IoT Project:

Real Data Collection and Visualization system

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Used Tools Authentication and Download

Gmail

E-Mail: romurzprogiot@gmail.com

Password: Qwerty123q

Data.Sparkfun

Title: RomUrzProj

OutputUrl: http://data.sparkfun.com/output/mKlaXb61pjfOwybLwm69

InputUrl: http://data.sparkfun.com/input/mKlaXb61pjfOwybLwm69

PanageUrl: http://data.sparkfun.com/streams/mKlaXb61pjfOwybLwm69

PublicKey:mKlaXb61pjfOwybLwm69

PrivateKey: kzqrgEaWM0SA5eEj5y0o

DeleteKey: VvxLnWBaNzcXJGenJjWq

Thingspeak - FreeBoard

E-Mail: romeo.matteo94@gmail.com

Password: qwerty123

PubNub

Authentication: with Google

Command for component installation in node-red: `npm install node-red-contrib-pubnub`

Twitter

E-Mail: romurzprogiot@gmail.com

Password: qwerty123

Development

Overview

The working flow of the project has been divided into three main phases:

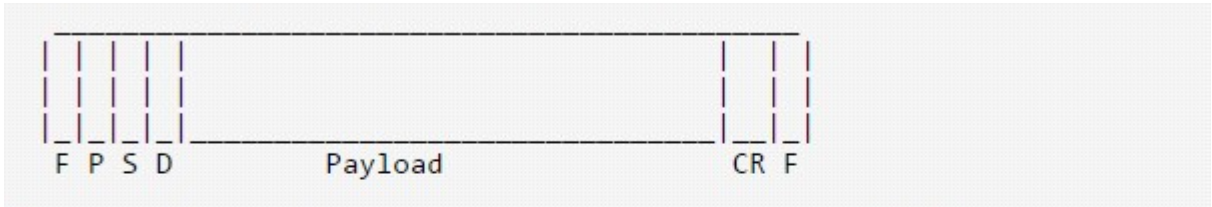
- Sensing
- Storage
- Data Analysis and notification

Sensing

The Software loaded on the TelosB is in charge to exploit the hardware sensors in order to sense temperature, humidity with the Sensirion Sht11 and luminosity with the Hamamatsu S1087 from the environment.
The sensed data needs to be converted, and the conversion is delegated to a Node-Red flow forwarding via serial port the raw data.

Storage and Visualization

The “Retrieve and Forward Sensed Data” Flow receives via the serial port the raw sensed data in the payload of an Uart packet (structure of the packet in the image below).




```
F       = Framing byte, denoting start of packet: HdlcTranslateC
P       = Protocol byte: SerialP
S       = Sequence number byte: SerialP
D       = Packet format dispatch byte: SerialDispatcherC
Payload = Data payload (stored in SerialDispatcherC): SerialDispatcherC
CR      = Two-byte CRC over S to end of Payload: SerialP
F       = Framing byte denoting end of packet: HdlcTranslateC
```

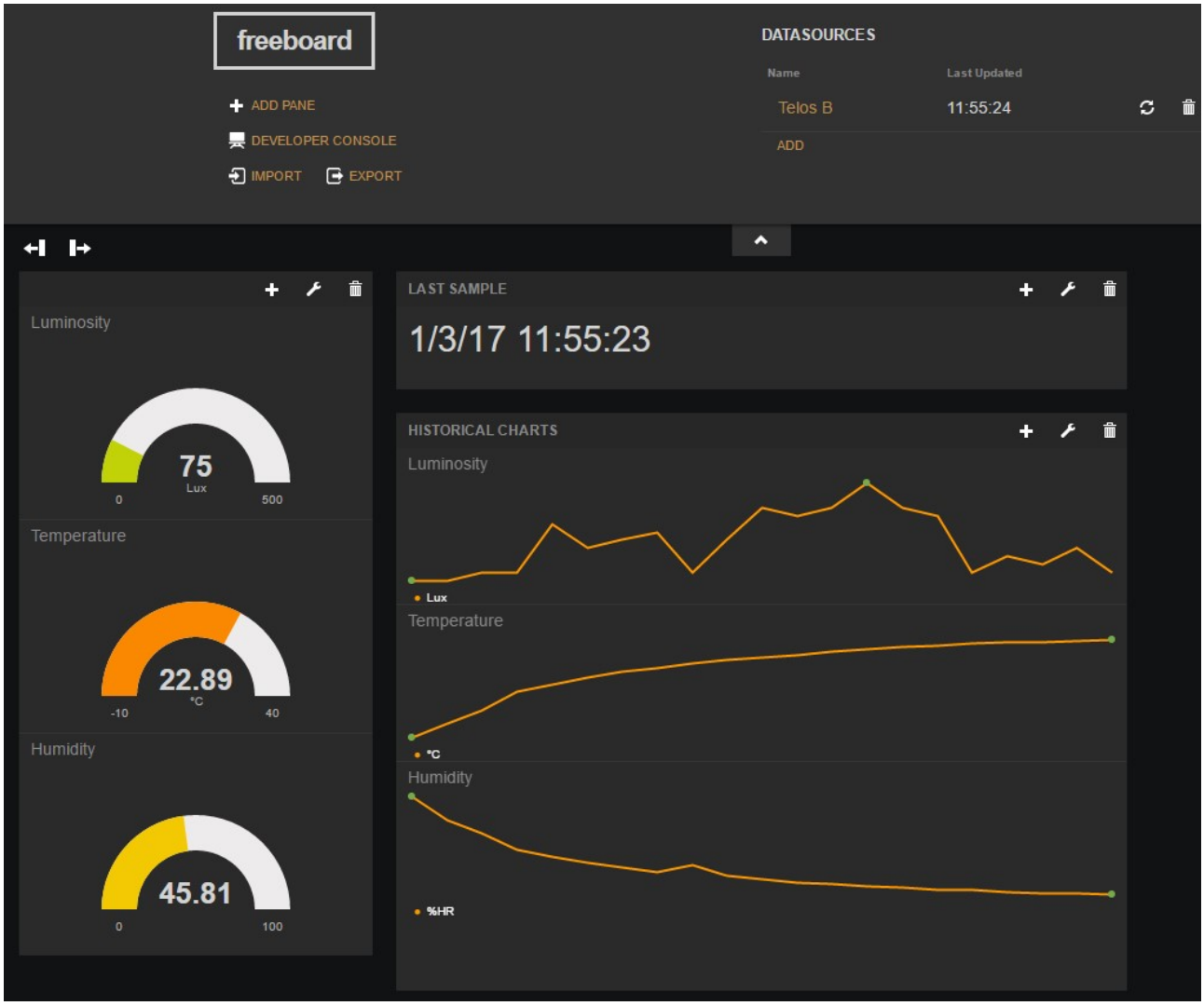
Once the raw data are converted into the desired units of measure

- Lux for the luminosity
- Relative Humidity for the humidity
- Celsius degrees for the temperature

They needs to be stored and visualized.

The choice of the needed services providers has fallen to:

- ThingSpeak: which allows to store the data and graphically visualize them;
- Data.Sparkfun: simply a cloud storage for the data without visualization;
- PubNub: it is a publish subscribe system which allows the subscribers to receive the published data on the channel they are interested in;
- FreeBoard: using this service it has been possible to subscribe to the PubNub channel to keep under control the graphical visualization of the sensed data in real-time.



The data has been sensed for three days.

Data Analysis and Notification

The “Data Analysis and Notification” Flow, with the usage of the ThingSpeak’s API, receives in input the JSON files containing all the stored data.
From the file, the flow extracts from the data the minimum, maximum and the average of the values for every measure and for each day.
Once the results are computed, they are sent via E-Mail and posted on Twitter.