

Comovis (Co2 ,Temperature and Humidity Sensor for EspHome)



by Nayel Khouatra

Keep your home safe and healthy with Comovis! The air quality sensor gives you insight into the air you breathe; monitor PM2.5 particles, temperature, humidity, and more. With the lights indicator, you'll be able to know at a glance whether your air is safe or hazardous. You can also use Home Assistant platform to check air quality on your phone or PC. Let Comovis give you peace of mind when it comes to the air you breathe at home!

Supplies:

Adafruit breakout board usb-c female : <https://www.adafruit.com/product/4090>

Led strip WS2812 : <https://www.amazon.fr/ws2812b/s?k=ws2812b>

Grove Air_Quality_Sensor_v1.3 : <https://www.gotronic.fr/art-capteur-de-qualite-d-air-grove-101020078-23838.htm>

AHT10 temperature and humidty sensor : <https://www.amazon.fr/Pr%C3%A9cision-Digital-capteur-temp%C3%A9rature-dhumidit%C3%A9/dp/B08716SL9T>

D1 mini esp8266 : <https://www.amazon.fr/wemos-d1-mini/s?k=wemos+d1+mini>

ESPHome : <https://esphome.io/>









Step 1: Overview

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Home Assistant :

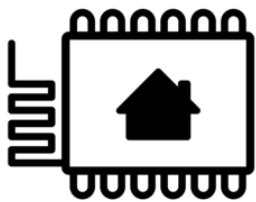
Home Assistant is an Open source home automation that puts local control and privacy first. Powered by a worldwide community of tinkerers and DIY enthusiasts. Perfect to run on a Raspberry Pi or a local server.

Features

Home Assistant integrates with over a thousand different devices and services.

Once started, Home Assistant will automatically scan your network for known devices and allow you to easily set them up.

- INTEGRATIONS
- AUTOMATIONS
- ADD-ONS
- DOWNLOAD APPS



ESPHome

ESPHome:

ESPHome is **a simple yet powerful system that allows users to control ESP boards using YAML configuration files**. It allows users to quickly and easily build custom firmware for sensors and devices without any programming skills.

Step 2: SETUP

The first thing that we need to do is to configure Home assistant and EspHome. In order to that you need to install a (VM) Virtual Machine.

Step 1 : Installation

Click on the link below for the installation of the virtual machine OS, you can use the virtual machine of your choice but I prefer to use Virtualbox instead of the others :

<https://www.home-assistant.io/installation/windows/>

Then click on the link below to install the actual Virtual Machine :

<https://www.virtualbox.org/wiki/Downloads>

And finally create a folder called "Home assistant" and past all the files that you have downloaded.

Step 2 : Configuration for the Virtual Machine

Note: I will only show how to install home assistant with Virtual box, so the different steps could be different depending on your virtual machine.

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Once you finished to install the Virtual Box, launch Virtual Box and in "New Tab" ,click on "expert Mode" and give your virtual machine a name then pick the directory where your copy the os of the virtual machine change the "type" by Linux and choose other Linux in the "Version" section, then select 2000 Mb of ram and click on "Use an existing disk"

Then click on add and select the OS of the Virtual Machine

And finally click on "Create".

Once you created the virtual machine you need to specify the network service that you use. Note: That Home assistant only accept ethernet port.

So in the setting go to system click on EFI and then click on network and select "bridge connector" and choose "Ethernet Controller" and Finally click on "ok" and launch your virtual machine.

Voila ! You have configured your Virtual machine.

Step 3 : Configuration of Home Assistant and ESPHome :

Once you have launched The VM (Virtual machine) after the boot of the VM, You should see an IP address and also see the Home assistant URL :

OS Version:	Home Assistant OS 9.5
Home Assistant Core:	2023.1.7
Home Assistant URL:	http://homeassistant.local:8123
Observer URL:	http://homeassistant.local:4357

This IP adress is in fact the IP adress of your Home Assistant local Server. In order to see your dashboard you need to copy The URL and to change the http://homeassitant.local by your IP adress and to past this IP address on the search bar :

PS : don't forget to add the :8123 after your IP address

Then you should see this:

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Then type you name user name ect... and click on "Create account", this step can take a long time.

Now your are officially in Home Assistant now you have to install EspHome :

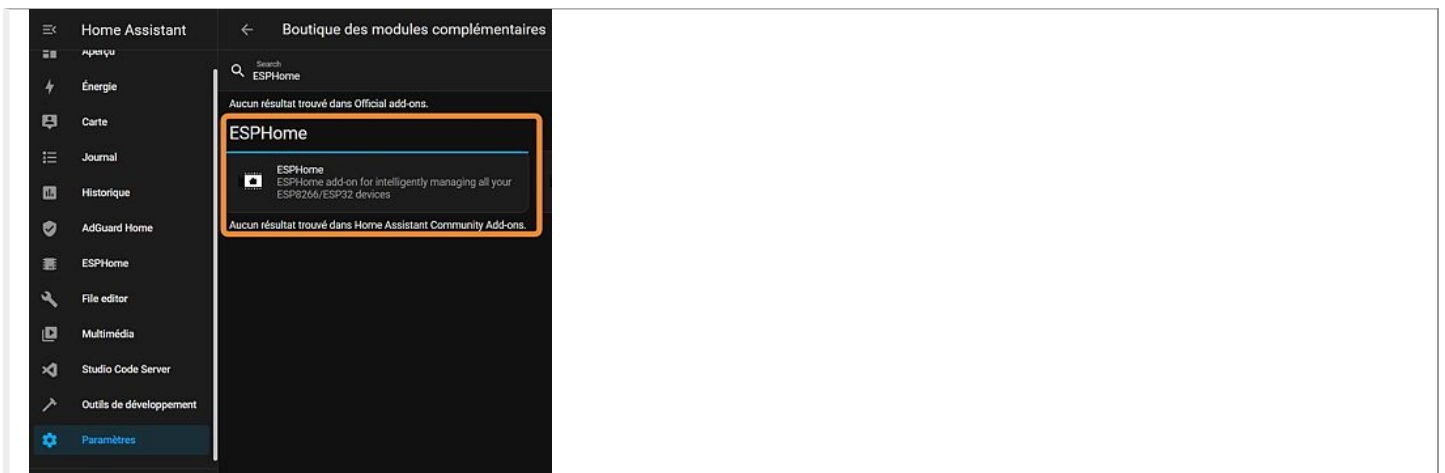
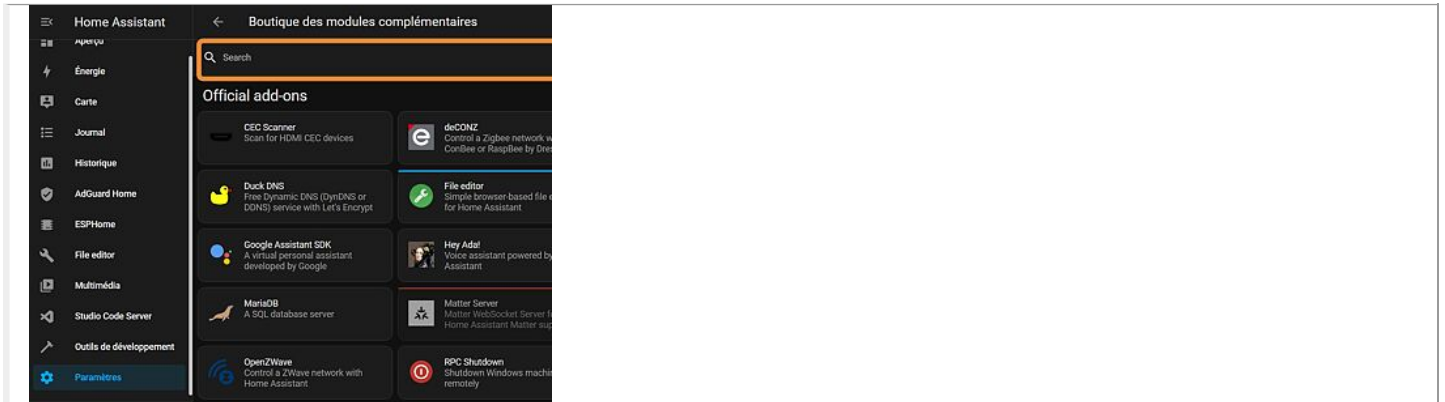
- Go to Settings



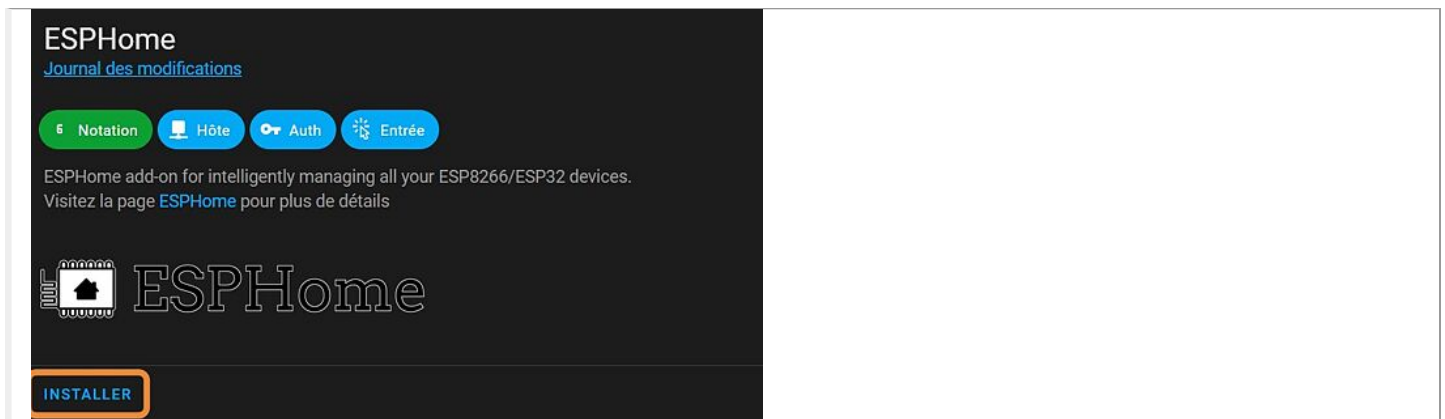
- Search for add-ons and click on it



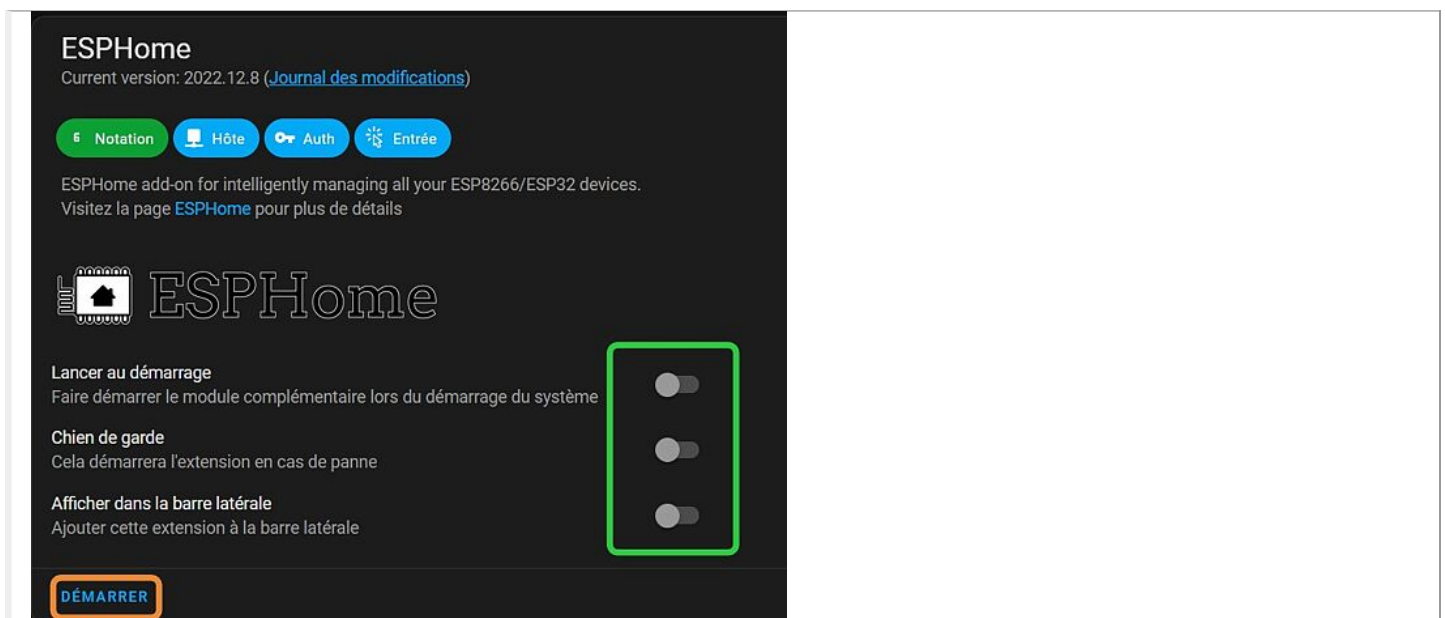
- Search for ESPHome



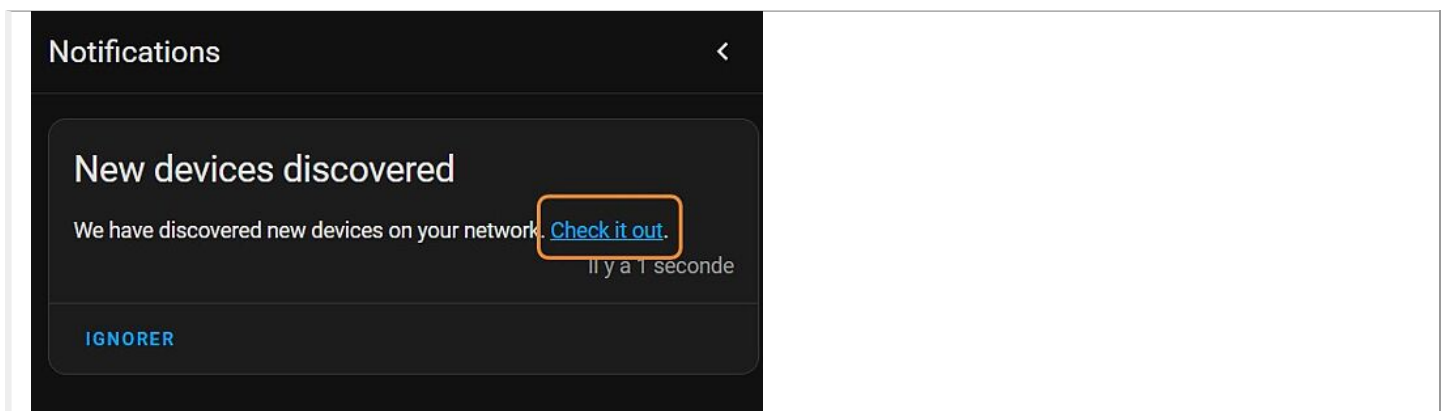
- Click on install



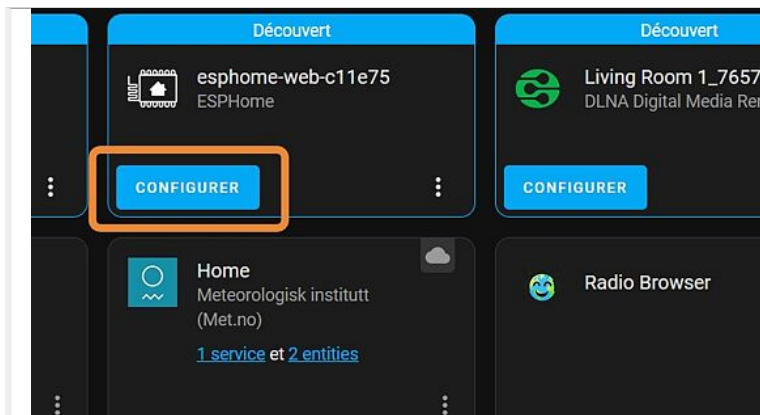
- And click on BOOT



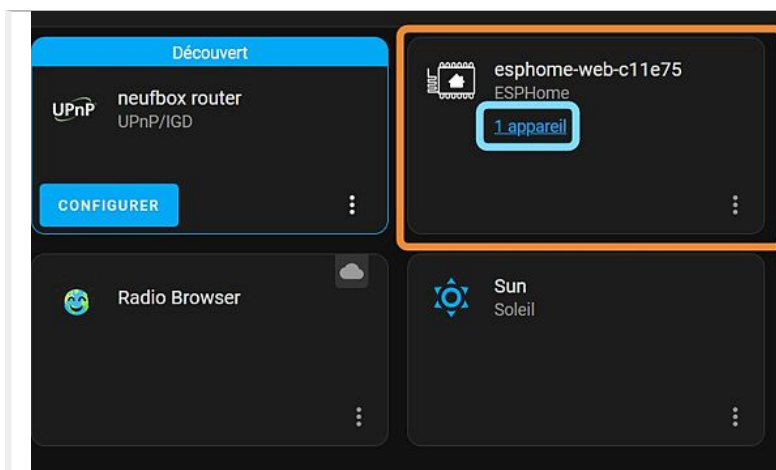
In your Home Assistant Dashboard you should see a notification like this :



It's normal you didn't setup your ESP to be visible to do this, clic on the notification and click on " check it out" , once that is done you should see this :



After that you will see this :



Your Esp it is now ready to be use.

And Voila you have your esp configured and both Home assistant and ESPHome installed and configured !

// Windows

Installation

- Install Home Assistant Operating System
- Download the appropriate image
 - Create the Virtual Machine
 - Hypervisor specific configuration
 - Start up your Virtual Machine
- Install Home Assistant Core
- Install WSL
 - Install dependencies
 - Create an account
 - Create the virtual environment

Install Home Assistant Operating System

DOWNLOAD THE APPROPRIATE IMAGE

- [VirtualBox](#) (.vdi)
- [KVM](#) (.qcow2)
- [VMware Workstation](#) (.vmdk)
- [Hyper-V](#) (.vhdx)

Follow this guide if you already are running a supported virtual machine hypervisor. If you are not familiar with virtual machines we recommend installation Home Assistant OS directly on a [Raspberry Pi](#) or an [CORRO](#).

CREATE THE VIRTUAL MACHINE

Load the appliance image into your virtual machine hypervisor. (Note: You are free to assign as much resources as you wish to the VM, please assign enough based on your add-on needs).

Minimum recommended assignments:

- 2 GB RAM
- 32 GB Storage
- 2vCPU

All these can be extended if your usage calls for more resources.

START HERE



Énergie



Carte



Journal



Historique



ESPHome



File editor



Multimédia



Outils de développement



Paramètres



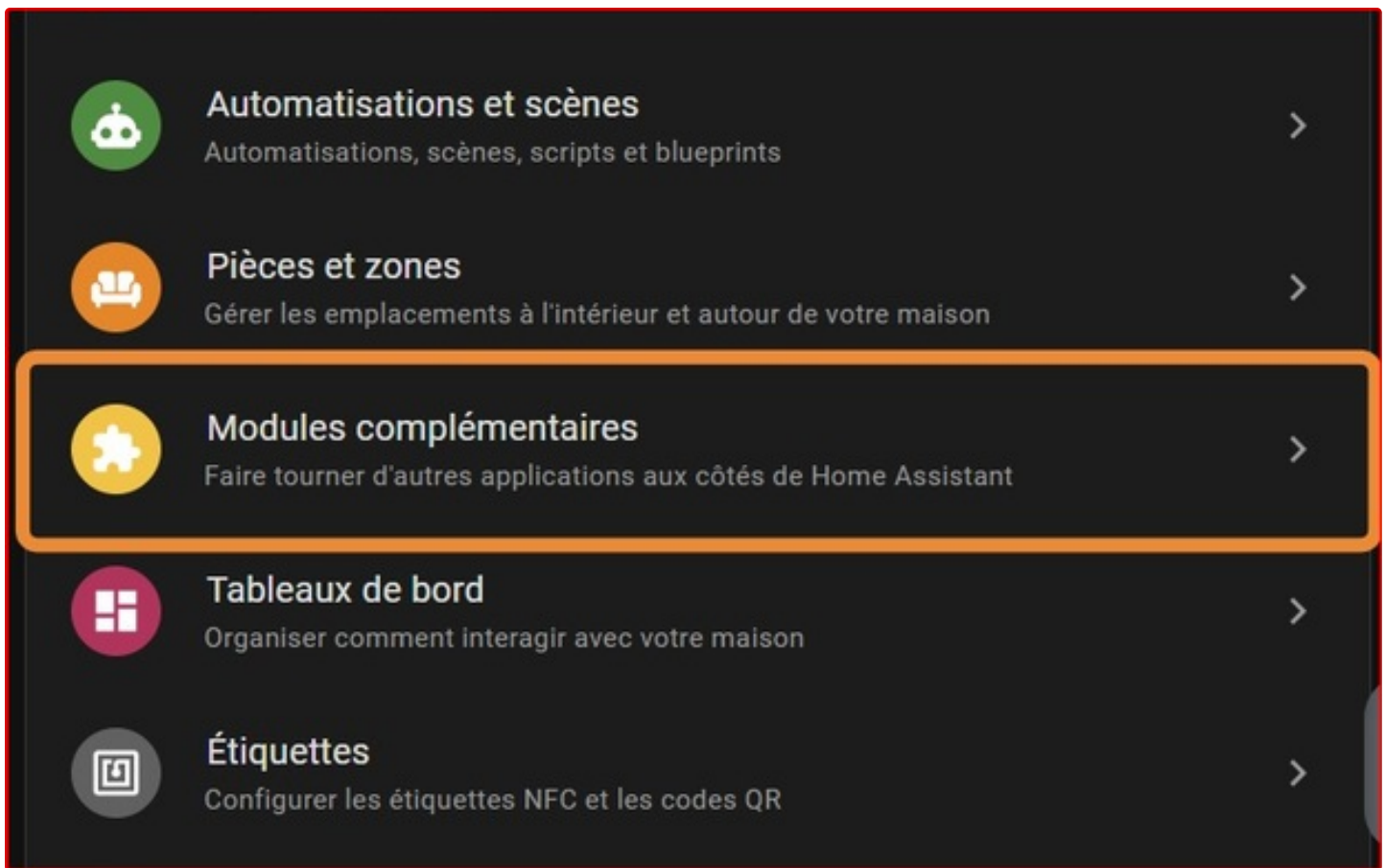
Solutions



PSalon Humidité



PSalon Température



Step 3: Flowchart,Schematic and Circuit

Flowchart :

The Comovis is link to EspHome (and also HomaAssistant). The esp32 (or esp8266) will take data from the two sensors (AHT10 and Air_Quality_Sensor_v1.3), based on the temperature, Humidity, and CO2, the status of the three LEDs strips will change of colors and at the same time send the data to HomeAssistant.

Note: If your device is well connected to wifi and home assistant, you should receive a notification about the appearance of a new device then what do you have to do is check your dashboard to see the differents data.

Circuit and schematic :

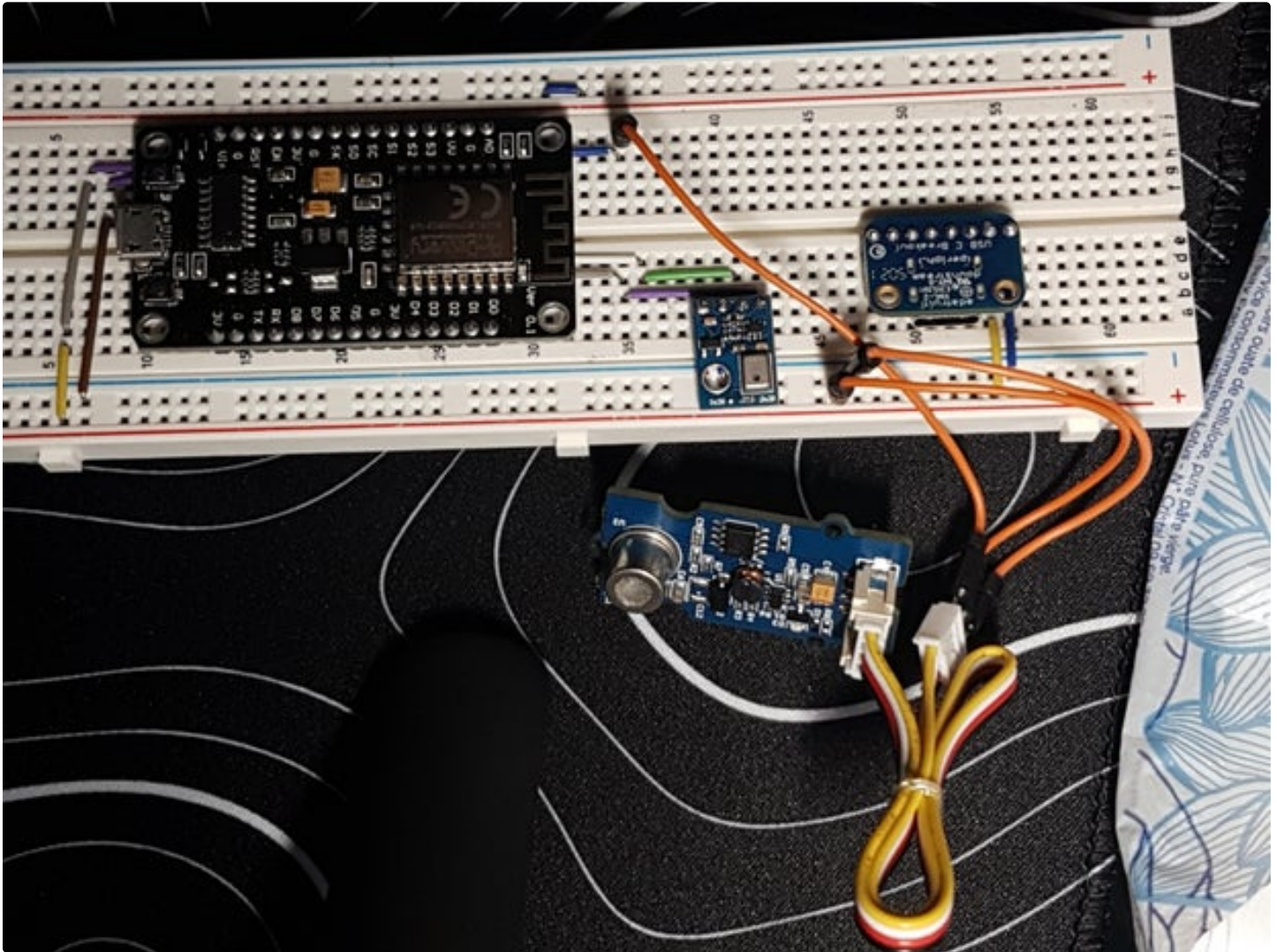
You will need an esp32 or 8266 mine is an lolin node MCU v3, the D1 mini is on shipping so i'm sticking to that.

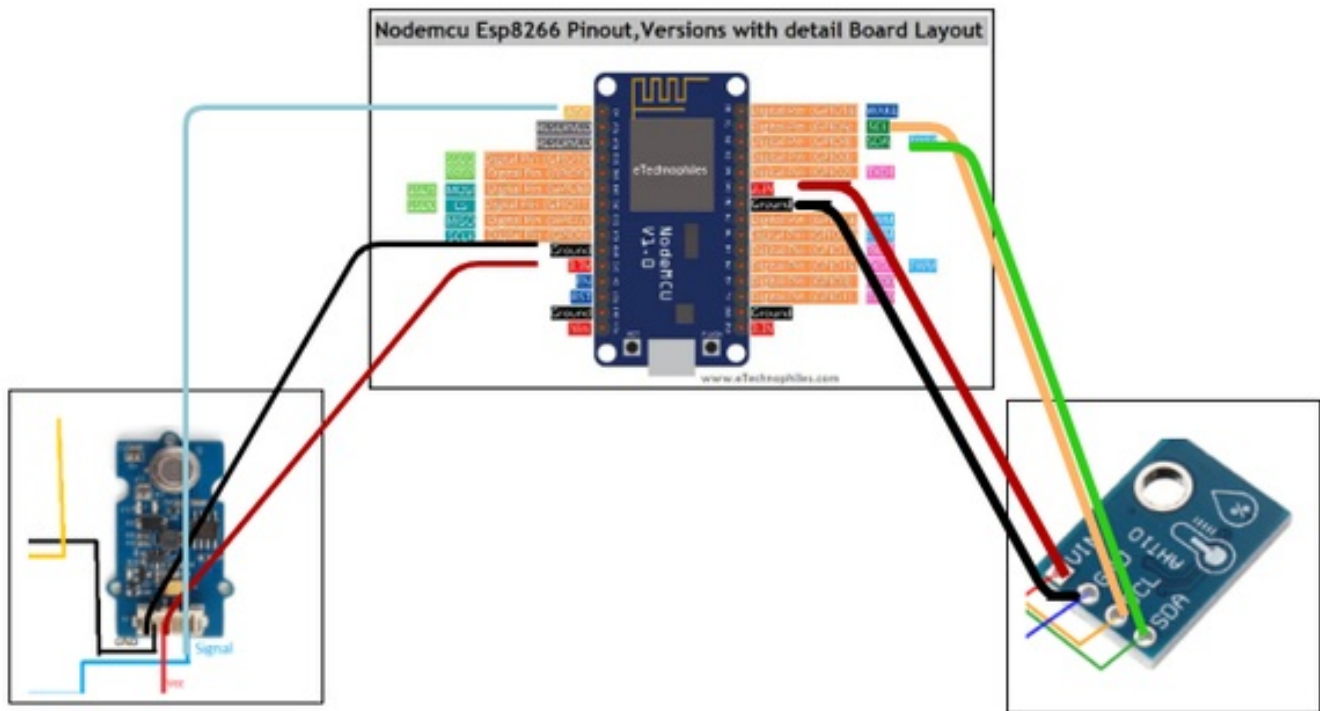
you will also need an AHT10 wich is a temperature and humidity sensor and the Air_Quality_Sensor_V1.3 wich is like the name suggest a air quality sensor that mesure PM.2 particules.

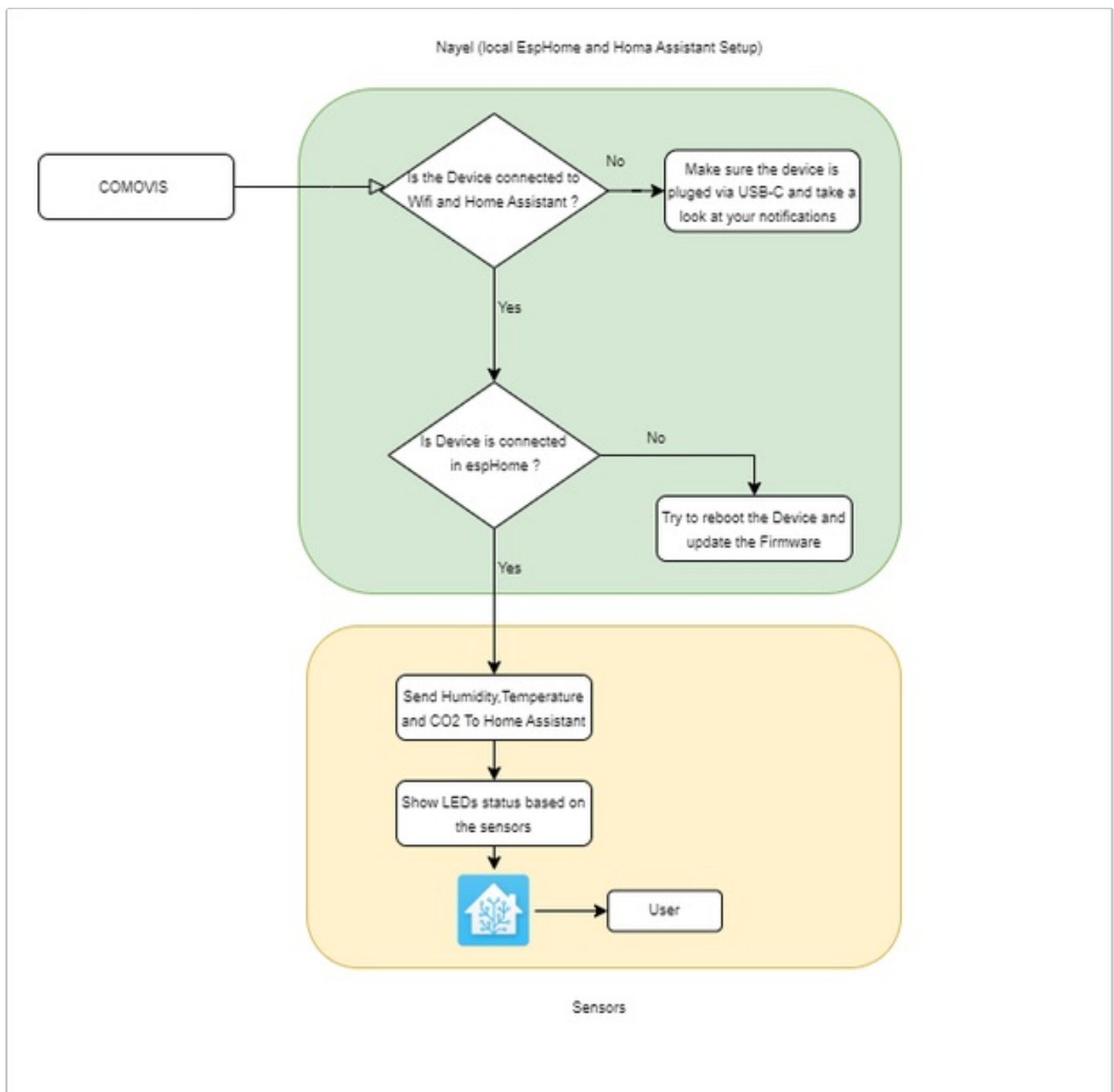
and a usb-c breakout board for the power.

In order to use those components you will need to connect the AHT10 to the SDA and SCL pin of the Lolin node MCU wich is pin 5 for the SCL and pin 4 for the SDA and connect the +5V and GND to the USB-C breakout board.

For the Air_Quality_Sensor_V1.3 you just have to connect the SIG pin of the sensor to the Analog pin of the ESP wich in this case is A0 and finnaly connect the GND and +5V to the USB-C breakout board.







Step 4: Fusion360

3D printing of the comovis

The Comovis was 3D printed with the filament ColorFabb AllPHA from ColorFabb which is a recycled and biodegradable filament which is pretty good for the environment it is also a strong and durable filament but it comes with a high cost (around 47 euros).

Here is a link in case you wanted to 3D print the Comovis <https://www.makershop.fr/filament-3d/5483-colorfabb-alpha.html>

Filament ColorFabb AlPHA



The photos cannot be placed on the page so I added the photos but in the media, don't worry you just have to follow the chronology of the photos.

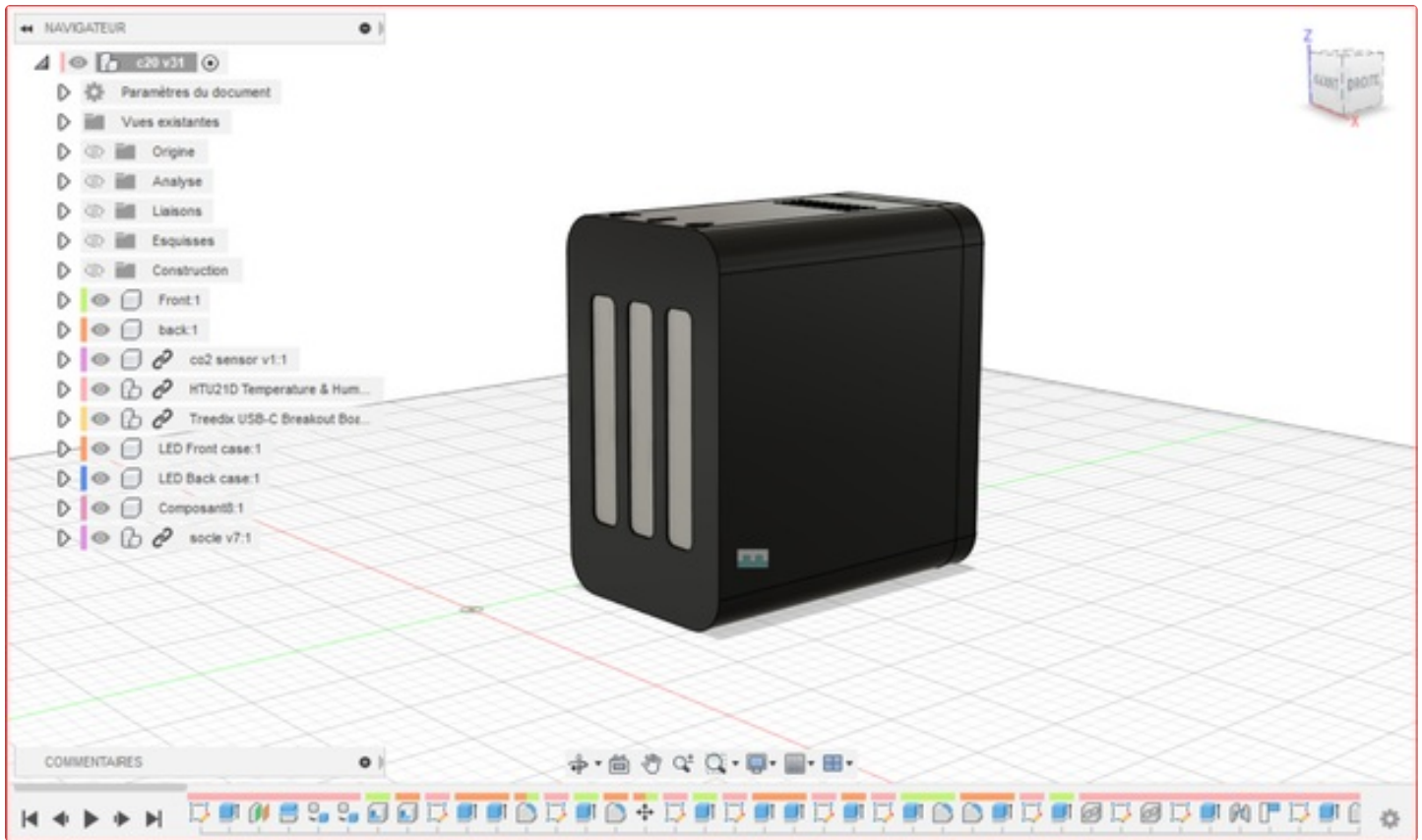
So, the first Screenshot is just the entire box with all the components, you can see in the second Screenshot the arrangement of all the Components thanks to the tool "section analysis" provided by "Fusion360".

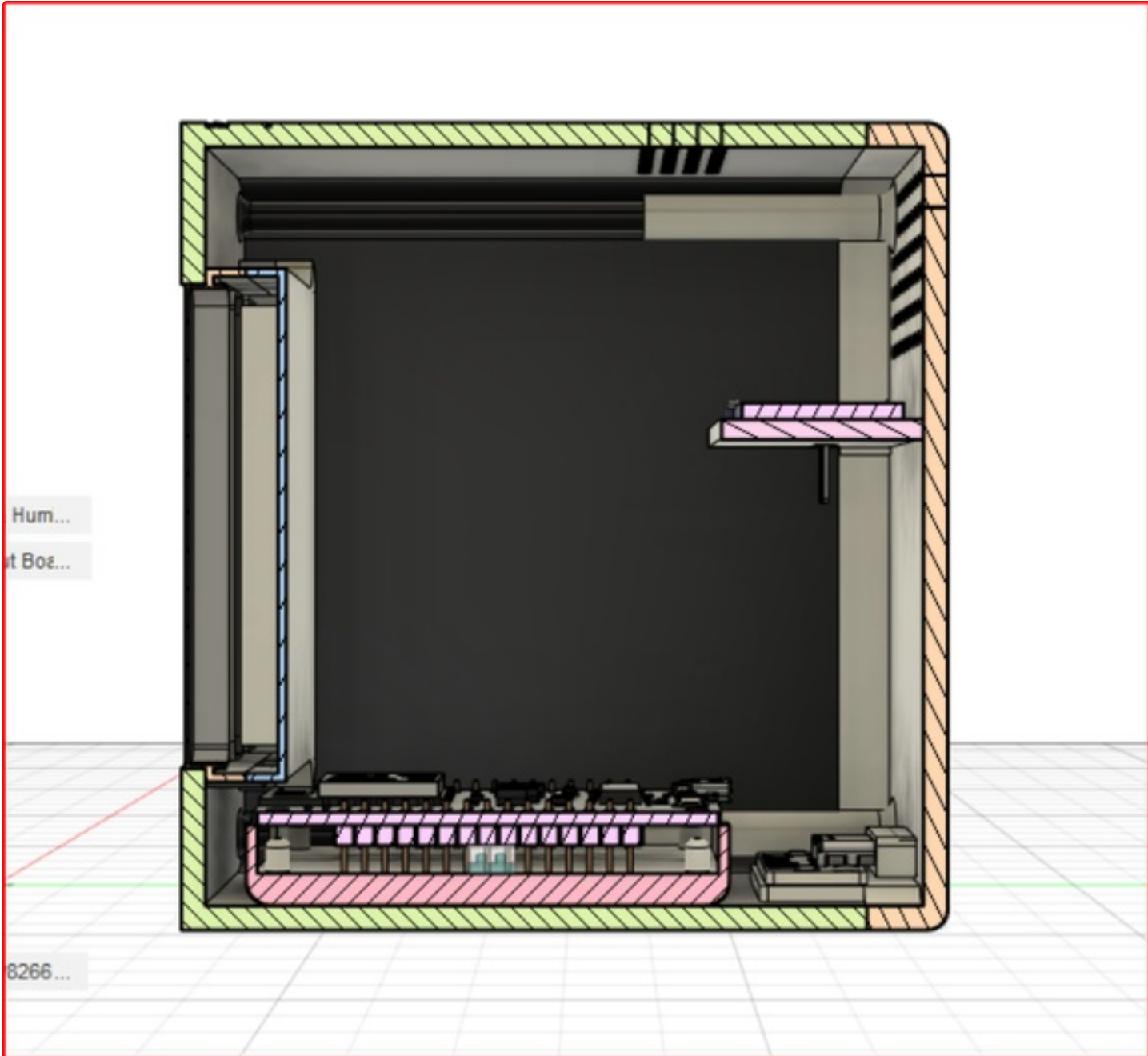
On the third Screenshot we can see in the front one part of the diffuser this part is really important because you will be able to see more clearly the colors of the different LED strips which is important for example if we want to know the temperature.

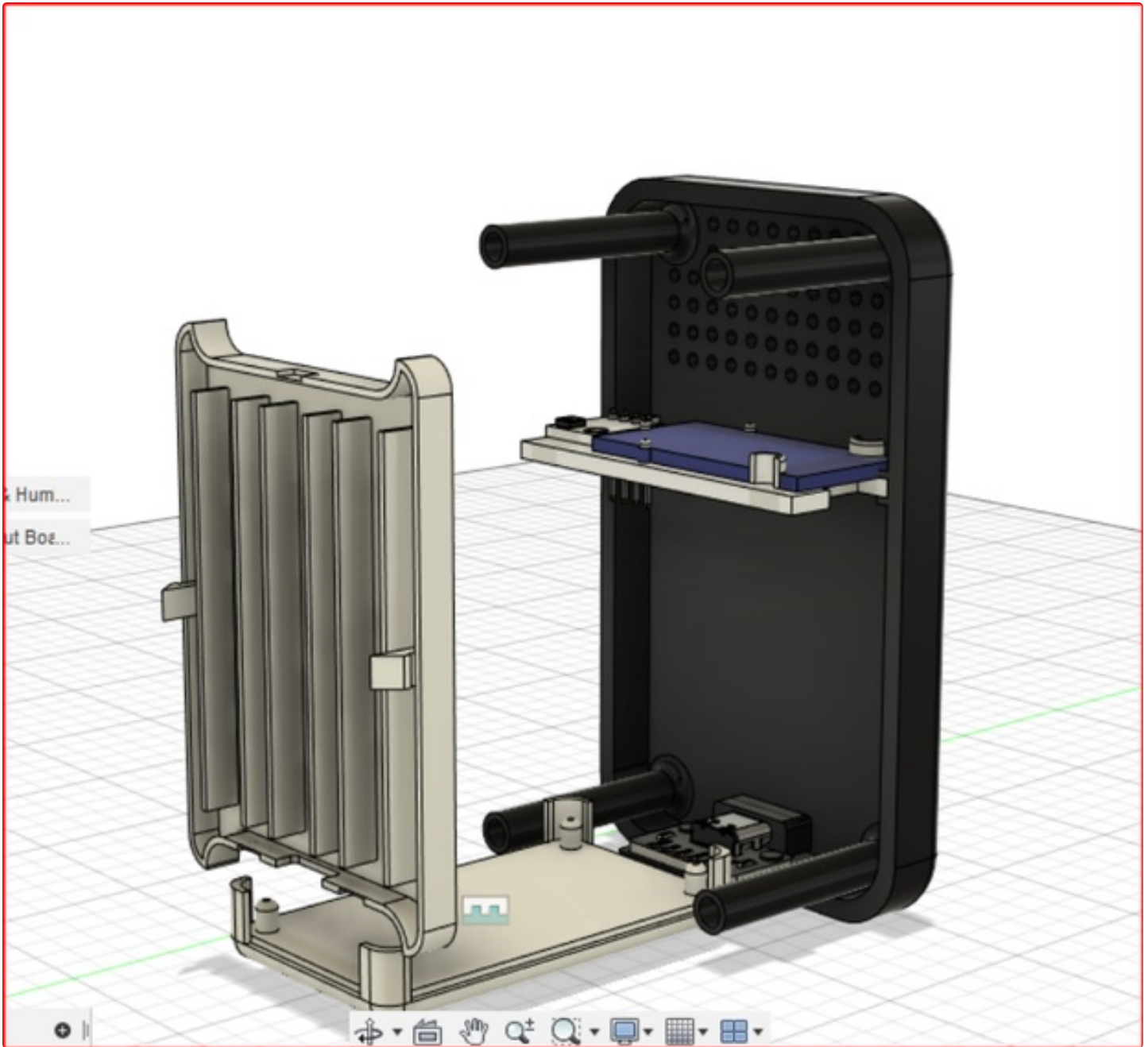
On the fourth Screenshot, we have the socket for the ESP8266 this part has its own location in the box as we can see on the fifth Screenshot.

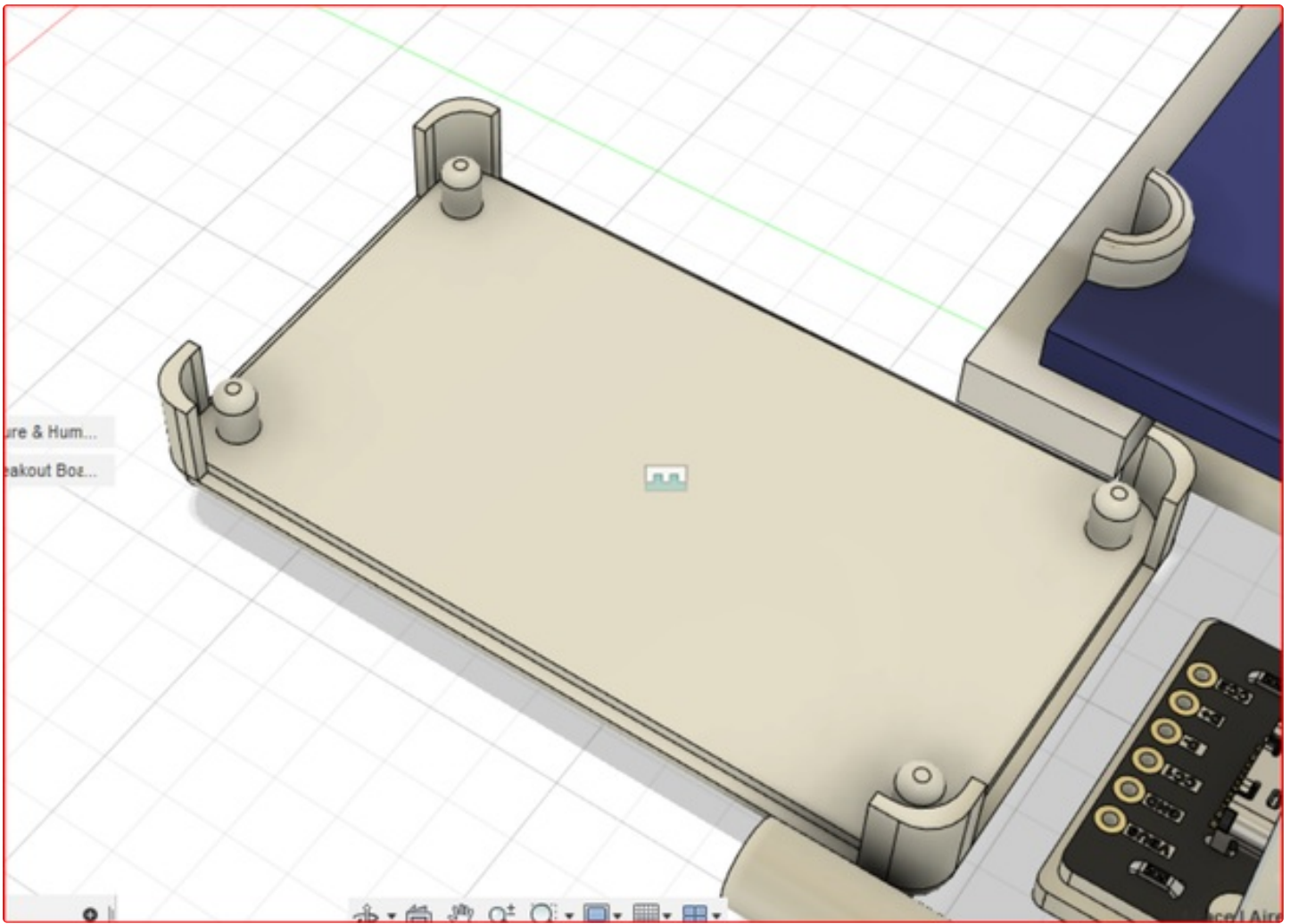
Finally the two last Screenshots represent the socket for the sensors. This tiny part has its own location on the very top of the box. Why this? you may ask. To have better value when we take info from the esp, you can see that we have holes in there which help with the detection of particles in the air.

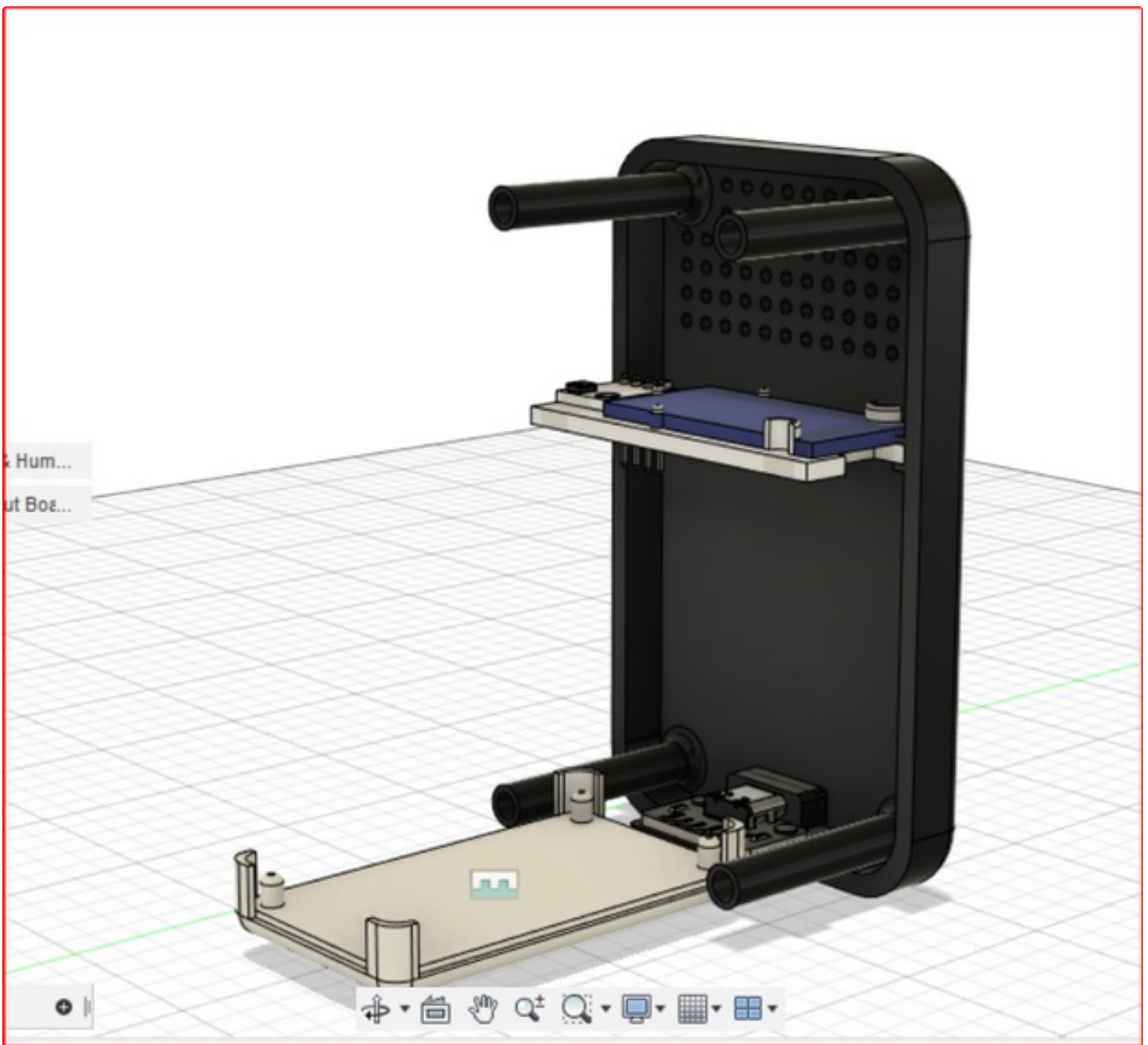
That's all for this part, all the 3D files are below, but wait a little bit because I will create a new version of this. Because the 3D model has big issues that I need to fix.

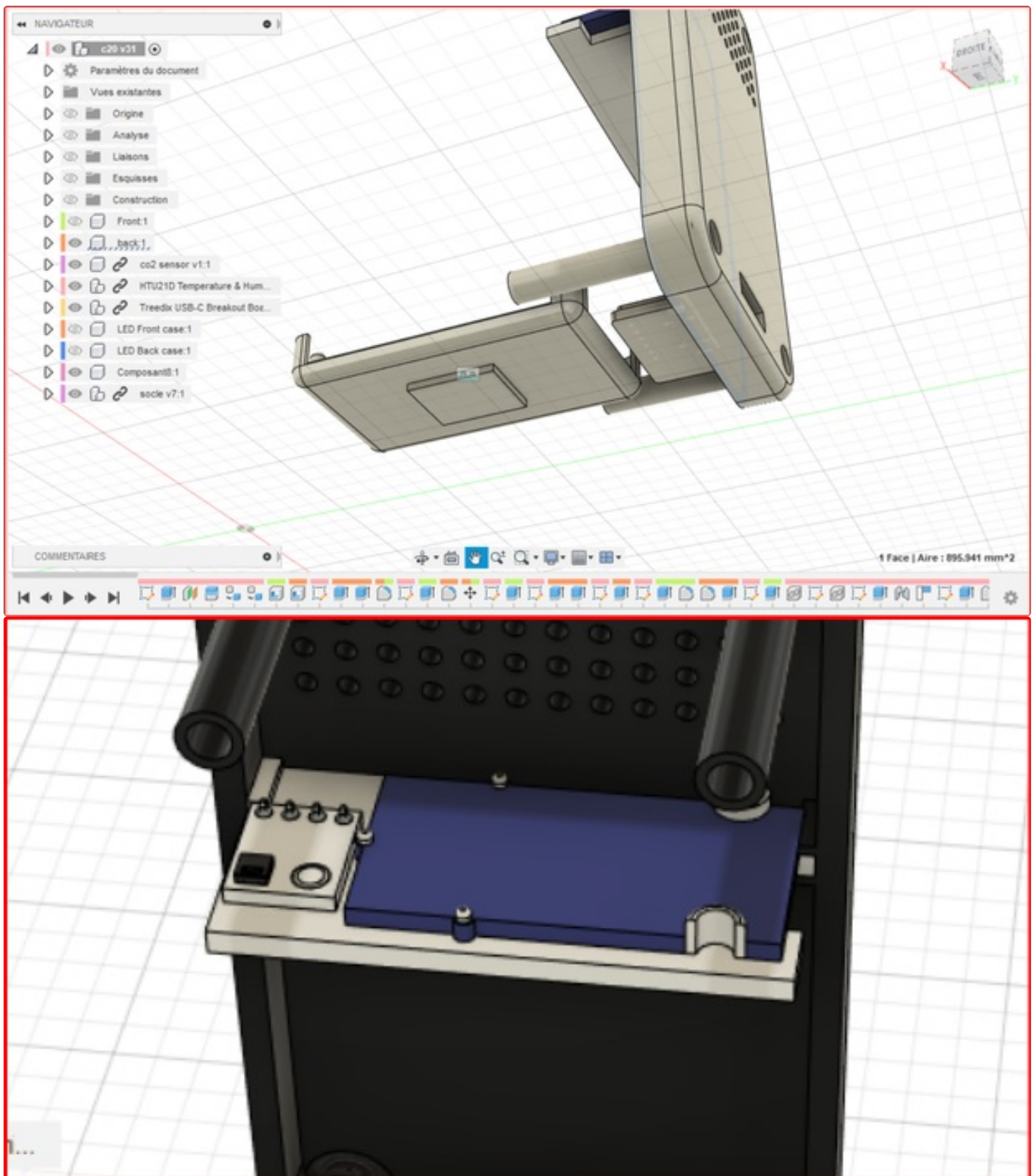


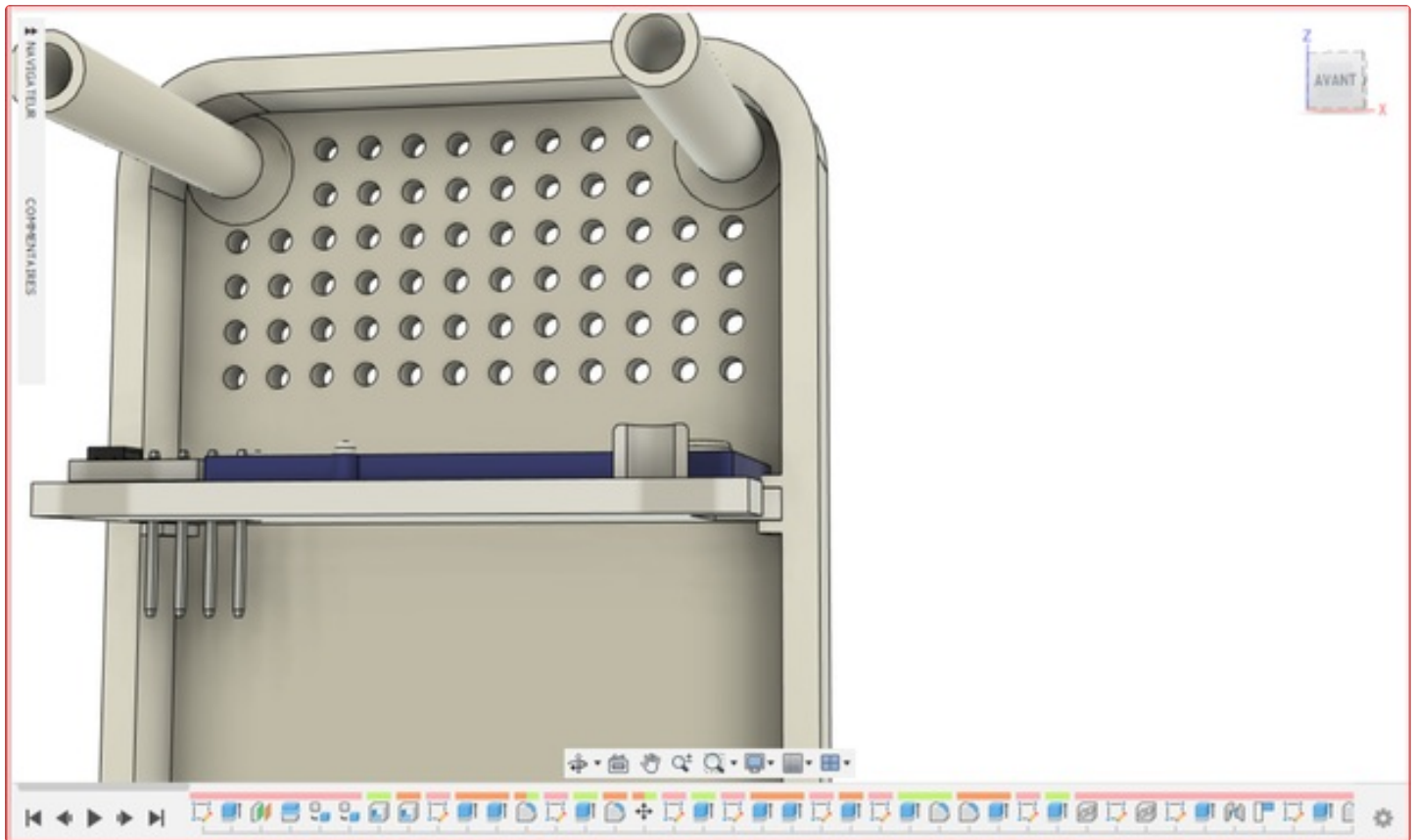












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	https://www.instructables.com/FC0/N0C5/LDJ5QDUD/FC0N0C5LDJ5QDUD.f3z	View in 3D	Download

Step 5: CO2 Box

RGB Lights :

For the lights you will need to use an iron in order to make the leds work together.

Cut the LED strips and glue them into the diffuser, then solder the different wires with their pairs.

Then clip the two pieces of the diffuser and put the diffuser into the front of the CO2 box.

Node MCU V3 :

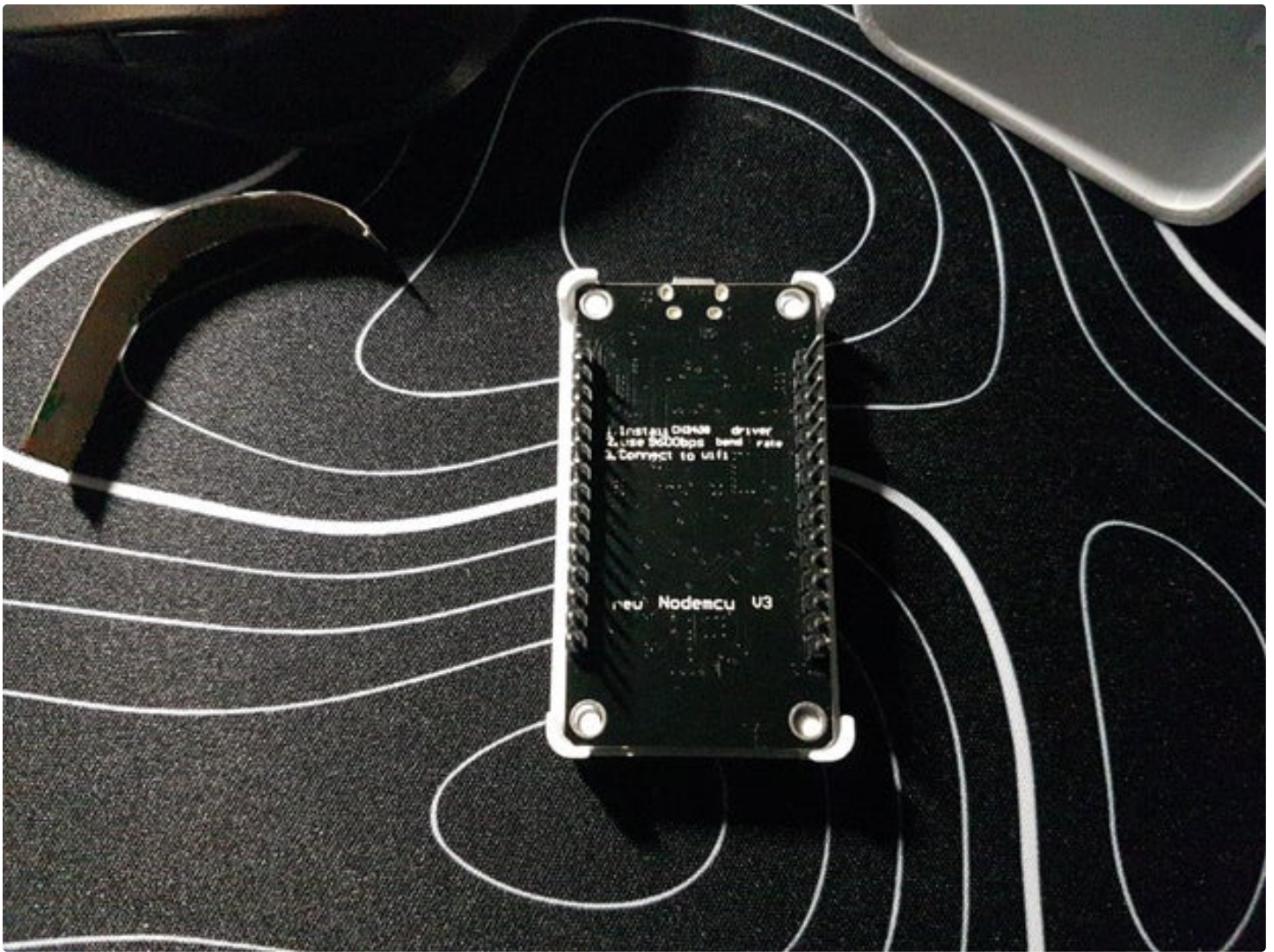
I designed a small socket, you just have to put the ESP on his socket and glue the socket in the small notch provided in the base of the Comovis.

Sensors :

Then, I designed a small socket that can slide into the back of the Comovis so you just have to Glue the two sensors into the socket and slide the socket into the back of the Comovis

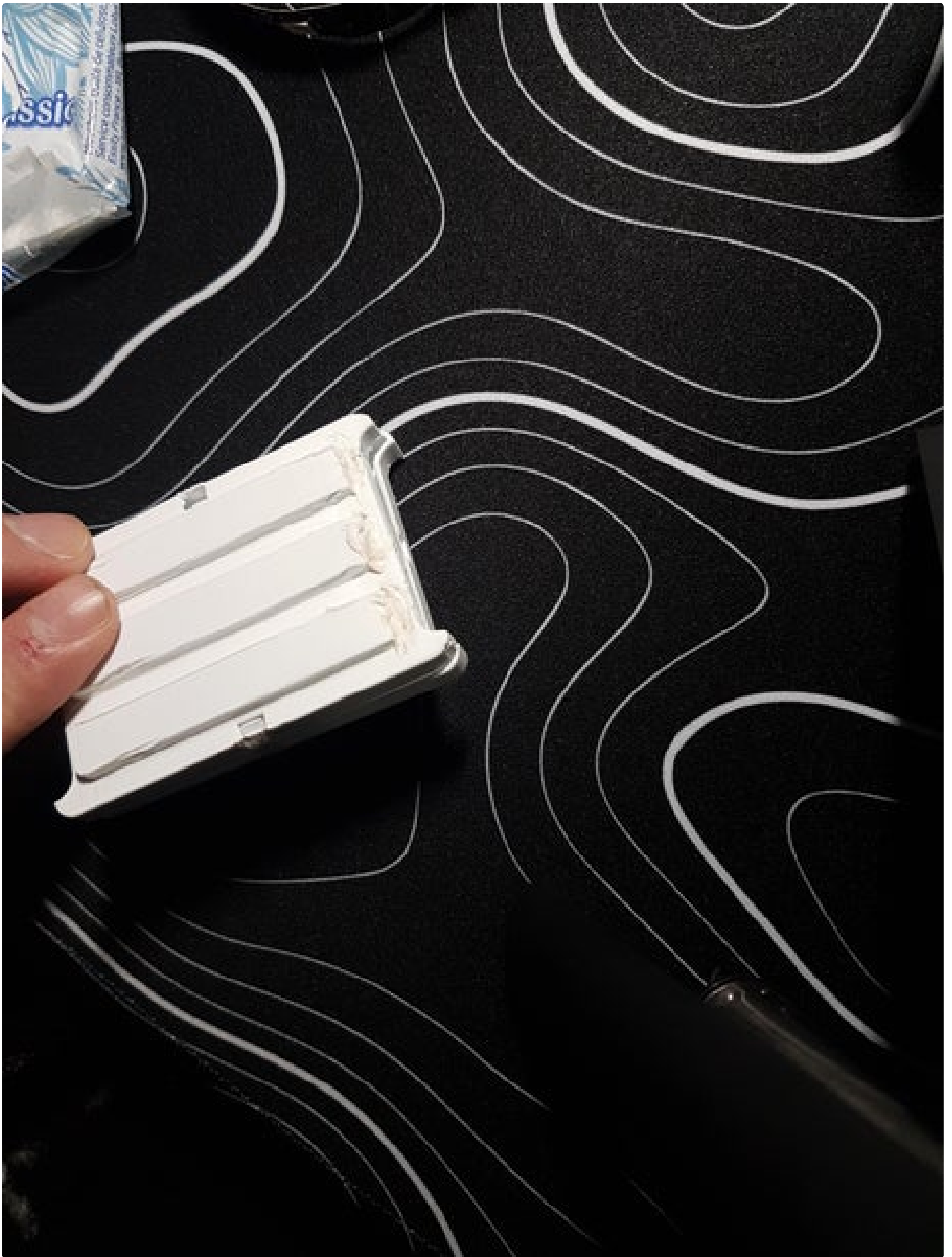
And finally make the cable management and closed the Comovis.



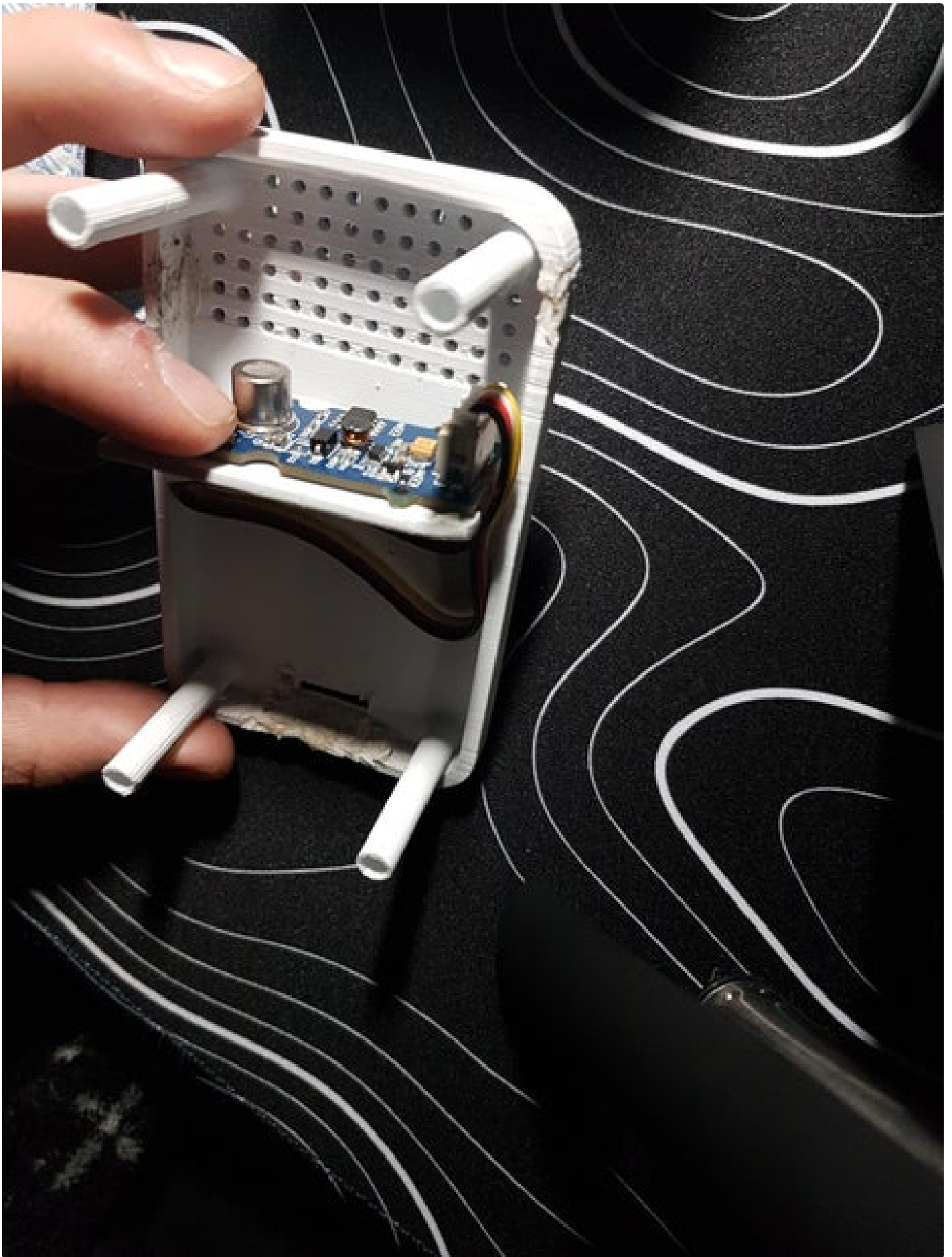












Step 6: Programming

///////////////// **This part is still under developement !** //////////////////

For the programations part on ESPHome. first you have to setup your ESP8266 (or ESP32 and other's)
Then to modify the .YAML file of the esp8266 and add the sensors and LED as it shown here :

```
esphome:
  includes:
    - Air_Quality_v1.h
  sensor:
    - platform: aht10
      temperature:
        name: "PSalon Temperature" //the name of the Infos
        accuracy_decimals: 1 //The precision of the number that is showned
      humidity:
        name: "PSalon Humidite"
        accuracy_decimals: 1
        update_interval: 20s //the delay
        address: 0x38 //the adress of the sensor
        i2c_id: bus_b //the way we use the i2c

    - platform: custom
      lambda: |-
        auto my_sensor = new Air_Quality_v1();
        App.register_component(my_sensor);
        return {my_sensor->Co2};
      sensors:
        name: "Polutions"
        unit_of_measurement: PPM //type unit of the info
        accuracy_decimals: 2 //the precision

  captive_portal:
  i2c:
    - id: bus_b
      sda: 4 //pin number for the AHT10
      scl: 5 //pin number for the AHT10
      scan: True
```

Don't forget to add the library.h of the sensor !

You can download the Library.h here : <https://github.com/Nacros115/Comovis.git>

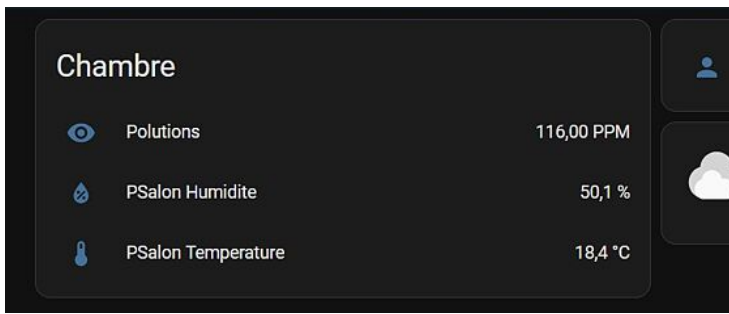
Note : Of course you can use Arduino for programming the device, but I think it is way easier to this with ESPHome.

I will add the library for the arduino just in case you want to use the Air quality Sensor.

Here is the link to the Github repo : <https://github.com/Nacros115/Comovis.git>

Step 7: Results

Hey ! You made it to the last step ! Now that your device and your server are ready, you will be able to see this type of informations in your dashboard :



This is the different infos of the esp, you have the Temperature, the Humidity and the Air Quality. Of course you can modify the design of your dashboard, but I think it is the best way to show infos.

Step 8: Other Ideas & Upgrades

So we made it the top, now the thing is that the Comovis need to be more practical. What I mean by that, is we can find some new features like adding modules for other sensors to complete the product or make it easier to assemble. One thing that goes over my mind is that it is hard to find a solution to stick the diffuser in the front of the Comovis without gluing the part. I try to create some clips around the different parts but it was not the best solution.

So for the next improvements of the Comovis :

- Add features. (like Pressure sensor or an all in one temperature, humidity and air quality sensor)
- Make it more practical.
- Make it more easy to assemble.
- Maybe create an app that send notification to the user.