Air Quality - Hardware Device

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Cofinanciado por el programa Erasmus+ de la Unión Europea

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Introduction and description

This international project involves measuring air quality of our environment, exposing these measurements and those collected by different weather stations over the years and current ones, and raising awareness of the importance of conserve and improve the environment for our future.

In this part of the project, we have designed and made a small hardware device which is capable of measuring air quality and uploading data to a database on the network.

For this, we have used a board called NodeMCU which has an integrated Wi-Fi module and has an analog port to receive information from the gas sensor. This board is Open Source and is programmable with the arduino IDE itself, only ESP8266 boards must be added to the boards repository.

This device measures the amount of CO2 (carbon dioxide), NH3 (ammonia), NO (nitrogen monoxide) and CO (carbon monoxide) that is present in the air thanks to the MQ-135 sensor and MQ-07 sensor to. Those have certain chemical elements inside which react with the aforementioned particles causing the voltage that is transmitted to the Arduino (NodeMCU) to vary and so we can obtain the amount in parts per million that are in the air of each component.

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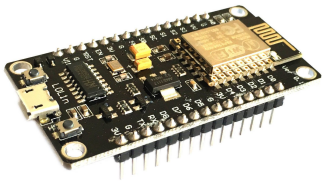
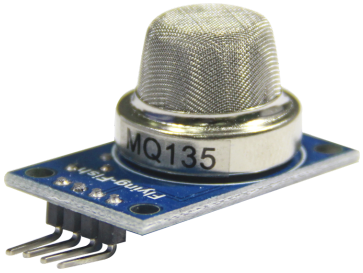
Tools and equipment

For this project we will need:



NodeMCU V3
x2



Gas Sensor
MQ-135

Gas Sensor
MQ-7

Led
x2

Jumpers
x10

Resistor
x2

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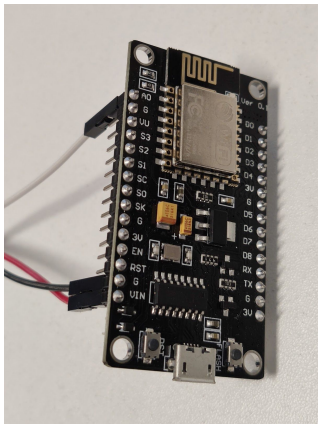
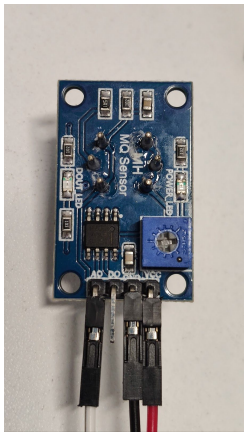
Assembly

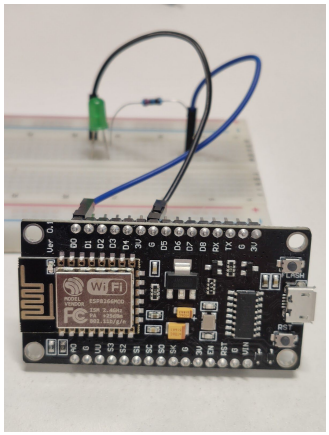
We have to connect:



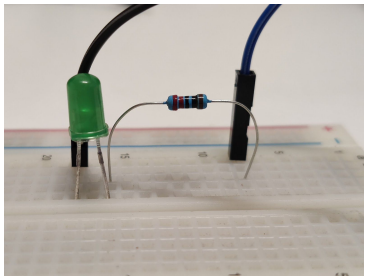
Red → VV
Black → G
White → A0



Red → VCC
Black → GND
White → A0

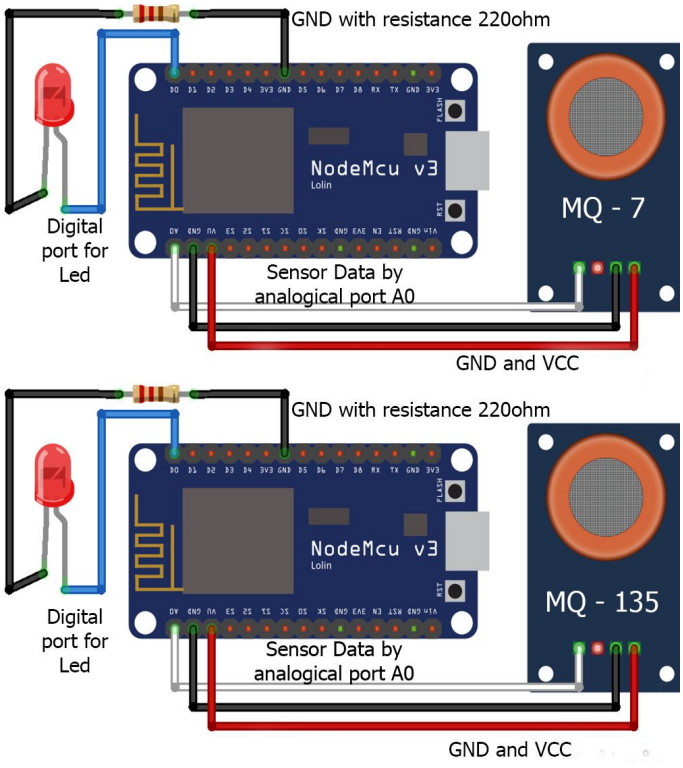


Blue → D0
Black → G



Blue → Resistor
Resistor → Led
Black → Led

Finally, it should look like this:



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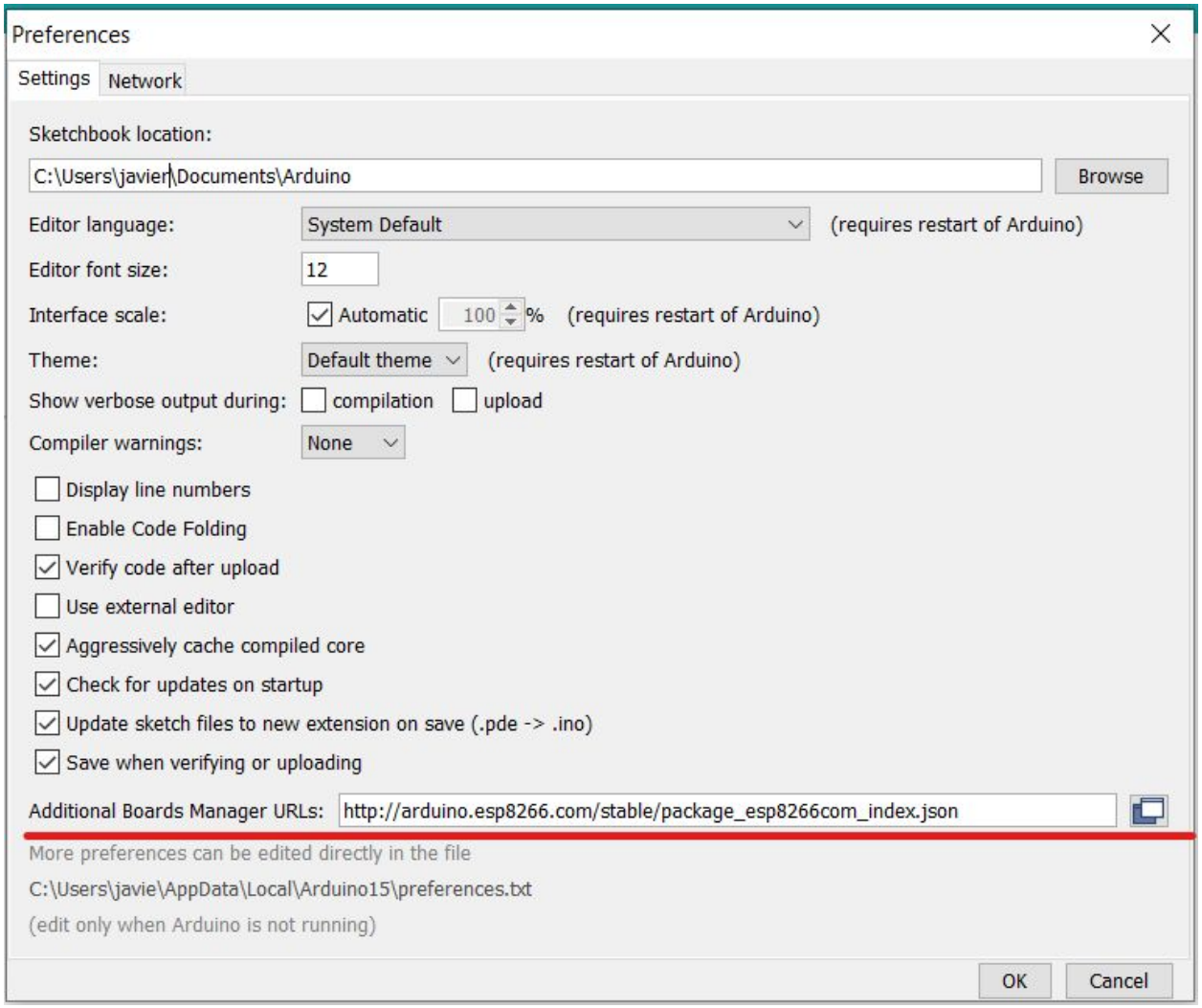
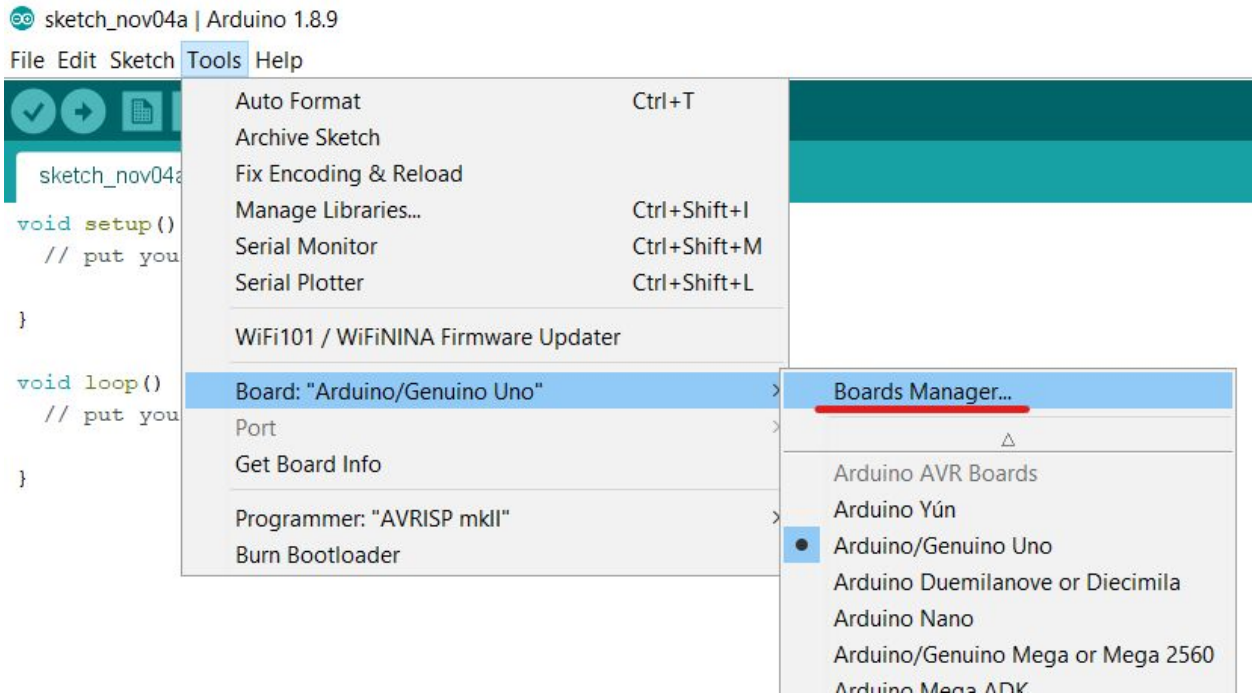
Installation and programming

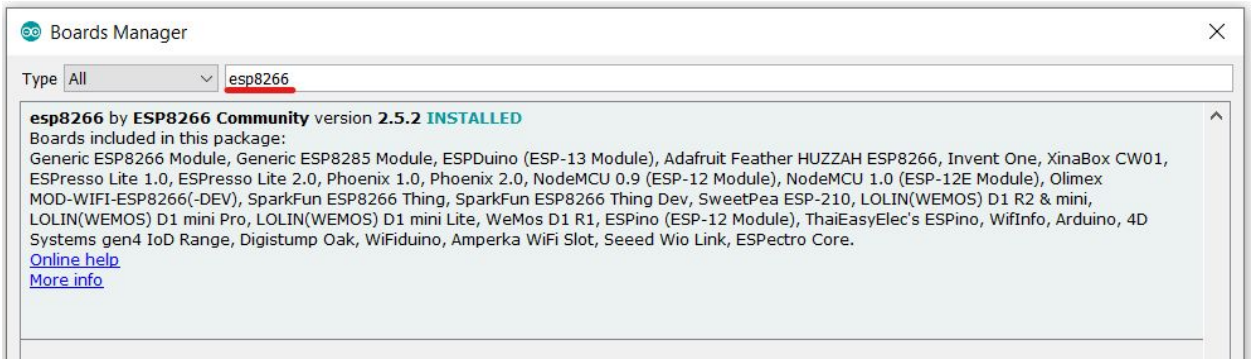
First of all, we must have the latest version of the arduino IDE, if not, download here. Once installed, we must install the library containing the ESP8266 Wifi boards (NodeMCU).

For it, in Arduino IDE, in the file tab, we click in “Preferences” and we add the next link: http://arduino.esp8266.com/stable/package_esp8266com_index.json



Then press OK. Now in the Tools tab:





Now we can program the boards ESP8266!

The code that we have to upload in the board is here. It's a repository on GitHub called AirDuino. You have to download 2 files, AirDuinoMQ-7.ino and AirDuinoMQ-135.ino, and save all of them in folders with the same name that files.

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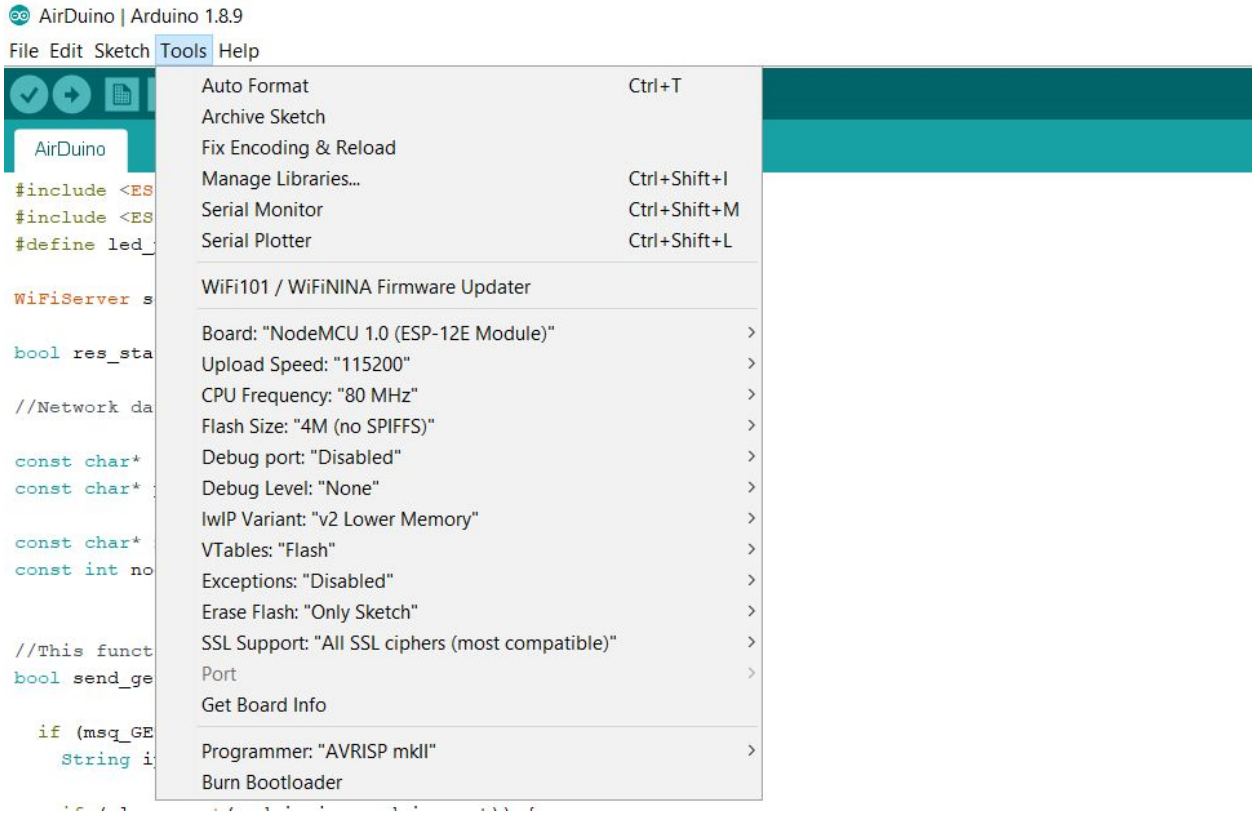
Open Arduino IDE with the files and setup it with NodeMCU configuration, select the port where the board is located:



You have to modify part of the code to indicate the wifi, the wifi key and the server's ip:

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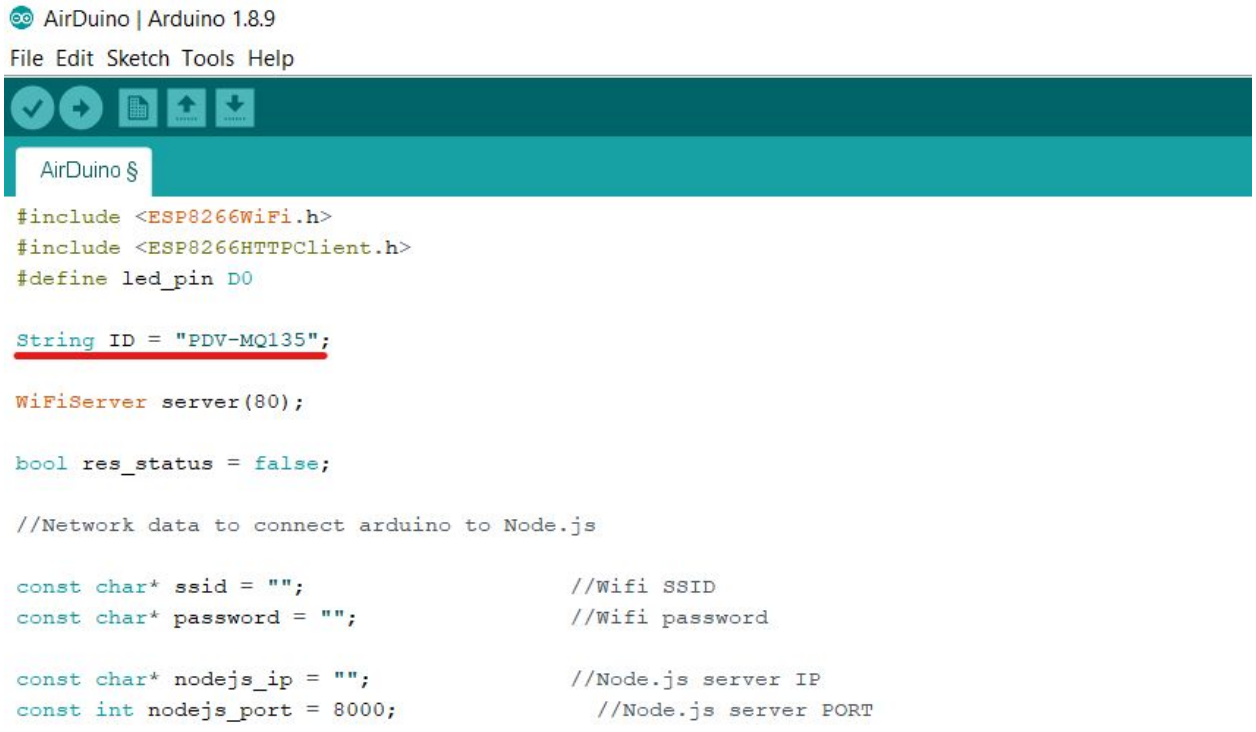
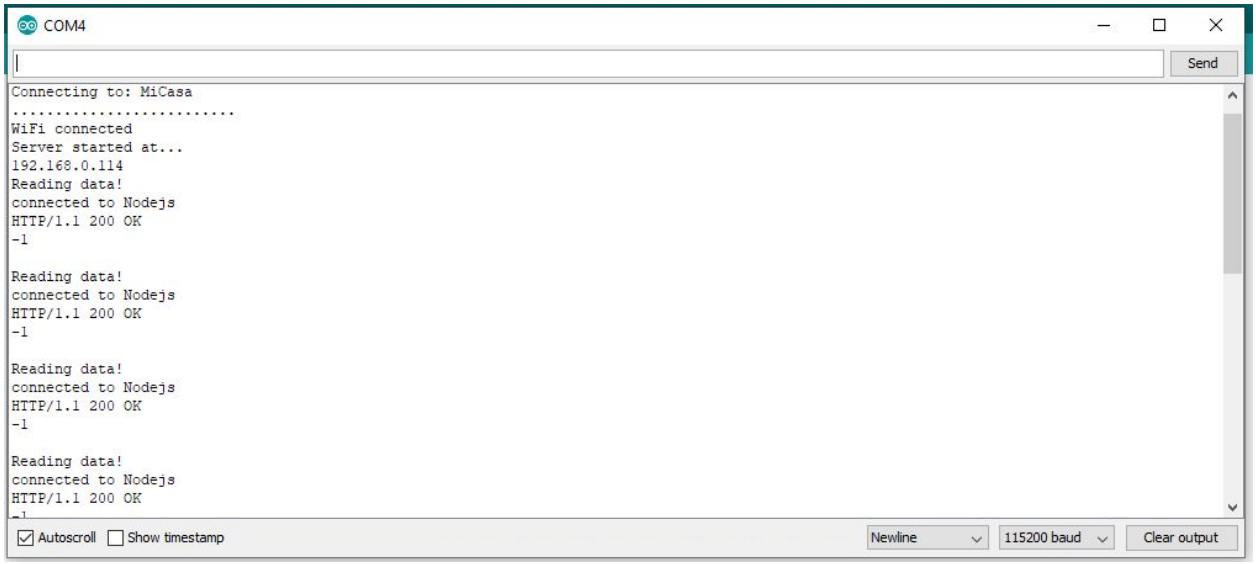
and you have to set an ID who determinate where is the sensor to differentiate it from the rest:



Then open Serial Monitor and press the upload button.

Now we should start watching on the serial monitor:



And this would indicate that everything worked correctly.

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