
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!

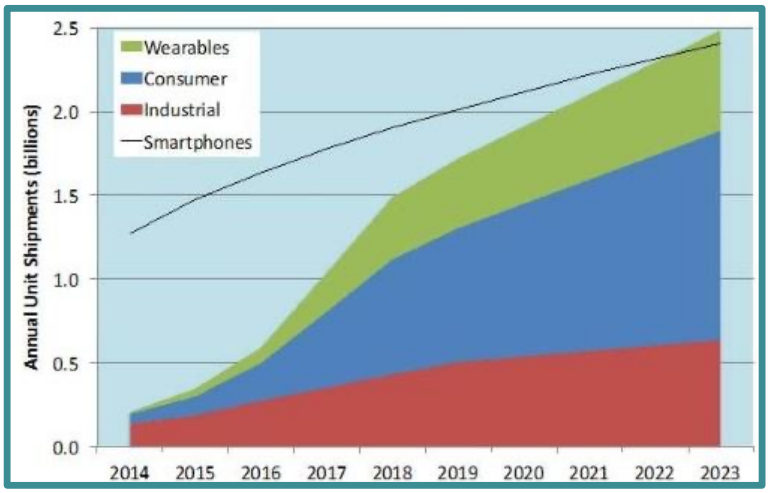


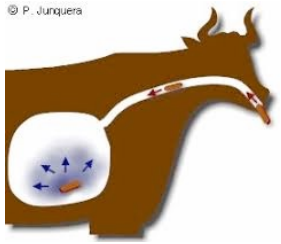
# INTEL-IRRIS

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

# GETTING STARTED!

# IoT devices!

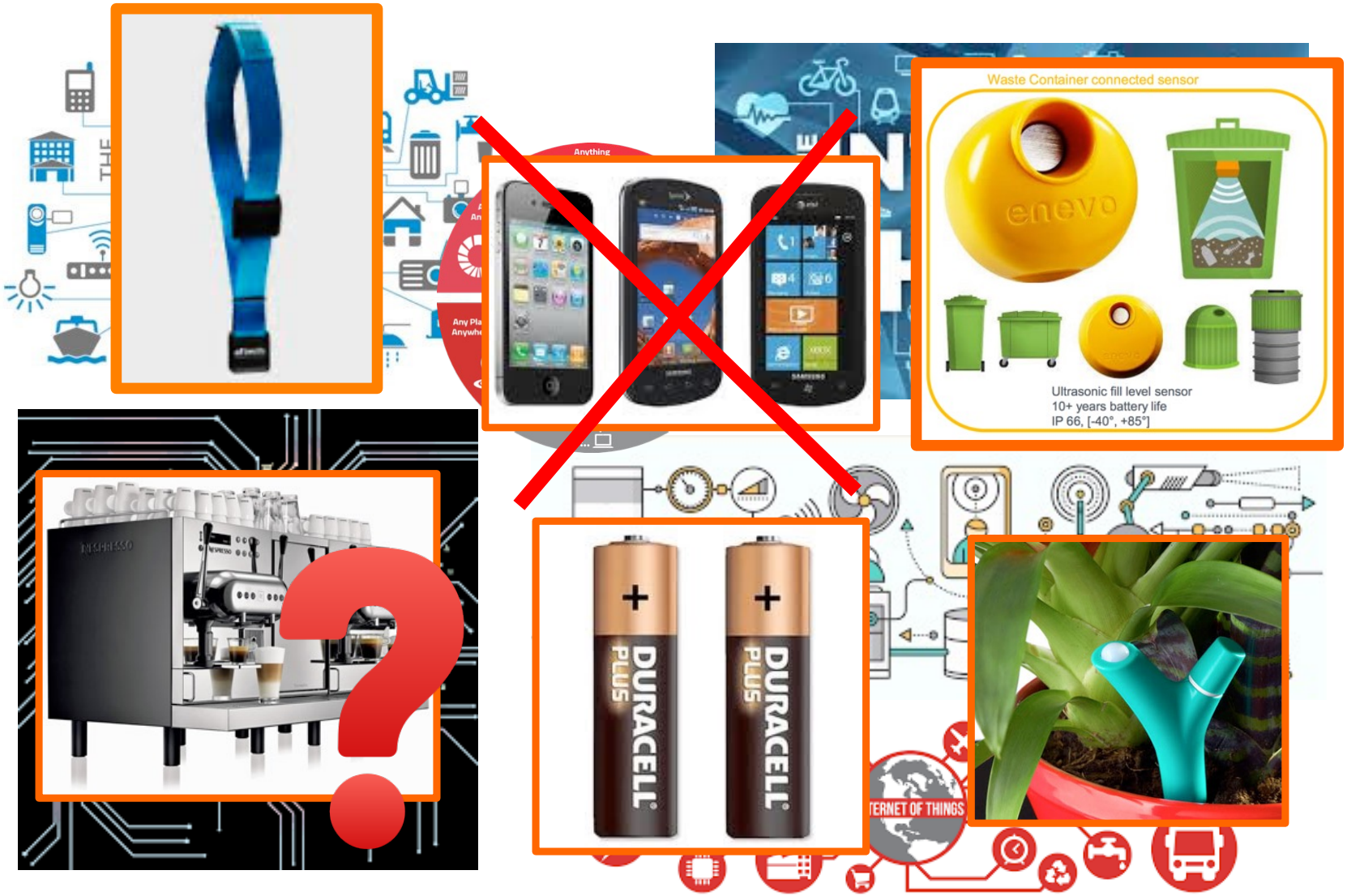








Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

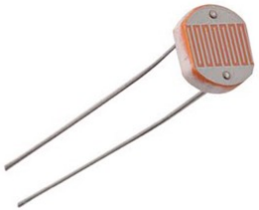
# All communicating objects?

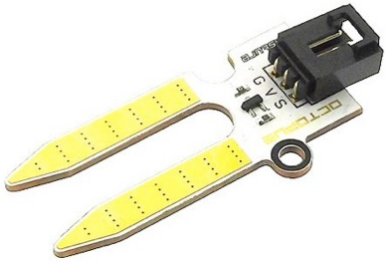



Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

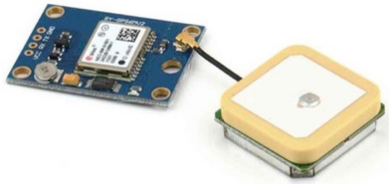
# Interaction: Sensors

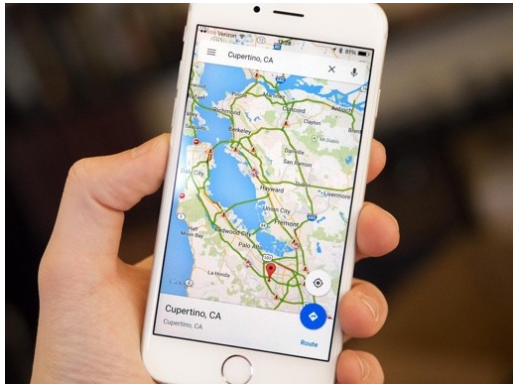






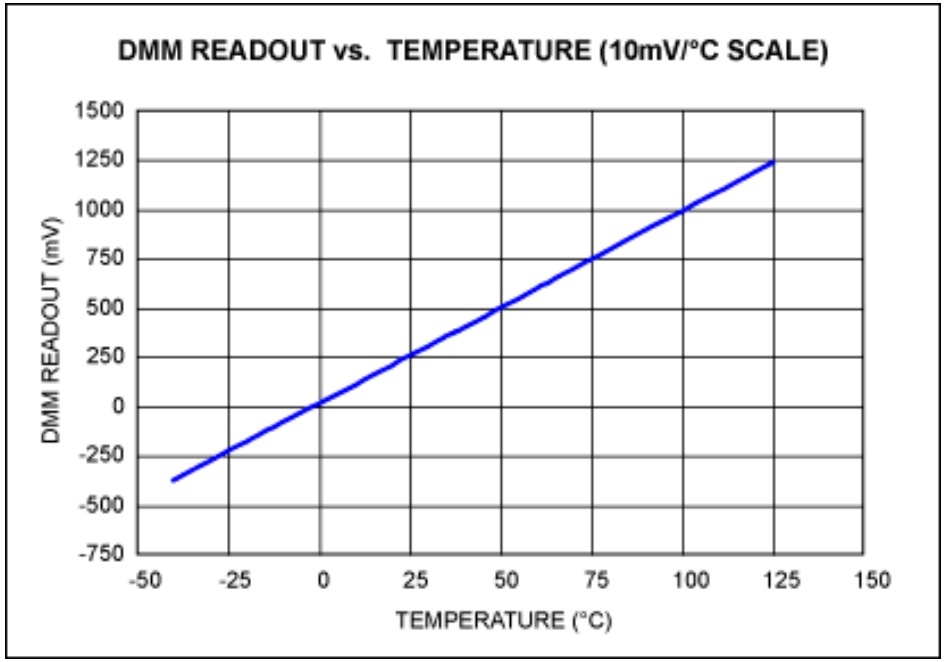






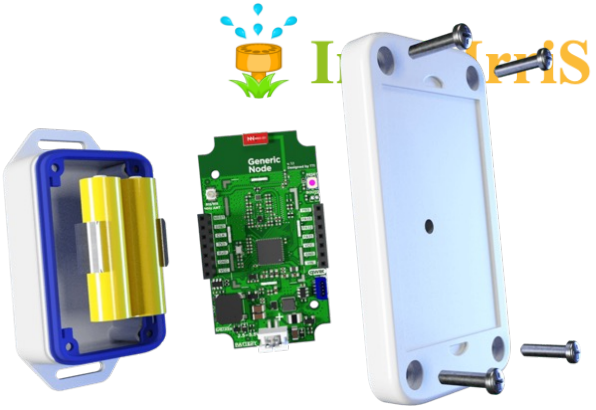
# Interacting with the real world?

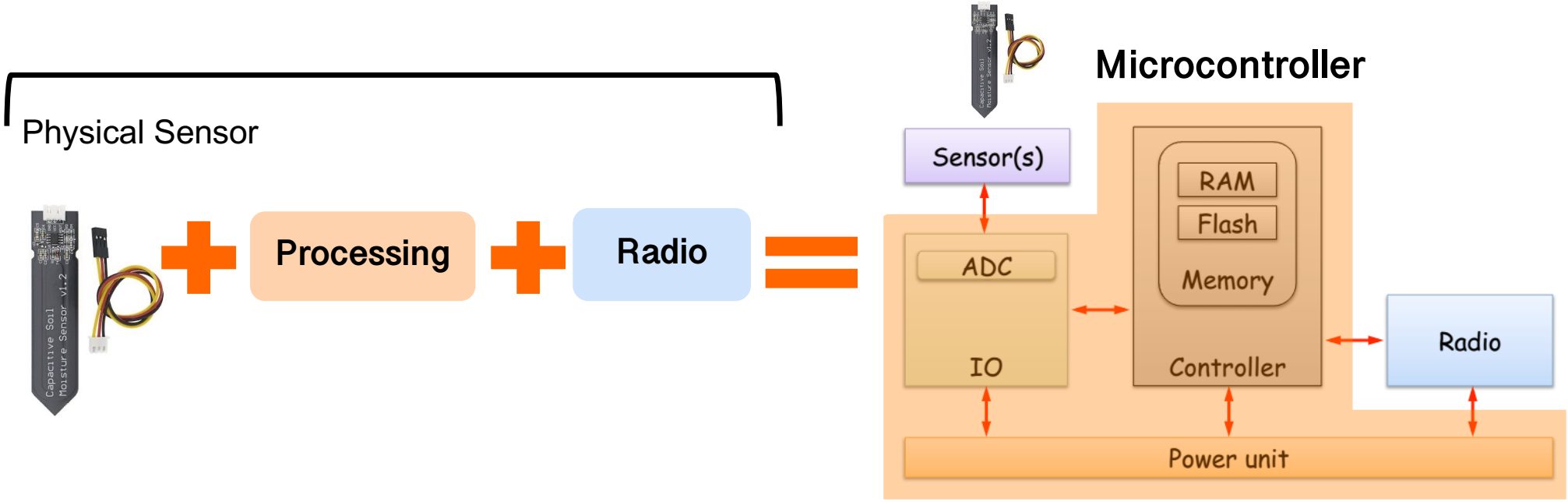
- Taking the simple analog sensors example
- Analog sensors provides a voltage output that varies according to a physical parameter, e.g. temperature, humidity, luminosity,…

# Typical IoT device

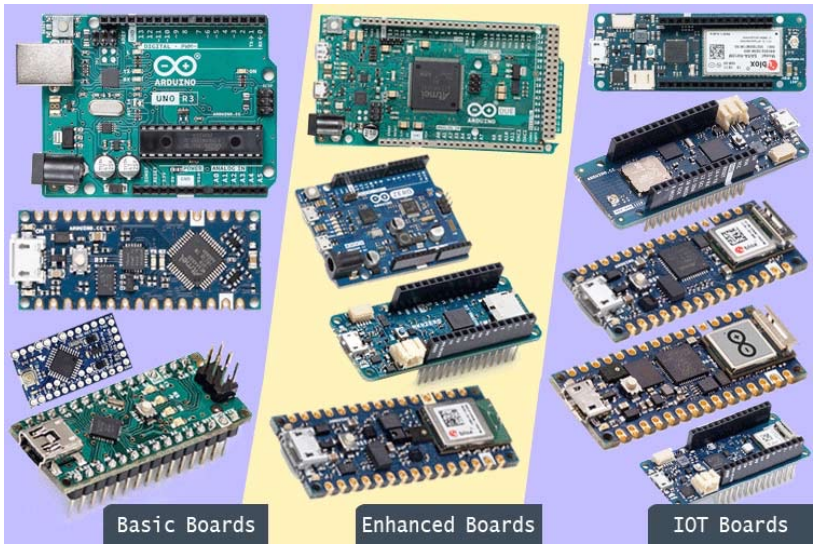
- IoT device can be viewed as a simple Embedded System






Q: uprocessor vs ucontroller?

# the incredibly large microcontroller board ecosystem!





LoPy

STM32 Nucleo-32

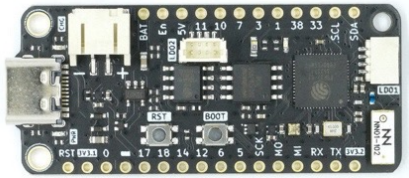
Teensy 3.2


LinkIt
Smart7688 duo

Adafruit Feather

uPesy ESP32

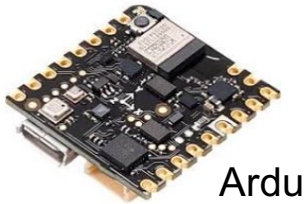
ePulse Feather Low Power ESP32



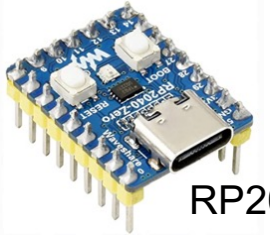
FeatherS3 – ESP32-S3


Heltec ESP32

XIAO SAMD21



Arduino Nicla
Sense ME



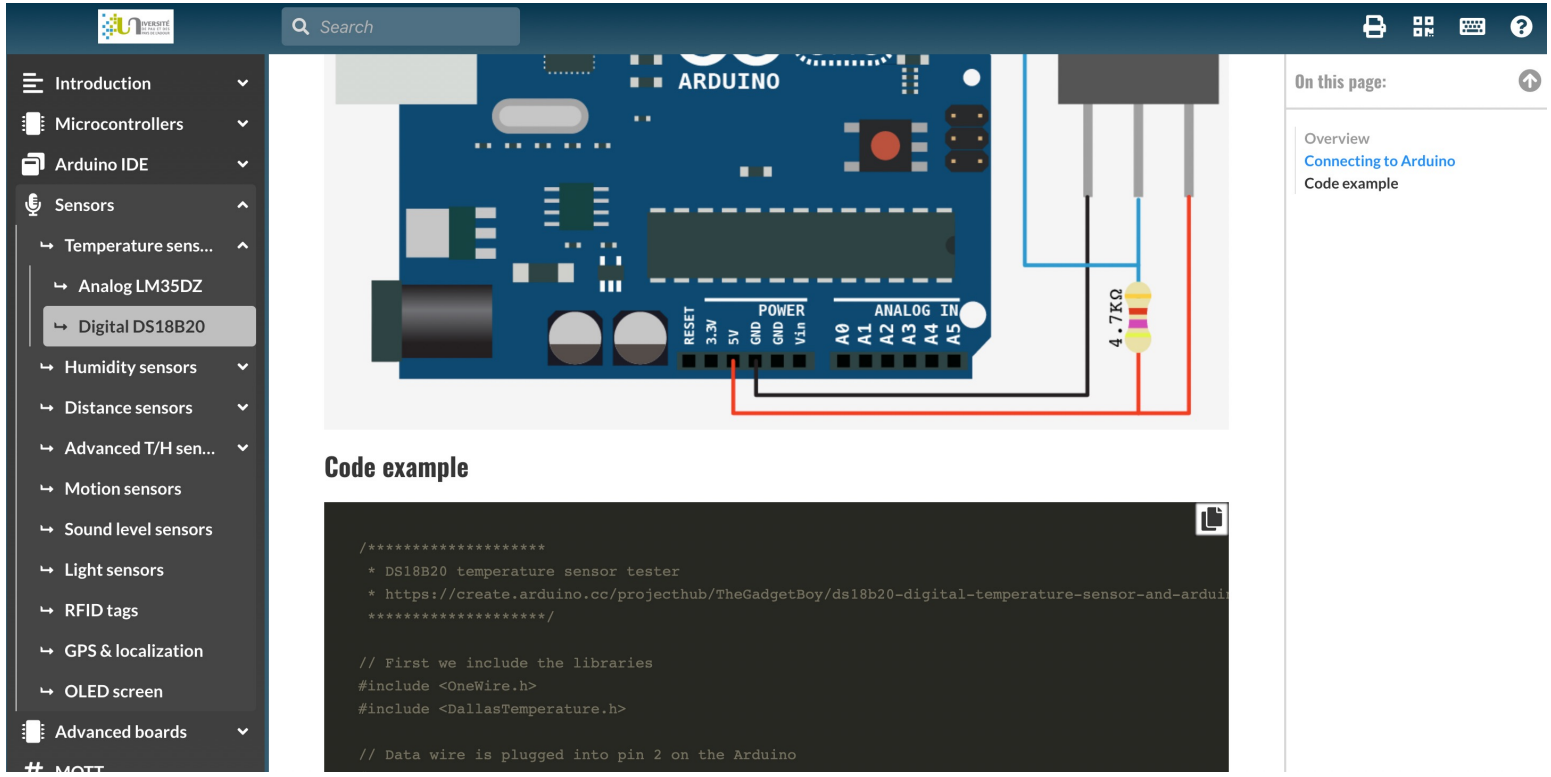
RP2040
zero

DFRobot
Beetle

QT Py ESP32-C3

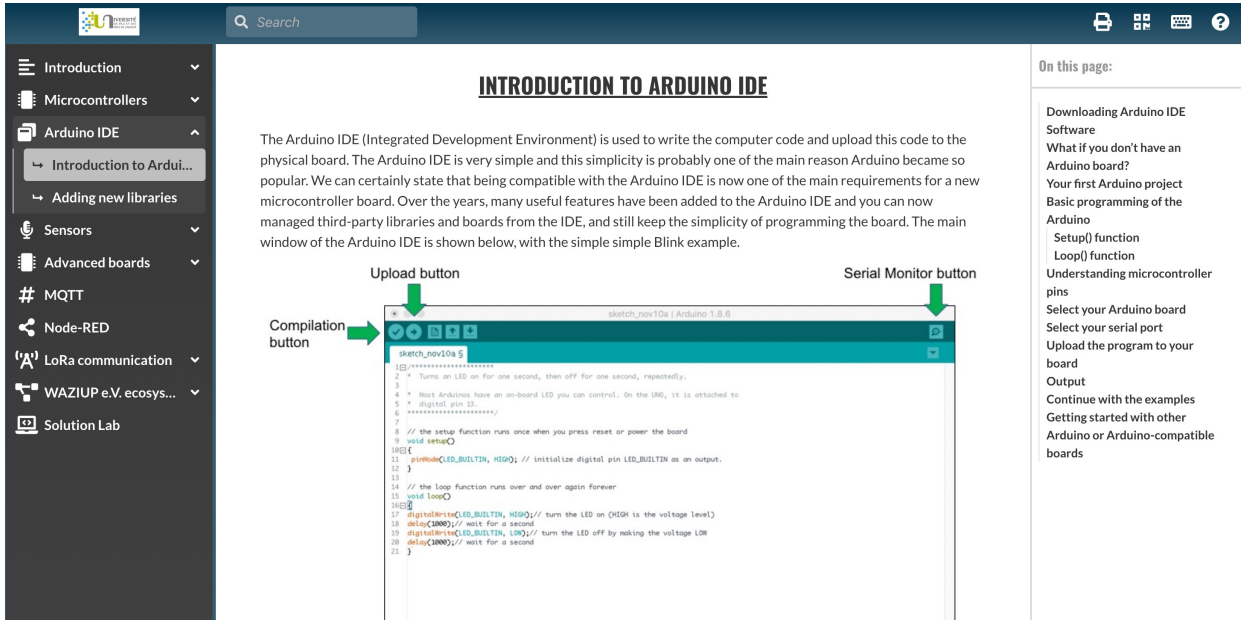
# Online Arduino & Sensor tutorial

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

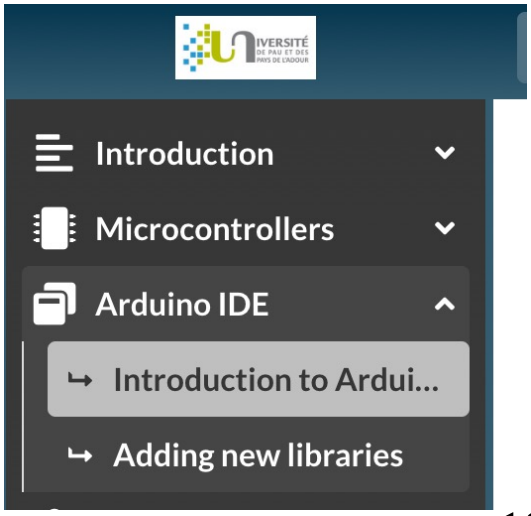


# Discover the Arduino ecosystem

- 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



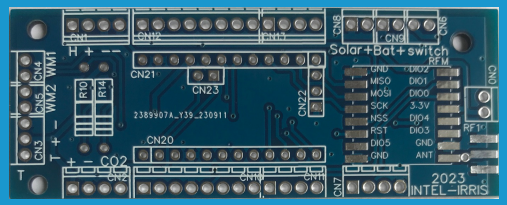

**Navigate and read:**




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

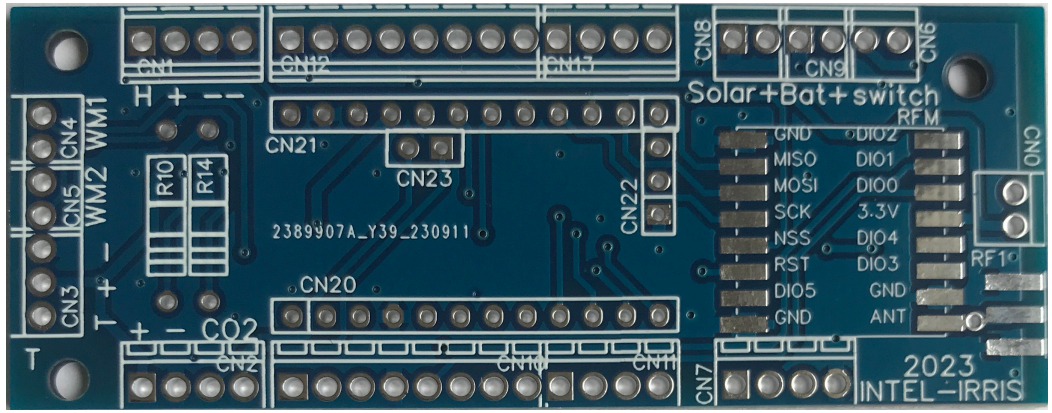
# INTEL-IRRIS

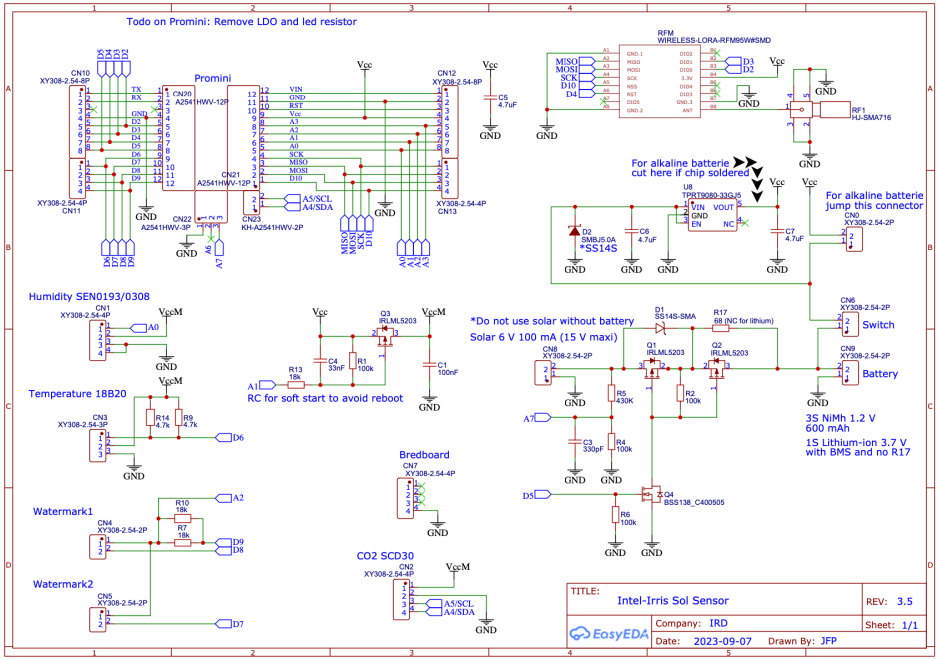
Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture

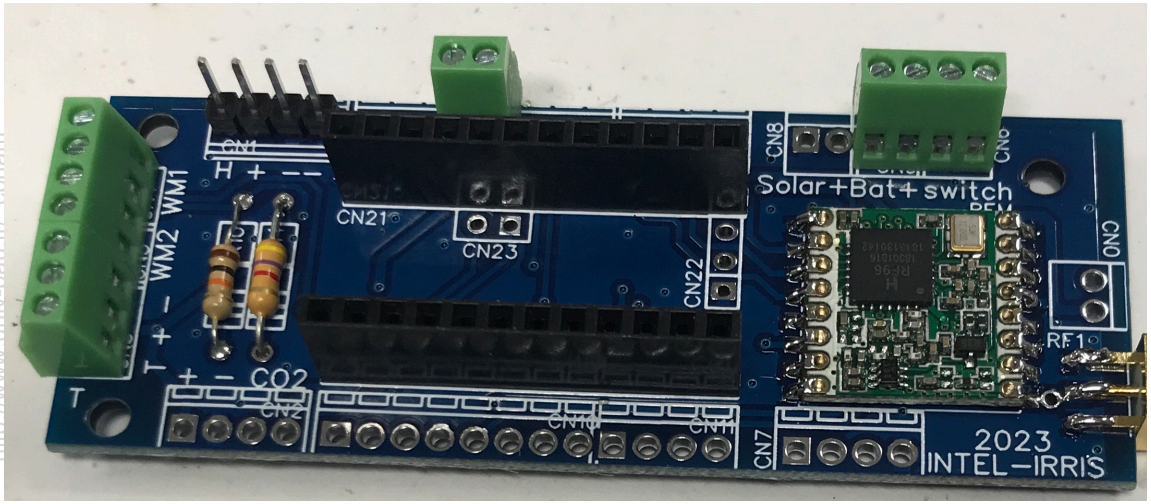


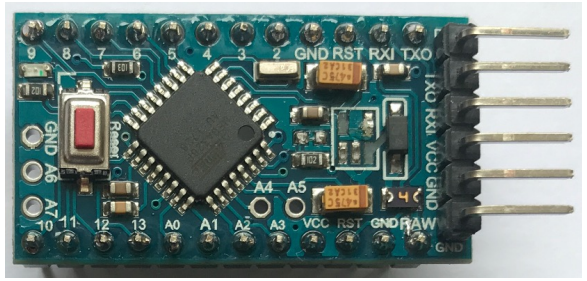

## HANDS-ON

# The new IRD PCB (raw version)



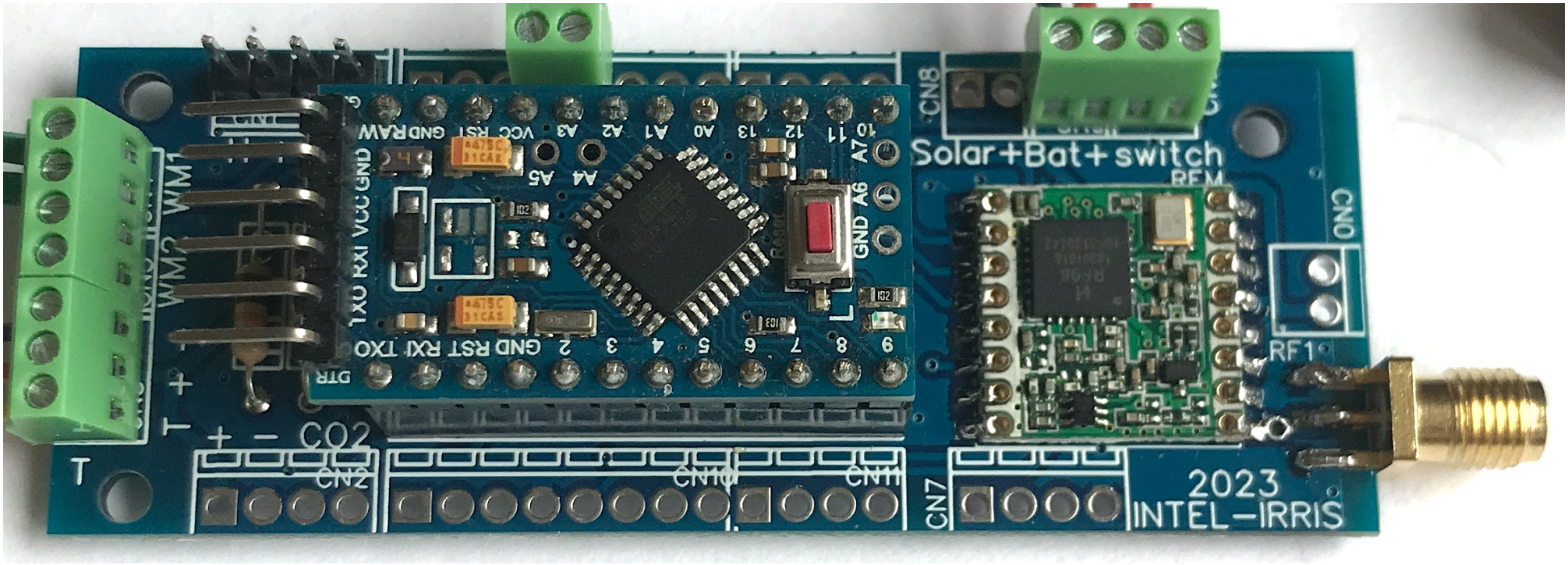



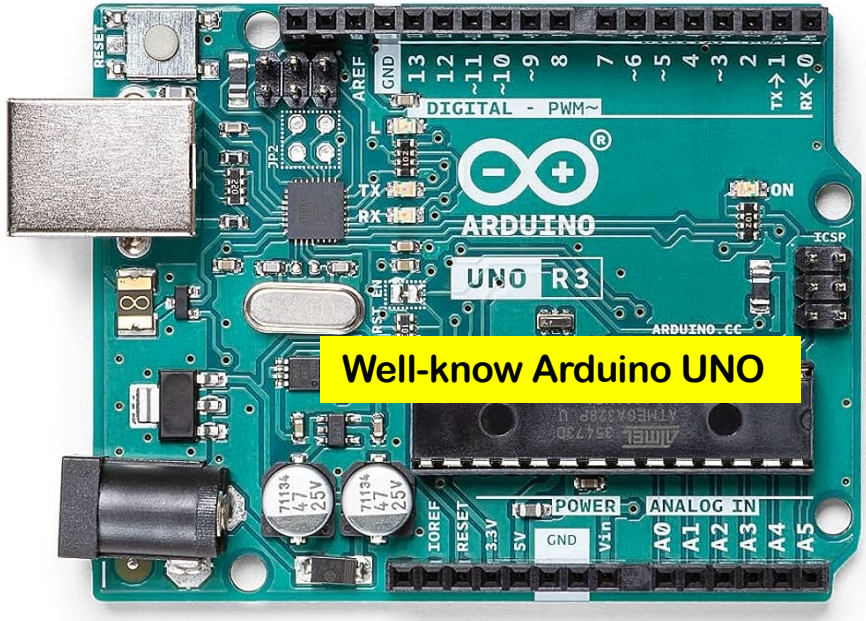



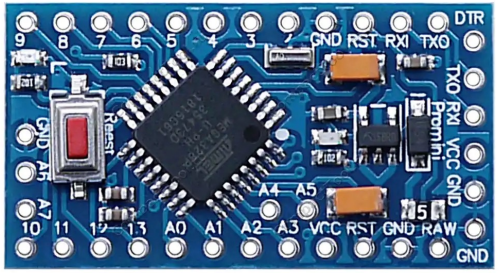

**Arduino Pro Mini**

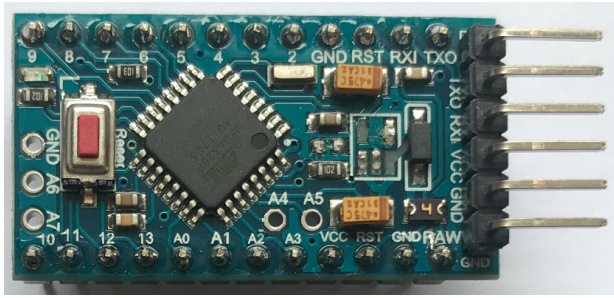
# The new IRD PCB: close-up view

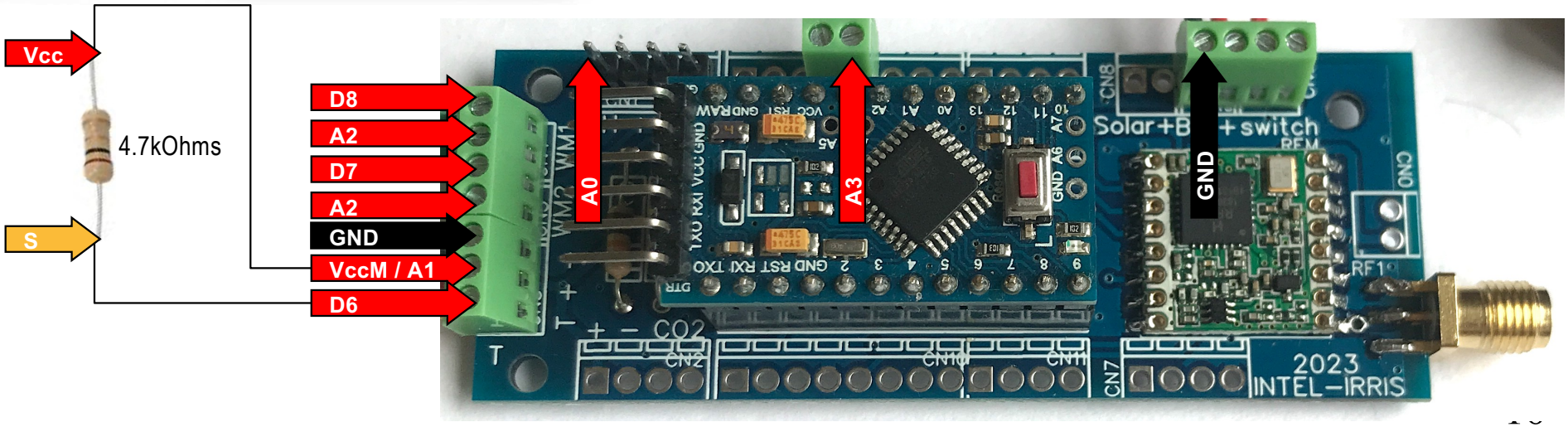


# Arduino pins exposed on the PCB



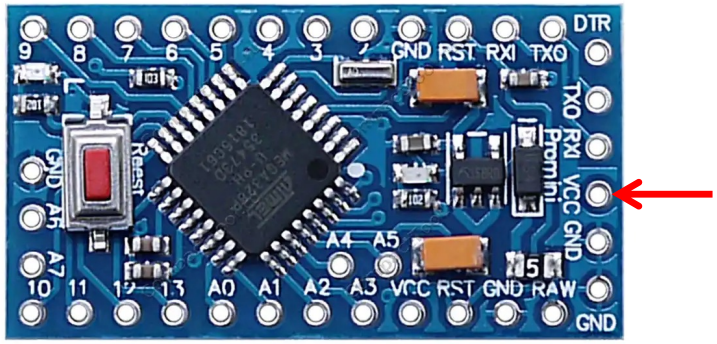



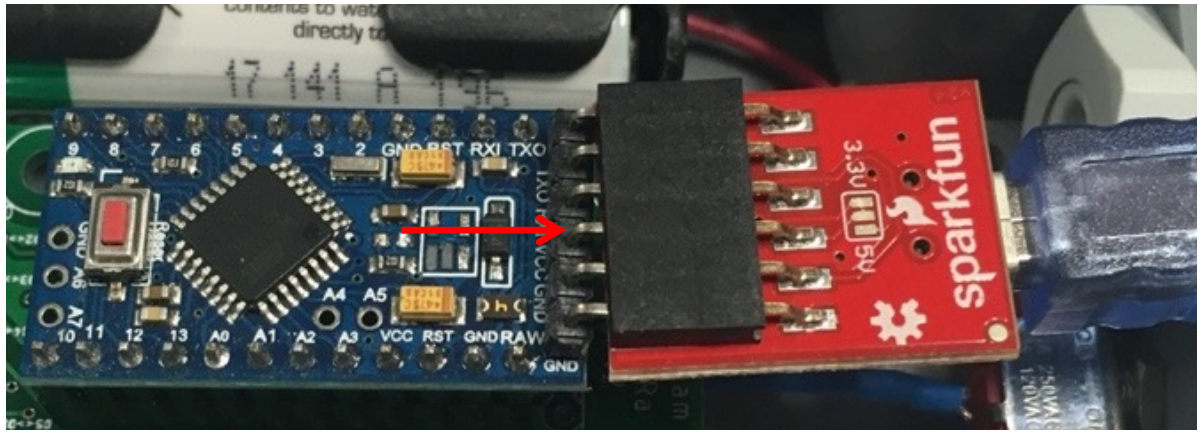





# Programming the microcontroller

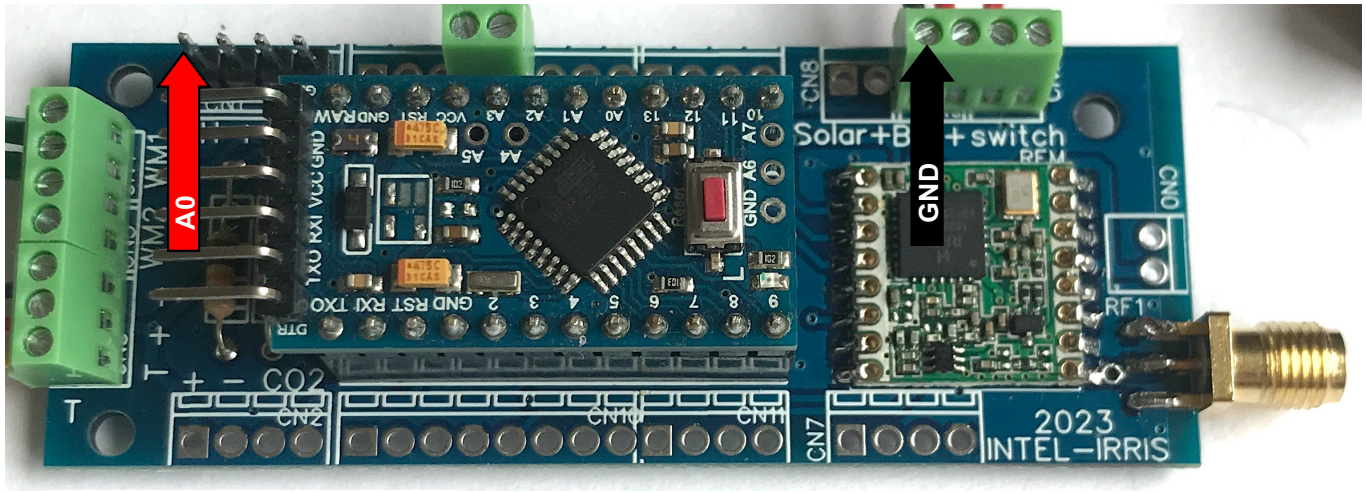
Most Chinese clone version,
check the VCC pin

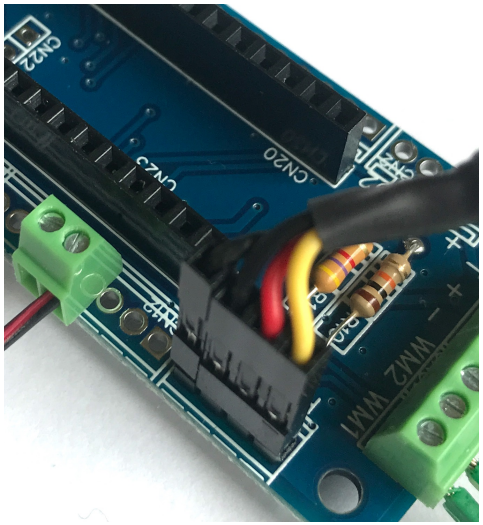


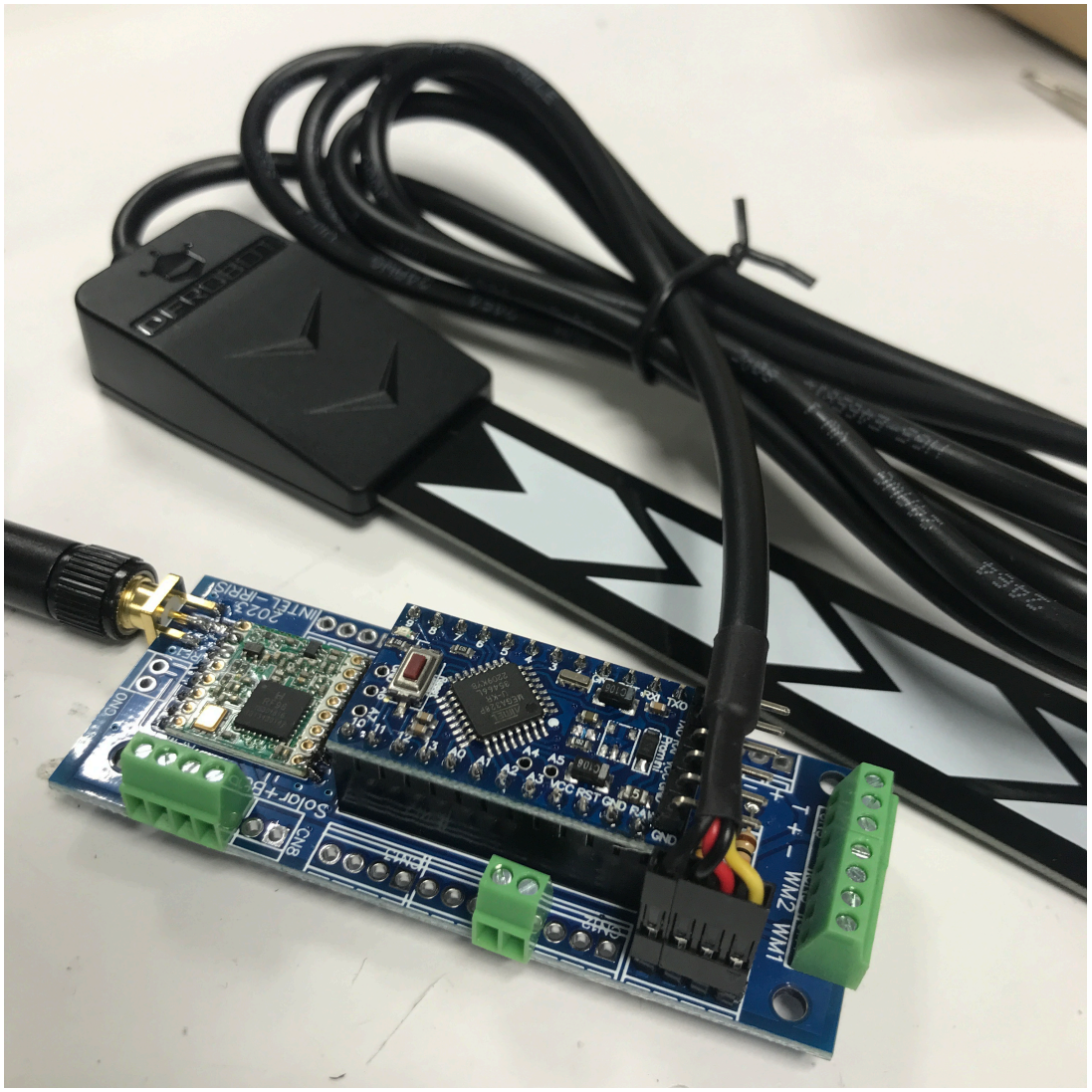
# 1st example: read from analog

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



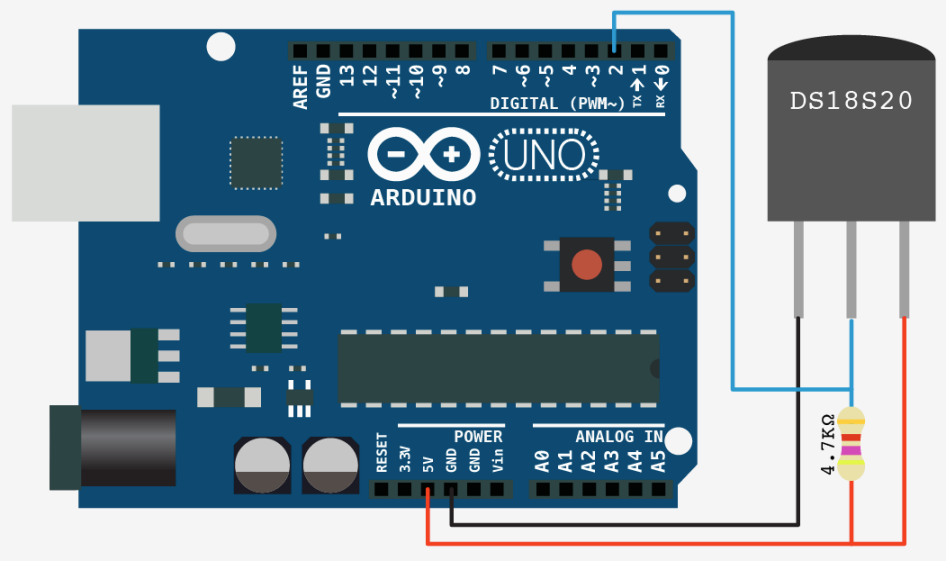



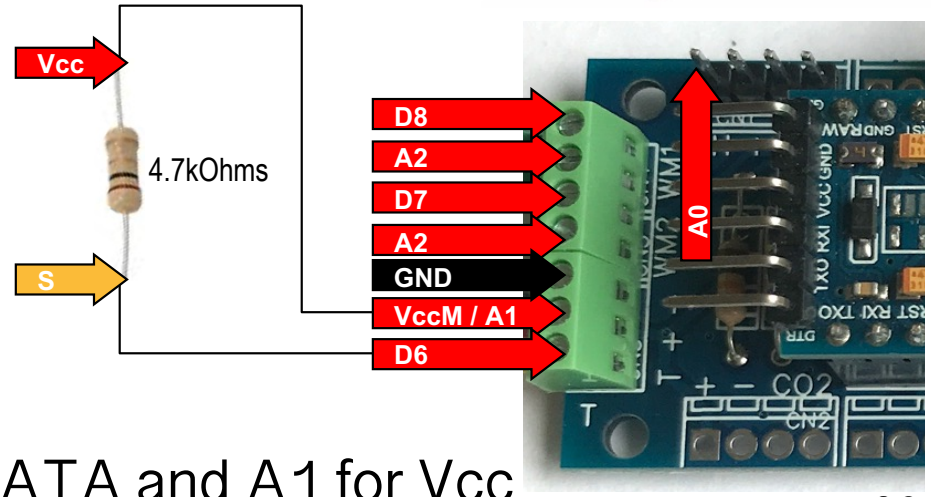
# Connecting SEN0308 in image



# 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

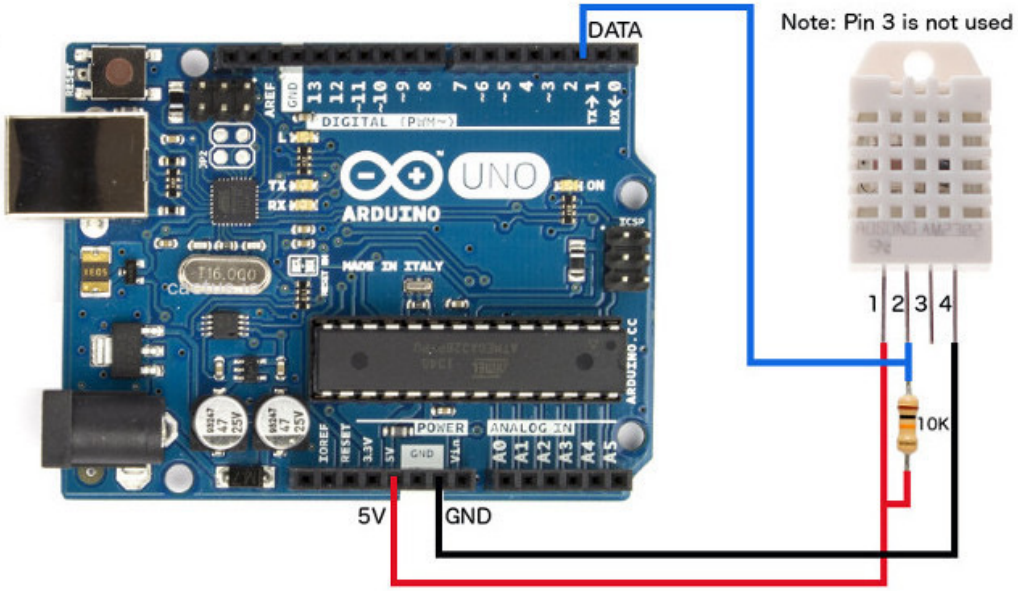




- Adapt the code to use D6 for DATA and A1 for Vcc

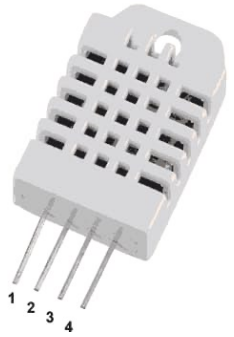
# Connecting DS18B20 in image

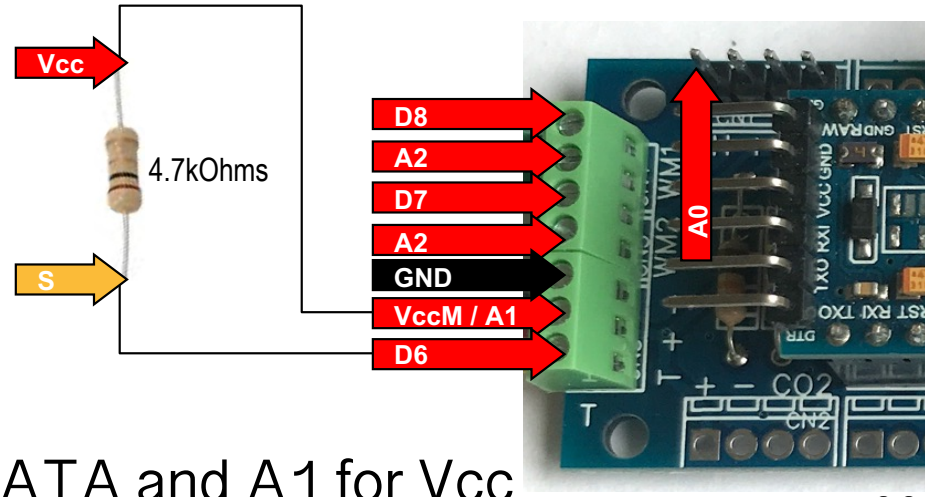
# 3rd example: read from digital DHT22

- DHT22: combined temperature & humidity sensor
- https://cpham.perso.univ-pau.fr/LORA/HUBIQUITOUS/solution-lab/arduino-lora-tutorial/sensors/temp_hum/dht22/



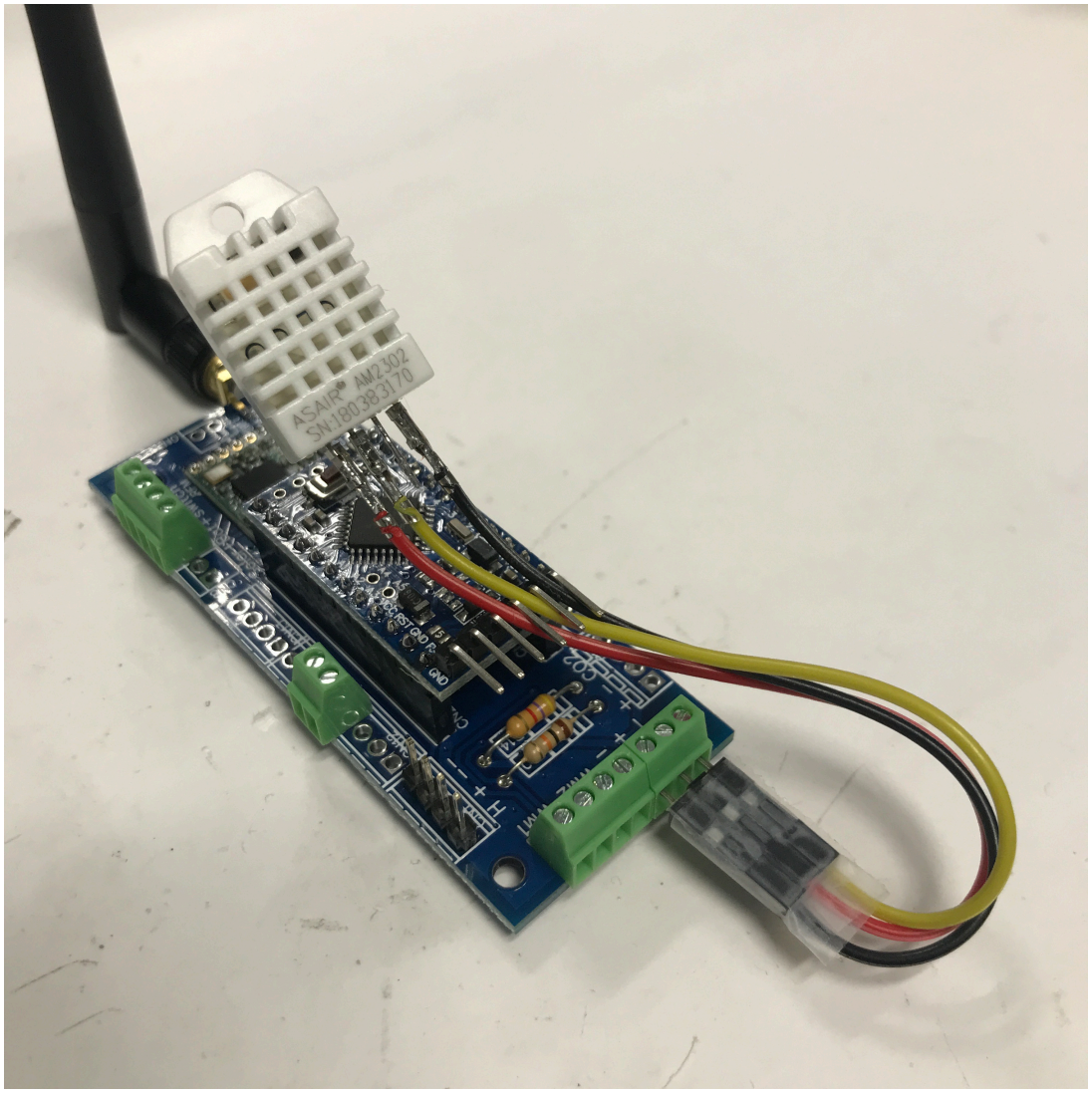

| DHT22 pins | |
|---|---|
| 1 | VCC |
| 2 | DATA |
| 3 | NC |
| 4 | GND |



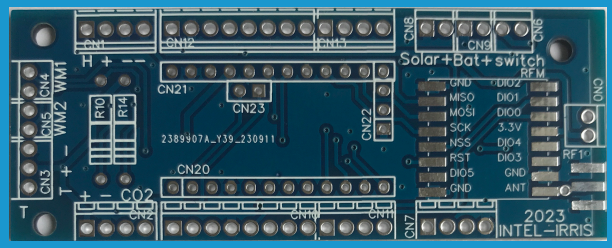

- Adapt the code to use D6 for DATA and A1 for Vcc

# Connecting DHT22 in image



# INTEL-IRRIS

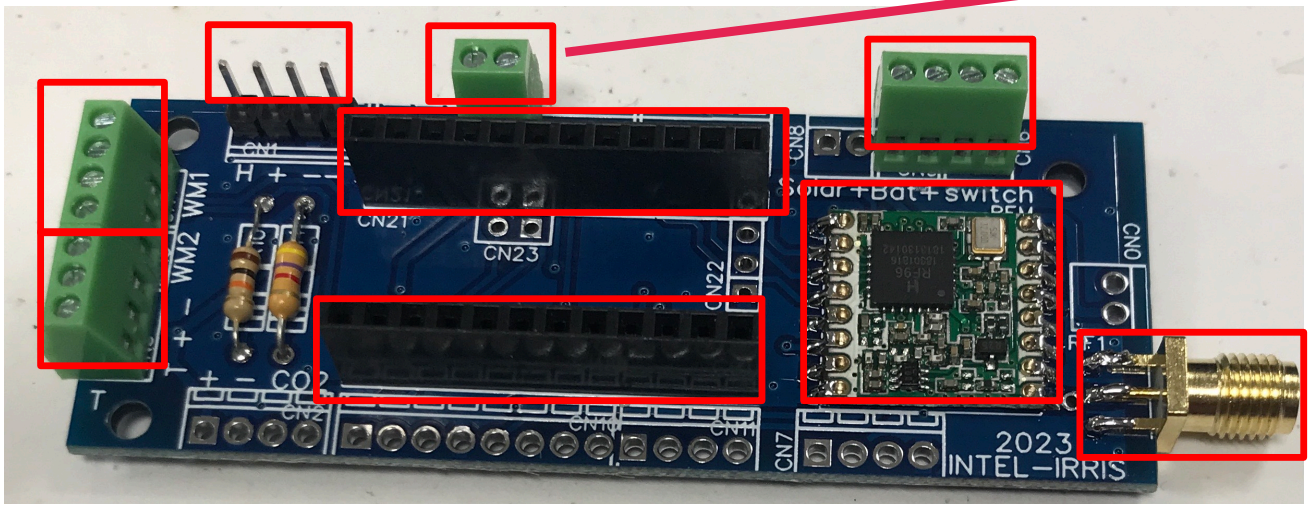
Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture

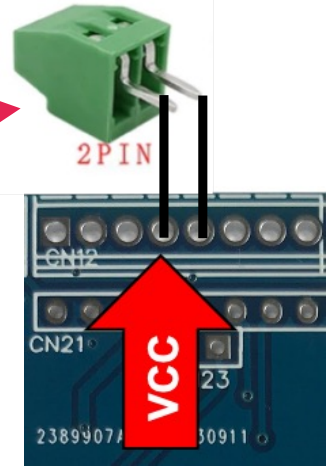



# BUILDING STARTER-KIT

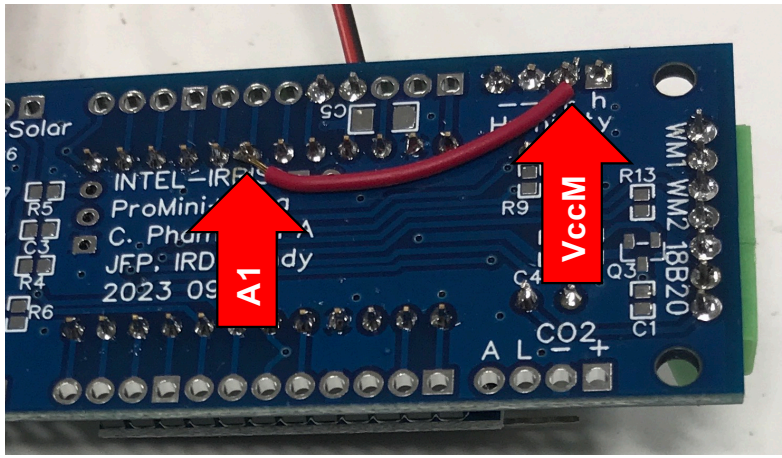
# Wiring with new IRD PCB (raw version)

- First, solder the various components



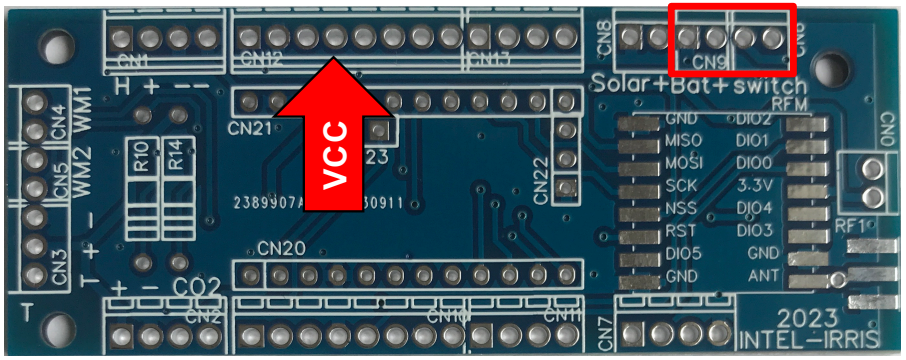

- For the raw PCB (no circuit for solar), need to link A1 to VccM on the back side of the PCB
- VccM can be taken on the + of the soil humidity sensor

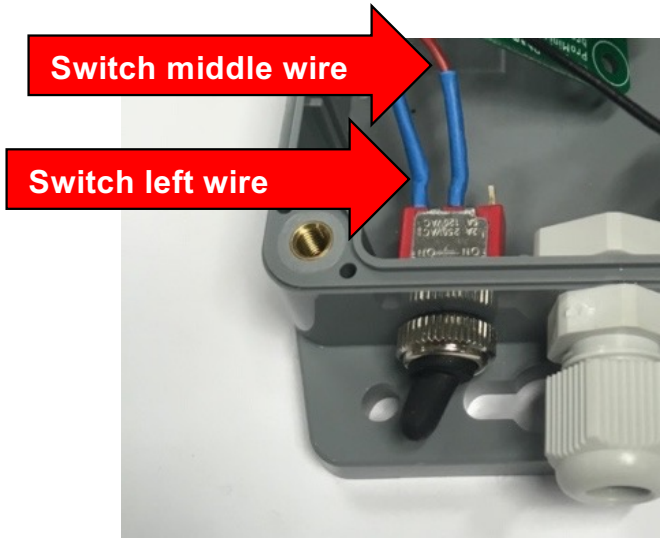


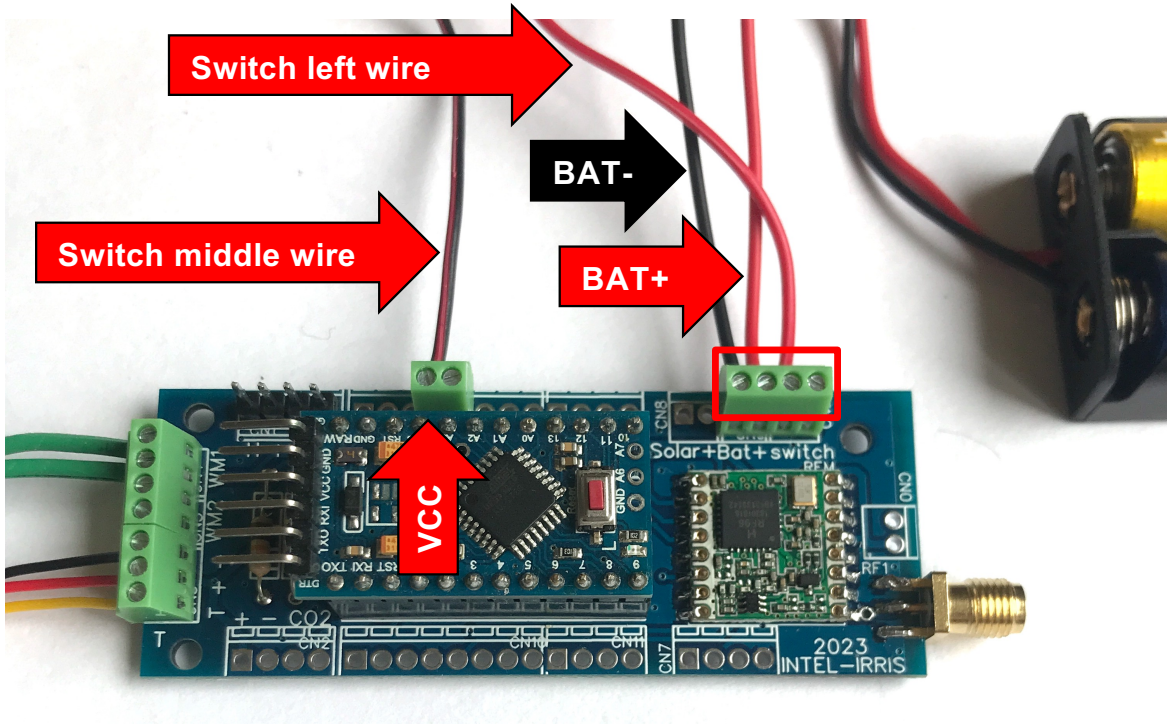

Prof. Congduc Pham
http://www.univ-pau.fr/~cpham

# Wiring with new IRD PCB (raw version)

- Power wires

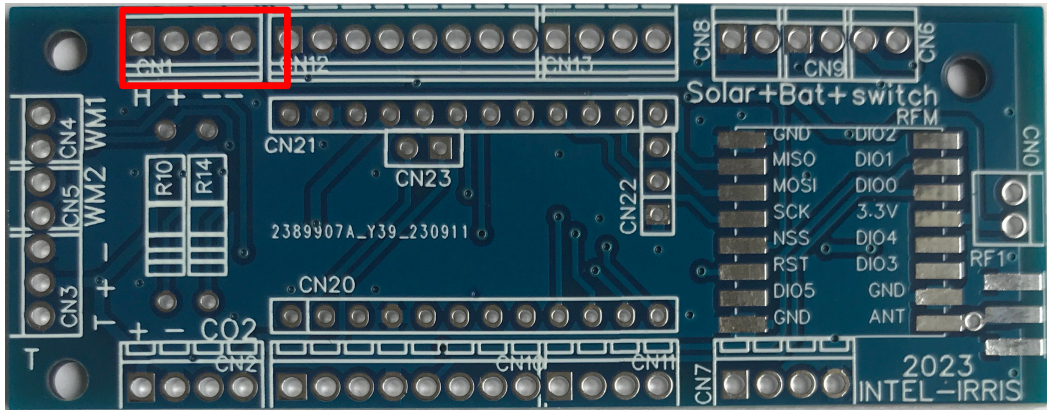


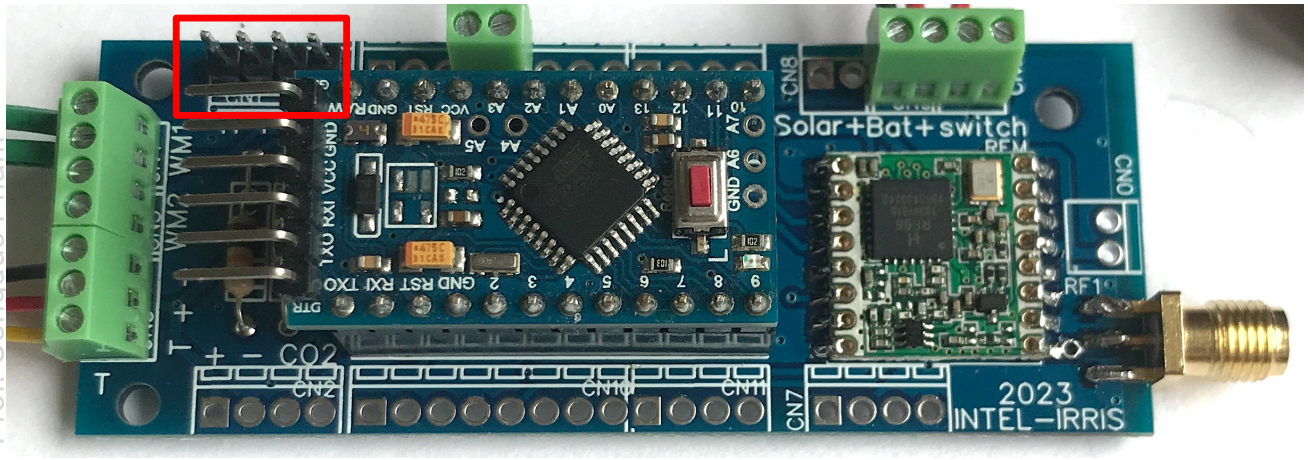



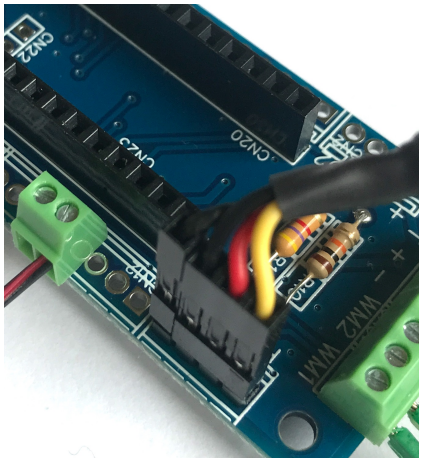
# Wiring with new IRD PCB (raw version)

- SEN0308 capacitive



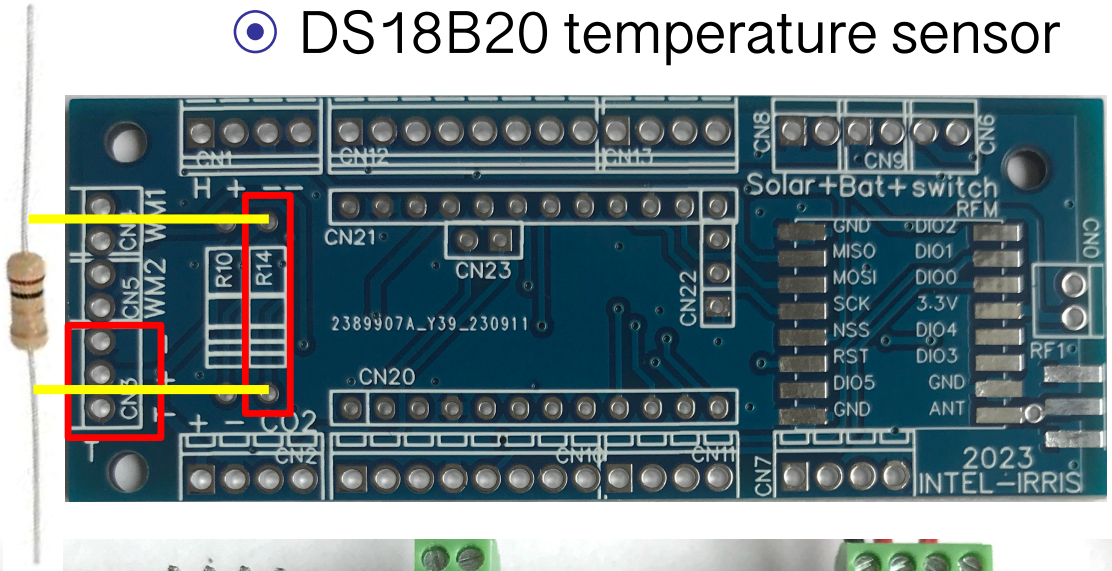

**Just connect the sensor in the dedicated header**
**– – are the 2 black wires**
**+ is red and H is yellow**



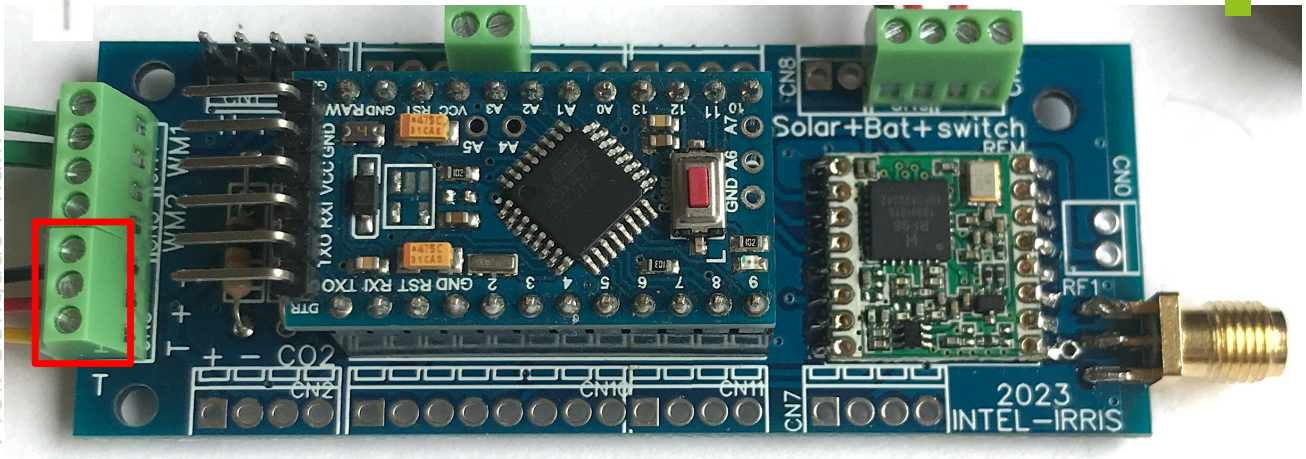
# Wiring with new IRD PCB (raw version)

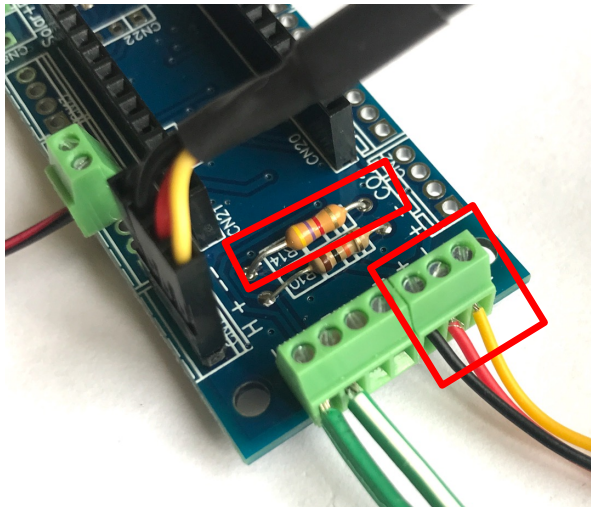
- DS18B20 temperature sensor




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

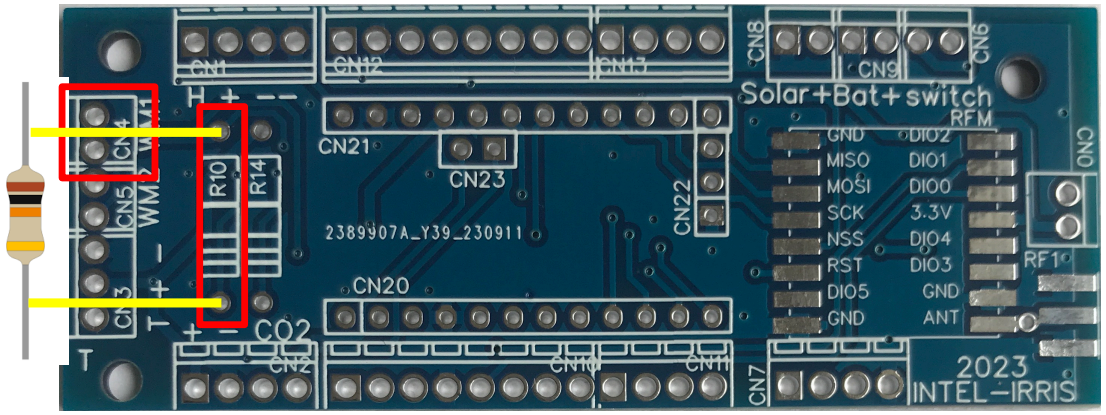
**T+ – : Yellow, Red, Black wires**

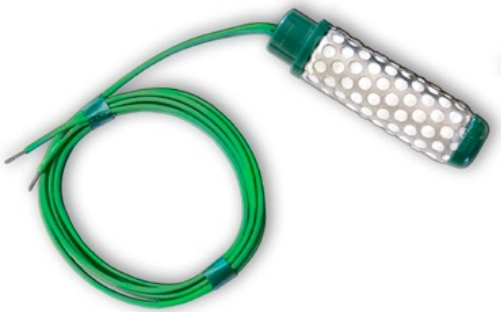


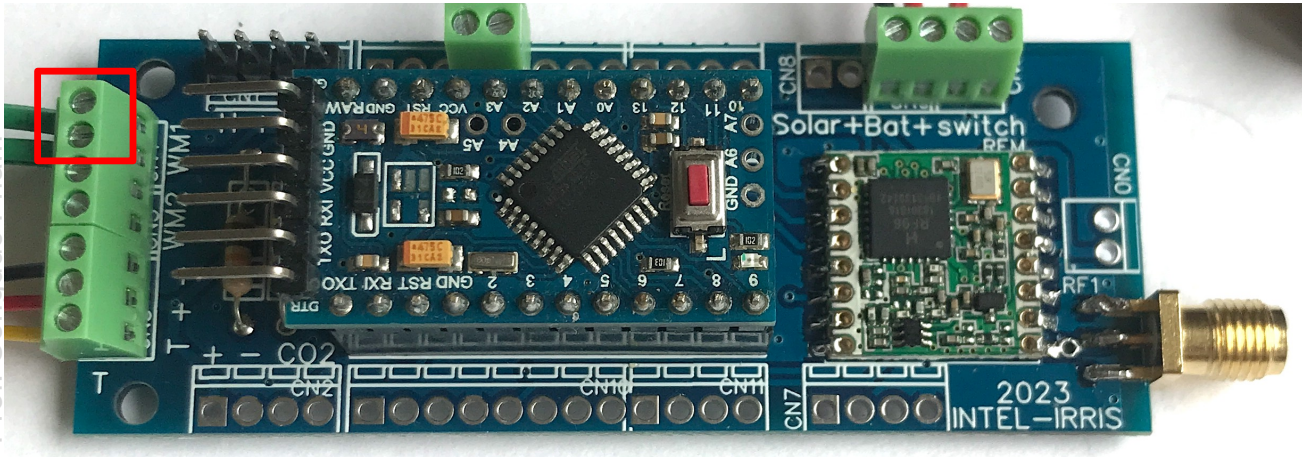
# Wiring with new IRD PCB (raw version)

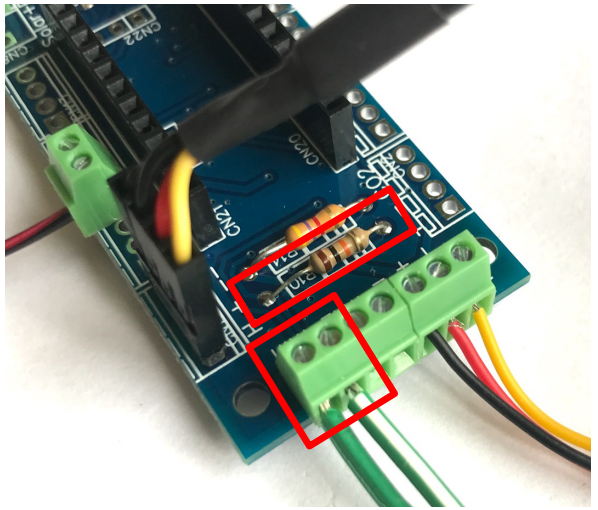
- First Watermark



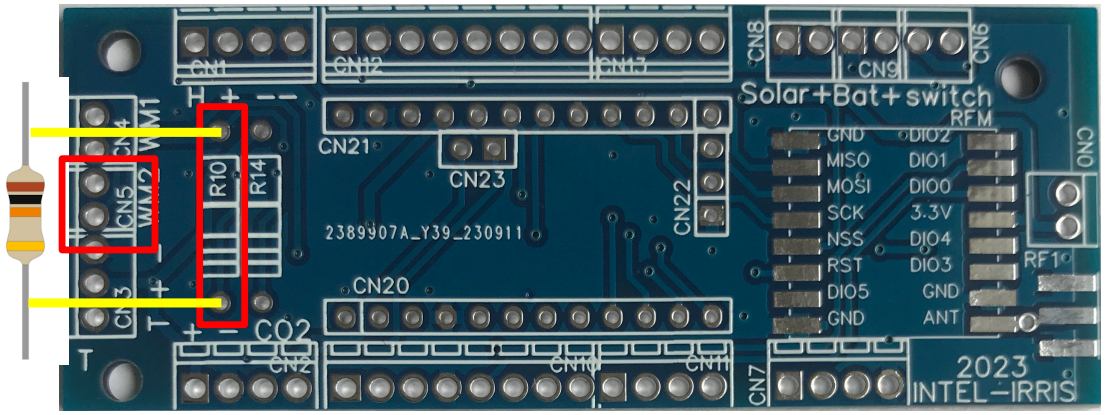
**Solder a 10kOhms resistor then wire in the dedicated WM1 terminal block**

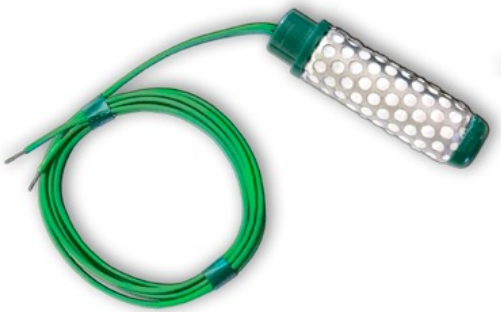


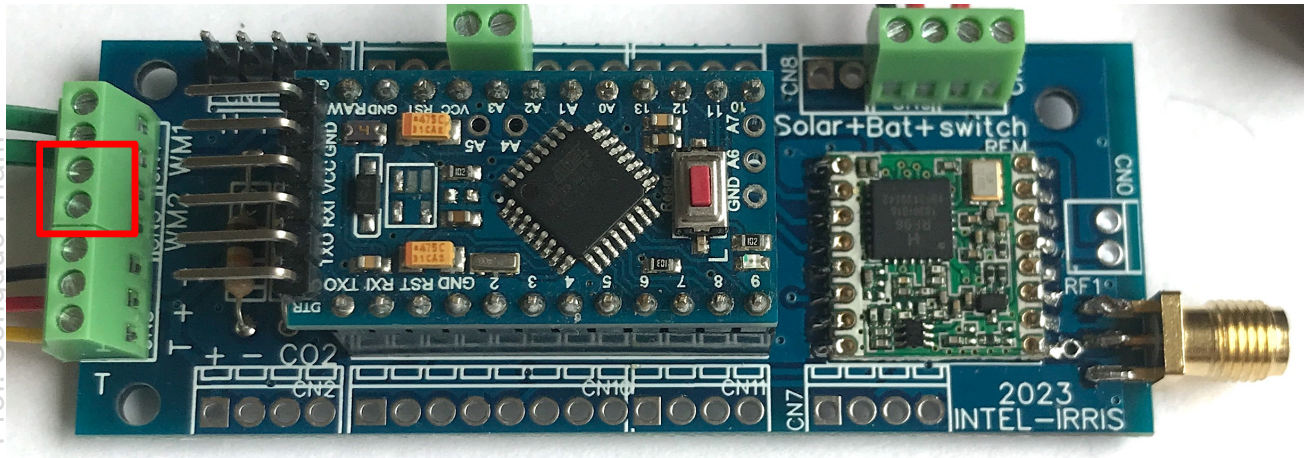
# Wiring with new IRD PCB (raw version)

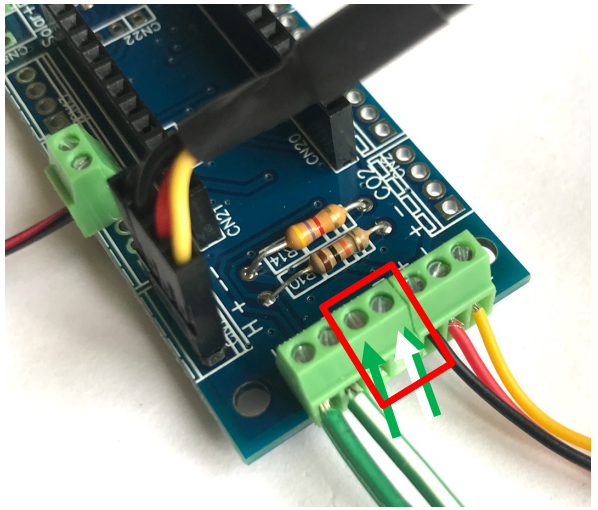
- Second Watermark



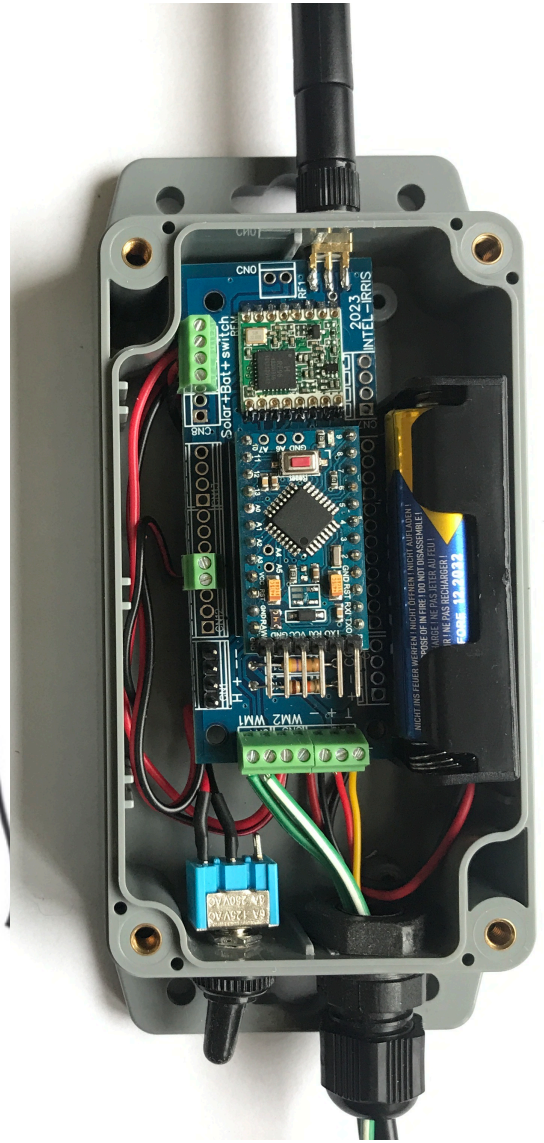



**No additional resistor**
**just wire in the dedicated WM2**
**terminal block**



# Final result with casing & sensors

# 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

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