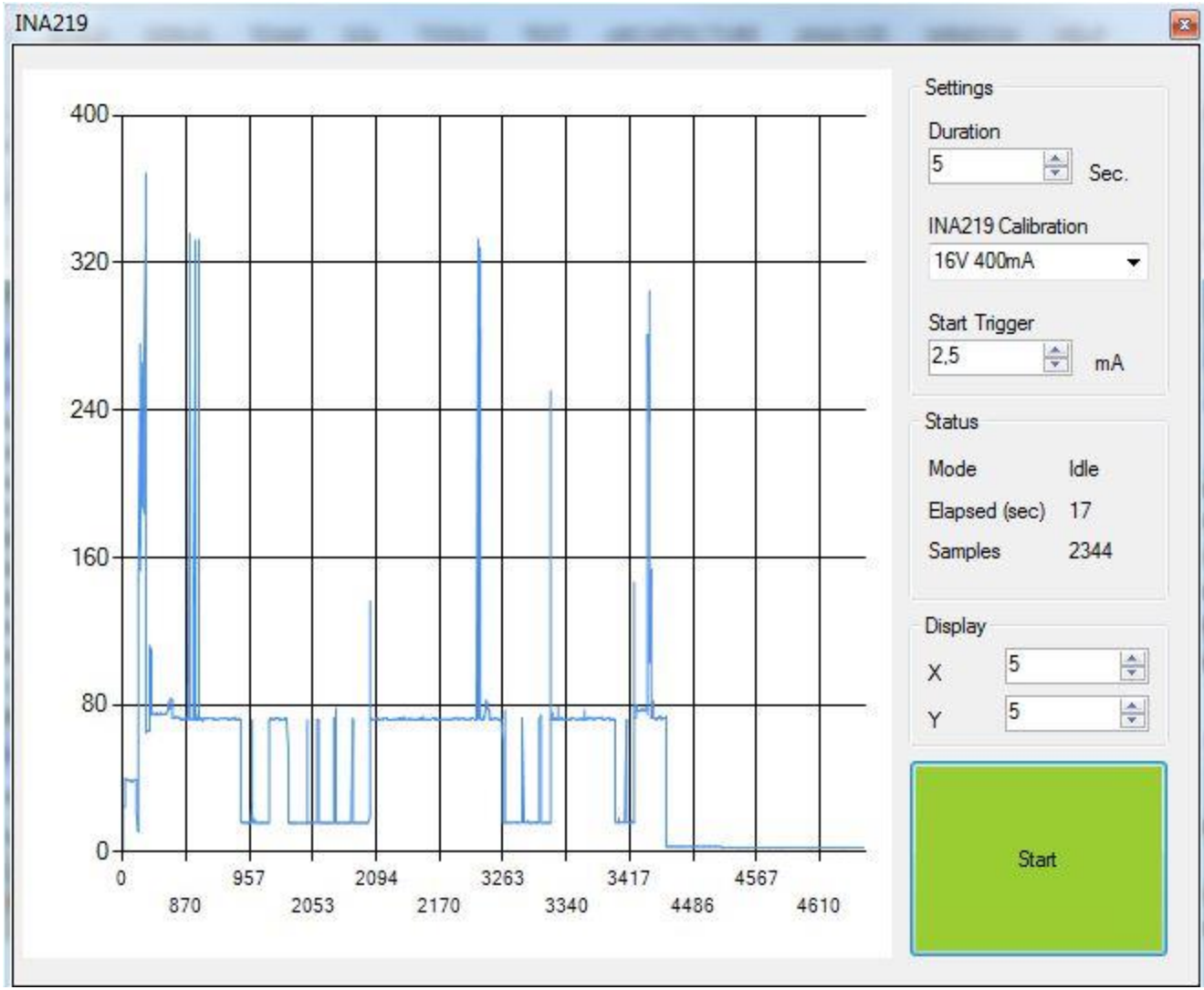
IoT @ FMI
Lecture 5

22.03.2017

Power Consumption

- ESP8266 (2.9-4.2v)
  - Active: 30-300 ma
  - Sleep: 0.1 – 10 ma
- Arduino (Atmega328p)
  - Active: 4-20 ma
  - Sleep: 0.001 – 0.01 ma
- Raspberry PI
  - Active: 80-240 ma
- BLE/Zigbee modules
  - 0.02ma (BLE), 0.05ma (Zigbee)

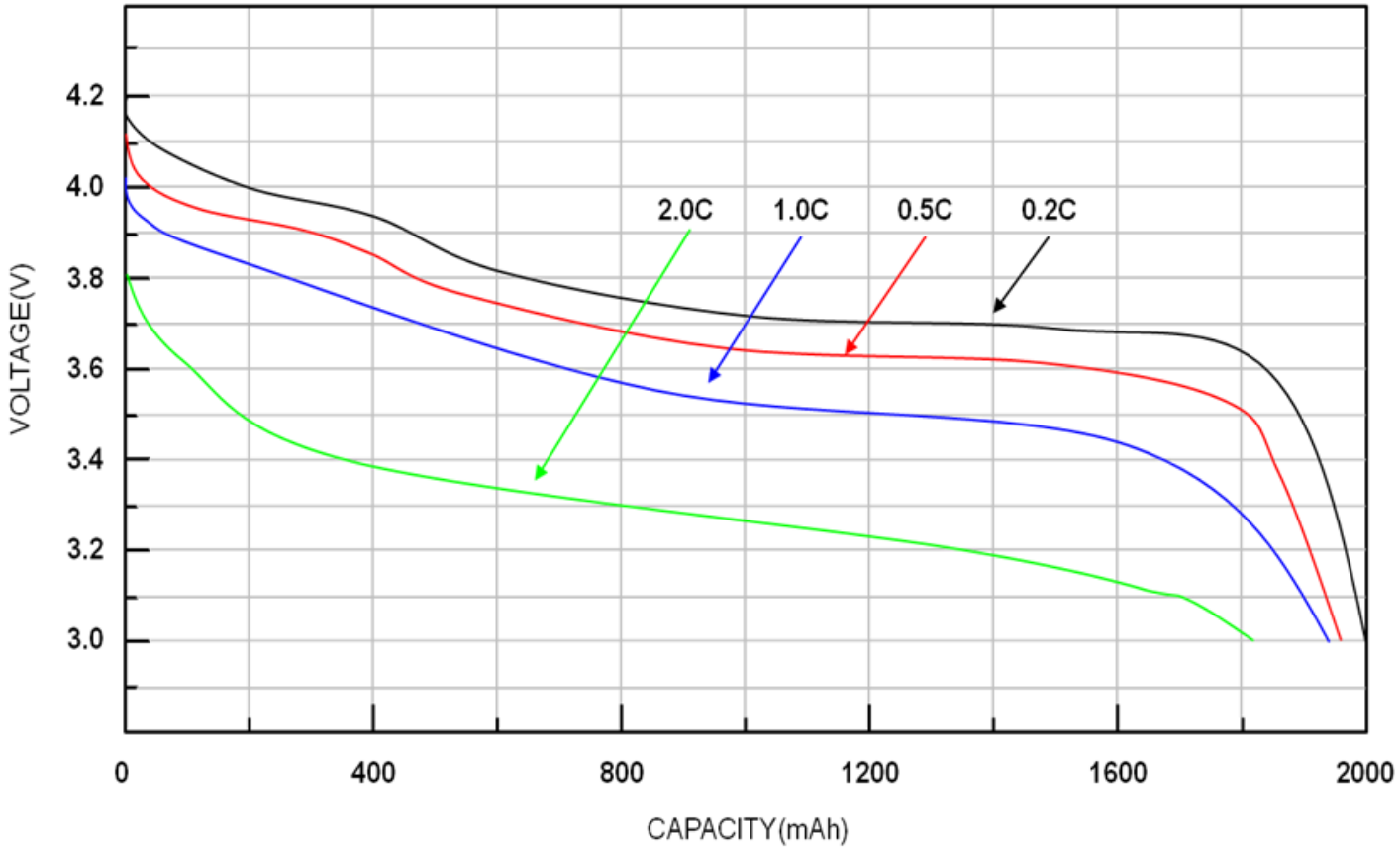


Types of Batteries

Type	Voltage (V)	Capacity (mAh)	Resistance	Self Discharge
Coin Cell 2032	3.00	200	High	Low
AAA/AA/C/D (Alkaline)	1.2 – 1.5	1000/2000/5000/10000	Medium	Low
AAA/AA/C/D (NiMh)	0.2 – 1.3	same	Medium	Med/Low
AAA/AA/C/D (Ni-Zn)	1.3 – 1.6	Same	>	?
LiPo (Generic)	3.3 – 4.2 (3.7)	10 – 5000	Low	Low
LiPo - 16850	Same	1000 – 5000		
LiPo – 14500	Same	500 – 1000	Low	Low

Battery Discharge Curve

- Internal Resistance increases with decreased capacity
- 1 om @ 300 ma = 0.3v voltage Drop



ESP8266 – DeepSleep

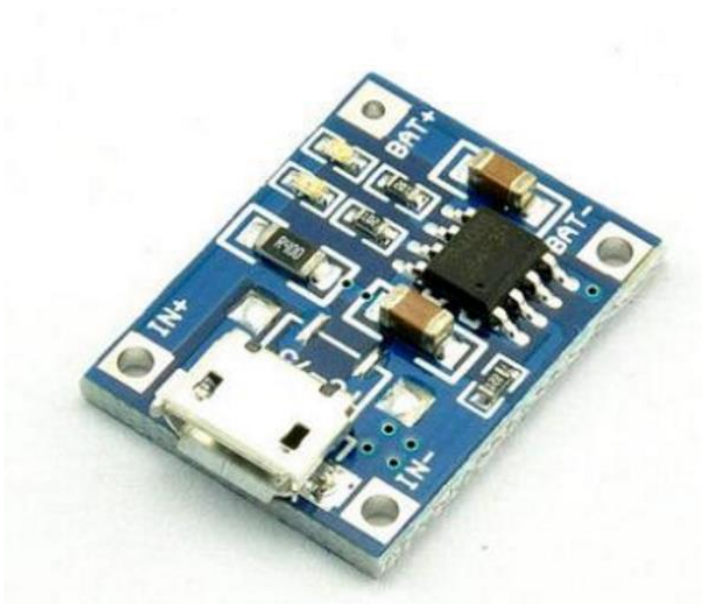
- Sleep current in DeepSleep is 0.08 ma
- Connect D0 and RST with a jumper wire
- Call ESP.deepSleep(time); delay(1000);
- ESP will go to deep sleep and reset after “time”
- Time is in us (1,000,000 us = 1,000 ms = 1 sec)
- RTC Memory can be used to store data between iterations
- After wake up it takes ~300 ms to boot and ~3-10 sec to connect to WiFi
- All GPIOs are set to INPUT during sleep
- http://www.espressif.com/sites/default/files/9b-esp8266-low_power_solutions_en_0.pdf

ESP8266 – LIGHT and MODEM sleep

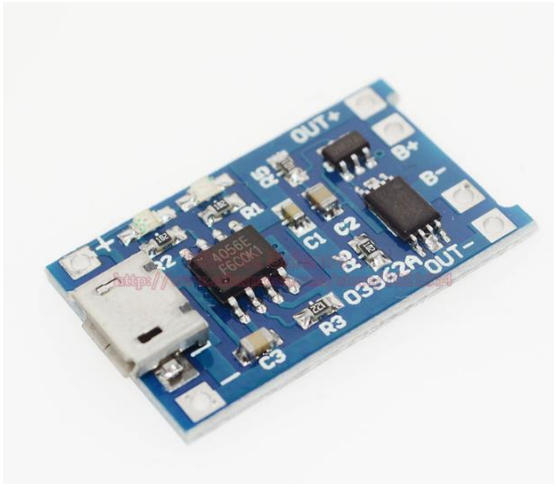
- Modem Sleep: ~15 ma. Just use delay(xxx)
- Light Sleep: ~0.5 ma
  - Details: https://github.com/esp8266/Arduino/issues/1381#issuecomment-279117473

LiPo Chargers

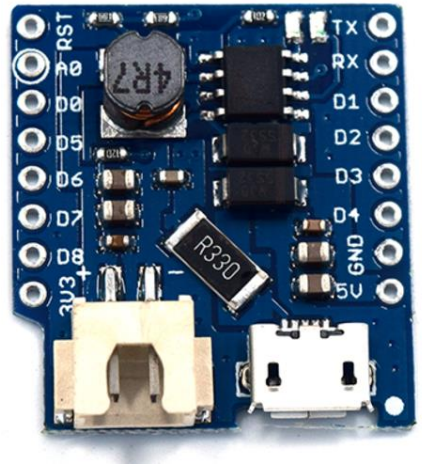
- Only Charge



- + battery protection



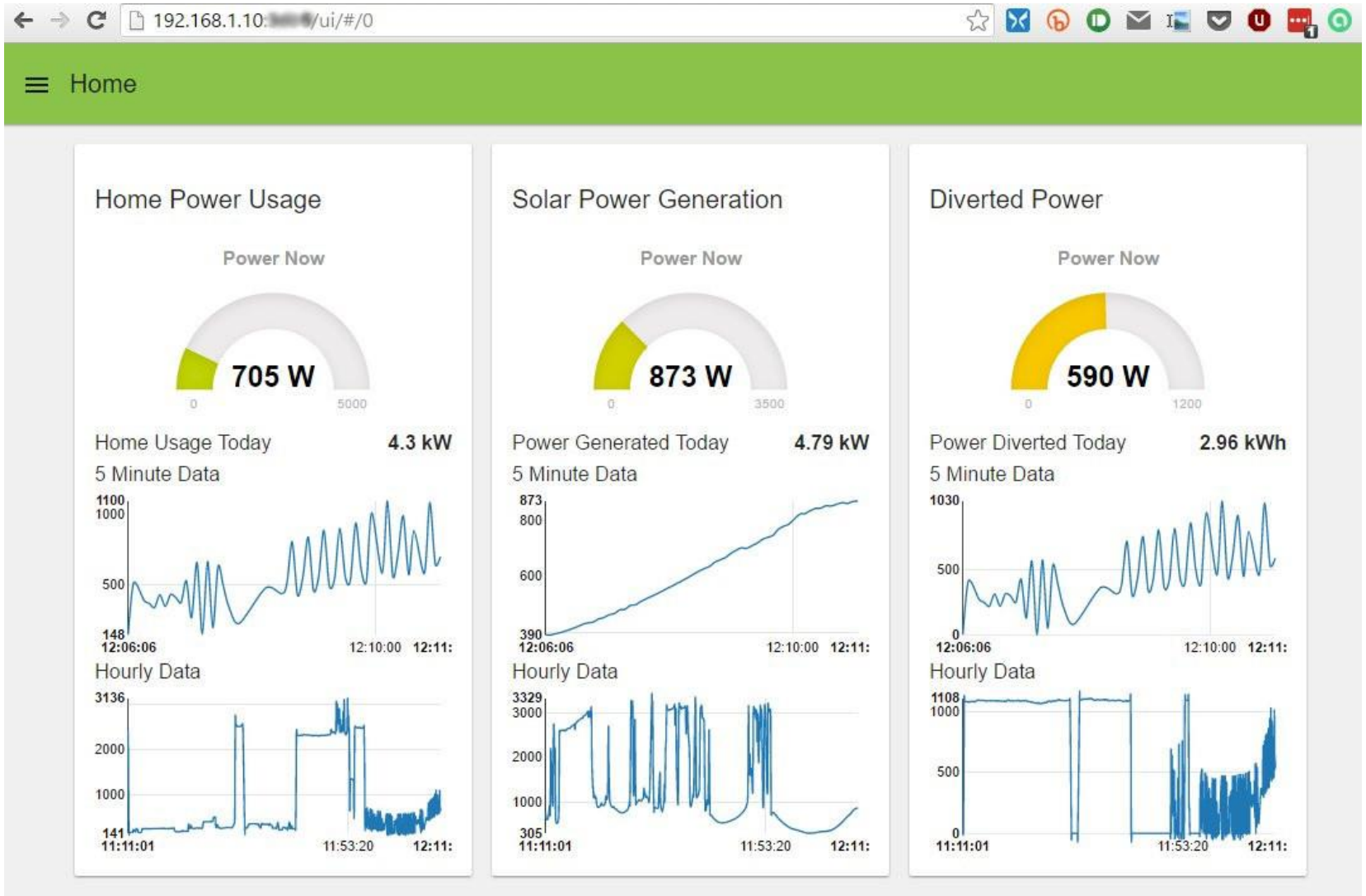
- Wemos Battery Shield
  - + battery protection
  - + 5v Boost

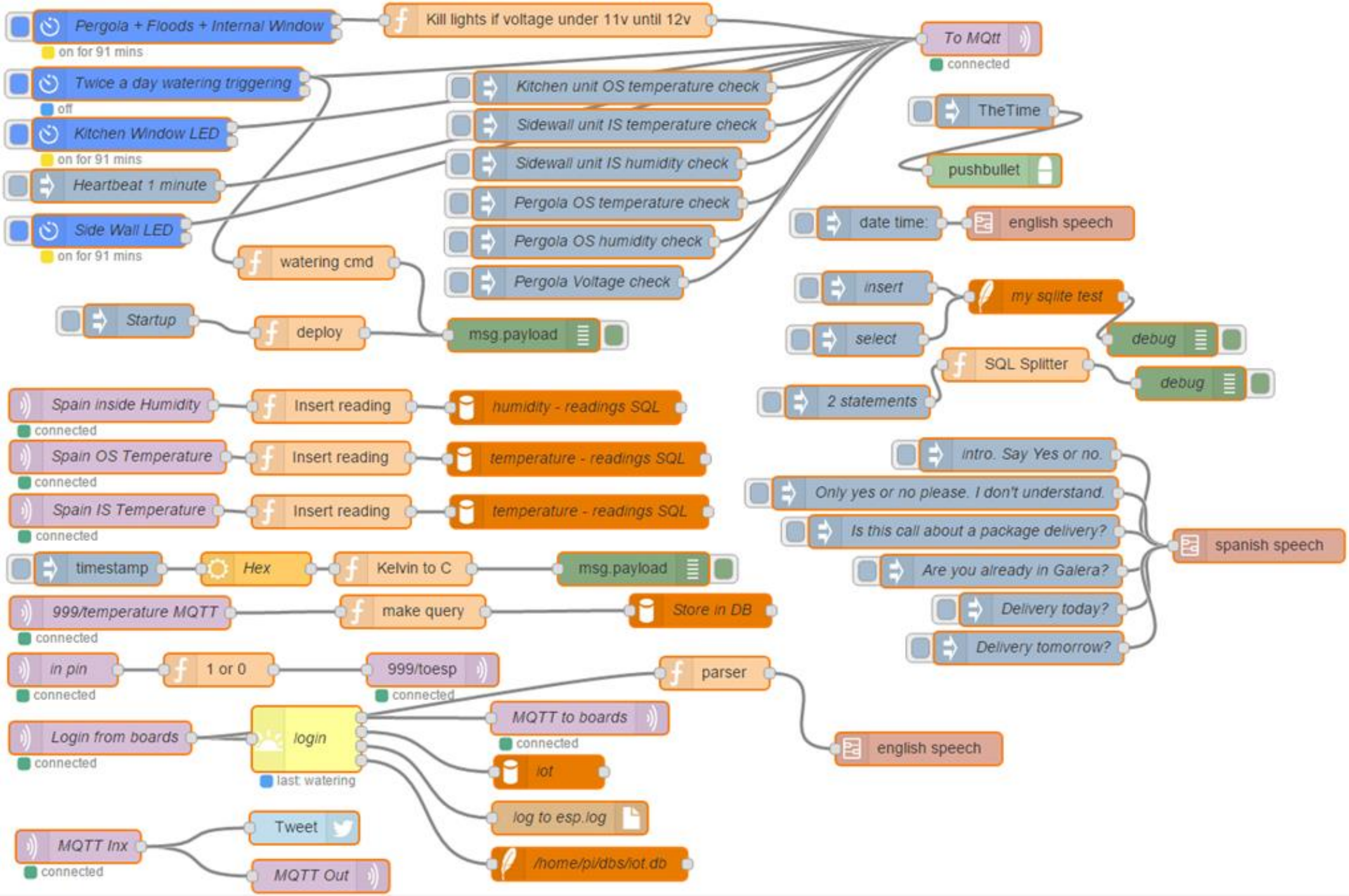


Popular Software

NodeRED

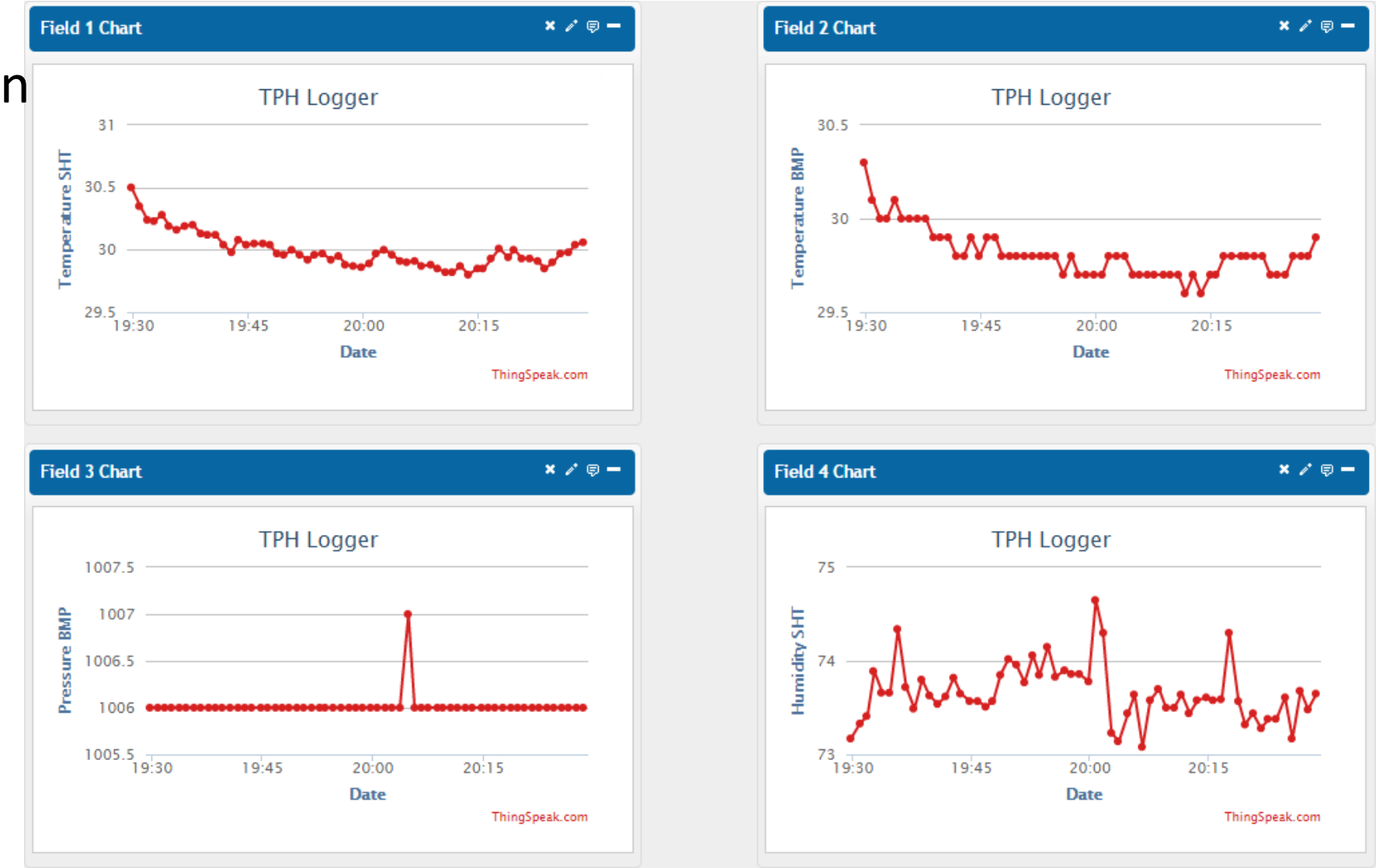
- Design flows
- Java Script
- Dashboards



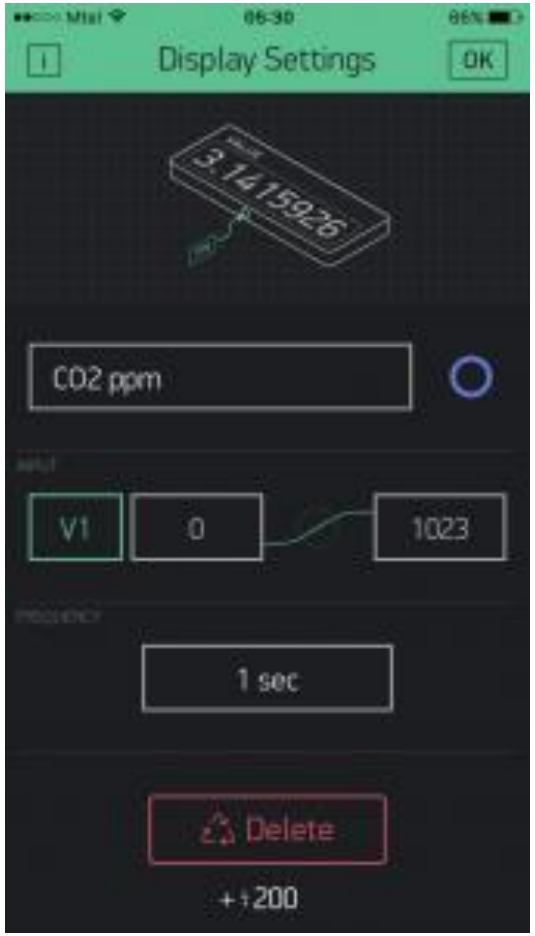

Pergola + Floods + Internal Window
on for 91 mins
Kill lights if voltage under 11v until 12v
To MQtt
connected
Twice a day watering triggering
off
Kitchen unit OS temperature check
TheTime
Kitchen Window LED
on for 91 mins
Sidewall unit IS temperature check
pushbullet
Heartbeat 1 minute
Sidewall unit IS humidity check
Side Wall LED
on for 91 mins
Pergola OS temperature check
date time:
english speech
Pergola OS humidity check
watering cmd
Pergola Voltage check
insert
my sqlite test
Startup
deploy
msg.payload
select
debug
SQL Splitter
debug
2 statements
Spain inside Humidity
connected
Insert reading
humidity - readings SQL
intro. Say Yes or no.
Spain OS Temperature
connected
Insert reading
temperature - readings SQL
Only yes or no please. I don't understand.
Spain IS Temperature
connected
Insert reading
temperature - readings SQL
Is this call about a package delivery?
spanish speech
timestamp
Hex
Kelvin to C
msg.payload
Are you already in Galera?
999/temperature MQTT
connected
make query
Store in DB
Delivery today?
Delivery tomorrow?
in pin
connected
1 or 0
999/toesp
connected
parser
Login from boards
connected
login
last: watering
MQTT to boards
connected
iot
english speech
log to esp.log
/home/pi/dbs/iot.db
MQTT Inx
connected
Tweet
MQTT Out

Thingspeak

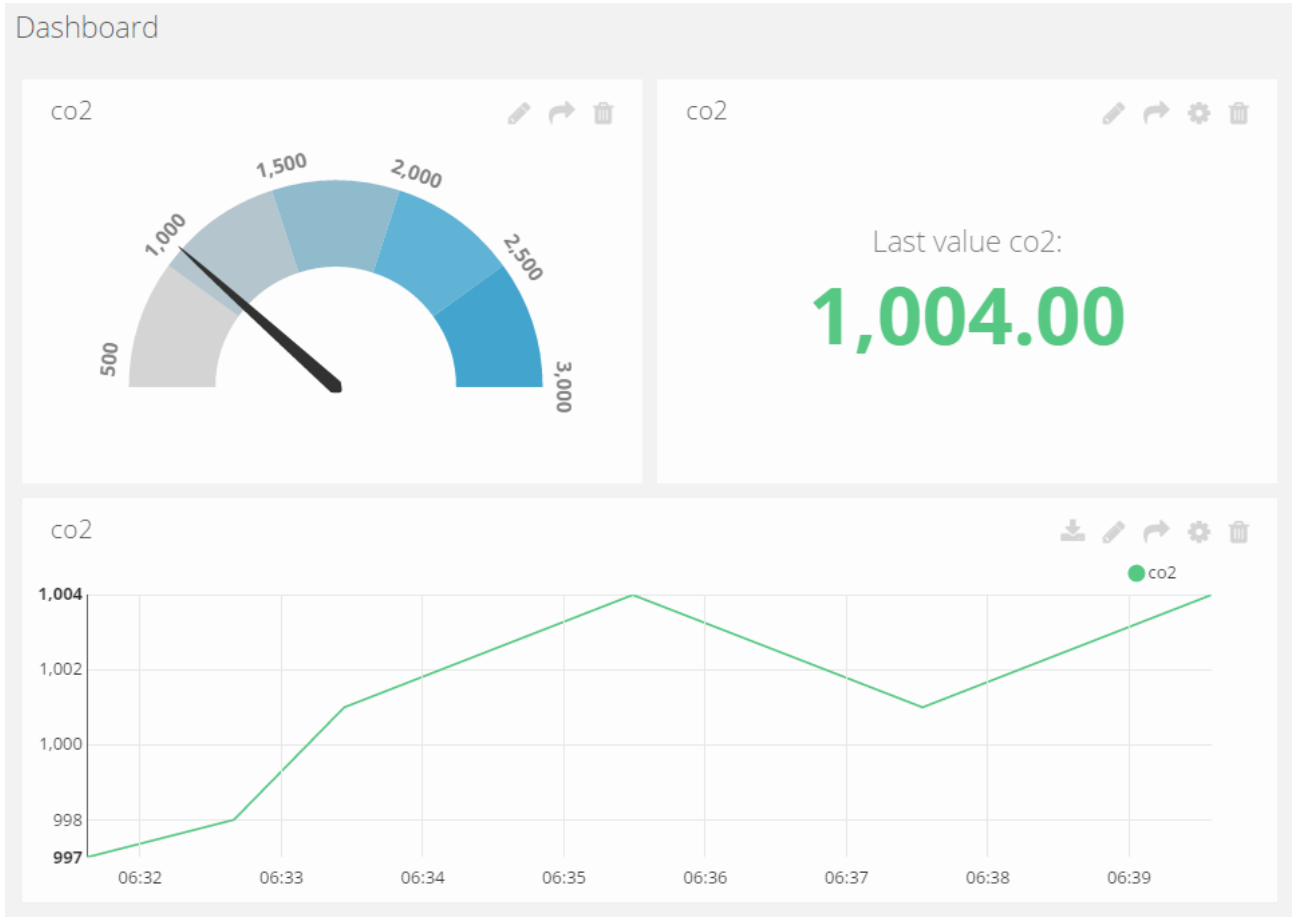
- Easy integration
- Lots of display options



Blynk – Arduino to Mobile



Ubidots – IoT Dashboards



Dust Monitors

vlast3k Public *Created: January 20th 2017* Views: 783

BeeBotte

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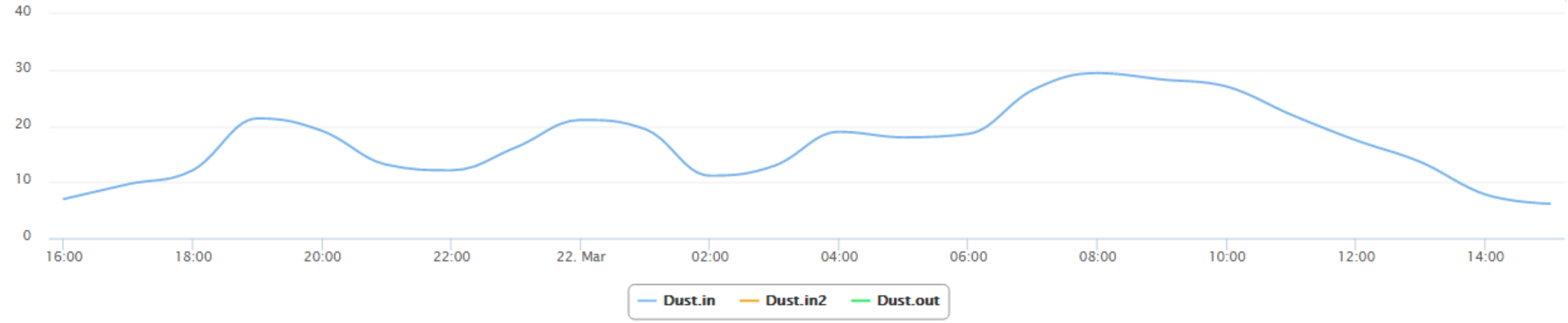
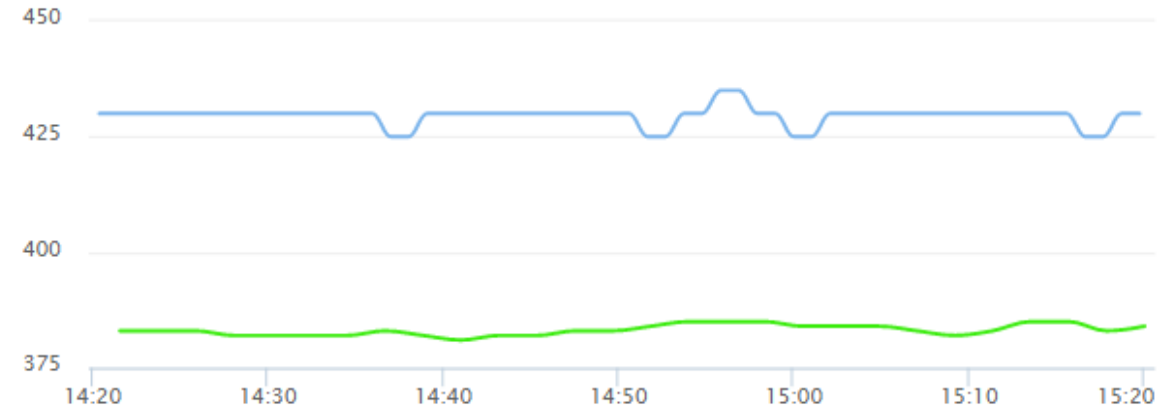
My multiline chart

Period: Last 24 Hours



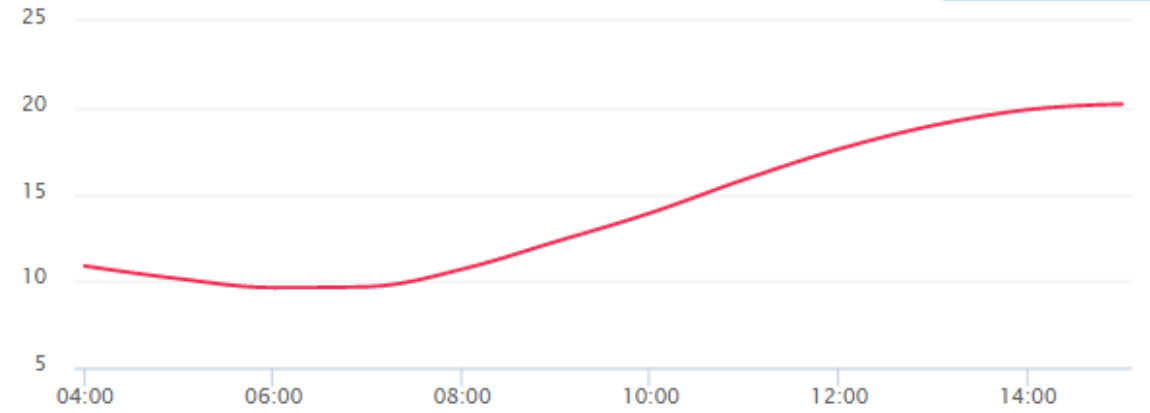
CO2

Period: Last Hour



My multiline chart

Period: Last 12 Hours



Popular Hardware

Sonoff

- https://www.itead.cc/search/result/?cat=&q=sonoff

SHARP GP2Y1010AU0F-Dust Sensor

1. Low consumption current (Icc: MAX. 20 mA)
2. Working Temperature: -10~65℃
3. The presence of dust can be detected by the photometry of only one pulse
4. Enable to distinguish smoke from house dust
5. Lead-free and RoHS directive compliant

DHT11 Humidity & Temperature Sensor

1. Humidity measuring range: 20% ~ 9 0% RH
2. Temperature measuring range: 0 ~ +100℃
3. High reliability
4. Optimized long-term stability
5. Ultra-low consumption

GM55 Serie Photoconductive resistance-GM5528

1. Epoxy encapsulated
2. Quick response
3. Small size
4. High sensitivity
5. Reliable performance
6. Good characteristic of spectrum

Electret Condenser Microphone

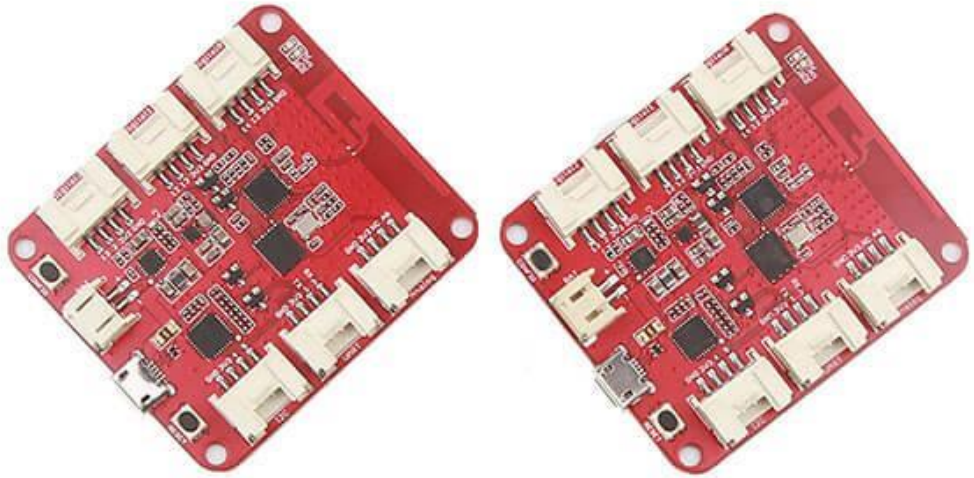
1. Wide frequency band
2. Great sound quality
3. Low noise
4. Low power consumption
5. High sensitivity

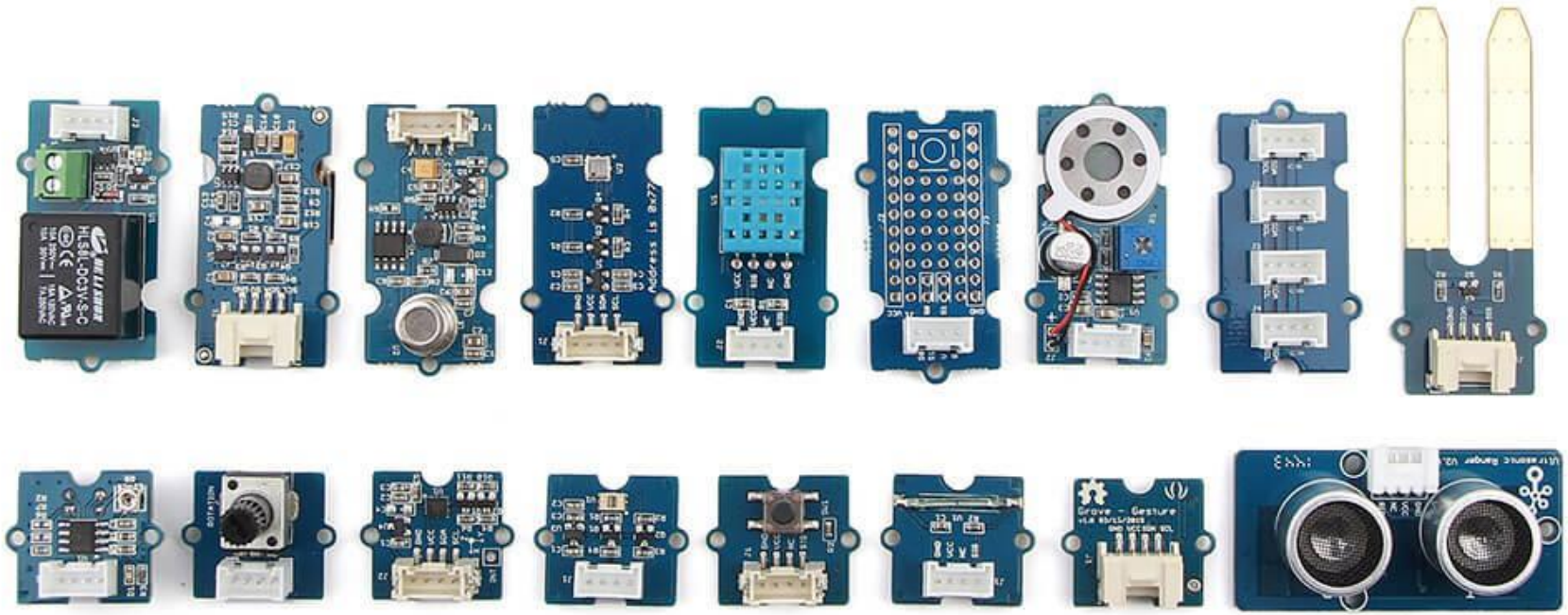
Broadlink


Touch the future
TC2 Fire-new updating
Smartphone/Panel Control & One-button Configuration
TC2 makes light controlling easier and more user-friendly.


Contros
Wi-Fi Smart Plug/Timer
Smarter, but smaller!
Contros is a Wi-Fi timer that enables you to set timer and turn on/off your home appliances by iOS/Android phone anytime from anywhere
Lamp
ON

Grove / Wio Link





Xiaomi