Mission
“Everywhere Wireless Sensors”

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

SEND THE DATA SENSORS TO THE RECEIVER

EASY INTEGRATION

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.
# Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>STE PPM</th>
<th>STE OOK</th>
<th>Others</th>
<th>Freescale FXTH8715116T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max RF output power</td>
<td>+14dBm</td>
<td>+14dBm</td>
<td>+8dBm</td>
<td>+8dBm</td>
</tr>
<tr>
<td>RF consumption in TX mode</td>
<td><strong>PPM: 0.9mA @+14dBm</strong></td>
<td><strong>OOK: 7.6mA @+5dBm</strong></td>
<td><strong>FSK: 9mA @+8dBm</strong></td>
<td><strong>FSK: 7.6mA @5dBm</strong></td>
</tr>
<tr>
<td>Ultra Low standby current</td>
<td>500nA</td>
<td>500nA</td>
<td>500nA</td>
<td>500nA</td>
</tr>
<tr>
<td>Energy consumption per bit</td>
<td>235.7nJ per bit @ 10kbps</td>
<td>≈2000nJ per bit @10kbps</td>
<td>≈2000nJ per bit @10kbps</td>
<td>≈2000nJ per bit @10kbps</td>
</tr>
<tr>
<td>Life of system</td>
<td>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 battery). → Suitable for energy harvesting application.</td>
<td>≈10 years with CR2032 battery (225mAh) * ** *with Axis sensor for wake up and sleep strategy. ** with a transmission rate of 1 minute.</td>
<td>≈10 years with CR2032 battery (225mAh) * ** *with Axis sensor for wake up and sleep strategy. ** with a transmission rate of 1 minute.</td>
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</tr>
</tbody>
</table>

**Micro.sp TX consumption 0.9mA @ 14dBm**

**Competitors TX consumption 7.6mA @ 5dBm**
Micro.sp vs competitors

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 €

ENOECEAN 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
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.
- <1/4 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
> 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.

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.
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
Wireless Advantages

BEFORE
Wires and cable connectors

AFTER
WIRELESS TECHNOLOGY

THIS IS MICRO.SP «INNOVATION»
field of applications

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

INDUSTRIAL
HEALTH CARE
SOCIAL ALARMS
HOME
APPLIANCES

AUTOMOTIVE
ACTIVE
RFID & ACCESS CONTROL

Wireless SENSORS
LOW CONSUMPTION

AUTOMATIC METER READING
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.

The Sp.Net: network evolution

Any object, no matter whether big or small, can be part of your sp.net network.
Cuby: a new gateway concept

Cuby is a new STE proprietary multitechnology 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.

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 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.
micro.sp is
Internet Of Things
this is SP.Net

RFID Logistic
Home Appliances
Health Care
Building Automation
Smart Parking
Tire Pressure

Internet Of Things
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 targets fleets at IAA Commercial Vehicles 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

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 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).

Bridgestone’s Smartphone Ap

Log in

Preferences

Language

English

Preferences Mobile Website

IAA
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 continuous monitoring maintenance free.**

“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.

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.

- Connected objects in cars.
  The micro.sp enables «wire free» car’s and connect objects such as tires, seats, dashboards and links them with smartphones
IoT sp.net smart city

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
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

SMART LIGHTING – VEGALED SPAGNOLO SRL

2013 - 2014
GENOVA INSTALLATION
SMART PARKING SOLUTION
Bogie/Wheel Sensors

- Speed
- Temperature
- Vibration
- Strain
- Deformation
- Torque
- Vertical acceleration
- Load

Wireless gateway
Wheel integrated battery less sensors
Train wireless infrastructure
Temperature and vibration Wireless sensor
In order to control hub and bearing.

- Life Time >10 years with a small lithium battery
- Continuous monitoring
- Send all the data to the receiver
- Smartphone or tablet app for iOS and Android OS
Alcar Wireless Sensor Box

ISOBUS SENSOR BOX

Data-Logger

Strain gauges

Inclinometer

Load cell
Temperature and vibration Wireless sensor

> Life Time >10 years 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
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

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

case history
IoT sp.net smart home & kitchen

- Cuby gateway to manage spNet
- Water sensors for quantity & quality
- Sensors to improve cooking
- Light management
- Temperature management of refrigerators, wines, food, etc.
- Gas sensors
- Energy management of appliances

Customer & collaboration

Indesit

Industria 2015

Electrolux
RFID MICRO.SP
Active tag
Alarms
Position

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

Gasoline & Oil
Wireless sensor level

Active RFID low
Energy consumption
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.

Innovative electronic concept
Integrated and economical impact.
Communication between sensor – station.

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).
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Think Distributor of Innovations