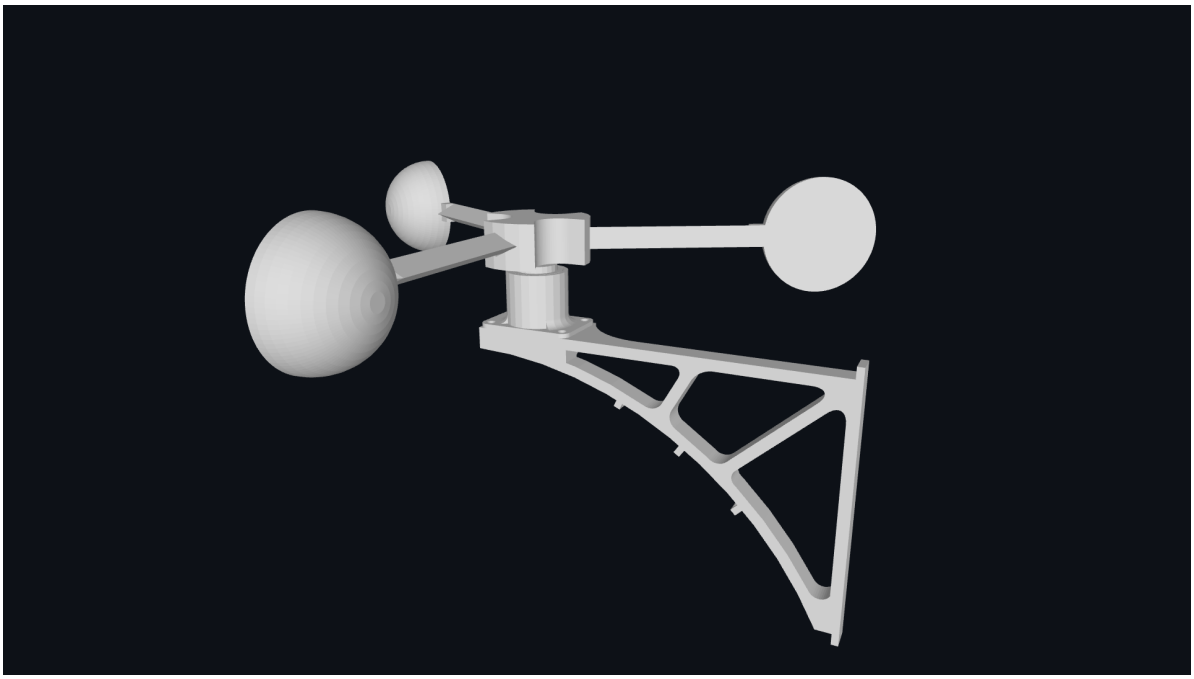
weatherStation



Overview

This is a simple Weather Station having the following sensors:

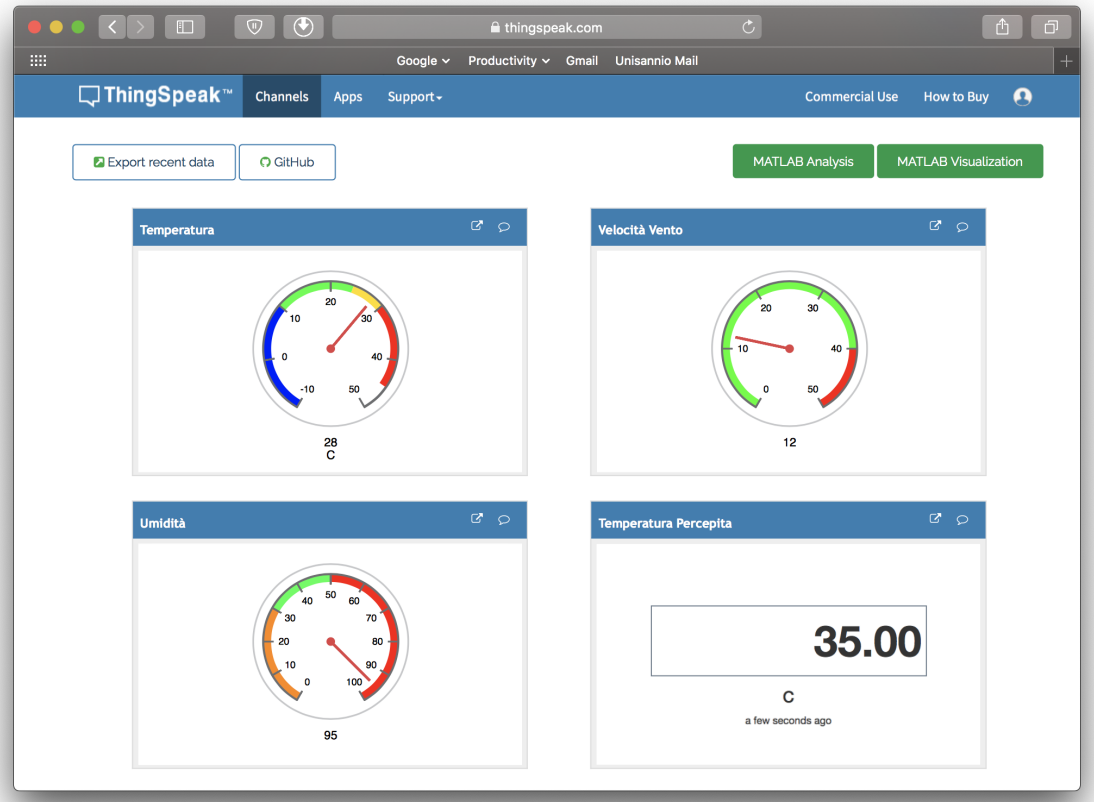
- Temperature sensor
- Humidity sensor
- Wind Speed sensor

Currently the Station uses the **NodeMCU V3**, with the embedded **ESP8266** `WiFi Module.`
For this reason, the station can only have **one** `Analog Input`, and the port is wired to the `Wind Speed sensor`.

The next version will use the `ESP32`, that has **18** Analog Inputs, yes, a lot of pins!
Having such a number of `analog inputs` i'll be able to connect a lot of analog sensors, and i'm planning to add:

- Light sensor
- Rain sensor
- Barometer
- Pyranometer
- CO2 sensor

The UI



The **UI** was built using [ThingSpeak] that offers an **API** to populate the various **Widgets**

```
void updateThingSpeak ()
{
  ThingSpeak.setField(1, temp);
  ThingSpeak.setField(2, hum);
  ThingSpeak.setField(3, percTemp);
  ThingSpeak.setField(4, windSpeed);

  int x = ThingSpeak.writeFields(myChannelNumber, myWriteAPIKey);
  if(x == 200)
  {
    Serial.println("Channel update successful.");
  }
  else
  {
    Serial.println("Problem updating channel. HTTP error code " + String(x));
  }
}
```

Parts used

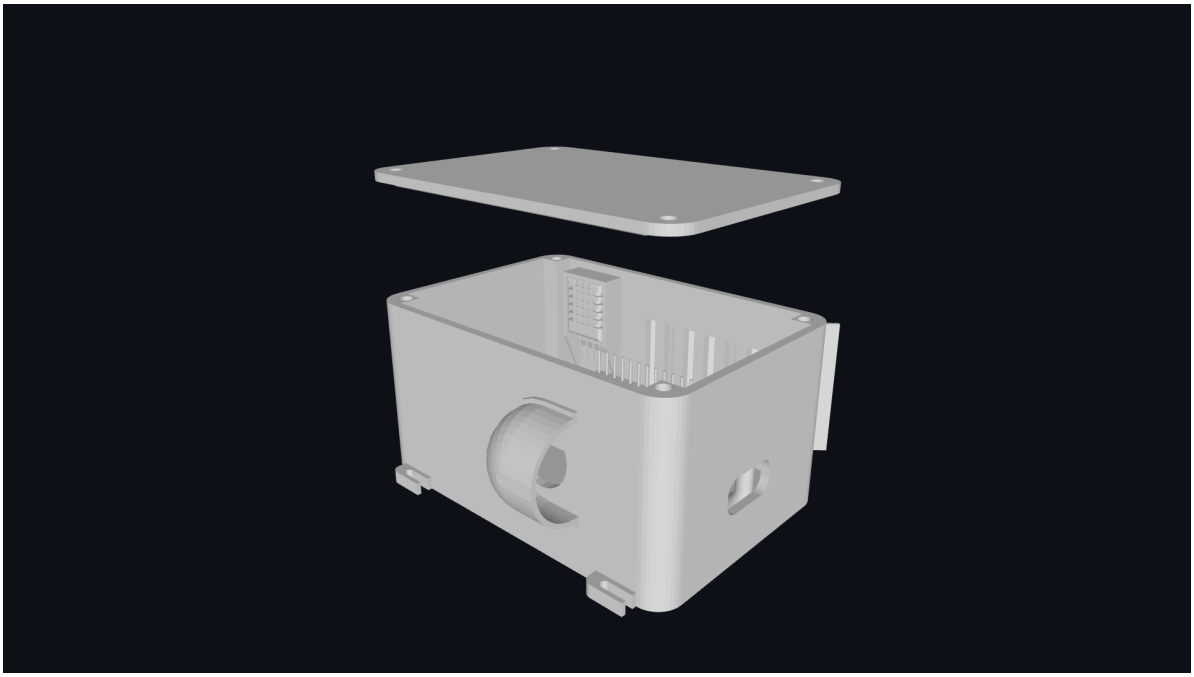
- `NodeMCU V3` with `ESP8266` **WiFi Module**
- One `10k Ohm resistor`
- `DHT11` Temperature/Humidity sensor (I don't like this sensor, if you are planning to build something like this, use another sensor)
- `5V DC motor` (Used for the Wind Speed Sensor, agin, do not use this method. The next version will use a `Magnetic Sensor` to compute the wind speed)
- `A 3D Printer` (mh, that's crucial)

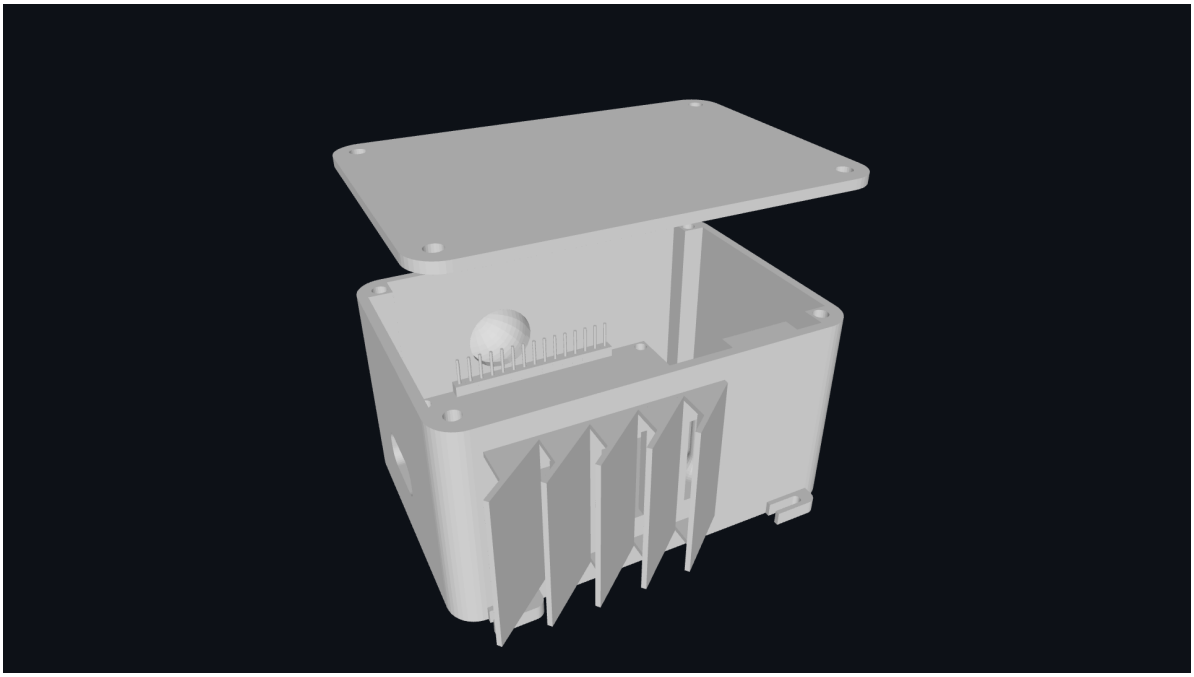
3D Project

The project is available on Thingiverse, or there is a Folder where all files are uploaded.
The project consists of **two main parts**:

Arduino case

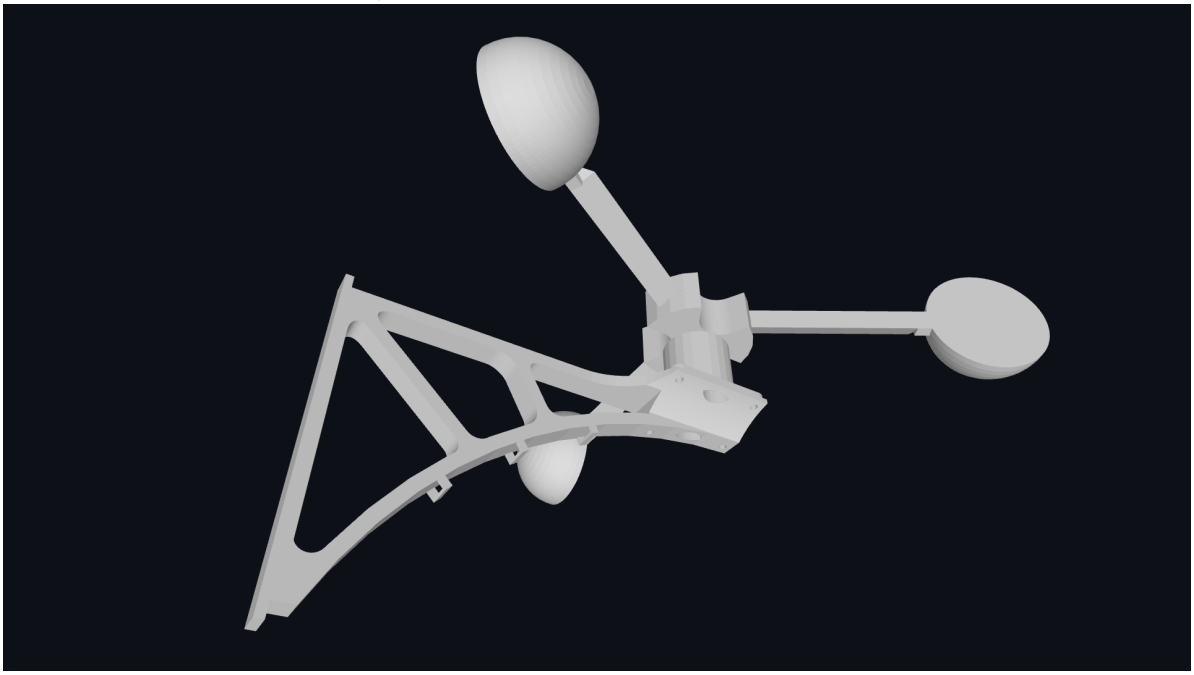
The case only has room for the `NodeMCU` and the `DHT11 sensor`.
Moreover, the case has an hole on the left side for the external `Wind Sensor` and a vent on the right for the `DHT11 sensor`.





Wind Speed Support

The wind speed sensor is supported by a 3D printed part mounted on the wall.
This part should be printed in a weather resistant material, such as PETG or ABS, don't use PLA.
Moreover, the "blades" are 3D printed too.



MATLAB

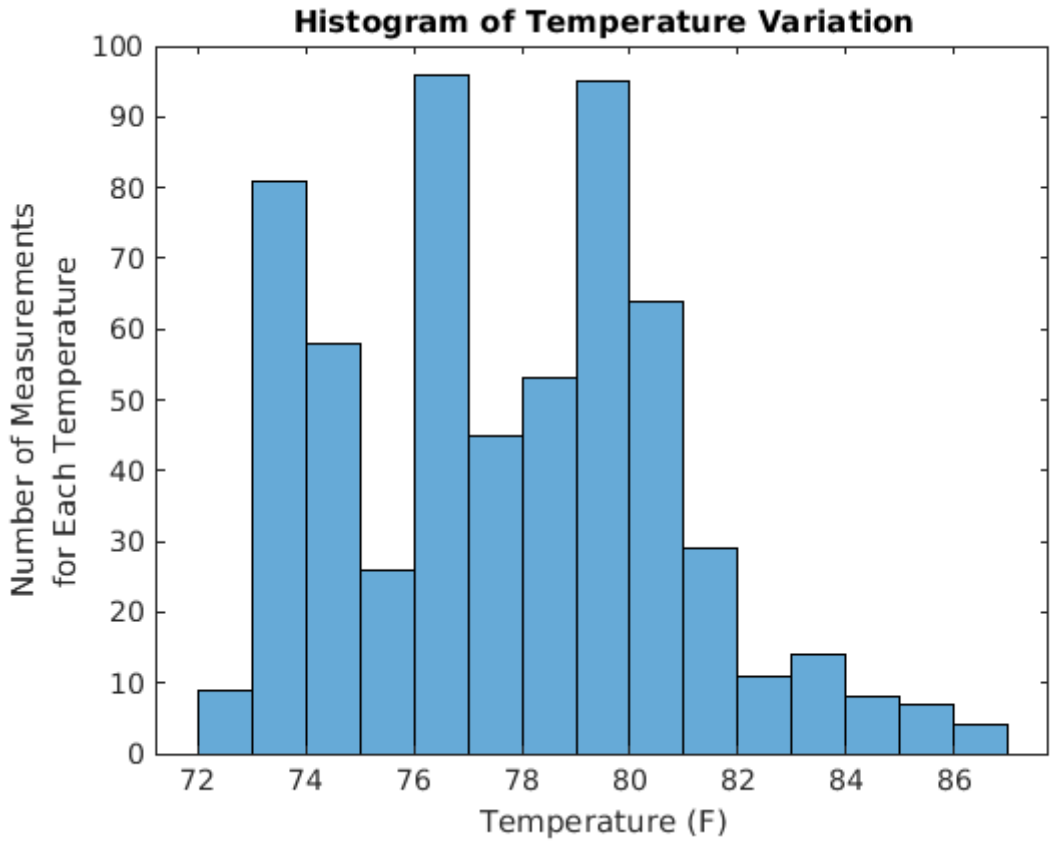
We can use **MATLAB** scripts to analyze our data:

Histograms

```
tempF = thingSpeakRead(readChannelID,'Fields'
,TemperatureFieldID,...
'NumMinutes',10*60, 'ReadKey',readAPIKey);

histogram(tempF);
xlabel('Temperature (F)');
ylabel('Number of Measurements\newline for Each Temperature');
title('Histogram of Temperature Variation');
```

That computes:



Some Pics

https://user-images.githubusercontent.com/74026278/130363595-80cdf6d4-ce8a-403d-b3db-37c81fa7ad7b.mp4