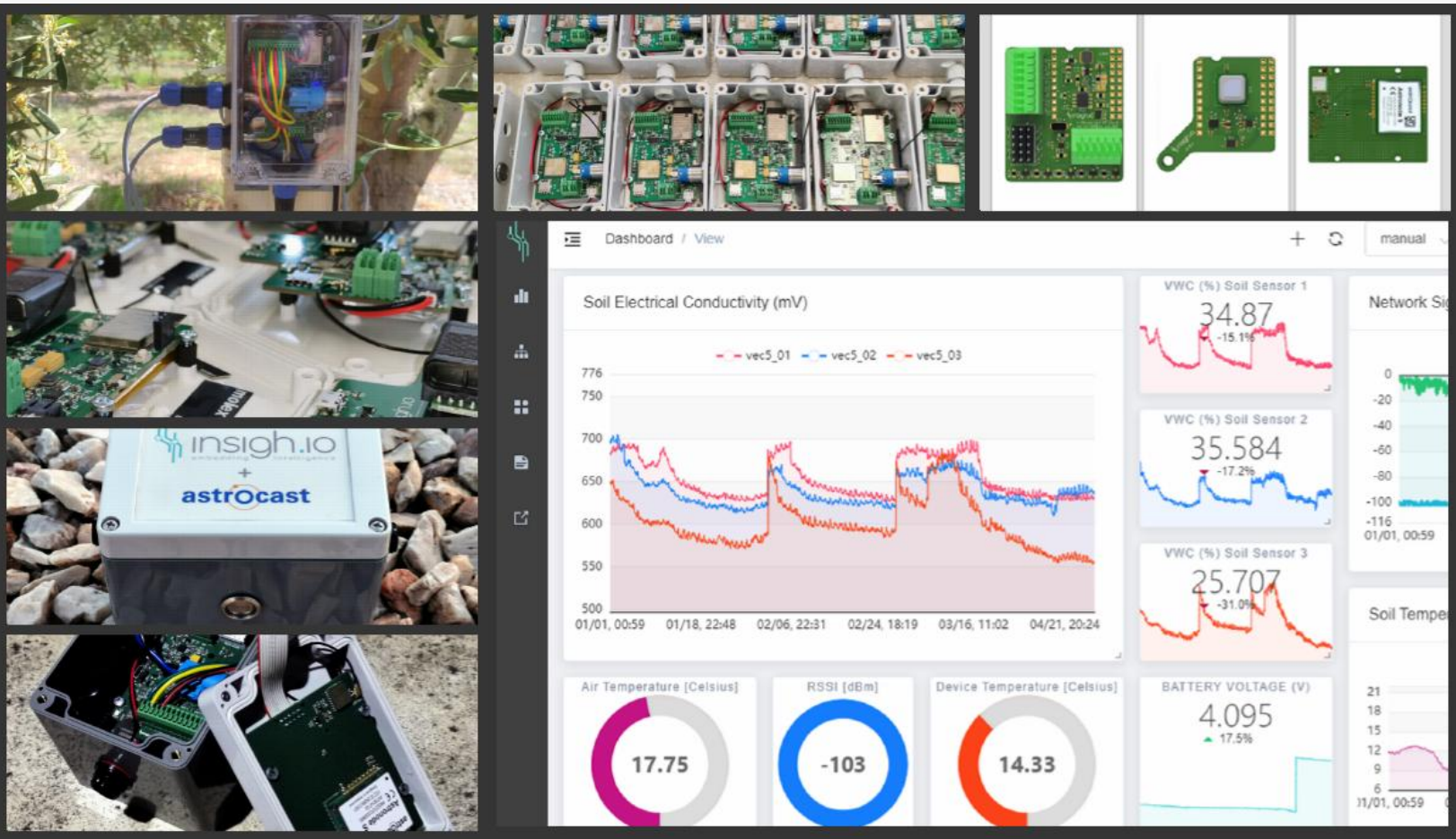
insigh.io

embedding intelligence

insigh.io IoT solution Overview

insigh.io offers a quick and affordable way to develop and smoothly scale new IoT solutions from scratch:

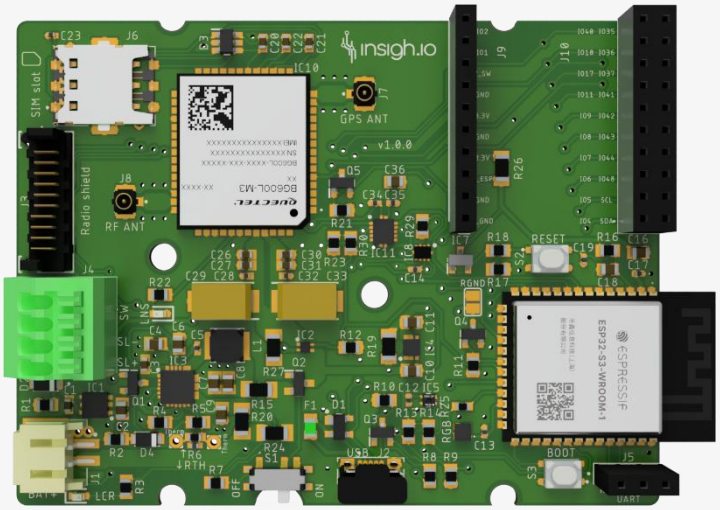
- Start with a flexible and modular development board
- Pick and place an existing or design a new shield tailor-made to your application and sensors
- Optionally add a connectivity expansion shield when WiFi and Cellular are not enough
- Configure the devices with our open-source Micropython firmware
- Power on, connect to our Cloud Platform and check measurements
- Place the board to the provided outdoor enclosure, attach peripherals, deploy, scale, and forget
- Manage your deployment remotely, access and visualize data from your office



INSIGHIO P.C. Epidavrou 17, GR-15233, Chalandri, Attica, Greece
email: info@insigh.io web: https://insigh.io

insigh.io IoT solution
Hardware – Overview

insigh.io board is a generic and affordable board for accelerating IoT adoption by companies, makers and non-experts.



Out of the box features:

- programmable microcontroller
- multiple power supply options
- USB/solar charging
- Integrated WiFi & Cellular
- on-board temp/hum sensor
- embedded GPS
- device access via USB/Serial port
- configuration via WiFi and Web UI or remotely
- live data transmission or in batches
- memory for 1000+ measurement storage

Build to last for years:

- ultra-low power design
- energy consumption profiling
- automatic power management

One product - infinite applications:

- exposed IOs for breadboard tests
- tailor-made sensor shields
- additional connectivity shields
- open-source firmware
- cloud-platform ready

Connectivity

- WiFi/Bluetooth
- Cellular
- LoRa
- Satellite IoT

Energy sources

- Battery
- Solar Power harvesting
- USB

Sensors

- Analog
- Digital
- Industrial Protocols

Scenarios

- Agriculture
- Smart Cities
- Smart Offices
- Machines

INSIGHIO P.C. Epidavrou 17, GR-15233, Chalandri, Attica, Greece
email: info@insigh.io web: https://insigh.io

insigh.io IoT solution
Hardware – Main Board Specs

General Information	
Dimensions (L x W x H)	77.47(83.5*) x 62.23 x 16.7 mm * *including WiFi antenna*
Weight	28 g

Operating Conditions	
Operational Temperature	0 – 50°C
Charging Temperature	0 – 50°C
Charging Current Limit	440 mA
Maximum Drawn Current (sensors)	250 mA

Power Supply					
USB	Port	Input Voltage			
	Micro USB Female	Min.	Typ.	Max.	Units
		4.5	5	5.5	V
Battery	Port	Nominal Characteristics			
	JST PH 2.0	1 x Rechargeable LiPo/Li-Ion 1S1C 3.7-4.2 V			
Solar Panel	Port	Input Voltage			
	Fixed Terminal Block with push-in connection (no tools required)	Min.	Typ.	Max.	Units
		5.5	6	7	V

Connectivity	
Integrated Radio Modules	WiFi, Bluetooth, Cellular IoT (NB-IoT) & 2G (GSM) fallback
Extensions	LoRa, Satellite IoT

Switches	
S1	Controls power supply to the micro-controller (the battery charging process is not affected)
S2	Tactile switch for rebooting the micro-controller
S3	Tactile switch for activating the micro-controller's bootloader (needed only for fw upgrade)
J4	Port for connecting external switch (S1 should be in OFF state)

On-board diagnostics, protection & features	
On-board Sensors	1 × Temperature/Humidity Sensor (based on the SHT40 chip) 1 × GPS (using embedded modem's functionality)
Energy Profiling	Accurate Measurement of battery voltage even at charging state
Embedded Protection	4 x Resettable Fuses for protecting battery, solar panel and USB ports, 3.3V regulator 1 x Thermistor protecting charging
Expansion	3 x 10 Female Headers Pin Connector 1 x 10 Molex Connector & Ribbon Cable (Part numbers: 90325-0010, 92317-1012)

LED Indicators			
Usage	Type	Status	Indication
Charging	RED	ON	Battery is charging
		OFF	Battery charged
		FLASH	Battery not present (USB on)
Modem	RED	OFF	Disabled by micro-controller
		FLASH	Activity (connecting, sending)
Scenario	RGB	BLUE	Sensor measurement
		RED	Connecting to network
		GREEN	Sending Data

Additional Peripherals	
Battery	Cellular IoT/WiFi: At least 1200 mAh GSM: At least 2200 mAh 4000 mAh for permanent deployment * *Battery Mandatory for GSM*
Solar Panel	6V/1W or 6V/2W

Certification	
CE, FCC, RoHS	In progress

INSIGHIO P.C. Epidavrou 17, GR-15233, Chalandri, Attica, Greece
email: info@insigh.io web: https://insigh.io

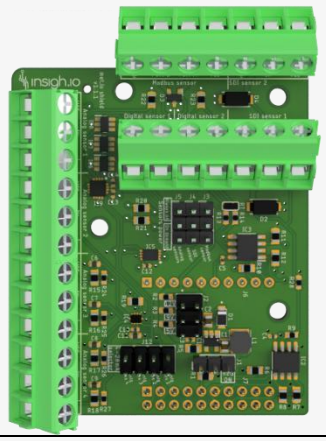
insigh.io IoT solution
Hardware – Sensor Expansion Shields

- Swappable
- Built-in firmware
- Rapid testing
- Push-in connectors (no tools required)
- Ready for final product
- Power management

Smart Weigh Scale Shield (INS-S-S-SCA)

Number of Sensor Ports	2
Output Voltage	3.3 V & 5V
Ports	1 x ADC for Weigh Scale | 1 x UART for RFID/NFC 2 x External LEDs | Built-in Buzzer | Embedded Temperature Sensor for Calibration
Example sensors *built-in firmware*	Load Cells up to 200 kgr RFID reader (RDM6300) | NFC reader (PN532)
Example applications	Waste Stream Monitoring, Recycling, Beehives Monitoring

Enviro Sensor Shield (INS-S-S-ENV)



Number of Sensor Ports	9
Sensors Supply Voltage	5V/9V/12V (controlled by jumper)
Sensor Ports	2 × SDI12 | 1 x Modbus RTU | 2 x Digital/Pulse Input 4 x Analogue Input (used as 4-20mA also)
Power Supply	On-demand or Always-On (controlled by firmware & jumpers)
Example sensors *built-in firmware*	Meter Teros-12 (VWC, EC, Temp)
	Meter ATMOS41 (Weather Station)
	Kisters HyQuant (Non-Contact Water Level Sensor)
Example applications	Agriculture, Weather, Water Monitoring

Machine Sensor Shield (INS-S-S-MAC)

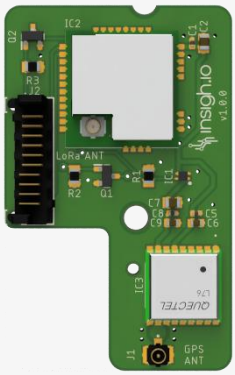
Number of Sensor Ports	4
Sensors Supply Voltage	None (External needed)
Sensor Ports	1 x Modbus-RTU | 4 x 2-wire 4-20mA
Example sensors *built-in firmware*	PLCs with Modbus slave RTU interface
	Laser Distance Sensor, pH Sensor
	Split Core Transformers with 4-20mA output
Example applications	PLC communication, Weather stations, Electricity metering in buildings / machines

INSIGHIO P.C. Epidavrou 17, GR-15233, Chalandri, Attica, Greece
email: info@insigh.io web: https://insigh.io

insigh.io IoT solution
Hardware – Connectivity Shields

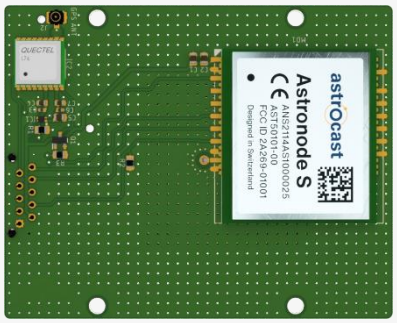
- Swappable
- Built-in firmware
- Rapid testing
- Push-in connectors (no tools required)
- Ready for final product
- Power management

LoRa Shield (INS-S-C-LOR)



Modem	RAK Wireless RAK3172 Module (accessed via UART)
GPS	Quectel's L76L-M33 Module (flashed with I²C firmware)
Operating Voltage	3.3V
Dimensions	30.5 x 49 x 16.7 mm
Antenna	External ISM 868-915MHz Antenna Required External Flexible GNSS Antenna (for GPS option)
Firmware Support	Beta version with custom payload formatter available; Final version available in Q1-24
Platform Support	TheThingsNetwork Support Private Chirpstack Server

Satellite IoT Shield – Astrocast (INS-S-C-AST)



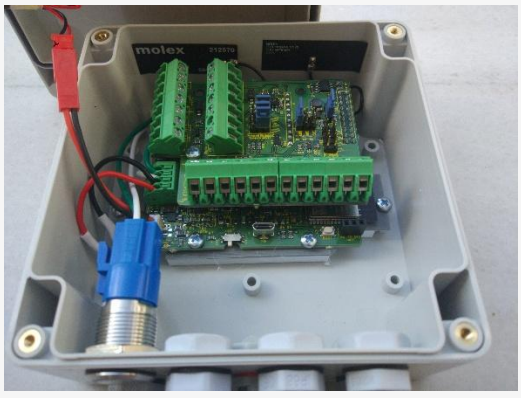
Modem	Astrocast's Astronode S Module (accessed via UART)
GPS	Quectel's L76L-M33 Module (flashed with I²C firmware)
Operating Voltage	3.3V
Dimensions	78.31 x 63.15 x 7 mm
Antenna	On-board Astronode Compact ceramic patch antenna Flexible GNSS Antenna (for GPS option)
Firmware Support	Full support through dedicated library
Platform Support	Integration with Astrocast's Platform

INSIGHIO P.C. Epidavrou 17, GR-15233, Chalandri, Attica, Greece
email: info@insigh.io web: https://insigh.io

Outdoor Node & Operational Conditions

- IP-rated enclosure
- Indoor/Outdoor Deployment
- Unattended Operation
- Minimal Installation Effort
- Easy configuration
- Data Plan

Parameters	
Enclosure Material	ABS or Polycarbonate (depending on application requirements)
Enclosure Protection	IP65 or IP67 (depending on application requirements)
Enclosure Dimensions	120mm x 120mm x 60mm
External Switch	Yes, with proper IP rating
External Connectors	Glands or Specialized Connectors (WeiPu)
Antennas	Included
Additional Protection	Hydrophobic Ventilated Plug (option)
Mounting Kit	Included (if required)
Environmental Conditions	Standard Outdoor operation
Peripherals	Rechargeable Battery, Solar Panel 6V/6W, External Switch
Cellular Connectivity	Integrated 500 MB data plan (optional)
Support	
Warranty	2-years. Defective parts are replaced.
Manuals	Online Portal in English Language available PDF manual on demand

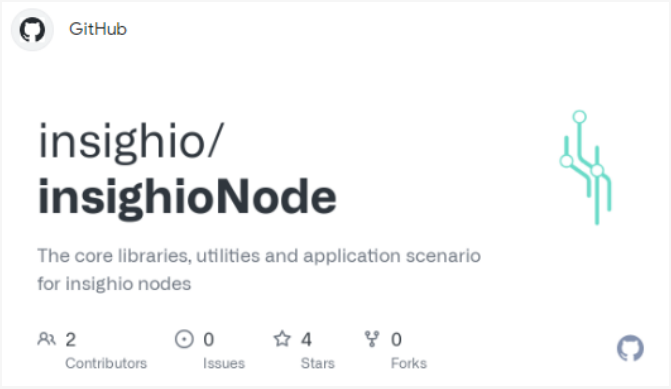


INSIGHIO P.C. Epidavrou 17, GR-15233, Chalandri, Attica, Greece
email: info@insigh.io web: https://insigh.io

insigh.io IoT solution
The Device Software

insigh.io IoT device software (firmware) is an open-source package written entirely in Micropython with a dual-role:

- automate device operation for non-experts.
- accelerate new application development for advanced users.

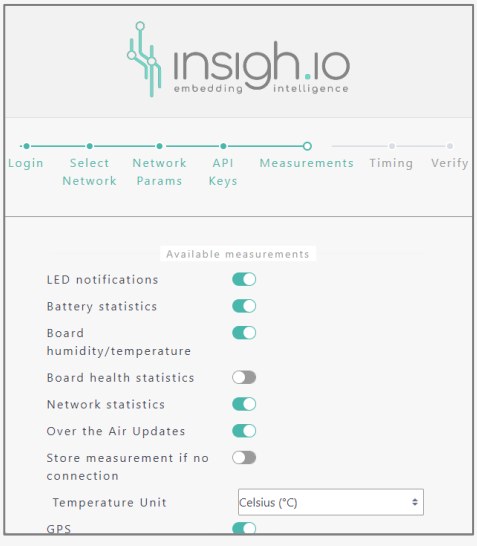


IoT adopter: A non-expert user

- *Requirement*: A **plug-and-play** consumer-like device
- *Our Solution*: Pre-built software
  - simplifying the device configuration and on-boarding operations
  - based on a mobile friendly web setup environment

IoT developer: An advanced user

- *Requirement*: An **easy-to-use platform** for building custom applications
- *Our Solution*: Open-source software
  - abstracting all the necessary low-level sensor and connectivity functionalities in a well-defined high-level API
  - empowered by a collection of libraries and sub-modules



Build-in Web Configurator

insigh.io IoT Node acts as a WiFi hotspot serving a user friendly configuration wizard to setup:

- Network configuration
- insigh.io platform API tokens
- Measurement pack by selecting attached shield
- Device health and statistics
- Execution scenario:
  - Periodic measurement (for battery operation)
  - Batch upload (minimum battery consumption)
  - Always-on connection (for live monitoring)

INSIGHIO P.C. Epidavrou 17, GR-15233, Chalandri, Attica, Greece
email: info@insigh.io web: https://insigh.io

insigh.io IoT Solution
The Management Platform

insigh.io IoT platform allows for full administration of your IoT fleet, enhanced data visualization, live reporting, along with instant and flexible data interconnection with external platforms using multi-technology integrations.

Data visualization

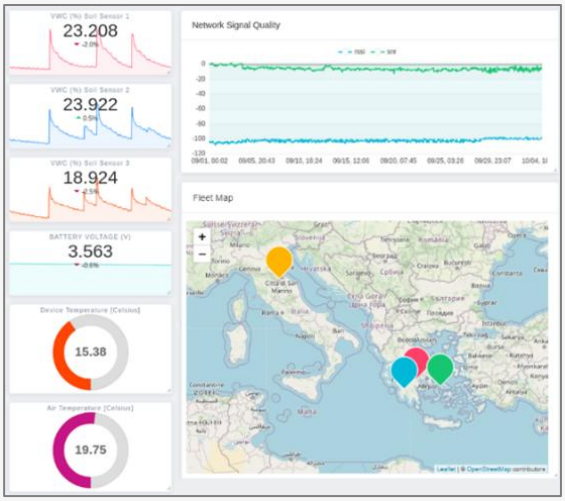
Configurable widgets with access to raw data and meta-data for live views and trend identification

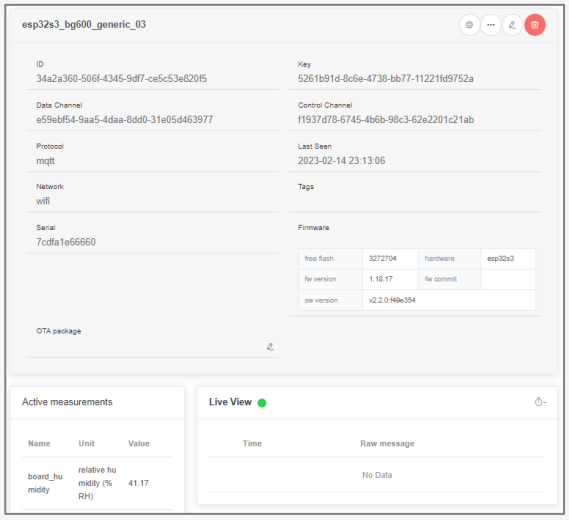
Administration panels

All tools needed to manage your fleet, from multi-device operations to per-device controls

Device-level view & control

End device health report, firmware update process monitoring, two-way communication





Rule-based triggers

User defined rules on in comming messages trigger retransmission to 3rd party systems or calls on external REST APIs

Data Plugin support

Configurable incoming data sources in the form of user defined plugins to accept measurements from external systems

Open APIs

Multi-protocol APIs allowing smooth integration with 3rd-party applications (REST, MQTT, WebSockets and more)

INSIGHIO P.C. Epidavrou 17, GR-15233, Chalandri, Attica, Greece
email: info@insigh.io web: https://insigh.io

insigh.io IoT Solution
The Management Platform

insigh.io
embedding intelligence

Inherent security features

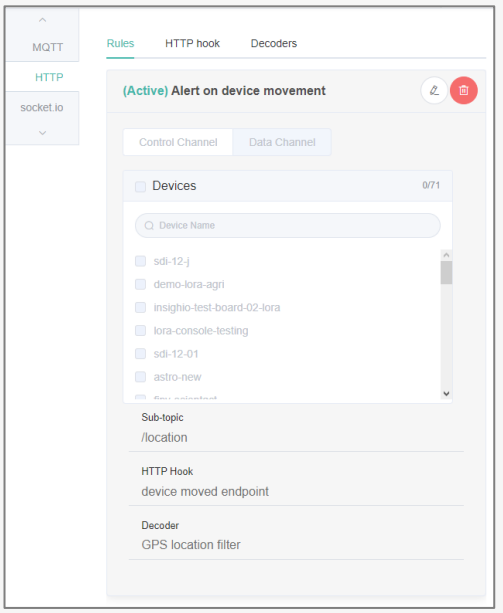
End-to-end data encryption through TLS with reverse proxies for access control and per-device authorization through unique API keys

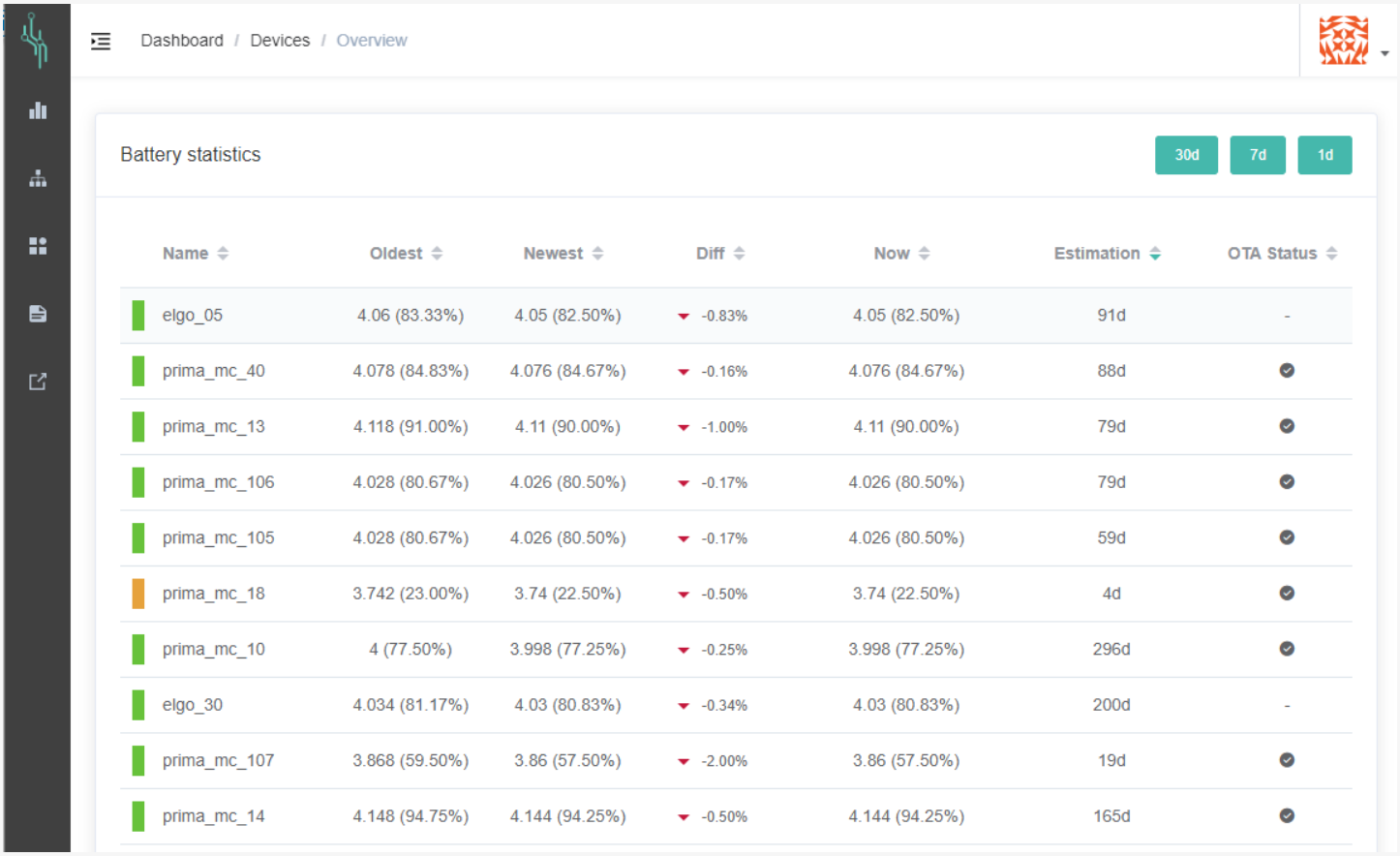
Predictive maintenance

Device behavior pattern extraction to identify operation deviations calling for maintenance

Flexible deployment

Our managed cloud deployment is the quickest way to get started, while on-premises deployment is always an option for special needs





Name	Oldest	Newest	Diff	Now	Estimation	OTA Status
elgo_05	4.06 (83.33%)	4.05 (82.50%)	-0.83%	4.05 (82.50%)	91d	-
prima_mc_40	4.078 (84.83%)	4.076 (84.67%)	-0.16%	4.076 (84.67%)	88d	✓
prima_mc_13	4.118 (91.00%)	4.11 (90.00%)	-1.00%	4.11 (90.00%)	79d	✓
prima_mc_106	4.028 (80.67%)	4.026 (80.50%)	-0.17%	4.026 (80.50%)	79d	✓
prima_mc_105	4.028 (80.67%)	4.026 (80.50%)	-0.17%	4.026 (80.50%)	59d	✓
prima_mc_18	3.742 (23.00%)	3.74 (22.50%)	-0.50%	3.74 (22.50%)	4d	✓
prima_mc_10	4 (77.50%)	3.998 (77.25%)	-0.25%	3.998 (77.25%)	296d	✓
elgo_30	4.034 (81.17%)	4.03 (80.83%)	-0.34%	4.03 (80.83%)	200d	-
prima_mc_107	3.868 (59.50%)	3.86 (57.50%)	-2.00%	3.86 (57.50%)	19d	✓
prima_mc_14	4.148 (94.75%)	4.144 (94.25%)	-0.50%	4.144 (94.25%)	165d	✓

INSIGHIO P.C. Epidavrou 17, GR-15233, Chalandri, Attica, Greece
email: info@insigh.io web: https://insigh.io