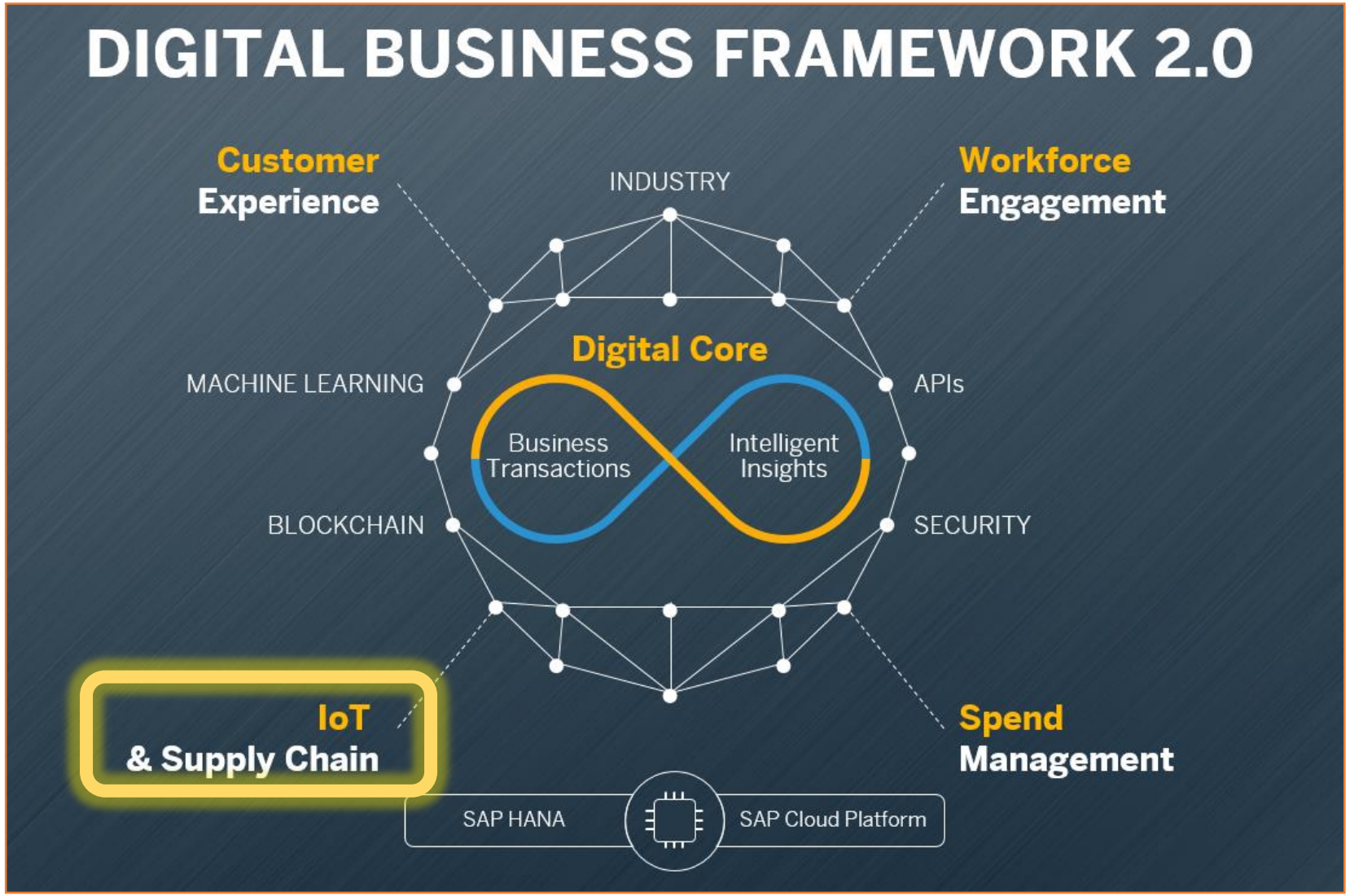
Internet of Things

Vladimir Savchenko
GeekyCamp v5.0, Sept.2018

Why IoT? - SAP Strategy



Over 20 billion connected devices

Consumer market: ~$546B

1.4B smartphones (flat*)

157M tablets (7% decline)

21M smartwatches (flat*)

Industrial market: ~$868B

Factories (Industry 4.0)

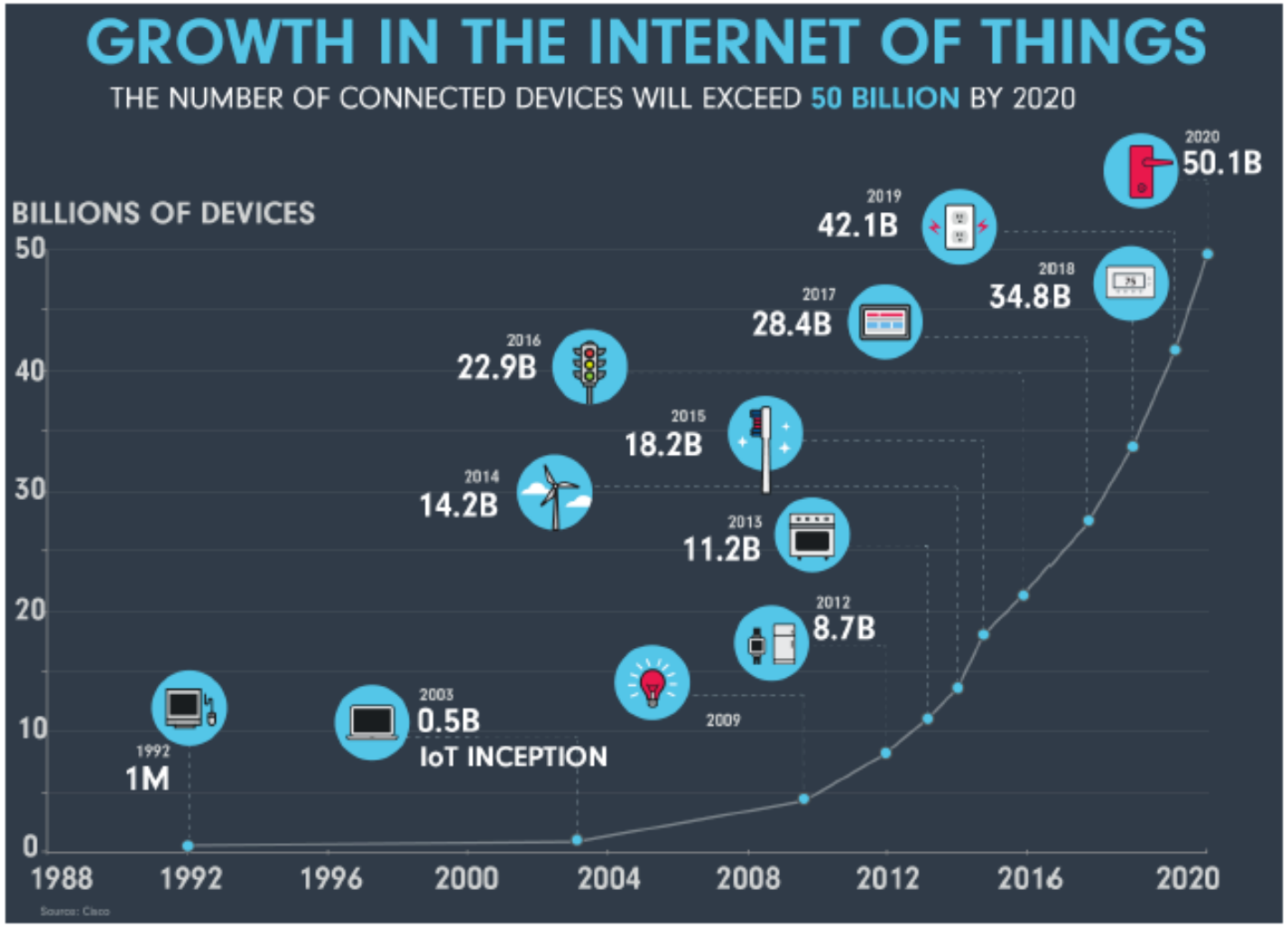
Logistics

Meters

Trains

Cities

….



Why all this IoT hype?

Hardware is now …

Cheaper

Smaller

More connected

Less power hungry

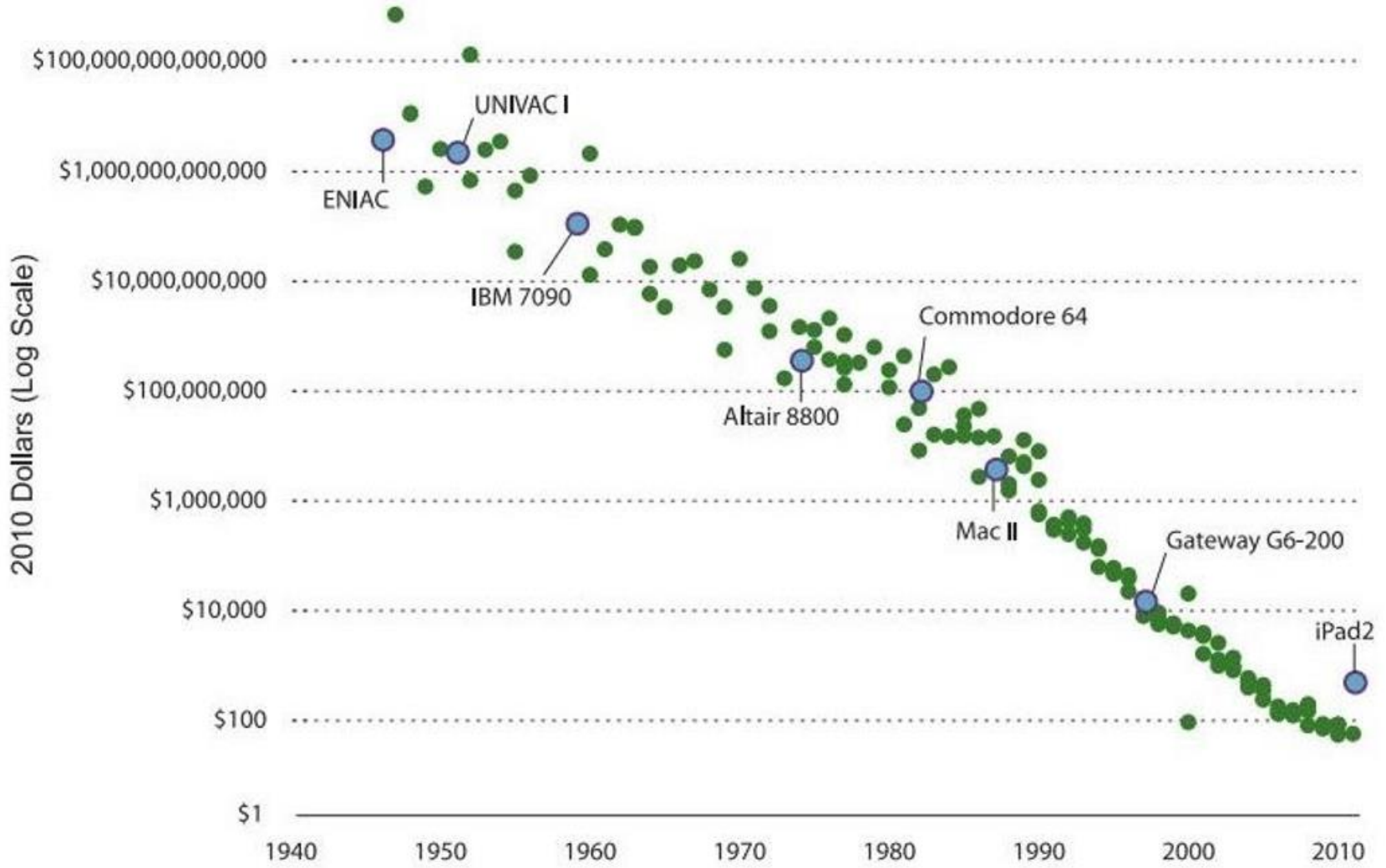
Easier to develop

Ecosystem

More knowledge

More opportunities

More investment



Industrial vs Consumer IoT

Industrial IoT

***Drivers**:* cost and risk reduction, business agility, informed decision making

***Challenges**:* security, compliance, compatibility, reliability, connectivity, support …

Consumer IoT

Drivers: coolness, convenience, health, some cost reduction

Challenges: UX, hype vs value, time to market, some privacy and security

Industrial IoT examples

Predictive maintenance & Remote management

Solar & wind power, pipelines, bridges, facilities, vehicles, crops …

Smart utilities (meters)

Remote and continuous metering of water, electricity, gas …

Industrial IoT examples contd.

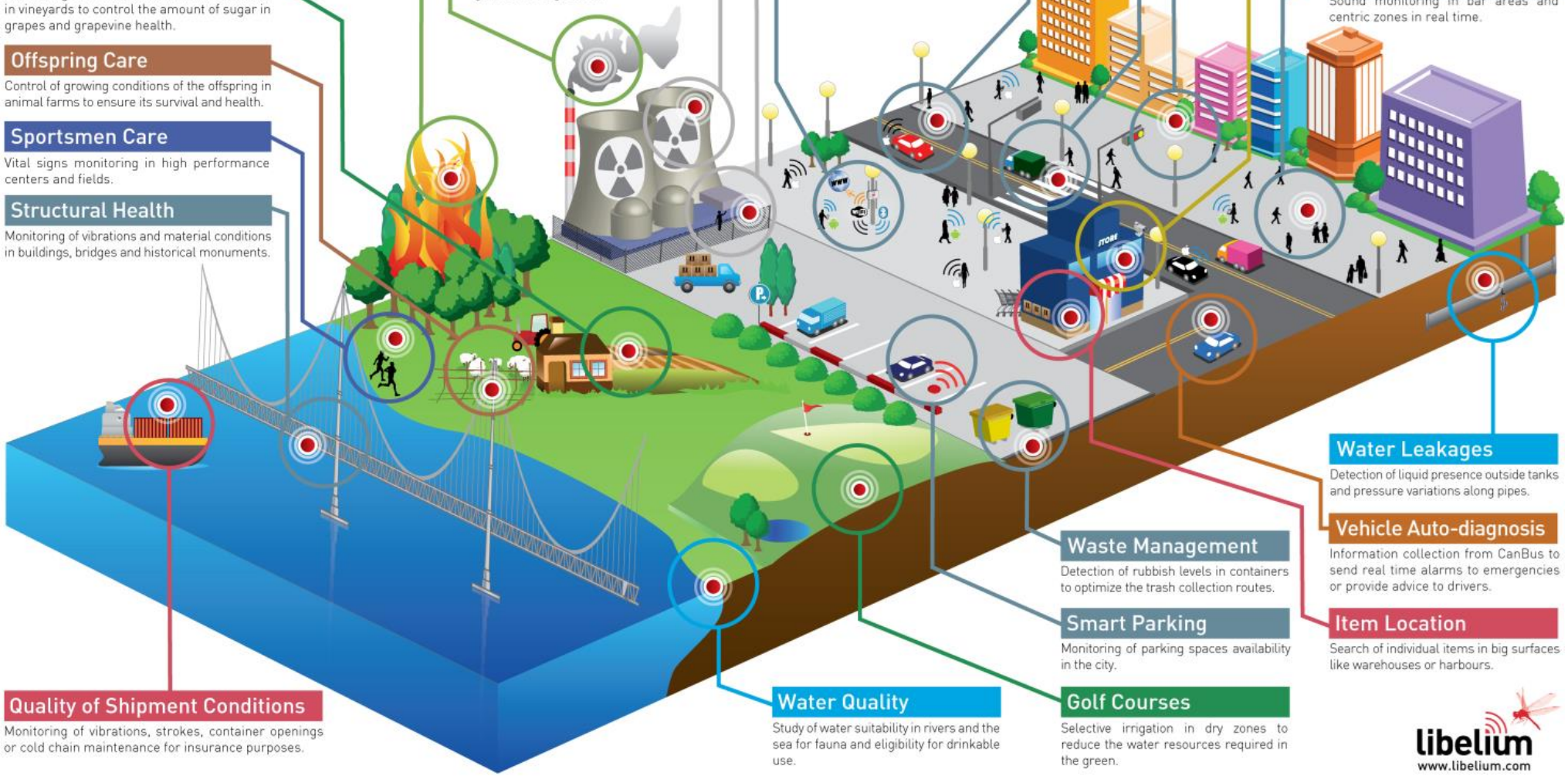
Smart buildings

HVAC, lighting, security & access control, safety monitoring, indoor positioning …

Smart City

Pollution, traffic, crime, controlling, services …

Libelium Smart World



Air Pollution
Control of CO_2 emissions of factories, pollution emitted by cars and toxic gases generated in farms.

Forest Fire Detection
Monitoring of combustion gases and preemptive fire conditions to define alert zones.

Wine Quality Enhancing
Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

Offspring Care
Control of growing conditions of the offspring in animal farms to ensure its survival and health.

Sportsmen Care
Vital signs monitoring in high performance centers and fields.

Structural Health
Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Smartphones Detection
Detect iPhone and Android devices and in general any device which works with Wifi or Bluetooth interfaces.

Perimeter Access Control
Access control to restricted areas and detection of people in non-authorized areas.

Radiation Levels
Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

Electromagnetic Levels
Measurement of the energy radiated by cell stations and WiFi routers.

Traffic Congestion
Monitoring of vehicles and pedestrian affluence to optimize driving and walking routes.

Smart Roads
Warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

Smart Lighting
Intelligent and weather adaptive lighting in street lights.

Intelligent Shopping
Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

Noise Urban Maps
Sound monitoring in bar areas and centric zones in real time.

Water Leakages
Detection of liquid presence outside tanks and pressure variations along pipes.

Vehicle Auto-diagnosis
Information collection from CanBus to send real time alarms to emergencies or provide advice to drivers.

Item Location
Search of individual items in big surfaces like warehouses or harbours.

Waste Management
Detection of rubbish levels in containers to optimize the trash collection routes.

Smart Parking
Monitoring of parking spaces availability in the city.

Golf Courses
Selective irrigation in dry zones to reduce the water resources required in the green.

Water Quality
Study of water suitability in rivers and the sea for fauna and eligibility for drinkable use.

Quality of Shipment Conditions
Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

libelium
www.libelium.com

Smart Drones

- **Unmanned aerial vehicle** (UAV) (a.k.a. drones) are finding their way into IoT
- **Autonomous or remotely piloted**
- Used in Agriculture, Archaeology, Surveillance, Filmmaking, Sports, Domestic policing, Oil & Gas, Search and Rescue, Military, Animal rights, etc.

Consumer IoT examples

Personal productivity & fashion

Smartphones, smartwatches …

Home Automation

Smart locks, Bulbs, Smart TVs, Baby monitors…

Consumer IoT examples contd.

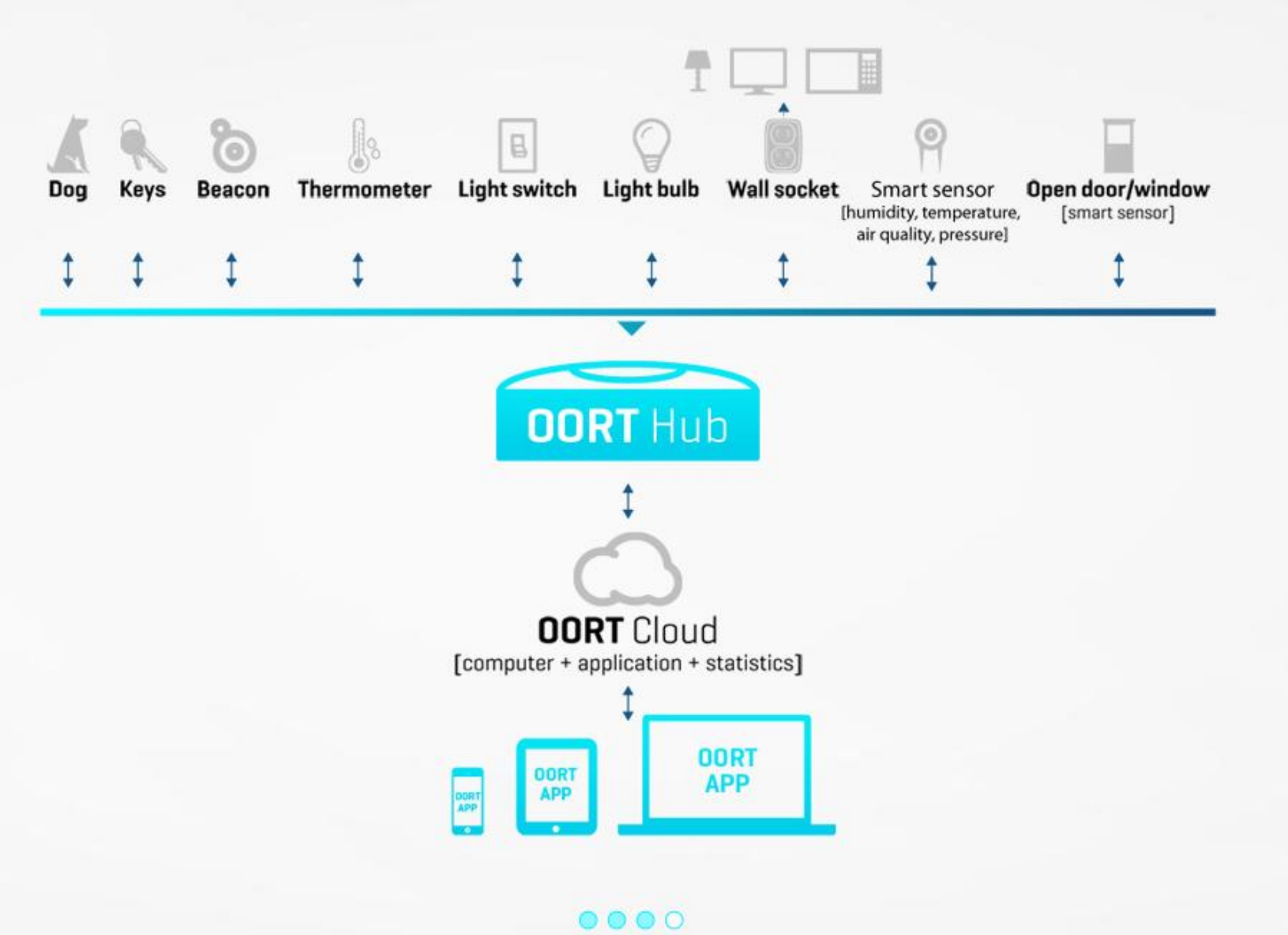
Sports & Health

Fitness & health trackers

Connected cars …

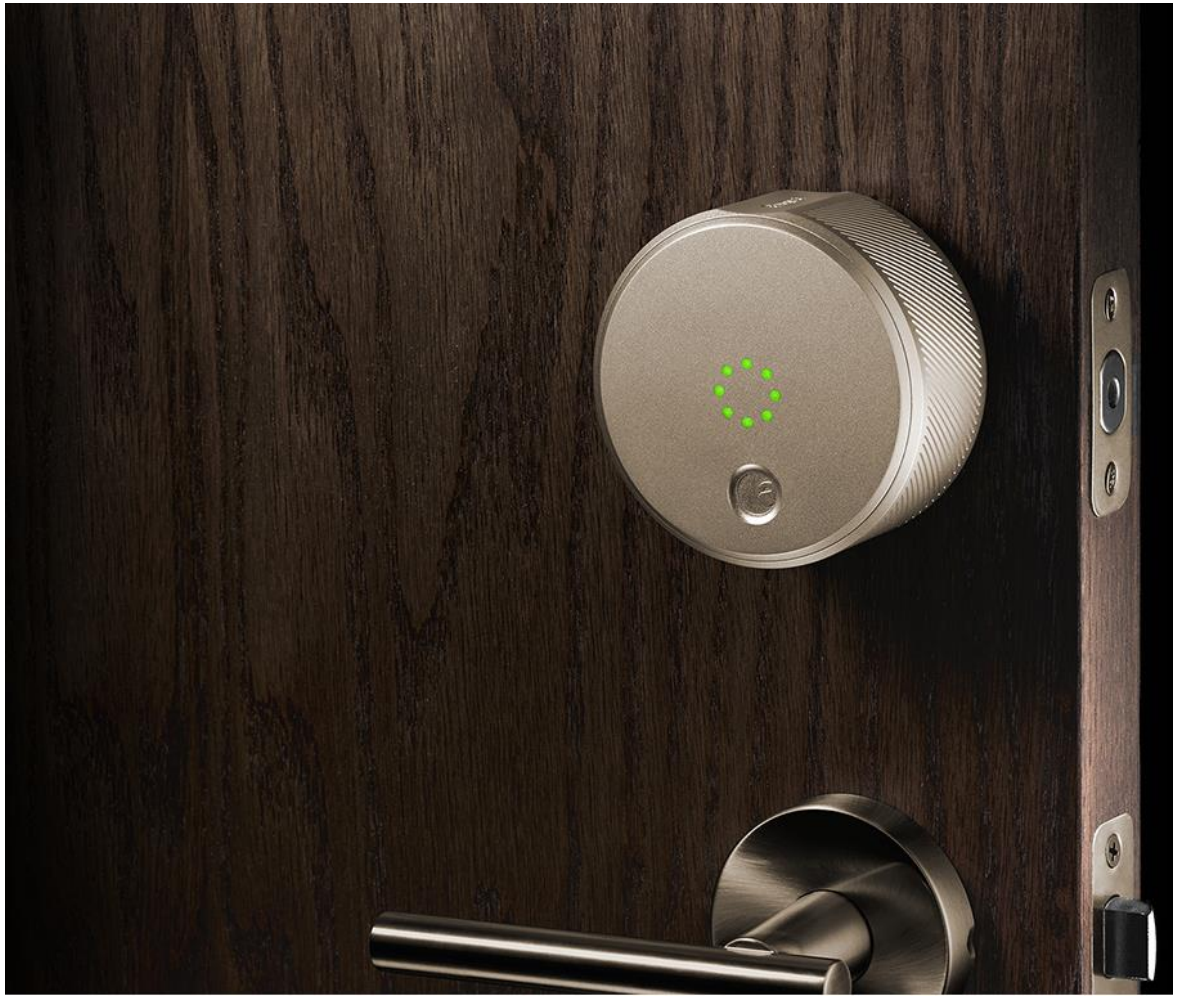
Predictive maintenance, accident reaction, theft protection …

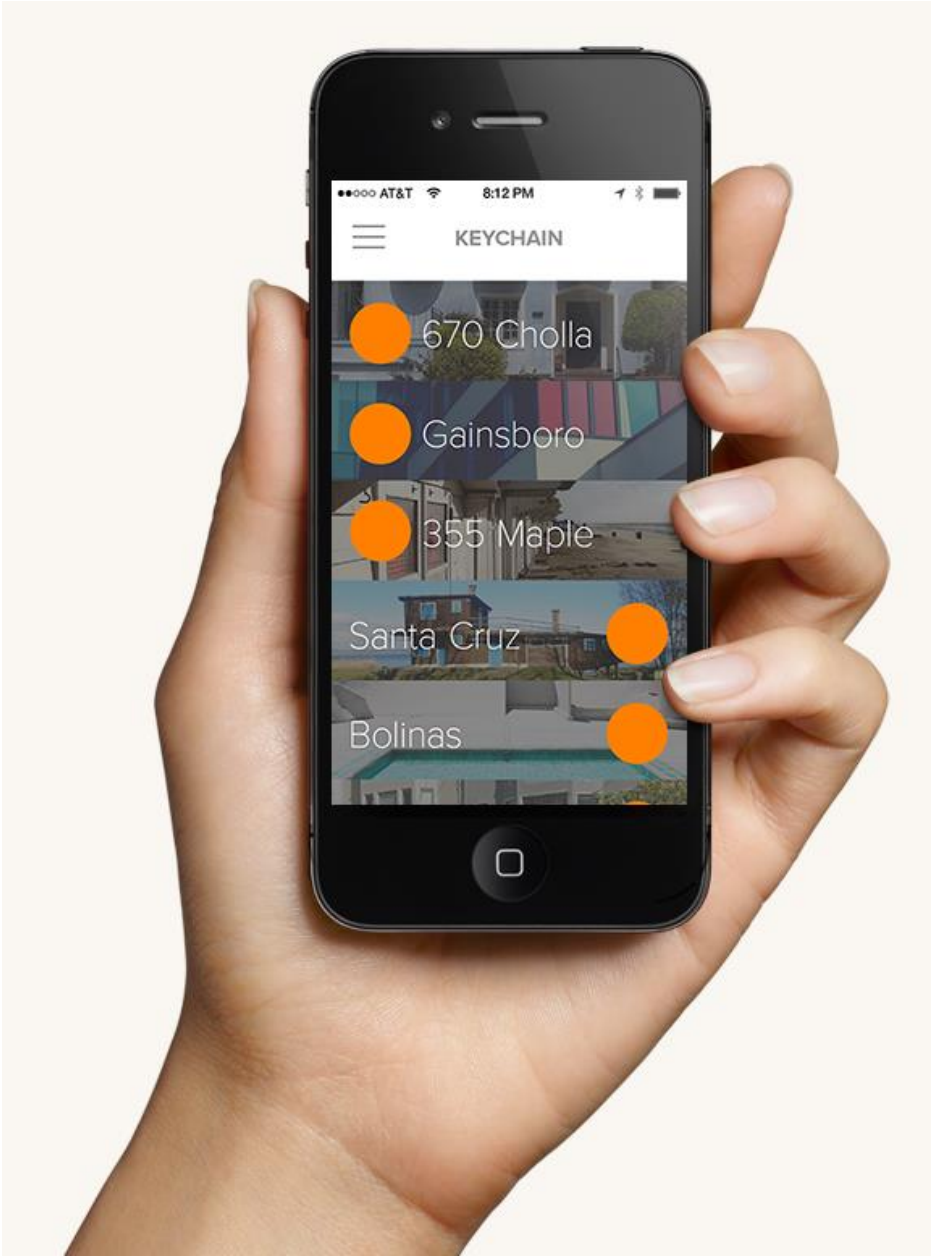
Smart Home



http://prefundia.com/projects/view/oort-internet-of-everything/1331/

Smart Home: Smart Lock





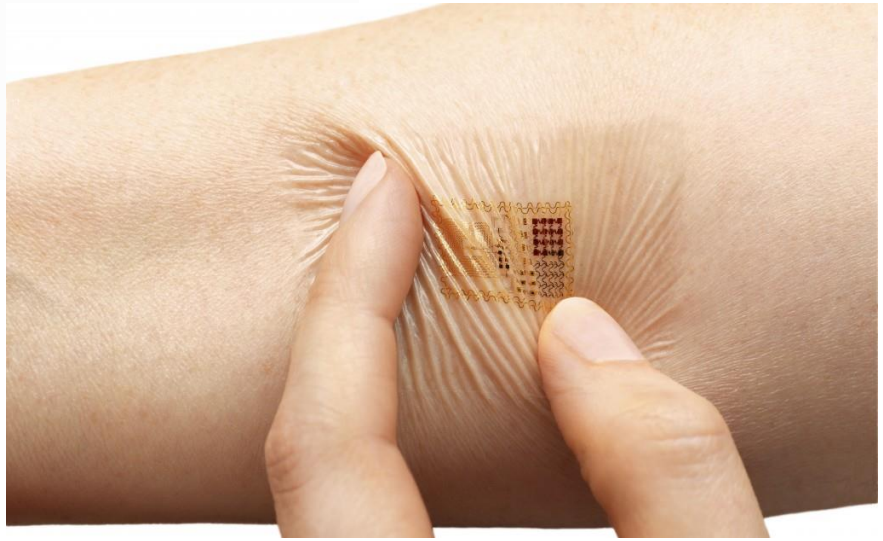
http://august.com/products/august-smart-lock/

Smart Home: Smart Bulb

- Remote control via Wi-Fi
- 16 million colors, dimmable
- 2000 K – 8000 K temperature
- Lifetime 10 years
- Geofencing

http://www.lumenbulb.net

Wearables



Smart Baby

Listen In
Hear your little one's coos and cries directly from the Mimo app.

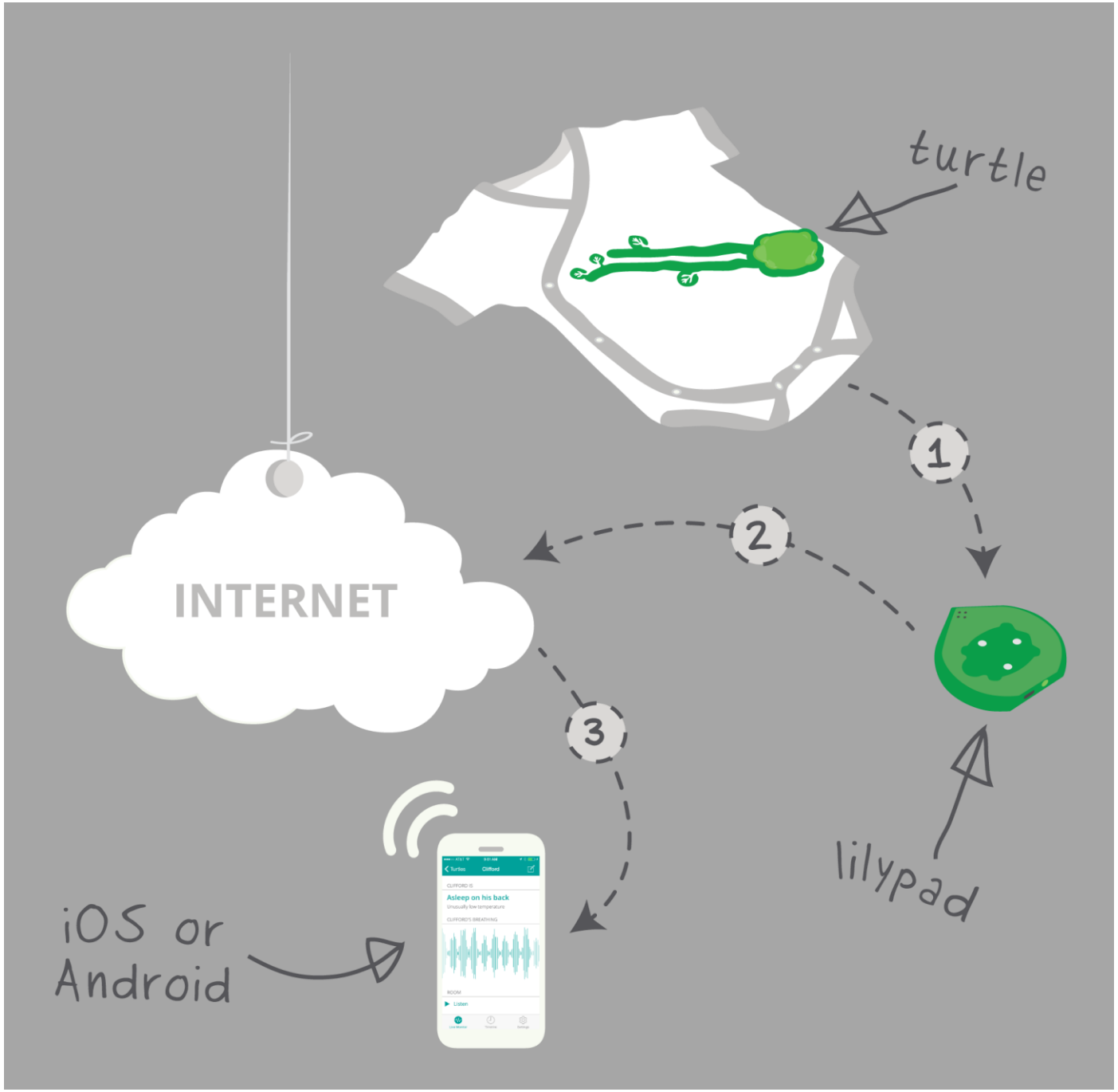
Check Sleep Status
Know if your little one is awake or asleep, and if she rolls over onto her stomach or side.

Track Breathing
Respiration sensors, which sit on top of the Mimo kimono, give you real-time insight into your baby's breathing.

Know Body Position
Check your baby's body position to see how they're sleeping and be notified if s/he rolls over.

Stay Connected
Available on both Android and iOS, the Mimo app lets you stay in-tune with your baby, from anywhere in the world.

Machine Wash
Toss Mimo kimonos in the wash, and tumble dry on low. Made with love in the USA.



http://mimobaby.com/

Security

Who’s the hacker?

Motivation

Emotion

Profit

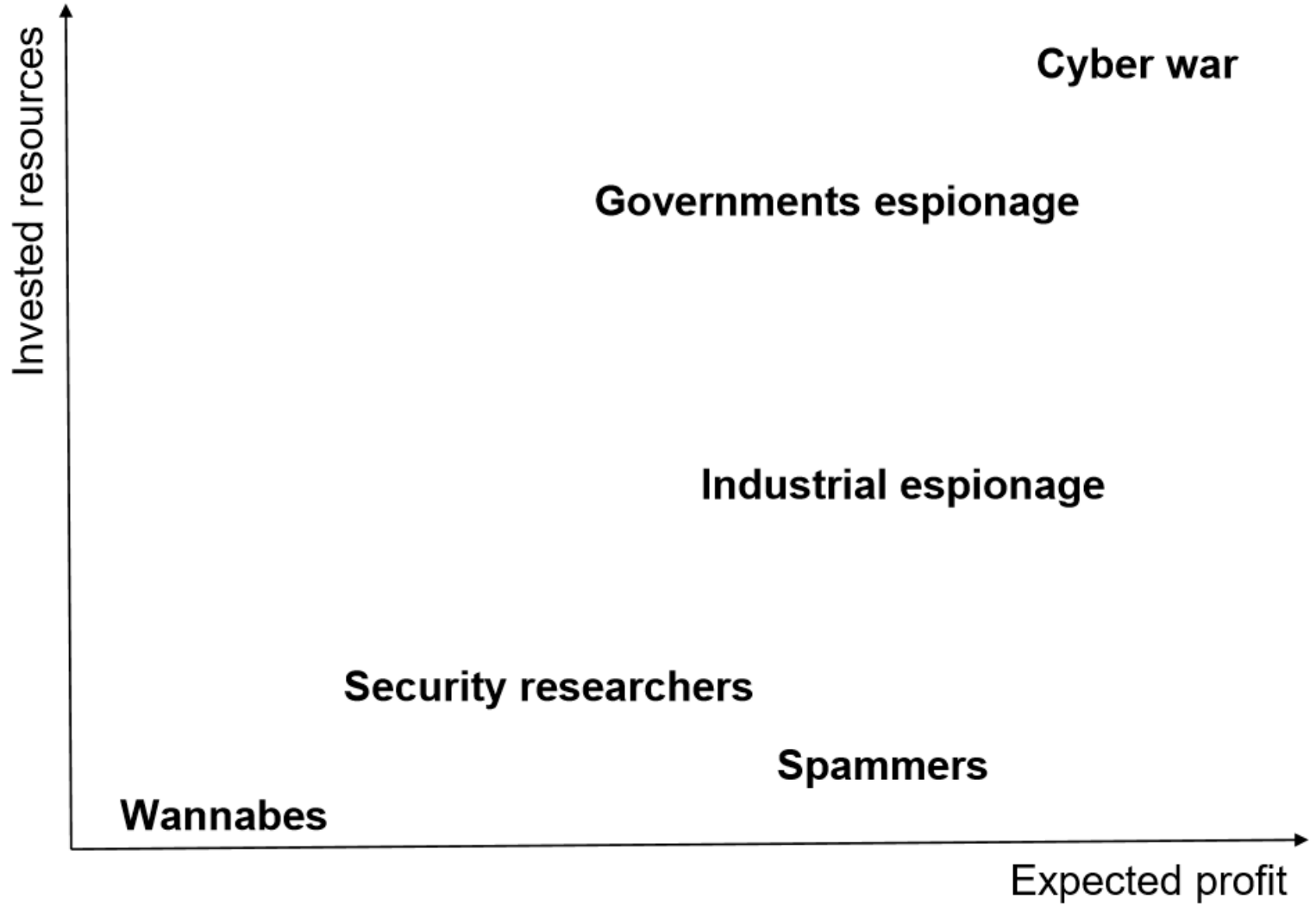
Scientific interest

Black hats vs White hats

Damage

Money flow

Breaking the law?



Stuxnet … an APT

Hackers: No Such Agency

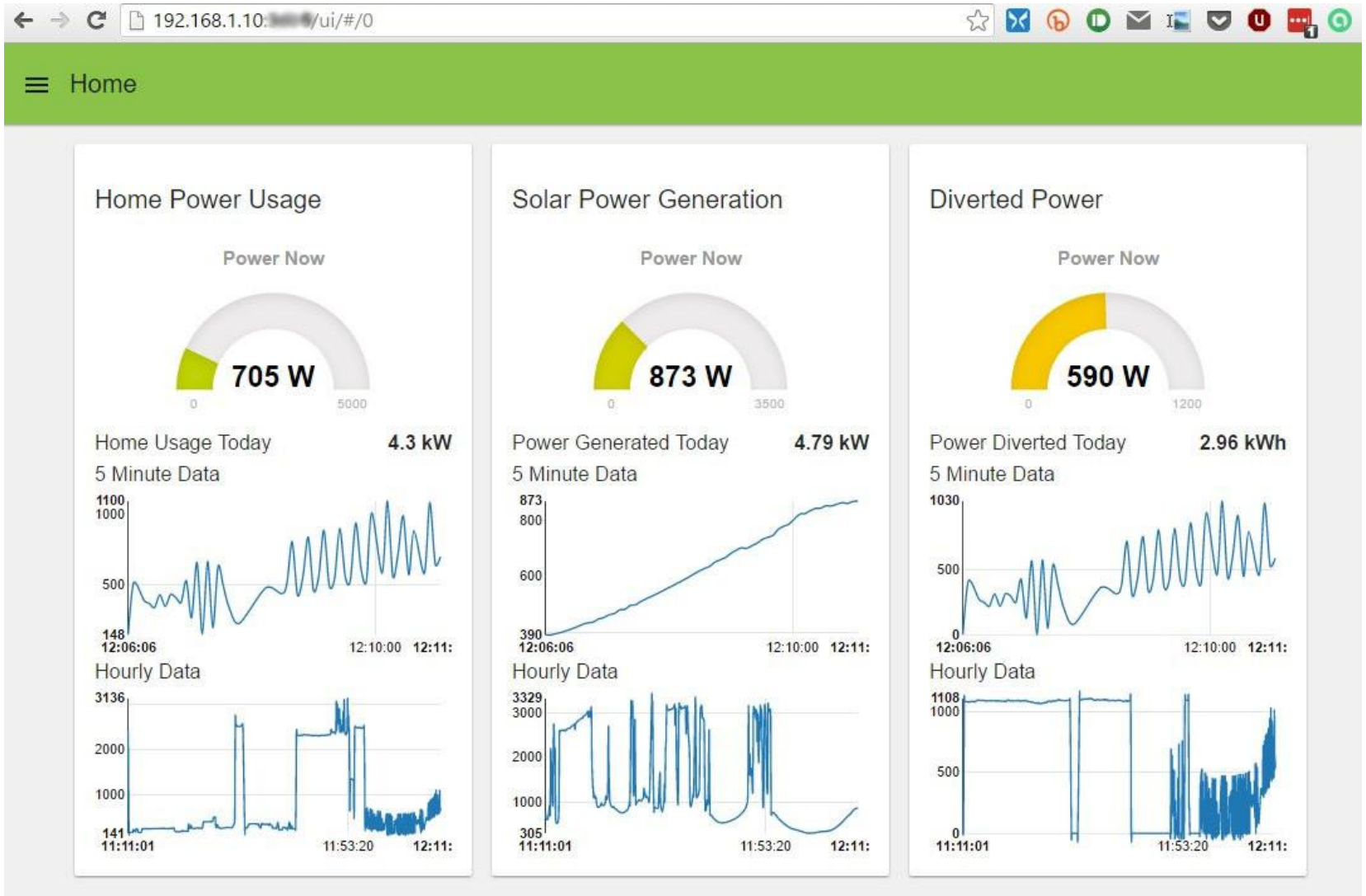
Target: Iran's Natanz uranium enrichment centrifuges

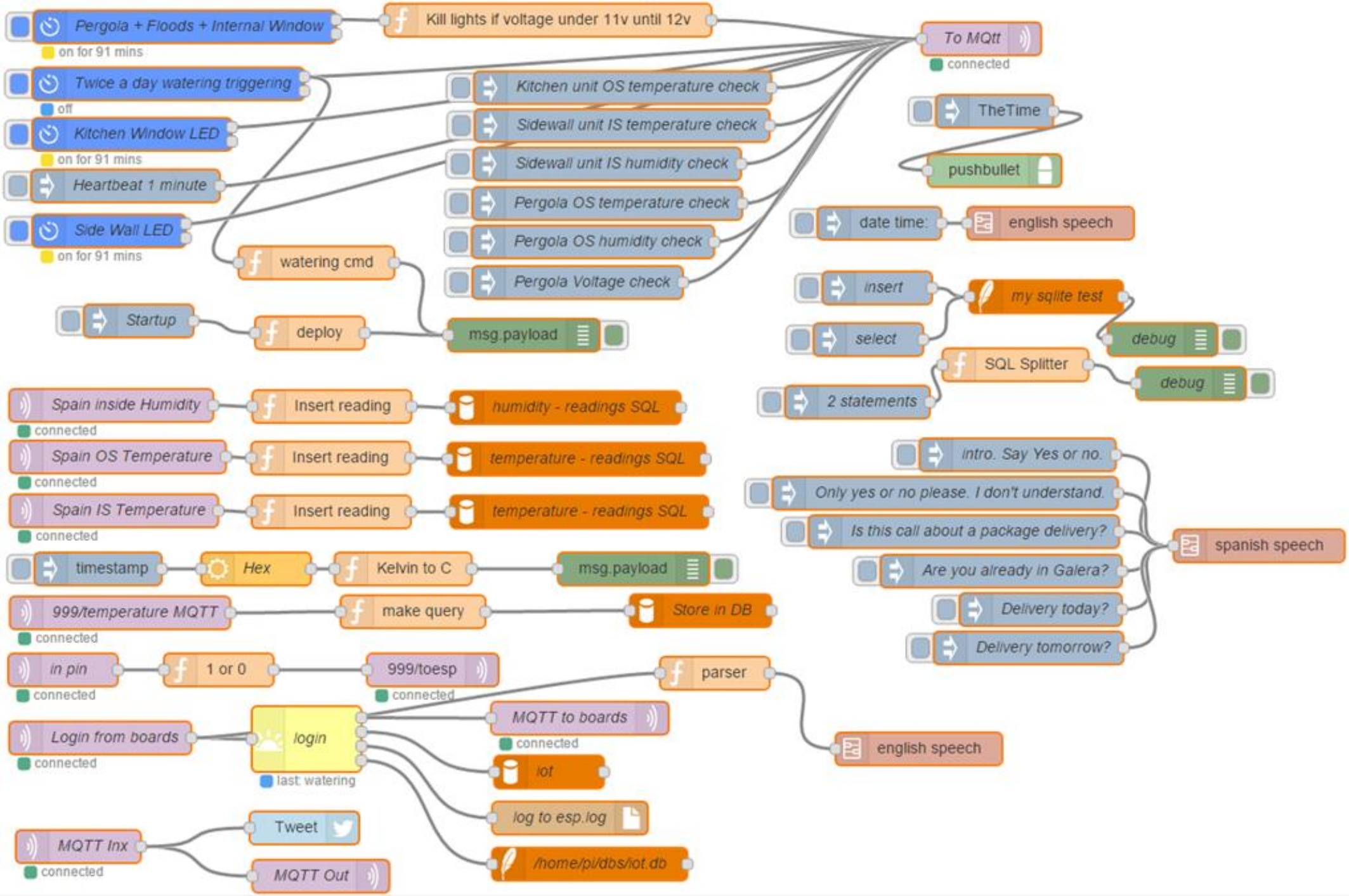
Attack: Spin rate could be controlled. Monitoring data tampered.

Popular Software

NodeRED

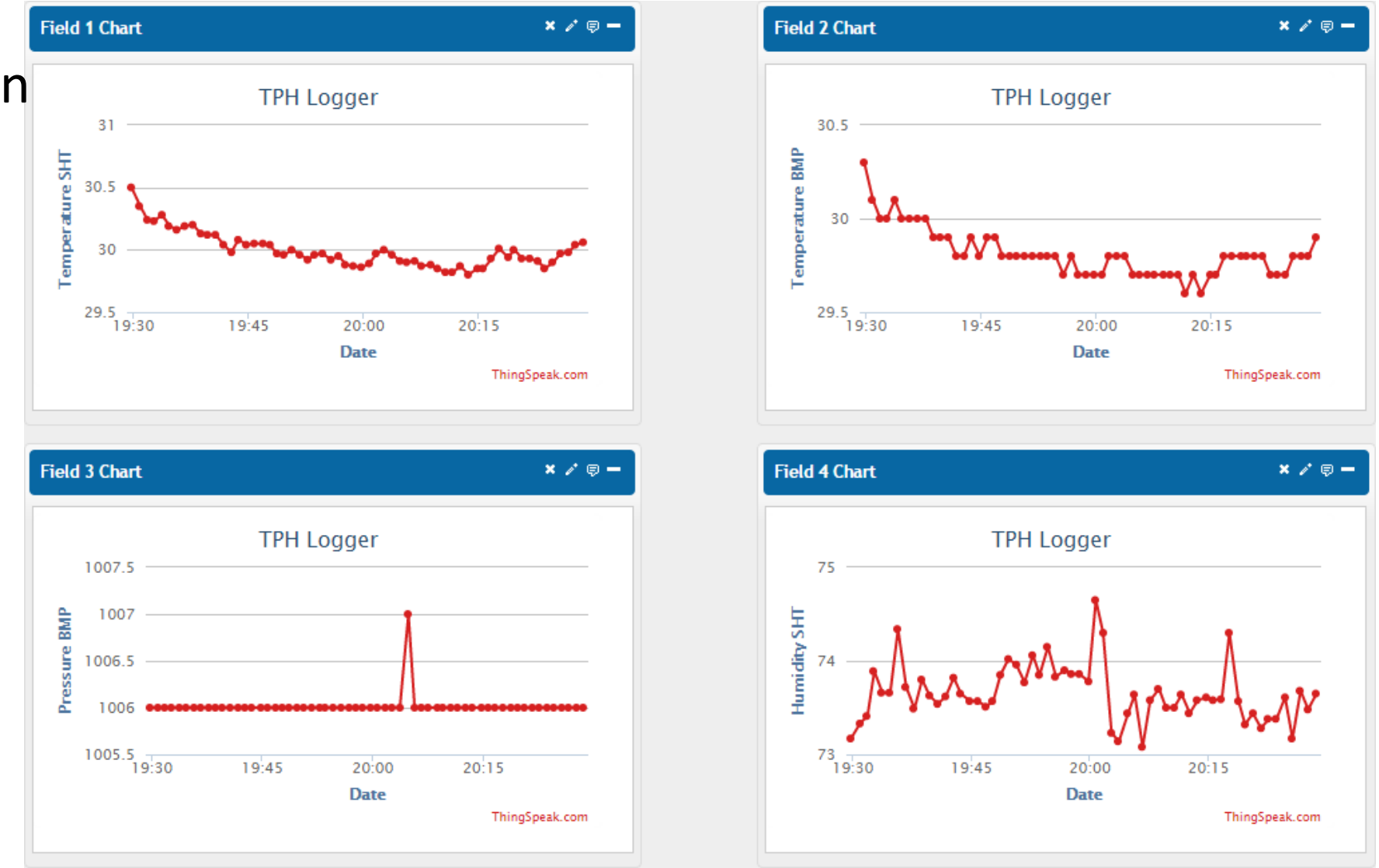
- Design flows
- Java Script
- Dashboards



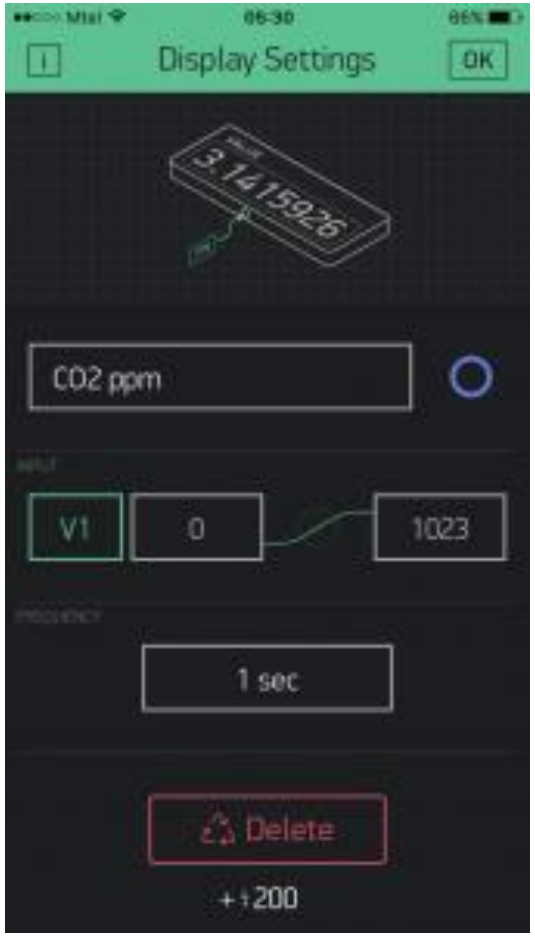

Pergola + Floods + Internal Window
on for 91 mins
Kill lights if voltage under 11v until 12v
To MQtt
connected
Twice a day watering triggering
off
Kitchen unit OS temperature check
TheTime
Kitchen Window LED
on for 91 mins
Sidewall unit IS temperature check
pushbullet
Heartbeat 1 minute
Sidewall unit 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

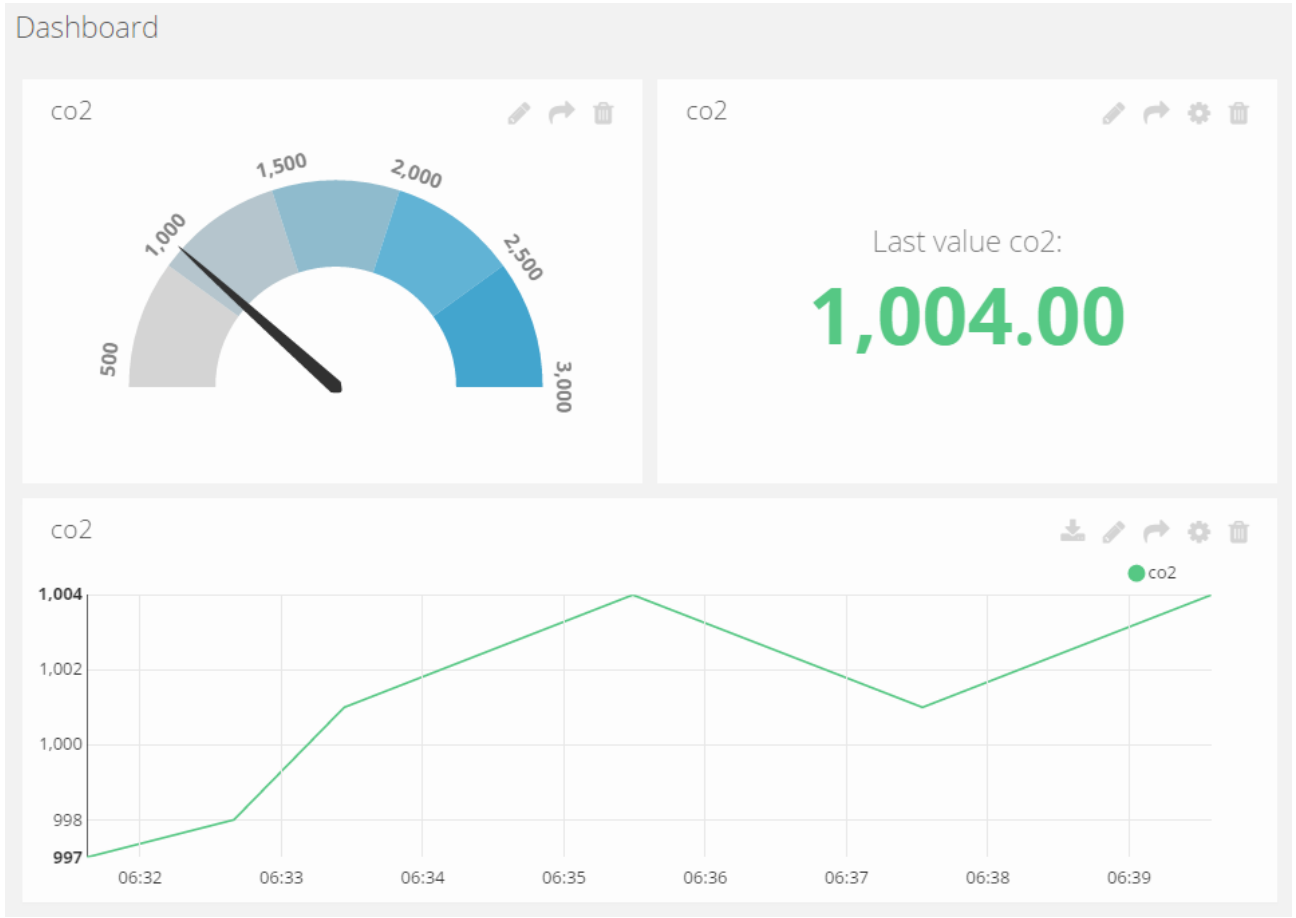
- Easy integration
- Lots of display options



Blynk – Arduino to Mobile



Ubidots – IoT Dashboards



Dust Monitors

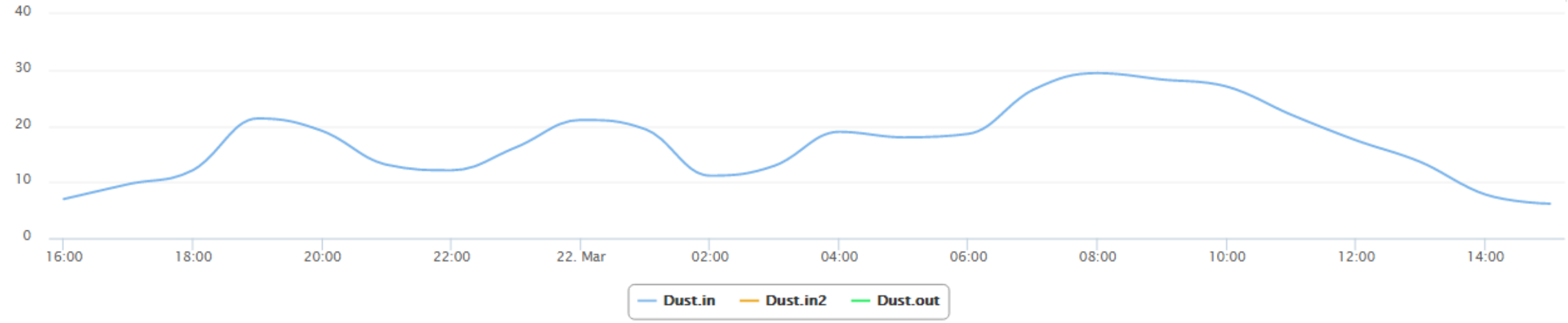
vlast3k Public *Created: January 20th 2017* Views: 783

BeeBotte

6

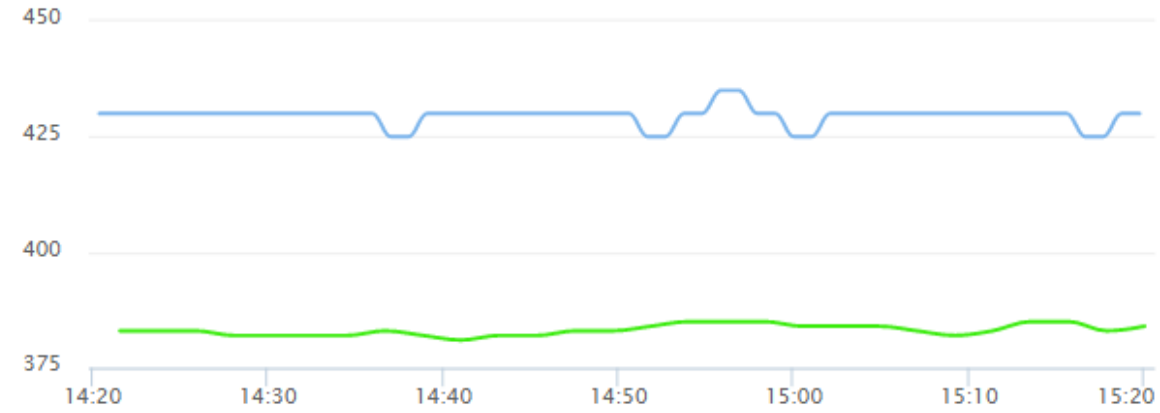
My multiline chart

Period: Last 24 Hours



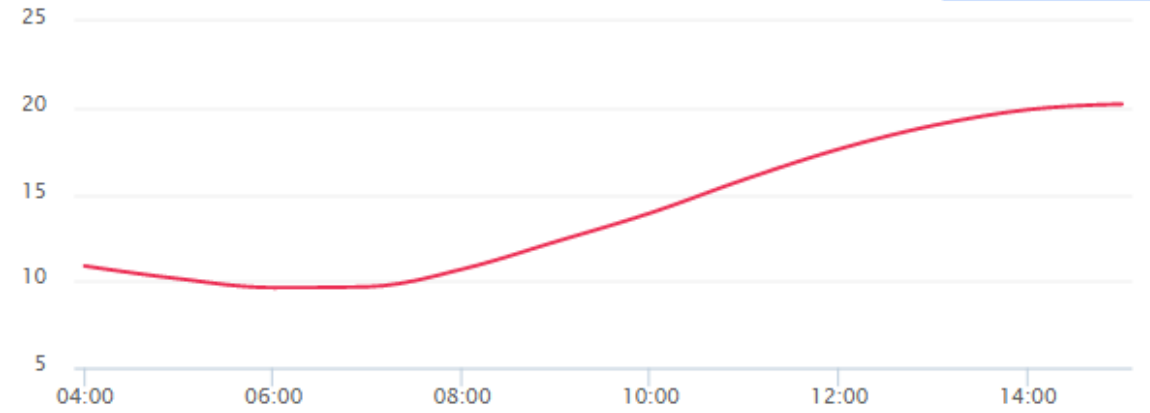
CO2

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

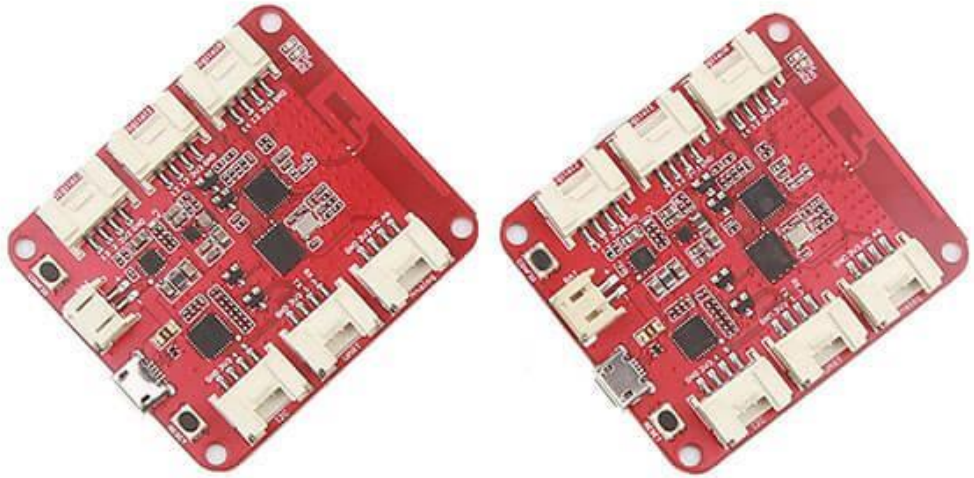
1. Wide frequency band
2. Great sound quality
3. Low noise
4. Low power consumption
5. High sensitivity

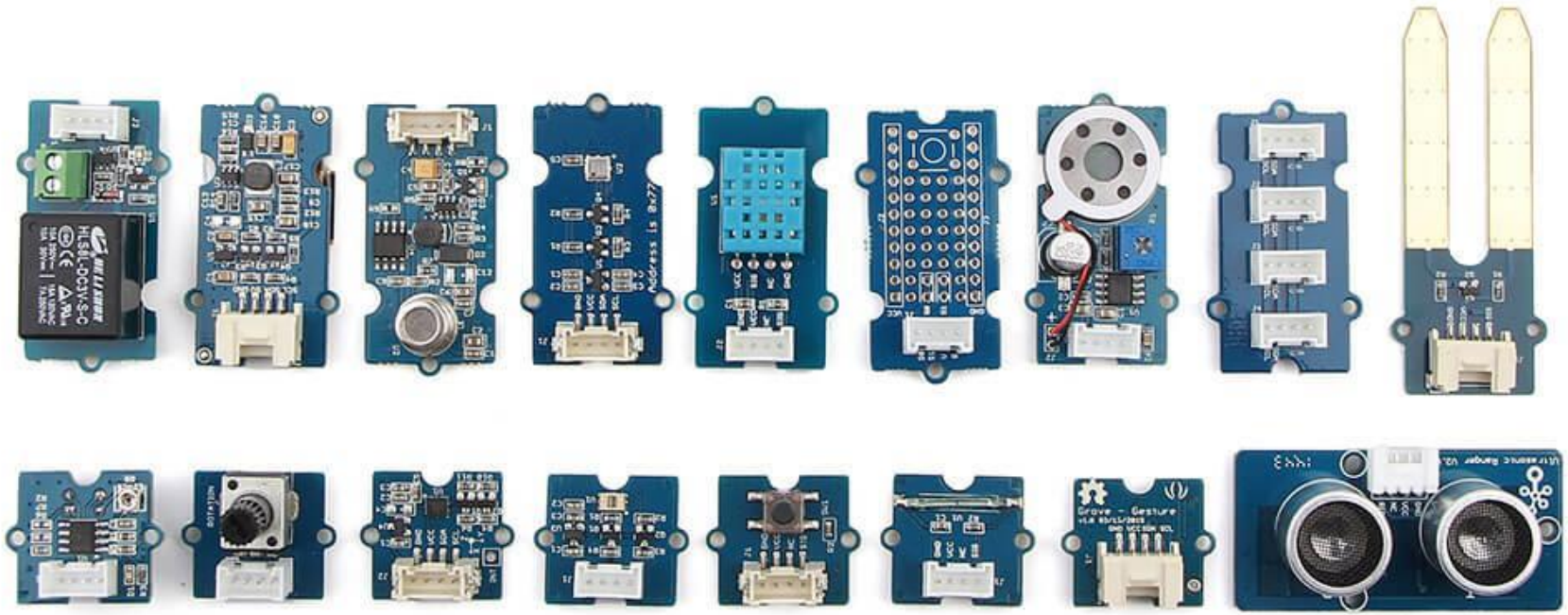
Broadlink


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