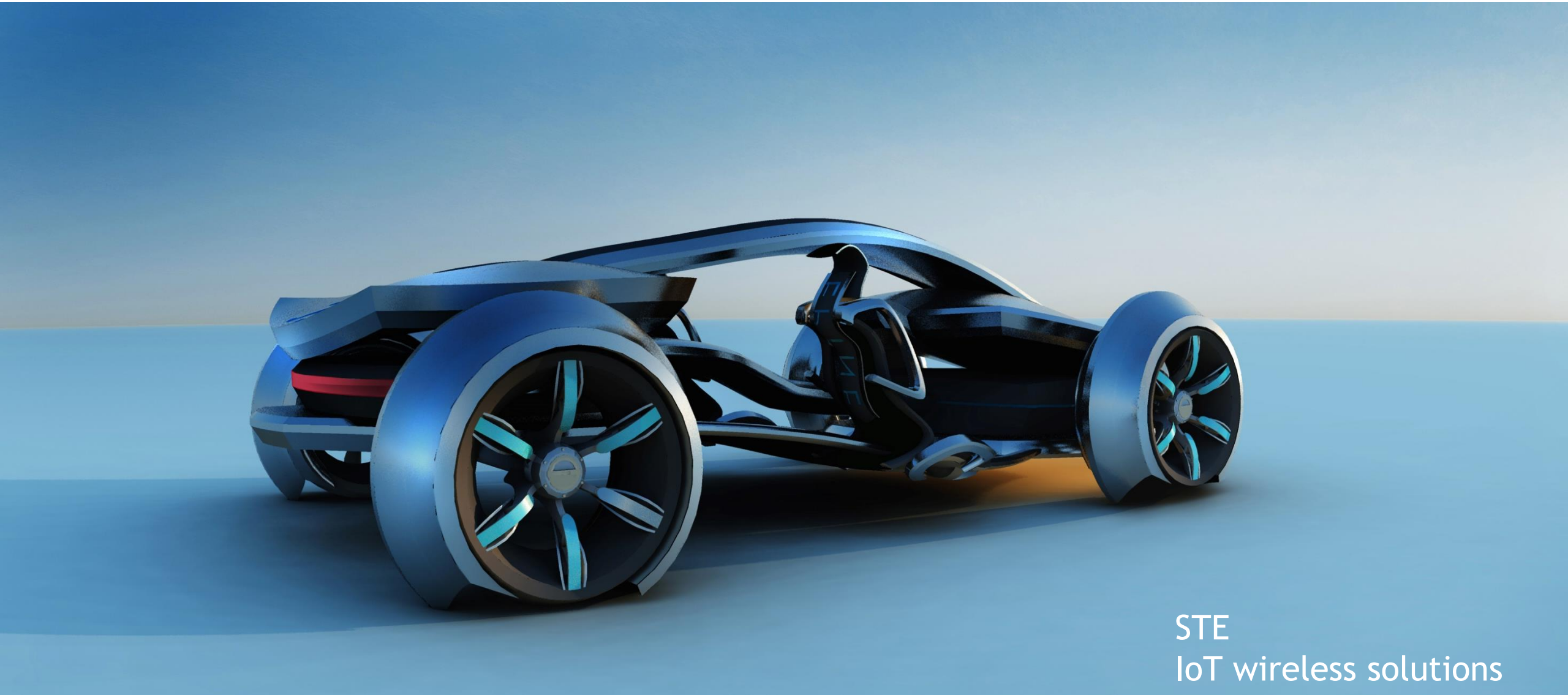
Think | Distributor of Innovations



STE
IoT wireless solutions

index

- Ste company profile
- Micro.sp technology
- Ste ip portfolio
- Fields of application
- Sp.Net concept & IoT Approach
- Case History

Ste Engineering

Mission
"Everywhere Wireless Sensors"

We aim to redesign the concept of wireless networks Sensors solutions for the most innovative approach to energy management.

Think Distributor of Innovations

RADIO-FREQUENCY SINCE 1965

- Established earlier in the 1965, 1.7m € turnover / 14 employees.
- Devoted to RF engineering in the domain of Short Range Device (SRD).
- Has remarkable know-how in Ultra Low power Autonomous Wireless Sensors.
- **STE** is a technology developer, manufacturer and licenses to larger companies for mass production.
- Innovators in RF with micro.sp® breakthrough technology.
- Owner of a number of IPs in the domain of data telemetry and automotive area.

micro.sp®

SENSING A WORLD OF THINGS

micro.sp® technology

STE FIRST COMPANY IN THE WORLD TO PROPOSE THE MICRO.SP TECHNOLOGY INNOVATION.

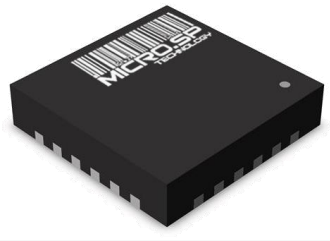
WHAT IS THE MICRO.SP TECHNOLOGY?

-> **MICRO.SP** IS MICRO SHORT RADIO TRANSMISSION LOW CONSUMPTION BASED ON SAW RESONATOR (Surface Acoustic Wave)

-> **MICRO.SP** IS THE **WORLDWIDE RECOGNIZED TECHNOLOGY THAT CONSUMES LESS ENERGY** AND ENABLE TRILLION VISION SENSORS IN THE IOT WORLD.

-> **MICRO.SP** ALLOWS APPLICATIONS THAT ARE OFF LIMITS FOR COMPETITORS.

-> WITH **MICRO.SP** IT IS POSSIBLE TO CONVERT VIRTUALLY ANY SENSOR INTO A WIRELESS APPLICATION FOR INTERNET OF THINGS.



This is micro.sp core
wireless sensor core
a new IoT concept

micro.sp® KEY FACTORS

THE KEY FACTORS OF MICRO.SP TECHNOLOGY:

> ULTRALOW ENERGY CONSUMPTION (3 magnitude lower power consumption than competitors)
> LOW ECONOMIC IMPACT
> HIGH FLEXIBILITY ENABLING REMOTE MONITORING OF ANY TYPE OF SENSORS
> RECORD IN MECHANICAL FORM FACTOR (7X7 mm)

PROS

- ULTRA LOW ENERGY CONSUMPTION
- SMALL FORM FACTOR
- LOW COST
- SMALL BATTERY (LIFETIME 10 YEARS)
- EASY AND FAST TO INTEGRATE
- INNOVATIVE & UNIQUE WIRELESS PROTOCOL

CONS

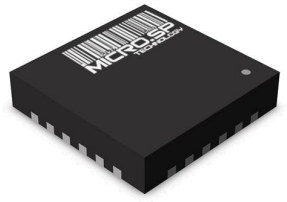
- PROPRIETARY PROTOCOL
- MONODIRECTIONAL COMMUNICATION
- OPTIONAL BI_DIRECTIONAL

LIFETIME 10 YEARS WITH SMALL BATTERY

micro.sp® is a flexible architecture

Micro.sp is flexible architecture to interface STANDARD SENSORS. With micro.sp technology you can easily integrate any kind of sensor immediately and send the data directly to the receiver. It's possible to eliminate wiring.

- Temperature
- Pressure
- Strain
- Humidity
- Light
- Inclinometer
- Accelerometer
- Deformation
- Vibration
- …



EASY INTEGRATION

SEND THE DATA SENSORS TO THE RECEIVER

INTEGRATED TO THE CUSTOMER PRODUCT

You can manage the sensors of your wireless sensors network from any devices commonly used such as smartphone or tablet.

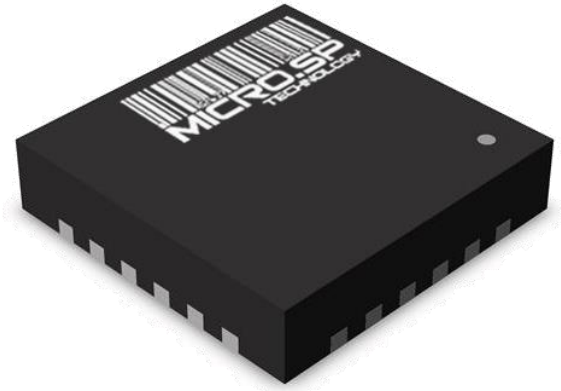
micro.sp®: technical data and comparative table

Competitors

Specification	STE PPM	STE OOK	Others	Freescale FXTH8715116T1
Max RF output power	+14dBm	+14dBm	+8dBm	+8dBm
RF consumption in TX mode	**PPM: 0,9mA @+14dBm**	**OOK: 7,6mA @+5dBm**	**FSK: 9mA @+8dBm**	**FSK: 7,6mA @5dBm**
Ultra Low standby current	500nA	500nA	500nA	500nA
Energy consumption per bit	235,7nJ per bit @ 10kbps	≈2000nJ per bit @10kbps	≈2000nJ per bit @10kbps	≈2000nJ per bit @10kbps
Life of system	a) ≈ 10 years with 1 minute data rate transmission using a 1225 lithium battery (48mAh). b) ≈ 20 years with 10 sec data rate transmission using a 2032 (225mAh) lithium battery (exceeding self-discharge of lithium batter). → Suitable for energy harvesting application.	≈ 10years with CR2032 battery (225mAh)* ** *with Axis sensor for wake up and sleep strategy. ** with a transmission rate of 1 minute.	≈ 10years with CR2032 battery (225mAh) * ** *with Axis sensor for wake up and sleep strategy. ** with a transmission rate of 1 minute.	≈ 10years with CR2032 battery (225mAh) * ** *with Axis sensor for wake up and sleep strategy. ** with a transmission rate of 1 minute.

Micro.sp TX consumption 0,9mA @ 14dBm
Competitors TX consumption 7,6mA @ 5dBm

Micro.sp vs competitors



MICRO.SP TECHNOLOGY

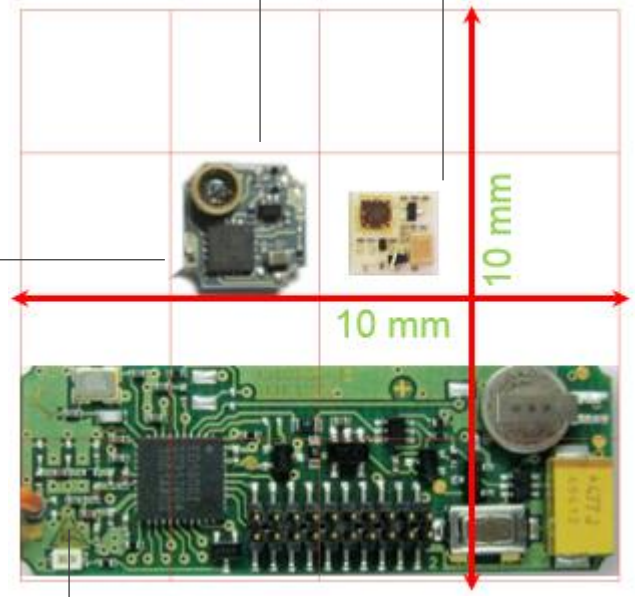
Micro.Sp Core TX

Dimension: 9 x 9 mm (discrete version 0201).

TX mode: < 1mA.
RX mode: ~10 mA.
Average current @10s TX rate: <3,5µA
Target cost: <3 €

Micro.sp Gen 1

Micro.sp Sip



ENOCEAN STM 332U

Dimensions: 43 x 16 x 8 mm
Tx mode: 24 mA
Rx mode: 33 mA
Average current @10s TX rate: ~13,5µA
Target cost: >10 €
www.enocean.com

COMPETITORS

Value proposal and scale reduction

Enhanced features:

- +14dBm: the unmatched MOST ROBUST RF core.
- Unveils new and innovative market opportunities.
- Unmatched powerful chip to reduce time to market and investments.
- ENVIRONMENT: the lowest that contributes to environment by reducing battery size of trillion sensors.
- Bridge towards future of battery-less connected object.
- Competitive Cost.
- Scalable and Flexible architecture.

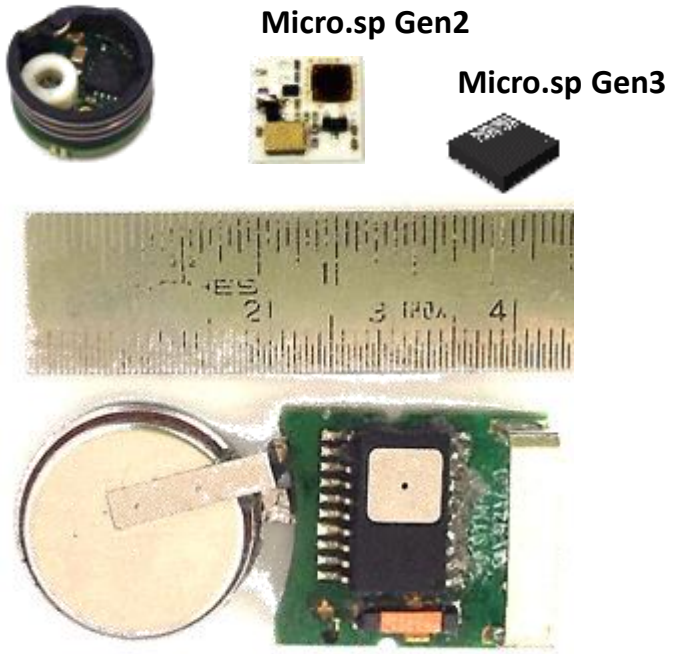
Micro.sp core
Dimension: 7 x 7 mm.
TX mode: microAh x 10 years = 2,03
RX mode: ~12 mA.
Authonomy: 10 Years with 12mm battery.
<¼ of the lithium volume compound less than competitors

Competitors:
Architecture: ASIC.
TX mode: microAh x 10 years = 7,65
RX mode: ~14 mA.
Authonomy: 10 Years 32 mm battery

Micro.sp Gen1

Micro.sp Gen2

Micro.sp Gen3



ip portfolio & trademarks

> 5 patent applications granted.

> 2 IP pending and waiting for grant.

> High performances in terms of IP contribution to EU market.

> 1 IP application every 2 employees.

> (Q)Be® and micro.sp® are STE trademarks.

> IP portfolio is currently submitted to estimation.

> On going discussion for funds and capital.

Europäisches Patentamt
European Patent Office
Office européen des brevets

European Patent Register

Intellectual property rights intensive industries: contribution to economic performance and employment in the European Union

Industry-Level Analysis Report. September 2013

OFFICE FOR HARMONIZATION IN THE INTERNAL MARKET

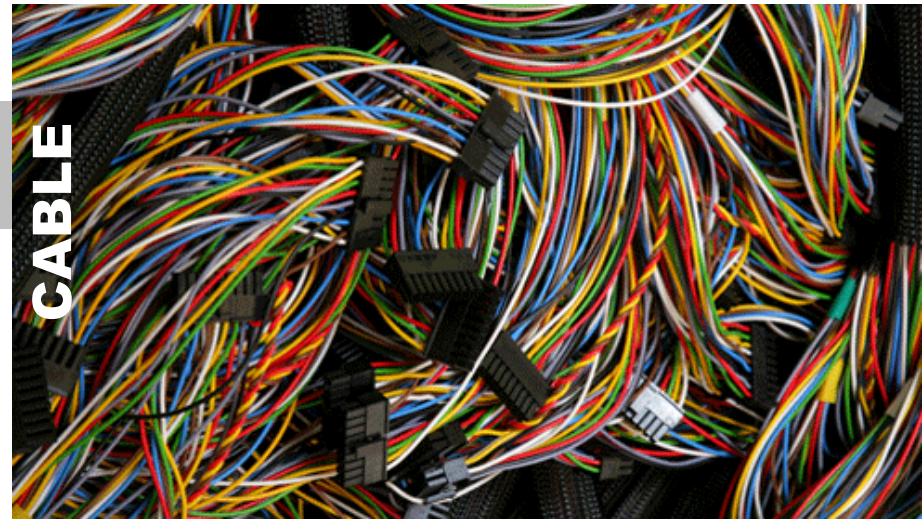
A new tire revolution.

Energy efficiency and integration in autonomous wireless sensors matters greatly. STE is leading the pace of innovation: a technology that serves future trends in sensing a world of things is now available. And this "new tire revolution" means bringing intelligent innovation to a world where energy efficiency makes the difference: micro.sp™ is the innovation that makes the tire technology intelligent.

cablefree

Think | Distributor of Innovations

CABLE – sometimes is a problem….



The cables could be a problem. Sometimes…..

1. High cost of wiring and cable connectors.
2. High cost for test and production (labour costs).
3. High failure rate.
4. High wear rate of cables and connectors
4. Hard environment

WIRELESS – …..it's a solution

Thanks to the wireless technology you can put a sensor in unthinkable places (i.e. Tire pressure monitoring System)

With a wireless sensor you can:
Reduce the chassis weight.
Reduce risks of failures (connector, cable).
Reduce hardware wear (due to vibration).
Reduce Installation cost.
Increase efficiency of fitment and test, less labour costs.
A lot of sensors can works with a 1 receiver.
The sensors can send the datas continuously.

Without cable it's possible

Think | Distributor of Innovations

BEFORE
Wires and cable connectors

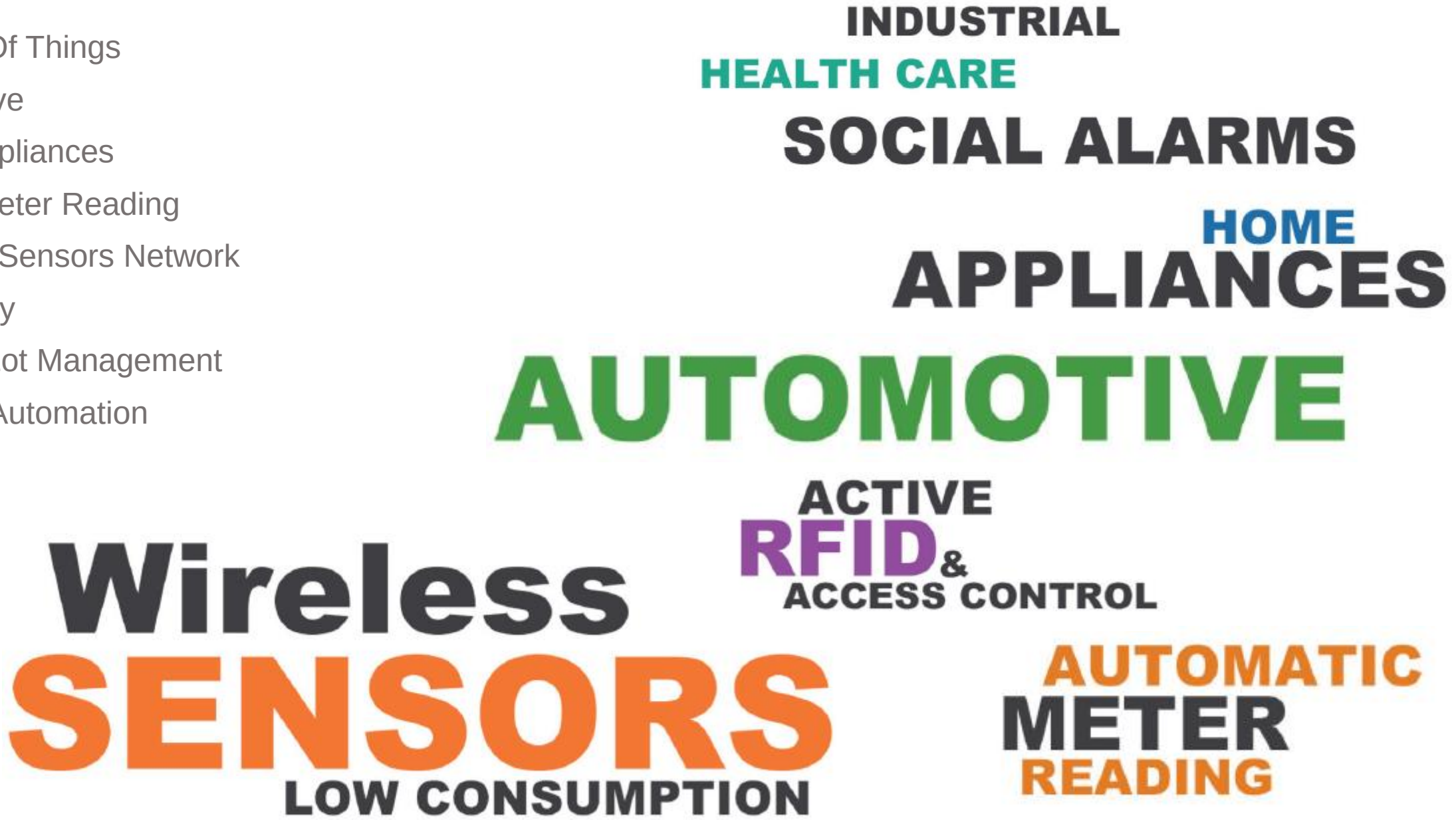
AFTER
WIRELESS TECHNOLOGY

THIS IS MICRO.SP «INNOVATION»

Wireless

field of applications

> Internet Of Things
> Automotive
> Home Appliances
> AMR – Meter Reading
> Wireless Sensors Network
> Smart City
> Parking Lot Management
> Building Automation



sp.net concept

Sp.net is the new multi-technology sensors network produced by STE.

Thanks to **sp.net** you will be able to create your own wireless infrastructure with just few easy steps while saving your money.

With **sp.net** you will be able to control any kind of sensor within any environment.

A wide range of applications which go from small home sensors to bigger urban systems as well as more sophisticated use such as checking wheel pressure through a sensor placed into the tyre which sends data directly to your smartphone.

sp.net
wireless sensors

The Sp.Net: network evolution

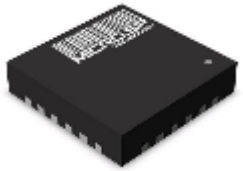
Any object, no matter whether big or small, can be part of your **sp.net** network.

Aiming to redesign the clouds of wireless sensors through the most innovative approach to energy efficiency.

sp.net concept

Cuby: a new gateway concept

Cuby is a new STE proprietary multi-technology concept. With just few easy steps CUBY is able to create an effective sensors network at high energetic efficiency. A wide range of different sensors can be mounted within the same system: low consumption MicroSp, 169Mhz Systems, Wireless M-Bus,Zig-Bee sensors as well as Bluetooth. Thanks to wi-fi connection Cuby becomes a hub of the internet network.



this is IoT

All in one concept

Cuby is an all-in-one platform including:
> Last generation radio receiving Micro-SP
> RTX Radio 169Mhz Wireless M-Bus
> Wi-Fi Module
> Bluetooth module
> RJ45 Interface
> USB connector
> GSM Module

Multitechnology

Cuby has on-board all technologies needed for the accomplishment of typical wireless infrastructure focused on a wireless sensors network.
The system is able to simultaneously handle all on-board peripherals thanks to an extremely performant firmware. In this regard, either managing monodirectional low-consumption sensors or controlling data collecting hubs within an urban environment it becomes simply possible and real. User friendliness and the expansion capability turn the CUBY into an essential choice should you wish to realise an highly professional product.

CUBY

sp.net concept

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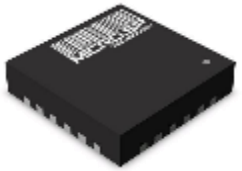
Wireless Sensors Network

sp.net wireless sensors

METER READING
WHITE MARKET SENSORS
SWITCH SENSORS
3 AXIS SENSORS
SOCIAL ALARMS
LEVEL SENSORS
LIGHTNESS SENSORS
TEMPERATURE SENSORS
HOME SENSORS
LOGISTICS SENSORS
TRAFFIC SENSORS
PARKING SENSORS
LAMP SENSORS
AUTOMOTIVE SENSORS
POWER SENSORS
HUMIDITY SENSORS



all micro.sp wireless sensor

Cuby collects data from multi-technology Sensors and manages them individually.
It is a scalable solution.
It can be powered by a solar panel, both by a battery or directly connected to the power line.

WEB SERVER INTERFACE
You can manage the sensors of your wireless sensors network from any devices commonly used such as smartphone or tablet.

SENSING A WORLD OF THINGS

Internet Of Things

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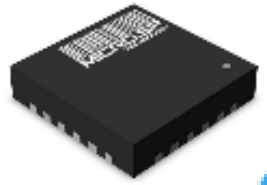
RFID Logistic

Health Care

Building Automation

Home Appliances



micro.sp is

Internet Of Things

this is SP.Net

Smart Parking

Tire Pressure

IoT sp.net tire pressure

case history

A new tire revolution

Energy efficiency and integration in autonomous wireless sensors matters greatly.
STE is leading the pace of innovation: a technology that serves future trends in sensing a world of things is now available. And this “new tire revolution” means bringing
intelligent innovation to a world where energy efficiency makes the difference: micro.sp™ is the innovation that makes the tire technology intelligent.

TPMS

When moving from standard packaging attached to tyre stems to a mechanical complex inside the tyre carcass, the form factor becomes a key feature:
STE, recently designated as R&D partner of one of the world's largest tyre maker, is committed to develop an innovative method of data transmission applied to tyres.
According to recent experiments conducted by STE on radiowave propagation in carcass, a new PPM modulation scheme has demonstrated an extremely higher energy efficiency along with a greater RF robustness.

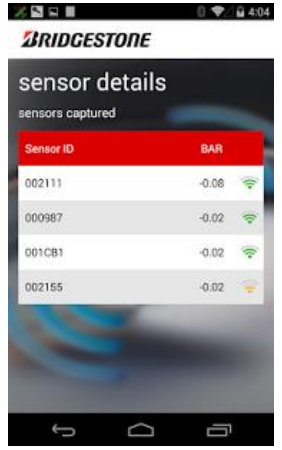
BRIDGESTONE

Bridgestone targets fleets at IAA Commercial Vehicles 2014

case history

Show presence – CV Show, IAA, Reifen Essen, Bridgestone Days

IAA 2014: Bridgestone will present its innovative TPMS at the 65th IAA Commercial Vehicles International Motor Show in Hanover (Germany), 25th September to 2nd October 2014



Bridgestone's Smartphone Ap

Bridgestone to break ground at Reifen Essen

Bridgestone's dedication to innovation goes well beyond the tyre itself. Which is why Bridgestone's exclusive systems package will also be on display, including the revolutionary Tyre Pressure Monitoring System (TPMS).

IoT sp.net automotive

case history

“The passenger first enters their height via smartphone or onboard console, then sits back against the adjusted head and foot rests as pressure sensors evaluate posture for perfect seating.”
Faurecia SA and Johnson Controls.

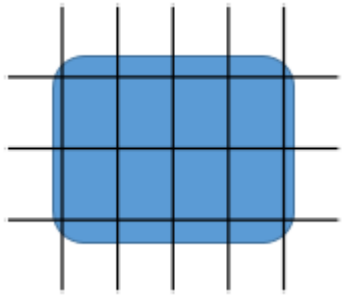
Connected objects in cars.
The micro.sp enables «wire free» car’s and connect objects such as tires, seats, daashboards and links them with smartphones

Wireless sensors for seat self-adjust
> Self-adjusting seats to take the guesswork out of comfortable driving.
> Current trend towards self-adjusting seats that utilize cameras and pressure sensors.
> Targeting to tailor the perfect seating for a level of comfort not easily achieved with the numerous controls currently found in luxury sedans.

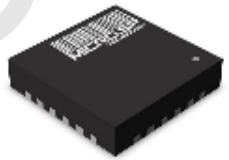
> The seat could move to fit exactly customer’s need
> Finding the right seat position is crucial for comfort &visibility.
> And it is crucial for safety.
> Measurements are taken even before user get in.

Micro.sp sensor offers ten year continuos monitoring maintenance free.

1. **The key for the intelligent seat is the wireless sensor that must be small, cheap and energy efficient.**
2. **It must last for years maintenance-free.**



Micro.sp integrated in seats grid



Mobile com Dashboard Smart app

IoT sp.net smart city

case history

Where can i park?
Check it on your smartphone

SMART PARKING
Thanks to extremely performing sensors it becomes possible to put in place a network to wisely manage and control parking lots and traffic flows.

The sensor can be used either hidden underground underneath the pavement or glued to the pavement at street level.

SMART LIGHTING – VEGALED SPAGNOLO SRL
The street lamps become a SMART system and it's possible to manage all the data sent from the parking systems.

Every street lamp is connected with others through a wireless infrastructure.
The system can handle more than 1000 lamps.

In partnership with Spagnolo srl

IN-GROUND MAGNETOMETER SENSOR

SURFACE MAGNETOMETER SENSOR

COMUNE DI GENOVA

2013 - 2014
GENOVA INSTALLATION
SMART PARKING SOLUTION

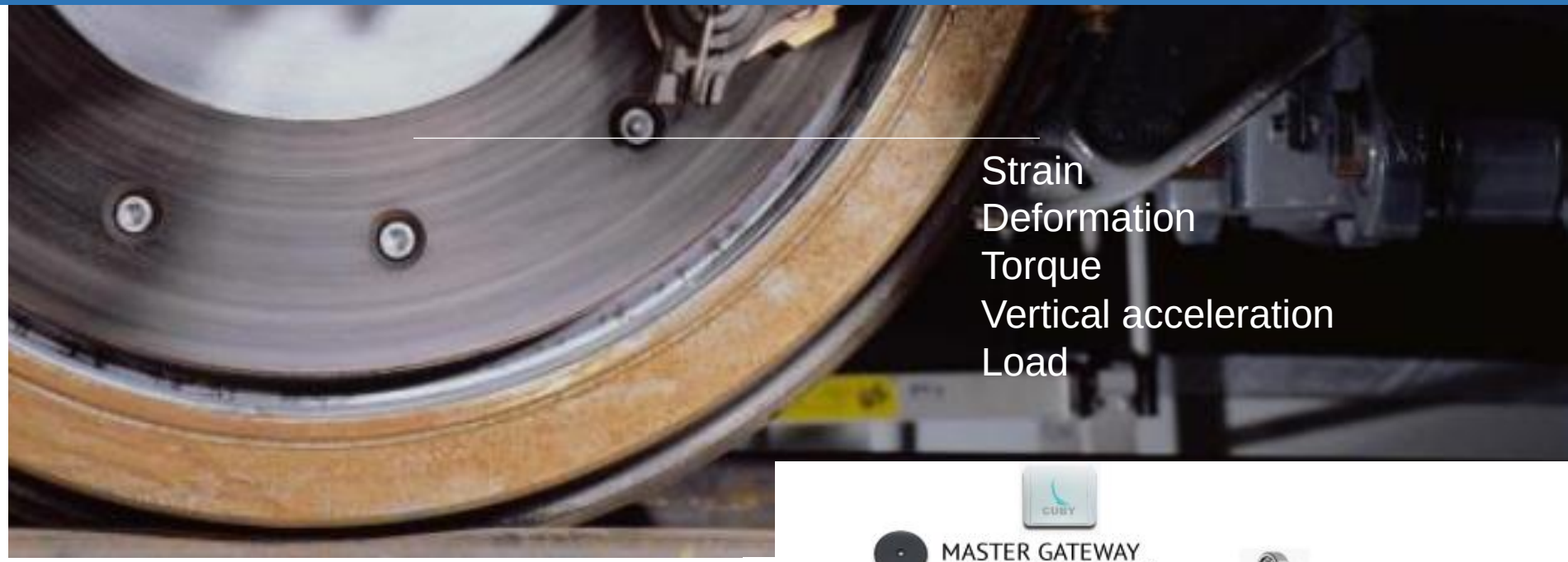
Bogie/Wheel Sensors

case history

Speed

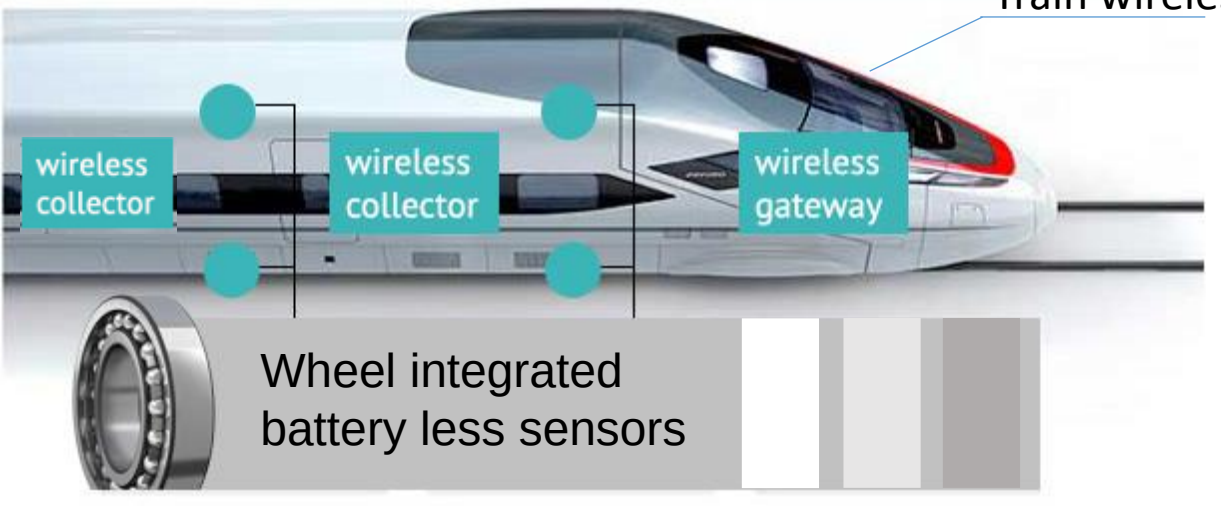
Vibration

Temperature

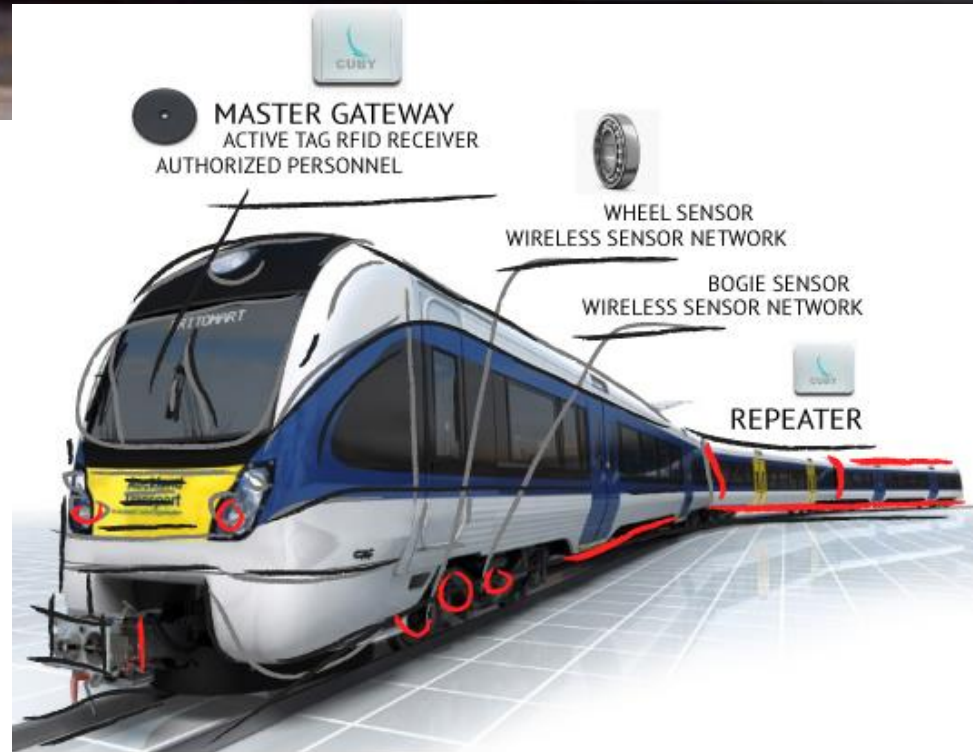


Strain
Deformation
Torque
Vertical acceleration
Load

Train wireless infrastructure

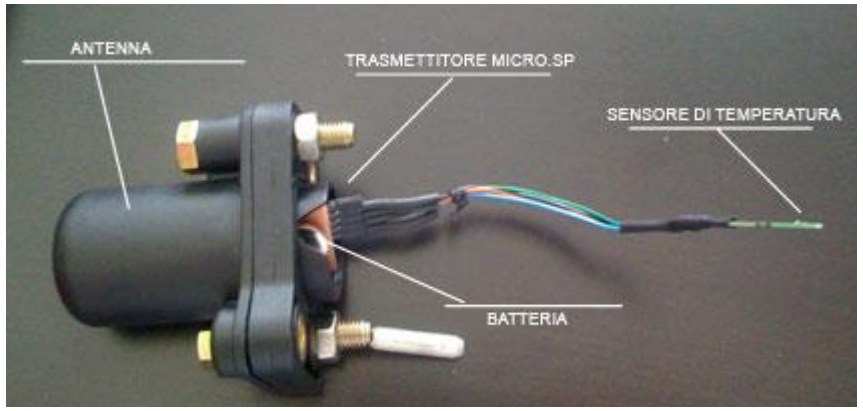


Wheel integrated
battery less sensors



IoT Wireless Sensors - Industrial

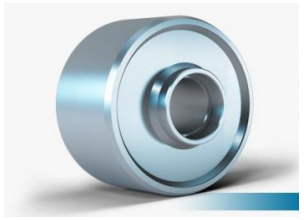
case history

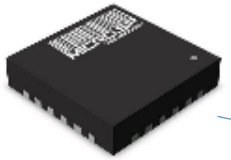


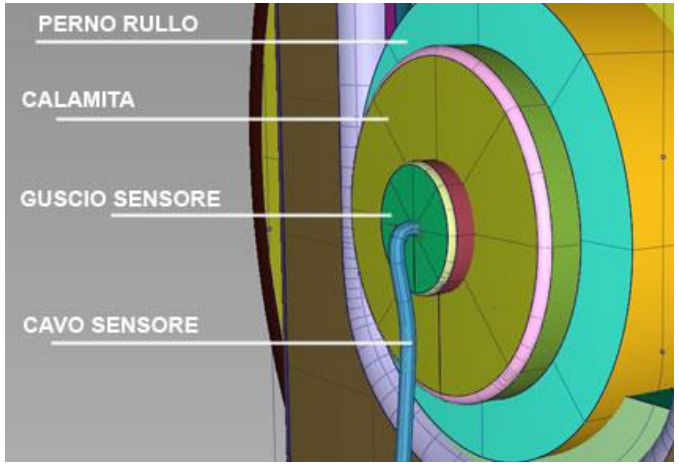
Temperature and vibration Wireless sensor
In order to control hub and bearing.

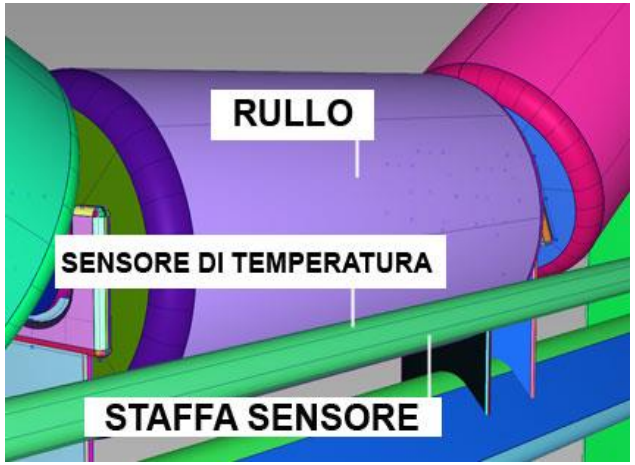
> Life Time >10years with a small lithium battery
> Continuous monitoring
> Send all the data to the receiver
> Smartphone or tablet app for Ios and Android OS

MICRO.SP TECHNOLOGY









Alcar Wireless Sensor Box

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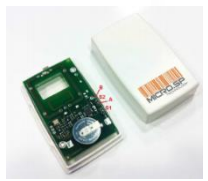
Alcar MOVING THE WORLD

Data-Logger

ISOBUS SENSOR BOX



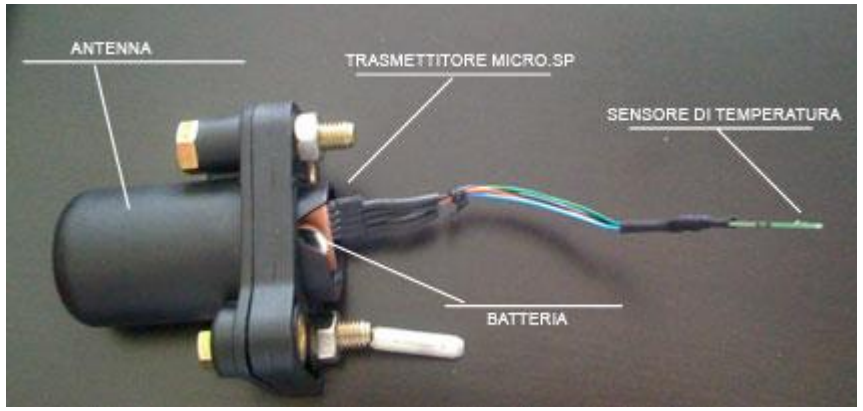
Inclinometer

Load cell

Strain gauges

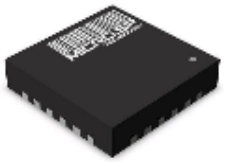
OTR - Wireless Sensors

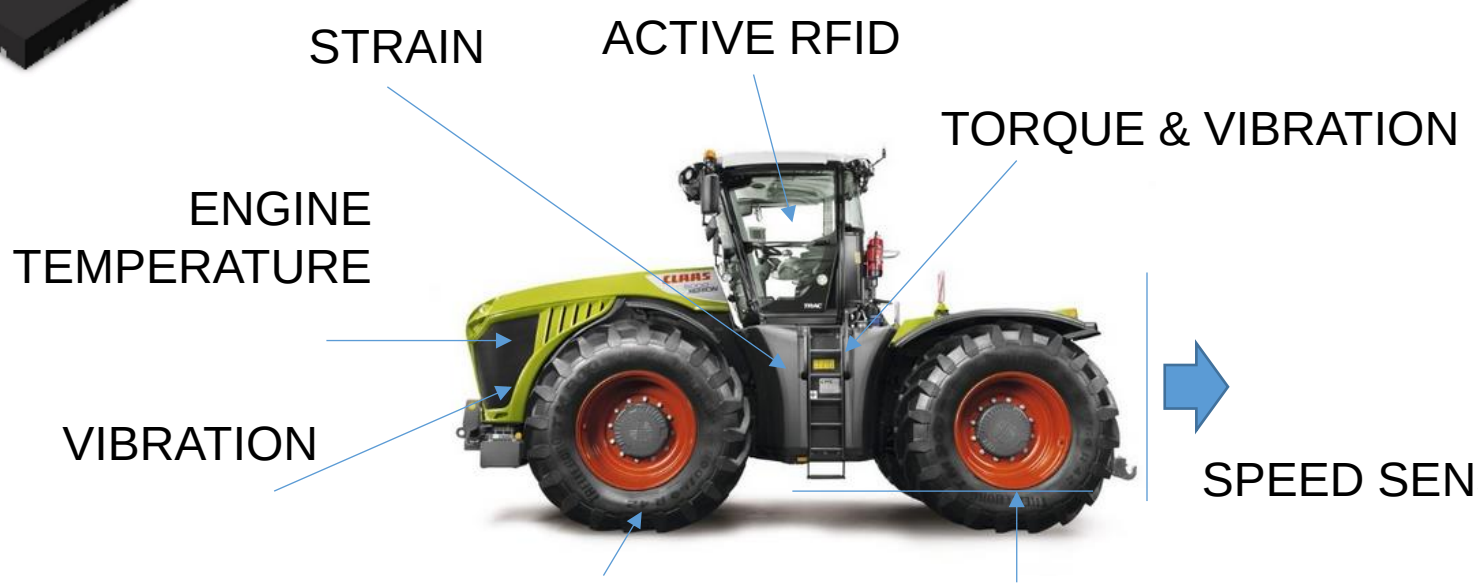
case history

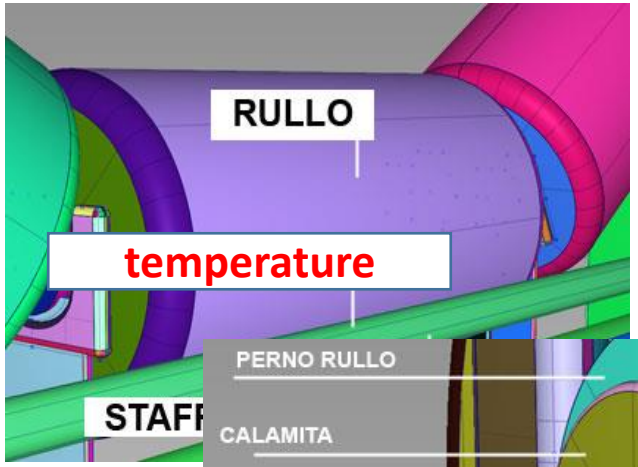


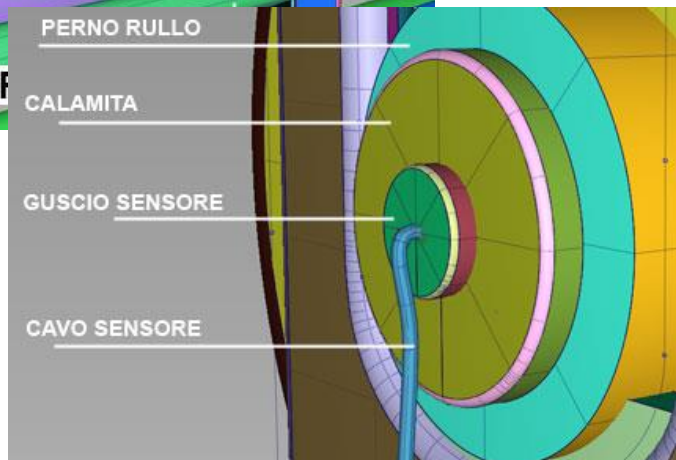
Temperature and vibration Wireless sensor

> **Life Time >10years with a small lithium battery**
> Continuous monitoring
> Send all the data to the receiver/dashboard
> Receiver Integrated into the dashboard
> Smartphone or tablet app for Ios and Android OS









IoT sp.net domotica

case history

It's easy to use

Between two explanations go for the clearer one
Between two shapes pick the the most basic one
Between two words….the shortest.

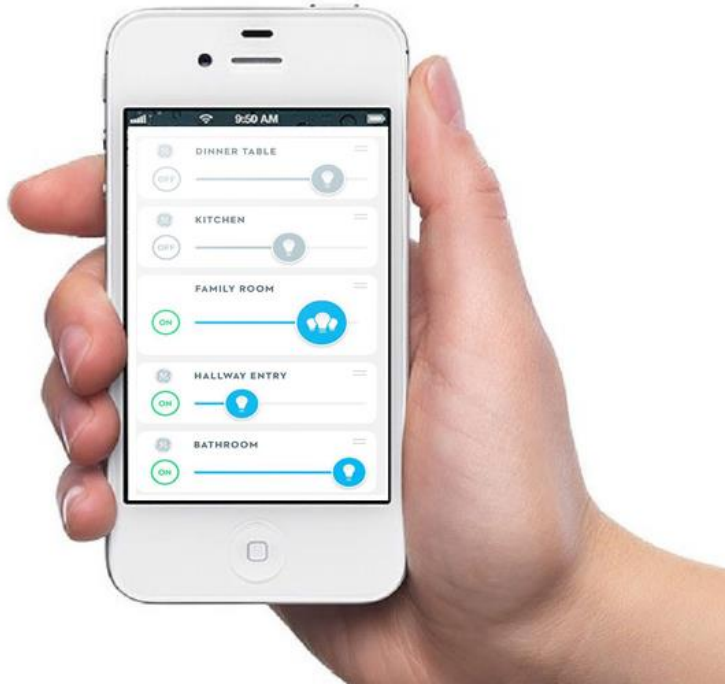
SMARTPHONE & TABLET APP

SMART LIGHTING

Thanks to sp.net you can easily and quickly set up a home sensors network to control and manage different variables such as temperature, pressure, vibration, air-quality, movement, lightings, power switch, smart light and many others.
The multi-technology sensors are wirelessly linked to a gateway: the "Cuby".
"Cuby" is able to manage all sensors together and this can be done through a remote connection.
"Cuby", thanks to the wifi-board, becomes part of its own network though which it can easily access the world wide web.
The application developed by STE can manage a constantly check all sensors placed within the home environment easily setting-up its own smart-network.

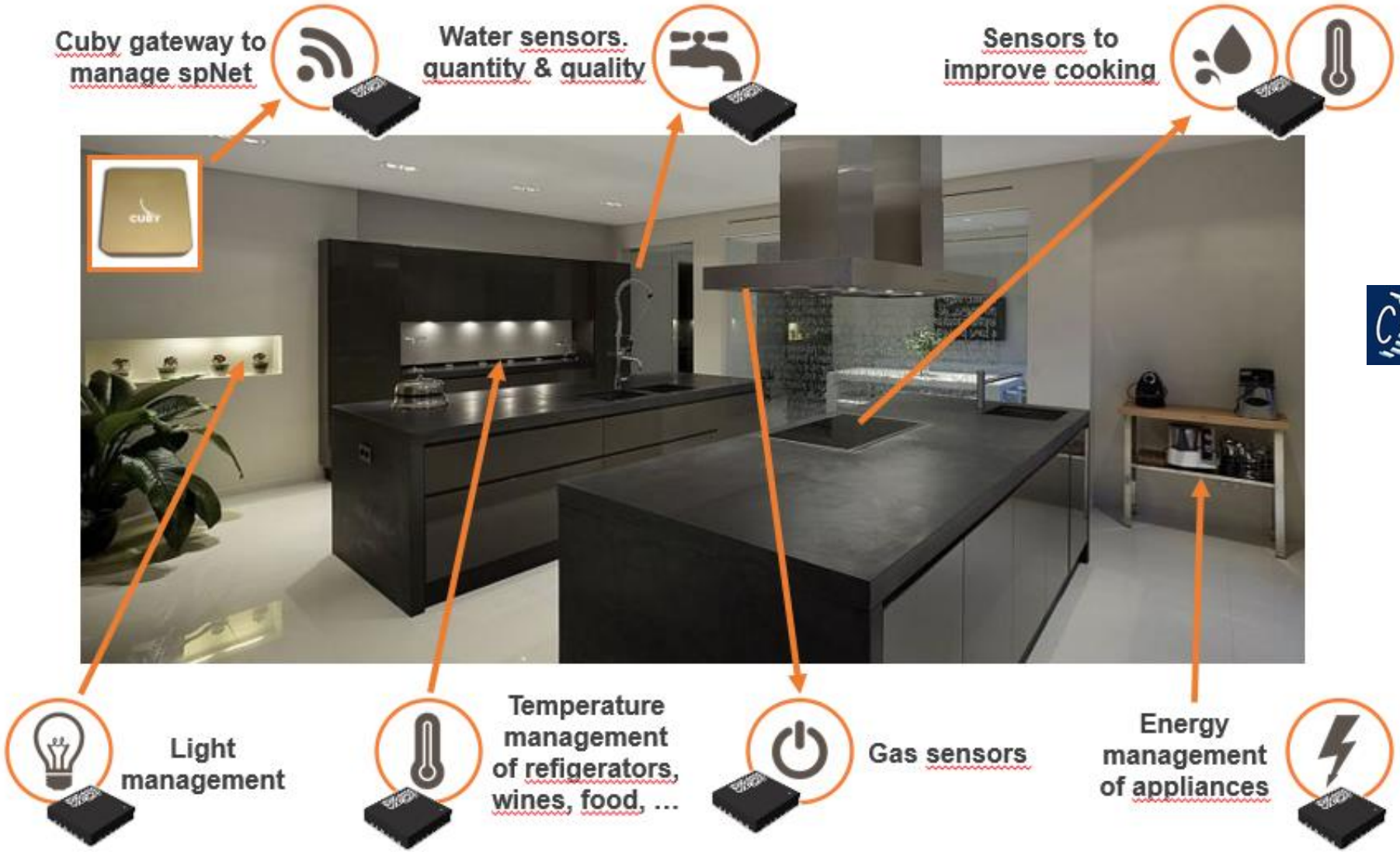
WIRELESS POWER CONTROL

WIRELESS SWITCH



IoT sp.net smart home & kicthen

case history



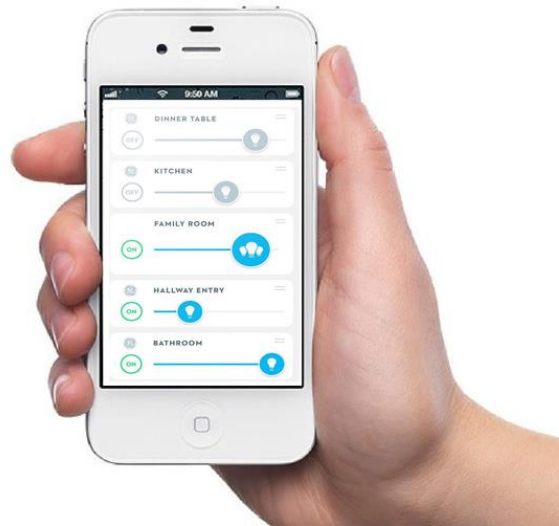
customer & collaboration

INDESIT

INDUSTRIA 2015

Ministero dello Sviluppo Economico

Electrolux



V2I – Smart station

Micro.SP
Wireless sensor
Temperature
Pressure
3Axis
Vibration
Luminosity

Metering

Wireless
photovoltaic monitoring

Lighting

Wireless
lighting control

Environmental

Wireless air
contimants monitoring

V2I wireless

Gasoline & Oil
Level / Pressure / Temperature

Active RFID

Wireless RFID
Gas station attendant

TPMS sensor

Sensor in-tire
Pressure and temperature

Low Power sensor

Reed sensor
Nozzle

Gasoline

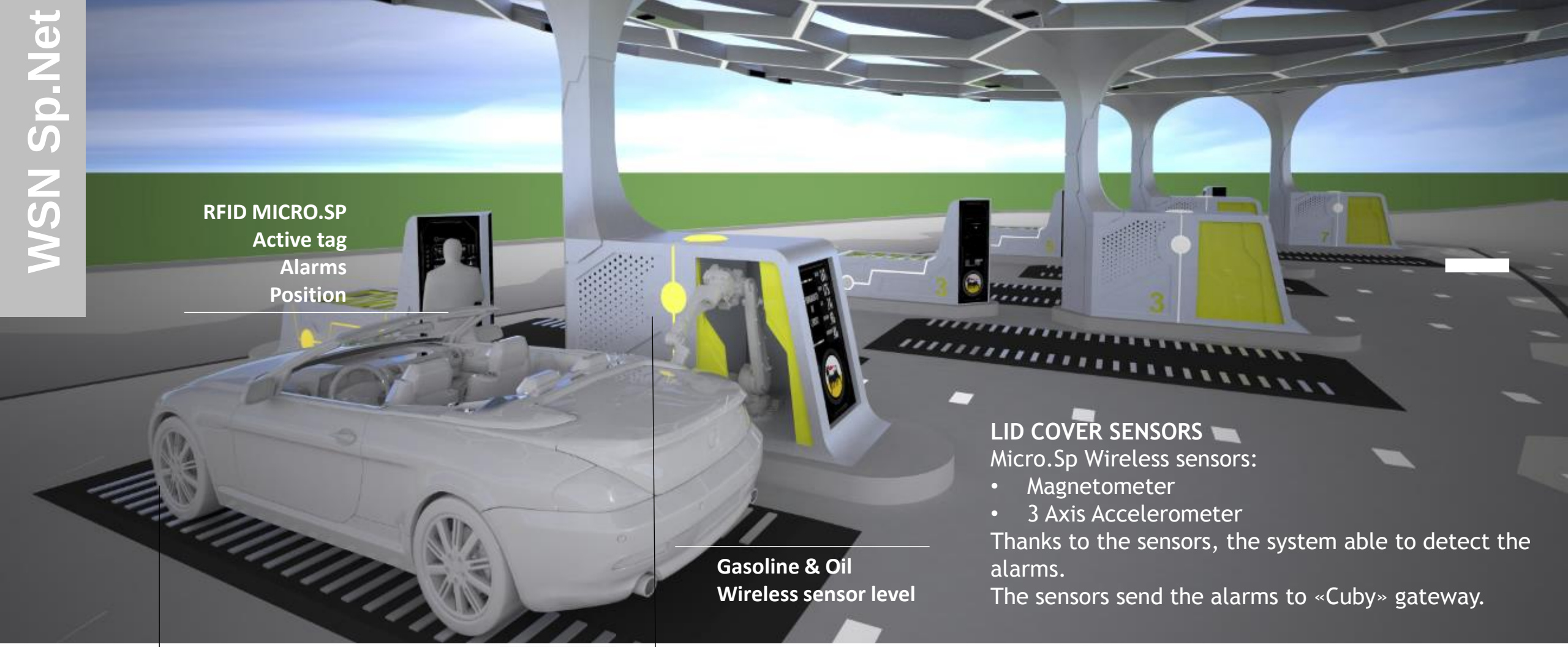
169MHz
gasoline level gauges

Low Power sensor
Lid cover
anti theft


CAR detection

In-Ground
megnetometer sensor

WSN Sp.Net



RFID MICRO.SP
Active tag
Alarms
Position

Gasoline & Oil
Wireless sensor level

LID COVER SENSORS
Micro.Sp Wireless sensors:
- Magnetometer
- 3 Axis Accelerometer

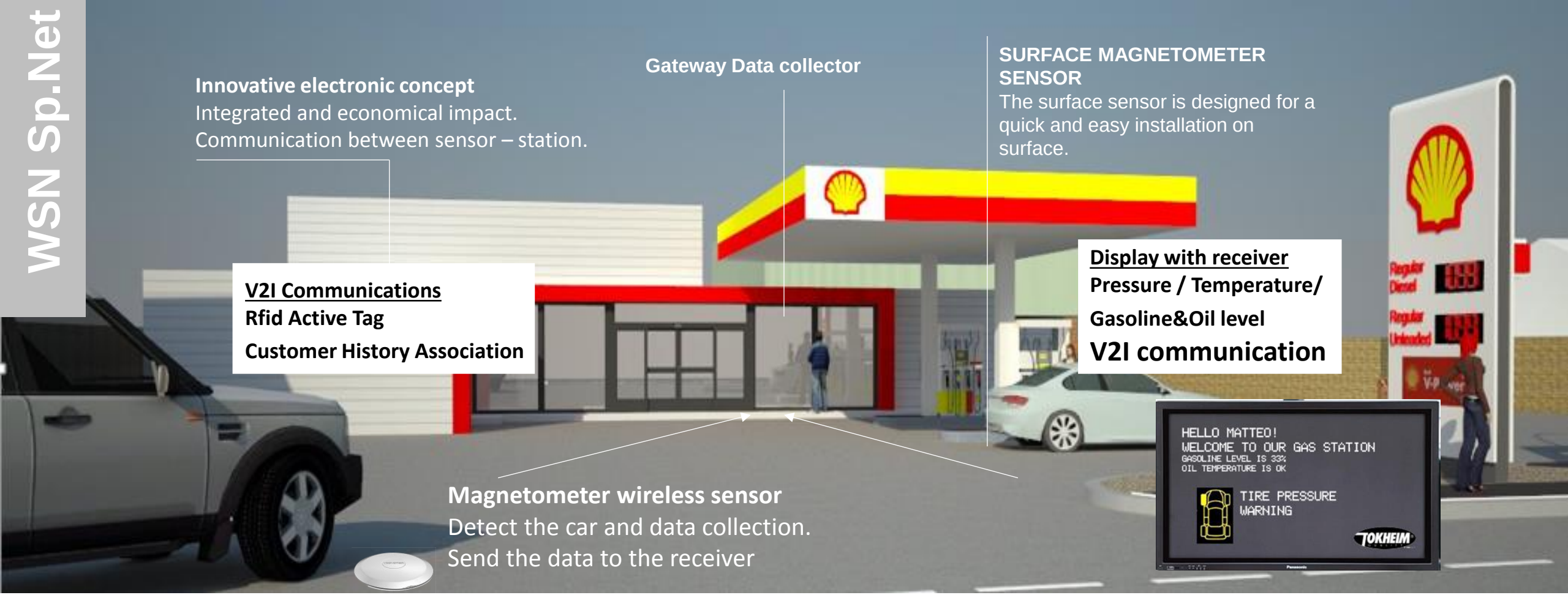
Thanks to the sensors, the system able to detect the alarms.
The sensors send the alarms to «Cuby» gateway.

TPMS SENSOR

Nozzle sensor
Micro.Sp Reed Sensor
Open-Close monitoring
Lighting sensor

Active RFID low
Energy consumption

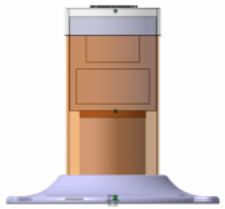
WSN Sp.Net



Magnetometer Wireless Plate Sensor
STE has developed through the years two different magnetometer sensors:

- Magnetometer embedded in-ground Wireless Sensor
- Magnetometer Surface Wireless Sensor

The two sensor transmit data through an extremely efficient low consumption radio module at 169 MHz with narrow bands. These features guarantee quite a long life expectancy for the system.



IN-GROUND MAGNETOMETER SENSOR

The in-ground sensor is installed under surface and can be used to monitor the transit in a certain zone. Transmission range between sensors and gateway can be quite long (typically 200-250m).

Think | Distributor of Innovations

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