INTEL-IRRIS

Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture

This project is part of the PRIMA Programme supported by the European Union

Intel-IrriS

PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA

Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture

Intel-IrriS

Training & capacity building with INTEL-IRRIS starter-kit

PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA

Prof. Congduc Pham
http://www.univ-pau.fr/~cpham
Université de Pau, France

UNIVERSITÉ DE PAU ET DES PAYS DE L'ADOUR

LIUPPA

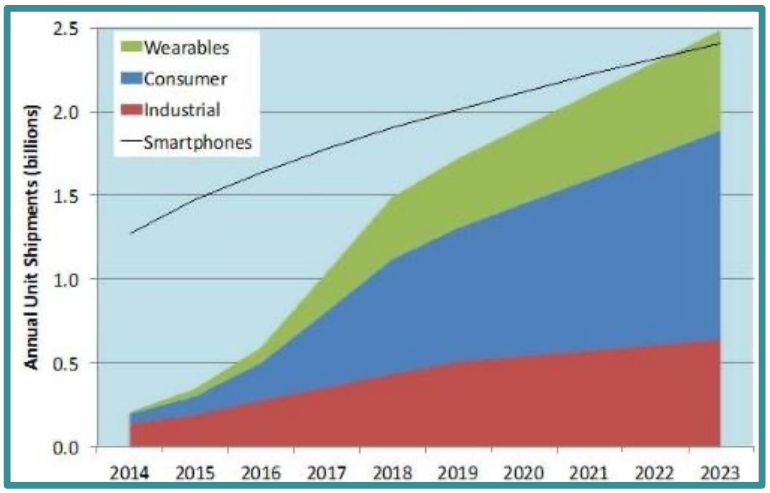
WAZIup
IoT – from idea to reality
WAZIhub

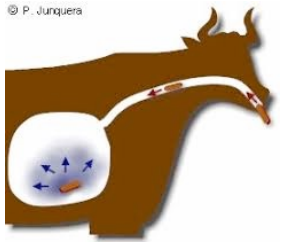
INTEL-IRRIS's starter-kit

- From idea to reality!


INTEL-IRRIS
Intelligent Irrigation System for Low-cost Autonomous Water Control
in Small-scale Agriculture
GETTING STARTED!

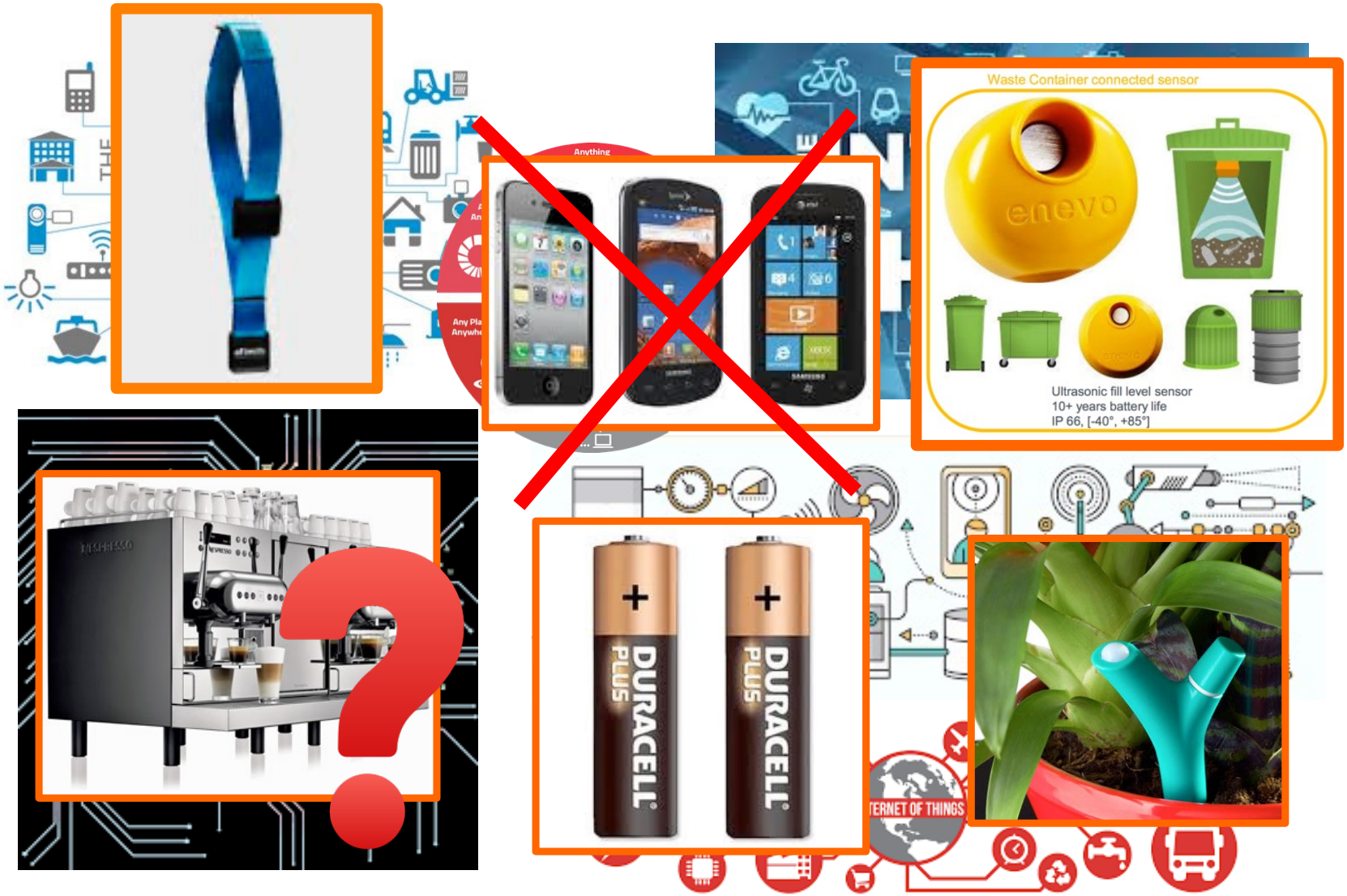
IoT devices!





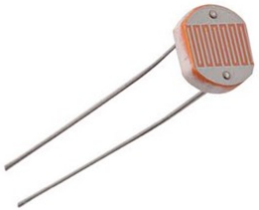
Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

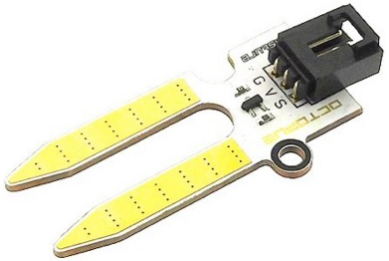
All communicating objects?

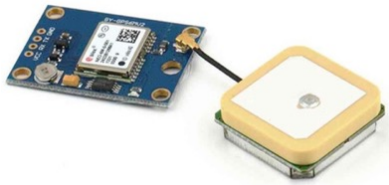


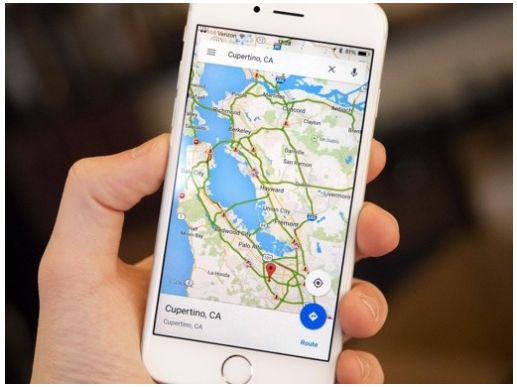
Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

Interaction: Sensors



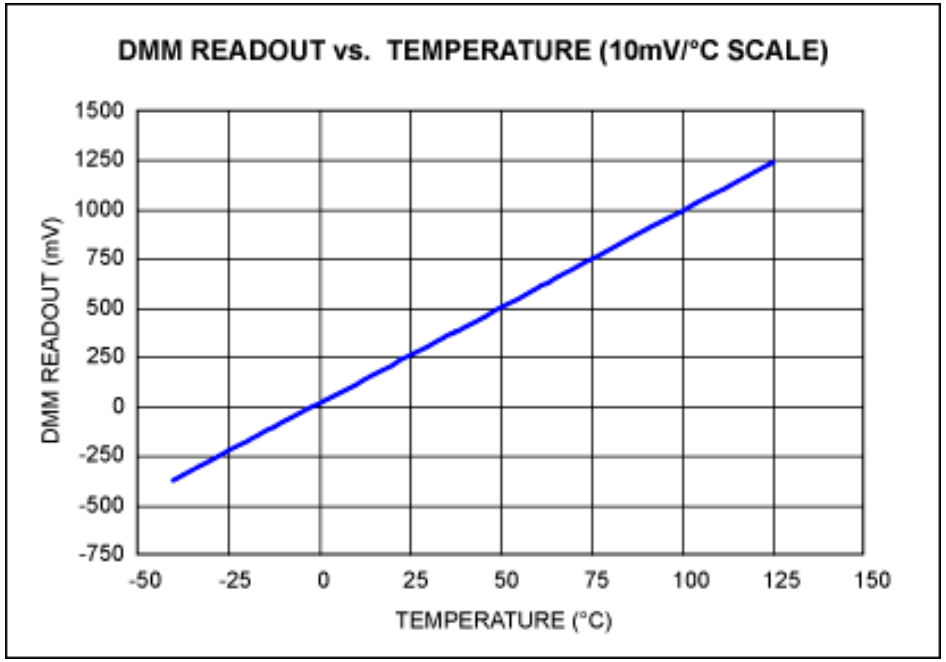






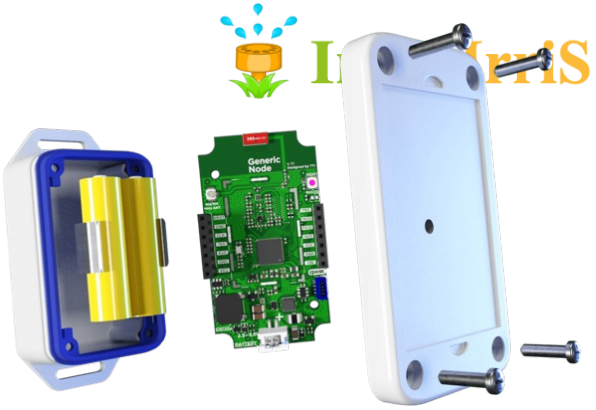
Interacting with the real world?

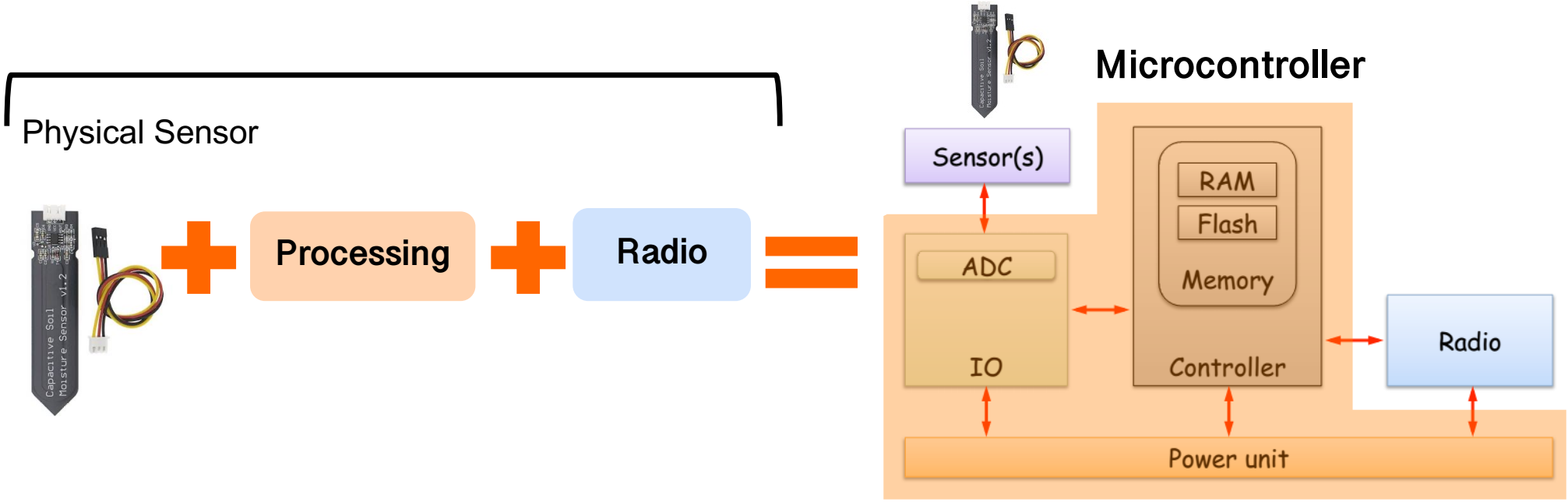
- Taking the simple analog sensors example
- Analog sensors provides a voltage output that varies according to a physical parameter, e.g. temperature, humidity, luminosity,…



Typical IoT device

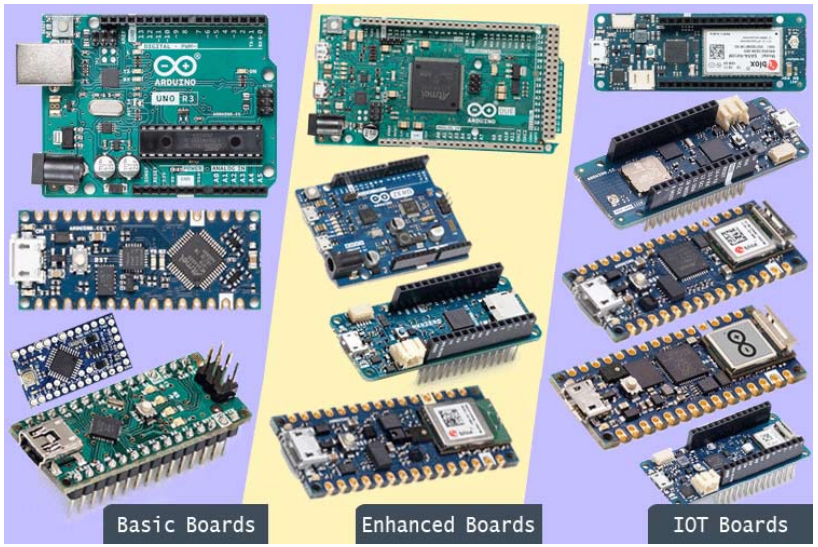
- IoT device can be viewed as a simple Embedded System





Q: uprocessor vs ucontroller?

the incredibly large microcontroller board ecosystem!



LoPy

STM32 Nucleo-32

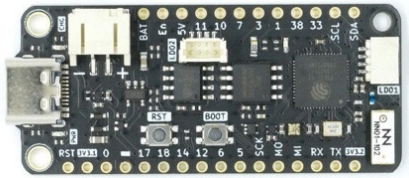
Teensy 3.2

LinkIt
Smart7688 duo

Adafruit Feather

uPesy ESP32

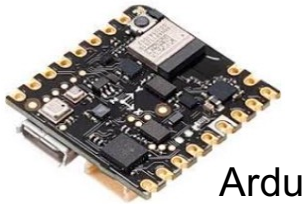
ePulse Feather Low Power ESP32



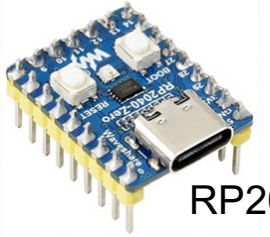
FeatherS3 – ESP32-S3

Heltec ESP32

XIAO SAMD21



Arduino Nicla
Sense ME



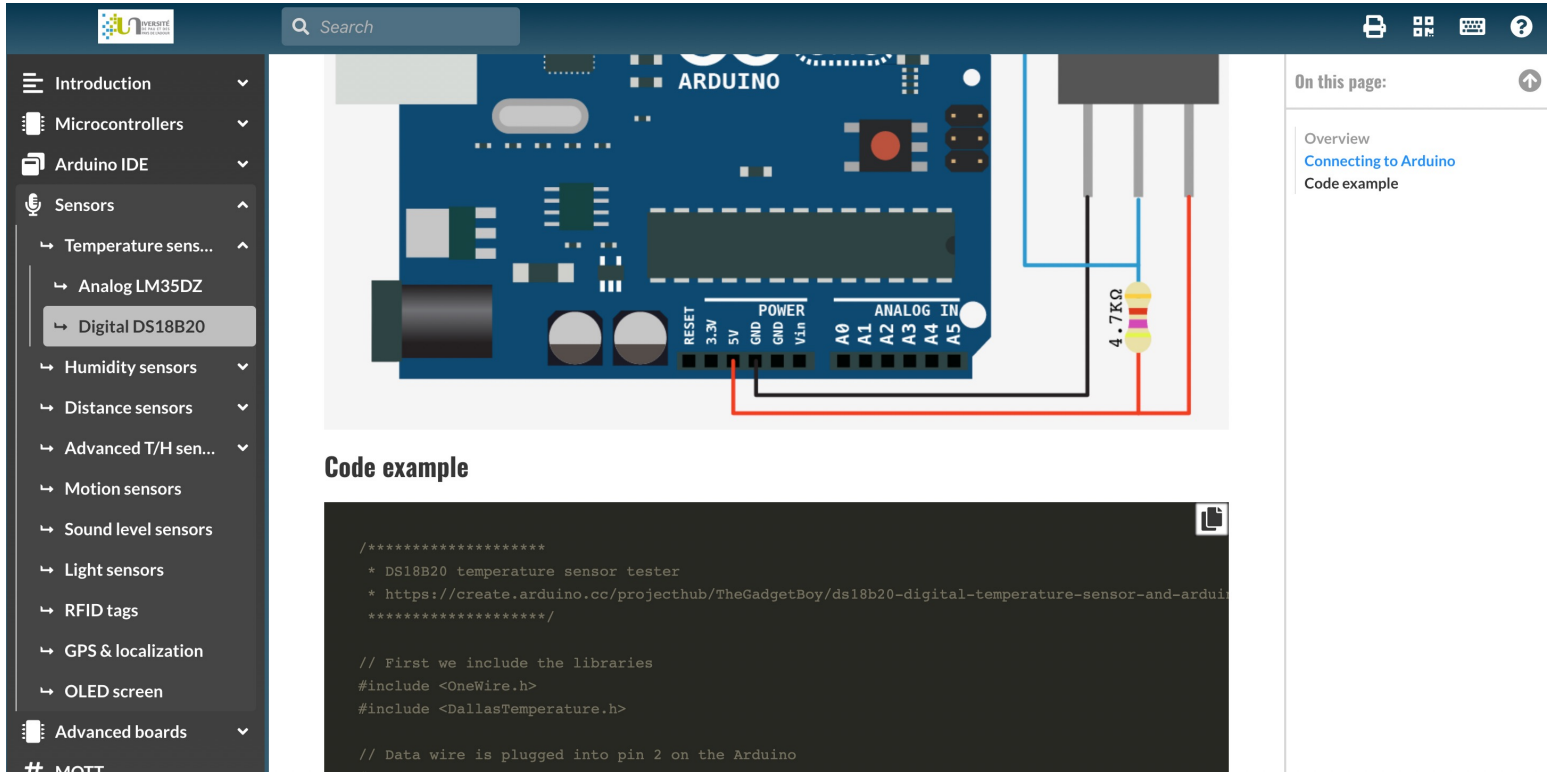
RP2040
zero

DFRobot
Beetle

QT Py ESP32-C3

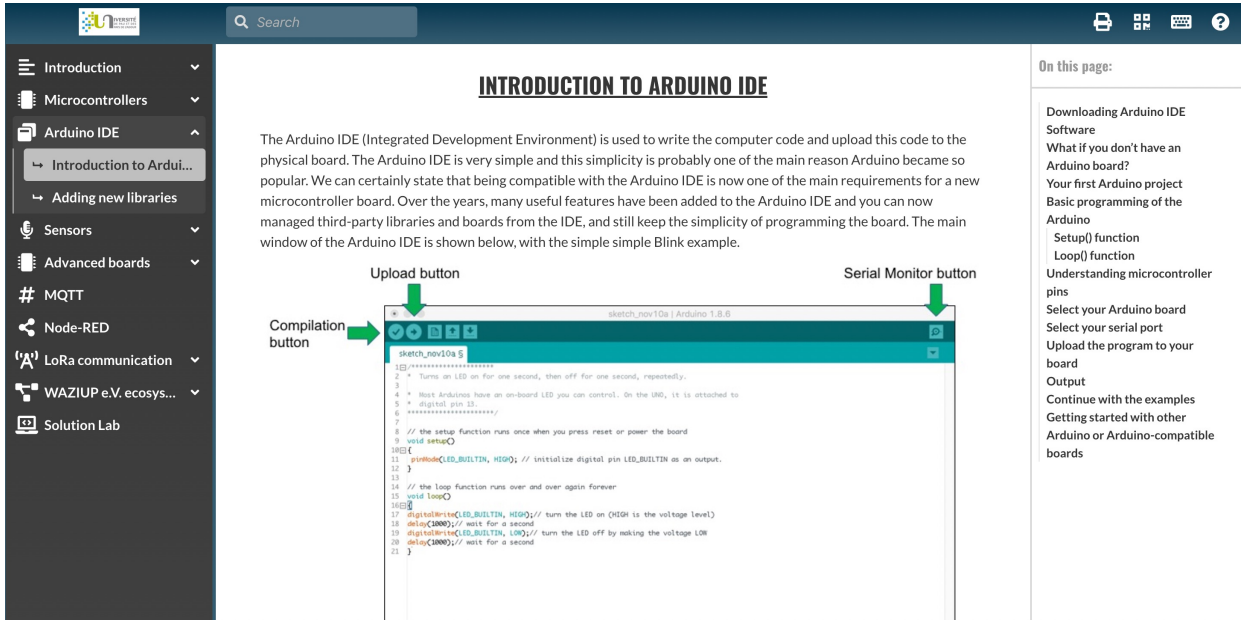
Online Arduino & Sensor tutorial

- https://cpham.perso.univ-pau.fr/LORA/HUBIQUITOUS/solution-lab/arduino-lora-tutorial

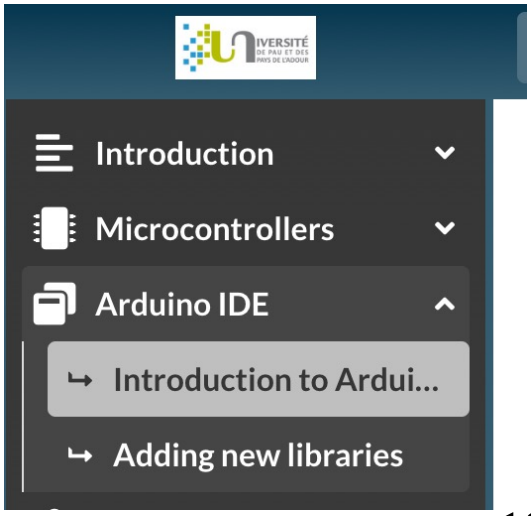


Discover the Arduino ecosystem

- Understand microcontrollers & their architecture
- Discover the most advanced boards with WiFi capabilities
- Get to know how to program microcontrollers with Arduino IDE
- Then step-by-step tutorial on connecting various sensors



Navigate and read:

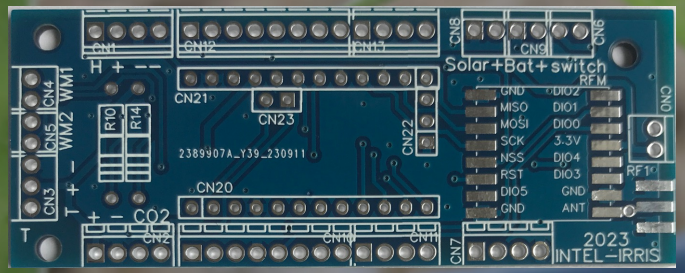


Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

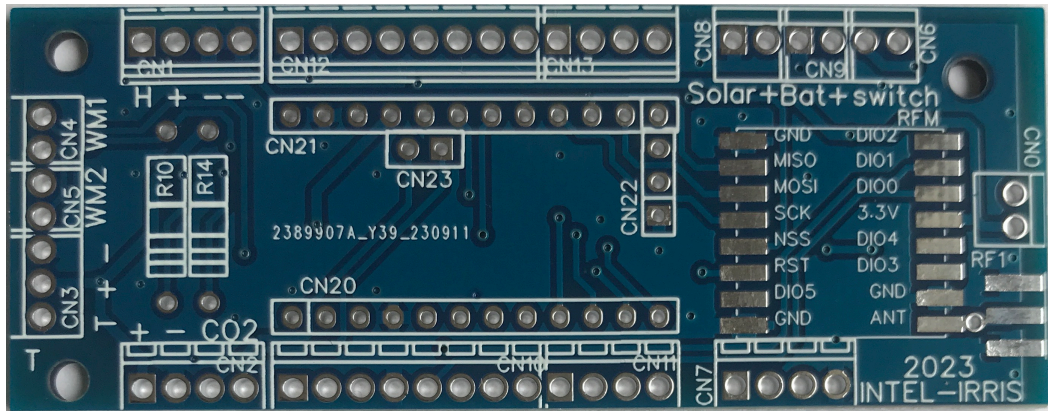
INTEL-IRRIS

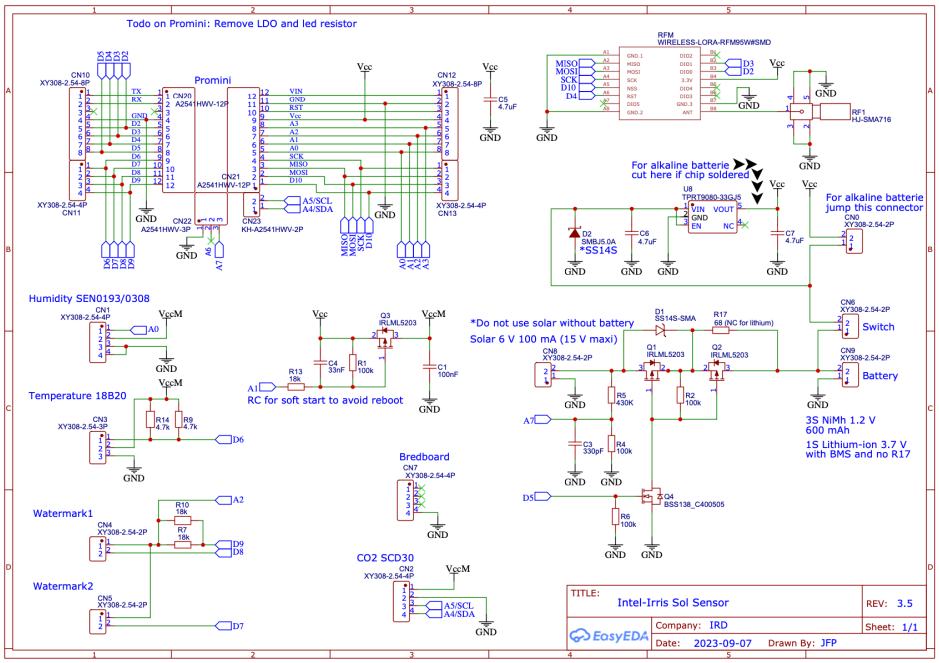
Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture

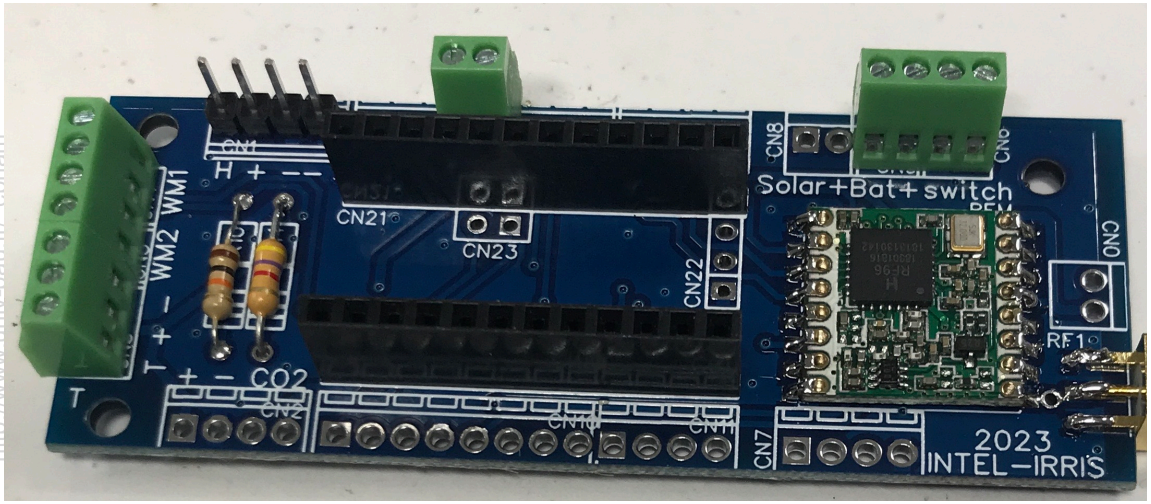
HANDS-ON

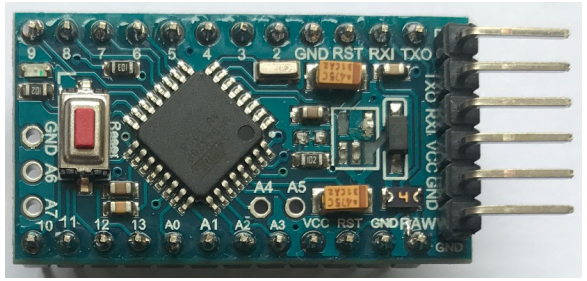


The new IRD PCB (raw version)



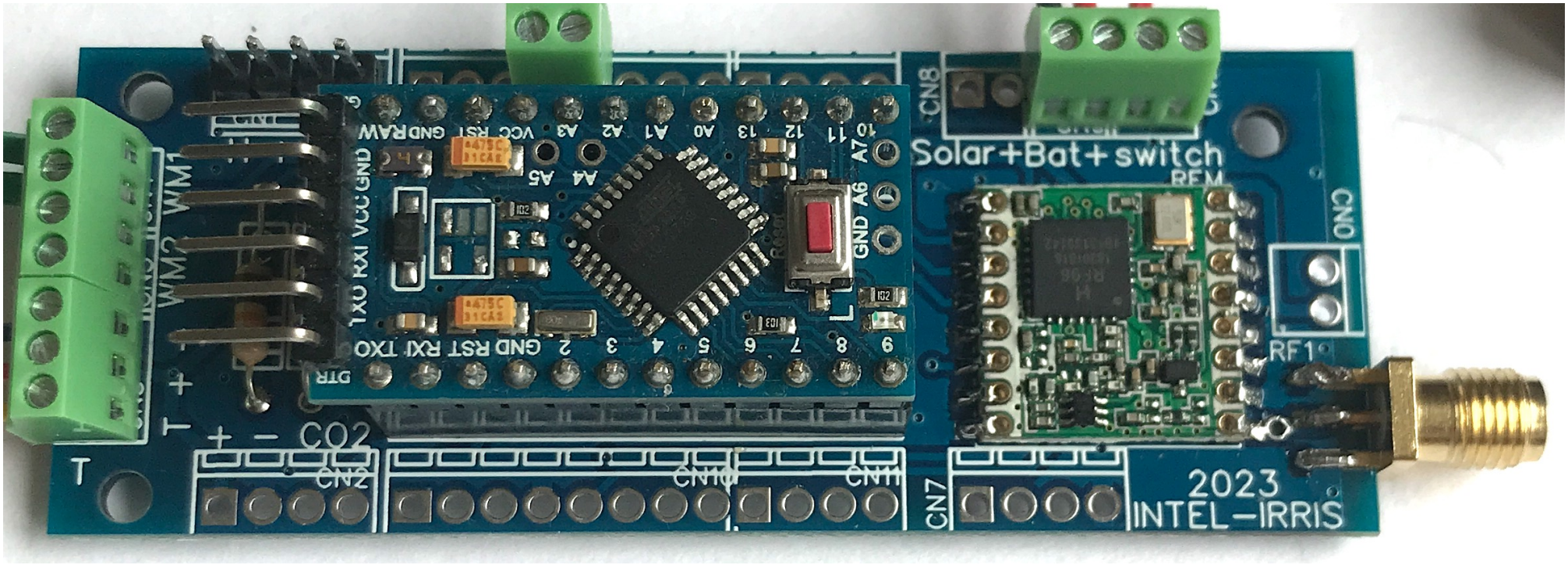




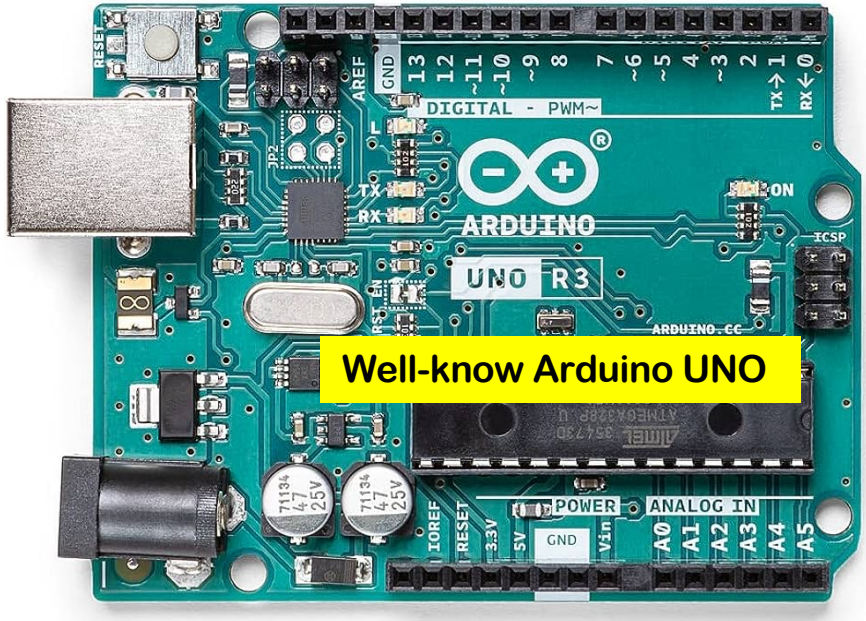


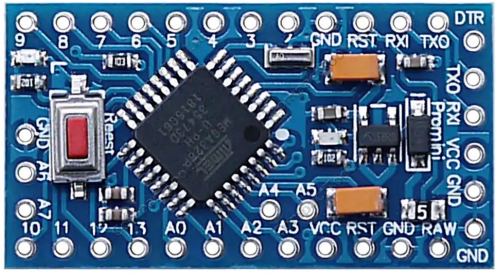
Arduino Pro Mini

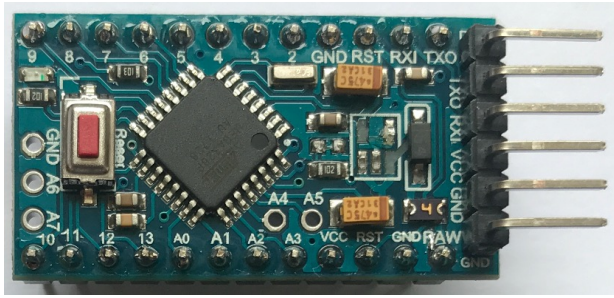
The new IRD PCB: close-up view

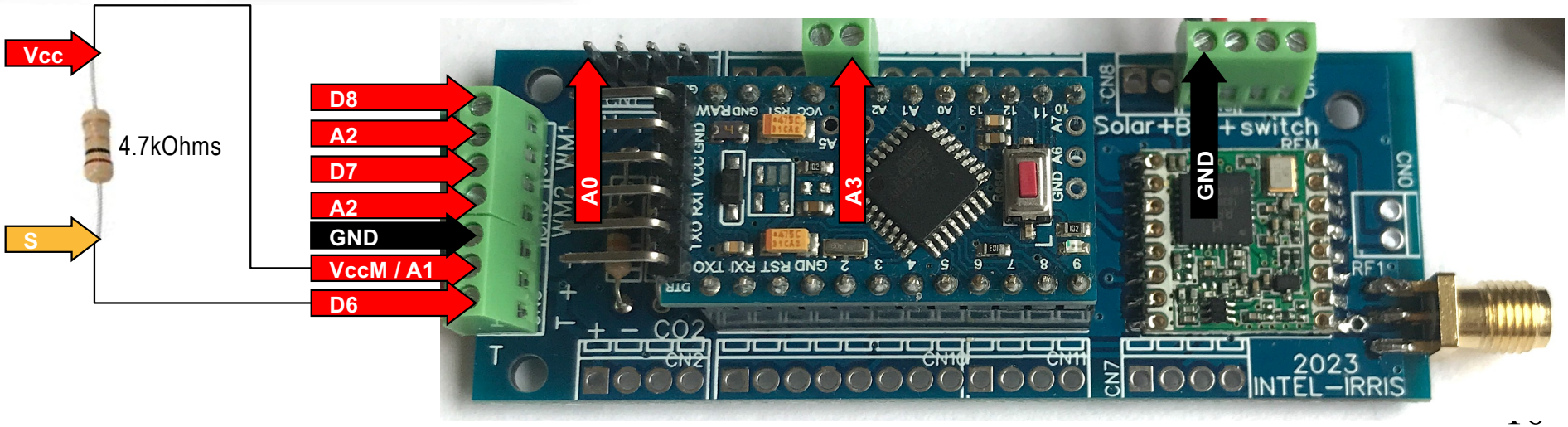


Arduino pins exposed on the PCB





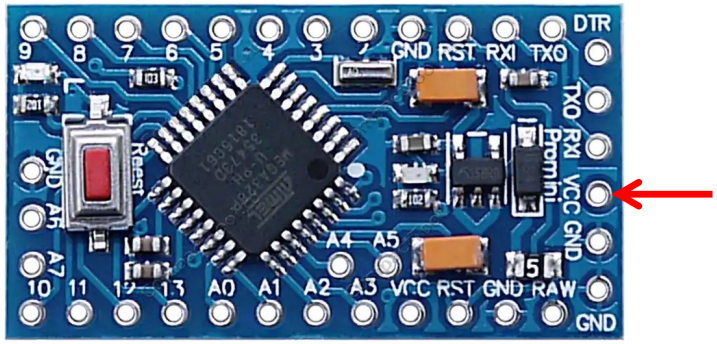


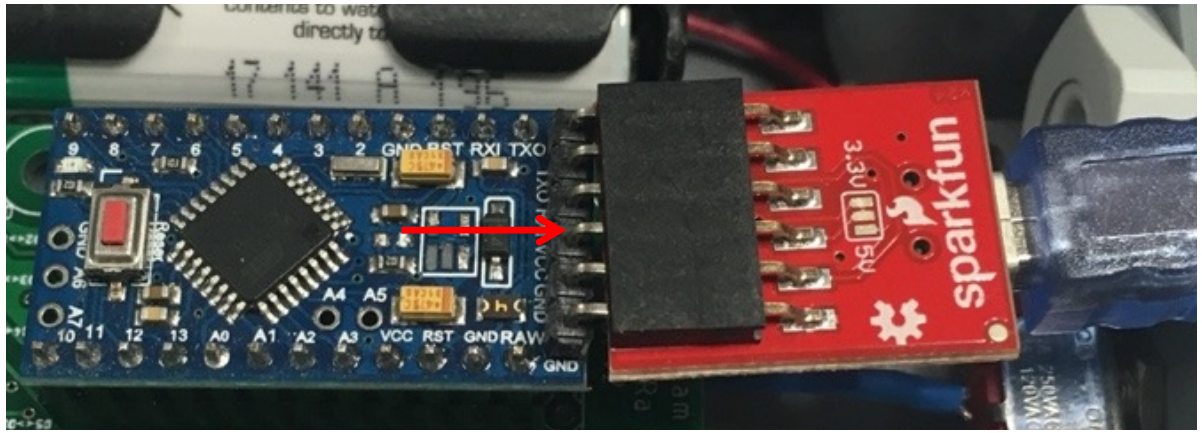


Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

Programming the microcontroller

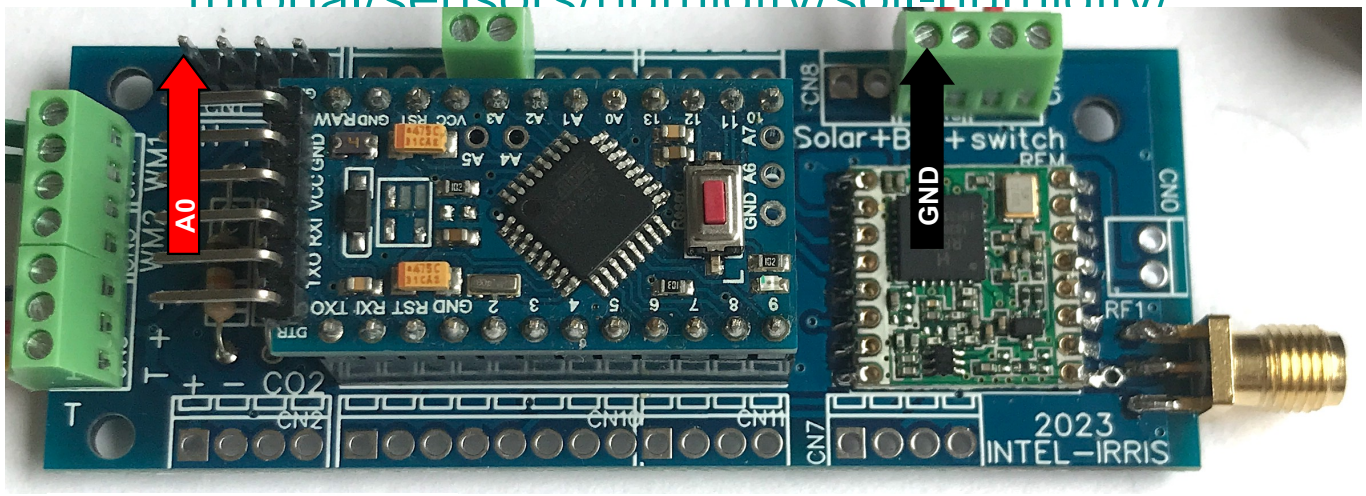
Most Chinese clone version,
check the VCC pin

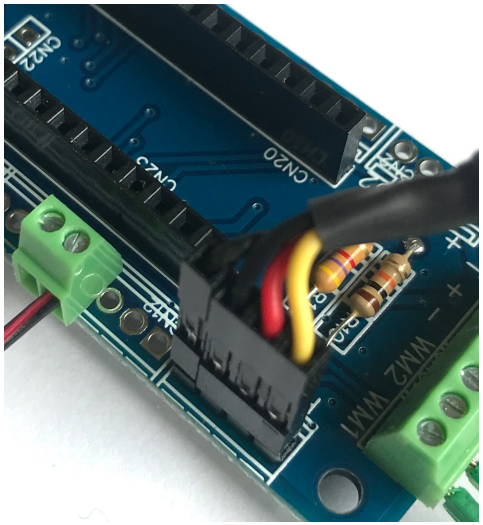




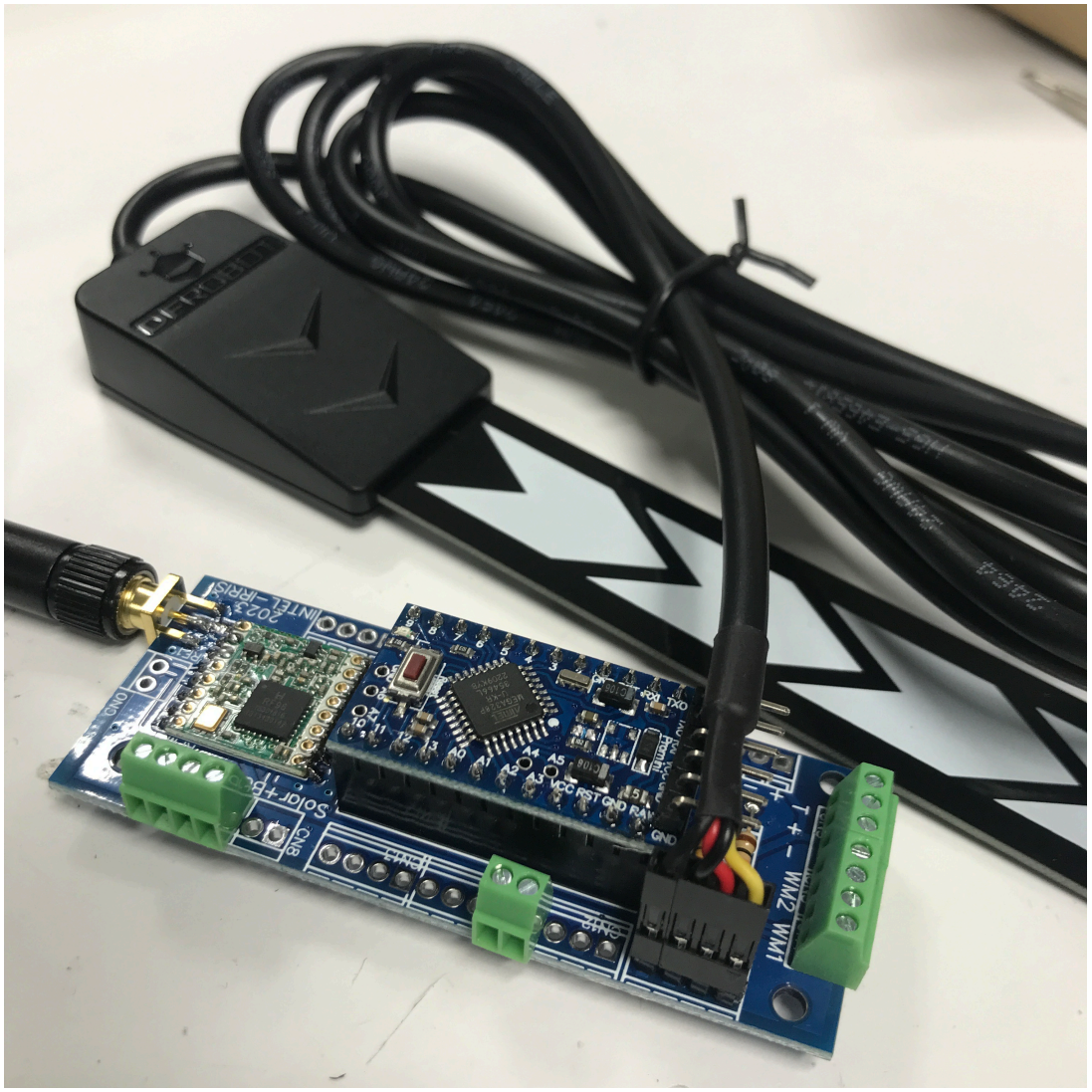
1st example: read from analog

- https://cpham.perso.univ-pau.fr/LORA/HUBIQUITOUS/solution-lab/arduino-lora-tutorial/sensors/humidity/soil-humidity/





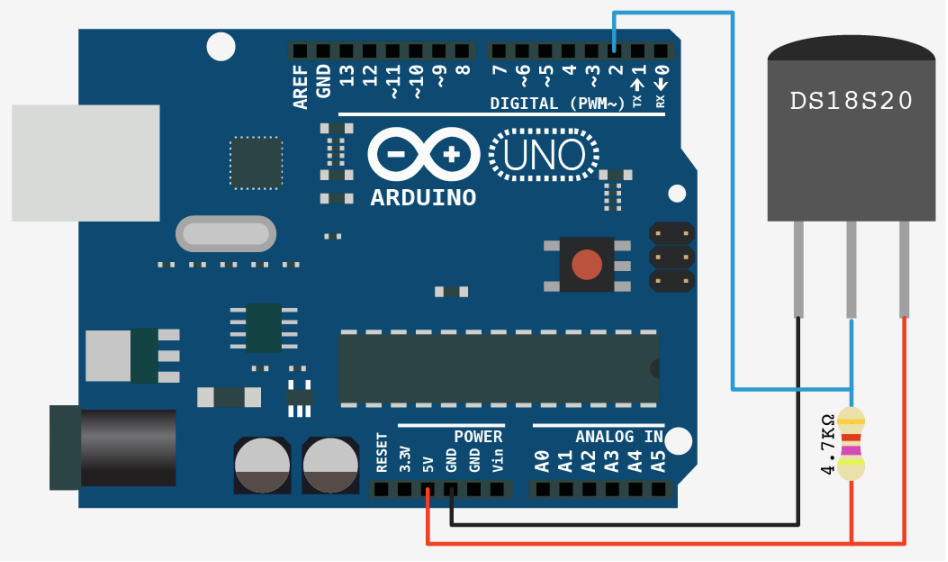
Connecting SEN0308 in image

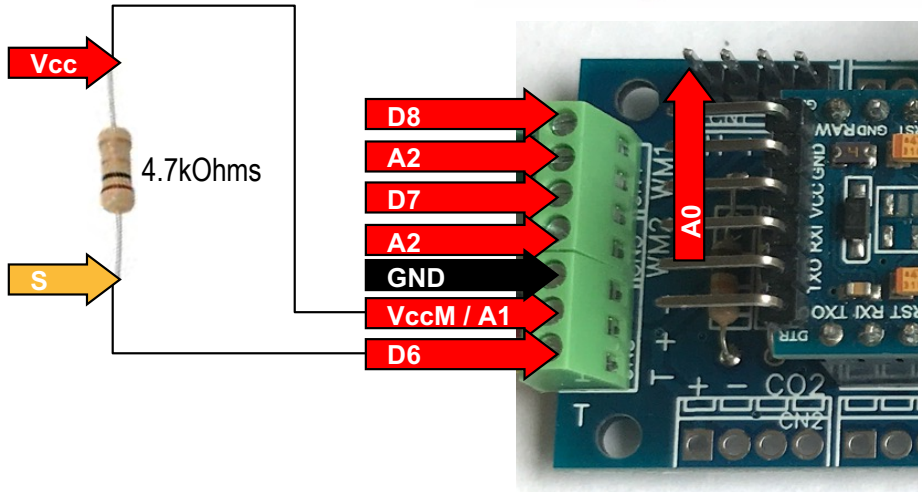


Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

2nd example: read from digital, 1-wire

- https://cpham.perso.univ-pau.fr/LORA/HUBIQUITOUS/solution-lab/arduino-lora-tutorial/sensors/temperature/ds18b20/
- Use a digital temperature sensor DS18B20



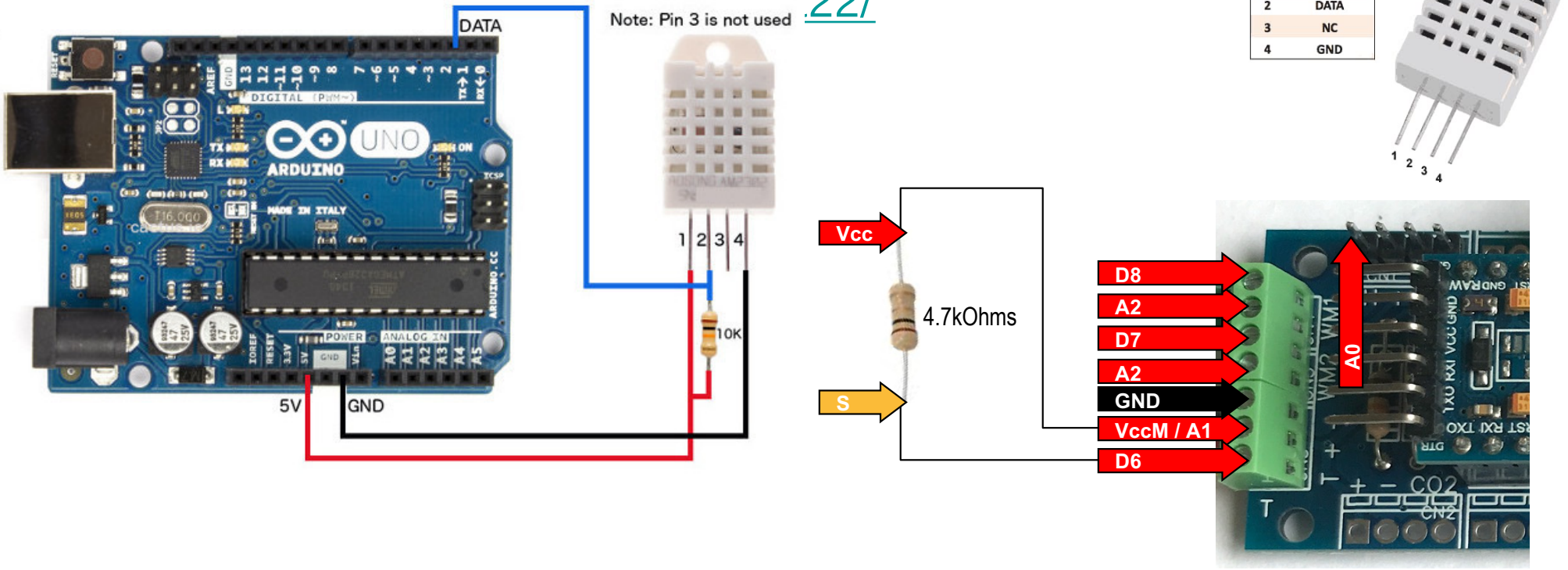


- Adapt the code to use D6 for DATA and A1 for Vcc

Connecting DS18B20 in image

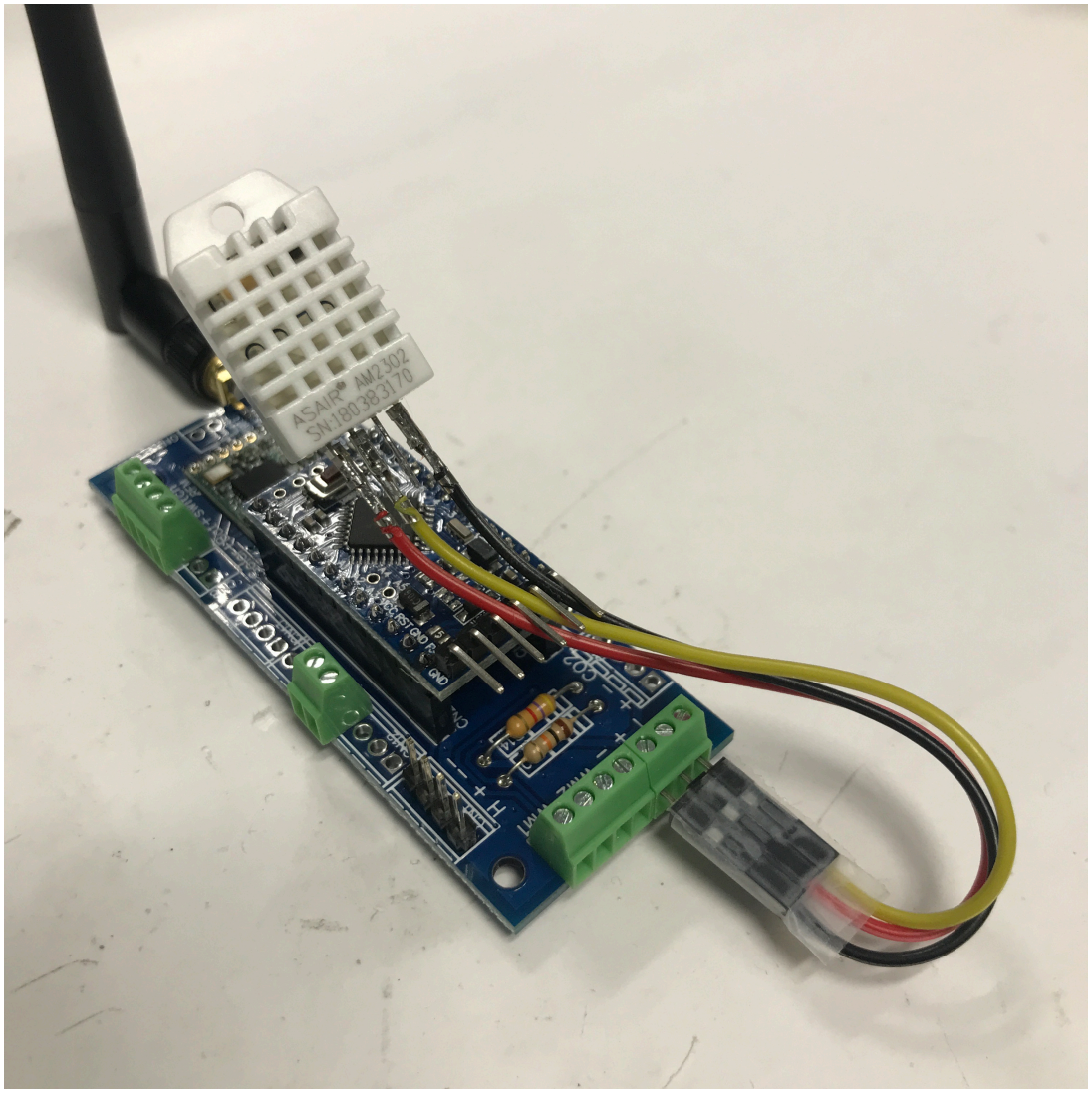
3rd example: read from digital DHT22

- DHT22: combined temperature & humidity sensor
- https://cpham.perso.univ-pau.fr/LORA/HUBIQUITOUS/solution-lab/arduino-lor…:22/



- Adapt the code to use D6 for DATA and A1 for Vcc

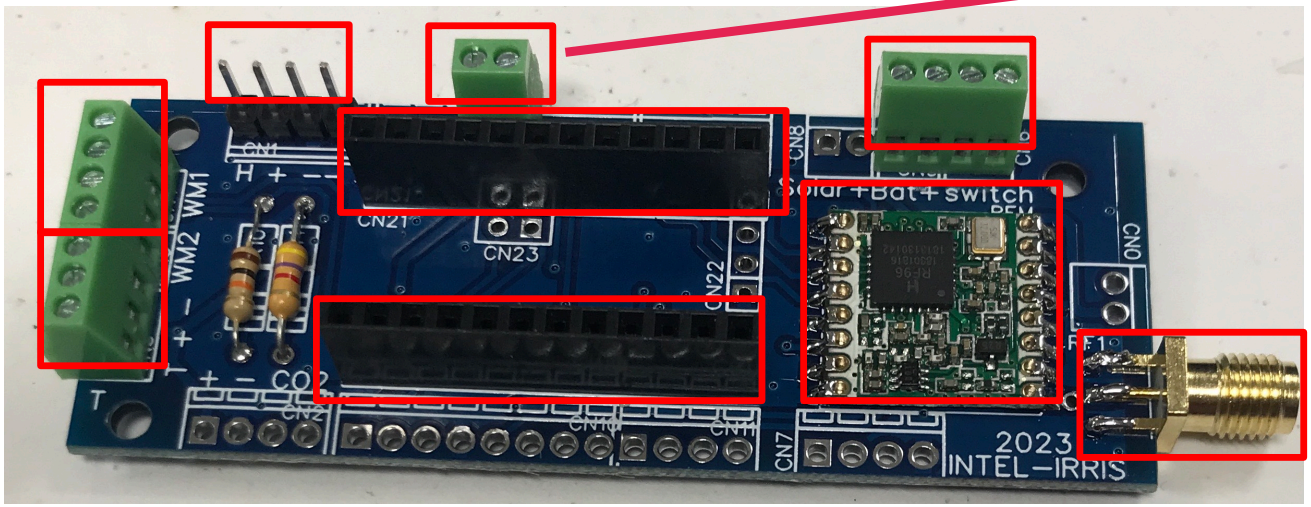
Connecting DHT22 in image

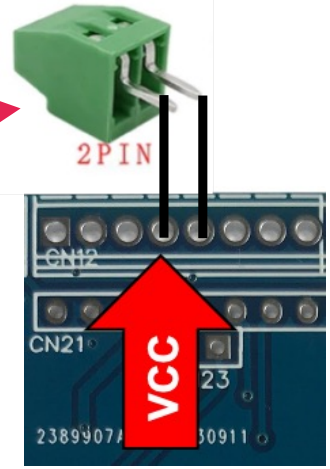



INTEL-IRRIS
Intelligent Irrigation System for Low-cost Autonomous Water Control
in Small-scale Agriculture
BUILDING THE
STARTER-KIT

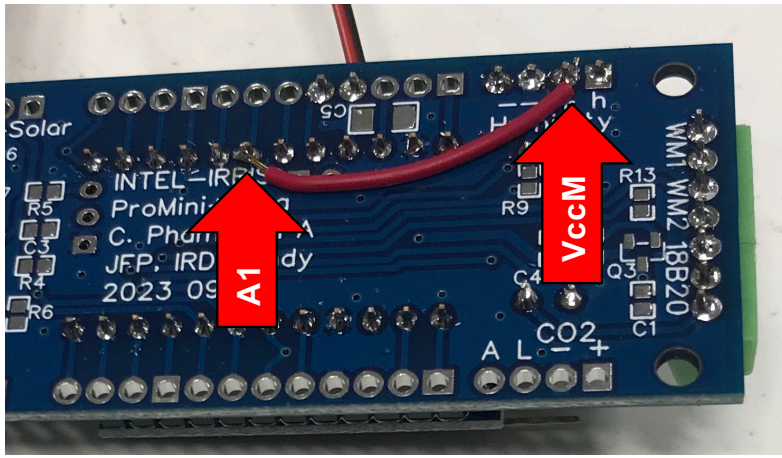
Wiring with new IRD PCB (raw version)

- First, solder the various components





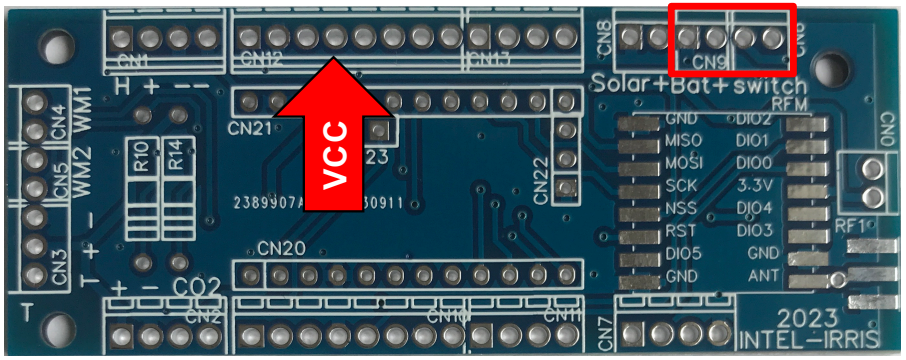
- For the raw PCB (no circuit for solar), need to link A1 to VccM on the back side of the PCB
- VccM can be taken on the + of the soil humidity sensor

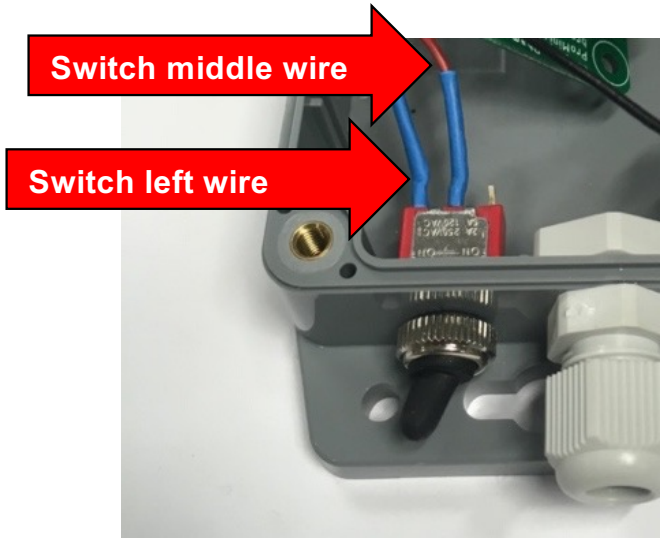


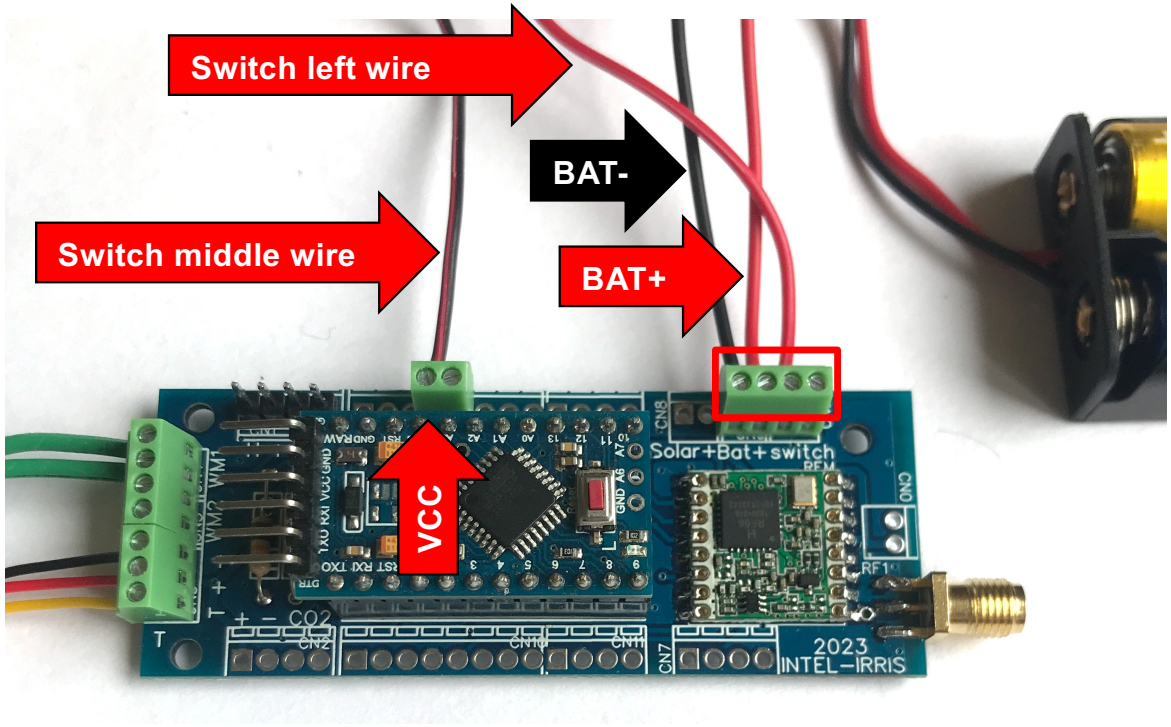
Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

Wiring with new IRD PCB (raw version)

- Power wires



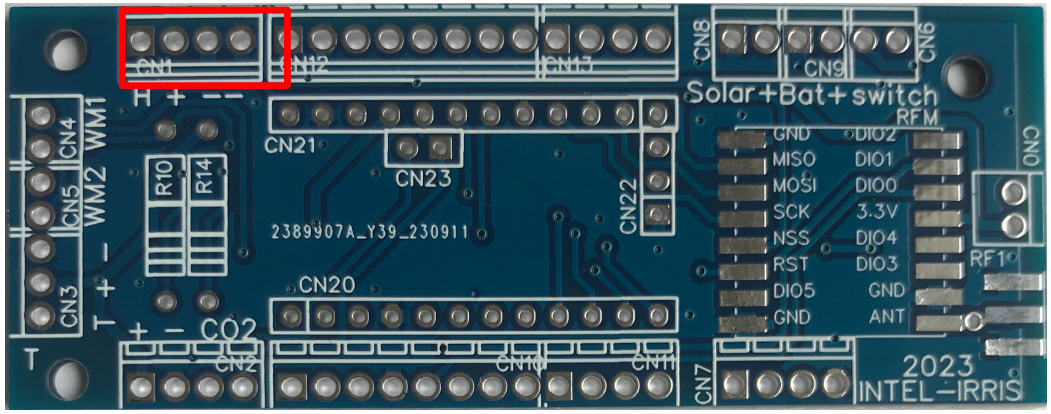




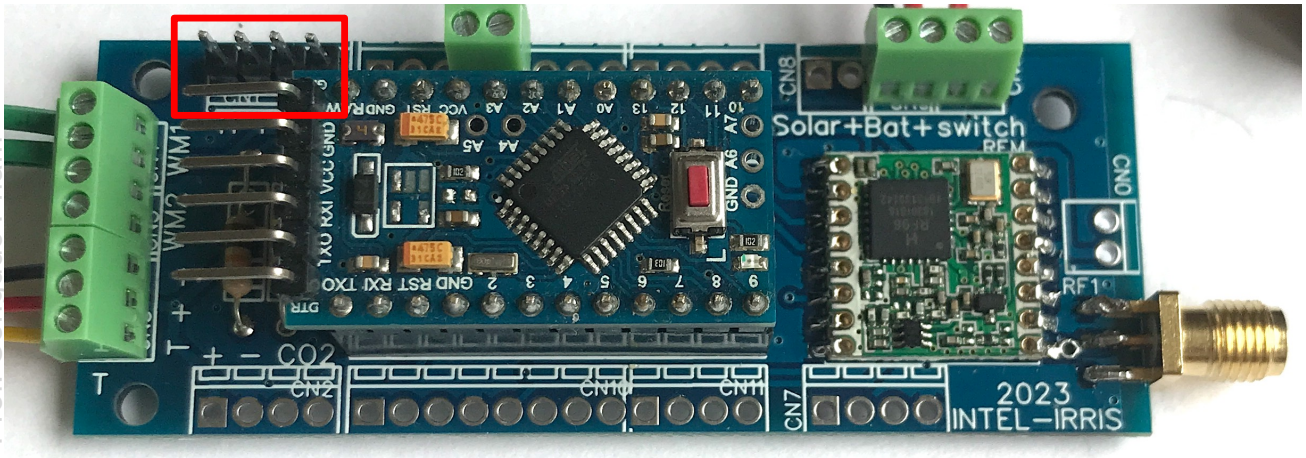
Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

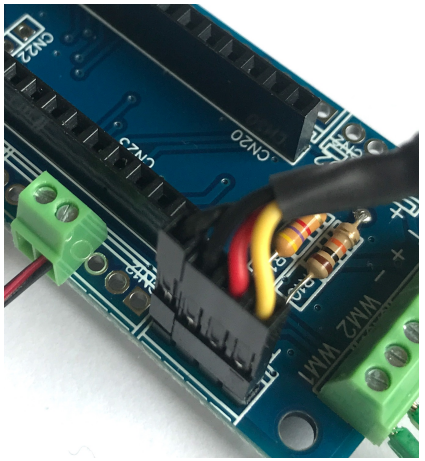
Wiring with new IRD PCB (raw version)

- SEN0308 capacitive



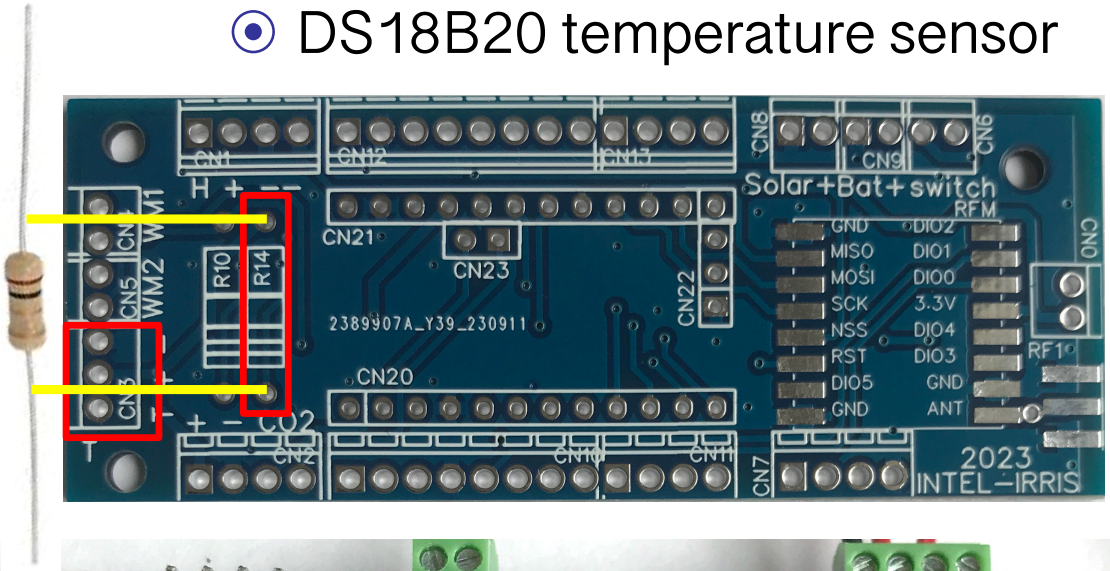
Just connect the sensor in the dedicated header
– – are the 2 black wires
+ is red and H is yellow





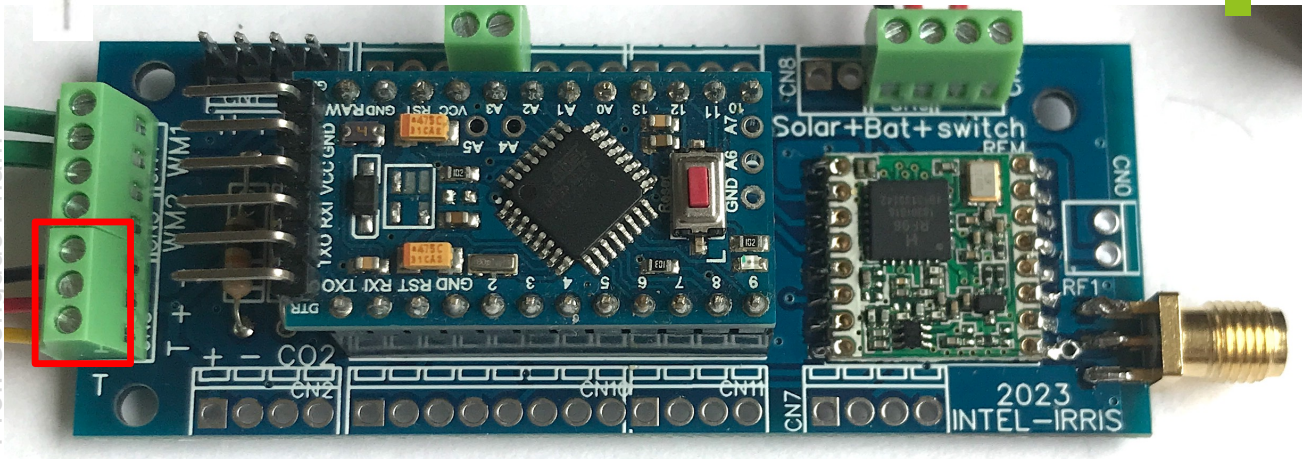
Wiring with new IRD PCB (raw version)

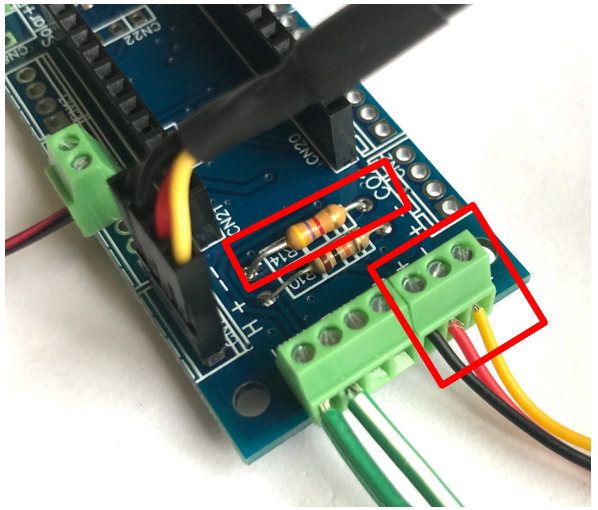
- DS18B20 temperature sensor



Solder a 4.7kOhms resistor then wire in the dedicated terminal block

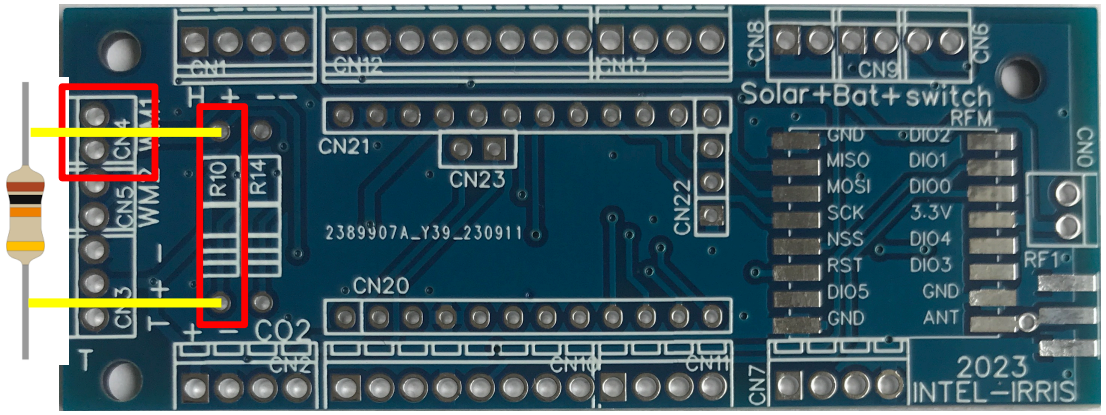
T+ – : Yellow, Red, Black wires



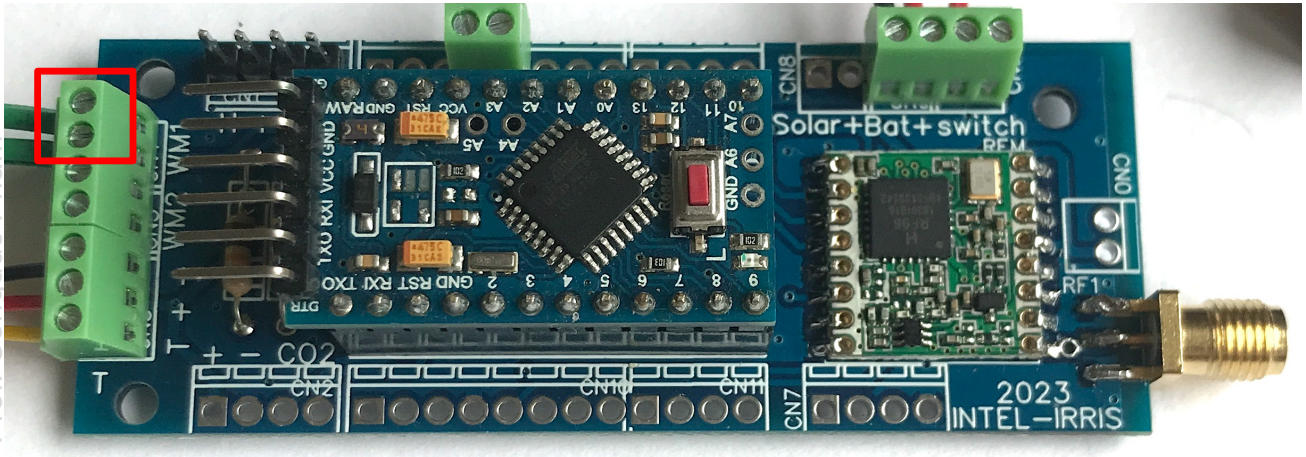


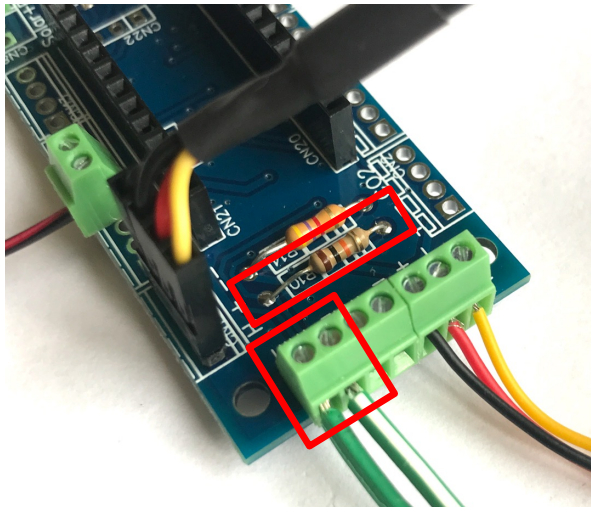
Wiring with new IRD PCB (raw version)

- First Watermark



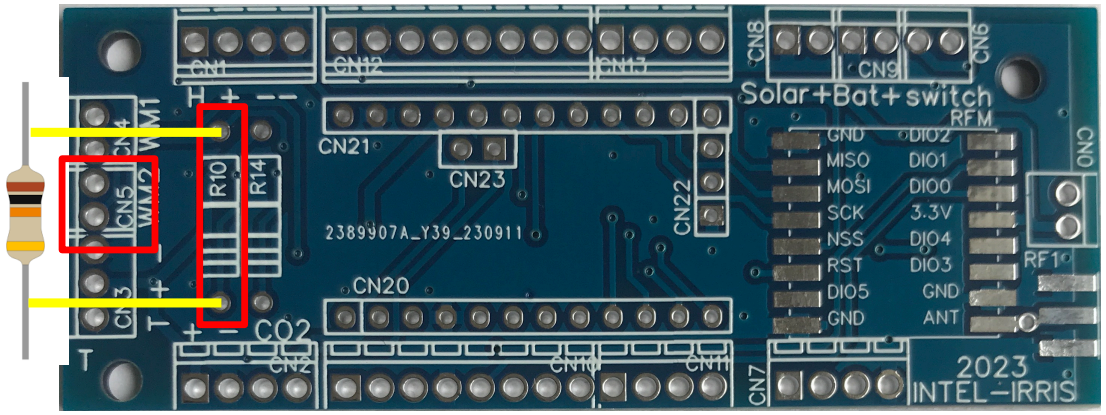
Solder a 10kOhms resistor then wire in the dedicated WM1 terminal block



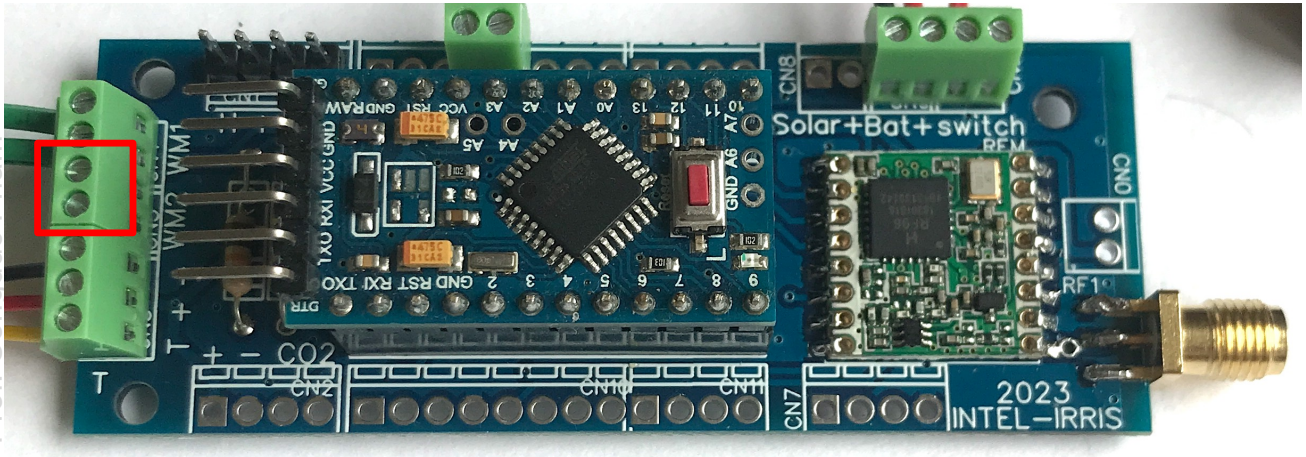


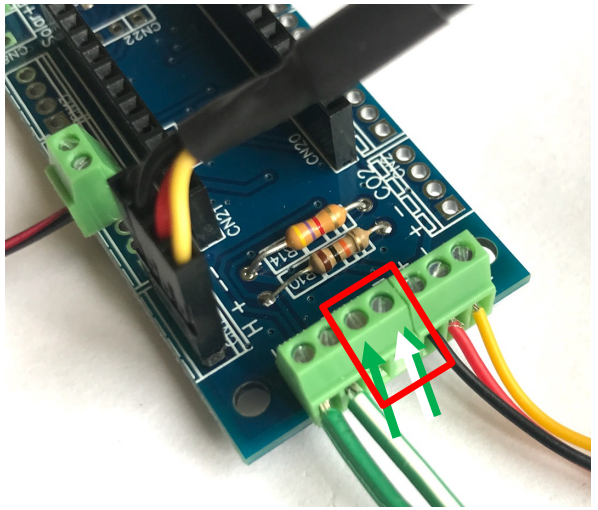
Wiring with new IRD PCB (raw version)

- Second Watermark

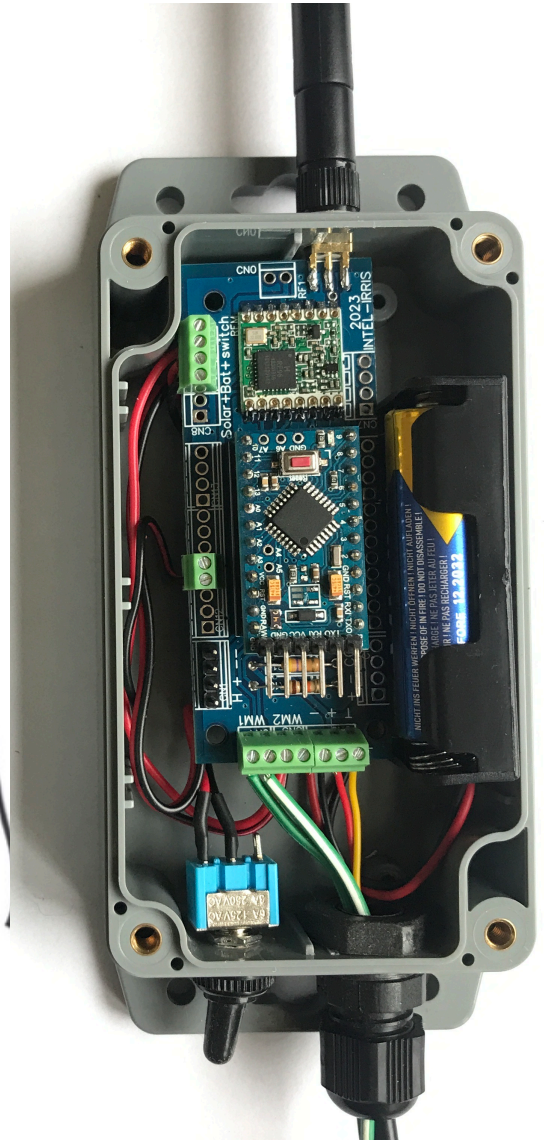


No additional resistor
just wire in the dedicated WM2 terminal block





Final result with casing & sensors



Prof. Congduc Pham
http://www.univ-pau.fr/~cpham


INTEL-IRRIS
Intelligent Irrigation System for Low-cost Autonomous Water Control
in Small-scale Agriculture
NEXT STEPS

Transmission to gateway

Parameters for
INTEL-IRRIS gateway

LoRaWAN™

SF12BW125
868.1MHz | 433.175MHz
Node id is 26011DAA
1 msg/60mins
1 sensor
XLPP data

This dedicated video will show all these steps, from connecting the SEN0308 to testing transmission to the gateway
Video n°4: https://youtu.be/j-1Nk0tv0xM

Live demo