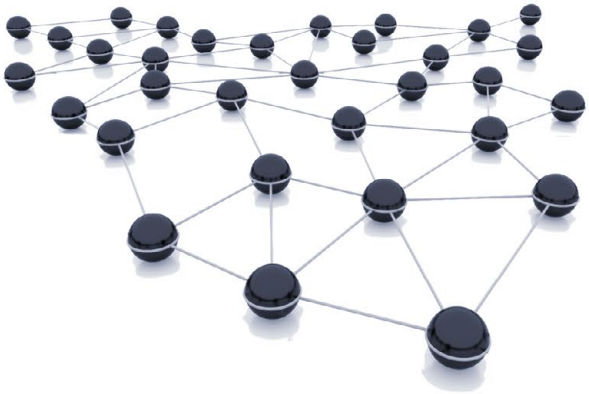
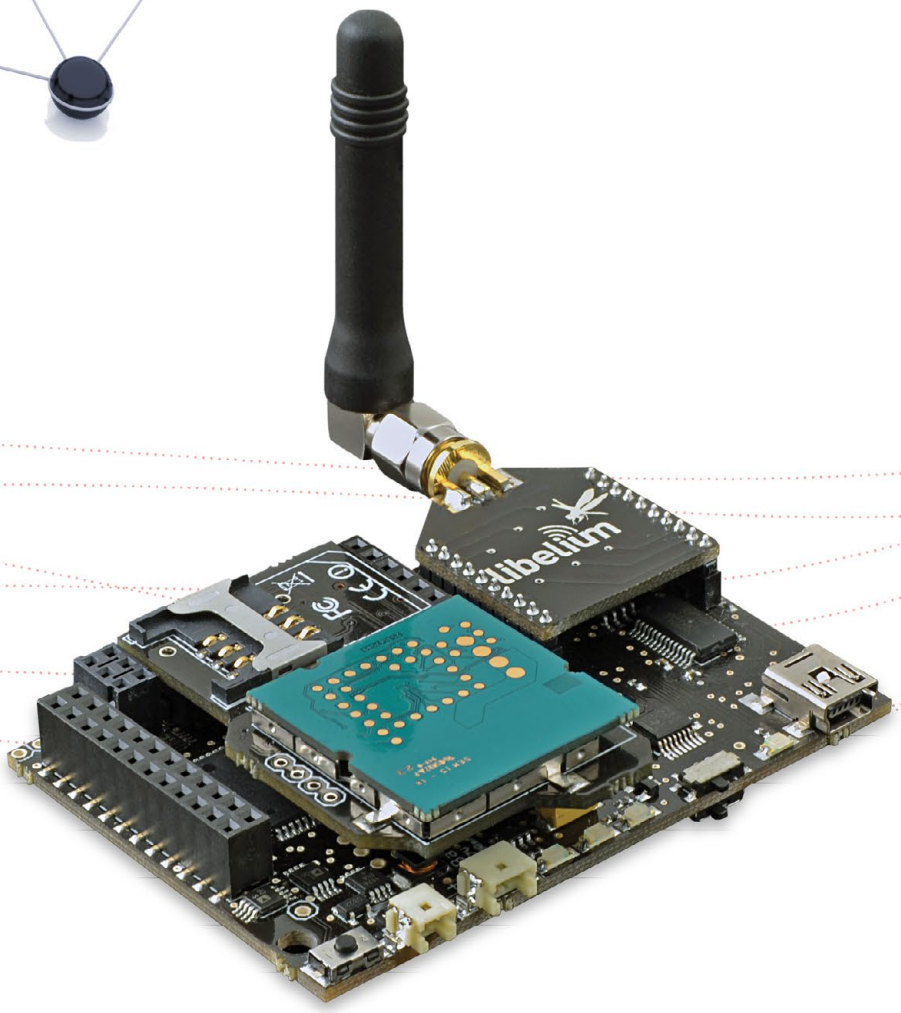
Waspmote

Datasheet

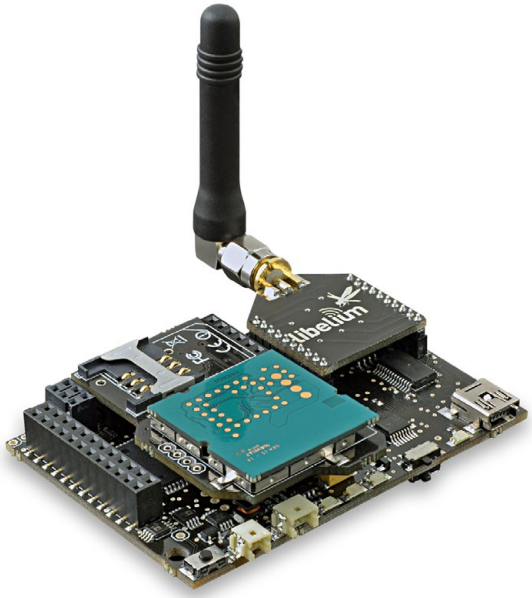




libelium

wasp mote

Waspmote



General data:

Microcontroller:	ATmega1281
Frequency:	14.7456 MHz
SRAM:	8KB
EEPROM:	4KB
FLASH:	128KB
SD Card:	2GB
Weight:	20gr
Dimensions:	73.5 x 51 x 13 mm
Temperature Range:	[-10ºC, +65ºC]
Clock:	RTC (32KHz)

Consumption:

ON:	15mA
Sleep:	55µA
Deep Sleep:	55µA
Hibernate:	0.07µA

Operation without recharging: 1 year *

** Time obtained using the Hibernate mode as the energy saving mode*

Inputs/Outputs:

7 Analog (I), 8 Digital (I/O), 1 PWM,
2 UART, 1 I2C, 1USB, 1SPI

Electrical data:

Battery voltage:	3.3 V - 4.2V
USB charging:	5 V - 100mA
Solar panel charging:	6 - 12 V - 280mA

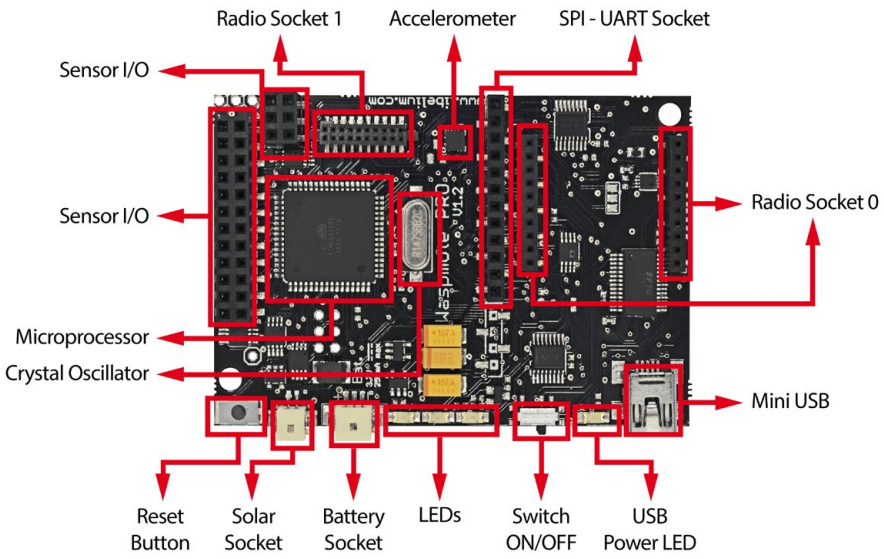


Figure: Waspmote Board Top

Built-in sensors on the board:

Temperature (+/-): -40ºC , +85ºC. Accuracy: 0.25ºC
Accelerometer: ±2g/±4g/±8g
Low power: 0.5 Hz/1 Hz/2 Hz/5 Hz/10 Hz
Normal mode: 50 Hz/100 Hz/400 Hz/1000 Hz

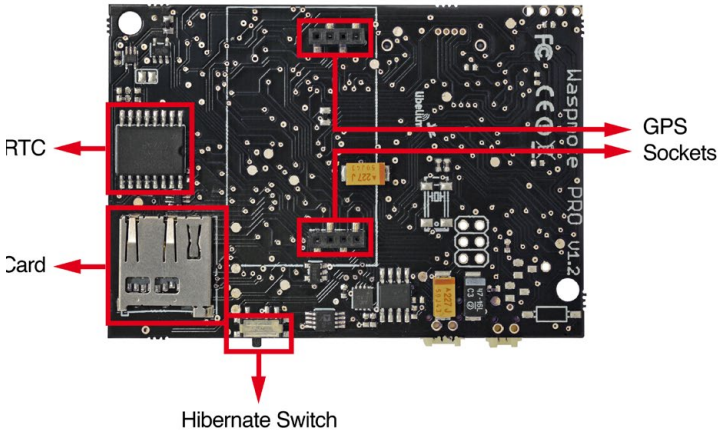


Figure: Waspmote Board Bottom

802.15.4/ZigBee

Model	Protocol	Frequency	txPower	Sensitivity	Range *
XBee-802.15.4-Pro	802.15.4	2.4GHz	100mW	-100dBm	7000m
XBee-ZB-Pro	ZigBee-Pro	2.4GHz	50mW	-102dBm	7000m
XBee-868	RF	868MHz	315mW	-112dBm	12km
XBee-900	RF	900MHz	50mW	-100dBm	10km

** Line of sight and Fresnel zone clearance with 5dBi dipole antenna*

Figure: XBee

Antennas: 2.4GHz: 2dBi / 5dBi
868/900MHz: 0dBi / 4.5dBi
Connector: RPSMA
Encryption: AES 128b
Control Signal: RSSI
Standards: XBee-802.15.4 - 802.15.4 Compliant / XBee-ZB - ZigBee-Pro v2007 Compliant
Topologies: star, tree, mesh

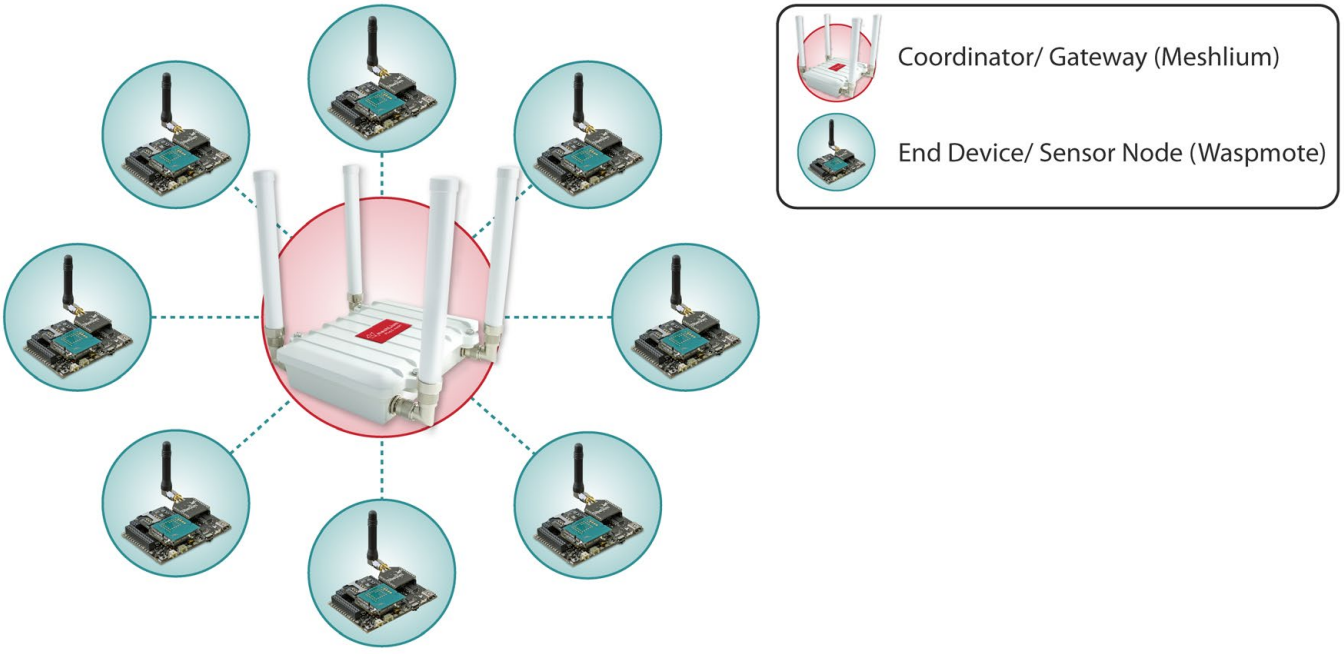


Figure: Star

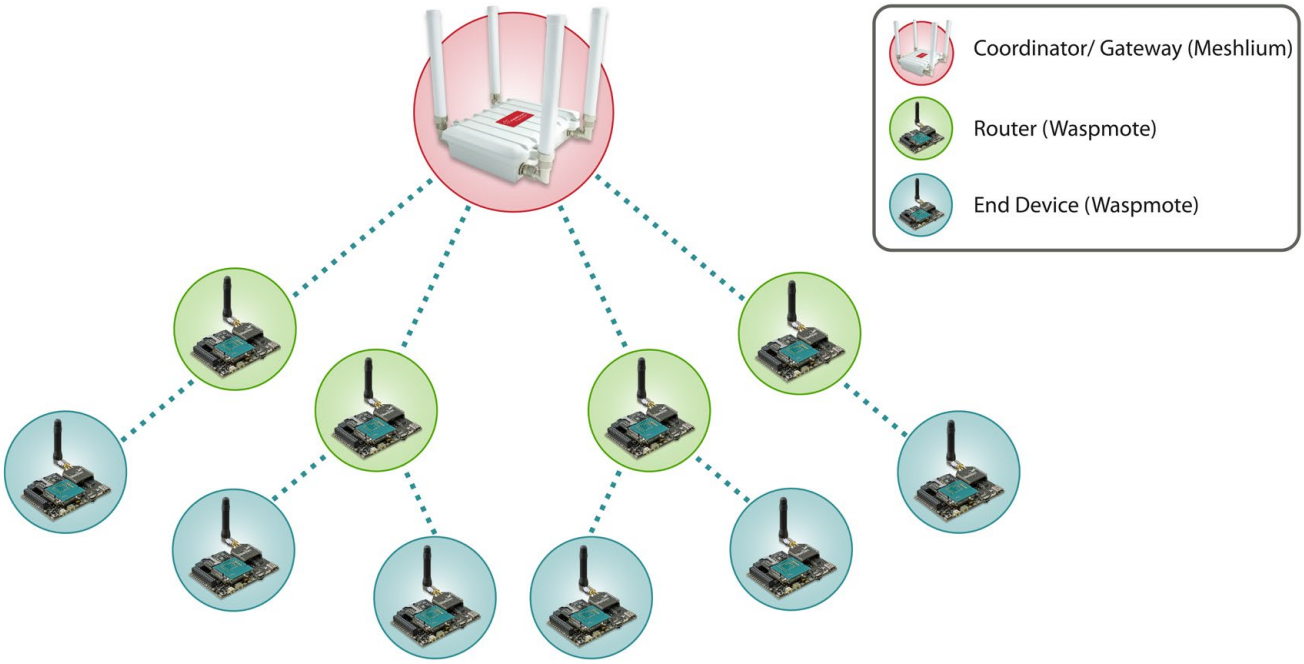


Figure: Tree

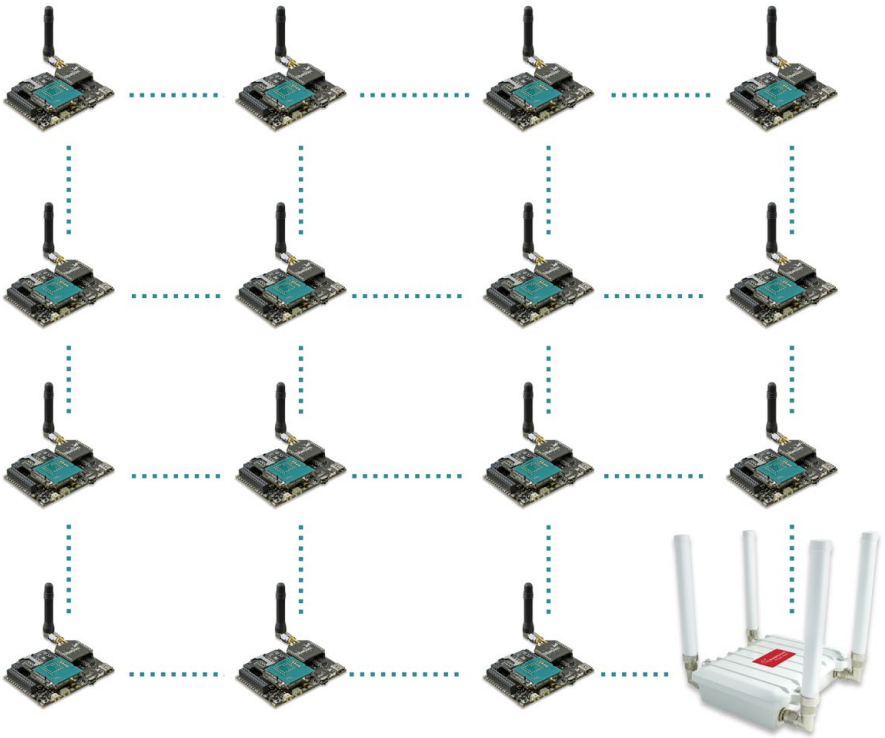


Figure: Mesh

LoRaWAN modules

Protocol: LoRaWAN 1.0, Class A
LoRaWAN-ready
Frequency:

- LoRaWAN 868/433 modules: 868 MHz and 433 MHz ISM bands
- LoRaWAN 900 module: 900-930 MHz ISM band

TX power:

- LoRaWAN 868/433 modules: up to +14 dBm
- LoRaWAN 900 module: up to +18.5 dBm

Sensitivity: down to -136 dBm
Range: >15 km at suburban and >5 km at urban area. Typically, each base station covers some km. Check the LoRaWAN Network in your area.
Chipset consumption:

- LoRaWAN 868/433 modules: 38.9 mA
- LoRaWAN 900 module: 124.4 mA

Radio data rate:

- LoRaWAN 868/433 modules: from 250 to 5470 bps
- LoRaWAN 900 module: from 250 to 12500 bps

Receiver: purchase your own base station or use networks from LoRaWAN operators

Figure: LoRaWAN 868 module

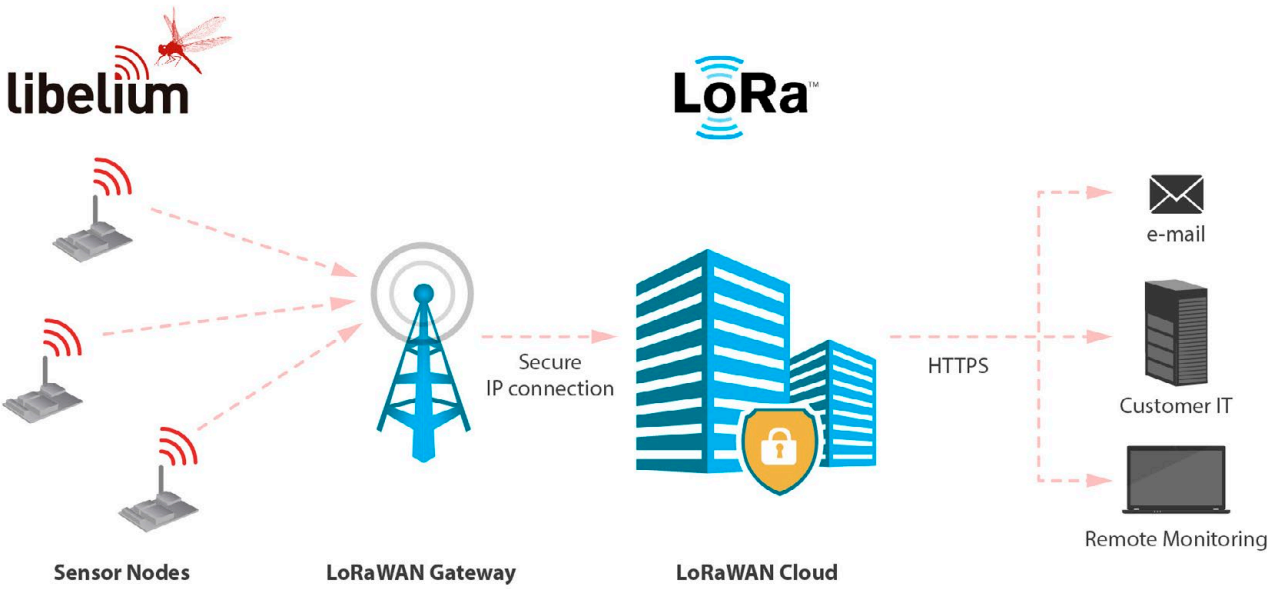


Figure: LoRaWAN 868 network

Sigfox module

Frequency: ISM 868 MHz

TX Power: 14 dBm

ETSI limitation: 140 messages of 12 bytes, per module per day

Range: Typically, each base station covers some km. Check the Sigfox Network

Chipset consumption: TX: 49 mA @ +14 dBm

Radio Data Rate: 100 bps

Receive sensitivity: -126 dBm

Sigfox certificate: Class 0u (the highest level)

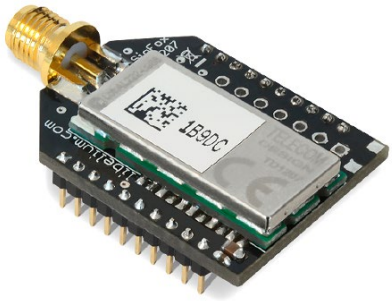


Figure: Sigfox module

Figure: Sigfox network

LoRa module

Protocol: Own, developed at Libelium. Not compatible with LoRaWAN.

Model: Semtech SX1272

Frequencies available: 860-1000 MHz, fits both 868 (Europe) and 915 MHz (USA) ISM bands

Max TX power: 14 dBm

Sensitivity: -137 dBm

Range:

Line of Sight: 21+ km / 13.4+ miles (LoS and Fresnel zone clearance)

Non Line of Sight: 2+ km / 1.2+ miles (nLoS going through buildings, urban environment)

Figure: LoRa module

Antenna:

868 / 915 MHz: 0 / 4.5 dBi

Connector: RPSMA

Encryption: AES 128/192/256b (performed by Waspmote API)

Control Signal: RSSI

Topology: Star

Receiver/Central node: Meshlium LoRa, special Gateway LoRa (SPI) or another Waspmote or Plug & Sense! unit

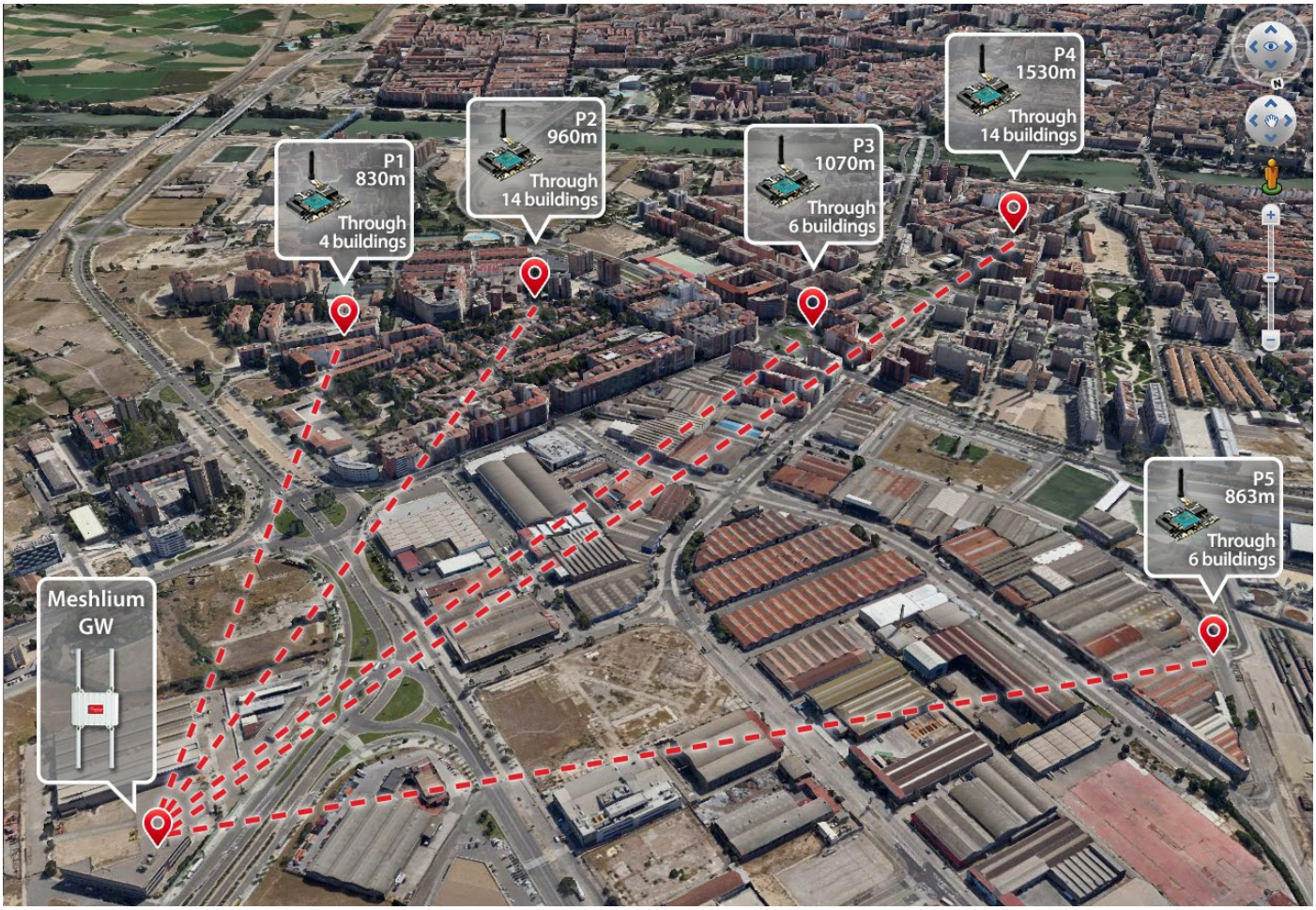


Figure: Star topology

Over the Air Programming (OTA)

There are two different OTA methodologies:

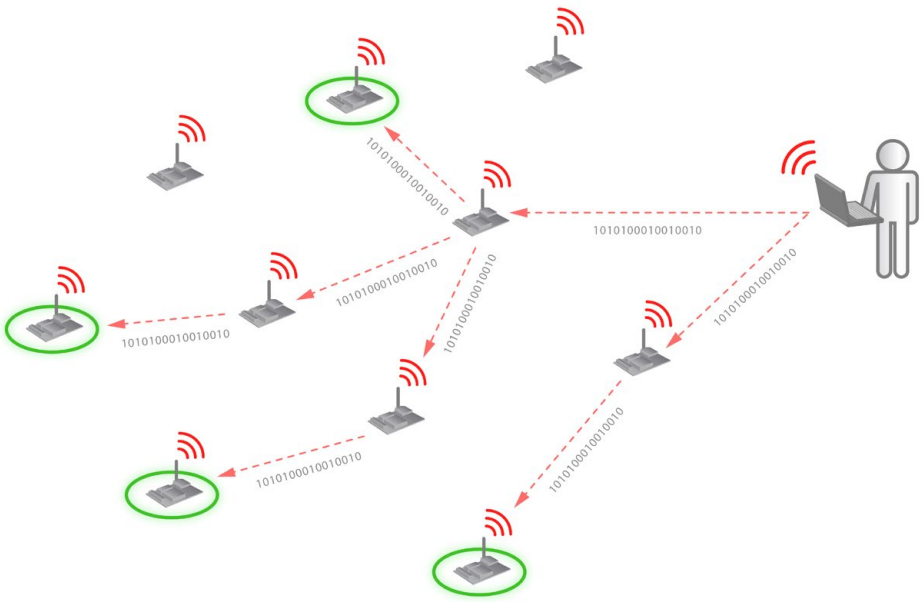
- OTA with 802.15.4/ZigBee modules
- OTA with 3G/GPRS/WiFi modules via FTP

OTA with 802.15.4/ZigBee modules

Benefits:

- Enables the upgrade or change of firmware versions without physical access
- Discover nodes in the area just sending a broadcast discovery query
- Upload new firmware in few minutes
- No interferences: OTA is performed using a change of channel between the programmer and the desired node so no interferences are generated to the rest of the nodes

Over The Air Programming with 802.15.4 / ZigBee



Topologies:

- Direct access: when the nodes are accessed in just one hop (no forwarding of the packets is needed).
- Multihop: when the nodes are accessed in two or more hops. In this mode some nodes have to forward the packets sent by the Gateway in order to reach the destination.

Modes:

- Unicast: Reprogram an specific node
- Multicast: Reprogram several nodes at the same time sending the program just once
- Broadcast: Reprogram the entire network sending the program just once

OTA with 3G/GPRS/WiFi modules via FTP

Benefits:

- Enables the upgrade or change of firmware versions without physical access.
- Upgrades the new firmware by querying a FTP server which helps to keep battery life.
- Upload new firmware in few minutes.

Topologies:

- Protocols which support FTP transmissions are directly connected to the Network Access Point.

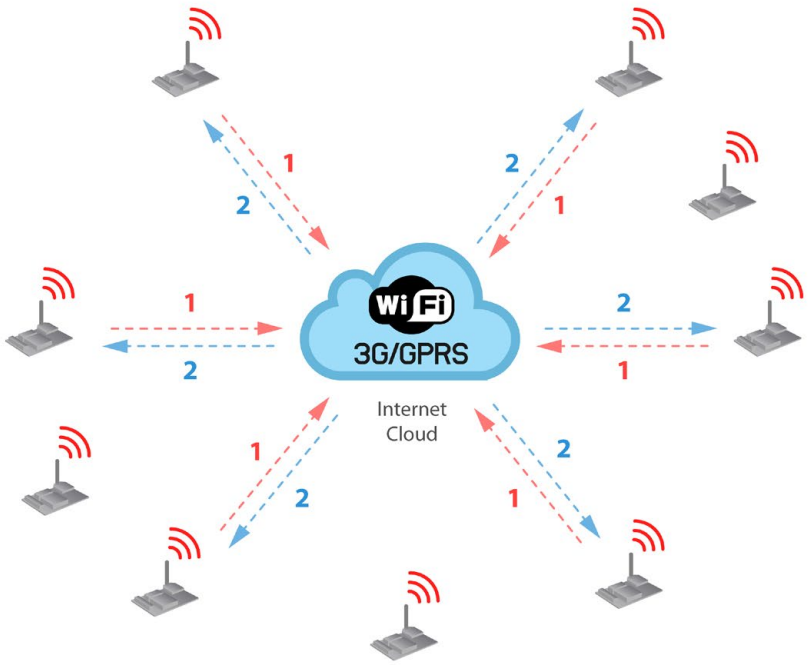


Figure: OTA with GPRS/3G/WiFi fundamentals

Encryption Libraries

The new Encryption Libraries are designed to add to the Waspmote sensor platform the capabilities necessary to protect the information gathered by the sensors. To do so **two cryptography layers** are defined:

- **Link Layer**: In the first one all the nodes of the network share a common **preshared key** which is used to encrypt the information using **AES 128**. This process is carried out by specific hardware integrated in the same 802.15.4/ZigBee radio, allowing the maximum efficiency of the sensor nodes energy consumption. This first security layer ensures no third party devices will be able to even connect to the network (access control).
- **Secure Web Server Connection:** The third security technique is carried out in Meshlium -the Gateway- where **HTTPS** and **SSH** connections are used to send the information to the Cloud server located on the Internet.

A third optional encryption layer allows each node to encrypt the information using the Public key of the Cloud server. Thus, the information will be kept confidentially all the way from the sensor device to the web or data base server on the Internet.

Transmission of sensor data:

Information is encrypted in the application layer via software with **AES 256** using the key shared exclusively between the origin and the destination. Then the packet is encrypted again in the link layer via hardware with **AES 128** so that only trusted packets be forwarded, ensuring access control and improving the usage of resources of the network.

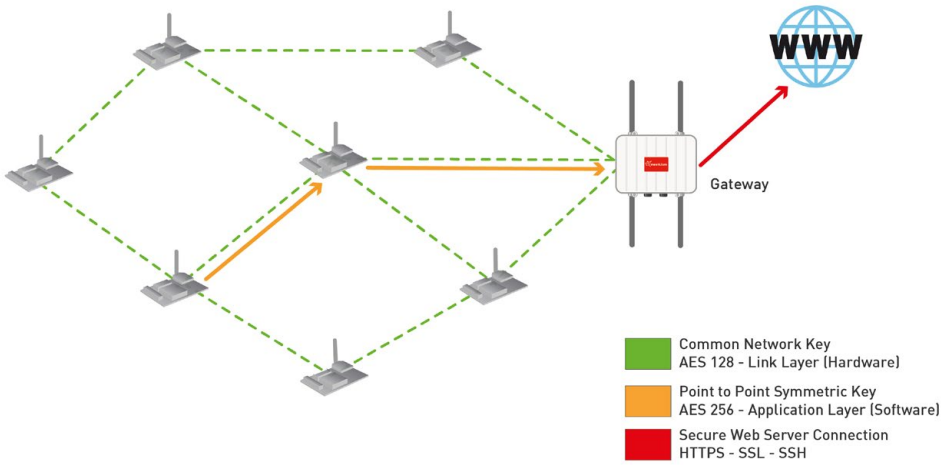


Figure: Communication diagram

WiFi

Protocols: 802.11b/g - 2.4GHz
TX Power: 0dBm - 12dBm (variable by software)
RX Sensitivity: -83dBm
Antenna connector: RPSMA
Antenna: 2dBi/5dBi antenna options
Security: WEP, WPA, WPA2
Topologies: AP
802.11 roaming capabilities

Actions:

- TCP/IP - UDP/IP socket connections
- HTTP web connections
- FTP file transfers
- Direct connections with iPhone and Android
- Connects with any standard WiFi router
- DHCP for automatic IP assignation
- DNS resolution enabled

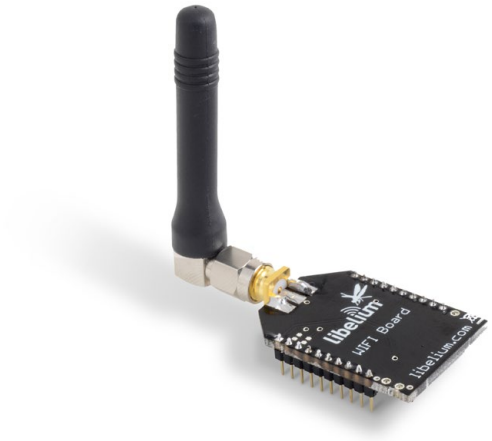


Figure: WiFi Module

GSM/GPRS

Model: SIM900 (SIMCom)
Quadband: 850MHz/900MHz/1800MHz/1900MHz
TX Power: 2W(Class 4) 850MHz/900MHz, 1W(Class 1) 1800MHz/1900MHz
Sensitivity: -109dBm
Antenna connector: UFL
External Antenna: 0dBi
Consumption in sleep mode: 1mA
Consumption in power off mode: 0mA

Figure: GSM/GPRS

Actions:

- Making/Receiving calls
- Making 'x' tone missed calls
- Sending/Receiving SMS
- Single connection and multiple connections TCP/IP and UDP/IP clients
- TCP/IP server
- HTTP Service
- FTP Service (downloading and uploading files)

GPRS + GPS

Figure: GPRS+GPS

Model: SIM928 (SIMCom)

GPRS features:
Quadband: 850MHz/900MHz/1800MHz/1900MHz
TX Power: 2W (Class 4) 850MHz/900MHz, 1W (Class 1) 1800MHz/1900MHz
Sensitivity: -109dBm
Antenna connector: UFL
External Antenna: 0dBi
Consumption in sleep mode: 1mA
Consumption in power off mode: 0mA

GPS features:

Time-To-First-Fix: 30s (typ.)
Sensitivity:

- Tracking: -160 dBm
- Adquisition: -147 dBm

Accuracy horizontal position : <2.5m CEP
Power consumption (GSM engine in idle mode):

- Acquisition : 72mA
- Tracking : 67mA

Actions:

- Making/Receiving calls
- Making 'x' tone missed calls
- Sending/Receiving SMS
- Single connection and multiple connections TCP/IP and UDP/IP clients
- TCP/IP server
- HTTP Service
- FTP Service (downloading and uploading files)
- GPS receiver

3G module

Model: SIM5215 (SIMCom)
Versions: Europe and America/Australia
Europe version:

- Dual-Band: 900/2100 MHz
- Tri-Band: 850/900/1800 MHz

America/Australia version:

- Dual-Band: 850/1900 MHz
- Quad-Band: 850/900/1800/1900 MHz

WCDMA (downlink): up to 384 kbps
WCDMA (uplink): up to 384 kbps
TX power:

- UMTS 850/900/1900/2100: 0.25 W
- GSM 850/900: 2 W
- DCS 1800 / PCS 1900: 1 W

Sensitivity: -106dBm
Antenna connector: UFL
External antenna: 0dBi
Consumption in sleep mode (RF circuits power off previously): 1mA

Figure: 3G module

Actions:

- Videocall using 3G network available with Video Camera Sensor Board
- Record video (res. 320 x 240) and take pictures (res. 640 x 480) available with Video Camera Sensor Board
- Support microSD card up to 32GB
- 64MB of internal storage space
- Making/Receiving calls
- Making 'x' tone missed calls
- Sending/Receiving SMS
- Single connection and multiple connections TCP/IP and UDP/IP clients
- TCP/IP server.
- HTTP and HTTPS service
- FTP and FTPS Service (downloading and uploading files)
- Sending/receiving email (SMTP/POP3)

Bluetooth low energy module

Protocol: Bluetooth v.4.0 / Bluetooth Smart
Chipset: BLE112
RX Sensitivity: -103dBm
TX Power: [-23dBm, +3dBm]
Antenna: 2dBi/5dBi antenna options
Security: AES-128
Range: 100 meters (at maximum TX power)

Figure: Bluetooth Low Energy module

Actions:

- Send broadcast advertisements (iBeacons)
- Connect to other BLE devices as Master / Slave
- Connect with Smartphones and Tablets
- Set automatic cycles sleep / transmission
- Calculate distance using RSSI values
- Perfect for indoor location networks (RTLS)
- Scan devices with maximum inquiry time
- Scan devices with maximum number of nodes
- Scan devices looking for a certain user by MAC address

Bluetooth module for device discovery

Protocol: Bluetooth 2.1 + EDR. Class 2
TX Power: 3dBm
Antenna: 2dBi
Max Scan: Up to 250 unique devices in each inquiry
Power levels: 7 [-27dBm, +3dBm]

Figure: Bluetooth module for device discovery

Application:

- Vehicular and pedestrian traffic monitoring

Features:

- Received Strength Signal Indicator (RSSI) for each scanned device

Scan devices with maximum inquiry time

- Scan devices with maximum number of nodes
- Scan devices looking for a certain user by MAC address
- Class of Device (CoD) for each scanned device

RFID/NFC

13.56MHz

- **Compatibility:** Reader/writer mode supporting ISO 14443A / MIFARE / FeliCaTM / NFCIP-1
- **Distance:** 5cm
- **Max capacity:** 4KB
- **Tags:** cards, keyrings, stickers

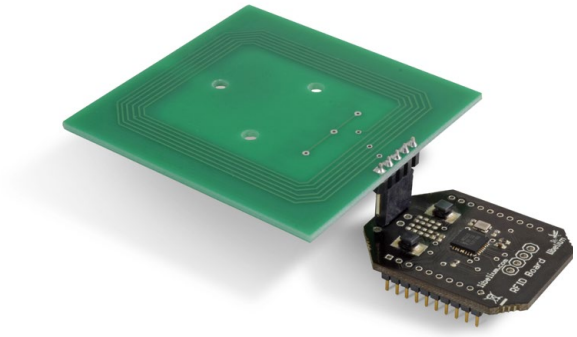


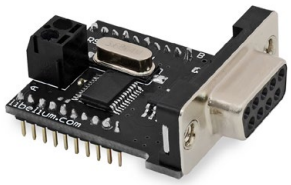
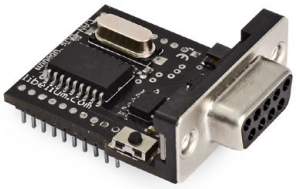
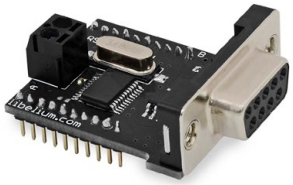
Figure: 13.56MHz RFID/NFC module

Applications:

- Located based services (LBS)
- Logistics (assets tracking, supply chain)
- Access management
- Electronic prepaid metering (vending machines, public transport)
- Smartphone interaction (NFCIP-1 protocol)

Industrial Protocols

RS-485, RS-232, CAN Bus and Modbus are widely used standards in the industrial and automation market. Waspmote can be interfaced with standard devices and sensors thanks to the Industrial Protocols modules.

MODULE	MAIN APPLICATIONS	
RS-485 / Modbus module	• Industrial Equipment • Machine to Machine (M2M) communications • Industrial Control Systems, including the most common versions of Modbus and Profibus • Programmable Logic Controllers • RS-485 is also used in building automation • Interconnect security control panels and devices	 *Figure: RS-485 module*
RS-232 Serial / Modbus module	• Dial-up modems • GPS receivers (typically NMEA 0183 at 4,800 bit/s) • Bar code scanners and other point of sale devices • LED and LCD text displays • Satellite phones, low-speed satellite modems and other satellite based transceiver devices • Flat-screen (LCD and plasma) monitors to control screen functions by external computer, other AV components or remotes • Test and measuring equipment such as digital multimeters and weighing systems • Updating firmware on various consumer devices • Some CNC controllers • Uninterruptible power supply • Stenography or Stenotype machines • Software debuggers that run on a 2nd computer • Industrial field buses	 *Figure: RS-232 module*
CAN Bus module	• Automotive applications • Home automation • Industrial Networking • Factory automation • Marine electronics • Medical equipment • Military uses	 *Figure: Can Bus module*
Modbus software layer	• Modbus is a software layer which can be run over the RS-485 or RS-232 modules • Multiple master-slave applications • Sensors and instruments • Industrial Networking • Building and infrastructure • Transportation and energy applications	 *Figure: RS-485 module*

Expansion Radio Board

The Expansion Board allows to connect two communication modules at the same time in the Waspmote sensor platform. This means a lot of different combinations are possible using any of the wireless radios available for Waspmote: 802.15.4, ZigBee, DigiMesh, 868 MHz, 900 MHz, LoRa, Bluetooth Pro, Bluetooth Low Energy, RFID/NFC, WiFi, GPRS Pro, GPRS+GPS and 3G/GPRS. Besides, the following Industrial Protocols modules are available: RS-485/Modbus, RS-232 Serial/Modbus and CAN Bus.

Some of the possible combinations are:

- LoRa - GPRS
- 802.15.4 - Bluetooth
- 868 MHz - RS-485
- RS-232 - WiFi
- DigiMesh - 3G/GPRS
- RS-232 - RFID/NFC
- WiFi - 3G/GPRS
- CAN bus - Bluetooth
- etc.

Remark: *GPRS Pro, GPRS+GPS and 3G/GPRS modules do not need the Expansion Board to be connected to Waspmote. They can be plugged directly in the socket1.*

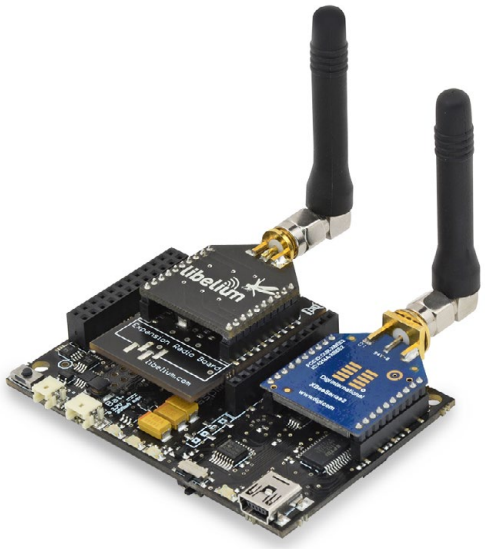


Figure: Expansion Radio Board

Applications:

- Multifrequency Sensor Networks: (2.4GHz - 868/900MHz)
- Bluetooth - ZigBee hybrid networks
- NFC (RFID) applications with 3G/GPRS
- ZigBee - WiFi hybrid networks

Programmable interruptions

- **Asynchronous**
  - Sensors (programmable threshold)
  - Accelerometer: Free-fall, impact (programmable threshold)
  - XBee (DigiMesh)
- **Synchronous:**
  - Watchdog: programmable alarms: from 32ms to 8s
  - RTC: programmable alarms: from 1s to days

Sensor Boards

GASES	APPLICATIONS	SENSORS

Figure: Gases Board

APPLICATIONS

- **City pollution**
  CO, CO_2, NO_2, O_3
- **Emissions from farms and hatcheries**
  CH_4 ,H_2S , NH_3
- **Control of chemical and industrial processes**
  C_4H_{10} ,H_2, VOC
- **Forest fires**
  CO, CO_2

SENSORS

- Carbon Monoxide – CO
- Carbon Dioxide – CO_2
- Oxygen – O_2
- Methane – CH_4
- Hydrogen – H_2
- Ammonia – NH_3
- Isobutane – C_4H_{10}
- Ethanol – CH_3CH_2OH
- Toluene – $C_6H_5CH_3$
- Hydrogen Sulfide – H_2S
- Nitrogen Dioxide – NO_2
- Ozone – O_3
- Hydrocarbons – VOC
- Temperature
- Humidity
- Atmospheric pressure

GASES PRO	APPLICATIONS	SENSORS

Figure: Gases PRO Board

APPLICATIONS

- **City pollution**
  CO, NO, NO_2, O_3, SO_2, Particle Matter - Dust
- **Air Quality Index calculation**
  SO_2, NO_2, Particle Matter - Dust, CO, O_3, NH_3
- **Emissions from farms and hatcheries**
  CH_4, H_2S, NH_3
- **Greenhouse management**
  CO_2, CH_4, Humidity
- **Control of chemical and industrial processes**
  H_2, HCl, CH_4, SO_2, CO_2
- **Indoor air quality**
  CO_2, CO, Particle Matter - Dust, O_3
- **Forest fires**
  CO, CO_2

SENSORS

- Carbon Monoxide – CO
- Carbon Dioxide – CO_2
- Molecular Oxygen – O_2
- Ozone – O_3
- Nitric Oxide – NO
- Nitric Dioxide – NO_2
- Sulfur Dioxide – SO_2
- Ammonia – NH_3
- Methane – CH_4 – and other combustible gases
- Molecular Hydrogen – H_2
- Hydrogen Sulfide – H_2S
- Hydrogen Chloride – HCl
- Phosphine – PH_3
- Ethylene Oxide – ETO
- Chlorine – Cl_2
- Particle Matter (PM1 / PM2.5 / PM10) – Dust Sensor [only for Plug & Sense!]
- Temperature, Humidity and Pressure

EVENTS

Figure: Events Board

APPLICATIONS

- **Security**

  Hall effect (doors and windows), person detection PIR

- **Emergencies**

  Presence detection and water level sensors, temperature

- **Control of goods in logistics**

SENSORS

- Pressure/Weight
- Hall Effect
- Temperature (+/-)
- Liquid Presence
- Liquid Flow
- Luminosity
- Presence (PIR)

SMART WATER

Figure: Smart Water Board

APPLICATIONS

- **Potable water monitoring**

  pH, ORP, Dissolved Oxygen (DO), Nitrates, Phosphates

- **Chemical leakage detection in rivers**

  Extreme pH values signal chemical spills , Dissolved Oxygen (DO)

- **Swimming pool remote measurement**

  pH, Oxidation-Reduction Potential (ORP)

- **Pollution levels in the sea**

  Temperature, Conductivity (Salinity), pH, Dissolved Oxygen (DO) and Nitrates

SENSORS

- pH
- Oxidation-Reduction Potential (ORP)
- Dissolved Oxygen (DO)
- Conductivity
- Temperature
- Turbidity

SMART WATER IONS

Figure: Smart Water Ions Board

APPLICATIONS

- **Drinking water quality control**

  Calcium (Ca^{2+}), Iodide (I^-), Chloride (Cl^-), Nitrate (NO_3^-), Magnesium (Mg^{2+}), Sodium (Na^+), pH

- **Agriculture water monitoring**

  Calcium (Ca^{2+}), Nitrate (NO_3^-), Magnesium (Mg^{2+}), Sodium (Na^+), Potassium (K^+), Ammonium (NH_4^+), pH

- **Swimming pools**

  Bromide (Br^-), Chloride (Cl^-), Fluoride (F^-), pH

- **Waste water treatment**

  Cupric (Cu^{2+}), Silver (Ag^+), Fluoroborate (BF_4^-), Lithium (Li^+), Nitrite (NO_2^-), Perchlorate (ClO_4^-), pH

SENSORS

- Ammonium (NH_4^+)
- Bromide (Br^-)
- Calcium (Ca^{2+})
- Chloride (Cl^-)
- Cupric (Cu^{2+})
- Fluoride (F^-)
- Iodide (I-)
- Fluoroborate (BF_4^-)
- Lithium (Li^+)
- Nitrate (NO_3^-)
- Nitrite (NO_2^-)
- Magnesium (Mg^{2+})
- Perchlorate (ClO_4^-)
- Potassium (K^+)
- Silver (Ag^+)
- Sodium (Na^+)
- pH
- Temperature

SMART CITIES

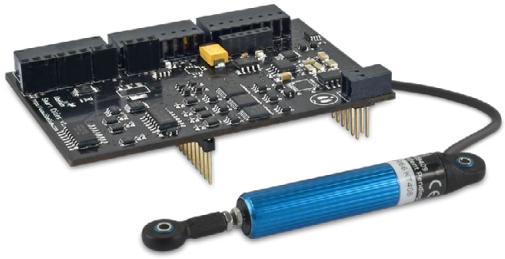


Figure: Smart Cities Board

APPLICATIONS

- **Noise maps**

  Monitor in real time the acoustic levels in the streets of a city

- **Structural health monitoring**

  Crack propagation

- **Air quality**

  Detect the level of particulates and dust in the air

- **Waste management**

  Measure the garbage levels in bins to optimize the trash collection routes

SENSORS

- Microphone (dBA)
- Crack propagation gauge
- Linear displacement
- Dust
- Ultrasound (distance measurement)
- Temperature
- Humidity
- Luminosity

SMART PARKING

Figure: Plug & Sense! Smart Parking node

APPLICATIONS

- Car detection for available parking information
- Detection of free parking lots outdoors
- Parallel and perpendicular parking slots control
- Sigfox and LoRaWAN connectivity (868 and 900)
- Extreme battery life
- Surface-mount enclosure, fast installation
- Easy configuration, remote management from the cloud

SENSORS

- Magnetic field
- Temperature

AGRICULTURE

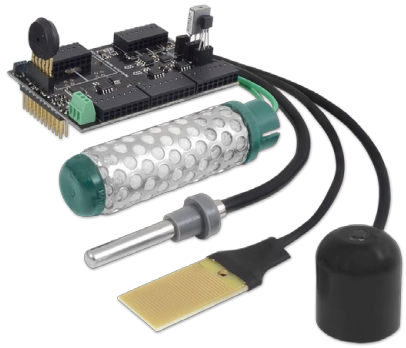


Figure: Agriculture Board

APPLICATIONS

- **Precision Agriculture**

  Leaf wetness, fruit diameter

- **Irrigation Systems**

  Soil moisture, leaf wetness

- **Greenhouses**

  Solar radiation, humidity, temperature

- **Weather Stations**

  Anemometer, wind vane, pluviometer

SENSORS

- Air Temperature / Humidity
- Soil Temperature / Moisture
- Leaf Wetness
- Atmospheric Pressure
- Solar Radiation - PAR
- Ultraviolet Radiation - UV
- Trunk Diameter
- Stem Diameter
- Fruit Diameter
- Anemometer
- Wind Vane
- Pluviometer
- Luminosity

4-20 mA CURRENT LOOP

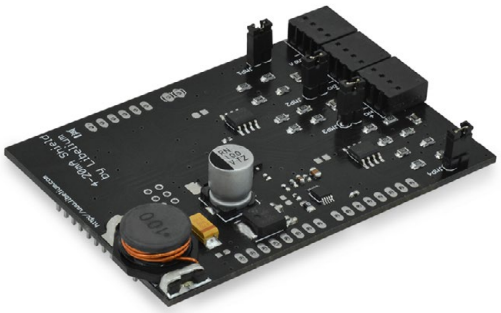


Figure: 4-20 mA Current Loop Board

APPLICATIONS

- Sensors and Instruments
- Remote transducers
- Monitoring processes
- Data transmission in industrial ambients

FEATURES

- **Type:** Analog
- **Media:** Twisted Pair
- **No. of devices:** 1
- **Distance:** 900m
- **Supply:** 5-24V

The user can choose among a wide variety of standard sensors

VIDEO CAMERA

Figure: Video Camera Sensor Board

APPLICATIONS

- Security and surveillance
- Take photos (640 x 380)
- Record video (320 x 240)
- Realtime Videocall using 3G network
- Night Vision mode available

SENSORS

- Image sensor
- Luminosity
- Infrared
- Presence (PIR)

RADIATION

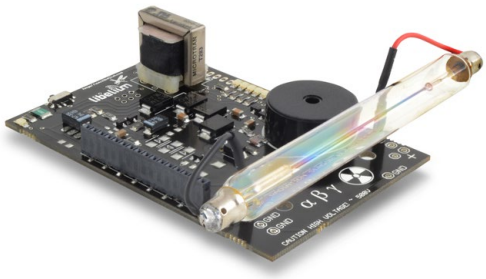


Figure: Radiation Board

APPLICATIONS

- Monitor the radiation levels wirelessly without compromising the life of the security forces
- Create prevention and control radiation networks in the surroundings of a nuclear plant
- Measure the amount of Beta and Gamma radiation in specific areas autonomously

SENSORS

- Geiger tube [β, γ] (Beta and Gamma)

PROTOTYPING SENSOR

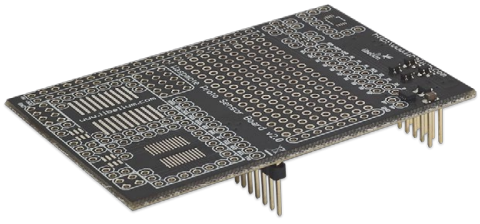


Figure: Prototyping Sensor Board

APPLICATIONS

- Prepared for the **integration of any kind of sensor**.

SENSORS

- Pad Area
- Integrated Circuit Area
- Analog-to-Digital Converter (16b)

Power supplies

- 6600mAh Li-Ion rechargeable // 13000 /26000/52000mAh **non - rechargeable**
- Solar Panel: rigid (7V – 500mA) and flexible (7.2V – 100mA)
- USB (220V-USB, car lighter USB)

USB-PC interface

Model: Waspmote Gateway *
Communication: 802.15.4/ZigBee - USB PC
Programmable buttons and leds
** Included in the developers Kit*

Compiler:

- IDE-Waspmote (open source)
- Language: C++
- Versions Windows, Linux and Mac-OS

Figure: Waspmote Gateway

Waspmote vs Waspmote Plug & Sense!

Waspmote is the original line in which developers have a total control over the hardware device. You can physically access to the board and connect new sensors or even embed it in your own products as an electronic sensor device.

The Waspmote Plug & Sense! line allows developers to forget about electronics and focus on services and applications. Now you can deploy wireless sensor networks in an easy and scalable way ensuring minimum maintenance costs. The platform consists of a robust waterproof enclosure with specific external sockets to connect the sensors, the solar panel, the antenna and even the USB cable in order to reprogram the node. It has been specially designed to be scalable, easy to deploy and maintain.

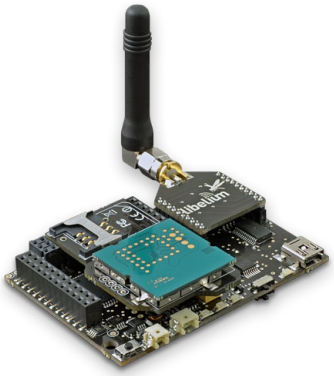


Figure: Waspmote

Figure: Waspmote Plug & Sense!

For more information about Waspmote Plug & Sense! go to:

http://www.libelium.com/plug_&_sense

Certifications

- CE (Europe)
- FCC (USA)
- IC (Canada)

Document version: v5.9 - 07/2016