fuelics

NBIoT:

The new era of Internet of Things. New design trends and business models that fuel innovation

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Introduction ›

› **Fuelics** is an R&D rapid prototyping company with the ability to conceptualize, design, develop and produce **sensors & systems** for **massive deployment** in the IoT era
› We strive **in identifying** new massive markets for IoT sensors and **produce** high valuable industrial **IP** mainly targeting the **IoT Market.**
› 4 founders with **entrepreneurial mindset**, 2 of them with **PhDs**, 1 of them **PhDc**, in electrical and computer engineering. 15 engineers in our work force
› Collective experience in significant IoT **Asset / Fuel** Management and **Energy PV Projects**. The team has delivered the first ever IoT projects in **Fuel Management** of **Vehicle Fleets** in 10 municipalities in Greece and sold more than **9000 metering electronic boards** in **PV parks** around the world

Market Focus ›

› **Main focus** on connecting **stationary** & **mobile storage tanks** in the cloud utilizing **sensors** with unpresented **measurement accuracy**, extra **low energy** needs, **low cost** of production and intrinsic **machine learning** intelligence
› **Secondary focus** on developing **sensors & systems** for **Smart City** applications

Facilities and Business Units ›

- › Certified **Electronics Laboratory** with Quality Control Assurance
- › 600m² Mechanical Engineering **production facility** with state of the art machinery for massive production of several thousand units per month
- › **Research** and **Development** Unit
- › **CAD** design Unit
- › **Business Development** & **Sales** Unit
- › **Marketing** Unit
- › **Quality Assurance** Unit
- › **Installations** Unit

Technology ›

- › Low Power Wide Area Network (**LPWAN**) technologies **mainly focusing on** the design and development of battery operated **NBIoT** sensors & systems
- › Machine-To-Machine (**M2M**) technologies **as an interim** technology platform while waiting for fully fledged NBIoT networks
- › Other **unlicensed LPWAN** technologies like LoRa
- › In-house **Machine learning** coding on a microcontroller level

NBIoT ›

› **NBIoT is the protocol of the Telecom Operators**
› Infrastructure-wise is a small part of the **800 MHz** spectrum attributed to Voice and Data. Only **200KHz** is attributed to NBIoT. Short bursts! Like tweets.
› It is considered the absolute protocol for IoT applications. Why?
  › It is highly penetrative. The 800 MHz band has a very big wavelength, therefore buildings or land is transparent
  › It is **highly sensitive**. Sensors can work in -20dBm lower power transmission
  › It works over **licensed spectrum**. LoRa, SigFox and all the other antagonizing private networks work in unlicensed spectrum, therefore prone to interference, jitter etc
  › **SLA** and **QoS** of the Network operator guarantees 99,999% uptime
  › Since base station is your physical infrastructure, there is no way power shortages that may compromise service. This is not guaranteed for private infrastructure in LoRa and Sigfox (eg. in Municipalities)
  › **Ericsson, Nokia, Huawei** provides the infrastructure in telecom operators. The seem to know their business better than everyone .
  › Today, almost half (48%) of mobile operators earn less than 1% of their revenues from the IoT. **Rapid growth ahead**!
  › Vodafone, Cosmote will switch on NBIoT in **Q1, 2019**!!!

LoRa & SigFox ›

› **Private investments, private networks**
› Infrastructure-wise the operate in operating in **unlicensed spectrum prone to external interference**
› In comparison with NBIoT these technologies produce turnover
› These networks will dominate in private/confined investments, e.g. Industrial applications, where CAPEX investment in infrastructure can support the IoT test case
› Same characteristics in penetration as NBIoT. Conceptually LoRa and SigFox produce the same outcome as NBIoT.

LPWA Networks› NBIoT, LoRa, SigFox

Improved Indoor Coverage

Low Power Consumption

Massive Connections

+20dB
Better than GSM
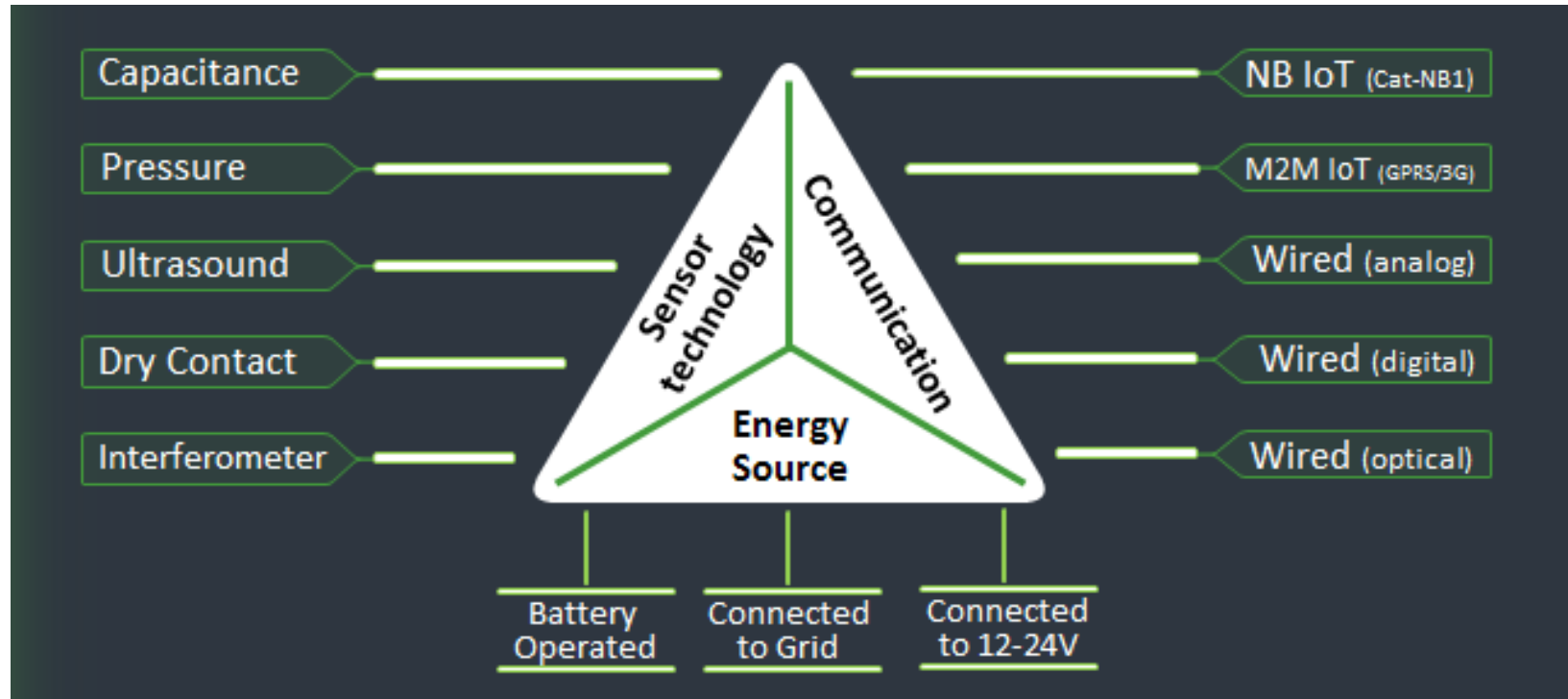
10Yrs Battery Life

50K Connections Per Cell

Fuelics Sensor Design ›

Fuelics Sensors[1] ›

Fuelics is providing solutions for a bouquet of Smart City needs such as:

› **Level / Volume** Management of **Stationary** or **Mobile Tanks** in ambient conditions
  › **Tank Content:**
    › **Diesel Fuel** for heating or transportation
- Sensing Technology: **CAPACITANCE**

› **Level / Volume** Management of **Stationary** or **Mobile Tanks** in ambient conditions
  › **Tank Content**:
    › **Diesel Fuel** for heating or transportation
    › Any type of **non-explosive liquids** such as water, chemicals, food
- Sensing Technology: Differential **PRESSURE**
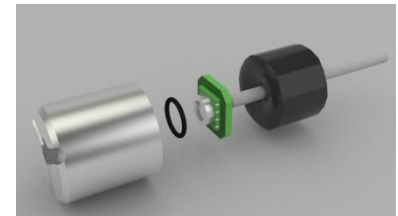
› **Level / Distance Management** of **Storage Tanks / Industrial Silos**
  › **Storage / Silo content:**
    › Any type of contained grained or high viscosity materials
- Sensing Technology: **ULTRASOUND** or **INTERFEROMETRY**
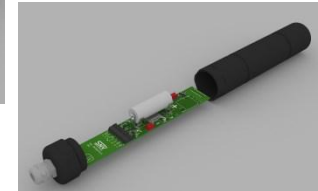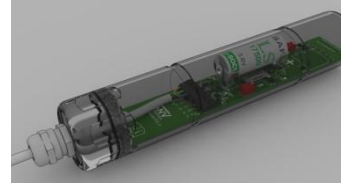
Fuelics Sensors[2] ›

Fuelics is providing solutions for a bouquet of needs such as:

› **Pulse** Management of **Water & Natural Gas** meters with pulse output
  › **Measuring:**
    › Water **Flow**
    › Natural Gas **Flow**
- Sensing Technology: **DRY CONTACT**

› **Magnetic Distance** Sensing of any **metallic surface** (parking sensor)
  › **Measuring:**
    › **Magnetic Flux** in a geometric space
- Sensing Technology: **MAGNETOMETER**

› **Remote Energy** Management Unit with **Power Switching Control**
  › **Measuring:**
    › Energy **Consumption**
  › **Actuating:**
    › Energy **management of integrated devices based on needs**
- Sensing Technology: **Combination of energy measuring technologies**

Vodafone IoT event video›

New disruptive business models ›

› **IoT** is about providing solutions to **humanity problems** (vodafone video)
› How much fuel do I consume and when I need to re-fuel?
› Is there enough grey water in cisterns gathered in underground tanks so that Nicosia can water the plants by deciding which valves to oper (AI is here)
› Where can I park my car, based on my current position? Can I sell my parking space? (Block chain)
› Who has used the collocated optical concentrators in Limassol? Is security enabled? In Australia all collocated optical pits are considered a public threat
› Where is my asset? Can I follow my asset even enclosed in a container?
› Does my water supply has any leaks? What if my water pipe breaks? Will I be notified in time so that my house is not flooded?
› Where is my assets? Where is my bicycle? Can I track my elder relative?

Everything changes because sensor design trends changes›

› Sensors in the NBIoT era are **constrained devices**
› Battery optimization dictates the sampling and attaching to the network
› Connection protocols like LwM2M create a new design philosophy not only for firmware coding (southbound) but for the IoT platforms (northbound)
› The big ones, like Ericsson, Nokia, Huawei, try to capitalize on **massive sensor deployments by introducing their own middleware platforms.**

Thank you for your attention!

www.fuelics.com