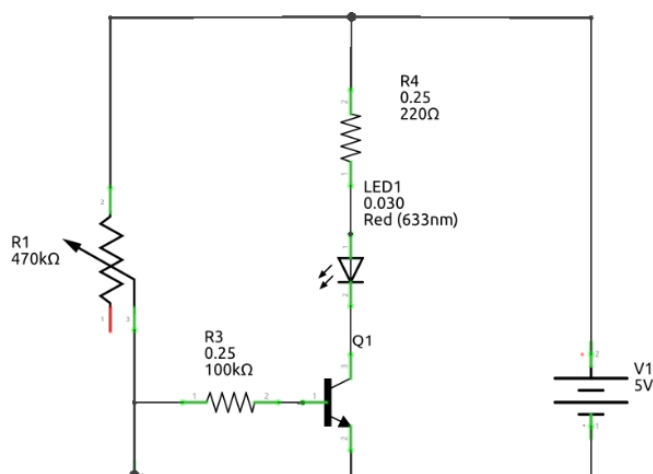
MATERIAL:

- Cables.
- Potentiometer 470K.
- Bipolar junction transistor 547C.
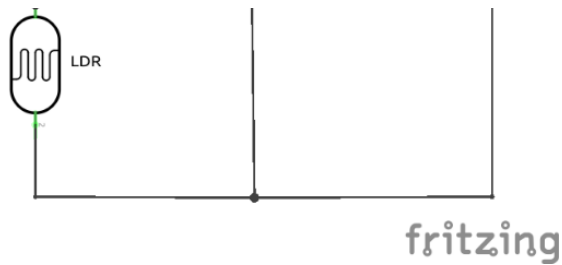- LED.
- LDR Sensor.
- R: 220Ω, 100K Ω, 470K Ω.

First circuit

Night light circuit using a BJT.

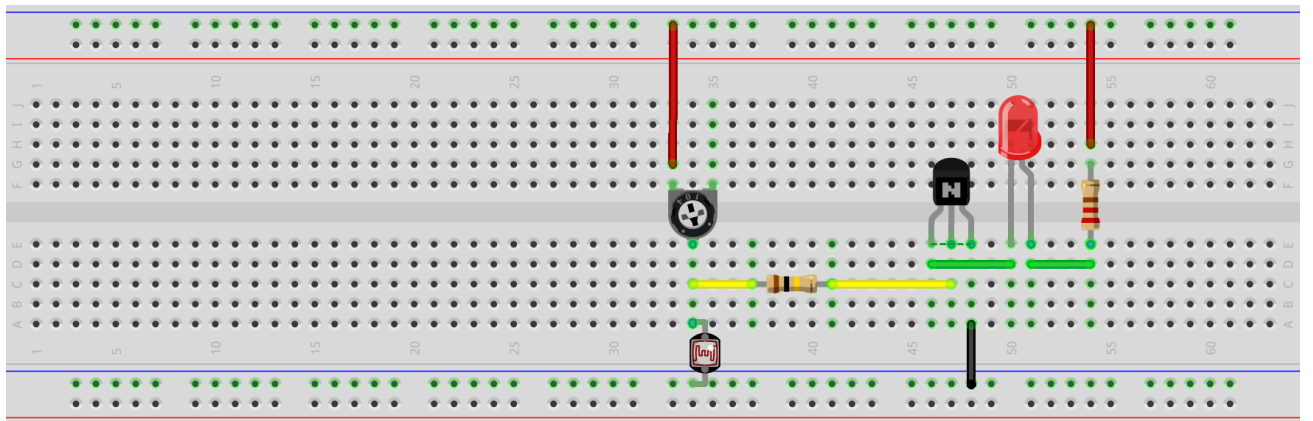Let's see the circuit schematic. Additional videos on how to assemble it are available here:
Video

HELP: This is how to wire the circuit on your protoboard:
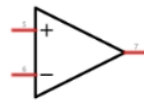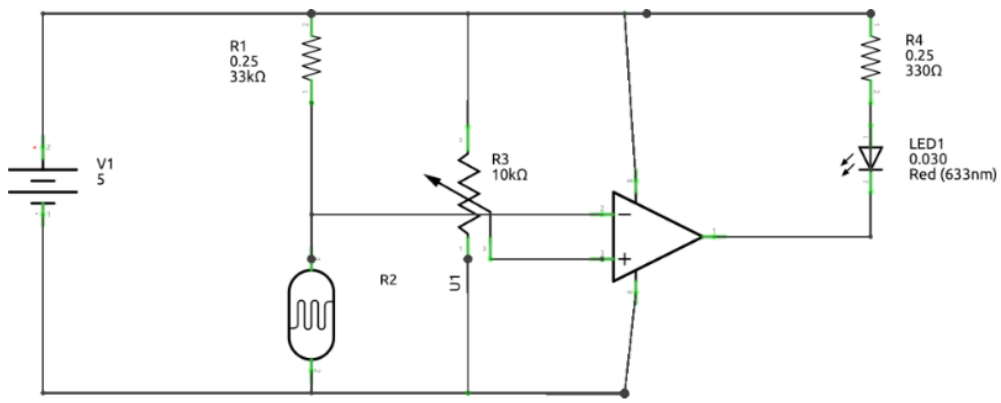

Second circuit

Necessary materials

In this second approach, we use a **comparator instead of the bipolar transistor**. In particular, the LM393 IC that consists of two independent voltage comparators designed to operate from a single power supply over a wide range of voltages (2 to 38 V).

MATERIAL:

- Cables.
- Potentiometer 10K.
- LM393.
- LED.
- LDR Sensor.
- R: 33K Ω, 330Ω.

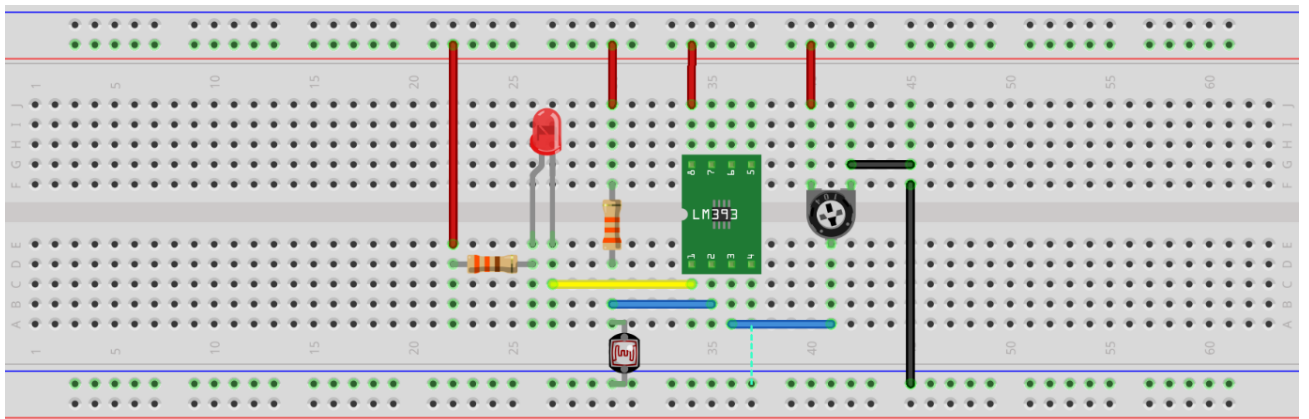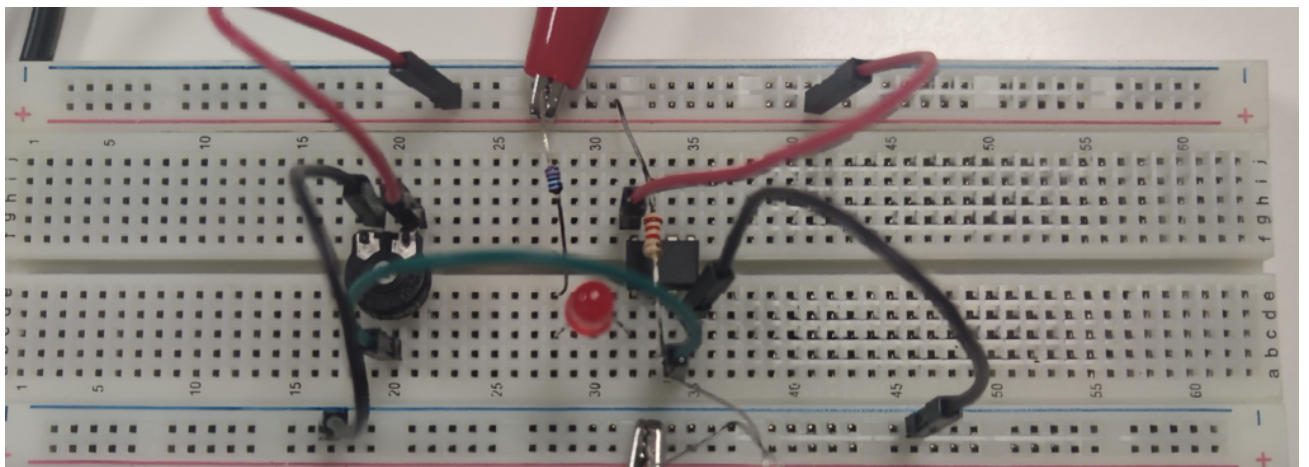Let's see the circuit schematic. Additional videos on how to assemble it are available here:
Video

Obtained results

HELP: This is how to wire the circuit on your protoboard:

Project Name	Exercise 2: Gas control using a microcontroller
Our Goal	*Activate a FAN depending on the parameters given by a gas sensor.*

Third circuit
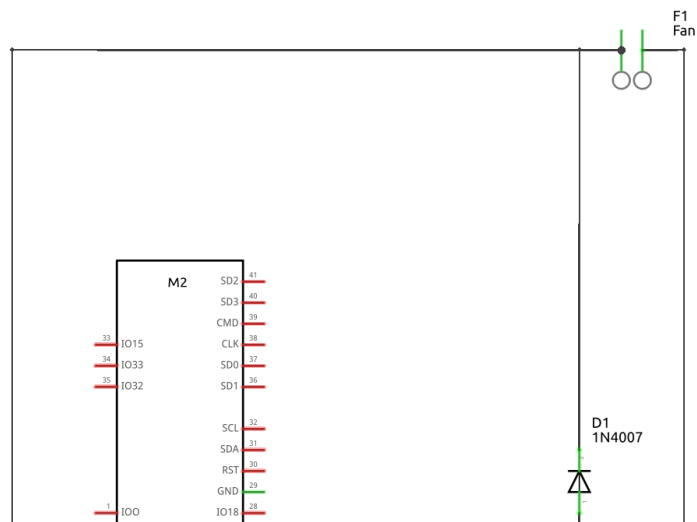
Necessary materials

We introduce the microcontroller board to manage a FAN (actuator) depending on the gas levels given.

MATERIAL:

- Cables
- Gas Sensor MQ-135
- R: 18kΩ, 620Ω and 3,6KΩ
- BJT (Bipolar juntion transitor)
- FAN
- Diode: 1N4007
- FACILINO microcontroler board (with or without multisensor shield)
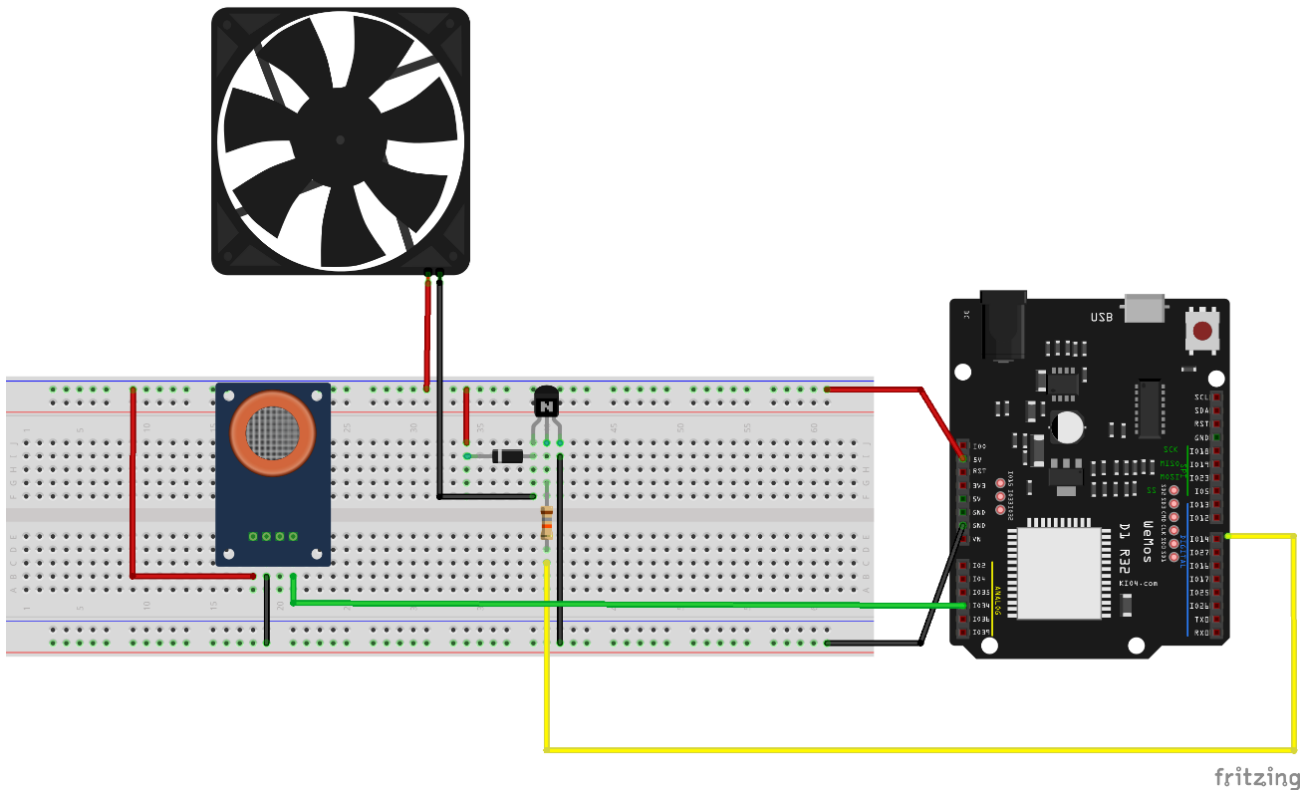
Gas Sensor and Fan circuit

Let's see the circuit schematic. Use A3 pin to connect the Gas Sensor; and D7 to connect the FAN circuit. Additional videos on how to assemble it are available here: ***Video***
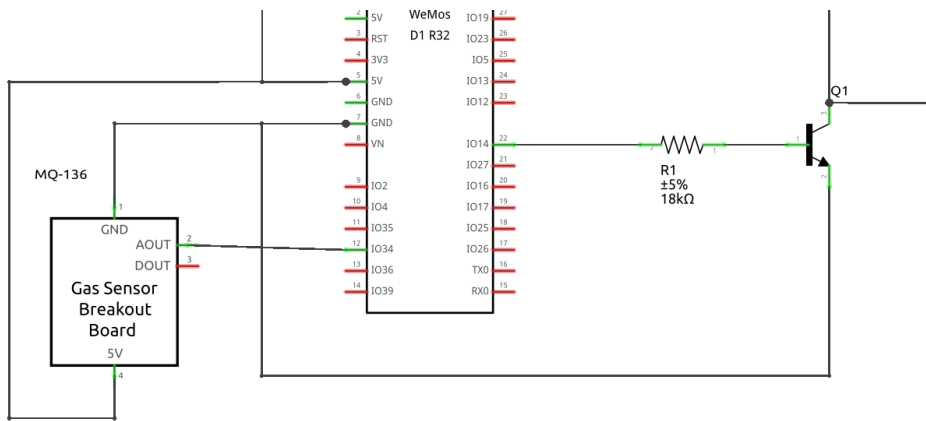
Obtained results

HELP: This is how to wire the circuit on your protoboard:


fritzing

Fourth circuit

Necessary materials

Finally, we introduce BLE (BlueTooth Low Energy) to plug a Master and Slave. Thus, we need TWO Esp32 boards (one acts as master and another acts as slave). The master will support the GAS Sensor circuit, while the slave supports the FAN circuit.
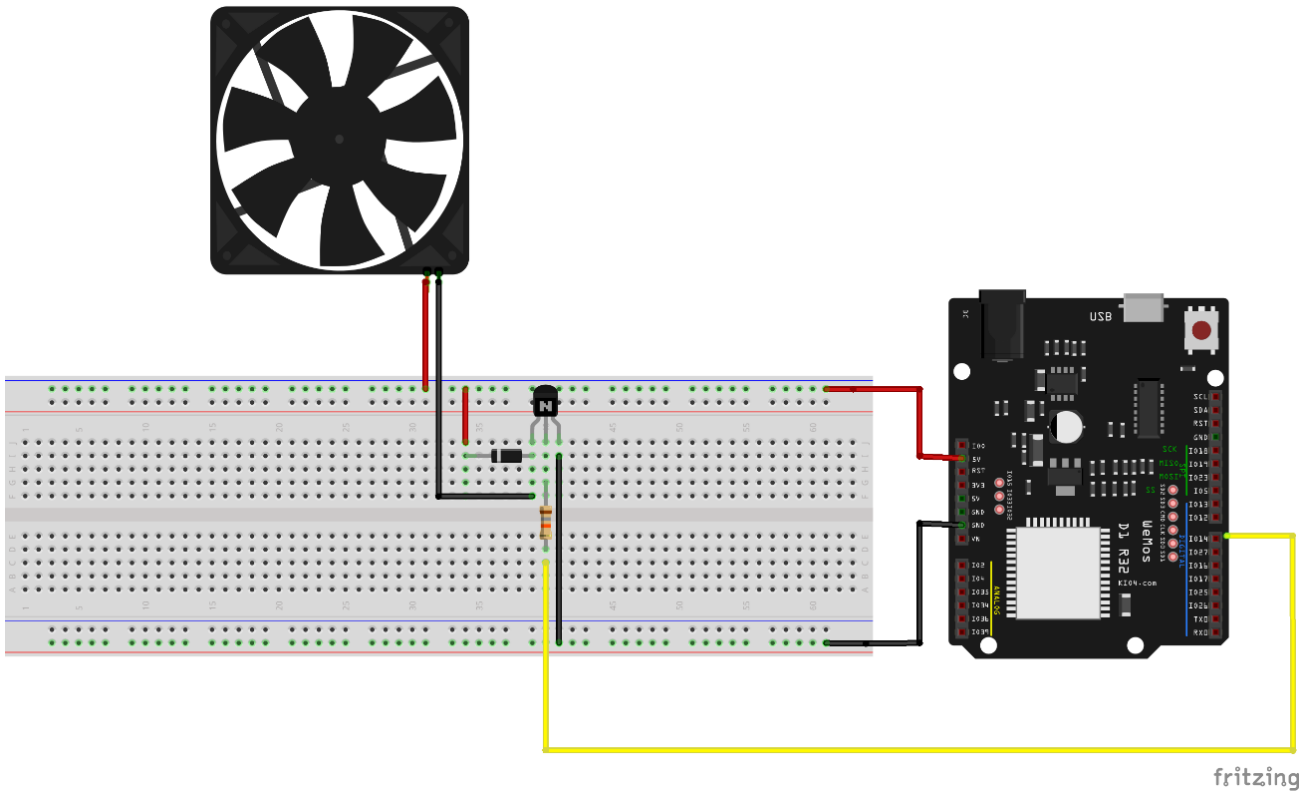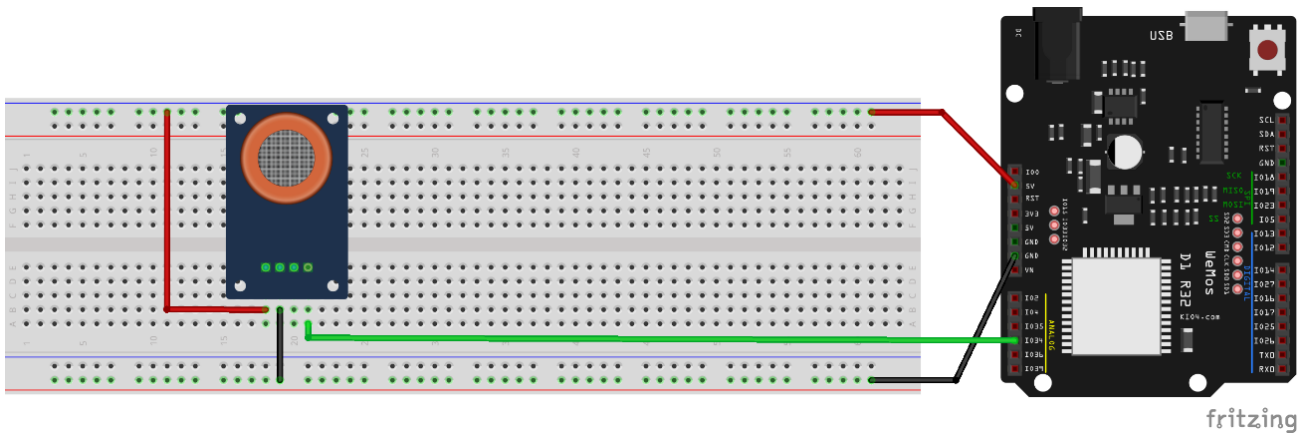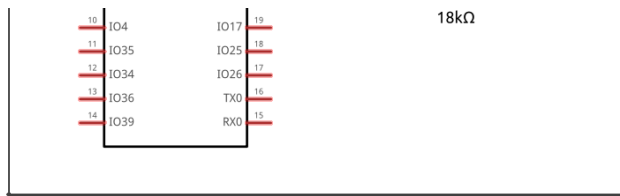
- Cables
- Gas Sensor MQ-135

- R: 18kΩ, 620Ω and 3,6KΩ
- BJT (Bipolar juntion transitor)
- FAN
- Diode: 1N4007
- FACILINO microcontroler board (with or without multisensor shield)

ESP32 BLUETOOTH circuit

Schematic and protoboard views:

10 IO4	IO17 19	18kΩ
11 IO35	IO25 18	
12 IO34	IO26 17	
13 IO36	TX0 16	
14 IO39	RX0 15	
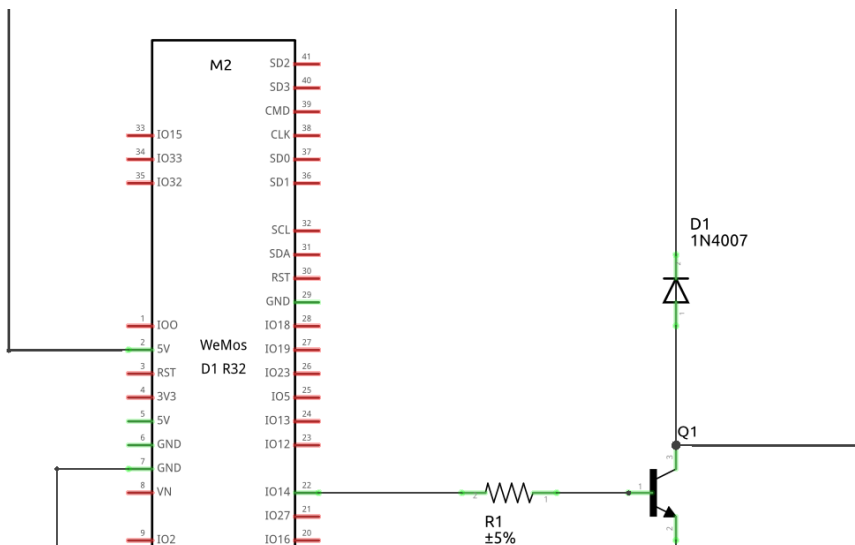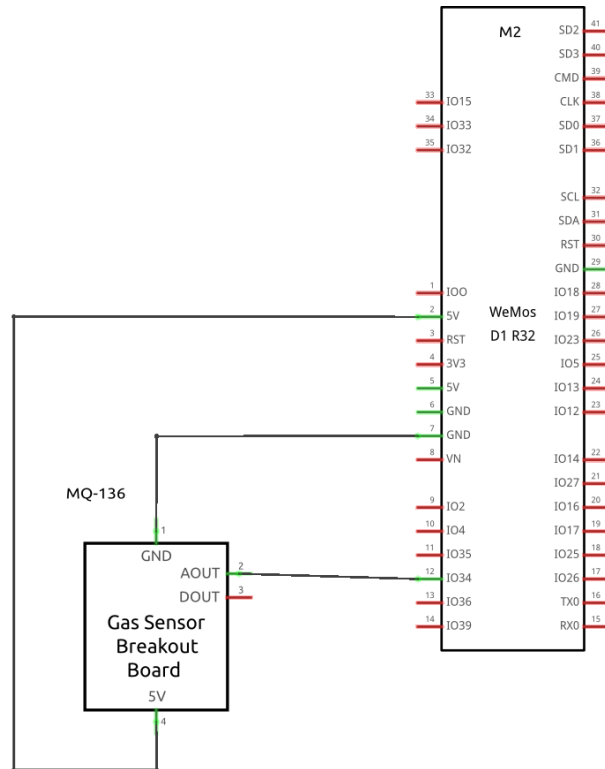
Obtained results

Here is a ***video*** of how to assemble the circuit and also the ***codes*** that must be implemented in the ESP32 boards.