1.1 Description

The FRESCO Tdrop Datalogger is a microcontroller-based device able to create a multi-sensor environment for a real-time acquisition by the use of a network of independent temperature, humidity and light sensors, see Fig. 1a.
The FRESCO Tdrop Datalogger supports up to 5 analog temperature sensors, up to 4 digital temperature/humidity sensors and 2 light sensors, see Fig 1b.
The FRESCO Tdrop Datalogger integrates a local Real-Time Clock (RTC) and can store the acquired data on a mini SD-Card. These capabilities make it appropriate for stand-alone applications.
The FRESCO Tdrop Datalogger has on-board a Wi-Fi module for the remote control and data access, through a web interface specifically designed, making it suitable for IoT applications.

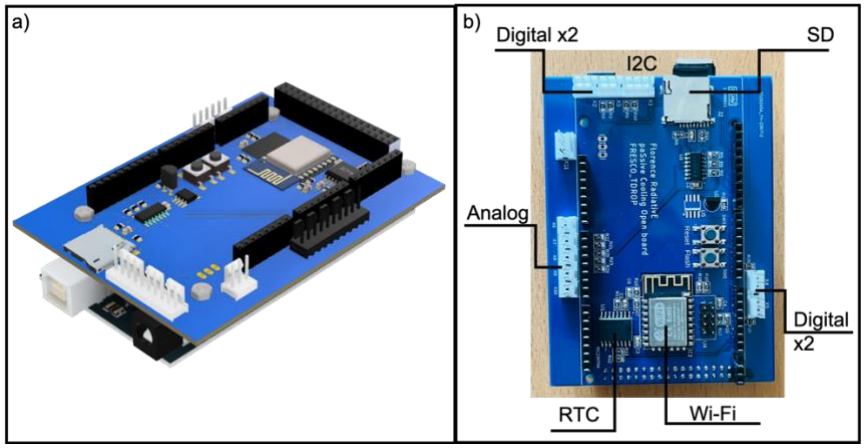


Figure 1 a) Arduino Mega and FRESCO Tdrop Datalogger, b) real picture (top view) of FRESCO and references to the input/ output pins and components.

In details, the Tdrop board allows using the following input channels:

- Analog inputs are used to connect up to 5 NTC thermal resistors.
- Digital inputs allow plugging digital thermometers such as the DS18B20 series or the DHT22 for temperature and relative humidity.
- Additional digital inputs allow connecting light sensors BH1750 and IR thermometers MLX9064 (used for Sky temperature and cloudy weather recognition).

2.1 Technical Specification

Electrical Specification		
Power Supply	5V	USB
	12V	PSupply jack

Communications & Storage	
Wi-Fi	802.11b/g/n
SD	32GB

Measure	*Type*	*Sensors*
Temperature	Analogic	5 x NTC
Temperature	Digital	4x DS18b20 series
Luminance	Digital I2C	BH1750
IR temperature	Digital I2C	MLX9064

2.2 Oled Display

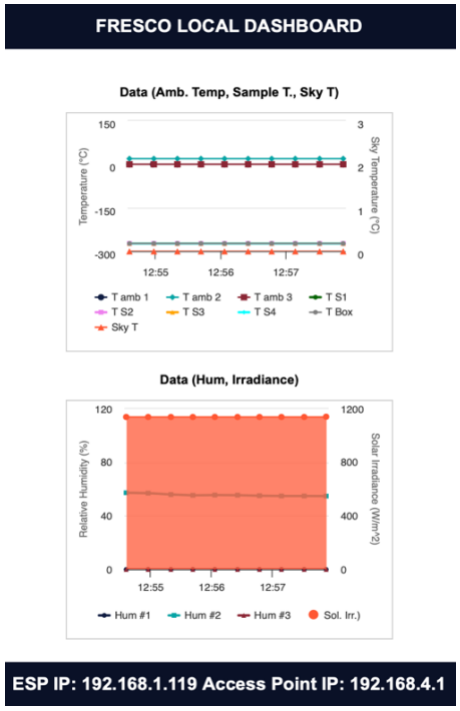
The FRESCO Tdrop Datalogger is equipped with an oled display of 0.9 inch. It serves to show the startup initialization of RTC, SD-card and Wi-Fi functionalities. The persistent icon strip shows the initialized and correct working operations/function using a proper icon, see Fig2.

Figure 2: Oled display showing the persistent icon strip and the collected measurements.

Furthermore, the oled display allows visualizing parameters such as temperature, relative humidity, the luminance, the IR temperature, the Date and Time on a continuous rolling mode.

3.1 Web interface

The data collected by FRESCO are shown on a web dashboard by means of Grafana. The Web page looks like the one reported in Fig3, it allows customization accordingly with the needs of the end-user. The dashboard exploits a personal server like "influxdb" linked to the local address e.g. *http//localhost.8086*, while "Grafana" will be installed to show the data at the link *http//localhst.3000*.



3.2 Local web interface

The Fresco TDrop Datalogger allows to get a double Wi-Fi capability s, 1) *local hotspot*, it generates a Wi-Fi for closest devices that can acceded to a local network (e.g. 192.168.4.1) and see the data as shown in Fig.4, or 2) it can be used to *connect on Wi-Fi*. In both cases it generates the shown interface using the proper Filesystem .

Figure 4: Local dashboard generated using ESP8266. The charts are solely reported to show the possible web app aspect.

4.1 Enclosure and final look

The in-house enclosure design (Fig.5) . it has been made to maximize the air flow exchange and the possibility to work outdoor. At the same time, it has been designed to minimize the final device size. The enclosure allows a on board re-chargeable battery. The final size in terms of height can be decided accordingly with the end-user requirements such as the total shields, the number and kind of sensors, and components included inside it.

Figure 3: The Grafana dashboard displaying the collected data.

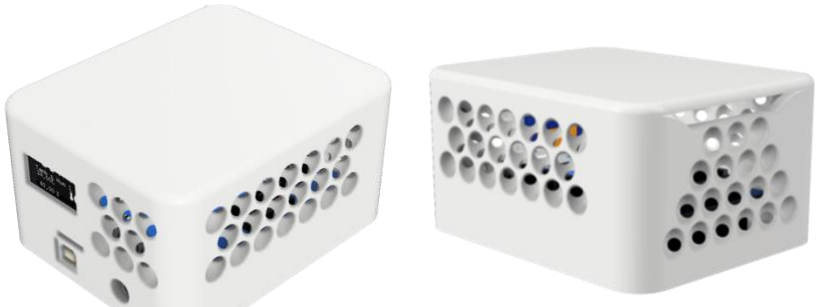


Figure 5: the FR… …closure, two different views.