

# INTEL-IRRIS

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



Intel-Irris



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



## Building the INTEL-IRRIS LoRa IoT platform Part 4: the INTEL-IRRIS Irrigation WaziApp

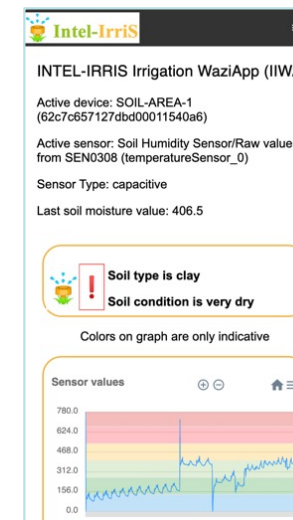


Prof. Congduc Pham  
<http://www.univ-pau.fr/~cpham>  
Université de Pau, France



# INTEL-IRRIS Irrigation WaziApp

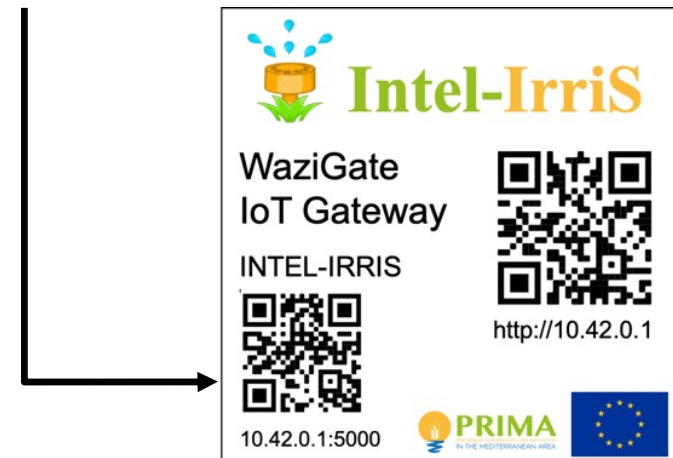
- ⦿ The INTEL-IRRIS Irrigation WaziApp (IIWA) is an embedded application running on the INTEL-IRRIS WaziGate itself
- ⦿ It is included in the starter-kit to implement the "intelligent Irrigation in-the-box" & "plug-&-sense" approach
- ⦿ Its objective is to enhance the irrigation indication by applying sensor calibration models with soil/plant/weather parameters



# Connect to IIWA

- ④ First, connect to INTEL-IRRIS WaziGate WiFi which should look like WAZIGATE\_XXXXXXXXXXXX
  - ④ Password is loragateway
- ④ Otherwise, with the OLED screen, a QR code for automatically joining the WiFi network is periodically displayed for 10s
  - ④ scan the displayed QR code with a smartphone to connect to WaziGate's WiFi
- ④ Then, scan the static QR code on the WaziGate sticker to connect to the INTEL-IRRIS Irrigation WaziApp on : <http://10.42.0.1:5000>

WAZIGATE\_DCA6325C2A7A






# IIWA main screens

DEVICE NAME & ID ARE  
ONLY INDICATIVE

## Dashboard, Device Manager and Sensor Configuration

Dashboard →  
Device Manager →  
Sensor Configuration →



Menu


**INTEL-IRRIS Irrigation WaziApp (IIWA)**

Active device: SOIL-AREA-1  
(6314f8f4127dbd00018b0f01)

Active sensor: Soil Humidity Sensor/Raw value  
from SEN0308 (temperatureSensor\_0)


Sensor Type: undefined

Last soil moisture value: 398.5



**Soil type is undefined**  
**Soil condition is undefined**

Colors on graph are only indicative



**IIWA Device Manager**

List of devices added to IIWA.

Devices added to IIWA


DEVICE ID	DEVICE NAME	SENSORS

Active device determines sensors values  
visualization and data source for humidity index  
value computation.

Select an active device and sensor

Active device: **none**. Select from list

Active sensor: **none**. Select from list for  
Dashboard & humidity index value  
computation



**IIWA Sensor Configuration**

No sensor configuration has been made!

Active Device: SOIL-AREA-1  
(6314f8f4127dbd00018b0f01)

Active Sensor: Soil Humidity Sensor/Raw value  
from SEN0308 (temperatureSensor\_0)

**Settings for sensor configuration**

Select a sensor to view its current configuration  
and update its parameters

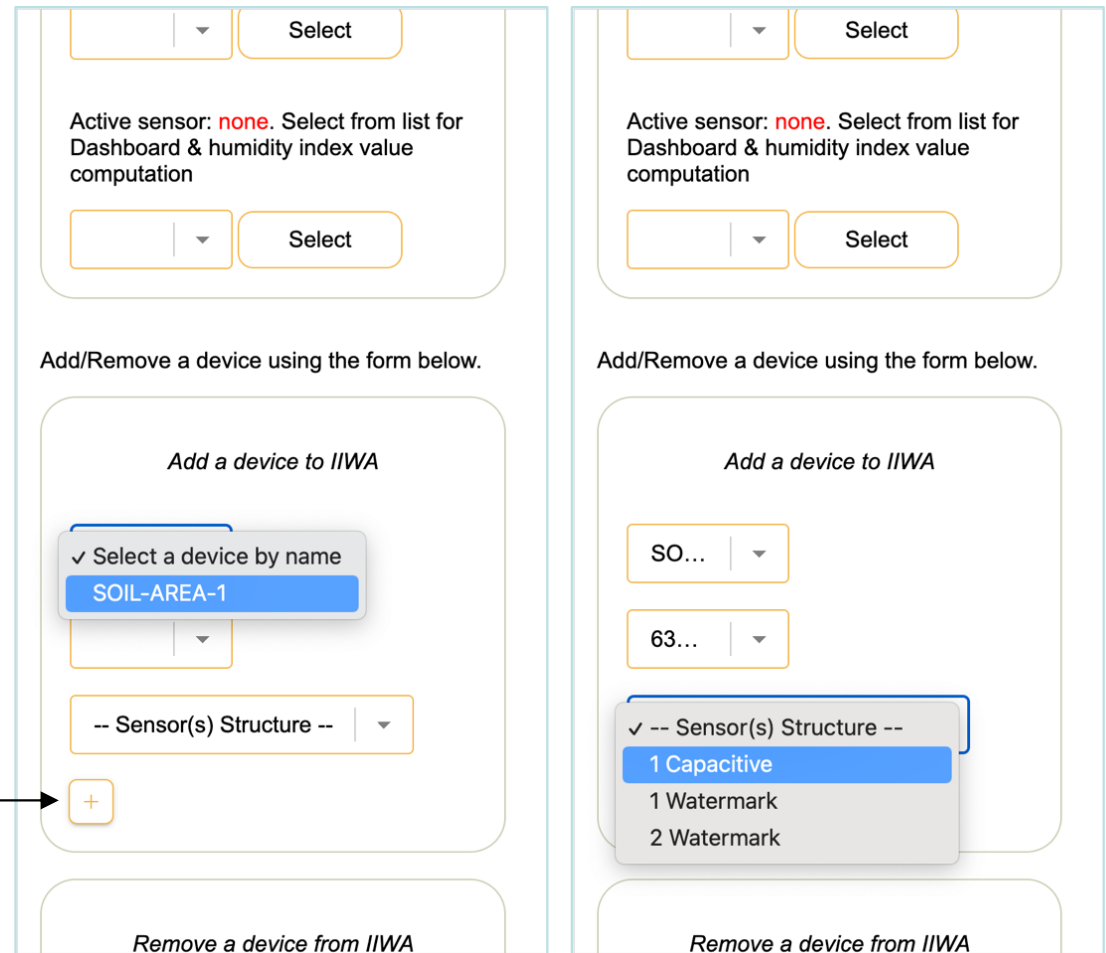
☒ Soil Humidity Sensor/Raw value from SEN0308  
(temperatureSensor\_0)

**Update configurations**

Sensor Type is the only  
mandatory parameter to  
be filled, other  
parameters can be left  
undefined

# Add a device to IIWA

- IIWA **only monitors devices that are added to the IIWA** application
- By default, there is no device associated to IIWA
- Go to Device Manager to add the default capacitive sensor device
- The device name is SOIL-AREA-1
- Select "1 Capacitive" as sensor structure
- Click on "+" icon



Active sensor: **none**. Select from list for Dashboard & humidity index value computation

Select

Select

Add/Remove a device using the form below.

Add a device to IIWA

✓ Select a device by name  
SOIL-AREA-1

-- Sensor(s) Structure --

+

Remove a device from IIWA

Active sensor: **none**. Select from list for Dashboard & humidity index value computation

Select

Select

Add/Remove a device using the form below.

Add a device to IIWA

SO...

63...

✓ -- Sensor(s) Structure --  
1 Capacitive  
1 Watermark  
2 Watermark

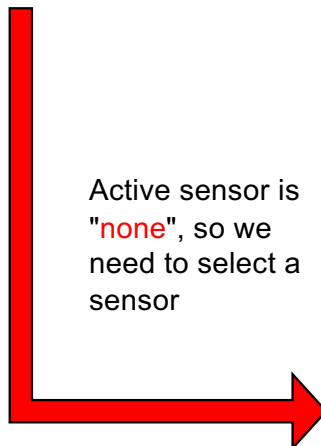
Remove a device from IIWA

# Select the active device

- ⦿ The list of added device is updated
- ⦿ Then, an active device/sensor pair must be selected for sensor configuration
- ⦿ Normally the newly added device is selected as active device
- ⦿ Select "Raw value from..." for the active sensor



Active sensor is "none", so we need to select a sensor



Select an active device and sensor

Active device: **SOIL-AREA-1** (639eec4368f319083725aca4). Select from list

63...

▼

Select

Active sensor: **none**. Select from list for Dashboard & humidity index value computation

Soi...

▼

Select

✓ Soil Humidity Sensor/Raw value from SEN0308

Battery voltage/volt, low battery when lower than 2.85V

Select an active device and sensor

Active device: **SOIL-AREA-1** (639eec4368f319083725aca4). Select from list

63...

▼

Select

Active sensor: **Soil Humidity Sensor/Raw value from SEN0308** (temperatureSensor\_0). Select from list for Dashboard & humidity index value computation

Soi...

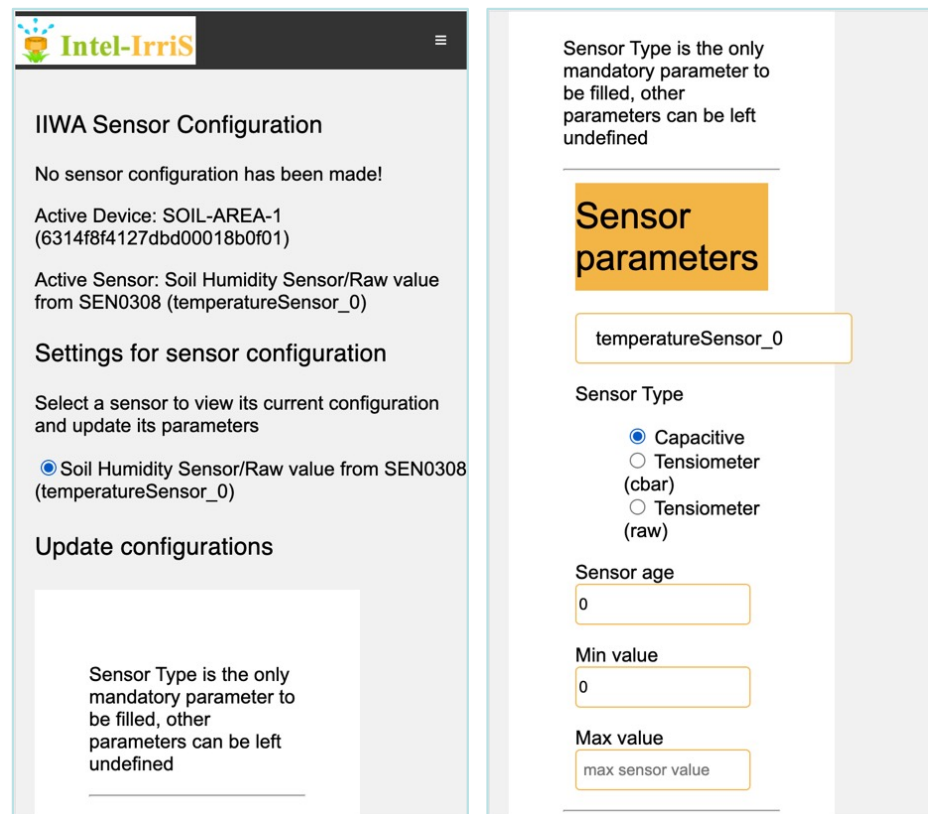
▼

Select

**DEVICE NAME & ID ARE ONLY INDICATIVE**

# Sensor configuration

- ④ To enable IIWA to calibrate the sensor, the minimum information is to provide the sensor type
- ④ Go to Sensor Configuration and select the Soil Humidity Sensor
- ④ Then, open "Sensor Parameter" tab and select "Capacitive"
- ④ Scroll to the bottom and click on "Update"



**IIWA Sensor Configuration**

No sensor configuration has been made!

Active Device: SOIL-AREA-1  
(6314f8f4127dbd00018b0f01)

Active Sensor: Soil Humidity Sensor/Raw value from SEN0308 (temperatureSensor\_0)

**Settings for sensor configuration**

Select a sensor to view its current configuration and update its parameters

☒ Soil Humidity Sensor/Raw value from SEN0308 (temperatureSensor\_0)

**Update configurations**

Sensor Type is the only mandatory parameter to be filled, other parameters can be left undefined

**Sensor parameters**

temperatureSensor\_0

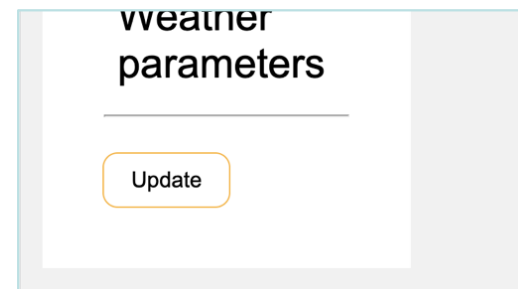
**Sensor Type**

☒ Capacitive  
☐ Tensiometer (cbar)  
☐ Tensiometer (raw)

**Sensor age**  
0

**Min value**  
0

**Max value**  
max sensor value



**weather parameters**

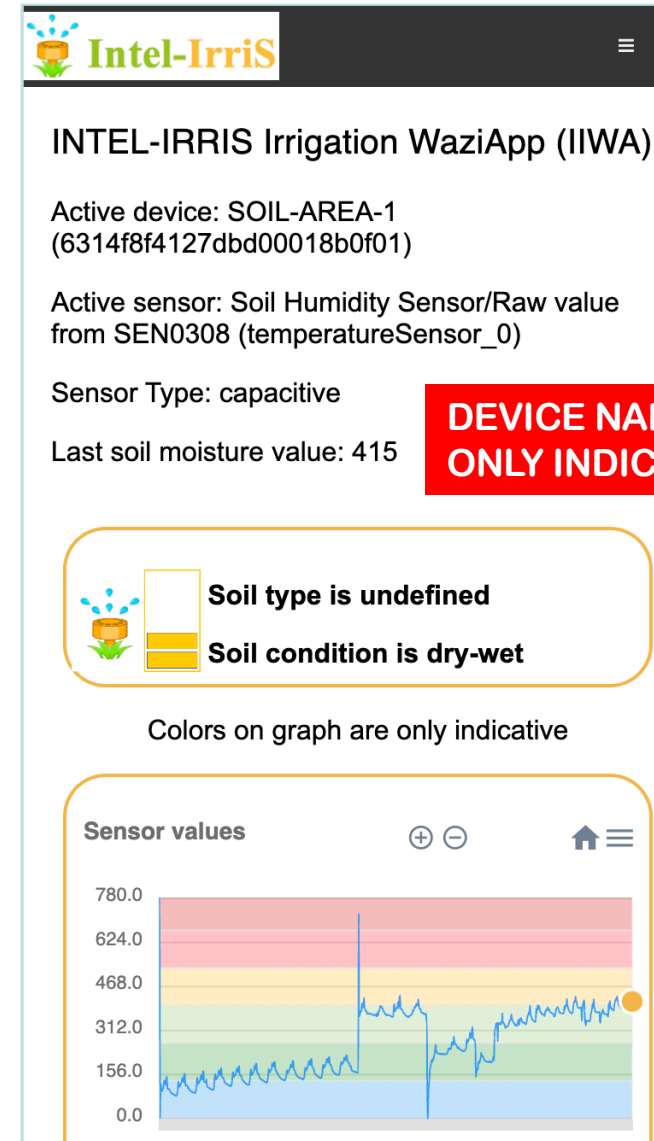
Update

**DEVICE NAME & ID ARE ONLY INDICATIVE**



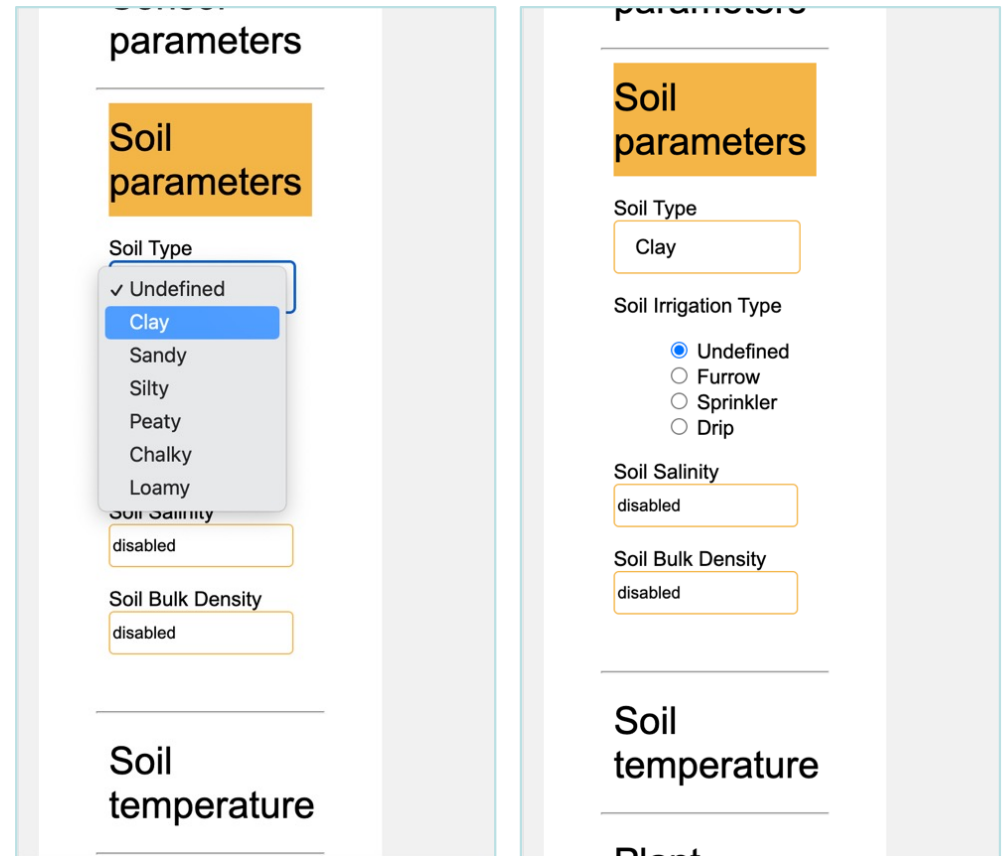
# IIWA dashboard

- Now that a device/sensor pair has been defined, IIWA dashboard can display information for the active sensor
- The soil type, and other parameters, are still undefined therefore IIWA takes the default value to determine irrigation conditions
- The "dry-wet" indication in this example not correct



# Advanced configuration

- ⦿ We will configure soil type to better reflect the reality
- ⦿ Go back to Sensor Configuration and select the Soil Humidity Sensor
- ⦿ Here, we go to "Soil Parameter" tab and select "Clay" as soil type
- ⦿ This is the soil type where the sensor is installed for this example
- ⦿ Don't forget to click on "Update"



parameters

Soil parameters

Soil Type

- ✓ Undefined
- Clay
- Sandy
- Silty
- Peaty
- Chalky
- Loamy

Soil Salinity

disabled

Soil Bulk Density

disabled

Soil temperature

parameters

Soil parameters

Soil Type

Clay

Soil Irrigation Type

- ☒ Undefined
- ☐ Furrow
- ☐ Sprinkler
- ☐ Drip

Soil Salinity

disabled

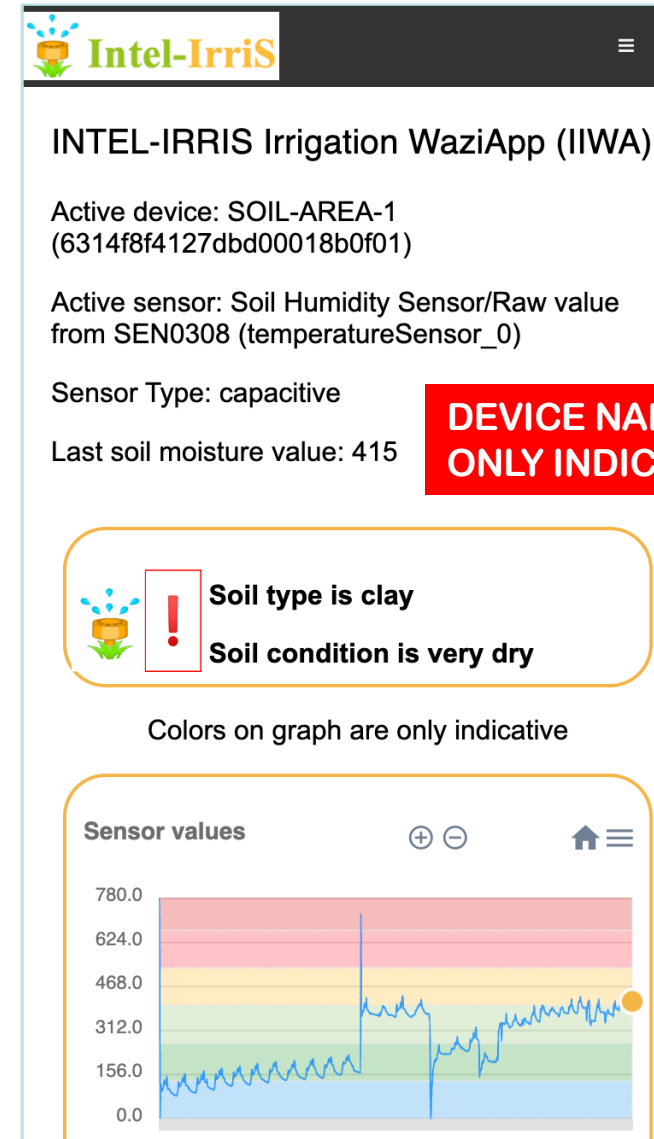
Soil Bulk Density

disabled

Soil temperature

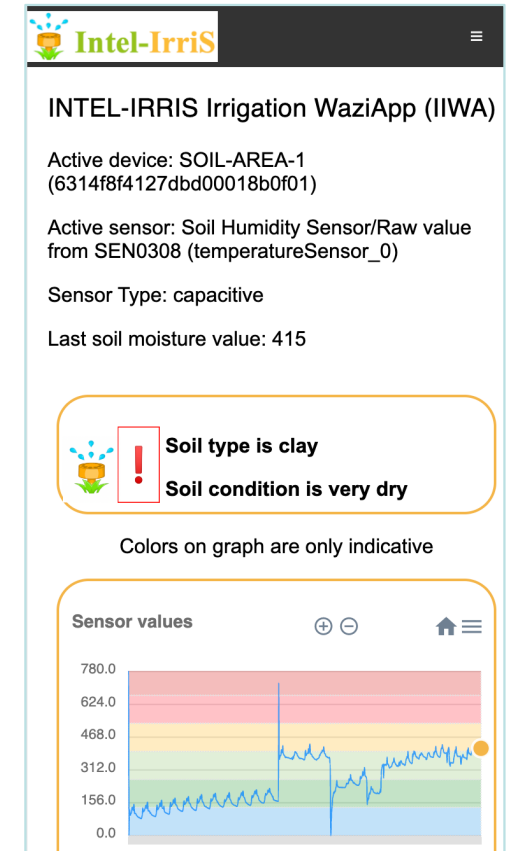
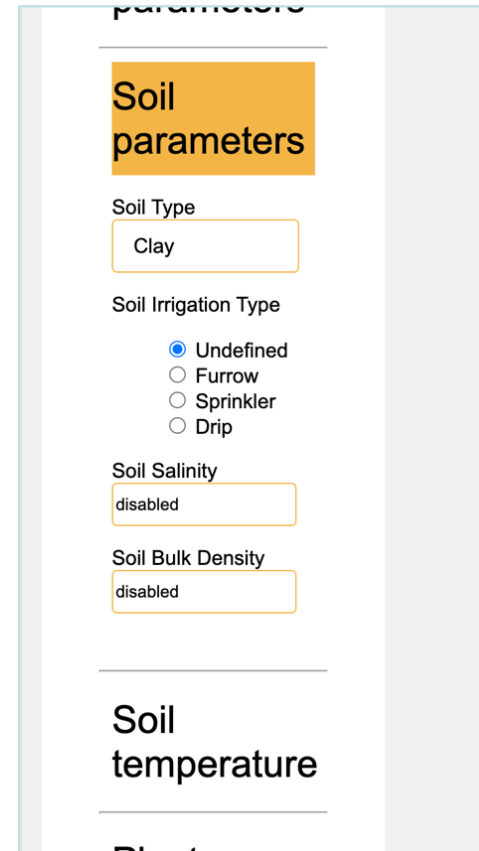
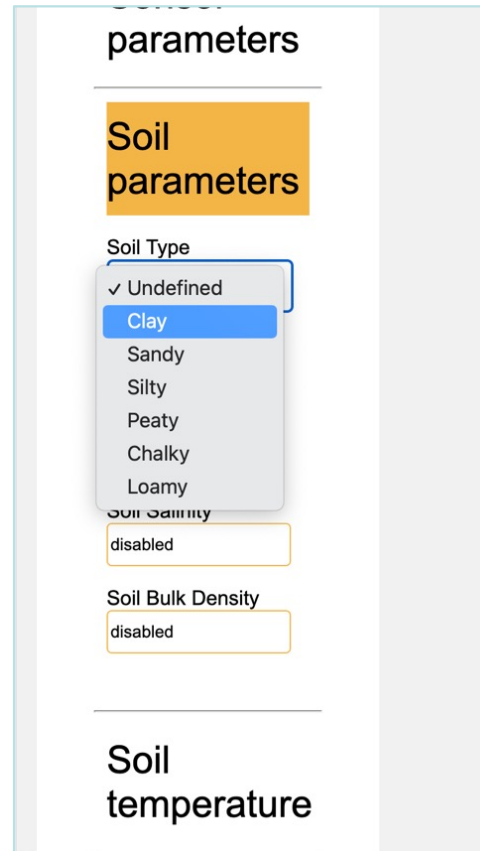
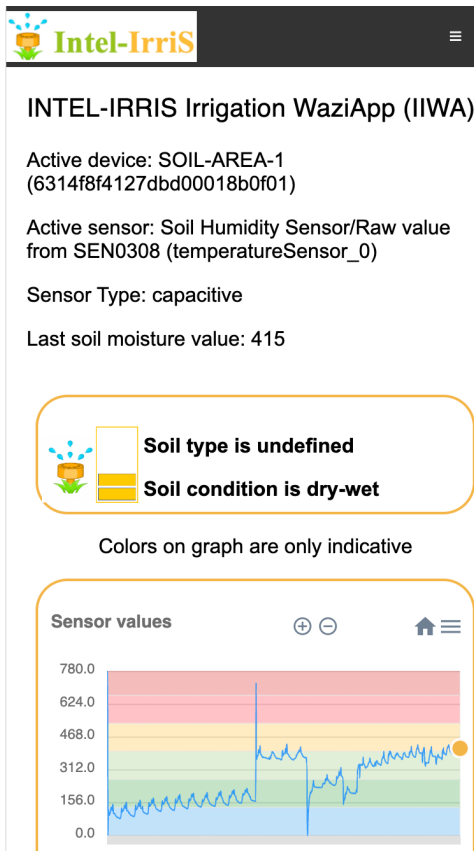
# Get back to the dashboard

- When getting back to the dashboard, the irrigation indication has been corrected by taking into account the soil type
- The soil condition is reported to be "very dry" which is the case in the deployment example used for this tutorial
- More parameters will be integrated in IIWA during the INTEL-IRRIS project



# Summary

**DEVICE NAME & ID ARE ONLY INDICATIVE**



# List of advanced parameters

### Sensor parameters

temperatureSensor\_0

Sensor Type

☒ Capacitive  
☐ Tensiometer (cbar)  
☐ Tensiometer (raw)

Sensor age

Min value

Max value

### Soil parameters

### Soil parameters

Soil Type

Soil Irrigation Type

☒ Undefined  
☐ Furrow  
☐ Sprinkler  
☐ Drip

Soil Salinity

Soil Bulk Density

### Soil temperature

### Soil temperature

Please select a source for soil temperature data

☐ user input  
☐ real sensor

Enter device id

Enter sensor id

### Plant parameters

### Plant parameters

Plant/Crop

Plant Sub-Type

Planting Date

### Weather parameters

### Weather parameters

Region



# Indication on the OLED screen

- IIWA monitors devices that are added to the IIWA application and **only** process sensor data from sensors that have been **configured** – i.e. at least the sensor type must be selected
- When the device/sensor has been properly configured then "IIWA" text is shown on the summary screen associated to the device
- If the irrigation indication computed by IIWA is older than the received time of the last value from the device then "IIWA" text will not show anymore, indicating that the irrigation indication may not be accurate
- This can happen if IIWA application is not running for some reasons. In this case, try to reboot the INTEL-IRRIS WaziGate **if you are sure that device/sensor configuration has been performed properly**



IIWA is active.  
Irrigation indication  
"très sec" (very dry)  
reflects the soil  
condition



IIWA is NOT active.  
Irrigation indication  
"sec-hum" (dry-wet)  
does not reflect  
correctly the soil  
condition as sensor  
type and soil type are  
not taken into account