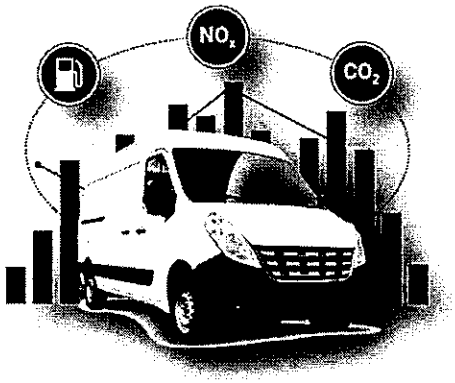
Air.Car

Introduce



We make your journey easier and more connected: we collaborate to build and define your connected vehicle strategies, helping our customers to benefit from a comprehensive connected car ecosystem, with our award-winning vehicle data platform and services.

1. Unlock the vehicle's digital potential

Our open platform augments the connected vehicle experience by deploying patented technology via a simple yet powerful user experience. Data filtered through deep analytics, gives the user meaningful insights to improve the driving experience, reduce the cost of motoring and to improve safety, during journeys and beyond.

2. An ecosystem of services that drivers actually want

We have curated the most innovative and relevant vehicle services and integrated them all into one platform. Our ecosystem of services drives the adoption of connected vehicle programs, powering daily engagement and monetisation. It is readily available through our open platform via SDK and APIs, and the white-labelled user app. Partnerships with a number of providers deliver relevant services such as roadside assistance, automated insurance, parking, accident management, and many other services that focus on safety, convenience or saving time and money.

3. All vehicle related payments in one place

Pay.Car is the first end-to-end invoicing, billing, and CRM platform for connected vehicles. It provides integration into core services and the ability for one-click payments driving monetization and generating a single bill for all car services whether everyday parking or in-car entertainment. A truly seamless, in-vehicle payment experience.

4. Technology to combat pollution

We are committed to helping the world through technology. With patents for real-time CO2 emissions and an Innovate UK funded project for real-time NOx emissions calculations, Tantalum are at the forefront of creating innovative solutions to crucial industry and global issues in the

connected car.

Products

1. SPARK

(1) What Is Spark

HARMAN Spark is a connected car device and app that provides users with a rich ecosystem of services, including emergency crash assistance, vehicle diagnostics, roadside assistance management and many more. It can also turn your vehicle into a powerful Wi-Fi hotspot.

(2) Features

HARMAN Spark will help transform your car thanks to its wide range of features, all controlled through a single app with its own built-in payment platform.

A. Parking Reservations：We don't need to keep circling for a parking spot. Save time by searching, booking, and paying for parking using the app.

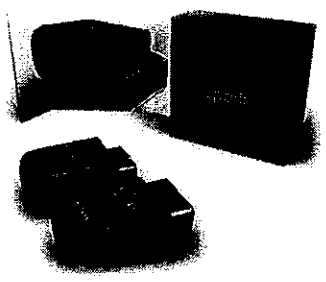
B. Wi-Fi Hotspot：Connect up to 8 devices and stream, browse, share and more from the open road.

C. Virtual Mechanic：Keep your car in great shape. The virtual mechanic monitors your vehicle's health and lets you know what to do if there's a problem.

D. Watchlt：Park with peace of mind knowing Watchlt is keeping a close eye on your car. You'll receive and alert if your car is bumped, moved, or towed, and the location tracker can even help authorities find it if it's stolen.

E. Emergency Crash Assistance：Get help when you need it most.

If you're involved in a crash, the Emergency Crash Assistance feature will automatically send and alert to your phone. If you're unable to respond, your emergency



contacts will be notified.

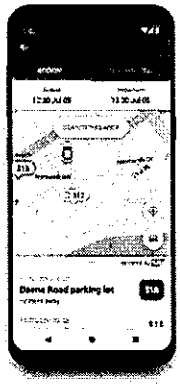
F. Roadside Assistance Manager：Get roadside assistance at the drop of a pin. Receive a quote, pay for it using the app, and help will be on its way.

G. Trips：Keep a record of the details of your trips. Including time and mileage, and get information on your driving habits such as speed insights, hard braking, rapid acceleration, and more. Trips can be organized and saved by type, too.

H. Geofences：Draw boundaries on a map, view vehicle locations, and get a notification when any of your family cars enter of exit the geofenced area.

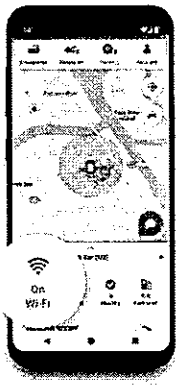
I. Driving Score：Receive a driving score based on your driving habits and get helpful tips on how to become a safer and smarter driver.

J. Family Share：Share trip and location information with family members to keep everyone in the loop.



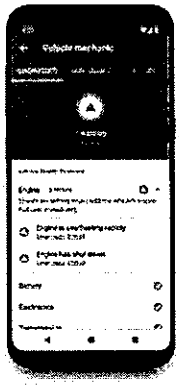
Parking Reservations

You don't need to keep circling for a parking spot. Save time by searching, booking, and paying for parking using the app.



Wi-Fi Hotspot

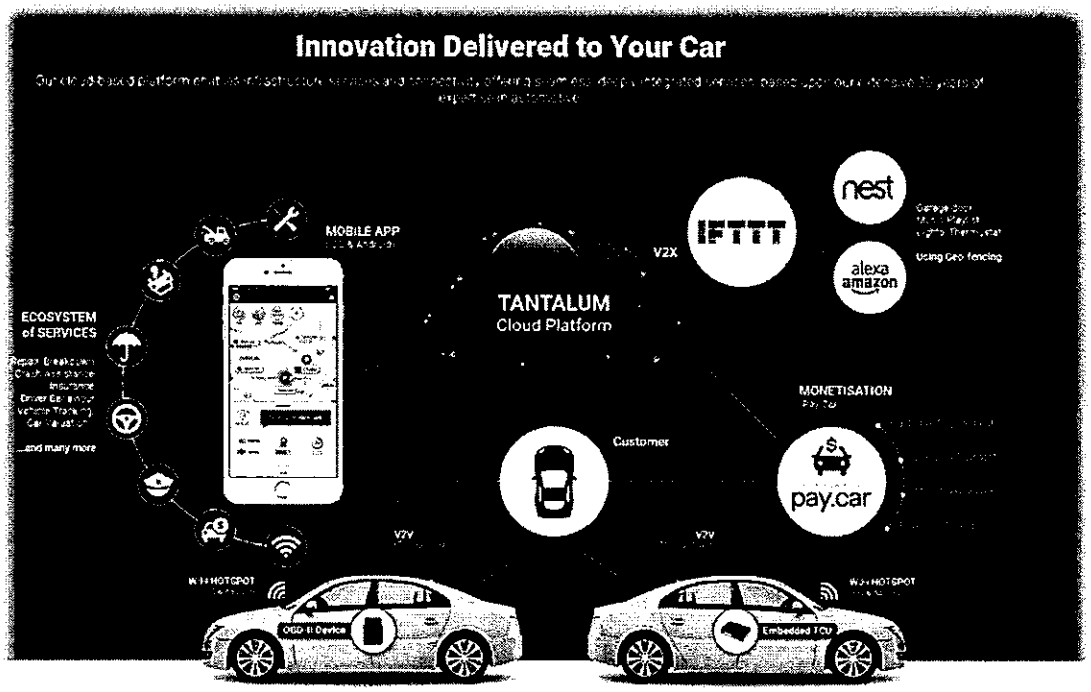
Connect up to 8 devices and stream, browse, share and more from the open road.



Virtual Mechanic

Keep your car in great shape. The virtual mechanic monitors your vehicle's health and lets you know what to do if there's a problem.

2. OPEN PLATFORM



(1) Hardware Agnostic

Tantalum offers a hardware and platform agnostic solution, which can be customised to meet your needs. We have integrated our platform with many devices; and with our own in-house experience of high-specification devices over the past twenty years, we can offer the best integration possible – to a single device or to the whole connected home.

(2) Open APIs & SDKs

Our cloud-based platform enables innovation through open APIs and SDKs, providing a quality infrastructure for the wider marketplace. This allows for deep integration within an app, creating the best possible experience.

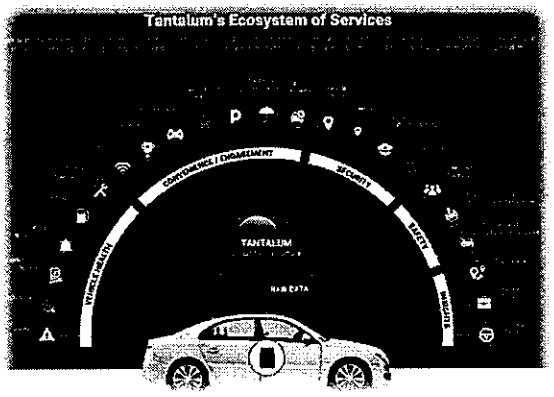
(3) Big Data & Analytics

Providing analytics is at the core of Tantalum's proposition. Using AI and computer-learning systems, we can provide insights that are timely, subtle and useful, providing quick feedback to users of the platform. Different tools combine with our proprietary algorithms and technology to 'learn' about the user, improving features over time.

(4) Secure Platform

Tantalum's cloud-native platform is proven to be scalable and

secure to millions of devices. All of our systems have been designed from the ground up with security in mind. We use a layered security architecture, with defence in depth. We combine components together using a single comprehensive security strategy. All technologies are first considered from a security viewpoint.



3. ECOSYSTEM SERVICES

Tantalum's Ecosystem of Services：Tantalum is a market leader in auto-tech innovation and has aggregated differentiated services for the connected car. We focus on services that save users time and money, as well as prioritising their safety. Our flexible technology allows users to freely change their vehicles, as well as select their preferred service providers.

4. PAY.CAR

(1) What Is Pay.Car

Pay.Car is the world's first dedicated end-to-end billing, payment and data management platform for connected vehicles. It provides a robust, secure and scalable transaction platform to drive growth, adoption and monetisation of the connected car, storing financial details securely and providing customers with one combined, easy-to-read bill for all the services used. Ensuring that service providers can maximise the new revenue opportunities presented by the connected car, Pay.Car is also unique in its ability to share revenue across service providers.

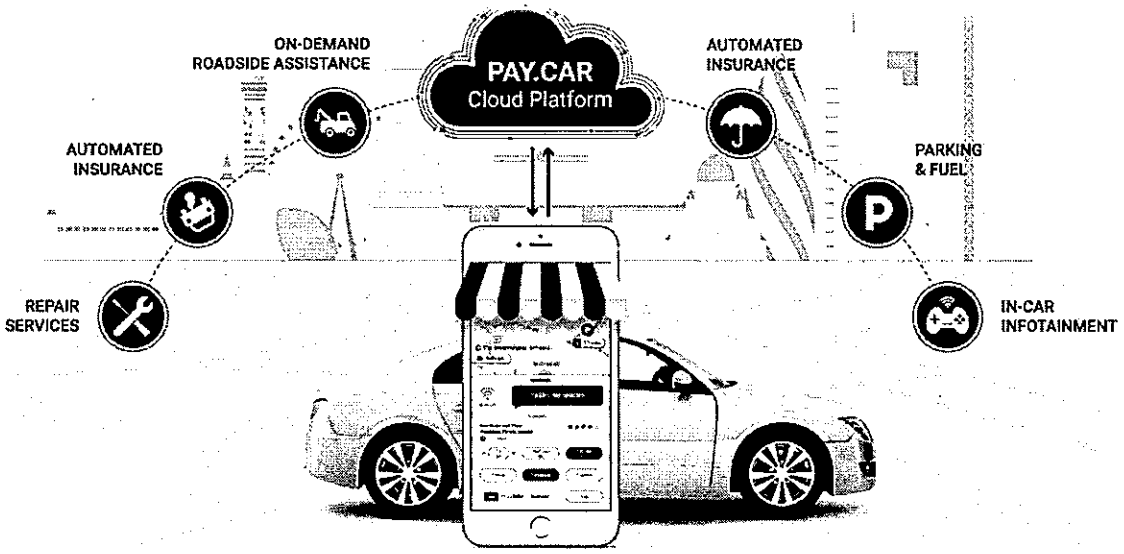
(2) Benefits

A. Customer Engagement：With Pay.Car, there is a full end-to-end journey in the connected car. For the first time, in-car searches, billing, payments and CRM can be undertaken through one platform, offering the best customer engagement tool possible.

B. One Click Payments : One-click payments for services and car-related expenses provides a simple and intuitive solution, enabling secure and fast transactions without the need for long processes or cash transactions.

C. Monetised Services : Pay.Car has monetised the connected car, by allowing revenue-share agreements for individual services and the ability to tailor offerings towards customers.

D. Revenue Sharing : With one payment platform, revenue sharing becomes simple. Each share is processed by Pay.Car and sent to the appropriate company



5. AIR.CAR

(1) What Is Air.Car

Using IoT and Smart City technology, Tantalum's award-winning Air.Car project will deliver the ability to drive a greater understanding of vehicle pollution, while enabling the reduction of environmental impact and vehicle operation costs. Clean Air Zones and London's Ultra Low Emissions Zones are being developed, and Air.Car's NOx emissions estimation will give users the information to measure, manage and reduce their impact

in real-time, saving fuel and money.

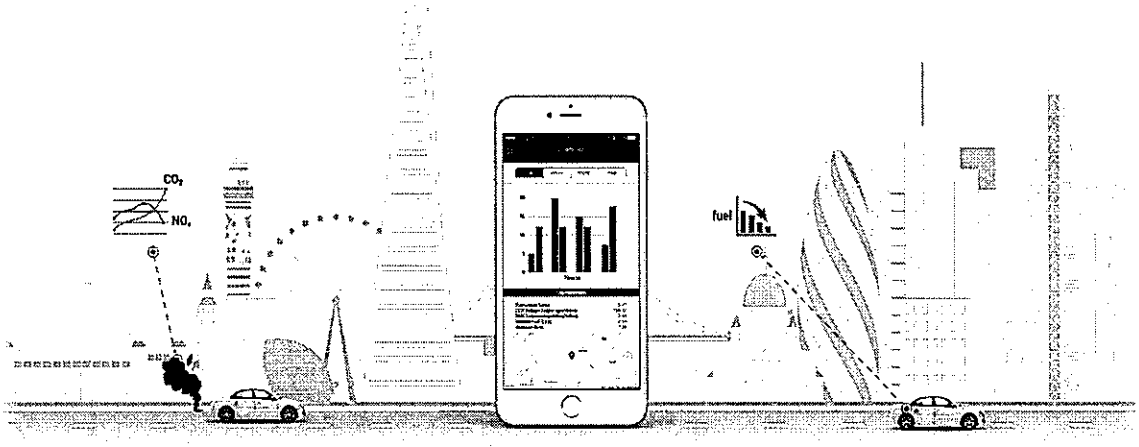
(2) Benefits

Air.Car can be used to measure the pollution in Clean Air Zones allowing simple, effective and fair charging of individuals on a vehicle-by-vehicle basis, while also encouraging the reduction of pollution in the worst-hit zones. Other benefits include:

A. Save Fuel：By showing the user information about their driving and pollution, Air.Car can help change driver behaviour, while suggesting alternative routes to avoid polluted or busy areas.

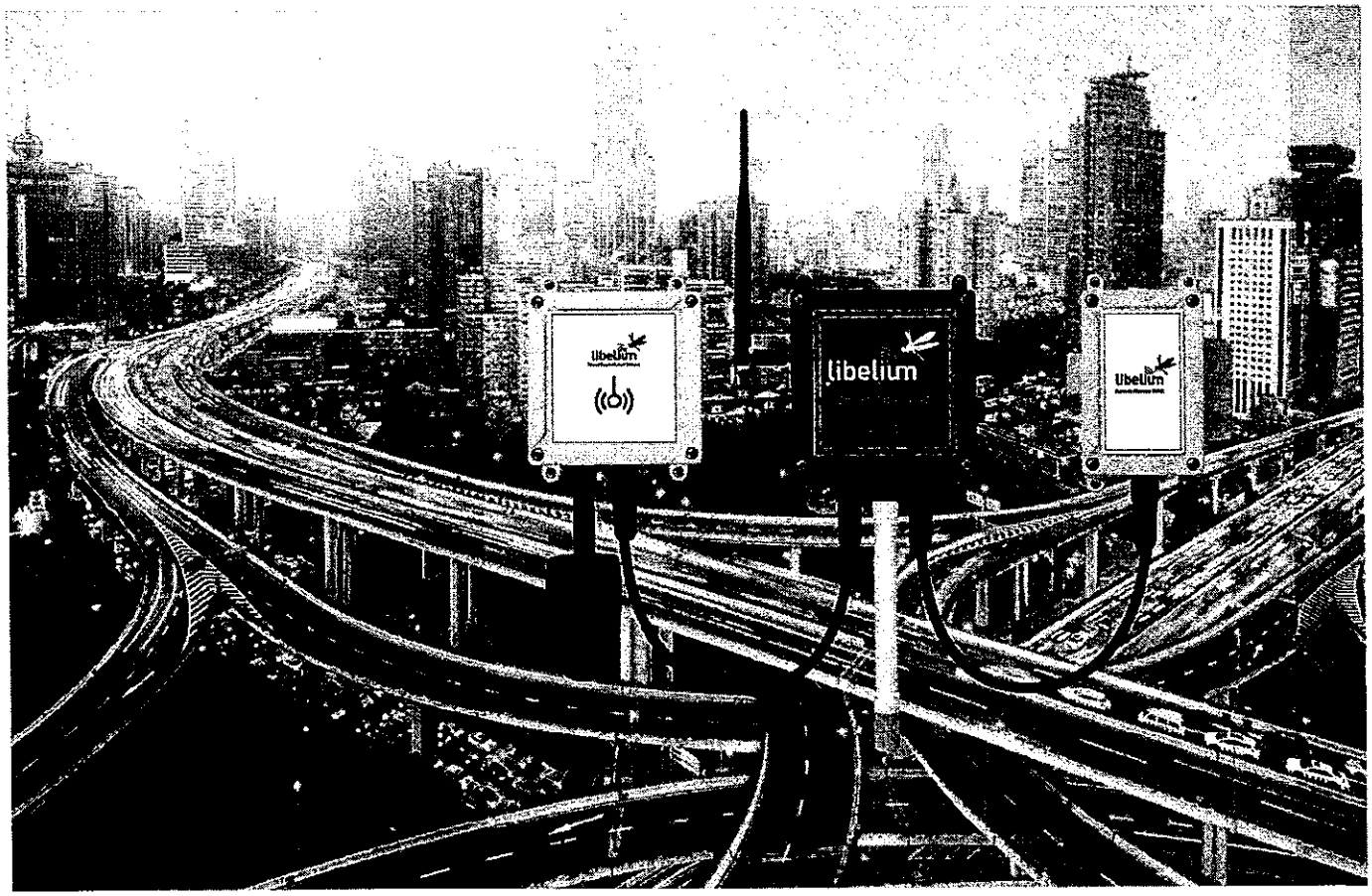
B. Reduce Emissions：Together with our fuel usage analytics Air.Car will give users the information to measure, manage and reduce their environmental impact in real time. Our technology can improve fuel efficiency by more than 15 per cent and NOx emissions can be halved through better driving.

C. Driver Behaviour Improved：With Clean Air Zone and Ultra-Low Emission Zone charging being implemented, Air.Car will enable fair charging, increased ability to see the cost of journeys, while also improving driver behaviour through accurate and useful information on journeys.



Smart Cities

"The global Smart Cities market is projected to reach $1.56 trillion by 2020."



Smart Cities solutions are specially designed to cover applications in urban spaces such as air quality control, waste management, building structural health, noise maps, smart adaptative lighting and traffic congestion.

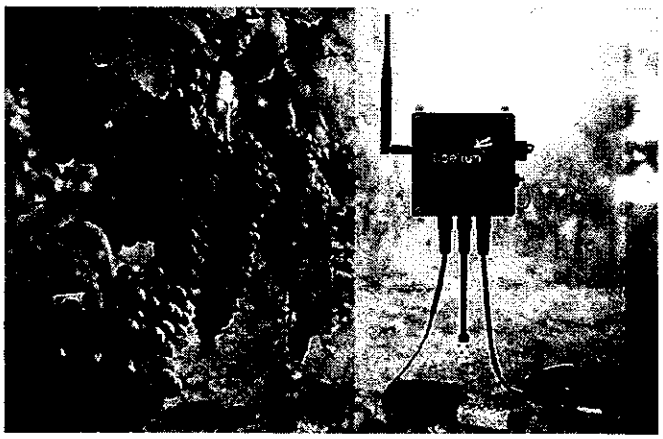
Sensors:

- CO
- CO_2
- O_2
- CH_4
- NH_3
- NO
- NO_2
- O_3
- SO_2
- H_2
- H_2S
- HCl
- PH_3
- ETO
- Cl_2
- Temperature
- Humidity
- Pressure
- Ultrasound
- Luminosity (Luxes Accuracy)
- Noise Level Sensor (dBA)
- Particle Matter (PM1 / PM2.5 / PM10) - Dust Sensor

Calibrated

Smart Agriculture

"By 2050 worldwide food production should increase by 70% to feed 9.6 billion people."



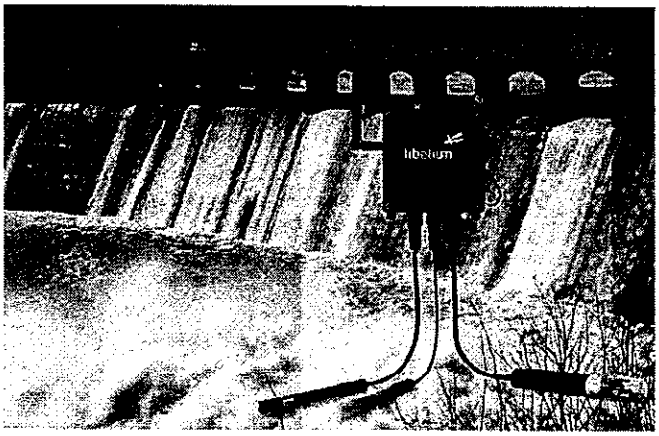
Smart Agriculture solutions are designed to perform crops monitoring for enhancing production and preventing diseases, selective irrigation on sports fields, control conditions in greenhouses, improve wine quality and support decision systems about agricultural operations among others.

Sensors:

- Temperature
- Humidity
- Pressure
- Soil / Water temperature
- Solar radiation
- Leaf wetness
- Trunk diameter
- Stem diameter
- Fruit diameter
- Luminosity
- Soil moisture (1.5 m)/(4.5 m)/(8 m)
- Anemometer + Wind vane + Pluviometer
- Ultrasound (outdoor IP67)

Smart Water

"The use of smart water management technologies can help save more than $12 billion revenues for utilities annually worldwide."



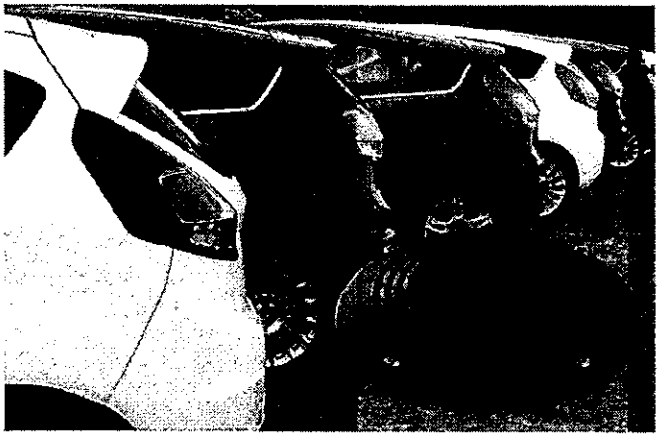
Applications for Smart Water are suitable for potable water monitoring, chemical leakage detection in rivers, remote measurement of swimming pools and spas, corrosion and limescale deposit, fish tank monitoring and seawater pollution levels.

Sensors:

- NO_3^-
- Ca^{2+}
- Cu^{2+}
- I^-
- NO_3^-
- Ag^+
- Turbidity
- Br^-
- F^-
- NH_4^+
- Li^+
- NO_2^-
- Na^+
- Conductivity
- Cl^-
- BF_4^-
- ClO_4^-
- Mg^{2+}
- K^+
- pH
- Dissolved Oxygen
- Soil / Water Temperature

Smart Parking

Drivers in major cities spend between 3.5 and 14 minutes searching for a space each time they park increasing traffic congestions.



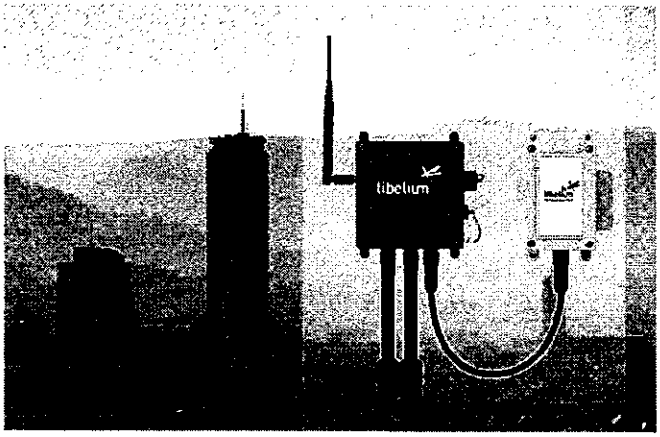
Smart Parking allows to detect available parking spots by placing the node on the pavement. It works with a magnetic sensor which detects when a vehicle is present. Traffic congestion and gas emissions are dramatically reduced with this technology.

Features:

- Double radio: LoRaWAN and Sigfox
- Smaller size, reduced over 50%
- Higher accuracy and reliability Faster time of detection
- Installed on the road surface
- No-dependance from temperature
- Lower power consumption
- Certifications with CE / FCC / IC marks

Smart Environment

It is estimated that up to 3.7 million people die per year in the world, prematurely, due to exposure to pollution in cities.



Solutions for Smart Environment enable the Air Quality Index (AQI) calculation, thanks to 16 gas sensors providing extremely accurate ppm values and a high-end particle matter sensor. Smart Cities, Industries and Civil Works are some scenarios to run this application.

Sensors:

- CO
- NH_3
- SO_2
- PH_3
- Temperature
- Volatile Organic Compounds
- CO_2
- NO
- H_2
- ETO
- Humidity
- Liquified petroleum gases
- O_2
- NO_2
- H_2S
- Cl_2
- Pressure
- Air pollutants
- CH_4
- O_3
- HCl
- Solvent vapors
- Particle Matter (PM1 / PM2.5 / PM10)
- Luminosity

Logistics

"More than 70% worldwide transport companies are looking for IoT to provide timely and accurate location information."

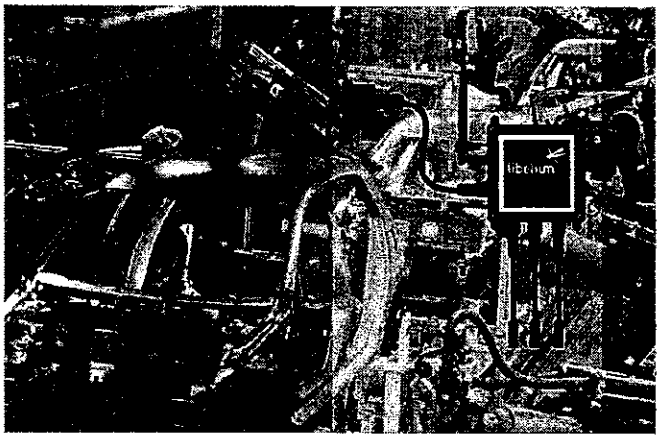
Applications for logistics are as varied as Quality of Shipment Conditions (vibrations, strokes, container or cold chain maintenance), Item Location, Storage Incompatibility Detection or Fleet Tracking with GPS and 4G cellular triangulation.

Any sensor can be added to a position monitoring system to give a holistic solution.

- Ultrasounds
- Presence
- Temperature
- Humidity

Industry 4.0

Investing in greater digitization and support for enterprise-wide integration is predicted to increase 118% by 2020 in support of Indusry 4.0 globally.



We provide solutions for M2M auto-diagnosis and assets control (Industrial protocols), Indoor air quality measurements, temperature monitoring, ozone levels, indoor location and vehicle auto-diagnosis. Interoperability provides endless possibilities for industry sector.

Waspmote Plug&Sense! is compatible with the most widely used industrial protocols RS-232, RS-485, CAN-Bus, Modbus and 4-20mA.

Modbus CAN-bus

Retail

By 2020 retailers worldwide will spend $2.5 billion in IoT-related hardware including beacons, RFID tags, other types of sensors and installation costs.

Libelium technology allows monitoring basic environment parameters and develop indoor positioning applications. Container movements and impacts control, Supply Chain Control, Cold Chain Maintenance, Intelligent Shopping Applications and Smart product Management are common uses.

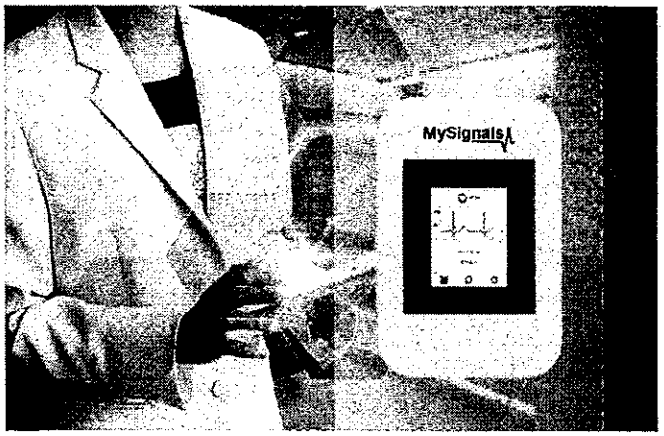
Sensors:

- Temperature+Humidity (Sensirion)
- Luminosity (luxes accuracy)
- Accelerometer

Meshlium Scanner can detect WiFi and Bluetooth devices, like smartphones and tablets to calculate the number of people passing through the range area.

MySignals

Self healthcare monitoring technology could save $3 billion yearly to public health services in avoidable hospital admissions and fewer demands on primary care.



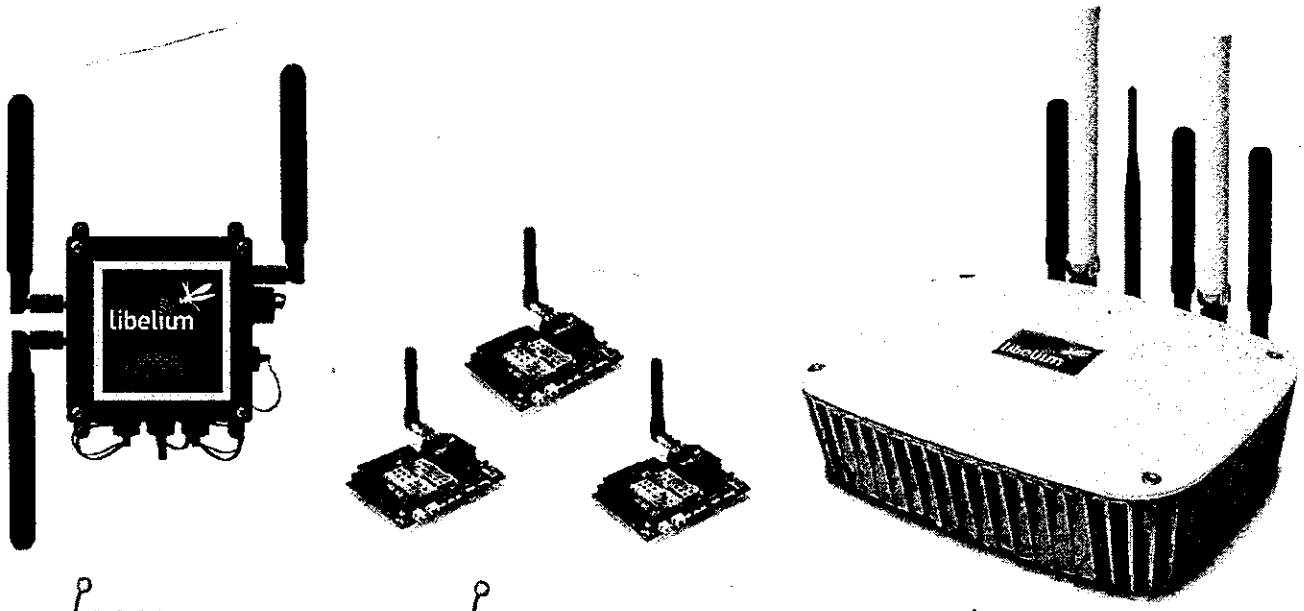
MySignals is a development platform for medical devices and ehealth applications. You can use MySignals to develop you own eHealth applications (Web, Android, iOS) on top or add your own sensors in order to build new medical devices. It allows to measure more that 20 different parameters.

Sensors:

The platform includes CE, FCC and IC certifications.

- Pulsioximeter (SPO2)
- Electrocardiogram (ECG)
- Airflow
- Blood pressure
- Glucometer
- Temperature
- EMG
- Spirometer
- Body position
- Snore
- Alert patient
- Sound
- Body scale
- Galvanic Skin Response (GSR)

New IoT sensor platform worldwide certified



Waspmote Plug & Sense!

Waspmote

meshLium

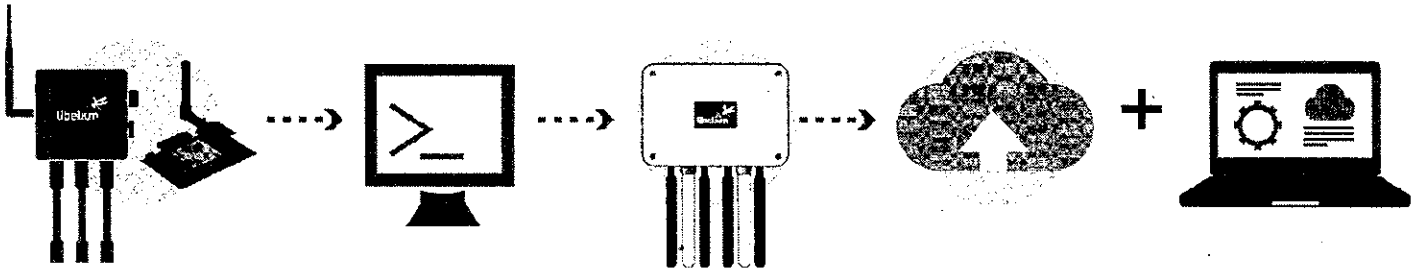
Features:

- Faster and more accurate IoT platform
- Compliant with the latest radio and cloud technologies
- Adds more than 10.000 developers' feedback
- New energy saving modes extend nodes lifetime from 5 to 10 years
- Fully certified with: CE (Europe), FCC (US), IC (Canada), ANATEL (Brazil), RCM (Australia), PTCRB (US) and AT&T (US)

CE FC IC at&t ANATEL PTCRB

Interoperability for the IoT

Connect **any Sensor** using **any wireless technology** to **any Cloud Platform**



Sensor Nodes | SDK / API | Gateway | Cloud Connection + Analytics

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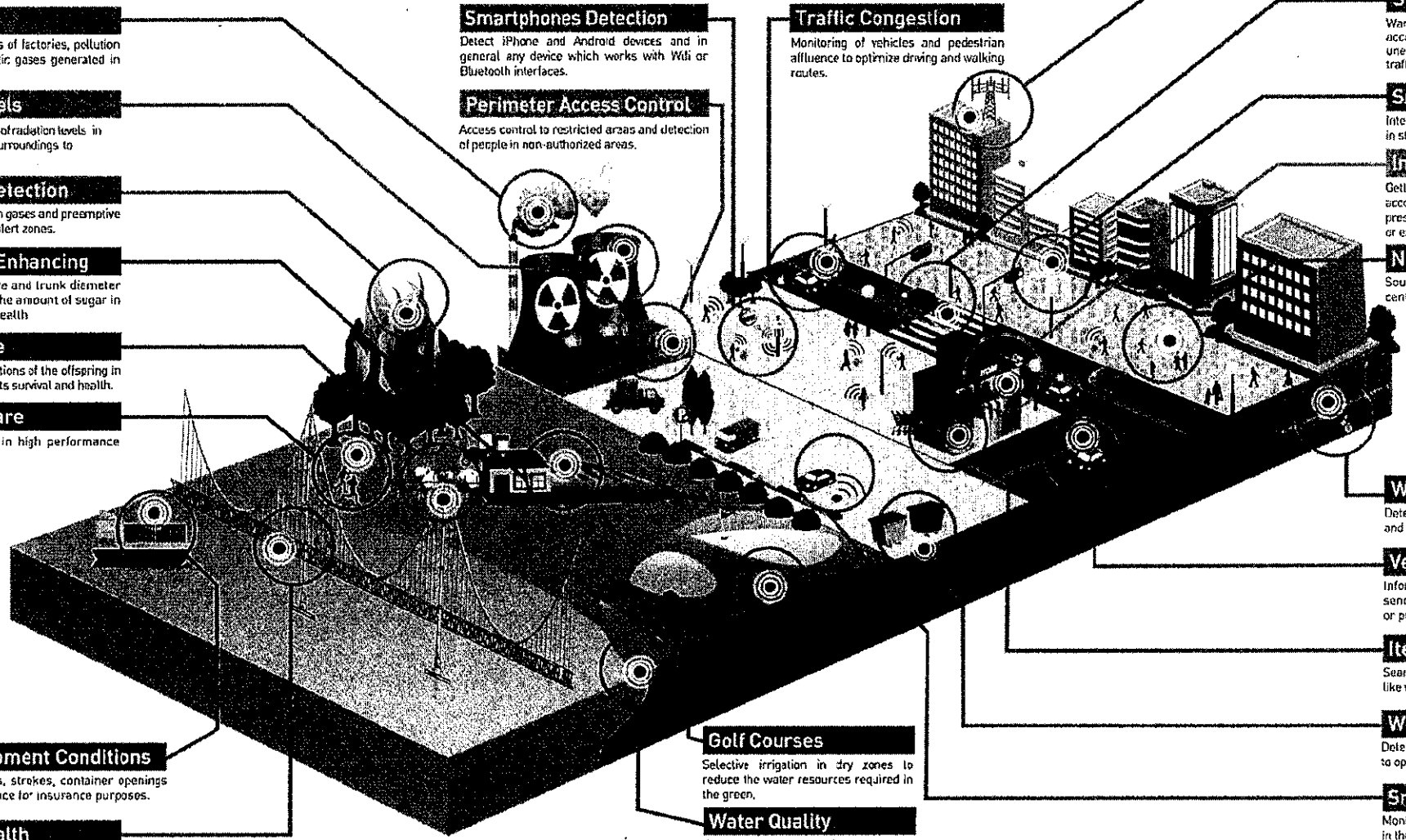
Join us at any point

Libelium technology impacts in the world



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

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

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.

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

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.

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

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.

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

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.

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Ohio River Endangered Mussels

A new data buoy and WIZARD monitoring platform deployed in the Ohio River near the Robert C. Byrd Dam is revealing key insights into the effects of dredging on endangered freshwater mussels.

The Ohio river is home to populations of various species of mussels that even most locals know very little about. Being little known does not mean that they are of little importance to our overall ecosystem. Freshwater mussels are not only an important food source for muskrats, waterfowl and fish but are also very important indicators of water quality.

Because of the vital role that these bi-valves play in the ecosystem, it is now more imperative than ever that we do all we can to protect them when working in local rivers and streams. This challenge became abundantly clear to the US Army Corps of Engineers at the Robert C. Byrd Lock Dam.

Robert C. Byrd Lock and Dam is the 10th of its kind on the Ohio River, located 280 miles downstream of Pittsburgh. There are 2 locks: one for commercial barge traffic that's 1,200 feet long by 110 feet wide, an auxiliary lock that is 600 feet long by 110 feet wide. As with all navigable locks, RCB requires dredging operations to keep the navigation channels open and operable.

When presented with the challenge of monitoring the effects of dredging on the local mussel populations the USACE reached out to the remote environmental monitoring sector. The challenge was to deliver a robust field deployable sediment deposition and scour platform capable o recording and sending data at a minimum of 5 minute intervals. Th platform also had to have the capability to communicate with a multi-pa rameter datasonde delivering Temperature (F), Conductivity (uS/cm Depth (m), pH, Turbidity (NTU), Diss. Oxygen Saturation (%), and Dis Oxygen (mg/L).

When presented with these challenges Aridea Solutions engineered an delivered the WIZARD (Water Intrinsic Zoological Ambient Researc Device) Platform. The following is a description of the WIZARD Solution

- Aridea Solutions furnished a communication buoy, eight (8) individu transducer SeaTek Ultrasonic Ranging Systems and a substra monitoring platform that comprised a field deployable sediment depo sition and scour platform combined with a multi-parameter datasond capable of recording and sending data at a minimum of 5 minu intervals.
- Data is made accessible through the internet via a cellular broadban connection to Aridea Solutions' Thinginformer software platform.
- Data is also retrievable in a format compatible with Microsoft Excel.
- The communications platform is run on battery power which recharged using solar panels.
- The buoy can be deployed in the Ohio River at depths from 3 mete to 20 meters.
- Eight (8) individual transducer SeaTek Ultrasonic Ranging System (info@seatek.com) capable of measuring changes in sediment of millimeter with all communications hardware, electronics packag and cables being assembled and provided by Aridea Solutions.
- Transducers housed in stainless steel 0.5 inch in diameter, 1.0 inch height.
- Substrate monitoring platform capable of being deployed witho divers in 3 m to 20 m of water on the Ohio River from a boat.

The Aridea Solutions WIZARD Platform provides an incredibly flexib solution that allows for the collection and aggregation of multiple enviro mental parameters through a single interface utilizing best of bree off-the-shelf sensor technology. This flexible solution is achieved b Aridea Solutions sensor agnostic communication and data delive system.

"Simply put, we can connect to and deliver data from any industrial protocol sensor." - Chris May, Director of Channel Sales

Visit www.aridea.com for more information.