2018

# From R&D projects

## to products

MINALOGIC

# From PROject to PROduct

Products commercialized or in the progress of commercialization as a result of R&D projects certified by Minalogic.

**MINALOGIC**

# TABLE OF CONTENTS

Projects Key Figures

# Projects Key Figures

**88** **projects have been completed, with quantifiable results:**

- **589** million total budget
- **225** million in government subsidies
- **213** patents applications field
- **762** articles published, one-third in international journals
- **926** jobs created
- Total investment of more than **217** million in equipment & infrastructure
- Direct revenue attributed to our projects:
  - » **€589** million already generated
  - » **€2 688** million in the first three years
  - » **€5 250** million three years post-project

# The
# PRODUCTS

ABCHIMIE

# SURFACE INSULATION TESTER (SIR)

**A testing device to measure surface insulation in humid environments**

## Product description

ABchimie's SIR tester measures a material's capacity to protect a circuit board from substantial humidity.

Samples are tested to assess whether or not materials are compatible with each other in these types of environments.

# Product history

ADEUNIS RF

# ANALOG

## A product that uses IoT networks to transmit data from consumer-grade analog sensors

## Product description

The Adeunis RF Analog product is a ready-to-use radio transmitter that can transform any type of sensor (0V-10V or 4mA-20mA) into a wireless communicating sensor.

• The product meets the needs of users looking for a solution to remotely supervise data of any kind (temperature, pressure, level, humidity, $CO_2$, speed, light, openings, etc.)

• A single Sigfox Analog PWR transmitter can handle two sensors

• The product transmits data from the sensors at regular intervals or on an event (if a high or low threshold is exceeded or if a change in status of the all-or-nothing relays on the inputs is detected)

• The transmitter configuration interface used to select transmission mode, frequency, and interface type (0V-10V or 4mA-20mA), for example, is accessed via a micro-USB port

• The Sigfox Analog PWR unit must be plugged in to an external power supply.

# Product history

The product was developed to give generic sensors IoT connectivity.

Multiprotocol implementation ensures connectivity via Sigfox, WM-Bus, and LoRa. LoRa is a prerequisite for releasing any product on the market and LoRaWAN certification requires a complex set of tests.

The Minalogic-certified project allowed us to develop the test needed to pre-certify our product before sending it to the LoRa Test Houses.

ADEUNIS RF

# FTD

**Field Test Device / This product was developed to test the coverage of IoT networks.**

## Product description

The Adeunis Field Test Device is a ready-to-use product that communicates with all network operators via LoRaWAN and Sigfox.

The system can transmit and receive a radio frame and display the result instantly on a large LCD screen for comfortable viewing of a variety of information about the network (uplink, downlink, SF, PER, etc.) and sensors (GPS coordinates, temperature, battery charge, etc.) used.

The product is particularly well-suited for validating implementation scenarios (communicating sensors, tracking, smart buildings, metering, security, and M2M).

# Product history

The product was designed to support the deployment of new IoT radio networks LoRa and Sigfox.

More than two years ago, the product allowed Adeunis to integrate and develop the technical elements (radio module, radio stack) required for these new networks.

The product has since become a market leader, offering unrivalled radio performance, and is used by operators to test their network coverage.

For Adeunis, this flagship product is leading the way to the development of new protocols and networks. The Easytech project enabled the company to model an FTD on future 3GPP IoT networks LTE-M1 and NB-IoT.

ADEUNIS RF

# LPWAN IOT WAVE

**This line of sensors transmits environmental data (temperature, humidity, etc.) over IoT LPWAN networks (LoRa, Sigfox, WMbus, etc.)**

## Product description

The sensors' main innovation is their capacity to implement all types of IoT protocols (LoRa, Sigfox, WMbus, and, soon, LTE) generically.

Quality data is collected and reliably transmitted, giving the products a maintenance-free operating life of more than ten years, something competing solutions cannot offer.

# Product history

This new line aligns closely with Adeunis' traditional business of developing high-performance radio-frequency products.

The development of LPWAN networks for IoT applications created an opportunity for Adeunis' core know-how, RF. The focus has primarily been on Sigfox and LoRa; 3GPP will soon be added.

The company identified this new opportunity very early on, investing in the development of products to communicate on these networks.

Validation of the technology for a particular communication protocol is a crucial step toward market release. Minalogic assisted Adeunis with the development of a LoRaWAN validation testing suite.

Minalogic also helped the company plan for future products to address emerging IoT communication protocols like 3GPP on LTE.

> **Easytech project**

ADEUNIS RF

# SELF-POWERING SENSOR

## Product description

One of the major challenges for M2M IoT sensors is power.

Adeunis RF is constantly assessing the latest energy-harvesting technologies to determine their level of maturity. This project was set up to asses three energy-harvesting technologies: solar, thermal, and vibration.
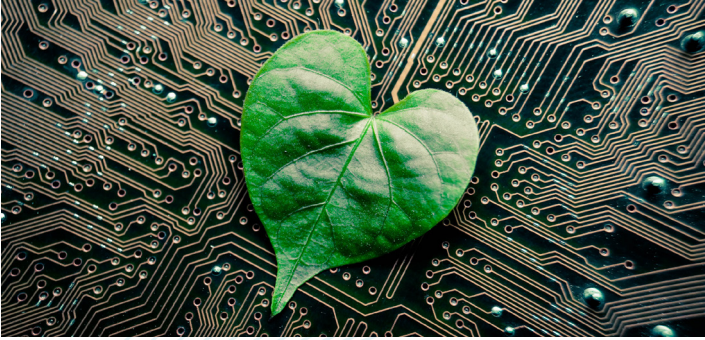
# Product history

The project resulted in a functional demonstrator for use implementing and assessing the three technologies. The main technical issue is the compatibility of the energy-harvesting system with the type and brand of electronics used. To use these systems to create self-powering sensors offering optimal yields, some design and customization work will be required.

In terms of cost, the energy-harvesting systems studied are more expensive than traditional battery-based power supply solutions. Therefore, the technologies are not yet mature enough to be integrated into Adeunis RF's products.

However, the project did position Adeunis RF to take full advantage of these systems when they are mature enough and the company is keeping a close eye on developments.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> Public sector financing from:
Auvergne-Rhône-Alpes Regional Council, Isère General Council,
The Grésivaudan Valley Intermunicipal Authority

> **Developed in conjunction with** Grenoble INP Esisar

ADIXEN VACUUM PRODUCTS

# A204H

## A line of pumps offering an extended lifespan

## Product description

The A204H pump line belongs to the company's new Series 4 generation of dry primary pumps developed for the most demanding applications. The new line integrates several innovations intended to boost the product's overall lifespan:

· New materials selected for their capacity to withstand corrosion

· An extended operating temperature range that limits the amount of sediment, reducing wear and tear on the pump

· A new monitoring system with features like support for new sensors, operating logs, new alert/alarm algorithms, and an energy-saving mode

The company's Series 4 meets the most stringent etching and CVD specifications, making it suitable for semiconductor, flat-panel display, and LED applications.

# Product history

Adixen Vacuum Products has been manufacturing multi-stage roots pumps since 1992. These dry primary pumps earned Adixen a position on the semiconductor, flat-panel display, LED, and solar markets. The low-pressure processes used in these industries produce gases that are compressed by the pump, transforming them into solids (sediment) that cause both corrosion and wear on the pump's mechanical parts, shortening the pump's lifespan.

One of the goals of the Minalogic Textuled2 project (November 2011– April 2014) was to find a solution to this problem. Specifically, project partner Corial uses sapphire etching equipment to manufacture its high-brightness LEDs, and the process creates byproducts that, over time, are detrimental to the equipment's Adixen primary pumps.

The Textuled2 project covered the engineering and development work that ultimately resulted in new technology capable of limiting the formation of these harmful byproducts and improving how the etching equipment and pump work in tandem (through machine-to-machine communication).

Adixen's 204H pump, which leverages these new developments, will replace previous generations of multi-stage roots pumps for the LED and other markets where processes are becoming increasingly damaging due to higher volumes and new materials. The pumps also meet customers' demand for integrated, communicating solutions.

> **R&D project behind the product:**
Textuled2
(French Single Interministerial Fund 12th grant round)

AIM

# IO32 DEVTOOLS

**A major competitive advantage for the developers of software embedded on 32-bit ARM Cortex-M core-based microcontrollers**

## Product description

IO32 DevTools slashes development times tenfold, creating a major competitive advantage for the developers of software embedded on 32-bit ARM Cortex-M core-based microcontrollers.

This intuitive development toolkit opens up STM32 development to a broader audience, including SMBs, where it could potentially drive:

- increased creativity

- better business competitiveness

- access to new markets

IO32 DevTools aligns with the STMicroelectronics STM32 lineup. STMicroelectronics is the global leader in 32-bit ARM Cortex-M core-based microcontrollers.

# Product history

The toolkit was developed in response to a specific issue.

On the one hand, microcontrollers are offering more and more power at lower and lower costs ($0.50 to $7). The development of a few hundreds of KB of software, however, costs tens of man-months of labor.

These high programming costs make it difficult for SMBs—which, unlike large corporations, tend to address low-volume niche markets—to move into certain markets.

The R&D project set out to reduce programming costs via a new toolkit addressing both software and instrumentation.

The project consortium, set up with support from Minalogic, included STMicroelectronics, Grenoble University Joseph Fourier School, AIM, Delta Dore and EASI-IC. EASI-IC, as an expert partner on the project, was tasked with measuring the performance improvements obtained for two applications developed by their company (with and without the toolkit). Development was ten times faster with the toolkit.

The results of the project demonstrated how bringing together partners with complementary skillsets can get results that exceed expectations.

> **R&D project behind the product:**
IO32
(French Single Interministerial Fund 9th grant round)

ALDES AÉRAULIQUE

# INDOOR AIR QUALITY SENSOR

## Product description

Aldes specializes in ventilation—not miniaturized electronics.

Therefore, the company turned to Leti for support developing this product. In parallel, Aldes is also developing a connected device for residential buildings. Therefore, in the future, the company will need energy-efficient communicating sensors for the development of its mobile devices.

Aldes plans to work with Leti again to address this need. This Easytech project is, in many ways, a first step toward a long-term partnership between the company and Leti.

In parallel, Aldes is also developing a connected device for residential buildings. Therefore, in the future, the company will need energy-efficient communicating sensors for the development of new solutions. The $CO_2$ monitoring sensor is an essential component that will position the company to deliver innovative solutions for ventilation systems.

# Product history

Aldes specializes in ventilation—not miniaturized electronics. Therefore, the company turned to Leti for support developing this product. Aldes and Leti worked together to develop an indoor air quality sensor.

**> Easytech project**

ALPWISE

# BLUETOOTH LOW ENERGY PROGRAM

**Communicating, self-powered, multi-sensor system module and development platform**

## Product description

Alpwise sells a range of hardware and software to customers seeking to integrate low-energy Bluetooth communications capabilities into their products, effectively transforming them into connected objects.

The company's TAG is both a development platform and a complete communicating, self-powered multi-sensor system module.It includes an accelerometer, a gyroscope, a magnetometer, and temperature, humidity, air pressure, and ambient light sensors and can be used to develop a broad array of applications from location and motion sensing to capturing environmental data. Data are sent via low-energy Bluetooth to a smartphone, tablet, or PC.

Alpwise supplies the entire software development environment, both for its TAG and for iOS, Android, and PC.

The company's product lineup also includes Bluetooth low-energy and dual-mode modules, development kits, and protocol stacks for 80c51, ARM CORTEX M0, M3, M4, Renesas RX100, RL78, and more.

Bluetooth low-energy was originally marketed for mobile telephony accessories, hands-free car kits, and medical systems. Today, the technology is finding new applications in the world of connected objects, where it can be used in sensors, home automation, TV, location, PC peripheral devices, smartphone accessories, sports and fitness devices, watches, and assisted-living products.

The Alpwise lineup, unique on the French market, includes technology bricks that can be used to give objects communicating capabilities for tomorrow's Internet of Things.
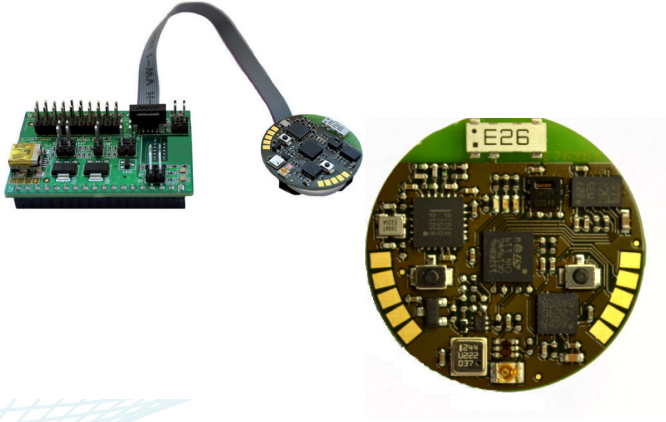
# Product history

Very early in its history, Alpwise, a wireless-communications specialist, narrowed its focus on Bluetooth low-energy technology, participating with the support of Minalogic in various collaborative R&D projects backed by the French Single Interministerial Fund.

For example, in 2007 Alpwise contributed to Bluetooth SIG working groups tasked with developing Bluetooth 4.0 specifications under the Surgimag collaborative R&D project.

The project positioned Alpwise to develop a complete Bluetooth 4.0 protocol stack and an initial RF module using the technology, and sign a strategic partnership with EM Microelectronic

(a Swatch Group company). Alpwise showcased these developments at the Electronica trade show in 2010—and was the only exhibitor at the event to have a working Bluetooth low-energy functional demo.

The company pursued its R&D efforts through two new collaborative projects (Disdeo and Demosen from 2011 to 2014), adding new Bluetooth low-energy products to its lineup.

The projects enabled Alpwise to deepen its know-how and broaden its Bluetooth low-energy product lineup with new communication protocols for medical data, adaptation layers for iOS and Android, the TAG multi-sensor module, development kits, sensor-network management algorithms, and FOTA (firmware over-the-air) technology.

> **R&D project behind the product:**
BLE SDK : SURGIMAG p.14
(French Single Interministerial Fund 3rd grant round)
BLE Module: Disdeo (French Single Interministerial Fund 11th grant round)
BLE TAG: Demosen (French Single Interministerial Fund 12th grant round)

APIX ANALYTICS

# CHROMPIX

**In situ real-time multi-gas analysis**

## Product description

ChromPix is a portable, modular miniaturized multi-gas analysis system that performs ongoing in situ analyses in real time. The system's main technological innovation is based on full integration on silicon (leveraging microelectronics technologies), key gas-phase chromatography capabilities and, specifically, a detection module built on NEMS nanoresonators. The entire measurement chain (injection, separation, and detection) is integrated into a miniaturized analysis (analytics) module designed for plug-and-play use. The ChromPix multi-module rack system can hold up to four plug-and-play modules for up to four parallel analyses from a single sample.

The product is designed for industrial (gas quality measurements, industrial process control) and environmental applications. The ChromPix system will soon (H2 2016) be equipped with a preconcentration system that will bring detection capabilities to the parts per billion, a degree of sensitivity that is suitable for air quality testing and pollution measurement use.

# Product history

The system was developed based on the GCAP system designed and developed under the MIGAS2 project, financed in part through the French Single Interministerial Fund (FUI) and certified by Minalogic.

Apix was founded in December 2011 and so far has been working mainly on developing an initial prototype of its gas testing system. The prototyping phase encompasses all of the system's basic building blocks (injection, separation, and detection modules and electronics).

Initial tests on the system's analytical measurement chain, conducted in 2012, were successful. However, the performance specifications for the tests were relatively low. The following development phase (which took place under the Minalogic-certified MIGAS2 project) led to substantial improvements to the prototype.

The demands of indoor air quality testing are high. The tester must, for example, be able to detect contaminants at concentrations of just tens of parts per billion. The ensuing R&D addressed these needs with enhancements like resizing the silicon-based components (the NEMS detectors and separation columns), developing MEMS-type injectors on silicon (crucial to measuring tiny concentrations), sourcing new components like preconcentrators to facilitate the measurement of low concentrations, and optimizing the system's architecture.

Because it is portable, the product could be used for other on-site environmental testing applications such as pollution monitoring, one-off audits, and identifying the sources of pollutants.

The technology developed by Apix will change how multi-gas testers are used, creating new applications for which conventional technologies are unsuitable.

> **R&D project behind the product:**
> MIGAS2
> French Single Interministerial Fund 13th grant round

> **Public sector financing from:**
> Bpifrance, ERDF Rhône-Alpes, Ain General Council, Isère General Council, Haute Normandie General Council

APIX ANALYTICS

# GCAP-MIGAS

**Real-time on-site multi-gas tester for air quality monitoring**

## Product description

GCAP-MIGAS is a comprehensive portable multi-gas testing system that can be used to complete real-time air-quality testing on site.

The product's key technological innovation lies in the miniaturization of testing capabilities on silicon chips (using techniques from the microelectronics industry). For example, the detection module is based on NEMS nanoresonators.

The product offers an alternative to current indoor air-quality testing systems, which generally either require taking air samples using absorbent cartridges, which must then be sent to a lab for testing, or using portable PID-type detectors that deliver immediate overall results, but that cannot provide a detailed analysis.

GCAP-MIGAS offers the best of both worlds, providing a detailed analysis of indoor air quality in real time, without the need to send samples to a lab.

The product will respond to France's upcoming indoor air-quality regulations (slated to go into effect in 2015), which will require public buildings like schools, daycare centers, and hospitals, to test the quality of their indoor air.

GCAP-MIGAS will address this new market, offering public and commercial building owners and operators a fast, easy testing solution.

The device can also be integrated into HVAC systems, where it can be used to trigger indoor air treatment if a certain contamination threshold is reached, for example.
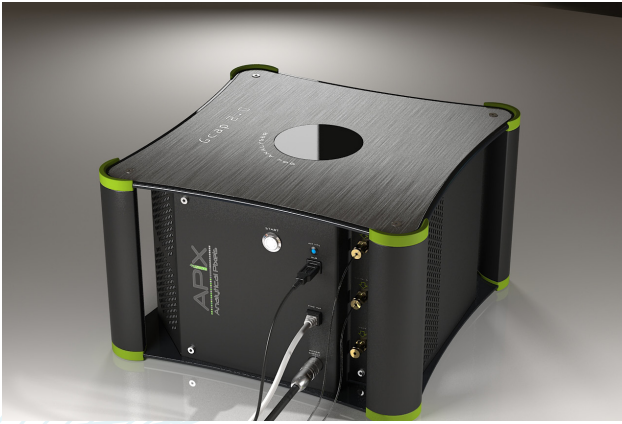
# Product history

Apix was founded in December 2011 and so far has been working mainly on developing an initial prototype of its gas testing system. The prototyping phase encompasses all of the system's basic building blocks (injection, separation, and detection modules and electronics).

Initial tests on the system's analytical measurement chain, conducted in 2012, were successful. However, the performance specifications for the tests were relatively low. The following development phase (which took place under the Minalogic-certified MIGAS2 project) led to substantial improvements to the prototype.

The demands of indoor air quality testing are high. The tester must, for example, be able to detect contaminants at concentrations of just tens of parts per billion. The ensuing R&D addressed these needs with enhancements like resizing the silicon-based components (the NEMS detectors and separation columns), developing MEMS-type injectors on silicon (crucial to measuring tiny concentrations), sourcing new components like preconcentrators to facilitate the measurement of low concentrations, and optimizing the system's architecture.

Because it is portable, the product could be used for other on-site environmental testing applications such as pollution monitoring, one-off audits, and identifying the sources of pollutants.

The technology developed by Apix will change how multi-gas testers are used, creating new applications for which conventional technologies are unsuitable.

> **R&D project behind the product:**
  MIGAS2
  (French Single
  Interministerial Fund 13th
  grant round)

ARNANO
# NANOFORME

**Micron-scale etching on thin glass disks**

## Product description

Arnano's Nanoforme technology makes it possible to store information for very long periods of time (around a thousand years). The concept is similar to microfilm. However, the material, sapphire, is very different.

A tiny reproduction of the document to be saved is engraved on a sapphire plate. The engraving is protected by an additional sapphire plate, for a tamper-proof, highly stable storage medium.

The solution is the fruit of numerous innovations: in image processing for the reproduction of documents on sapphire; in the molecular bonding technique to protect the engravings; and in the scanning method, which involves taking a photograph of the document and processing the resulting image.

The solution is designed for high-risk industries (nuclear power and chemicals) and conservation (museums and monuments). An additional consumer application for the technology is currently being tested under the crowdfunded Fahrenheit2451 project.
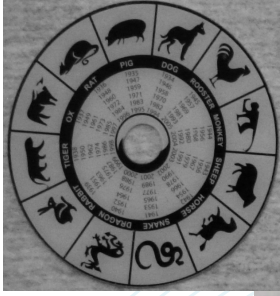
# Product history

This product was developed and subsequent improvements were made under two projects (Nanoforme and Fahrenheit2451) certified by Minalogic and financed by the French Single Interministerial Fund.

The technology bricks developed for this product have also found a niche on the luxury home goods market and are being tested for use in new applications in luxury timepieces and MEMS.

> **R&D project behind the product:**
NANOFORME
**(**French Single Interministerial Fund 8th grant round)

ARYBALLE TECHNOLOGIES
# NEOSE PRO

**A portable, universal odor detector**

## Product description

NeOse Pro leverages a unique combination of technologies (optics, microfluidics, biochemistry, electronics, and IT) to detect, save to memory, and recognize odors thanks to their interaction with around 100 biosensors inspired by the human sense of smell.

More than 500 odors have already been detected and saved to a database of benefit to food, flavoring, fragrance, and cosmetics manufacturers. The system can also detect unpleasant or potentially hazardous odors to assess indoor and outdoor air quality (waste, public restrooms, water treatment plants, automotive passenger cabins, etc.). Once an odor has been detected and saved, it can subsequently be recognized.

NeOse Pro is the first-ever portable odor detector. It has a battery and integrated display for truly portable use. It is fast (less than 30 seconds per measurement) and universal, which means that it can detect a very wide range of odors regardless of their chemical family.

The product is intended mainly for the food and cosmetics industries, where it can be used across the entire value chain, from raw material to finished product (quality control of raw materials compared to a reference material specific to each customer; monitoring of manufacturing processes; quality control of finished products; testing of product formulations as they age; support for product testing panels conducting sensory tests).

# Product history

One of the initial intended applications for the odor sensors developed by Aryballe was a BtoC product for people suffering from anosmia (total or partial loss of one's sense of smell). Very rapidly, however, the company received a number of requests from food and cosmetics manufacturers with odor-monitoring needs and from other industrial customers with air quality (the detection of unpleasant or hazardous odors) monitoring needs for their facilities. Because Aryballe's sensors can detect a substantial number of odors belonging to different chemical families and in different environments, they are well-suited to these new applications.

NeOse Pro was developed specifically to respond to industrial monitoring needs. An integrated display lets users operate the battery-powered portable device and see the results. Aryballe developed three generations of prototypes, releasing the product on the market in January 2018. Minalogic's support--and, especially, the cluster's certification of the Wise project, backed by the FUI and led by Aryballe--has been crucial over the company's three-and-a-half-year history.

The many BtoB events organized by Minalogic have given Aryballe opportunities to meet with numerous industrial customers potentially interested in the solution for their use cases. Minalogic also provided Aryballe with support at major events like CES Las Vegas and Smart City Barcelona 2016. The technological advances that made it possible to develop NeOse Pro and scale it up for manufacturing are and will continue to be of use to Aryballe in its product development activities.

> **R&D project behind the product:**
> French Single Interministerial Fund Wise project (2015), Easytech (2014) for the development of the technology

ARYBALLE TECHNOLOGIES

# NEOSMIA

**Odor sensor specifically for people who have lost some or all of their sense of smell**

## Product description

Anosmia is a disorder that causes patients to lose their sense of smell. Odors are perceived through orthonasal olfaction; however, the disorder also affects the patient's sense of taste, which is perceived through the mouth (retro-olfaction). Ageusia is a disorder that affects the ability to detect sweetness, saltiness, bitterness, acidity, and umami (savory tastes). Anosmia can be due to trauma, drug treatment, a genetic predisposition, neurodegenerative causes—or the cause can remain unknown. It is estimated that around 1% to 2% of the population (15% of people over age 60 and 70% of people over age 80) suffers from the disorder. Anosmia can also be an early-warning sign of neurodegenerative diseases like Alzheimer's and Parkinson's. The market in Western countries is estimated at €500 million.

The disorder often brings with it depression-like symptoms and difficulty eating a balanced diet. The loss of a person's sense of smell also creates safety hazards; sufferers of the disorder cannot smell dangerous odors like gas and smoke, rotting food, and unpleasant or abnormal body or household odors.

In general, the disorder is considered to be untreatable. Surgery is only rarely successful. The most treatable forms are due to sinus inflammation, and the side effects of treatment can be debilitating and last for months.

Aryballe Technologies developed an odor sensor specifically for people who have lost some or all of their sense of smell. A prototyping project led to the development of a dedicated SPRi chip, a database, and a product prototype.

The R&D conducted under the NEOSMIA project led to further advances. A second prototyping project was completed and ten identical prototypes were manufactured and used to test the device's operation in real-world conditions. Patients suffering from anosmia also tested the prototypes. The prototype is currently being scaled-up for manufacturing and the product's commercial release is expected by early 2017.

# Product history

Aryballe Technologies was founded in March 2014 by a group of entrepreneurs and scientists. The company's mission is to combine nanotechnology, biotechnology, IT, and cognitive science to develop breakthrough innovations. Surface Plasmon Resonance imaging (SPRi) for sensory testing, a technique initially patented by the French Alternative Energies and Atomic Energy Commission (CEA) and France's National Center for Scientific Research (CNRS) responds to this need. In the spring of 2014, the technique was successfully used for the first time ever to detect and distinguish between different odors. At the time, the technique had been developed as a laboratory-grade instrument that was cumbersome (dozens of centimeters and 20 kg) and expensive (more than €10K). Therefore, the company's early-stage R&D involved proof-of-concept testing to determine whether or not the sensor could be used universally and work to miniaturize the system leveraging low-cost components.

Leti's DTBS lab (which focuses on microtechnology for biology and healthcare) is renowned for its expertise developing innovative systems. Aryballe Technologies drew up specifications and seven months of development work was completed to come up with a small, affordable instrument capable of delivering the same results as the lab-grade instrument used for the proof-of-concept testing. The company turned to CREAB, an INAC lab (CEA-CNRS-Grenoble-Alpes University) for the biochemical functionalization of the optical sensors. Aryballe Technologies coordinated the project and conducted some of the R&D in conjunction with Leti's DTBS and CREAB.

These joint R&D projects took place from the fall of 2014 and the spring of 2015. The results positioned Aryballe Technologies to contract out the production of 20 prototypes and sign partnership agreements with healthcare-industry stakeholders. Since then, the company has built up a network of industrial partners through a consortium of seven France-based members under an initiative financed in part by the French Single Interministerial Fund. Aryballe Technologies recently raised €3 million from investors. The company is scaling up the technology for manufacturing and plans to manufacture and sell nearly 10,000 odor detectors, including for people suffering from anosmia, in 2017.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:**
  Auvergne-Rhône-Alpes Regional Council,
  Isère General Council,
  The Greater Grenoble Intermunicipal Authority,
  The City of Grenoble

> **Developed in conjunction with** CEA DTBS

ASCOREL
# MC803TOUCH

**A full-color touch human-machine interface for sophisticated, communicating machines**

## Product description

The MC803Touch is a human-machine interface designed to control equipment like bucket lifts and fire truck ladders.

The interface is linked by networks to sensors and computers.
Main technical specifications:
- 7-inch color sunlight-readable touch screen that can be operated with gloves
- Backlit ten-key keyboard
- 1 ARM IMX Micro 800MHz processor running on Linux (for the multimedia and networking functions)
- 1 32 bit, 30 MHz microcontroller running on a specially-developed operating system (for the I/O and CAN functions)
- CAN, Ethernet, USB, and RS232 networks
- Video and audio capabilities
- 54 analog and digital I/O
- Operating temperature range of -20 °C to 70 °C
- IP65 rated for water tightness

**Innovation developed during the project:**
In certain situations, operators must run their own bucket lift (or fire truck ladder) from the control panel on the ground. This can occur during a major fire, for example, to protect operators from potential explosions. To run their equipment efficiently, operators need to be able to see the images from the video and thermal cameras in the bucket while monitoring the equipment settings on the ground.

This project focused on developing a better-performing video management system capable of superimposing information on the video feed and streaming the feed via Ethernet between the different MC803Touch screens installed on the equipment.

# Product history

ASCOREL has a 25-year history of developing increasingly advanced high-performance products for bucket lift manufacturers. Initially, the company's products focused solely on managing tipping risk. However ASCOREL gradually expanded its solutions to overall equipment management with features to address all safety aspects, movement, secondary equipment (emergency lights, fire hoses), remote maintenance, automation and servo control, black box functions, and more.

The development of the MC803Touch was the next evolution in this trend. It is designed to make operating increasingly complex equipment simpler.

The MC803Touch has been on the market for a year. However, the version released offers limited features.

This Easytech project gave ASCOREL an opportunity to improve the performance of the company's existing HMI. Several technological problems were solved, positioning ASCOREL to offer additional features to its customers.

**> Easytech project**

ATIM

# ATIM CLOUD WIRELESS®

**The Atim Cloud Wireless® line**

## Product description

The Atim Cloud Wireless® M2M line of radio modems are flexible and fully configurable for local Modbus master, Modbus slave, or SIGFOX network connections.

These ultra-long-range, very energy-efficient modems are fast and easy to set up. The underlying connected-sensor technology is truly revolutionary, for an entirely new approach to network projects. Costly wiring and construction are now a thing of the past, as are hubs and radio repeaters. Simply place the radio modems and sensors at strategic locations, pick up their addresses, and setup is complete. The sensors automatically connect and are displayed on the Atim Cloud Wireless® platform.

The applications for this solution are virtually unlimited, from security and surveillance of remote or isolated sites, broken circuit detectors to prevent wire and cable theft, water leak detection, utility meter reading, smart building and smart city applications, and energy efficiency are just the beginning.
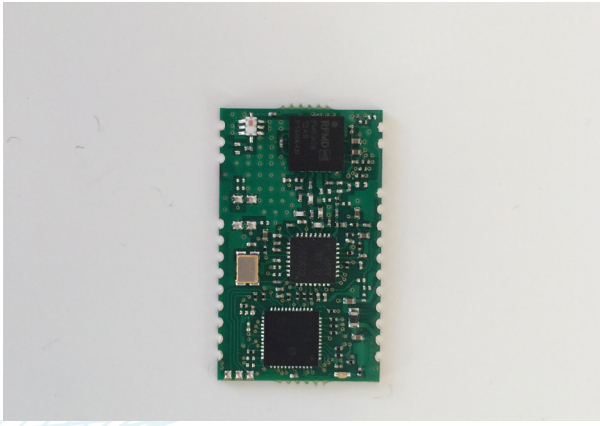
# Product history

Atim worked with Minalogic on the Smart Hydro Monitoring R&D project, backed by the French Single Interministerial Fund, developing a long-range spread spectrum radio modem offering robust radio communications, even in environments with obstacles and other disturbances. Atim is currently responding to high demand for this new-generation communications system, and is working with Atos to design a PoC leveraging Atim products and Atos' web-based supervision platform.

> **R&D project behind the product:**
Smart Hydro Monitoring (French Single Interministerial Fund 14th grant round)

# ATOS CLOUD INDUSTRIAL SUPERVISION

**Private-cloud-based industrial supervision solution**

## Product description

Atos Cloud Industrial Supervision is a private-cloud-based industrial supervision solution that enables plug-and-play implementation of the hardware and software needed for industrial supervision applications. The solution's intelligent mesh networking and cloud-based architecture give end users full remote access to data and software updates; no in-house IT resources are required.

The solution is particularly appropriate for physically-dispersed processes (oil fields, wind farms, cogeneration plants, etc.) where maintenance and scaling are critical. This multi-platform solution gives users a familiar PC, tablet, and smartphone experience.

The solution's main innovation lies in the secure, remote, dynamic distribution of processing units as close to the industrial process as possible and, worth noting, on embedded hardware systems.

Atos Cloud Industrial Supervision differs from the SCADA products on the market in that it offers flexible configuration (graphics-driven programming), can be used in harsh or difficult-to-access situations (e.g. in extreme temperatures), and offers the multi-business-unit capabilities required by deregulated markets.

The solution comes with a native geographic navigation system and a collaborative workflow. It is intended for all applications using smart processes and networks, from smart cities, multi-energy smart grids, and smart buildings to water, oil, and gas. It can also be used for distributed simulation.

Deploy Everywhere, Use Anywhere
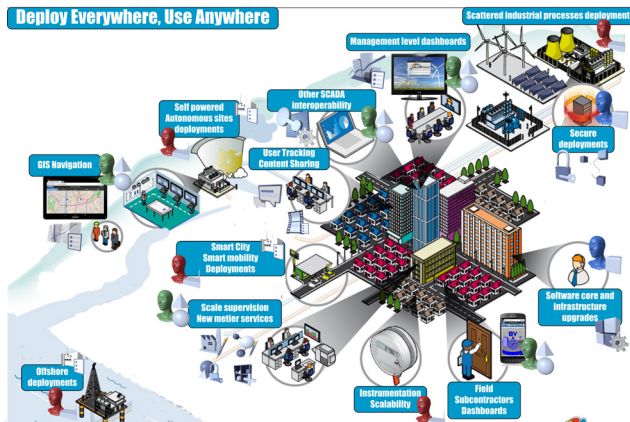
# Product history

Atos Cloud Industrial Supervision was developed to address the needs of new supervision markets not met by existing SCADA solutions.

Increasingly, the field of energy—and, in particular, smart grids—requires supervision systems with multi-operator, multi-business-unit capabilities to cope with the aftermath of deregulation.

And, for smart grids to work, data must be processed and analyzed as close to the process as possible, on embedded systems.

Atos Cloud Industrial Supervision is a break from traditional SCADAs, which generally have centralized architectures operated by a single business unit.

As smart grids are rolled out, the integration of renewable energy sources and increasingly difficult access to fossil-based-energy will create additional remote-configuration needs.

This solution leverages the results of the iDeviceCloud R&D project, in the form of a supervision software solution that is compatible with a broad range of Linux-based hardware used in the field.

It is particularly compatible with the iDeviceBox (developed by AIM under the same R&D project). And integration with ATIM radio products and its wireless cloud (Sigfox) versions has also been tested successfully.

The resulting system, developed by stakeholders in Grenoble's innovation ecosystem, can address all aspects of distributed process supervision (for smart grids, smart cities, and smart mobility), from sensors to the information system and its mobile versions.

> **R&D project behind the product:**
> iDeviceCloud
> (French Single Interministerial Fund 10th grant round)

AUTOMATIQUE & INDUSTRIE

# CACTUSes

**Decision-assistance software for industrial utility customers**

## Product description

In France, the NOME Act, which goes into effect on January 1, 2016, will make regulated electricity rates a thing of the past. This new deregulated market concerns around 436,000 industrial sites in France that will all need specific tools and information to choose their new utility contracts.

CACTUSes decision-assistance software, developed specifically for industrial utility customers, can analyze and forecast energy consumption, determine contract power, and predict unusual usage--crucial when it comes to navigating the deregulated electricity market.

Current energy-management software solutions tend to address residential and commercial customers' needs and do not take into account the issues faced by industrial customers.

CACTUSes leverages data-mining algorithms to provide advanced features not found in other software, including consumption forecasts, which are particularly complicated in industrial settings.

CACTUSes also helps industrial utility customers bypass the energy consultants they habitually use, giving them total independence to choose the right electric utility contract and negotiate rates with utilities. No specialized in-house know-how is required.

Finally, unlike other software on the market CACTUSes addresses a very specific and clearly-identified need.

# Product history

CACTUSes was developed under the OPSINE2 project, which was financed by the French Single Interministerial Fund.

Automatique & Industrie conceived of this project to address the lack of resources available to industrial utility customers seeking to implement continuous improvement processes targeting plant energy efficiency.

Minalogic certified the project, providing knowledgeable support not only with the administrative aspects of the project, but also to help Automatique & Industrie test and improve its products. The project consortium, included Automatique & Industrie (lead), ProbaYes, research lab LIRIS, and NTN-SNR Roulements (for the industrial demonstrator system).

Based on market insights and valuable information from the field provided by NTN-SNR, as well as the changing market regulations, the choice was made to develop an initial software package to help industrial utility customers select the best electricity contracts.

The product is slated for release in May 2015. Expected sales volumes are not yet known; however, feedback from initial demos has been encouraging, confirming CACTUSes' position as a comprehensive, intuitive solution.

> **R&D project behind the product:**
OPSINE2
(French Single Interministerial Fund 15th grant round)

AVALUN
# LABPAD

**Portable in vitro diagnostic system**

## Product description

LabPad® is a portable in vitro diagnostic system that can be used to complete a wide variety of biological analyses. It is made up of a single reader and a broad range of consumable microcuvettes.

Avalun's LabPad® is used in much the same way as a blood sugar test kit. The type of microcuvette selected determines which test will be carried out on a capillary (finger prick) blood sample.

The product aligns closely with the growing trend towards e-healthcare, offering communications capabilities to facilitate the exchange of information between the patient, the professional doing the test, and caregivers.

# Product history

LabPad is the result of a good match between an enabling technology and a market need. The point-of-care market is steadily moving toward in-home care and patient-connected solutions. The trend is fueled by the multi-measurement systems being developed by startups spun off from world-class research institutions (UCLA, MIT, EPFL). Avalun's founders are developing technologies that enable all biological measurements and that are simple to integrate into patient care protocols.

For LabPad to reach its full potential, the company must rapidly get a broad range of measurements to market. And progress is well underway, supported by strong R&D programs like the French Single Interministerial Fund-backed DDIVA project, which Avalun won with the assistance of Minalogic.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:**
   Auvergne-Rhône-Alpes Regional Council,
   Isère General Council,
   The Greater Grenoble Intermunicipal Authority,
   The City of Grenoble

> **Developed in conjunction with**
   CEA DTBS

AZIMUT MONITORING

# GREENBEE

## Continuous noise, weather, and air pollution monitoring

## Product description

Greenbee® is Azimut Monitoring's multi-sensor measurement station. It can measure noise, weather, ozone, nitrogen dioxide, hydrogen sulfide, and other parameters; is self-powered (by its own solar panels); and offers wireless communications capabilities (via GPRS).

The Greenbee® measurement station packs in a host of innovative tools that offer excellent interoperability and upgradeability. The system is easy to implement. It can be used to provide continuous environmental data and configured to trigger an alarm if a given threshold is reached. Because it is portable, collection points can be moved as needed.

Azimut Monitoring is rolling out a business model driven by data analysis and consulting services. The company is positioned to help organizations across the public and private sectors integrate environmental issues into their strategies through feasibility studies, equipment installation, data management, indicators and reports, dedicated web portals to access data, and alerts via SMS, email, and RSS.

# Product history

Azimut Monitoring has traditionally focused on noise pollution monitoring (with its Ladybird® measurement station). Today, with the Greenbee® measurement station, the company is extending its self-powered, communicating measurement station concept to data other than noise.

The use of heterogeneous sensors in the same system raises a number of technological challenges, most notably in terms of energy management. In addition to being self-powered and communicating, Azimut Monitoring products must also be easy to integrate into today's emerging urban sensor networks.

Azimut Monitoring joined the Senscity project (certified by Minalogic) to address the sensor-network issues inherent to tomorrow's smart cities. The project consortium included stakeholders with wide-ranging know-how. Together, they were able to bring the multi-sensor measurement station to a relatively advanced stage of maturity, both in terms of technology and in terms of an associated service lineup to ensure fast, easy commercialization of the future product.

Greenbee® was released commercially upon completion of the Senscity R&D project in 2011. Today, the product accounts for nearly half of Azimut Monitoring's revenue. The company even hired new employees from 2010–2012 on sales of the product (four positions within the company can be attributed to Greenbee®).

> **R&D project behind the product:**
Senscity
(French Single Interministerial Fund 7th grant round)

# HOLODECK
# BY BESPOON & KOLOR

**Immersive display technology**

## Product description

Holodeck by BeSpoon & Kolor offers a science-fiction-worthy teleportation-like experience accessible to a broad range of consumers.

Users simply set up around a half-dozen beacons right in their living room (or any other place); the beacons locate the user to within centimeters.

The user then puts on a pair of stereoscopic teleportation glasses equipped with the SpoonPhone, BeSpoon's smartphone with location capabilities.

All it takes is a few seconds to transform any space into a Holodeck. The user is instantly teleported to and can move around within a faraway (previously-digitized) place.

This impressive technology combines two major innovations:

• the precision location capabilities developed by BeSpoon under the Minalogic-certified Lokeos project (co-certified with SCS).

• The immersive display experience developed by Kolor, just a few kilometers down the road from BeSpoon.

The system has garnered interest from business users in a number of fields. However, because it is affordable and easy to use, it also offers the advantage of being accessible to a broad range of consumers.

Ultimately, BeSpoon and Kolor would like to see every home with its own Holodeck!

# Product history

Holodeck is a classic case of the good things that can happen when clusters like Minalogic help their members network.

Which is how BeSpoon and Kolor came to work together, combining their precision location and immersive display technologies.

The two companies knew each other well; some of their engineers had even worked together previously. However, they had to travel thousands of kilometers to the Consumer Electronics Show in Las Vegas to hatch a new idea for an interactive immersive experience at the crossroads of the two companies' respective technologies.

And the more they talked about it, the better the idea seemed:

• Kolor had the know-how to assemble spheres to digitize a physical space and move around within it.

• BeSpoon had a technology capable of pinpointing a person's movements within a given space.

Combining the two technologies resulted in a major advance, one that would allow people to move around within digitized spaces simply by putting on a pair of special glasses.

Anyone's living room can be transformed into a Holodeck, giving "the average Joe" access to a world of fascinating places, no matter how far away they may be.

> **R&D project behind the product:**
Lokeos
(French Single Interministerial Fund 13th grant round)
*Co-certified by cluster SCS*

BH TECHNOLOGIES

# REDIN

**Identification system that manages access to household waste receptacles to facilitate the implementation of incentive programs**

## Product description

Redin is an identification system that manages access to household waste receptacles to facilitate the implementation of incentive programs. To dispose of household waste, users must open the receptacle using their household's access card. Every time a household disposes of waste, it is recorded so that waste management authorities can bill the household for the number of uses. The less a household throws away, the lower the waste-disposal bill. Effective sorting of recyclables is also rewarded.

The product integrates IoT network capabilities into waste-reduction incentives in an innovative new way.

The Redin terminal is powered by a long-lasting (more than 10 years) lithium battery. It is IP68 and IP69K rated for resistance to moisture and dust and can withstand power washing. The product is robust and easy to use.

Redin is intended for municipal waste-management authorities seeking solutions for the implementation of waste-reduction incentives that respond to the "polluter pays" principle outlined in the French government's environmental agenda.

# Product history

The product will meet the needs of municipalities as they roll out policies to more effectively manage voluntary waste drop-off points to align with the national environmental agenda. The product was developed under a multi-partner R&D program with Orange Labs and other companies, including BH Technologies. The purpose of the project was to determine a standard communications protocol to ensure object-to-object communications. The results of the project positioned BH Technologies to leverage a LPWAN-type radio network to transmit the data gathered by the terminal.

Redin will round out BH Technologies' existing environmental products and services with two new products. The product aligns with municipalities' waste-reduction incentive strategies and will help municipalities control costs and encourage and improve waste sorting, ultimately reducing the total volume of household waste. This will reduce the need for landfills and incinerators. The access-card and incentive system will effectively encourage citizens to more effectively sort their own household waste.

A probe (SYREN) was also developed to measure the fill level of the voluntary waste drop-off receptacles to help avoid overflow, make waste-collection schedules more efficient, and, ultimately, further encourage households to use the bins.

> **R&D project behind the product:**
> Senscity
> (French Single Interministerial Fund 7th grant round)

BIDUL & CO

# CONNECTED QI INDUCTIVE CHARGER

## Product description

The connected Qi inductive charger can transmit information on the status of the passive device placed on the charger base. The idea is to be able to charge smartphones and tablets, of course, but also other devices like mice, remote controls, gaming controllers, or any other everyday battery-powered item. The connected Qi charger communicates via Bluetooth with an app installed on a smartphone, tablet, PC, or Mac. The app shows charging status and logs and provides analytics to help users save energy.

The charger offers a number of benefits. It is wireless, replaces highly-polluting batteries, and helps save energy. It is also a universal system that can be used to charge many products that are currently battery-powered without the hassle of removing the batteries from the product.

# Product history

Bidul&Co decided to develop an inductive charger that could also exchange data with a smartphone at very high speeds.

The project was completed in partnership with Grenoble Institute of Technology and STMicroelectronics under the Easytech program (an IRT Nanoelec program administered by Minalogic). Easytech supports SMBs from all industries so that they can integrate smart capabilities into their products. The project was also funded in part by France's National Research Agency (ANR) and local governments in the Auvergne-Rhône Alpes region.

BIDUL & CO

# POWER DATA TRANSFER

## Product description

The goal was to come up with a high-speed data transfer solution to rapidly replace the current mobile-device connectors that will soon be obsolete.

The first-generation product is a connected Qi charger with an iOS and Android application via Bluetooth. The second-generation product is a connected Qi charger that integrates a new technology, high-speed data transfer, thanks to a new STMicroelectronics chip.

# Product history

Digital media and data backup methods are changing, creating a need for products capable of transferring data between the smartphones and tablets people use every day. Cloud-based solutions cannot provide this service: these solutions cannot handle large files and access depends on a good internet connection.

Bidul&Co is filling this gap with multi-functional data storage systems capable of transferring data between computers and smartphones or tablets. The company's products are sold under Apple's MFi and Microsoft's Designed for Surface programs.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:** Auvergne-Rhône-Alpes Regional Council

> **Developed in conjunction with** Grenoble INP-Esisar

CORIAL

# ICP-RIE 200 MM

**Etching machine**

## Product description

Corial developed a new-generation 200 mm ICP-RIE etching machine.

The machine will give the company's current and future customers access to a broader range of materials etching processes, including deep etching (> 100 μm) of hard materials.

Deep silicon etching (cryogenic or Bosch) has become a crucial step in the production of MEMS (micro-electro-mechanical systems), integrated optics, and system-level packaging.

The primary challenge is to deeply etch materials just microns thick while maintaining a vertical etch profile, good etching uniformity, and a high aspect ratio. The ability to obtain these kinds of structures on hard materials like glass, silicon carbide, sapphire, and lithium niobate could open the door to new opportunities in MEMS, packaging, and power semiconductor devices.

Corial improved its etching machine by adding more powerful ICP and RF sources, a removable liner, a more efficient pump set, and a more effective substrate cooling system.

The upgrades made to the ICP-RIE machine, combined with in-house R&D know-how, resulted in the development of rapid deep etching processes for hard materials that respond to market needs.

# Product history

Deep reactive ion etching (DRIE) was a revolution that spurred exponential growth for silicon-based MEMS.

These technologies are now pervasive. However, DRIE is difficult to use effectively on materials other than silicon and today many industries make components on non-silicon substrates.

The purpose of the HMDE project was to develop solutions for the deep etching of «hard» materials (glass, ceramic, crystal) for new components for the watchmaking and telecommunications industries.

The project provided Corial with a unique opportunity to:

- Form a strategic partnership with Leti

- Develop deep etching technologies leveraging access to Leti's technology portfolio (substrates, masks, characterization equipment) and obtain a tangible, factual performance assessment of Corial's machines

- Validate the technologies developed through testing with end users

- Gain new technical knowledge (processes)

- Develop new products (machines)

> **R&D project behind the product:**
HMDE
(French Single
Interministerial Fund 19th
grant round)

COSERVIT

# SERVICENAV MONITORING

**Smart Support Center II & IoT supervision system
for support centers**

## Product description

ServiceNav is a SaaS server, application, and network supervision platform. It can be rolled out quickly and offers users an intuitive experience. ServiceNav meets the needs of companies of all sizes.

**ServiceNav features:**
- Easy implementation
- Easy administration
- SaaS or on-premises
- Intuitive and customizable dashboards
- Multi-tenant
- Decision-assistance reports
- Easy-to-understand, competitively-priced licensing model

**Competitive advantages:**
- Multi-tenant, SaaS, can be rebranded
- Dashboards & reports
- Predictive module
- 100% mobile
- More than 1,200 standard control points available

Designed for: CSPs/MSPs, end users (CIO/CTO/CDO)

**Customer benefits:**
- Measure and get clear information on IT service uptime
- Improve support center productivity
- Plan maintenance proactively
- Minimize unscheduled downtime
- High-added-value reports
- Easy to roll out and use
- Validation of SLAs
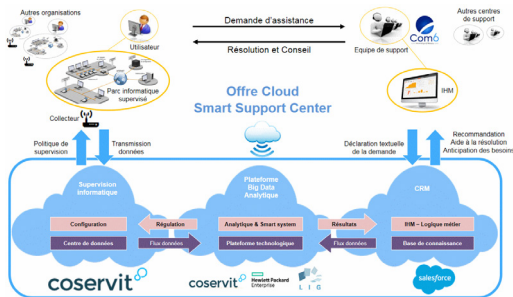
# Product history

Coservit has been developing its IT supervision platform in SaaS mode since 2009. In 2014, after a meeting at Minalogic Innovation Days, the company decided to partner with Salesforce, HPE, Com6, and the Grenoble Information Technology Lab on a project that would address the needs of tomorrow's support centers.

### Challenges

In a connected world, user support will become a strategic issue for businesses on all markets (ICTs, healthcare, manufacturing, energy, and more). And, in our digital society, the support center is crucial to relationships between users and their suppliers, regardless of sector (government, business, manufacturing, etc.). ServiceNav monitoring is a smart, cloud-based software application for support teams. The software shortens the time it takes to close support tickets an improves the user experience. Initially, the project consortium targeted the ICT industry. The project explored new data processing models, helping to establish a new state of the art in Big Data analytics. Coservit will release the product in SaaS mode, a new business model.

### Objectives

ServiceNav Monitoring targets support centers. Currently, the two major challenges facing support centers are reducing costs and improving service quality. Staffing accounts for more than 70% of a service center's operating expenditures and our product reduces these costs by 10%. In a BtoB and BtoC volume production environment, these costs are enormous. Our product gives support teams predictions about future alerts so that they can improve support center efficiency. Our sales strategy for the first three years will be to address Salesforce and Coservit customers and the 100,000 HP partners, a market of more than €150 million per year. Ultimately, we will target the entire ICT market (manufactures, managed-services providers, hosting companies, etc.). Later, we will expand into other industries with support centers. The members of the project consortium bring a range of complementary strengths, which will position us to continue to develop the solution and release it worldwide. Coservit, as project architect and lead, is commercializing the product; the lab is transferring the Big Data and AI technology to the company.

> **R&D project behind the product:**
> French Single Interministerial Fund 18th call for projects

CT2MC

# THE SPYBOAT® AQUATIC DRONE

**An aquatic drone for inspection and environmental sampling missions**

## Product description

Our SPYBOAT® aquatic drone technology is based on a sterile cover placed on the drone before each use, preventing contamination of the sample and the environment. The technology is protected by an international patent.

The SPYBOAT® line includes three products of various sizes and weights depending on the types of sensors used. The drones can be used for single- and multi-beam bathymetry, multipoint water sampling with a capacity of up to five liters, placing substances or equipment at a specific location, visual inspection during the day or at night, mapping and in-depth profiling of different indicators (temperature, pH, salinity, redox, conductivity, oxygenation levels, turbidity), removing vegetation and collecting sediment.

# Product history

The technology that underpins the SPYBOAT® drone took two years of research and development.

The first SPYBOAT® drone was released in early 2015.

In 2016 the company engaged in a joint R&D project with Grenoble Institute of Technology-ESISAR to develop new electronics for the drone.

A new model, GOOSE, was also developed in 2016 in partnership with EDF-DTG.

DE LUCIA

# PREMIUM THREE-WAY AUDIO SPEAKERS

## Product description

Premium three-way audio speakers that deliver extremely true sound reproduction. The speakers are also among the very few to deliver superior bass in a small form factor, for a product with a slim, elegant design—a crucial feature on the premium market.

# Product history

The product, in the final stages of development, is the result of a joint R&D project between DE LUCIA and a research lab.

Support from Easytech was vital to the successful completion of some of the R&D work in partnership with Grenoble Institute of Technology's Gipsa Lab. A prototype offering very high sound quality was built.

A second prototype, under construction, will be used to test stereo performance. In parallel, the final development work to prepare the first product for market release is in progress.

**> Easytech project**

DRACULA TECHNOLOGIES

# DRACULA POWER ULTRALIGHT

**Dracula Power Ultralight panels**

## Product description

Dracula Power Ultralight photovoltaic panels by RaidLight provide portable, off-grid power for outdoor activities.

These third-generation PV panels plug in to a USB port to top up a USB powerbank that can then be used to charge a mobile phone, GPS, or any other USB-compatible device.

Weighing in at just 35 grams, the product meets the extreme weight requirements of adventure racing and backpacking.
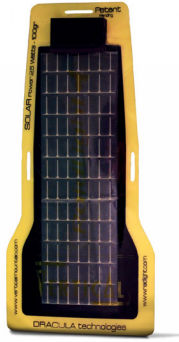
# Product history

Dracula Power Ultralight panels evolved from our flexible PV and EL management circuit boards.

The goal was to design a new electronic board combining Dracula Power's two technologies, photovoltaics and electroluminescence. But first, the board's solar energy storage capacity and overall yield had to be improved.

Dracula Technologies joined forces with Grenoble Institute of Technology-Esisar students to develop new solutions optimized for these applications. This joint R&D project resulted in three new boards for Dracula Technologies. The students developed five modules and two daughterboards. They also achieved yields in excess of 95%.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> Public sector financing from: Auvergne-Rhône-Alpes Regional Council

> **Developed in conjunction with** Grenoble INP Esisar

EBL FRANCE

# GBOOST

**Easy to install, lightweight, and quiet electric drive system for bikes**

## Product description

The Gboost electric drive system transforms any bike into an electric bike in just minutes. Gboost delivers the best of electric bikes (low-effort, quiet, and discreet) and standard bikes (lightweight, agile, and free from concerns about battery range). The electric motor weighs just 950 grams. It takes just minutes to install the Gboost electric drive kit on any type or size bike. And, thanks to Gboost's patented technology, no tools or special skills are required. To date, users have been thrilled with E Bike Lite's Gboost, raving about how quiet and lightweight it is.

# Product history

An early, low-cost version of the product was sold by Decathlon from 2013 to 2015. The project partnered with Grenoble-Alps University's Gipsa Lab in R&D funded by Carnot LSI to update the motor regulation electronics for less noise and to streamline installation with a new pedaling-detection technology. These advances (made in 2016 and, with support from Easytech in 2017) resulted in the creation of startup E Bike Lite (2016) to commercialize this new and improved version of the product.

**> Easytech project**

EFJM
# RFID-EQUIPPED PISTON

## Product description

Pistons are generally made of a metal structure for mounting on control equipment, a PTFE section to ensure low friction in the machine's housing, and a flexible rubber material between the two elements that provides the contact required for a tight seal.

EJFM's goal was to add electronics to the piston to save information to memory and transmit it to an operating system via a contactless communication protocol.

The resulting piston is designed for food-dosing machines that use volumetric measurement. This type of machine is used in large food manufacturing plants, including dairy packaging plants, which face particularly stringent requirements. Amid the rapidly-emerging Factory of the Future, the ability to equip wear parts like pistons with devices that enable predictive maintenance is more than relevant. EFJM overcame a significant technical hurdle: how to integrate an electronic device during the rubber vulcanization process. It will now be possible to integrate directly into the piston all of the equipment ID and traceability data to head off counterfeiting. The piston will also generate monitoring data so that replacement can be planned according to key characteristics.

# Product history

EJFM invented a process to adhere rubber to PTFE. The innovation positioned the company as a hyper-specialist in dynamic sealing solutions. The pistons used in food dosing machines are one of the flagship applications for the technology. EFJM's many innovations in this field generate substantial revenue for the company. However, the oldest products in the company's lineup are beginning to face competition now that some of the underlying patents have come into the public domain.

To navigate this challenging environment, several years ago, EFJM began exploring how they could bring innovation into the product and what resources that would take. The idea of integrating RFID was the result of this process. RFID tags were totally outside of the scope of EFJM's know-how.

As a member of cluster Elastopole, the company attended an innovation session facilitated by ANRT, where it identified Leti's potential to help. EFJM then turned to Leti to design a miniaturized electronic assembly that would overcome the main challenges that had been identified. The partnership with Leti led EFJM to work with Minalogic to review the planned roadmap and create an economically-viable framework for the development..

> **Easytech project**

EFS & SCHNEIDER ELECTRIC

# LEDBOX

**LED lighting power and control unit**

## Product description

LedBox is a new lighting system offering centralized power and control modules to operate solid-state (LED and OLED) and traditional lighting at room-level. The unit is intended for use with a complete lighting system (lighting, sensors, and actuators) with the goal of improving both energy efficiency and occupant convenience and comfort.

One LedBox is installed in each room, where it converts a single 230V AC input into nine very-low-voltage DC outputs that directly feed the room's light fixtures.

The unit adapts to the needs of the light fixtures in terms of polarity, power supply (voltage, current), and energy level, and can be configured for different lighting scenarios (dimmer, colors).

LedBox can also communicate with a supervision system (several LedBox units can be connected to the same supervision system). The overall system can be configured either centrally by the supervision system, or locally via a suitable human-machine interface (by an installer or user).

LedBox is designed to ensure optimal energy efficiency and room lighting at all times. It addresses all markets potentially interested in the occupant comfort and energy efficiency offered by LED lighting.

Pilot projects are currently in progress at hotels, restaurants, and other commercial buildings.

# Product history

LedBox was developed under the DELight project (backed by the French Single Interministerial Fund). Schneider Electric, which had previously completed proof-of-concept testing on the LedBox, served as the project lead for the 12-partner consortium.

LED lighting offers vast potential for widespread adoption in the short term. LED lighting is currently the only solution that can offer end users excellent energy efficiency and comfort.

LED technology is expected to reach maturity within the next ten years and will gradually replace traditional incandescent and fluorescent bulbs.

Regulations prohibiting the use of energy-hungry light bulbs will be a key growth driver on this market.

However, one roadblock to the widespread adoption of solid-state lighting systems (which are, by nature, non-standard) is the fact that their control systems must be configured by a professional.

LedBox was designed to overcome this hurdle by offering rich human-machine interfaces suitable for both installers and end users. Easy to install and pleasant to use, the LedBox is both a self-contained product and an enabler that innovative solid-state lighting and lighting systems providers can leverage to drive growth.

> **R&D project behind the product:**
DELIGHT
(French Single Interministerial Fund 11th grant round)

ENDOCONTROL
# JAIMY

**Bras robotique co-manipulé associé à un système de fluorescence pour l'assistance aux gestes opératoires en chirurgie laparoscopique**

## Product description

With laparoscopic surgery, incisions are just millimeters long. This is good news for patients, but creates an additional challenge for surgeons, who can no longer directly see the surgical site. Fluorescence imaging, which consists of injecting markers that are concentrated in the area of interest and that emit infrared light, could give surgeons more detailed information about what they are seeing. However, fluorescence imaging is currently not compatible with laparoscopic surgery.

Laparoscopic surgery presents the added challenge of giving surgeons extremely tight spaces to work within. Endocontrol developed an endoscopic fluorescence imaging system combined with a surgical cobot to make laparoscopic surgery safer and more precise. The first step was to develop an endoscopic imaging system capable of displaying the areas of interest in color and fluorescence. This entailed miniaturizing the fluorescence imaging system and coming up with an endoscope compatible with the two types of imaging. The surgical cobot leveraged an innovative shared control mechanism. The surgeon picks up an instrument, which is also held by a robotic arm. The surgeon uses the traditional technique, and the robot serves as a guide, enhancing the surgeon's stability and precision. Endocontrol worked on the robotics component of the project.

The laparoscopic surgery systems developed will address: digestive, bariatric, and urological surgery, which all include complicated coelioscopy, which has much to gain from robotic assistance; as well as gynecological, cardiac, pulmonary, and vascular surgery. The laparoscopic surgery market was estimated at €14.8 billion in 2008 and was expected to grow 7.8% per year to reach €23 billion by 2014, according to the 2009 BCC Research Report, «The market for Minimally Invasive Medical Devices.»

There are an estimated 100,000 laparoscopic surgeons worldwide (not including India and China) according to the MedTech Insight and Frost & Sullivan reports on endoscopic surgery (2006). The number of centers potentially interested in this solution could therefore be between 30,000 and 40,000.

# Product history

The FluoRoMIS project looked at an endoscopic fluorescence imaging system (including a 3D version) and a surgical cobot. The end goal was to combine the two systems to guide the surgeon's hand, making laparoscopic surgery safer. The concept was to extract the information required to control the robot from the fluorescence images.

The first step was the endoscopic fluorescence imaging system. This type of imaging is used in open surgery. To use it in laparoscopic surgery required new optical systems compatible with the difficult conditions of laparoscopic surgery (miniaturization, lighting, image quality).

Next came the cobot, with the goal of developing a robotic arm capable of enhancing the surgeon's technique without interfering. Finally, image-based control rules were developed. The first two steps were completed in parallel, and resulted in the development of two separate, fully operational systems suitable for different markets.

The complete system combining the two is designed to respond to the fundamental problem in laparoscopic surgery: seeing the areas of interest and using the surgical instruments with precision.

This project harnesses the strengths of the MedTech ecosystems in Grenoble and Paris, with academic and institutional partners like UPMC, UJF, and the CEA, as well as a number of SMEs. The project addresses microtechnologies (video sensors, fluorescence imaging, miniaturized robotics) and embedded software (3D display, video and fluorescence image fusion, and a master/slave configuration for the robotics and operating room systems), two of Minalogic's core activities, as well as innovative medical systems in oncology, leveraging the Medicen cluster's expertise in imaging.

The project played a crucial role in technology convergence, coupling the surgical robotics developed for over a decade at UJF, UPMC, and Endocontrol with CEA-Leti/Fluoptics fluorescence imaging technologies.

> **R&D project behind the product:**
FLuoRoMIS
(French Single Interministerial Fund 13th grant round)

# VIKY

**Motorized endoscope positioner**

## Product description

Viky gives surgeons direct, assistance-free control of endoscope (Viky EP) and uterine manipulator (Viky UP) positioning. A multilingual voice-control system with wireless microphone lets surgeons simply tell the system the desired position to deliver the best possible image of the surgical site. Viky is small, lightweight, and fast and easy to learn to use, a revolution in minimally-invasive surgery.

Viky EP is a motorized endoscope positioner for laparoscopic surgery. It provides excellent image stability and lets the surgeon control the image. It also eliminates camera shake, reducing eye fatigue, a key factor for longer procedures. Viky EP can be used for a variety of laparoscopic procedures (urological, gynecological, thoracic, pediatric, and general surgery).

Viky UP is a motorized uterine manipulator holder for gynecological surgery that lets the surgeon control the position of uterine tissue during surgery, exposing tissue to be removed and keeping healthy tissue away from the surgical site. Viky UP makes a number of traditional and robotically-assisted laparoscopic gynecological procedures (hysterectomy, myomectomy, promontofixation, and endometriosis treatment) easier.

The robotically-assisted surgery market is the leading professional-grade robotics market and it continues to grow. Surgeons are particularly open to new innovations, and, based on their successful use of pioneering robotics solutions, surgeons are particularly likely to adopt alternative robotics concepts. Endocontrol developed a new collaborative robotic concept for laparoscopic surgery for more flexible, affordable, and modular systems that adapt well to the wide range of anatomical features and pathologies surgeons deal with every day. This new concept has the potential to make robotically-assisted surgery systems more precise and ergonomic.

# Product history

The Viky EP motorized endoscope positioner was the first robot developed by Endocontrol in 2007. It lets surgeons control the endoscope camera directly and without assistance. Viky's revolutionary architecture, developed by and for practitioners, responds to the ergonomics requirements of laparoscopic surgery. Because it is small and lightweight, Viky EP improves surgeons' posture and is compatible with traditional instruments and techniques. It can also be used for a wide range of procedures for the benefit of many patients. In 2010 a new version of the Viky system was developed for uterine positioning: the Viky UP robotized uterine manipulator holder for gynecological surgery.

Viky EP (Endoscope Positioner) provides a stable image and lets surgeons control the image, eliminating camera shake and the associated eye fatigue, especially during longer procedures.

Viky UP (Uterus Positioner) gives surgeons excellent control positioning uterine tissue during surgery so that they can effectively expose the tissue to be removed and keep healthy tissue away from the surgical site.

Since Viky was released, 150 systems have been installed and 10,000 surgeries have been completed.

> **R&D projects behind the product:**
Fluoromis
(French Single Interministerial Fund 13th grant round)

ENLAPS
# TIKEE

**Indoor geolocation system**

## Product description

Enlaps developed an innovative solution for creating and sharing time lapse videos. The product, Tikee, is suitable for professionals and consumers.

Time lapse videos are produced by capturing individual frames at regular intervals. When the sequence is played back at a higher speed, phenomena that are normally too slow to be observed with the naked eye are revealed (construction of a new building, events, weather, etc.).

Enlaps was established to:

- Put time lapse video within the reach of all users by making the entire process (image-capture, editing, and sharing) simple, so that anyone who wants to observe a changing scene over time can.

- Support digital communication using time lapse video, a format particularly well-suited to online use. Time lapse videos are short, simple, and have a strong emotional impact.

The solution is made up of:

- A self-powered, communicating camera: The camera can be placed outdoors, is solar powered, and offers advanced connectivity to eliminate any memory capacity issues.

- A dedicated web app developed specifically for time lapse videos: The easy-to-use web app lets users configure, view, and edit their videos. No special knowledge is required. Videos can then be shared on social media or embedded in other video footage, websites, or other multimedia content.

**100% SELF-SUFFICIENT**
High efficiency photovoltaic panel
High capacity battery
Smart energy management

60mm

180mm

**100% CONNECTED**
Wireless communication

# Product history

Producing high-quality time lapse videos requires photography skills, costly equipment, complicated software, and a lot of time. The results are impressive, but the process is involved and expensive. Enlaps' founder took an interest in the topic, and, after taking a close look at the existing solutions on the market, started Enlaps to develop an affordable comprehensive solution offering automated configuration and editing capabilities.

Enlaps received the support of the Easytech program administered by Minalogic. This support included recruiting four students supervised by ESISAR, an engineering school, to develop the embedded software that gives the product its self-powering capabilities through the smart management of the integrated solar panel and battery.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:**
  Isère General Council, Grenoble Alpes Métropole (intermunicipal authority), Auvergne-Rhône-Alpes Regional Council

> **Developed in conjunction with** Grenoble Institute of Technology-Esisar

ENERBEE

# ENERBEE

## Indoor air quality control product

## Product description

EnerBee's new indoor air quality control product was developed to support healthy indoor environments and everyday wellness for building occupants.

The product is self-powered, easy to install, and fully integrated (with air-quality sensors and EnerBee's energy-harvesting system). The product can be integrated into HVAC systems where it delivers smart capabilities and helps keep energy consumption down.

EnerBee, for healthy living in a world where air quality, energy efficiency, and comfort are within reach for all.

# Product history

The impacts of indoor air quality on public health and the economy are becoming a major concern. A total of 4.3 million premature deaths each year are attributed to poor indoor air quality. In France, the cost to the economy is estimated at €19 billion per year.

HVAC systems and extractor fans play a crucial role in ensuring indoor air quality. EnerBee developed its latest product to help bring good indoor air quality to all.

The product addresses a large market. In France, some 12 million air extractor fans are already installed and more than 1 million new extractor fans are sold each year. EnerBee's new product has the capacity to give these systems smart capabilities and enhanced performance.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public financers :**
  The Grésivaudan Valley Intermunicipal Authority, Isère General Council, Auvergne-Rhône-Alpes Regional Council

> Developed in conjunction with Grenoble INP-Phelma

ENERBEE

# SMART VENT

## Self-powering vent that monitors and tests indoor air quality

## Product description

Smart Vent is a self-powering vent that monitors and tests indoor air quality.

The product is powered by Enerbee's multi-patented micro energy source, producing its own energy from the air flowing through the ventilation system to power the sensors (typically air flow, humidity, temperature, $CO_2$, VOCs, and pressure). Both the micro-generator and sensors are integrated into the wireless, batteryless vent. Smart Vent is easy to install and helps improve indoor air quality, save energy, and reduce maintenance costs.

It is suitable for residential (including subsidized housing) and commercial buildings.

# Product history

As a startup based in the Auvergne-Rhône Alpes Region, Enerbee's innovations leverage the work of the region's research institutes.

The Easytech program helped Enerbee by providing flexible support to develop processes and improve the company's competitive advantage. The Easytech program also put Enerbee in touch with the right contacts for the company's current stage of maturity.

To meet the building market's growing demand for IoT solutions, Enerbee integrated its piezomagnetic micro-generator into a self-powering, connected vent (Smart Vent). The company's proprietary technology is well-suited to generating energy from low air flows, enabling the self-powering device to provide indoor air quality monitoring and testing. The wireless, batteryless Smart Vent helps improve indoor air quality, save energy, and reduce maintenance costs. It is suitable for residential (including low-income housing) and commercial buildings.

An initial version of the product with only the self-powering monitoring features, was presented at CES 2017. Today, Smart Vent 2.0 is ready to be unveiled, with self-powering indoor air quality testing capabilities.

The device can collect and transmit indoor air quality data and, now, can also use the information to control ventilation automatically to ensure optimal occupant comfort.

ENYX

# OPTIMIZED CLOUD-BASED FPGA SYNTHESIS

## Product description

Optimizing FPGA internal development processes by streamlining the required computing resources and generating detailed statistics on Enyx FPGA projects.

The Synaas (Synthesis-as-a-Service) project was set up to optimize development on FPGAs by enabling a specific processing hardware allocation for each project (for the synthesis and routing steps) and by centralizing detailed statistics for each VHDL core (use of logic resources, critical pathway values, etc.)..

# Product history

This was an in-house R&D project. The company has not yet made a decision to release the product on the market.

EUVEKA

# EMINEO

**An industrial mannequin that can reproduce exact body measurements**

## Product description

Euveka helps its apparel-industry customers make a smooth, efficient transition to mass-customized and made-to-measure garments.

Its robotic mannequin can reproduce any morphology (related to age, geographical origin, or illness).

# Product history

Many consumers have a very difficult time finding clothing that fits well.

To help solve this problem, Audrey-Laure Bergenthal decided to design a connected mannequin that can be adjusted to replicate any body type.

EVEON

# INTUITY® JECT

**Automated drug injection system**

## Product description

The Intuity® Ject drug injection system is completely automated, a major innovation. The system is intended mainly for the biodrug market, which requires precision dose accuracy capacity due to the high cost of the drugs.

Intuity® Ject truly stands out from other solutions on the market in that it enables fully automated subcutaneous, intramuscular and intradermal injections of tiny amounts of a drug with a high degree of precision. No other product on the market can currently make these claims.

Eveon's portfolio of micropump technologies, which includes a MEMS-based pump, gives the company a significant advantage. The MEMS pump makes it possible to inject just a few microliters with minimal drug losses. And, for the more expensive drugs on the market, a few microliters can cost in the tens of euros.

Intuity® Ject was developed for the following treatments:

- oncology (cancer),

- neurodegenerative diseases (Parkinson's),

- inflammatory and autoimmune diseases (rheumatoid arthritis and multiple sclerosis),

- respiratory diseases (cystic fibrosis.

# Product history

The concept behind Intuity® Ject was inspired by the mosquito. Mosquitoes sting at the "right" depth, using five sensors and two pumps to inject their own anticoagulant and extract a "dose" of blood. The idea was to try to reproduce the mosquito's particularly effective injection technique in an automated drug injection system.

Eveon headed the FluMin3 R&D project (with partners Grenoble Institute of Technology lab IMEP-LAHC, CEA-Leti, and Cedrat Technologies, and the support of Minalogic) to develop a prototype of the first-ever MEMS-based totally-automated injection system.

The project's primary objectives were to develop:

- A MEMS with a powerful micropump (the only of its kind currently to offer flow rates of 10ml/min) and sensors to measure injection parameters in real time, all on the same chip.

- Wafer-level integration of the MEMS compliant with biomedical requirements (biocompatibility, sterilization, and manufacturable on an industrial scale).

- A miniaturized, low-power actuator.

- Methods for the mechatronic integration and assembly of subcomponents and components compatible with the final product's size requirements and complexity.

Eveon plans to commercialize the product in several years. However, the R&D project positioned the company as a leader in technical solutions for automated systems on the international markets and, specifically, enabled Eveon to establish a solid reputation with European and US-based partners.

> **R&D project behind the product:**
FluMIn3
(French Single Interministerial Fund 9th grant round)

FIND TECH

# PROTECT HUNT

**Electronic unit designed to be mounted on a hunting rifle to prevent dangerous shots from being fired**

## Product description

PROTECT HUNT: SMART ELECTRONICS

The Protect Hunt unit is the world's only electronic safety solution for hunting. It was designed to operate in all weather and environmental conditions. The technology inside the unit can alert hunters to dangerous behavior in just fractions of a second. The unit is ultra-lightweight and robust enough for use in all outdoor conditions. It is delivered as a unit that can be attached to or integrated into the hunting rifle's shoulder stock. It alerts hunters by emitting vibrations in the stock and generating a visible alert.

All hunters in a group are equipped, with one unit on each rifle.Once the hunters reach the hunting area, they switch the unit on and save two landmarks. The area between the landmarks is the authorized shooting area (a 30-degree angle).

# Product history

The idea for Protect Hunt came from an incident involving brand founder Pierre Alleysson. Alleysson, a hunting enthusiast, narrowly escaped a hunting accident himself. He was almost hit by a potentially-fatal stray bullet. Alleysson, an entrepreneur at heart, set out to find a solution. His goal was to develop a go-to product that would make hunting safer for everyone (hunt organizers, hunters, and other outdoor enthusiasts).

Project Hunt is that product.

The Protect Hunt P10 was released in December 2017 following two years of intensive testing in the lab, at a shooting range, and in different hunting areas completed in partnership with CEA Tech in Grenoble.

The product is now available on the market and is in use by hunters in France. Testing in other European countries began in March 2018. The product is used for the Presidential Hunts at Chambord and the hunt at Rambouillet, managed by France's National Hunting and Wildlife Authority.

Additional development work to improve the system is underway, with the goal of making hunting even safer through new technology. In particular, a new unit, called 30 ° assist, was developed for number-one French firearm manufacturer Verney-Carron. The unit, integrated into the stock, will be available on the market in late 2018.

> **Easytech project**

GORGY TIMING

# HANDI WIFI

## A Wi-Fi chip prototype for analog clocks

## Product description

This project's innovation is to develop an embedded time base with NTP synchronization over Wi-Fi.

Gorgy Timing integrated the Wi-Fi chip developed into its Handi Wifi analog clocks. This project's innovation is to develop an embedded time base with NTP synchronization over Wi-Fi.

# Product history

The initial project was to develop a Wi-Fi chip for the company's Handi Wifi analog clocks. An Easytech project with Minalogic enabled Gorgy Timing to build a prototype of the Wi-Fi chip. Later, a Minalogic-certified collaborative R&D project, SCPTime, gave the company an opportunity to fine-tune the product's capabilities to prepare for industrial scale-up.

Gorgy Timing is now integrating the newer version of the chip into its Box BiaTime B. The SCPTime concept is to provide a secure, accurate, certified, and traceable time to all points on a network to within a second—or for the most demanding applications—several nanoseconds.

**> Easytech project**

# SCPTIME

**End-to-end time production, distribution, broadcasting, and acquisition system**

## Product description

SCPTime is an end-to-end time production, distribution, broadcasting, and acquisition system. The system can be implemented on either an open network, or, for businesses that must keep their systems isolated, a closed network.

SCPTime was developed to produce and broadcast via IT networks an accurate, certified, traceable, and highly-secure universal time anywhere in the world.

The SCPTime Box gives users a legal, certified, tracked, and secure UTC. Two of the product's strengths are that it is linked to legal French time and data is traceable. The SCPTime Box delivers precise SCPTime to the customer. All synchronization data is tracked and logged.

SCPTime delivers accurate, secure legal time to secure servers to prevent jamming and cyberattacks. In today's digital economy, and with the advent of connected objects, these capabilities have become strategically important.

The product is suitable for organizations of all sizes seeking synchronization, time-stamping, and cybersecurity solutions.

# Product history

In 2014 Gorgy Timing took the lead on the Minalogic-certified SCPTime project. This innovative, multi-partner R&D project earned France's PSPC seal for its capacity to shape an emerging industry. A total of €12 million was invested in R&D over the course of the 42-month project, which was approved by the Steering Committee for France's economic stimulus package, financed by Bpifrance, and signed on June 2, 2014 by France's Prime Minister.

Gorgy Timing is an innovative mid-sized business headquartered in Isère, France. For more than 40 years, the company has been innovating time and, in particular, time synchronization, solutions. Minalogic's support was a key factor in securing the necessary partners for the SCPTime project.

This international multi-partner project involved a consortium of partners with broad, deep knowledge of time and frequency technologies:

- Business: Gorgy Timing, Eolas, Tronics, Syrlinks, Muquans, and Tyleos.

- Academic research: the Paris and Besançon Observatories, the Institut Femto-ST of Franche-Comté University, France's National Metrology and Testing Lab.

- Users/integrators: Schneider Electric for integration into industrial and smart energy distribution systems; France's national rail operator, SNCF, for integration into large infrastructures; and Business & Decision for integration into data centers.

SCPTime responds to cybersecurity, efficiency, and legal time-stamping needs for the transportation, energy, and manufacturing industries. However, the technology is also of interest to banking transactions, emergency call centers, and video surveillance.

> **R&D project behind the product:**
SCPTime
PSPC

GROUPE BRUNET

# E-NA

**Mobile, self-powered building**

## Product description

This project set out to develop a concept for a mobile building capable of providing its own energy and water. The idea was to start from the building's intended use (commercial, residential, tourism, healthcare, etc.) to come up with sustainable living spaces with modular, mobile equipment that can be adapted to different environments and uses.

The equipment would not need to be hooked up to traditional utilities, and would thus provide occupants with complete freedom to configure the space they need and go off-grid at the same time.

# Product history

Brunet spearheaded the LiveArium mobile, self-powered building development project run at IdeasLab.

The project sped innovation while generating synergies across the company for greater efficiency. The project was a precursor to the E-na project, which Groupe Brunet is leading at IRT Nanoelec.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:**
Auvergne-Rhône-Alpes Regional Council

> Developed in conjunction with IRT Nanoelec

HAP2U

# HAP2U

## Touch screens texture

## Product description

HAP2U was developed for integration into touch interfaces for devices like smartphones, tablets, touchpads, and communicating objects, with the goal of giving users the «third dimension»: touch.

The solution gives touch screens texture for richer content. Texture enhances web browsers (links), ecommerce (clothing you can «feel»), gaming, home automation, and assisted living solutions for the visually-impaired, bringing the human-machine interface into a new era.

Unlike competing solutions, HAP2U is fully synchronized and instantaneous, with no lag between the touch and visual feedback. The experience truly feels natural. The use of an innovative thin-layer technology resulted in optimized system packaging and a five-fold reduction in energy consumption. HAP2U can be used anywhere there is a touch interface:

- Mobile devices: more intuitive communication through enhanced browsing

- Industrial machines: secure interaction between machine and operator

- Automotive: touch-based GPS and on-board system control (air conditioning, etc.) for safer driving

- Interactive kiosks and ticketing: touch codes to replace numerical codes, enhanced browsing

HAP2U solutions will address manufacturers seeking ways to make their products more competitive as well as users looking for more «people friendly» technology.

# Product history

The project originally started as a joint initiative of STMicroelectronics, the CEA, and USTL (Lille Science and Technology University) to develop applications for STMicroelectronics touch microcontrollers. Positive market response (from customers like Microsoft, Samsung, Skoda, and Renault) encouraged STMicroelectronics to pursue development, this time under the TouchIT project backed by the French Single Interministerial Fund. TouchIT aimed to:

· Improve energy performance

· Develop models of the system's behavior to prepare the technology for industrial scale-up

· Improve the driver electronics for an ultra-compact form factor

· Develop applications for the technology

A project consortium covering all of these issues was created:

· STMicroelectronics: project lead, electronic component manufacturer

· EASII IC: integrated circuit design

· CEA-LETI: low-power actuator fabrication

· USTL: haptic feedback solution

· TIMA (UJF): mechanical modelling and characterization

· INRIA: algorithm development

· AlphaUI: backside keyboard integration

· ORANGE LABS: embedded application testing

HAP2U is targeting the touch interface market (a sizeable goal given the more than two billion smartphones sold in 2014). The company's go-to-market plan includes several generations of the technology for gradual penetration of growth markets (industrial, development) and, ultimately, the mobile phone market.

> **R&D project behind the product:**
TOUCHIT
(French Single Interministerial Fund 13th grant round)

## HFI · HAUTE FREQUENCE INGENIERIE

# RF800Z

**Indoor geolocation system**

## Product description

HFI's RF800 indoor geolocation system leverages professional-grade radio communication networks to precision-locate staff inside buildings.

The system is compatible with the latest digital mobile radio network (DMR and pDMR) standards and can be used with the latest professional-grade walkie-talkies.

The latest version of the RF800Z uses a UHF mesh network to locate personnel wearing a compact receiver manufactured by HFI. The system is totally self-powered, independent from the facility's communication networks, and easy to implement, test, and maintain. In addition, the frequencies used ensure effective indoor coverage with minimal infrastructure requirements.

The system responds to increased demand for location systems for industrial facilities, office buildings, and parking facilities and can enhance isolated worker protection, maintenance, and operations.

The initial standard version of the solution has already been implemented at several airports, prisons, shopping malls, and factories.

GEOLOCALISATION
INDOOR / OUTDOOR

- LOCALISATION DES PORTATIFS RADIO EN TEMPS RÉEL
- BALISES DE LOCALISATION INDOOR + GPS
- ALARME DE LOCALISATION
- SÉCURITÉ POSITIVE
- TRAÇABILITÉ DES ÉVÉNEMENTS
- ...
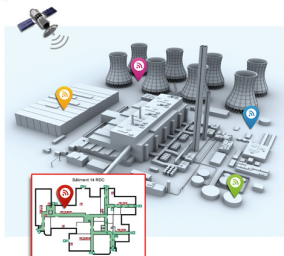
RADIO NUMÉRIQUE

BALISES RF-800          GPS TECHNOLOGY

hfi  Haute Fréquence Ingénierie

# Product history

HFI initially developed an indoor geolocation system that combined a simple fixed UHF beacon and receiver setup with a DMR or pDMR network to send location data to an application server.

To use the system, personnel had to carry walkie-talkies equipped with HFI chips to receive the signals emitted by the beacons. This ultimately evolved into a system where the UHF beacons could communicate with each other via a mesh network, with location capabilities still based on UHF beacon-receiver communication. However the data is transmitted to the server via the UHF mesh network, which is completely separate from the location system.

This improvement, developed in conjunction with Grenoble Institute of Technology-Esisar students with the support of the Easytech program, will allow the location system to be used outside of professional-grade radio environments.

The mesh network's main features were developed in conjunction with the students, who participated actively in the needs analysis, market intelligence, functional and technical specifications, and hardware and software development phases of the project.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:**
  Isère General Council, Grenoble Alpes Métropole (intermunicipal authority), Auvergne-Rhône-Alpes Regional Council

> **Developed in conjunction with** Grenoble Institute of Technology-Esisar

HYDRAO

# HYDRAO FIRST

**Hydrao First makes saving water fun, educational, and environmentally-responsible**

## Product description

Did you know that the average shower consumes 80 liters of water--double the amount that is actually needed.

The Hydrao shower head changes color to indicate how much water has been used. Water consumption data can then be displayed on a smartphone. Users can have fun tracking their water consumption while generating substantial savings.

**Innovation**

The Hydrao shower head does not need batteries. A turbine harnesses the energy of the flow of water through the shower head to power the device's patented technology.

Because the shower head is connected, each user can personalize his or her own colors and volume and track water consumption and savings individually.

**Benefits**

1. An educational tool for the whole family that helps everyone adopt better habits and stick to them over the long term.

2. A way to achieve real water and energy savings
- Savings of €50 per person per year on average for a return on investment within the first year
- Reduce shower-related hot water consumption by 20% on average; the average Hydrao user saves 22 liters per shower, for savings of 8 cu. m of hot water per person, the equivalent of 50 160-liter baths.

**Markets**

Retail and BtoB (hotels, smart cities)

# Product history

Hydrao creates innovative connected solutions for more efficient drinking water management.

Gabriel Della-Monica, Hydrao inventor and company founder, believes that connected objects have the power to make consumers proactive stakeholders in water conservation, an issue that he feels particularly strongly about. As the father of four daughters who love long showers, he would also like to reduce his own family's water bills and, if possible, be able to get into the bathroom in the morning!

Della-Monica is a former telecommunications engineer, with experience in the space (he headed telecommunications for the Ariane satellite launcher in French Guiana) and consumer electronics (Wi-Fi, 3G and 4G mobile communications) industries before founding Hydrao in Grenoble, a center for high-tech and micro and nanoelectronics.

The Hydrao smart shower head was released in 2015 after two years of research and development. The product reflects Della-Monica's commitment to the environment and drive to conserve our planet's water resources. The company's environmentally and socially responsible approach extends to manufacturing. Hydrao is made in Grenoble at a plant that supports the mainstreaming of disabled workers.

IN&MOTION
# SMART MOTO AIRBAG

## Product description

In&motion first developed its MotoGP wearable airbag for motorcyclists. The company then made some adjustments to its technology, expanding its applications to all two-wheeled vehicles. The airbag, combined with a vest and safety-approved back protector, can be worn under a wide range of fabric and leather jackets. It is also completely self-contained, with no cables or sensors to install on the motorcycle.

The system's smart capabilities (the airbag's «brains») are housed in the In&box unit integrated into the back protector. The sensors and algorithm in the In&box can detect an unrecoverable fall and deploy before impact by analyzing the data from the sensors and inflating the airbag in less than 100 ms.

# Product history

In&motion develops smart airbag systems that decrease the risk of injury in the event of a fall.

The company would like to make its systems widely available for a broad range of everyday uses.

The company first addressed skiers, and later adapted its technology for motorcyclists.

IOTIZE

# TAPNLINK

**Wireless connectivity hardware and software to interface mobile apps with electronic systems**

## Product description

TapNLink is an out-of-the-box solution that interfaces embedded electronics with mobile devices (smartphones, tablets. etc.).

It is used primarily for the supervision and control of electronic devices from a smartphone.

TapNLink can also be used to connect remote applications, using a smartphone as a gateway. This enables remote maintenance and supervision, for example.

Main innovations:

• Connection to the embedded system via the debugging port (neutralized or not). If the debugging port is used, the PoC can be created in minutes, and no changes to the hardware or software are required.

• Embedded software updates and remote debugging.

• NFC interface, which can be used for secure pairing with BLE devices, drastically reducing radio emissions and energy consumption.

• Easy integration with dedicated configuration software, which can also be used to dynamically generate monitoring applications.

• Factory-integrated (electrical, mechanical) and certified (FCC).

The main markets targeted are the manufacturing industries (machine tools), consumer goods (home appliances), and smart buildings.

Competing solutions only cover a portion of TapNLink's functional scope and integration is much more complex.

# Product history

Francis Lamotte founded Raisonance in 1988; the company specialized in microcontroller development tools like emulators, compilers, and simulators. Raisonance began diversifying in to smart-card and, later, NFC testing in 2000. In 2012 Raisonance changed its name to Keolabs, and smart cards became the company's core business.

The IoTize concept emerged in 2015, and leveraged the company's two main areas of expertise, development tools and NFC tools.

The IoTize project, backed by the French Single Interministerial Fund, took place from 2015 to 2018. Keolabs was the project lead, and the consortium included STMicroelectronics, Gemalto, LIG lab and ISEN.

This project gave the company a technical foundation, built in part on academic research in the fields of IoT protocols and security.

The architecture's main component is the TapNLink hardware module; several prototypes were built during the IoTize project. Improvements were made with each prototype: The form factor, energy consumption, and manufacturing costs were reduced. The result was a certified product ready for industrial-scale manufacturing.

While the hardware was being developed, three other projects were completed:

• Firmware: The firmware orchestrates all of TapNLink's embedded functions, most of which are executed from a configuration base

• Configuration software: A graphical user interface used by the customer to configure the desired features

• Smartphone app: Development solutions for monitoring applications (interfaced with TapNLink)

> **French Single Interministerial Fund**

IRLYNX

# IRLYNX SENSOR

## Product description

Irlynx sensors detect human presence and count people in real time, delivering reliable information and requiring no special equipment for users. The sensors can also provide additional value-added data like position, direction, speed, and posture (standing, sitting, lying down).

The data generated by the sensors can be used to manage smart building systems (lighting, HVAC, shutters and blinds, automatic doors) to generate energy savings while ensuring occupant comfort and convenience. The data is also of use for assisted living personal safety applications. Finally, the sensors can map traffic, generating data that can be leveraged to make more efficient use of space. All of these applications target the BtoB and consumer markets.

Irlynx sensors pick up the heat emitted by the human body to detect and locate people. The company's unique, patented infrared technology is compatible with low-cost mass production to make all homes more comfortable, economical, and environmentally-friendly.
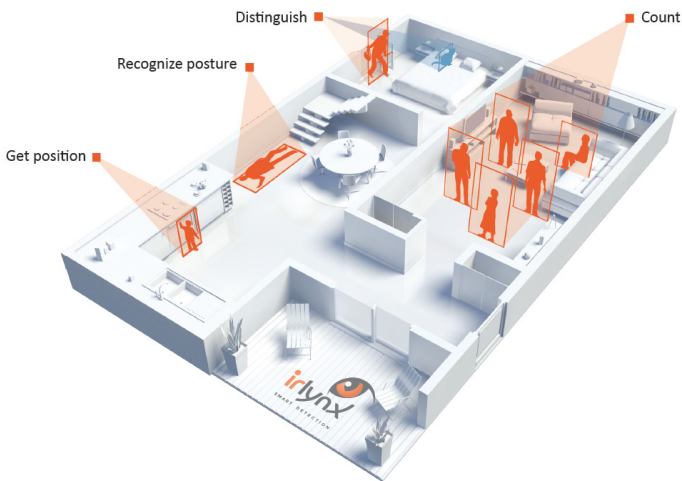
# Product history

Irlynx was founded by Sebastien Fabre in 2012. Mr. Fabre acquired solid experience with infrared technology during his employment at Vince Innovation. He founded Irlynx to develop a new, nonintrusive technology to detect and characterize human activity innovative enough to be unique on the market. He joined forces with tech pioneers Lionel Fritsch and Lionel Chaverot to invent new solutions to replace the basic motion detectors on the market and bring their customers more added value. The company developed a new generation of matrix-based thermal IR detector modules for smart building applications. The all-in-one, low-cost, low-power modules protect users' privacy.

In 2014, Irlynx joined the Easytech program, backed by IRT Nanoelec and administered by Minalogic, to receive support for the development of the company's innovative IR detector. Irlynx is currently a member of Minalogic and is taking full advantage of the cluster's ongoing support.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic
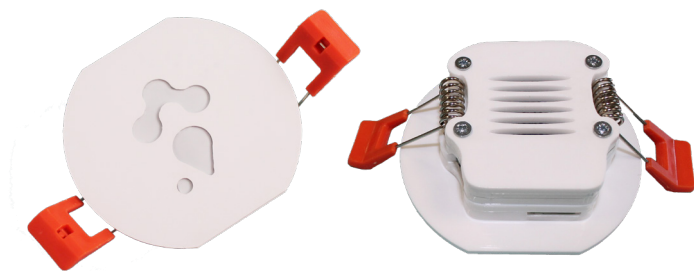
IRLYNX
# PEOPLE SENSE

## Product description

PEOPLE SENSE™ is a connected sensor for smart buildings. It delivers advanced data on human activity using an infrared technology that protects people's anonymity. The product is also easy to use. It is simply installed on the ceiling and does not require users to wear any devices.

PEOPLE SENSE™ offers excellent performance at an affordable price. The product delivers advanced, real-time data on the presence, absence, and number of people in a room as well as their positions and trajectories.

The data opens up a number of new possibilities for the smart management of office buildings, shopping centers, and industrial facilities.

The target solutions include building automation, energy efficiency, occupancy measurement, and optimizing the use of space.

# Product history

IRLYNX was founded by Sebastien Fabre in 2012. Mr. Fabre's previous experiences with infrared technology spurred him to develop a new, non-intrusive technology to detect and characterize human activity-and that would be innovative enough to be unique on the market.

He built a team of infrared specialists to come up with new detection solutions to replace the basic motion detectors available on the market and bring more added value to customers.

The company developed a new generation of thermal infrared sensor arrays for smart buildings. The low-cost, low-power, all-in-one solutions protect users' privacy.

In 2014 IRLYNX joined Easytech, the IRT Nanoelec program for SMBs administered by Minalogic. Easytech gave the company access to additional support developing its innovative infrared sensor. Today IRLYNX is a member of Minalogic and is taking full advantage of the cluster's services.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic
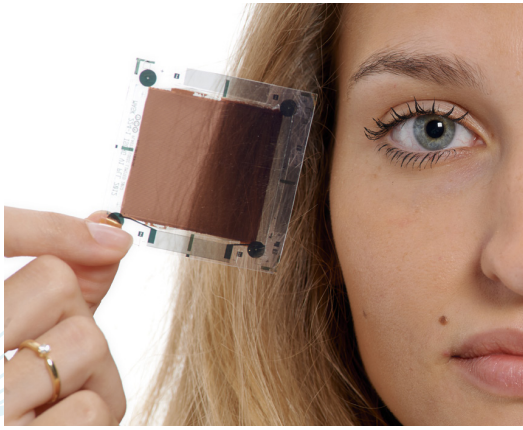
ISORG
# IMAGE SENSOR ON PLASTIC

## Product description

Isorg manufactures the world's first-ever image sensor (1 million pixels) on plastic.

The company's sensor leverages printed organic electronics and targets the healthcare, security, manufacturing, and consumer electronics markets. Capabilities include a scanner for X-ray imaging, biometric sensor, barcode reader, diagnostics, and document scanning.

Product benefits are: cost, flexibility, thin profile, mechanical strength, light weight, and high performance (sensitivity, and operation in visible and NIR modes).

# Product history

The sensor was developed under the Printronics project, backed by the French Single Interministerial Fund.

Isorg is a spinoff of the CEA created as a result of the same project.

The company is also involved in other Minalogic-certified projects: Optitat (industrial control for pharmaceuticals with Sanofi-Aventis) and Roxtar (X-ray medical imaging with Trixell).

The company is developing new electronics-on-plastic solutions for optical sensors.

> **R&D project behind the product:**
> Printronics
> French Single
> Interministerial Fund 5th
> grant round

> **Budget:**
> PIC-TIC (CEA Grenoble)
> pilot line. Industrial
> manufacturing facility
> under development for
> 2017

ISORG

# OMT

**A multi-touch screen demonstrator with optical sensors leveraging printed electronics**

## Product description

The demonstrator is the first and crucial step in the development of organic cells integrated into the LCD panel.

The demonstrator will have a screen size similar to an all-in-one PC

(24 to 27 inches) equipped with a crown of optical sensors

to triangulate the position of touch points. The project encompasses the development of a read board, an embedded system to control the measurement sequencing, and algorithms to determine the coordinates of the touch points.

# Product history

The main project partner, ESISAR (Grenoble Institute of Technology), is providing human resources and know-how to support transfer of the system for manufacturing.

ISORG has identified the display market as the leading potential market for this technology. The advantages of ISORG's technology are that it creates the possibility of a new type of contactless interface and, later, will give screens scanning capabilities.

ISORG's goal is to ready the technology for industrial-scale manufacturing and launch production for niche markets (industrial and medical applications, for example) where volumes will be compatible with the company's manufacturing capacity. For high-volume consumer markets, ISORG plans to license the technology to leading global manufacturers.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:**
  Isère General Council, Grenoble Alpes Métropole (intermunicipal authority), Auvergne-Rhône-Alpes Regional Council, The City of Grenoble

> **Developed in conjunction with** Grenoble INP-Esisar

JASON

# AN INK-JET PRINTING CONTROLLER MODULE

## Product description

Development of a new-generation machine with a new printer head offering modular flexibility (in terms of printer head technology and changes due to new or evolving customer or market needs).

# Product history

**Product background and history:**

· Soon-to-be-obsolete consumable

· Ageing product line

· Changing customer needs
> · More information to print
> · Printing on plastic
> · 2D data matrix barcodes

· Opportunity created by robotization

**Implementation:**

· Equipment selection

· Feasibility of high-speed real-time communication networks

· Review of common printing formats

· Development of embedded software modules:
> · HMI
> · Three-axis motorization
> · Printing module
> · Web interface
> · RFID interface

· Linux development knowledge transfer

**Project results:**

· Lower costs

· High-end product positioning.

# MPPA

## Massively Parallel Processor Array

## Product description

Kalray developed the MPPA® (Massively Parallel Processor Array), a manycore processor with 288 cores (more than any other processor on the market). The processor's unique parallel architecture makes it ideal for industries that need real-time, high-performance, low-power computing for network, storage, and offloading applications. The processor's real-time capabilities bring data centers low-latency transfer and storage.

Kalray works with the aeronautics and automotive industries to develop embedded solutions and plans to integrate its MPPA® processors into driverless cars.

# Product history

Kalray is one of France's only startups in the microprocessor business. The company is based in Montbonnot, near Grenoble, and is a member of clusters Minalogic and Systematic.

LUMIPLAN MONTAGNE

# DYNAMIC DIRECTIONAL ARROWS

## Product description

Improve directional arrows used on ski trails with a LED display and the associated solar power supply, plus radio transmission capabilities to inform and guide skiers in real time.

Giving a ski resort's directional arrows communicating electronics can provide skiers with the information they need to make decisions on the slopes. Skiers can find out in real time if a trail is closed, how long the lift lines are, or how crowded a trail or area is. The result is greater comfort and safety for skiers. The skier experience is also improved. This new technology also helps smooth out skier traffic across a resort, which improves resource management (grooming and snowmaking) for the resort operator.

# Product history

The idea of equipping directional arrows with smart capabilities is not new. Lumiplan—along with several resorts seeking ways to innovate—had been thinking about it for years. However, the technology was too expensive. The company's collaboration with the CEA and the support of the Easytech program led to the development of a suitable technical solution.

The solution developed is self-powered and environmentally-friendly insofar as it does not require any construction work. In addition, the electronics can be installed on existing equipment.

> **Easytech project**

MEERSENS

# мCHECK & мBOX & мSENS

**Meersens keeps an eye on your health!**

## Product description

Meersens is the first ever solution (an app and IoT technology) to leverage artificial intelligence for health monitoring. Users can monitor their environment and be made aware of potential health hazards, including air and water quality, UV and electromagnetic waves, and noise and pesticides.

The application is like Waze for health. It lets users map out all of the potential hazards in their environment, wherever they go. The results (the Meersens Risk Index, or MRI) are customized according to the user's profile, illnesses, and standards. The MRI is backed by certified, expert recommendations to help users reduce or avoid hazards in their environment. All potential hazards are shared by the community; members can generate alerts and offer certified recommendations and solutions.

IoT (the mBox, which connects to the app via BLE) further enriches the solution. The mBox's modular endoskeleton can connect to three mSens biosensors to meet the user's needs. The smartphone-sized device can follow users wherever they go. And, with the environmentally-friendly mSens sensors, the device is completely modular. The system adds new capabilities, like air quality and pesticide monitoring, to Meersens' existing sensor lineup with the same products used in the same way. The artificial-intelligence-powered back end proactively identifies potential hazards and tailors the associated recommendations and solutions to the user's profile.

# Product history

Meersens is headquartered in Lyon, France. It was founded in 2017 by engineers Morane Rey-Huet and Louis Stockreisser. Morane has lived in several different countries, including China. She was living in Shanghai, where her daughter was born right in the middle of the melamine scandal—which is where she got the idea for Meersens' unique solution. The immediate environment (air, water, food, UV and electromagnetic waves) is a source of concern when it comes to people's health. In fact, one out of five people surveyed wish they had reliable information. A total of 13 million people die each year from exposure to hazards in their environment. The founders of Meersens feel that if they can save at least one life, their efforts are well worth it! They founded Meersens to raise people's awareness of environment-related health issues and provide solutions.

An Easytech project enabled them to overhaul the electronics and firmware in just six months with project partner ESISAR, a school of Grenoble Institute of Technology. They also completed significant work on the product's technical documentation, structure, and testing to prepare for industrial scale-up.

> **Easytech project**

MINAPACK

# CAVITY-TYPE PLASTIC PACKAGES

**Dedicated «open tool» (compliant with international mechanical standards) cavity-type plastic packages**

## Product description

Packages manufactured by overmolding high-performance thermoplastic onto metal grids offer some real advantages (excellent thermal stability, low permeation, etc.) over conventional overmolded packages. We start from pre-molded «open tool» (compliant with industrial standards) packages and make adaptations to the mechanical designs and thermoplastics used to offer our customers custom-developed packages to meet the needs of their applications.

Our «open tool» package catalogue has been expanded, and we have developed associated services, including the assembly of small- to mid-sized production runs with the STMicroelectronics plant in Grenoble and the MicroPackS platform. The primary advantage for customers is the low investment. Our solution eliminates the need for custom molds and mechanical forming or cutting processes. Plus, we have established a reliability standard and determined the optimal use conditions for the main types of packages (insertion, power insertion, leadless surface-mount, and gull-wing) we manufacture. Our TO 257 power transistor package developed under this project and, later, the TO 254, the larger standard format package, meet aeronautics, space, and defense customers' needs for lighter-weight more cost-effective enclosures. For signal and RF applications, customers from the same industries need dedicated leadless packages like multi-chip QFNs.

# Product history

In 2009 we began manufacturing cavity-type packages. While high-performance thermoplastics like LCPs do offer excellent potential for microelectronics applications, we were able to demonstrate the major limitations of these materials; mainly the poor metal-to-plastic adherence and anisotropic properties. To overcome these challenges, we took advantage of the Microplast project to bring in specialists from fields like polymer science (INSA-IMP), the simulation of complex mechanical operations (SYMME), and reliability modelling (IMS). The most remarkable result achieved under the project was a 25-fold increase in adherence.

In terms of new products, the Microplast project enabled the development of packages with an integrated metal platform (chip integration) using a mechanical bending technique in the mold; we later developed packages with an exposed platform (for optimized heat dissipation) using a completely different molding technique.

This enabled us to expand our line of «open tool» (off-the-shelf) packages and develop associated services, including the assembly of small- to mid-sized production runs with the STMicroelectronics plant in Grenoble and the Micro-PackS platform in Gardanne, where we have assigned an engineer. Our TO 257 power transistor package developed under this project and, later, the TO 254, the larger standard format package, meet aeronautics, space, and defense customers' needs for lighter-weight more cost-effective enclosures. For signal and RF applications, customers from the same industries need dedicated leadless packages like multi-chip QFNs.

> **R&D project behind the product:**
Microplast
(French Single
Interministerial Fund 11th
grant round)

PRODUCT

MODEC

# PORTABLE VALVE ACTUATORS

## Product description

Modec portable rotating actuators are a powerful tool for opening and closing manual valves.

Imagine a simple tool that lets you quickly and safely open and close your manual valves and handwheels. Modec, located in France's Drôme region, designed and developed its new range of portable rotating valve actuators to solve this problem.

This must-have tool for operators is made of four main components:
- A handle to control speed, maximum torque, and power.
- A motor, powered by compressed air, electricity, or gasoline.
- A head, either straight, for valves facing the operator, or angled for valves in a horizontal position; a hollow head is also provided for valves with vertical stems.
- Adapters, which are mounted directly on the portable actuator head (and not on the valve wheel).

The portable actuators are extremely flexible with adapters available for all types of valves and flywheels. They are also lightweight and, on average, open a valve ten times faster than manual opening. The tool is particularly useful for valves that are stuck, difficult to reach, or that take a large number of turns to open/close. Plus, the tool is safe for both the equipment and the operator.

The product line includes three types of motors to meet the requirements of different environments:

> Compressed air
A pneumatic actuator (which runs on compressed air) is the ideal solution for facilities that already have a compressed-air network. This is often the best option for sensitive (explosive) environments and for operations that require high torque.

# Product description

> Electric
The electric actuator is a practical solution for valves in isolated locations. The portable battery is easy to move and provides a longer-lasting power supply.

> Gasoline
The gasoline-powered actuator is also a good choice for valves in isolated or faraway locations; simply go to the nearest filling station when needed. Why use a portable valve actuator

Valve actuators reduce the risk of accidents involving operators as well as operator pain and injury. The operator no longer needs to exert excessive force; the actuator does all of the work. With a variety of torque rods available, operators can actuate valves safely, without the fear of applying too much force at the start and end position. Valves at height or in crowded, difficult-to-access areas are much easier to actuate.

Save time! Modec portable valve actuators are lightweight and, on average, open a valve ten times faster than manual opening, saving you time. The tool is very fast and easy to set up; no previous preparation of the valve or handwheel is required.

Portable valve actuators are particularly useful in water-related facilities. They make it easier to detect leaks (by making it easier to isolate a part of the piping network, sometimes multiple times). Modec has also developed specific adapters for water-related facilities. These include a telescoping hydrant wrench that attaches directly to the portable valve actuator. There is also an adapter for underground valves.

Finally, Modec can also develop special straps and adaptors to meet the needs of virtually any situation.

MORPHOSENSE

# MORPHOSENSE CALIBRATION MACHINE

## Product description

The calibration machine developed in conjunction with the CEA and IRT Nanoelec with Minalogic's support can calibrate ten elementary nodes of the MEMS sensor network developed by startup Morphosense with guaranteed reproducibility and reliability.

Today, Morphosense possesses a calibration machine developed and built to specifications drawn up for the company's unique applications. The machine was financed through an Easytech-certified project with Leti and IRT Nanoelec. Once the measurement nodes are created and functional testing completed, the machine guarantees reliable, accurate, reproducible calibration while providing the valuable calibration data that is flashed in each elementary package. This is a fundamental element that is unlike any of the technologies competing with Morphosense's system. Calibration is done just once and the system enables long-term monitoring without the need for additional interventions.

# Product history

Previously, calibration was done "by hand" and took around two hours for each network measurement node. And a network is made up of around fifteen measurement nodes. Therefore, calibration was both costly and time-intensive.

The calibration machine—the only one of its kind in the world—drastically reduces calibration time to just 45 minutes to calibrate ten nodes simultaneously.

The time saved has a positive impact on costs.

MU-TEST

# MU-TEST AUTOMATED TESTING SYSTEM

**Electronic component testing platform (5, 10, and 21 slots) with power supply, digital, and analog instruments**

## Product description

Platform that can receive 5, 10, or 21 instruments for the validation, characterization, and testing of electronic components.

**Innovation**
FPGA-based architecture for optimal time to market at the lowest possible testing cost.

**Competitive advantage**
A transportable, low-power, easy-to-use system that drastically reduces CapEx and OpEx.

**Market**
Characterization, design, and in-line testing of mid-sized runs; in-line testing of volume production runs.

**Target customers**
Industrial R&D centers and labs (electronics and component manufacturers, test houses).

# Product history

Product development began in 2010.

First system used in engineering in 2012 and in production in 2014.

The Mu·Test platform has revolutionized testing in the space industry by enabling the same equipment to be used in laboratories and radiation centers, for example.

MU·TEST

# IMPROVED TESTING AND CHARACTERIZATION ARCHITECTURE FOR THE SEMICONDUCTOR INDUSTRY

## Product description

Target markets: engineering platforms that test components before launching volume manufacturing; and small-volume test platforms (100 K units/month).

# Product history

The purpose of the project was to bring CPU to instrument data transfer rates from 50 Mbps to 6 Gbps, for performance similar to competing solutions for a 20 megapixel imager. The hardware architecture was validated during an initial R&D project run with engineering school Esisar in 2015. This goal of this new project is to finalize the software. Sales resulting from this project are estimated at €500 K the first year and €600 K the second year.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Developed in conjunction with** Grenoble INP Esisar

N. SCHLUMBERGER

# SENSOR FOR THE IN-LINE MEASUREMENT OF TEXTILE TITLE VARIATIONS

## Product description

N. Schlumberger had previously offered its customers its proprietary Texgate system to measure variations of titles in production. The system was not as successful as had been hoped due to the fact that the measurements drifted over time and required substantial setup work.

The company turned to Leti to test concepts for potential use measuring titles. Leti recommended two technologies for further investigation, one a radiofrequency technology, and the other an ultrasonic technology. The ultrasonic technology was eliminated at this stage of the project. RF measurement using a waveguide emerged as the more promising option. However, some questions remain to be answered so that the concept can be validated and a prototype developed.

# Product history

NOVADAY

# NOVALAMP

**High-power LED systems for efficient, reliable systems**

## Product description

Novalamp is an efficient, robust lighting system suitable for use in industrial environments.

It can be installed at height and over large surface areas and offers fast ROI.

The R&D project focused on developing cost-effective, easily-transferrable technology bricks using materials with good thermal exchange compatible with high-power LED systems for efficient, reliable systems with two times the usual ROI.

# Product history

Today's lighting systems offer efficiency of 110lm/W.

Total system cost is directly influenced by the number of LEDs and the cooling system. Despite substantial market potential, these systems have failed to penetrate the French market due to low ROI. Energy costs are rising and building operators are being forced to cut operating costs.

Novaday is leveraging a technological breakthrough capable of slashing energy consumption to take advantage of this unique market opportunity.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:**
  Isère General Council, Auvergne-Rhône-Alpes Regional Council

> **Developed in conjunction with** CEA

ORPHEO

# ORPHEO AIRSET

**Contactless headphones**

## Product description

Orpheo Airset is a dedicated solution for visitors to cultural and other sites of interest to tourists. This new peripheral was designed to respond to the specific demands of this type of use, from cleanliness and comfort to durability.

# Product history

The idea for and development of the Orpheo Airset headset are the fruits of the GUIMUTEIC project. This R&D project, backed by the French Single Interministerial Fund, was set up to create an innovative and original new product for the culture and tourism sectors that would leverage image recognition to enable interaction with visitors.

> **French Single Interministerial Fund**

OROS

# MOBILE NOISE AND VIBRATION DAQ

**Ultra-portable data acquisition system**

## Product description

The product delivers the quality metrology of Teamwork instruments in an ultra-portable recorder. The device aligns with the latest trends on the testing and measurement market. It makes repetitive and/or arduous measurements easier by eliminating the need to have a PC on site--all while ensuring high-quality measurements. Expert analysts determine the precise measurement configuration using a guided interface available via a touch screen and/or an Android app to ensure that the tests completed are reliable.

The compact, connected, and wireless instrument is effective in all field conditions (included embedded configurations, high cybersecurity requirements, and difficult access). It rounds out the Teamwork line by making it easier for users with different profiles and assigned to different tasks to share equipment and data.

**Innovation**
This is the first noise and vibration acquisition instrument with an OLED touch screen; it is also the most compact instrument in the world to deliver measurements of such high precision (0.02°/0.01 dB @ 20 kHz).

**Competitive advantage**
Multi-mode instrument (stand alone, Android app, front-end PC)

**Market**
Europe, Japan, the US, China, South Korea

**Targets**
Measurement and testing departments and centers; machine service staff in the automotive, aerospace, marine, energy, and manufacturing industries; R&D and troubleshooting.

# Product history

**Background**

Oros designed this instrument to meet the needs of growing numbers of its customers for a simplified, mobile instrument in their fleets.

The product development was tied to the Minalogic project.

The results of the project (qualitative; the quantitative results will be provided separately):

Testing and measurement professionals can more efficiently manage their fleets to ensure that the measurement hardware and software needed is available at all times. The integrated data management further increases efficiency by eliminating the need for a conventional database, making it easier to share, archive, and search data.

Purchasers and other decision makers can bring their organizations higher productivity and greater flexibility for significantly higher overall performance.

QUALIPAC

# E-MOTION#1

**Adding light to cosmetics and other luxury goods packaging**

## Product description

E-motion adds light to cosmetics and other luxury goods packaging, delivering the capacity to sculpt light like any other noble material. The dynamic lighting effects are custom designed to interact with the glass' design, texture, and decorative features.

# Product history

This project responds to the need of the cosmetics and luxury goods industries' constant quest for new features to differentiate their products from their competitors'.

The project provided Qualipac with an opportunity to work with Minalogic and Leti to develop new know-how (in electronics) not previously available in-house.

As a result of this project, Qualipac will strengthen its image as an innovative brand with the capacity to meet its customers' (cosmetics brands') need for innovative solutions.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:**
Auvergne-Rhône-Alpes Regional Council

> **Developed in conjunction with**
Grenoble INP Esisar

R2S ROBOTICS

# REAL-TIME POSITION MEASUREMENT SENSORS

## Product description

In order to address the mining equipment reconditioning market, R2S Robotics needed a sensor module to determine the position of the drill arm in space. The module will be used to measure pitch, roll, and yaw. For mining applications, precise information about the position of the drill arm can be used to increase efficiency.

The module will be implemented on a 50 mm x 50 mm acquisition board supplied by R2S. The board must be vibration resistant to provide acceptable precision.

# Product history

ESISAR (Grenoble Institute of Technology) developed a sensor system to measure the drill arm's pitch, roll, and yaw. It works in static mode, like an inclinometer, with accuracy to within less than one degree. The sensor module also works in dynamic mode, which means that R2S will later be able to develop a master/slave communication protocol between the module and the drill arm.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **Public sector financing from:**
Auvergne-Rhône-Alpes Regional Council

> **Developed in conjunction with** Grenoble INP Esisar

RAC ELECTRONIC

# CLEAN ROOM CONTROL PANEL

## Product description

The product developed is a secure clean room vestibule access control panel. The principle is to separate the door and vestibule functions, with each door controlled individually so that door operation aligns with the specifications.

Interlocking will also be managed separately and master-slave relationships between doors will be fully configurable regardless of the number of doors or the layout of the vestibule. In the event of changes to the building or clean room layout, reconfiguring the access control system will not require any additional programming.

The current solution consists of the following equipment installed on the door frames:
• 1 limit switch
• 1 suction strip to lock or open the door
• 1 buzzer
• 1 optional key-operated switch
• 1 optional key-card reader
Each component is wired to the main cabinet, which contains the PLCs that manage the network with the software application developed.

The maximum distance between any given door and the PLC is estimated at 400 meters.

For larger facilities, the wiring costs would be high and network speeds would be negatively affected.

The main cabinet can also be connected to a supervision system, either locally or remotely.

# Product history

There are many automatic clean room vestibule door manufacturers, each with its own door interlock system.

All manufacturers offer economical one- or two-door solutions. However, for clean rooms and or labs with more than two doors, or with doors from different manufacturers, access management is a challenge.

Implementation times are unpredictable and it is often falls upon the customer to adapt to the capabilities of the different systems, when it should be the other way around: the customer should be able to install a system that operates according to specifications.

This project would simplify access control while providing enhanced security and the ability to adapt to unique configurations.

The product is expected to be priced at €200 ex. tax and annual sales volumes are estimated at 2,000 to 5,000 units.

RESOLUTION SPECTRA SYSTEMS

# PROCELLICS™

**Raman spectroscopy system that can be used as a PAT (Process Analytical Technology) tool for the biopharmaceutical industry**

## Product description

ProCellics™ is the first-ever Raman spectroscopy system that can be used as a PAT (Process Analytical Technology) tool for the biopharmaceutical industry. ProCellics™ was developed exclusively for the in-line process control of critical nutrients and metabolites to ensure that cell cultures develop optimally.

Raman spectroscopy has recently been confirmed by major pharmaceutical companies as a very effective bioprocess control tool. Resolution Spectra Systems now offers a GMP testing system that biotech companies can easily implement as an industrial-grade sensor to improve bioprocess development and in-line process control.

The product delivers a number of major benefits to users:

• A better understanding of bioprocesses

• Improved yields and a lower reject batch rate

• More effective final-product quality control

• Regulatory compliance

# Product history

ProCellics™ was developed as a result of the ANAgRAM project (2013-2016, 9 partners €4.9 million invested) led by Resolution Spectra Systems. The purpose of the ANAgRAM project was to develop high-performance, ultra-integrated Raman spectroscopy solutions to deliver non-destructive testing capabilities for industrial process control, microbiological analysis, in situ environmental testing, and anti-counterfeiting systems.

The project partners: Resolution Spectra Systems, Pyxalis, Teem Photonics, ATT, Leti, IPAG, IMEP-LAHC, LEPMI, and LTM.

> **R&D project behind the product:**
ANAgRAM
(French Single Interministerial Fund 15th grant round)

RESOLUTION SPECTRA SYSTEMS
# ZOOM & MICRO SPECTRA

**Compact high resolution optical spectrometers designed for laser characterization markets**

## Product description

The ZOOM Spectra and Micro Spectra are compact high resolution optical spectrometers designed for laser characterization markets.

They are used to characterize lasers (ECDL, VECSEL, DFB, ND·Yag, etc.) for both manufacturers who wish to integrate them into their products and end users.

These spectrometers are based on SWIFTS, a disruptive technology built around the combination of microelectronics, integrated optics, nanotechnology, and software engineering.

As a result, the products combine high resolutions and precision measurements with a compact, robust design.

To avoid any risk of accidental alteration to the spectrometer settings and capacities, all mobile parts were removed from the design.

Thanks to the products' calibration process, users no longer need to recalibrate their products after factory calibration.

ZOOM Spectra and MICRO Spectra products are currently sold throughout Europe (Germany, France, etc.), Asia (China, Japan), and the United States.

Over the past two years, the ZOOM Spectra product has earned several innovation and quality awards at trade shows in France, the United States, and Europe.
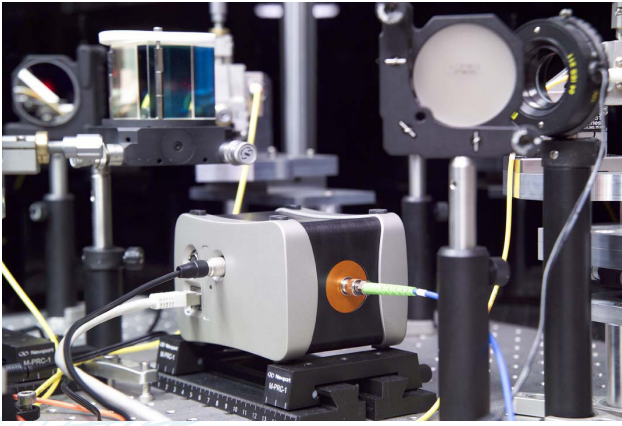
# Product history

These products were developed as a result of the SWIFTS 400-1000 R&D project backed by the French Single Interministerial Fund (2008–2011; 7 partners; €4.5 million) and led to the creation of the company Resolution Spectra Systems.

This project gave three companies (Teem Photonics, Floralis, and e2v) and four academic research laboratories (IPAG, IMEP-LAHC, LTM, and UTT) the opportunity to transform a Grenoble academic invention into a marketable product.

Since its creation, Resolution Spectra Systems has continued to transfer the developments born of the SWIFTS 400-1000 project to industry and has begun marketing these new products on the laser characterization market.

Another Minalogic project was launched in 2013 to develop new products based on SWIFTS technology.

The ANAgRAM project, led by Resolution Spectra Systems, is developing high performance and integrated Raman analyzer solutions that meet demands for nondestructive testing (NDT) in industrial processes, microbiology analyses, on-site environmental testing, and anti-counterfeiting programs.

Partners: Resolution Spectra Systems, Pyxalis, Teem Photonics, ATT, CEA-Leti, IPAG, IMEP-LAHC, LEPMI, and LTM..

SCHNEIDER ELECTRIC

# TEMPERATURE, HUMIDITY, AND CO2 SENSOR

## Product description

The wireless sensor prototypes developed under the Homes project served as the starting point for the development of a ZigBee-based very-low-power wireless sensor platform to meet the needs of a ZigBee sensor line for building and asset monitoring and control.

The first sensor, currently being prepared for industrial-scale manufacturing, is a ZigBee temperature, humidity, and CO2 sensor (commercial release Q1 2016).

The sensor's very low power consumption (less than 200 nA in standby mode) makes it unique, as does its CO2 sensor, which leverages a breakthrough technology providing the performance and battery life the market demands. It is the only CO2 sensor on the market guaranteed to work for ten years on the same battery. The building systems market will be the first addressed, with applications like HVAC control, comfort monitoring, and indoor air quality monitoring.

The second sensor, also being prepared for industrial-scale manufacturing, is a temperature monitoring sensor for medium-voltage electrical distribution equipment. The sensor's compact footprint and low power consumption make it compatible with self-powering via the magnetic field generated by the AC current in electrical cables and busbars.

The sensor is also robust, with projected lifespans of 20 years in harsh environments (temperatures up to 125°C). The sensor will address the heat monitoring market for medium-voltage switchgear (ensuring uptime for industrial sites and other building systems). Commercial release is slated for H1 2016.

# Product history

LThe wireless-sensor development work carried out under the Homes project confirmed the feasibility of very-low-power wireless sensors compatible with battery- or self-powered solutions for lifespans (10 years+) compatible with the target applications.

**> R&D project behind the product:**
HOMES
(French Agency for Industrial Innovation Strategic Industrial Innovation Program)

SOFRADIM PRODUCTION

# IDEA

**Early detection of postoperative complications**

## Product description

An early postoperative complication detection system that uses biosensors to detect biomarkers and a monitoring station, phone, or tablet for monitoring by healthcare practitioners.

# Product history

Sofradim Production set up a partnership with Leti with the goal of diversifying its business. The partnership focused on developing connected pH and lactate sensors.

With Minalogic's support, a functional model including the pH sensor, data transformation and transmission systems, and smartphone application was produced.

SOGILIS

# PULSAR

**Pulsar is a highly-reliable autopilot system developed to aeronautics-industry standards with the goal of making drones as safe as planes**

## Product description

The Pulsar autopilot system delivers levels of reliability and flexibility never before achieved in the drone autopilot ecosystem. Because the system is so reliable, it enables drones to be used for missions that had previously been prohibited. And the system's flexibility means that it can easily be adapted to all types of electronics and for all kinds of missions.

The major innovation was the development of the system to aeronautics-industry standards for a level of reliability unique in the world of drones made possible by new technology like formal proof (to prove that the system is bug-free with regard to specifications) and the generation of certifiable code.

Because it is so reliable, the Pulsar autopilot will enable drones to fly where they had previously been prohibited, creating new opportunities for drone operators. This is the product's major differentiator.

The commercial drone market is growing exponentially, as is the autopilot market, which is expected to reach $261 million by 2020.

Our target customers are commercial drone manufacturers and, especially, the manufacturers of drones used for high-risk missions (in urban and semi-urban environments).

# Product history

Sogilis brings extensive experience developing critical software for the aeronautics and drone industries. The company has contributed to developing navigation systems for large civil aircraft, complying with the most stringent aeronautics-industry standards. The company also helped to develop the Hexo+ drone software, which enables drones to follow and film athletes automatically. Given the increasing safety and security concerns surrounding drones, the company decided to lead the CAP2018 project with the goal of bringing drone manufacturers off-the-shelf components for more secure drone operation.

The project addressed software issues specific to the transportation industry, which was why the company turned to Minalogic to assist with setting up a project consortium and the project itself.

Pulsar sales will position Sogilis to become a major player in the drone industry and create jobs (through the creation of a spinoff, Hionos).

> **R&D project behind the product:**
> CAP2018 project backed by the French Single Interministerial Fund 20th call for projects

SOITEC

# ADVANCED SUBSTRATE FOR HB LEDS

**An advanced, high-performance GaN semiconductor substrate for high-brightness LEDs**

## Product description

This advanced, high-performance GaN semiconductor substrate for high-brightness LEDs leverages an innovative technology for transferring thin layers of very high quality GaN onto substrates compatible with the LED market's quality and cost requirements.

The product's key differentiator is a lighting density per sq. mm that opens the door to new designs and applications.

The product will target the LED and high-performance/high end lighting markets (general indoor and outdoor lighting, automotive lighting, consumer electronics, and video projectors, for example).

High-brightness LED manufacturers will be interested in the product.

Soitec also plans to develop a lighting lineup that takes advantage of this substrate's enormous potential.

© RATP

# Product history

2005: Start of R&D work on growing and transferring the GaN film (funded by Soitec).

2006–2011: Nanosmart program Developed in conjunction withCEA-Leti to develop advanced substrates for GaN-based lighting.

2012: Project secures government funding for additional R&D.

2013: Licensing agreement signed with Sumitomo Electric.

2013: Development of Soitec Lighting lineup.

> **R&D project behind the product:**
Nanosmart
(French Agency for Industrial Innovation Strategic Industrial Innovation Program)

SOITEC
# ESI

**A substrate for cost-competitive, high-performance RF circuits for 4G/LTE-Advanced smartphones**

## Product description

Soitec's eSI wafers are used for the fabrication of high-performance, competitively-priced radiofrequency circuits for applications that include new-generation smartphones. The substrate delivers faster, more reliable data transmission to meet the needs of 3G, 4G, and LTE Advanced networks.

Soitec's RFeSI-SOI wafers incorporate an innovative material (a trap-rich layer) between the high-resistivity handle wafer and the buried oxide (BOx), which limits the parasite surface conduction of standard HR-SOI and significantly improves the RF performance of the finished ICs manufactured on these wafers, enhancing RF isolation, lowering insertion loss, boosting thermal conductivity, and improving signal integrity. The substrate, which allows more flexible design rules, can also help reduce the number of steps in the manufacturing process, lowering production costs and enabling smaller chip sizes for the same function. The product targets RF circuit designers and manufacturers (front-end modules with power amplifiers, antenna switches, and transmitter-receivers) serving consumer electronics and, especially, smartphone and tablet manufacturers.

© iStock

# Product history

A patent was obtained for the Trap-Rich technology in 2005 as a result of RF substrate development work carried out with the Catholic University of Leuven, Belgium. The technology was developed further Developed in conjunction withLeti under the Nanosmart program from 2006 to 2011.

Prototypes were developed in 2009 in conjunction with Skyworks and RFMD. Industrial-scale manufacturing for the mobile telephone antenna switch market was launched in 2012.

The substrate became a true commercial success two years later, in 2014, rounding out Soitec's product lines to cover 100% of the 20-billion-unit RF IC market.

> **R&D project behind the product:**
Nanosmart
(French Agency for Industrial Innovation Strategic Industrial Innovation Program)

SOITEC

# FD-SOI SUBSTRATE

**An innovative silicon wafer combining energy efficiency and high performance at minimal cost**

## Product description

Soitec's FD-SOI substrate will enable the most advanced transistors in the microelectronics industry. FD-SOI, ideal for mobile applications, delivers high performance, ultra-low power consumption, and reliability—all at a competitive cost.

Given FD-SOI's low power consumption and high reliability, Soitec is currently marketing the product mainly to the IoT and automotive industries. The product is also particularly well-suited to the high-performance, low-power processors used in low-end smartphones and tablets.

What makes FD-SOI wafers so innovative is that the top and BOx layers are extremely thin and uniform. Soitec guarantees the final SOI layer's uniformity to within just a few atomic layers.

The product targets processor designers and manufacturers for consumer electronics applications.

# Product history

Soitec's R&D programs have mainly focused on ultra-thin products since 2005 and have been facilitated and financed in part by French government funds to support R&D through the Nanosmart project (2006–2011) and Exact (2012–2015), a financing instrument of the French government's economic stimulus package.

Soitec partnered with Leti and major industrial partners like IBM and STMicroelectronics to bring its FD-SOI product line to maturity. FD-SOI is gaining traction with manufacturers: Samsung chose 28 nm FD-SOI in 2014; and Global Foundries began running 22 nm and 12 nm FD-SOI in 2015 and 2016, respectively.

The first consumer product built on FD-SOI technology was released on the Chinese market in 2016: the Amazfit smart sports watch manufactured by Huami (a partner of Xiaomi). The watch is equipped with a GPS chip etched on FD-SOI for record-breaking energy efficiency. The chip's technology enables an unrivalled battery life of 35 hours with the GPS activated—twice the maximum battery life of 16 hours promised by similar products.

> **R&D project behind the product:**
> Nanosmart
> (French Agency for Industrial Innovation Strategic Industrial Innovation Program)

STMICROELECTRONICS

# MIOTiss

**IoT applications require self-powering sensors. We have developed a new batteryless sensor that operates on very-low-level energy harvesting.**

## Product description

To reduce costs and shorten time to market, connected objects are generally developed and released as battery-powered devices. The issue of replacing the batteries with an energy-harvesting system comes later. This requires the energy-harvesting system to deliver a certain level of performance that usually cannot be achieved. We feel that this approach is one of the reasons that more self-powering connected objects are not available on the market. Unlike existing solar and electromagnetic energy-harvesting systems, our economically-priced system is multi-energy and automatically adapts its operation to the ambient energy.

The product can provide physical measurements like temperature as well as three-axis motion detection. It is also compatible with a rechargeable backup battery if necessary. It uses variations in energy as an additional source of information; the speed and frequency at which the system harvests ambient energy to transmit data can be used to interpret the sensor's environment for new uses like presence, motion, and vibration detection. The product is suitable for the home automation, industrial monitoring, infrastructure monitoring, and healthcare markets. .
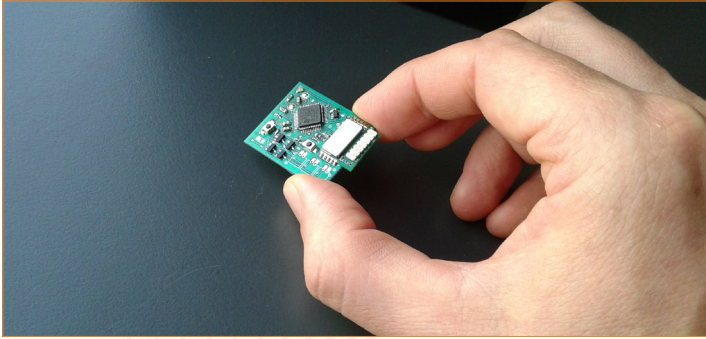
# Product history

Steady growth on the communicating object market (the number of connected objects is estimated to reach the tens of billions by 2020) will create some very real environmental challenges, in terms of managing spent batteries at the end of the objects' lifespans, not to mention replacement costs. While it is not always feasible to completely eliminate batteries (for safety and security related uses), the batteries used can be rechargeable and used in combination with energy-harvesting systems. We develop systems that enable sensors to automatically adapt to the ambient energy, to use a rechargeable backup battery if necessary, and to use variations in energy as a source of additional information used to analyze the sensor's environment (intelligence and interpretation at the receiver rather than at the communicating sensor).

The Minalogic-certified HEATec project, backed by the French Single Interministerial Fund, resulted in:

· Fifteen articles and five patents

· The development and prototyping of several energy-harvesting systems able to power a communicating platform prototype built on ST components, demonstrating the high performance and low energy consumption of the components

· The development of disruptive earlier-stage silicon processes and circuits that will give ST a differentiating technology.

> **R&D project behind the product:**
HEATec project financed by the French Single Interministerial Fund

165

SUNAERO

# RAPID CURING DEVICE

**Broad-spectrum infrared polymerization equipment**

## Product description

**Temperature-measurement system used to monitor the polymerization of putty used to repair aircraft fuel leaks.**

# Product history

TERRADONA

# CLIIINK

**Cliiink smart recycling container solution**

## Product description

The goal is to develop a proof-of-concept prototype that uses low-cost technologies and minimal energy. It will take the form of a self-contained unit that can then be integrated into recycling containers, where it would detect and identify waste, count the number of items, and estimate the size of the items.

The project objectives are a complete prototype for glass and proof-of-concept for paper.

# Product history

Terradona, Leti, and four engineering firms worked together to develop a truly unique material characterization system capable of transforming our recycling bins into smart robots.

This innovative material recognition system immediately identifies items placed inside a recycling container. Put an end to paper in the glass recycling bin once and for all!

The result is enhanced sorting of all recyclables through positive behavioral reinforcement each time someone places the right waste in the right bin.

The solution is designed to be practical and space-saving. It does not require the purchase of new bins and can be used with your existing bins. A universal sensor identifies, counts, and estimates the volume of recyclables for optimal waste management.

> **>** Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> **>** Developed in conjunction with CEA

TIEMPO
# TESIC-SC

**Secure microcontroller with dual contact-contactless interface for smart cards (payment, transportation) and government-issued ID cards**

## Product description

TESIC-SC is a dual-interface (ISO 7816 contact and NFC/ISO 14443 contactless) microcontroller for secure applications.

The circuit offers a very high level of security against physical attacks (side channel, fault injection, etc.) and is well-suited to environments with variable energy (like NFC transactions). It also offers state-of-the-art performance and lower energy consumption than today's products designed using conventional technologies.

The markets targeted are smart cards for banking and transportation as well as secure ID cards, passports, and other ID documents.

Tiempo Secure is currently developing a new family of secure elements based on TESIC-SC to make connected objects for IoT applications more secure.

# Product history

From the time Tiempo was founded (in 2007) until 2011, the company focused on developing its innovative asynchronous (clockless) design technology and intellectual property blocks for integrated circuits (a microcontroller core and crypto-processor cores) using the technology developed.

Based on feedback from French semiconductor manufacturers and security stakeholders, Tiempo's management felt that there was an opportunity to leverage its IP and bring in partners from research and industry to develop a complete secure microcontroller with a dual interface and non-volatile memory.

The ASMART project was initiated (and backed by the French Single Interministerial Fund) with Gemalto, LFoundry, Presto Engineering, Invia, and Leti as partners. The project kicked off in 2012 and was completed in 2015 with an innovative secure microcontroller prototype for payment (smart cards) and ID applications. The prototype was scaled up for manufacturing as the product TESIC-SC, which was then certified for ID use by ANSSI in 2016 (earning EAL5+ according to the Common Criteria standards).

The same year, EMVCo certified the product for banking applications. Tiempo also established a very close partnership with France-based Presto Engineering (an ASMART project partner), which is now handling the entire TESIC-SC circuit supply chain (production, testing, packaging, and logistics) for Tiempo.

> **R&D project behind the product:**
ASMART

TPL SYSTEMES

# THE BIRDY-TETRA PAGER

**Dual-mode TETRA/GPRS pager**

## Product description

The Birdy-Tetra pager is a system that sends alerts to on-call emergency response and maintenance workers.

It is the only dual-mode TETRA/GPRS pager in the world.

The target markets are:

- Emergency services (fire, police, and emergency medical)

- Industry

The pagers would be used by on-call personnel.

# Product history

With the support of Minalogic, TPL Systemes was able to work with Leti on making improvements to and integrating the miniaturized antennas. Without Leti, TPL Systemes would not have been able to complete this project.

> Project financed by the **IRT Nanoelec Easytech program**, administered by Minalogic

> Developed in conjunction with CEA DSIS

TRONICS MICROSYSTEMS

# AXO215

**A new-generation of compact, high-performance inertial sensors**

## Product description

TTronics is the sole provider of closed-loop MEMS gyrometers and accelerometers, bringing MEMS inertial sensors unrivalled performance.

Closed-loop (also called force-feedback) electronics bring several crucial advantages to inertial sensors, including superior linearity, enhanced signal-to-noise ratios, and better behavior in harsh (vibration, impact, temperature) environments.

Tronics' AXO® line of high-performance accelerometers, with their closed-loop architecture, bring new levels of performance to MEMS accelerometers. AXO® accelerometers are the ideal complement to the industry-standard GYPRO® line. They deliver low noise, high bias stability, and excellent temperature linearity. Tronics accelerometers are especially suitable for precision navigation applications.

# Product history

The STARS project brought together some of France's leading academic researchers and industrial companies in the field of inertial sensors: two high-tech companies from the Auvergne-Rhône-Alpes region (Tronics Microsystems and Meggitt-Sensorex), Leti, a leading global research organization and CEA Tech institute specializing in micro and nanotechnologies, and Cetim, a center for expertise in mechanical engineering.

The purpose of the project was to develop a new generation of compact, high-performance inertial sensor integrating MEMS (microelectromechanical systems), a technology that is sufficiently mature to carve out a position as the new industry standard. The system developed as a result of the project responds to the global trend of reducing mass and costs while maintaining performance—a trend observed in the aeronautics, rail, and manufacturing industries. A demonstrator system for a beyond-the-stratosphere application will be developed at the end of the project.

One of the underlying challenges addressed by the project was the strategic independence of European systems manufacturers facing virtually-exclusive competition from North American companies. This was the main reason that the project garnered support from so many local partners, including clusters Minalogic, Mont Blanc Industries, and Aerospace Auvergne-Rhône-Alpes (which co-certified the project), local governments (the Auvergne-Rhône-Alpes Regional Council, ERDF Rhône-Alpes, and the Haute-Savoie General Council), and financer Bpifrance. The French Directorate General for Armaments provided project management of technical aspects.

> **R&D project behind the product:**
> French Single Interministerial Fund project STARS

TRONICS MICROSYSTEMS

# GYPRO3300

**High-performance angular-speed MEMS sensor**

## Product description

Tronics is the sole provider of closed-loop MEMS gyrometers and accelerometers, bringing MEMS inertial sensors unrivalled performance.

Closed-loop (also called force-feedback) electronics bring several crucial advantages to inertial sensors, including superior linearity, enhanced signal-to-noise ratios, and better behavior in harsh (vibration, impact, temperature) environments.

Tronics' GYPRO® line of high-performance gyrometers was specially designed for applications with more stringent requirements than those of the automotive industry, but that do not require FOG (Fiber Optic Gyros) or DTG (Dynamically Tuned Gyros). GYPRO® gyrometers offer high bias stability, low noise, and low latency. Tronics gyrometers are suitable for precision navigation and stabilization applications.

# Product history

Tronics introduced its GYPRO® product line at the Electronica trade show in November 2012. Grenoble-based Movea—seeking inertial sensors with performance superior to those found in smartphones—was won over by the products. The company was seeking a solution to locate pedestrians inside buildings to ensure the safety of isolated workers and during emergency response operations. It rapidly became clear that a software layer was needed to ensure correlation with building maps, one of Leti's areas of expertise. The project consortium then welcomed EASI IC to integrate the electronics.

The idea for the ASIMUT project emerged, and the project was submitted to the French Single Interministerial Fund 16th call for projects in April 2013.

The economic benefits of the project were substantial, especially for Tronics, as described below, but also for the other project partners. Project lead Movea developed its Pedestrian Dead Reckoning (PDR) software, which was evaluated by several companies (CSR, Samsung, Huawei, etc.) seeking differentiating indoor location technologies. The software module also had a favorable impact on Movea's valuation in the run up to the company's acquisition by Invensense in 2014.

Leti developed new algorithms and substantial know-how in data fusion, in particular through a journal article and a patent that could be leveraged for future partnerships.

> **R&D project behind the product:**
> French Single Interministerial Fund project ASIMUT

VI TECHNOLOGY

# K3D & SIGMA LINK

**3D inspection of electronic boards**

## Product description

K3D is a 3D machine that responds to all of the optical inspection challenges of electronic board assembly.

It combines a high-resolution 2D camera, a fully-telecentric lens, a high-performance 3D sensor, and a high-precision fast-motion system. By combining the advantages of 2D and 3D techniques, the system significantly expands test coverage.

Coupled with K3D, Sigma Link is a powerful web-based software suite, and acts as a tool that supports continuous yield improvement by translating solder paste and component inspection data into actionable process information. Built around a unified database and the correlation of inspection data and images, Sigma Link provides in-line monitoring, easy troubleshooting of the entire PCB assembly process, and full traceability of data and images.

The yearly global market for inspection is estimated at $500 million. With K3D and Sigma Link, VIT addresses assemblers positioned on high-quality, low-volume manufacturing markets.
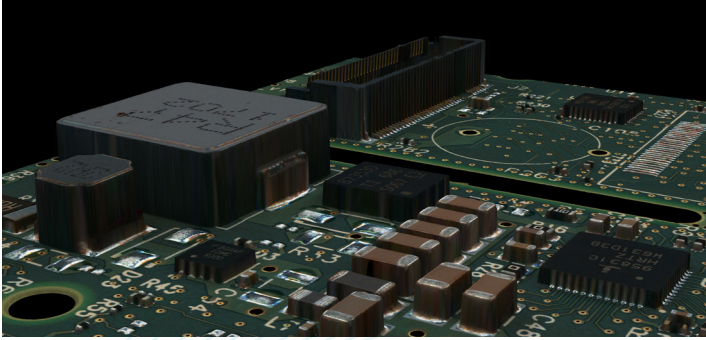
# Product history

VIT has been providing automated optical inspection for electronic boards for many years with its Kseries product range. Since 2009 the company has invested in the design of a 100% 3D product for solder paste inspection.

In 2012 VIT began looking for ways to extend 3D inspection to components, where an extremely diverse range of electronic boards to inspect creates additional technological hurdles.

Minalogic assisted VIT in identifying academic research and industrial partners for the project, which was certified in the summer of 2012 and kicked off by the end of the same year.

The Sigma software suite is initiated in 2014 with a first module.

After many unexpected problems, the first K3D beta tests were completed in July 2016 at a customer site, and the very good feedback on defect detection led to the product's commercial release in late 2016.

In the space of seven years, VIT expanded its product line with solder paste inspection and, thanks to this project, converted all of its solutions to 3D, ultimately creating a completely new software lineup to cover the entire fabrication line, positioning the company to respond to the future challenges of Industry 4.0.

> **R&D project behind the product:**
> 3DCI, French Single Interministerial Fund 16th call for projects

XENOCS

# NANO-INXIDER

**Characterization of materials at the nanometric scale**

## Product description

Compact and easy-to-use, Nano-inXider is a nanomaterials characterization instrument that uses X-ray scattering, a measurement technique that can determine a material's nanostructure and morphology. The information obtained is statistically representative of the millimetric volume probed and thus rounds out the information in microscope images. In addition, X-ray scattering is non-destructive, does not require any sample preparation, and enables dynamic measurements by varying the sample's environmental parameters (temperature, mechanical stress, humidity, etc.).

Previous measurement instruments using X-ray scattering are cumbersome and require trained experts to operate them.

Nano-inXider, which is much more compact, less expensive, and easier to use while offering excellent performance, targets a much broader market. The instrument combines wide-angle X-ray scattering (WAXS) and small-angle X-ray scattering (SAXS) to access information on the structure of samples at scales ranging from 0.1 nm to 100 nm. Samples can be measured using transmission or reflection with a range of options for controlling the sample's environment. The graphical user interface ensure smooth operation and data analysis.

# Product history

Xenocs had already developed and released a nanostructure characterization instrument, the Xeuss, a high-performance metrology platform inspired by synchrotron SAXS/WAXS beamlines. In order to make the method available to a wider range of users, Xenocs designed a second, more compact, less expensive, and easier-to-use instrument, the Nano-inXider.

The Nano-inXider was developed under the French Single Interministerial Fund-backed Nanolytix project by a consortium of partners that included Xenocs, Leti, Arkema, and INRIA. Leti and Arkema completed the needs assessment and functional testing of a prototype. INRIA developed a data inversion algorithm, and Xenocs designed and built a model and two prototypes.

The Nano-inXider was rapidly released on the market (summer 2014) with very few modifications with regard to the prototypes. Several units were sold before the end of the Nanolytix project and sales forecasts are very good. Sales of the Nano-inXider will create jobs at Xenocs (manufacturing, testing, and installation at customer sites) and will generate business for local vendors (manufacturing of structural elements and sheet metal work, vacuum chambers, and electrical cabinets).

Learn all about the **88** products commercialized or in the progress of commercialization
as a result of R&D projects
certified by Minalogic.