SMART TRASH CANS

BOOSTRAP 2

SMART TRASH CANS

IoT

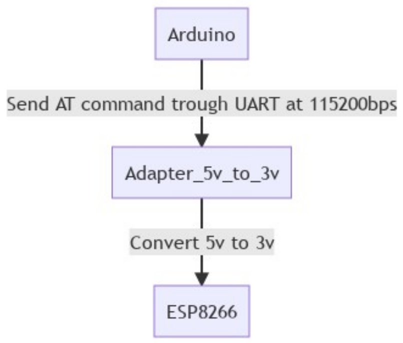
Game 1

Connect arduino to the ESP8266 trough the UART connection The ESP is a wifi module that will allow the Arduino to communicate with the internet.

- ✓ Wikipedia ESP8266
- ✓ Datasheet ESP8266

The arduino is operating at 5V nominal tension and the ESP8266 is operating at a 3V.
This means that you can neither make them communicate with each other nor power the ESP from the Arduino.
The ESP would be in overvoltage and would certainly be damaged.

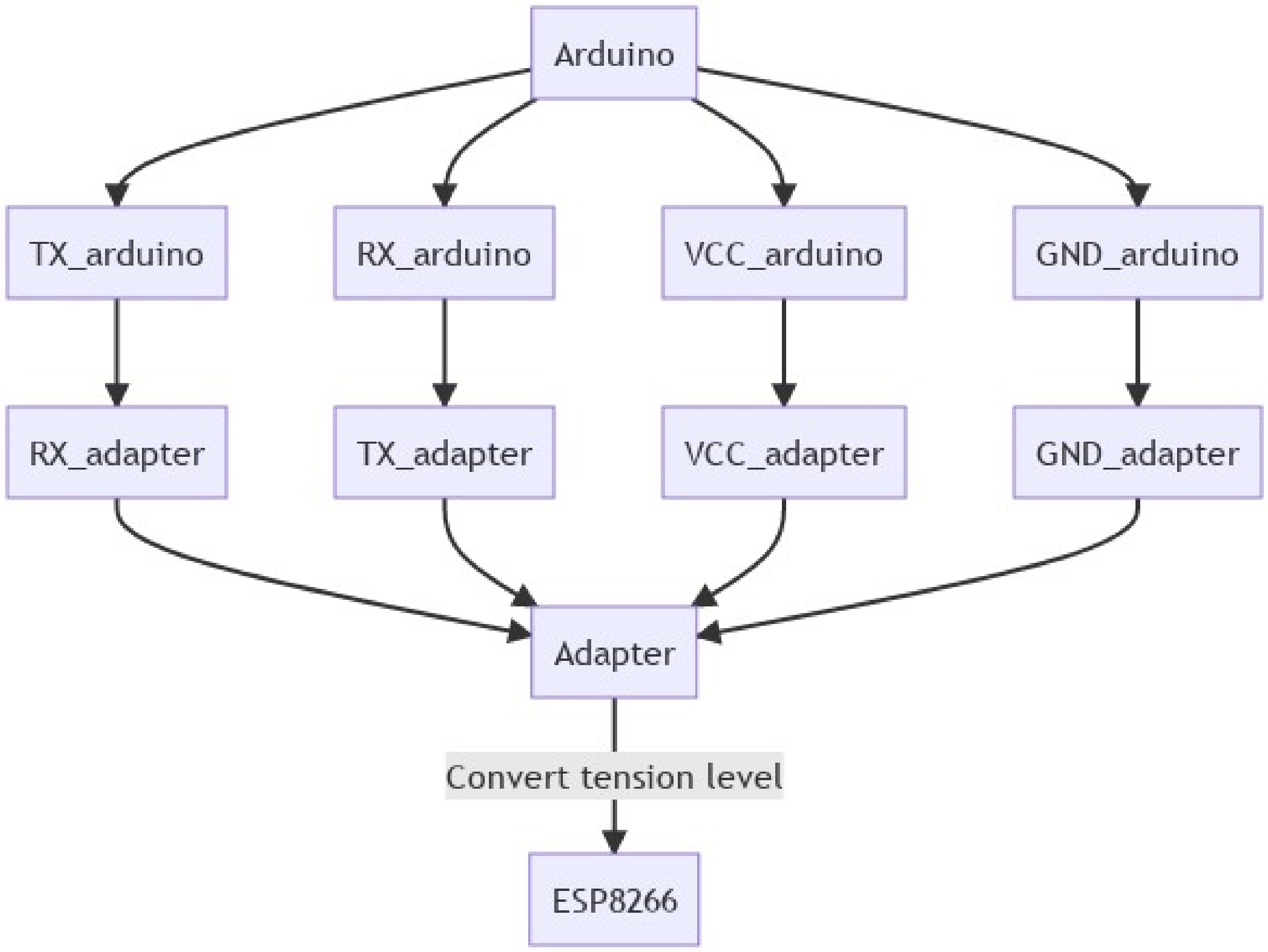
To avoid this, always use the adapter provided in your kit.



Its job is to convert the logic voltage from 5V to 3V to allow the two components to interface harmlessly.

The communication speed of the ESP8266 is 115200bps so you will absolutely have to use an arduino mega with several serial links. The arduino uno will make unpredictable errors.

The connection between the pins should be like this :



Game 2

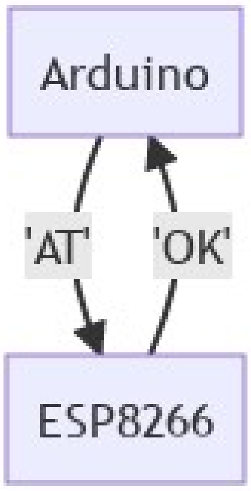
Now that the wiring is done we will send our first AT command This is a text protocol that will allow you to give orders to the ESP and communicate information with it.

Note that this is not the only way to use ESP. You could program it directly to embed its own code like the arduino.

The default mode is communication via AT command and it is the simplest mode, so we will use this one. You can experiment with the other modes by yourself but be careful to always be able to restore the default firmware so as not to brick the ESP.

- ✓ AT command on wikipedia
- ✓ ESP8266 - AT Command Reference

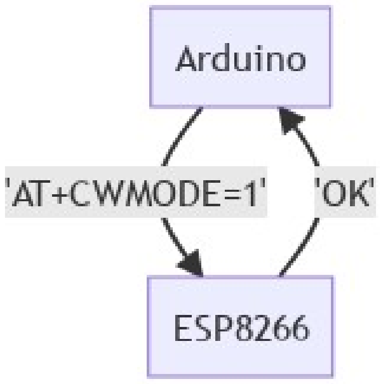
To complete the first task send "AT" from the arduino, to receive the response "OK" from the ESP. This is the test command that will confirm that the ESP is working properly and that the two modules are able to communicate with each other.



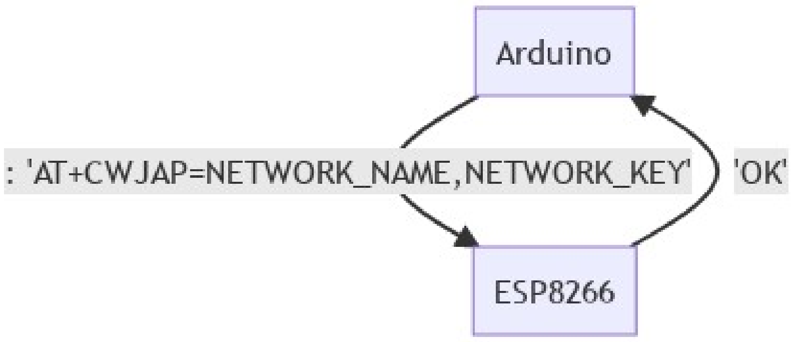
Setup ESP in "station mode" to connect to Wifi network The ESP can operate in 3 modes (see the doc for more information), the mode that interests us is the station mode which allows you to connect to a Wifi AP.

Note that if you can use your phone's 4g in access point mode to deploy a Wifi network.

Configuring ESP in station mode :



Connecting ESP to the network :

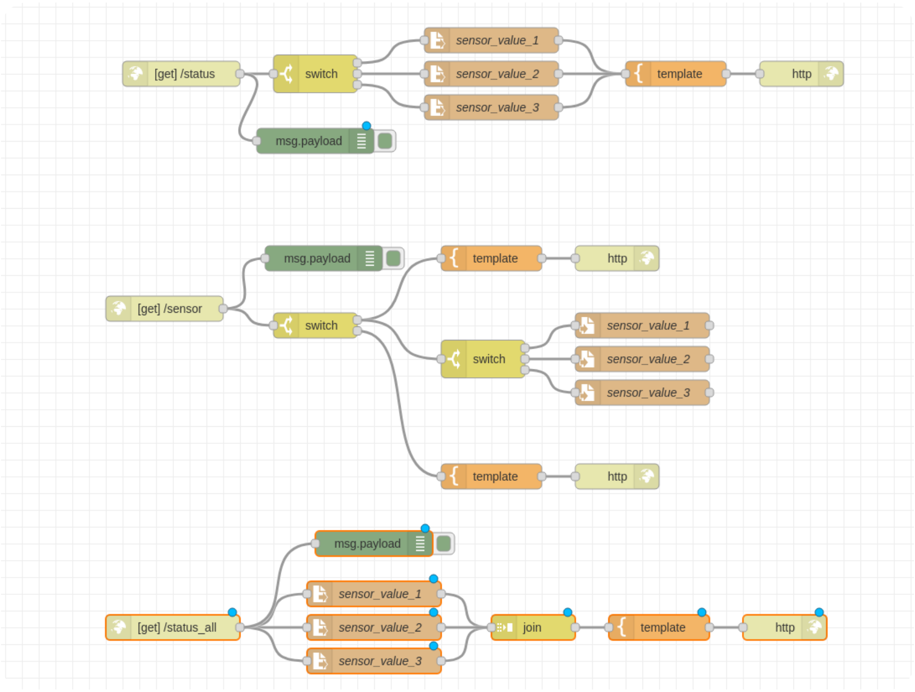


Of course you must replace "NETWORK_NAME" and "NETWORK_KEY" with your AP information (don't forget the char " as string delimiter).

Your system should now be connected to the internet.

Game 4

Deploy API Now to test the communication with the internet we are going to deploy locally an API which will be used for the tests and for the project.



The API was made with Nodered for simplicity.

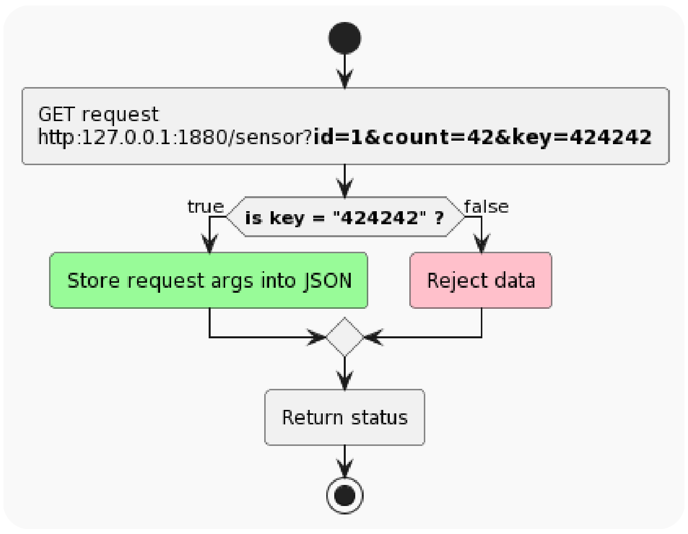
Thanks to NPM it should be easy to deploy on any laptop.

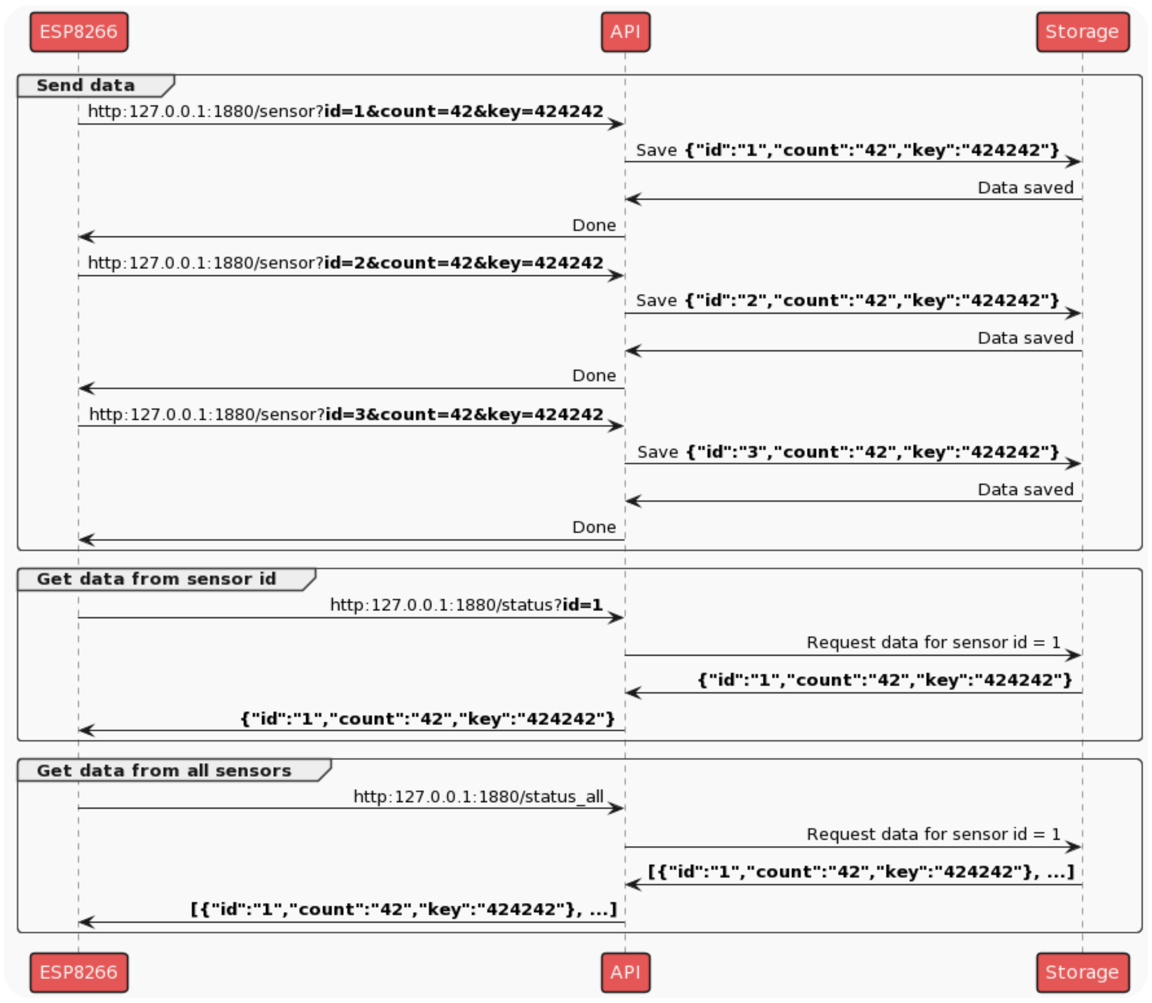
You will be able to implement your own API in the desired language during the project, **once everything else works correctly** (bonus).

You will find the corresponding flow.json file in this repo.

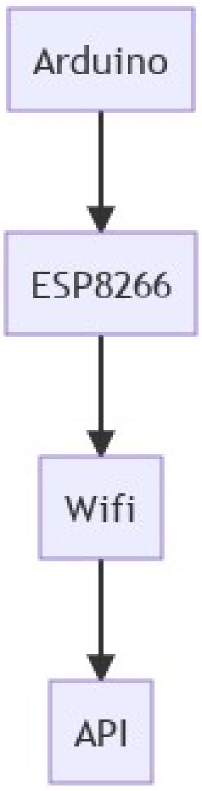
You will have to import it then click on "deploy" and the API will be normally functional (be careful to disable for firewall if necessary).

The API asks for an id and a key, then it will store all the arguments in a JSON file.


GET request
http:127.0.0.1:1880/sensor?**id=1&count=42&key=424242**
true
is key = "424242" ?
false
Store request args into JSON
Reject data
Return status


ESP8266
API
Storage
Send data
http:127.0.0.1:1880/sensor?**id=1&count=42&key=424242**
Save **{"id":"1","count":"42","key":"424242"}**
Data saved
Done
http:127.0.0.1:1880/sensor?**id=2&count=42&key=424242**
Save **{"id":"2","count":"42","key":"424242"}**
Data saved
Done
http:127.0.0.1:1880/sensor?**id=3&count=42&key=424242**
Save **{"id":"3","count":"42","key":"424242"}**
Data saved
Done
Get data from sensor id
http:127.0.0.1:1880/status?**id=1**
Request data for sensor id = 1
{"id":"1","count":"42","key":"424242"}
{"id":"1","count":"42","key":"424242"}
Get data from all sensors
http:127.0.0.1:1880/status_all
Request data for sensor id = 1
[{"id":"1","count":"42","key":"424242"}, ...]
[{"id":"1","count":"42","key":"424242"}, ...]
ESP8266
API
Storage

Game 5



Our setup should look like this.

We are now going to send our first HTTP request.

To send our “GET” request we will use AT commands which allow us to send information through a TCP connection.

To establish tcp connection my code look like this :

```
Serial2.println("AT+CIPSTART="TCP","192.168.43.99",1880");
```

And to actually send data, it look like this :

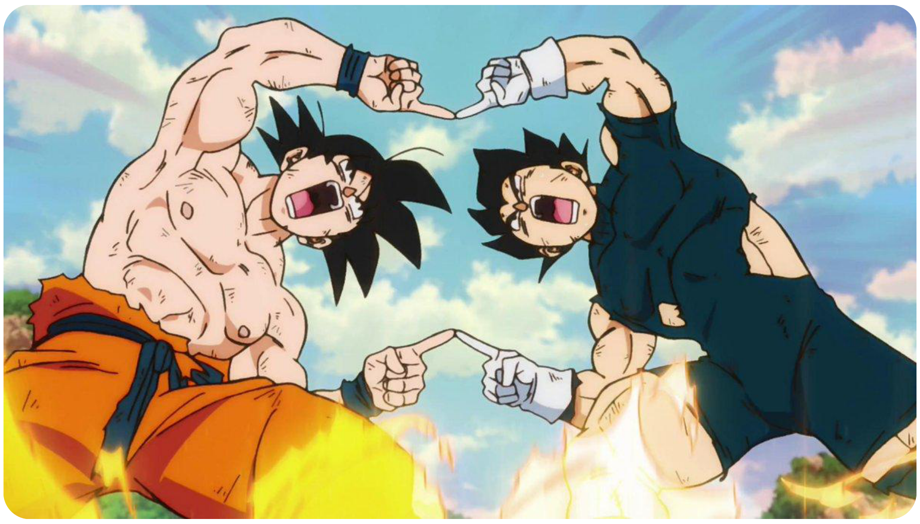
```
String message = "GET /sensor?id=1&count=12&key=424242\n\n";
Serial2.println(String("AT+CIPSEND=")+ String(message.length()));
delay(100);
Serial2.println(message.c_str());
```

You are now able to save data from the Arduino to the cloud and retrieve it from the application of your choice using the API, well done.

If you meet problems giving access from outside to your local API, I advise you to use ngrok.

Virtuality

In this new episode, we'll communicate between the two systems *Unity & Arduino*...



An episode always begins with a summary of the previous one!

Game 1

Communicate an *Arduino* with *Unity* via the **serial**. A button connected to the *Arduino* sends a message to *Unity*, which is rewritten in the debug console.

Game 2

Connect an RGB LED to the *Arduino* and create *(or integrate)* a color picker at *Unity*. Change the color of the LED via *Unity* to confirm/deny your actions.

Game 3

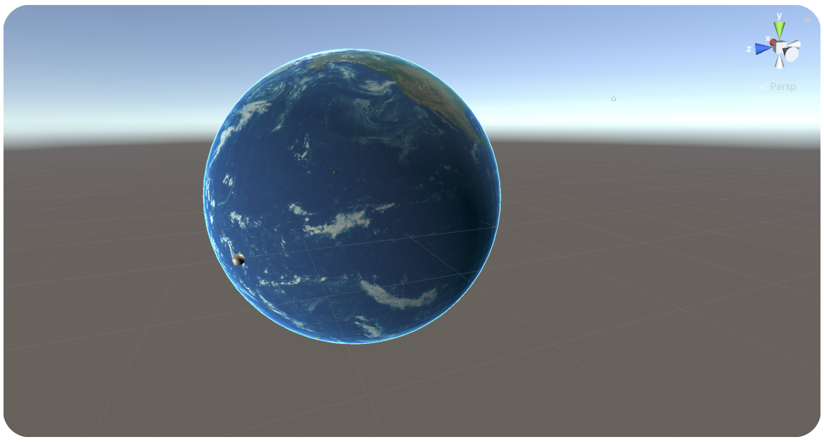
This one is for the unity team only.

Display a world map (2D or even better, globe).

On that map, display a Sphere at the location of the International Space Station *in real time*

You can find RESTful APIs that give you the position of the ISS, for instance on `http://api.open-notify.org/`.
You'll also need to find a JSON parser in the asset store.

You could check the API every seconds, or by the press of a button.



Game 4

The objective is the same as *Game 2*.
But this time, the arduino can't be connected to Unity via Serial.
You will communicate only via an API.

You *could* use AirTable and Postman to build a no-code RESTfull API!
A no-code node-red API is also provided on this repo.

v 1.4

{EPITECH.}
TECHNOLOGY