Building an IoT device for outdoor usage: a step-by-step tutorial

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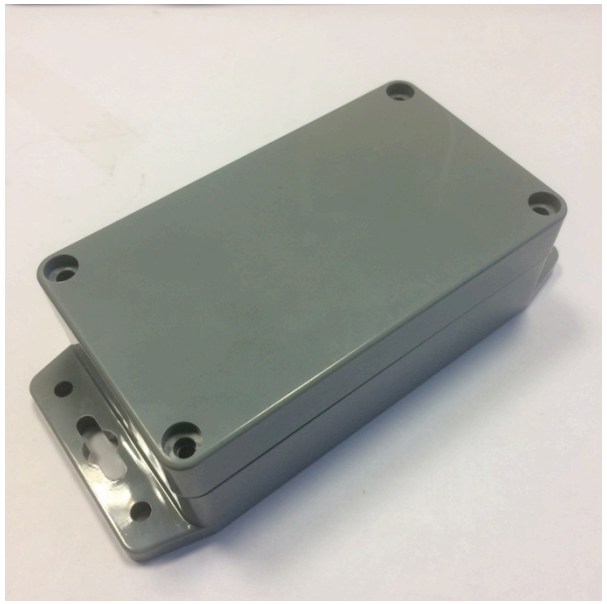
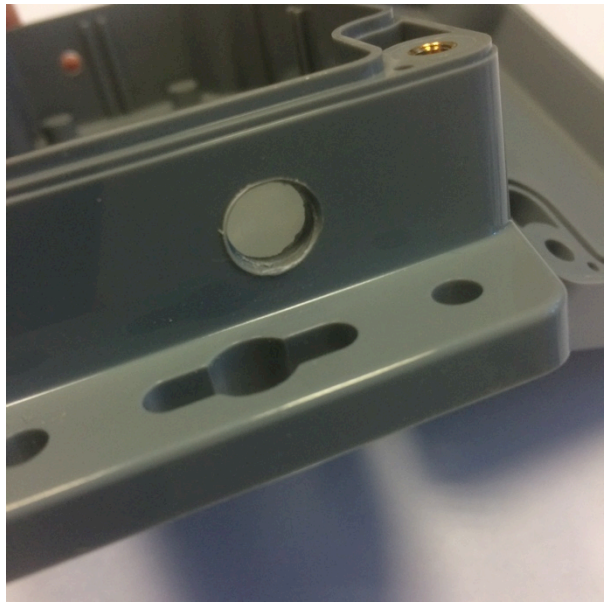
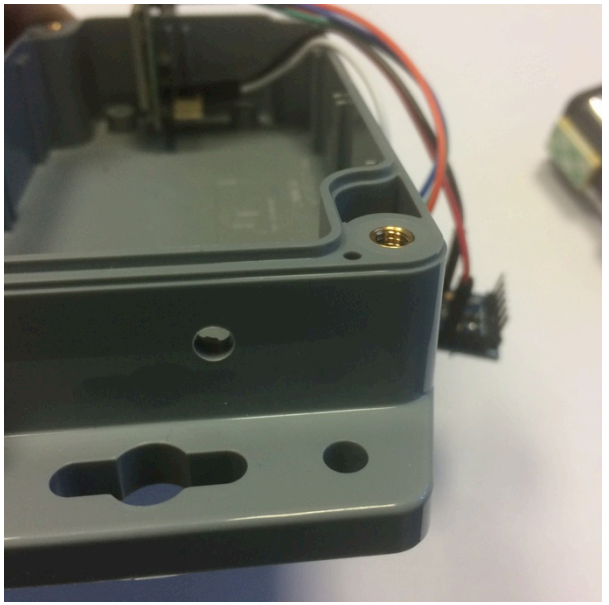
Contents

- This could be seen as a second part of « Low-cost LoRa IoT device: a step-by-step tutorial »
- We will show here how fit the IoT device for out-doot usage, again, at a very low cost
- Let's get started…

GET A BOX FOR OUT-DOOR USAGE



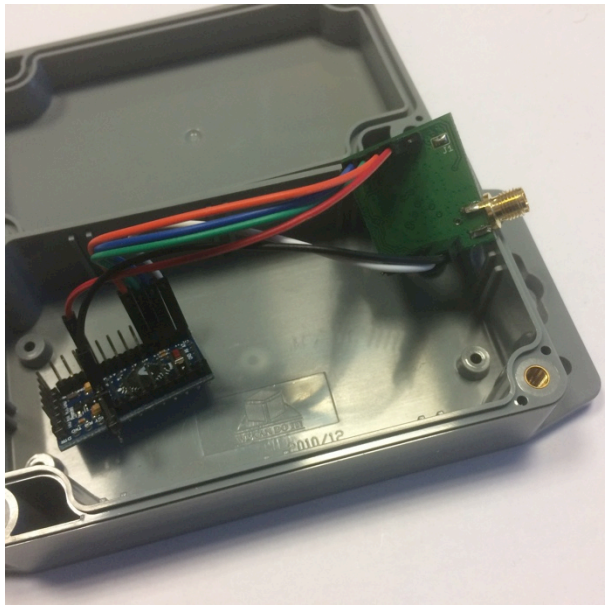


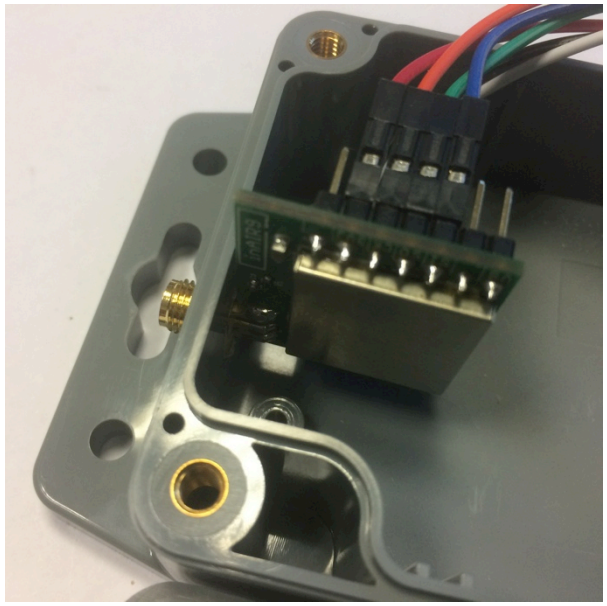


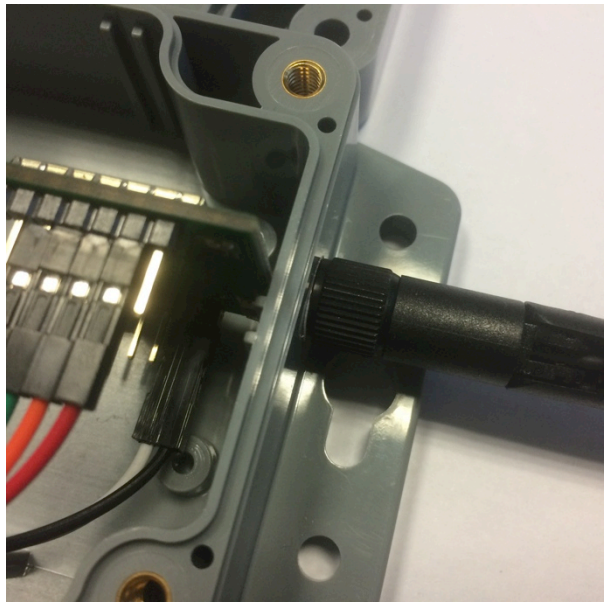
I got mine from Lextronic (http://www.lextronic.fr/P22453-boitier-etanche-115-x-65-x-40mm.html). It is an IP65 box which dimension is 115 x 65 x 40mm.

First thing is to drill a 8mm hole for the radio module and the antenna. At the other end, drill a smaller hole (4mm or 5mmm) for the sensor wire. Drill as many holes as needed.

PUTTING THE ANTENNA



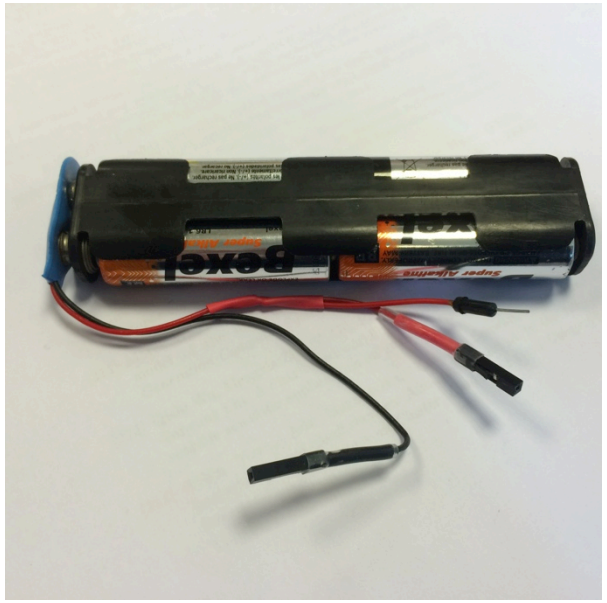




Take the IoT device that has been built previously with the « Low-cost LoRa IoT device: a step-by-step tutorial ».

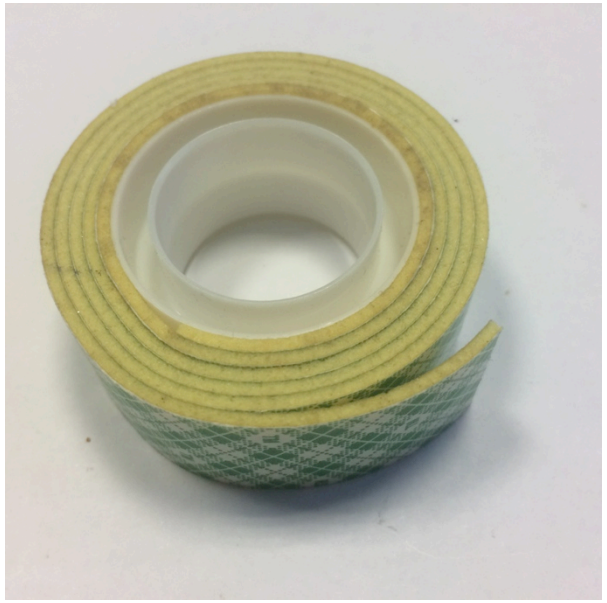
Put the antenna plug through the 8mm hole. Screw the antenna, but not too firmly, the radio module should be a bit loose.

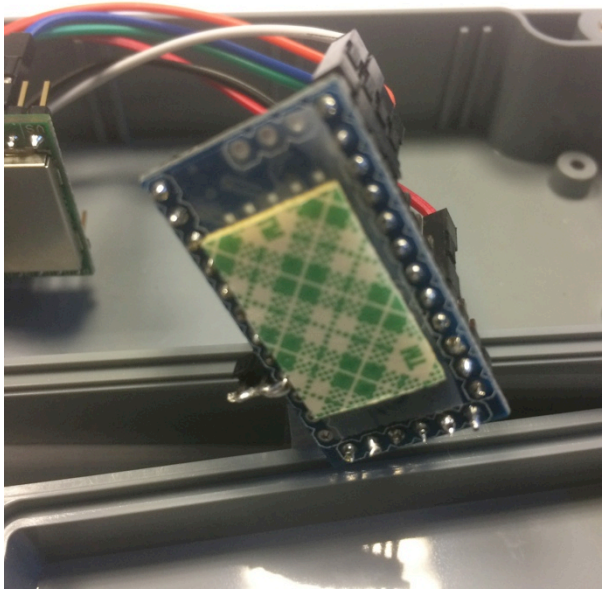
ADD THE POWER SUPLLY

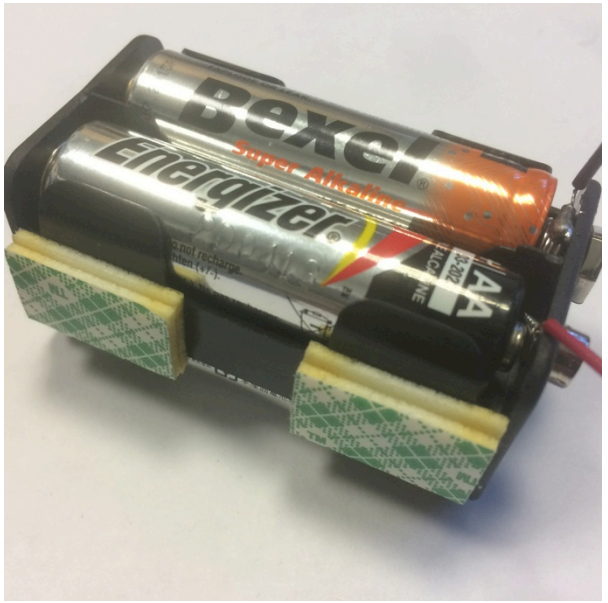


Instead of the long 4-AA battery coupler used in the previous tutorial, use a more compact version and solder 2 wires for the + (Vcc) and the - (GND). The voltage with 4-AA batteries is about 6v. The - wire should have a female connector at the other end to be plugged on the Pro Mini board directly. For the + wire, use whatever you want but it is advise to not connect the + to the board directly but rather use an other wire to easily switching ON/OFF

Fixing the components

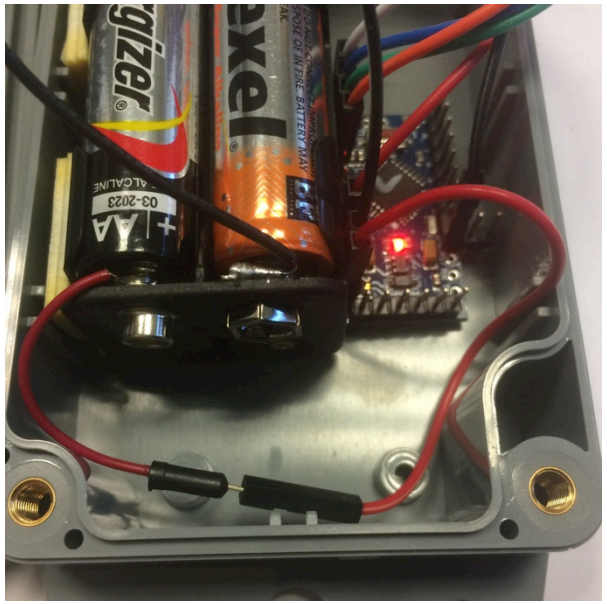






To firmly fix the board and the power supply in the box, I use double-side tape, the one used to fix mirror on the wall. For the board, it is better to use regular tape first between the board and the double-side tape because such tape can be very sticky and hard to remove.

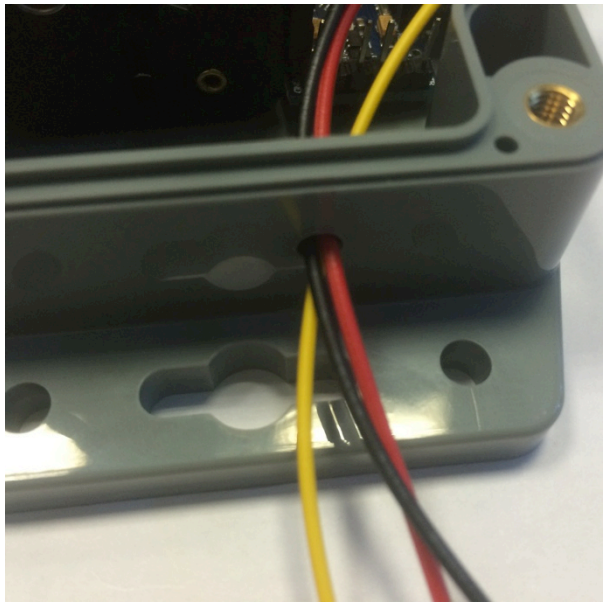
PUTTING EVERYTHING IN THE BOW

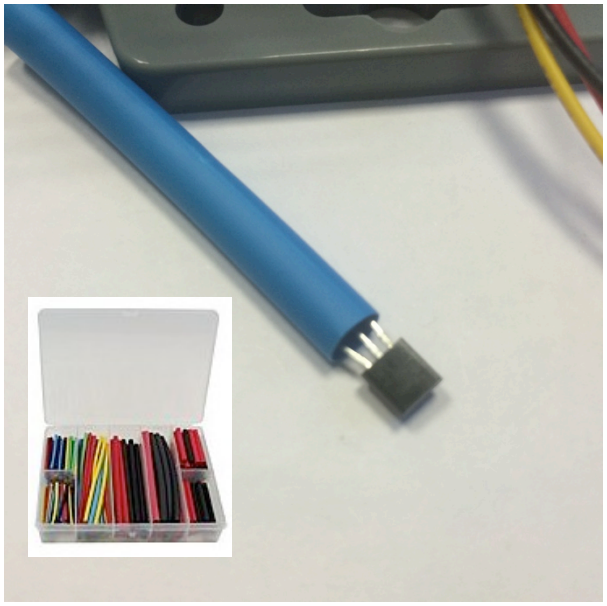


Now, put the board and the power supply in the box.

See how the Vcc is connected using an intermediate wire to ease manipulation.

Preparing for the temperature sensor

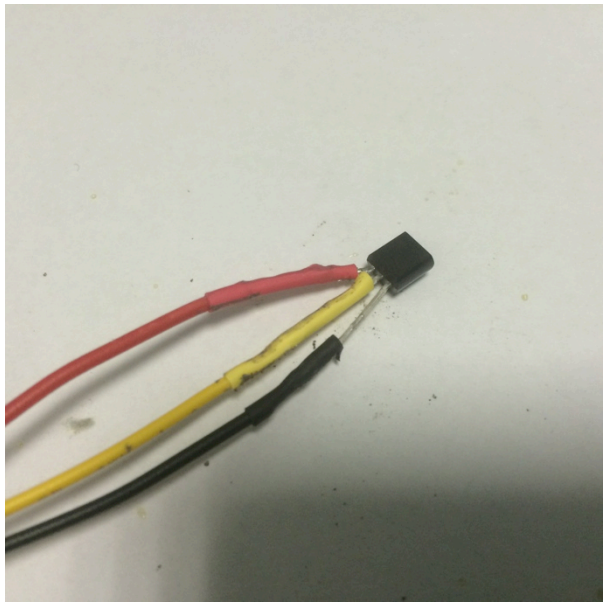


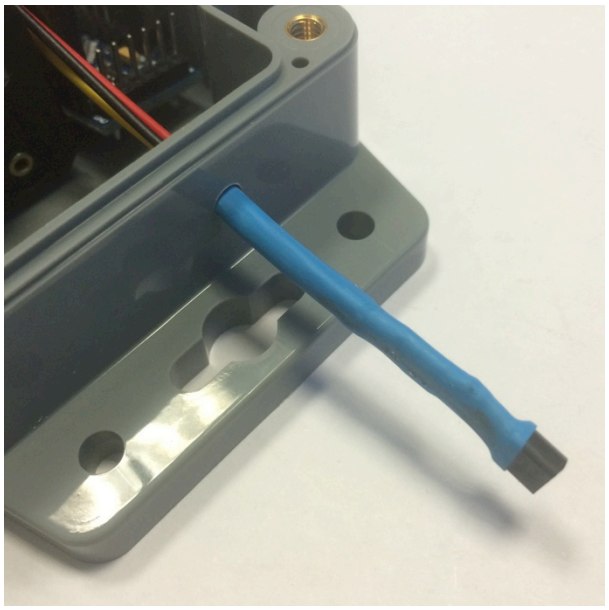


We will use the same temperature sensor than in the previous tutorial. We need 3 wires and we also need to make the design a bit more water and dust proof. First, use 3 wires with a female connector at one end that will be plugged into the board. Pass the wires through the smaller hole, leaving the female-connector side in the box.

To protect the sensor, use heat-shrink sleeve. Use a diameter that is large enough for the plastic part of the sensor to go through.

Preparing for the temperature sensor (2)

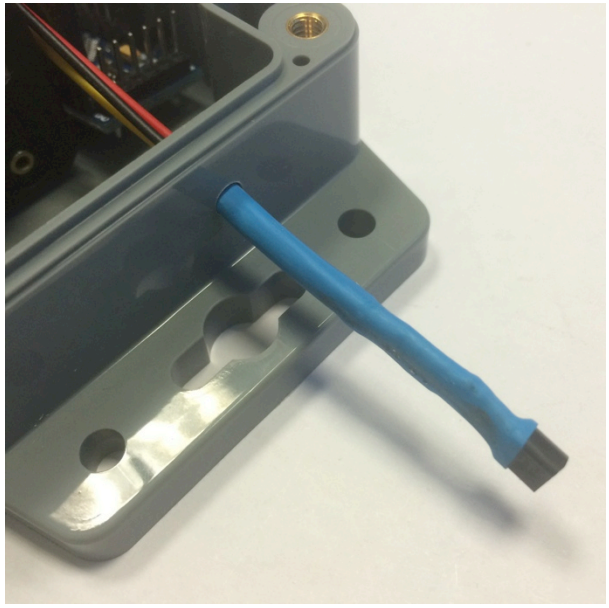


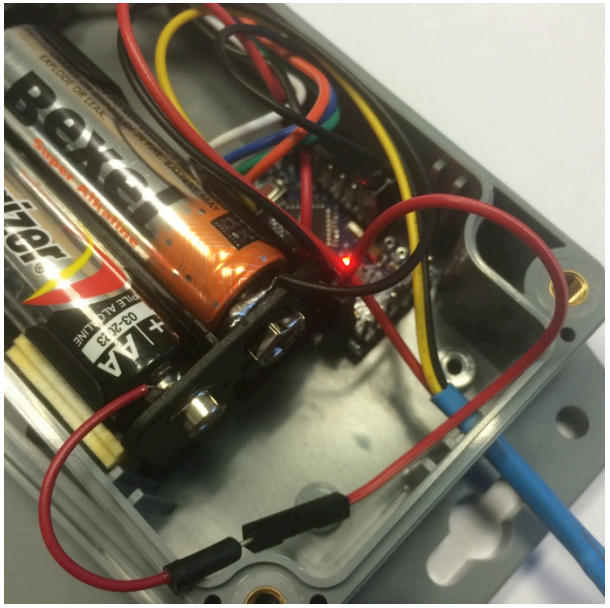


At the other end of the wire, you can just solder. Once again heat-shrink sleeves is great to isolate the wires.

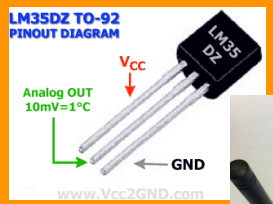
Once all wires have been soldered, place the larger heat-shrink sleeve and protect all wires. BE CAREFULL, you have to place the sleeves before soldering, then slice them in place before heating.

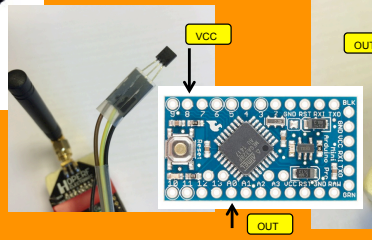
CONNECTING THE SENSOR

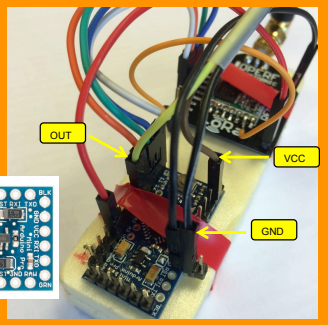




Connect the sensor's wires as described in the previous tutorial.

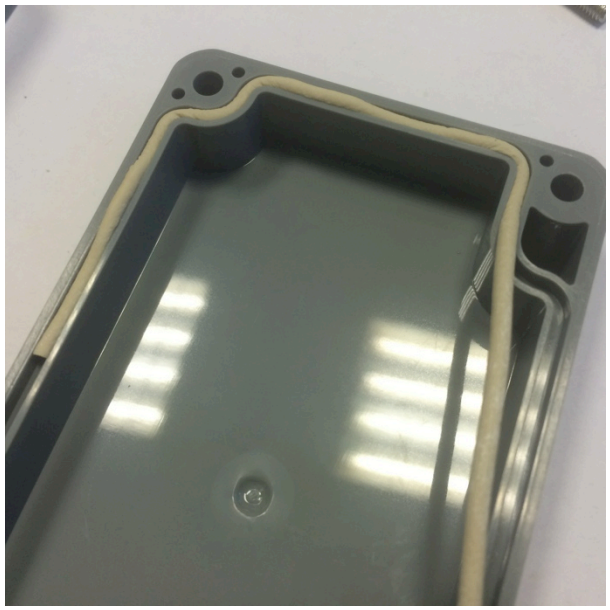


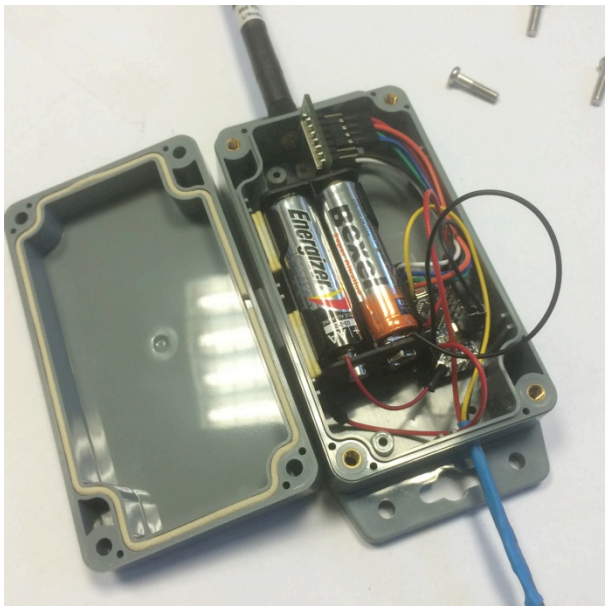


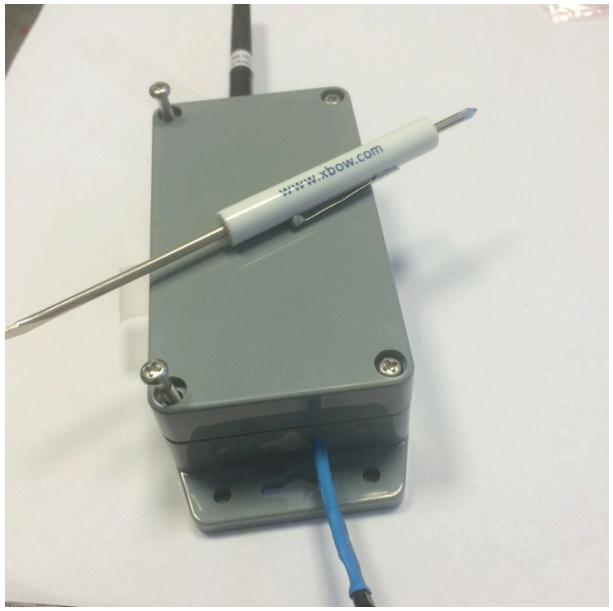


The GND should be connected to one of the board's GND, the VCC should be connected to the analog A8 pin and the OUT pin should be connected to the analog A0 pin.

LAST STEP AND DEPLOYING YOUR IoT DEVICE



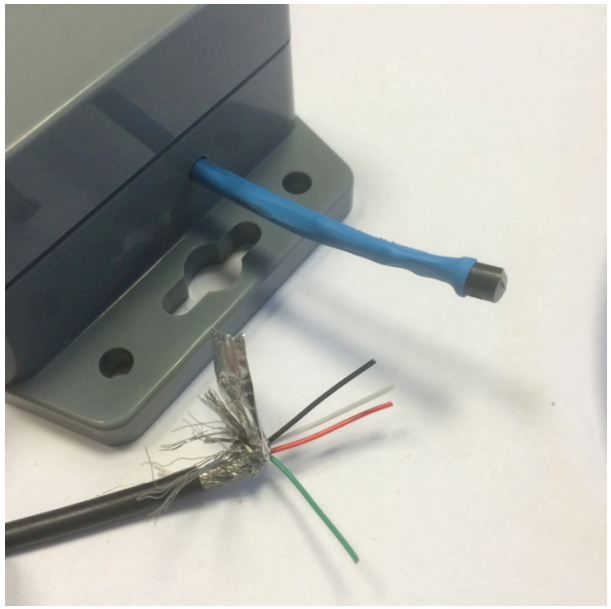


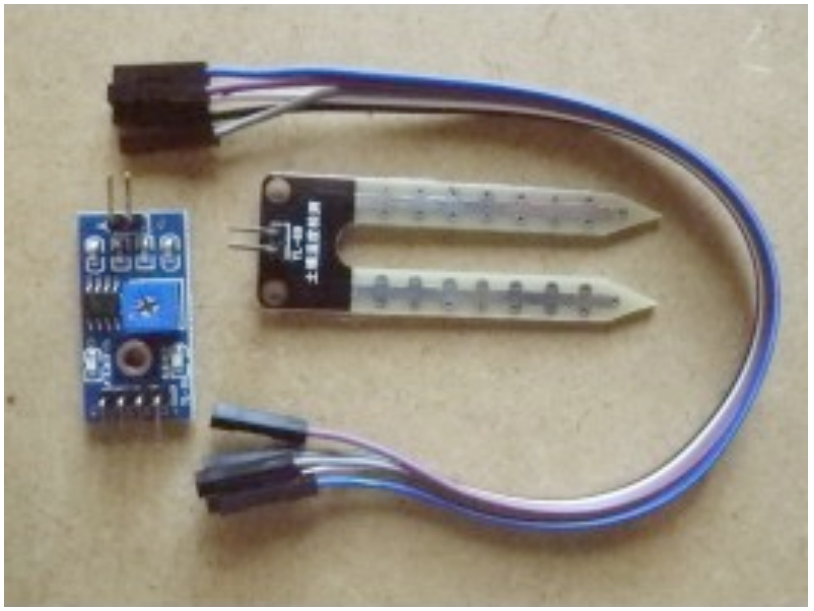


Program your board to have duty-cycle for low-power operation mode. Connect the Vcc wire, check that you receive the data on the gateway and then close the box. You can now screw a bit more firmly the antenna.

With 1 sample every hour, your device should be capable of running for several months.

Use longer cable for your sensor

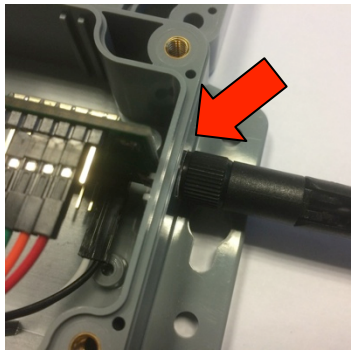


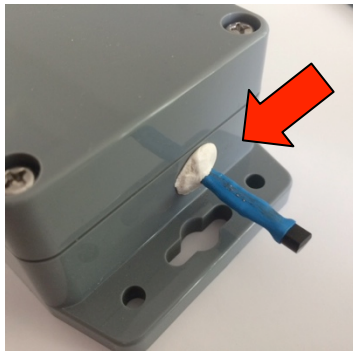


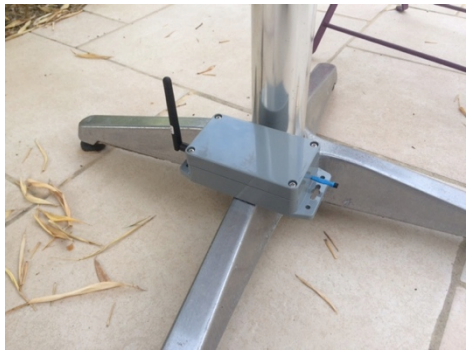
If you need longer cable for your sensor (like more than a meter, for instance for soil humidity sensor) it is of course not convevient to use heat-shrink sleeve to protect the wire.

A very low-cost solution is to use an old USB cable (there are plenty of them unused!) that already has the necessary plastic coating and that contains 4 wires for your own usage.

Outdoor test







Put some silicone/putty at the antenna and sensor wire junction to avoid humidity in the box

Outdoor test from May 6th to May 8th