

Low-cost LoRa IoT WaterSense platform part list

For deployment in Pakistan (433MHz unlicensed band)

TO BUILD THE GATEWAY

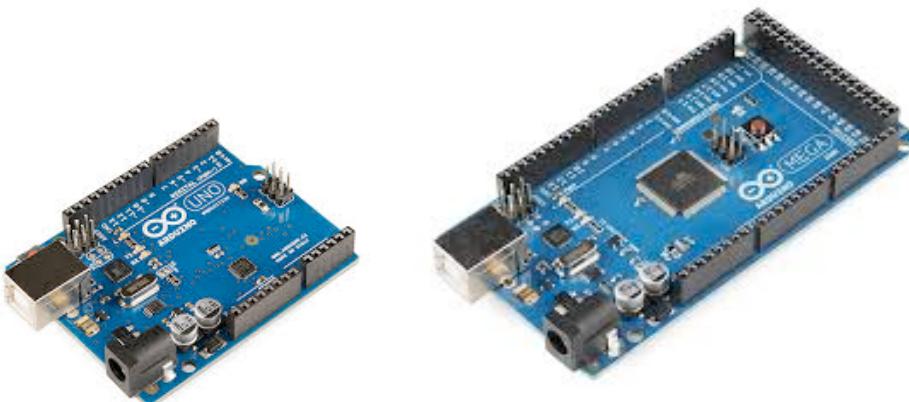
- A Raspberry 2 or 3 (RPI3 has built-in WiFi and Bluetooth)



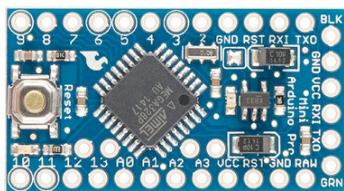
- You also need an 8GB SD card class 10 **class 10**

TO BUILD THE IOT DEVICE

- For prototyping and development tests: Arduino Uno/MEGA2560



- For integration phase: Arduino Pro Mini (take the 3.3v, 8MHz version). Original version is from Sparkfun

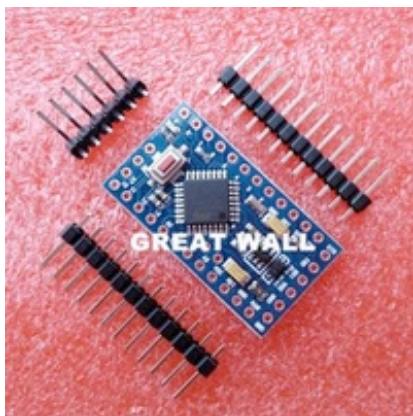


3.3v and 8MHz version

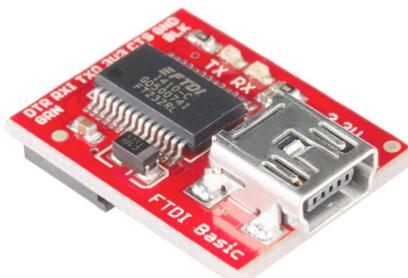
Can be bought as low as 1.5€ from Chinese manufacturers
<http://www.aliexpress.com/popular/arduino-pro-mini-328.html>

We tested this one:

https://fr.aliexpress.com/store/product/Free-Shipping-1pcs-pro-mini-atmega328-Pro-Mini-328-Mini-ATMEGA328-3-3V-8MHz-for-Arduino/731260_32340942669.html?spm=2114.12010608.0.0.4LfFx2



You will also need the FTDI breakout (3.3v version) to program the board. You need only one to program all your boards. Original product from Sparkfun is here: <https://www.sparkfun.com/products/9873>



We tested this Chinese one that can be set either at 5v or 3.3v.

https://fr.aliexpress.com/store/product/Free-shipping-FT232RL-FT232-FTDI-USB-3-3V-5-5V-to-TTL-Serial-Adapter-Module-Mini/1735233_32648254875.html?spm=2114.12010608.0.0.PizHXM



LORA RADIO MODULES

- We use the Modtronix inAir4 (433MHz) with 6mm pin header already soldered (see the available option on the Modtronix web page); and the 433MHz whip antenna



<http://modtronix.com/inair4.html>

<http://modtronix.com/ant-f105-433.html>

The screenshot shows a product page for the "Wireless SX1278 (SX1276) LoRa Module, 433MHz, 3.3V, SMA Connector". The price is listed as USD13.95. A dropdown menu for "Header Type" is open, showing "6.0mm Pin Header (+USD1.00)". A red arrow points from the "Description" section to the "Header Type" dropdown. The "Description" section contains text about releasing new versions with integrated onboard antennas and details about the inAir4 module's features and Semtech's LoRa technology.

- other radio modules are possible but require more soldering work



HopeRF RFM96W
433MHz

- SMA connectors (for cable model RG58) for custom antenna cable

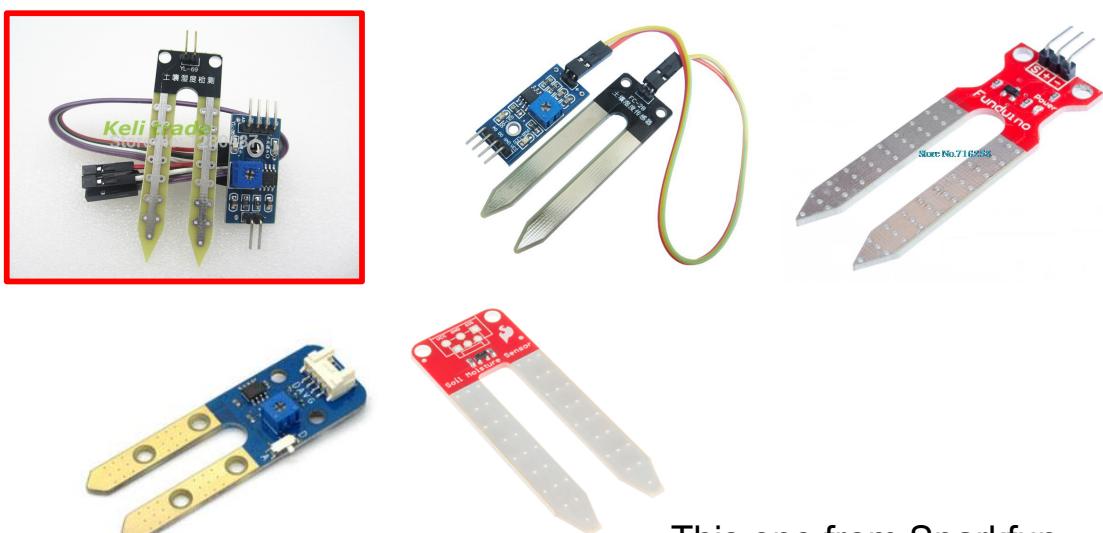


- Coax crimping tool (with RG58 format) and RG58 coax cable



SIMPLE PHYSICAL SENSORS

- Some low-cost soil humidity sensors (see them on AliExpress)

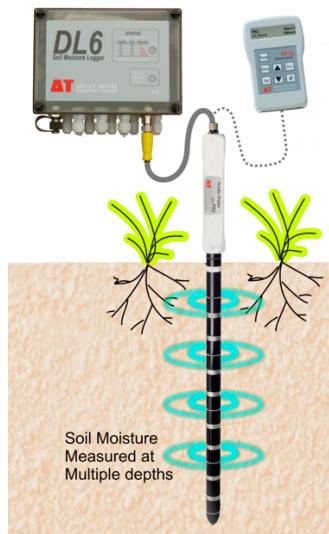


This one from Sparkfun
<https://www.sparkfun.com/products/13322>



This one from Cooking Hacks
<https://www.cooking-hacks.com/soil-moisture-probe-for-open-garden>

- High-end, (much) more expensive soil humidity sensors



<http://www.decagon.com/en/soils/volumetric-water-content-sensors/EC5, 10HS>



<https://www.pace-sci.com/soil-moisture.htm>



<https://www.seeedstudio.com/Soil-Moisture-%26amp%3B-Temperature-Sensor-p-1356.html>

CASING FOR SOIL SENSORS

- PVC tube/pipe of 40mm, associated PVC sockets and caps



- Special PVC cement



WIRES, CASING, AND VARIOUS ADDITIONAL PARTS

- Breadboard cables: need both M-F and F-F



M-F



F-F



take those that are about 10cm to 20cm maximum.

- Water-proof cases: electric out-door cases for instance



<http://www.lextronic.fr/P34821-botier-tanche-avec-3-presses-toupes.html>

<http://www.lextronic.fr/P22453-botier-tanche-115-x-65-x-40mm.html>

or any water-proof casing you can find suitable from your local hardware/electric stores

For the gateway, we are using this waterproof box



<http://www.mhzshop.com/shop/Accessoires-MHz/Boites-etanches/Boite-etanche-avec-fixation-mat-203x203x65mm-GentleBOX-JE-200.html>

You may need your own cable gland to have a real customized case



(see on AliExpress)

- Some standoffs/spacer and associated screws for the gateway



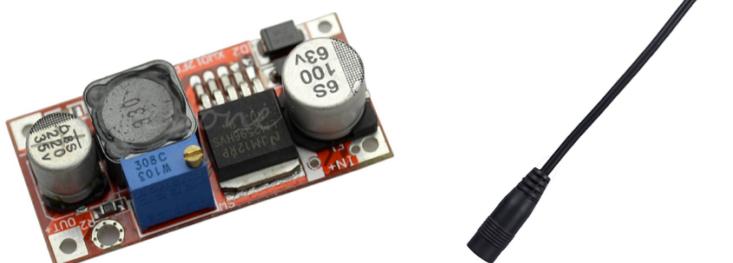
take 10mm to 20mm maximum

- PoE gland & injector



(see on AliExpress)

- LM2596 DC-DC down stepper & DC 5.5x2.1mm female power jack



(see on AliExpress)

- 4-AA battery couplers for the IoT device



(see on AliExpress)

- Simple waterproof switch



or



(see on AliExpress)

SOLDERING MATERIALS THAT ARE NOT MANDATORY BUT ARE ALWAYS GOOD TO HAVE!

- A simple soldering iron (or station if you want to invest) with thin solder wire



- A set of heat-shrink tubes to isolate wires / silicon for joints

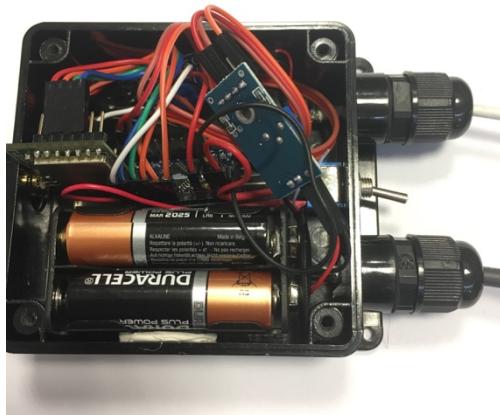


SOME ANGLE BRACKETS FOR THE ANTENNA MOUNT



(from local hardware store)

RESULTS:



Enjoy DIY!
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