Leti & eLichens are enabling Best In Class NDIR MEMS subsystem for gas sensing market

Grenoble - 07.03.2018

Mission

Pioneering the **Sensing IOT** Solutions for **Smart City** various markets
through eLichens **complete offering**
where **Data Fusion, Models & Analytics**
are powered by Patented **Smart Sensors** Network

Company Profile

- **Founded: December 2014**
- **R&D Grenoble, France**
  22 Employees (+5 in 2018)
- **Venture Backed**
  Series-A completed

DEMETER PARTNERS · SOFIMAC Innovation · BNP PARIBAS · bpifrance · FRANCE angels

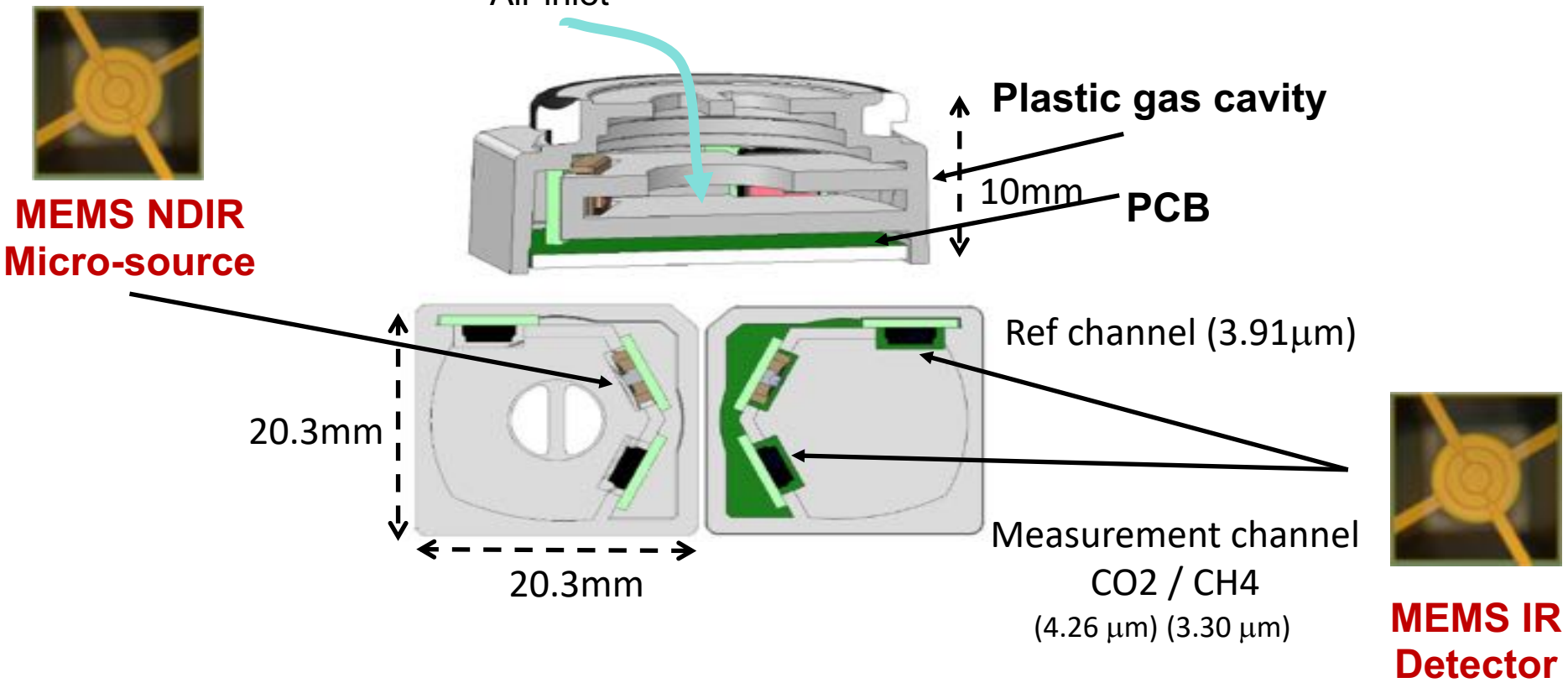
- **Patented Technology – 35 patents to date**
- **Research Labs Partners** cea leti

Leti & eLichens COLLABORATION

Testimony for Hardware Differentiation
MEMS Development Accelerator

Smart Sensors – Patented Optical NDIR subsystem

Collaboration with Leti becomes a MUST have for the MEMS COMPONENTS of the NDIR SUBSYSTEM



Success Criteria

Research Labs (in general)

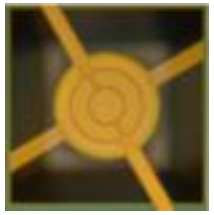
- ✓ Number of patents
- ✓ Number of publications
- ✓ Number of joint industrial partnerships
- ✓ Number of products - this is what industry covets

Start-Ups Company (eLichens)

- ✓ Market: identification of real problem
- ✓ Technology: solution to real problem
- ✓ strategy: focus on a deliverable product
- ✓ Business: Revenue, Profit, Margins

Synergy exists between WW Technology Research Leaders and Start-Ups

MEMS Hardware Solution



- Opportunity for MEMS to address ultra low power consumption, small footprint, low cost and ultimately produce extremely high volumes.

- BUT…. MEMS development is expensive, risky, time consuming and can only be justified with high volume application.

MEMS Development is not as easy as it looks – Start-Up limitations

Just ask anyone who has tried

- Process development requires stable industrial standard equipment not found in academia or most research institutions
- Mature process modules and integration experience will accelerate process development
- Good design that accounts for process uncertainties and tolerances accelerate the beginning of critical validation and characterization
- Start-Up insufficient resource to fab, hence develop process, hence hard to validate design
- Design <-> Process is a unique expertise that is not necessarily viable for a start-Up Time To Market

What Leti brings…

- Greatly accelerates time consuming MEMS process development
- Fab and Updated tool set enables **reproducibility** and facilitates **transfer to commercial foundry** avoids costly MEMS development at foundry
- Design, **multiple iterations** enabled by mature process approximates system limitations

- Some focus priority by eLichens including MEMS foundry constraints -> accelerating transfer to production foundry

Development Synergy

- **Market drives technology**
- eLichens provides sensor requirements for size, power consumption, and sensitivity performance
- Leti leveraging POC NDIR proposes path to meet requirements
- eLichens assesses system tradeoffs to prioritize proposed items to meet schedules
- Combined risk assessment and planning

Path to Production boosted by Leti partnership

Best Testimony of a collaboration
is to be able to address a wider market segments
By introducing products that customers want…

NDIR Sensors are driving IOT Applications for eLichens Addressed Markets

Industrial - Safety

HVAC/DCV

Smart Home

Air Quality

Gas Leak Monitoring

Automotive - In Cabin

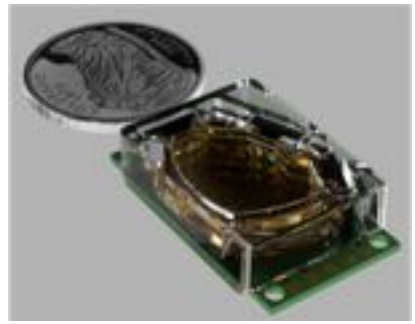
Case of eLichens Smart Sensors for Safety & Security

ELICHENS SOLUTIONS

Low-power-NDIR-gas CO2, CH4 & CH4-Narrow-Band sensors
Most aggressive footprint enabling new industrial standard

ULTRA-LOW-POWER NDIR SUBSYSTEM

- **Small and compact design for an easier integration (2x2x1cm)**
- **Ultra-low-power consumption: < 1.5mW at 100% duty Cycle**
- **High accuracy with compensated drift.**
- **Best sensitivity (alarm threshold triggered at 5% LEL)**
- **Fast response time**



Most aggressive footprint
< 1.5mW @ 100% duty Cycle
&

Roadmap with Leti, for <<< 1mW

Case of eLichens Gas leak Detection - Smart Meter Application

ELICHENS SOLUTIONS

Best-in-class Low-power-NDIR-gas-CH4-Narrow-Band sensor,
Connected station to be wall mounted next to Smart Gas Meter.

ULTRA-LOW-POWER CH4-NB NDIR GAS SENSORS

- **Small and compact design for an easier integration**
- **Ultra-low-power consumption: < 1.5mW at 100% duty Cycle**
- **High accuracy with compensated drift.**
- **Best sensitivity (alarm threshold triggered at 5% LEL)**
- **Fast response time**
- **Certified for use in Explosive Atmospheres (ATEX)**
- **Extended Life time > 10 years**

CONNECTED STATION

- **Battery Operated**
- **Reference station is available (HW & Firmware)**
- **Reference station is GTI certified.**

Case of Smart City Outdoor Air Quality

Differentiator System solution as Air Quality mapping is Sensors assisted

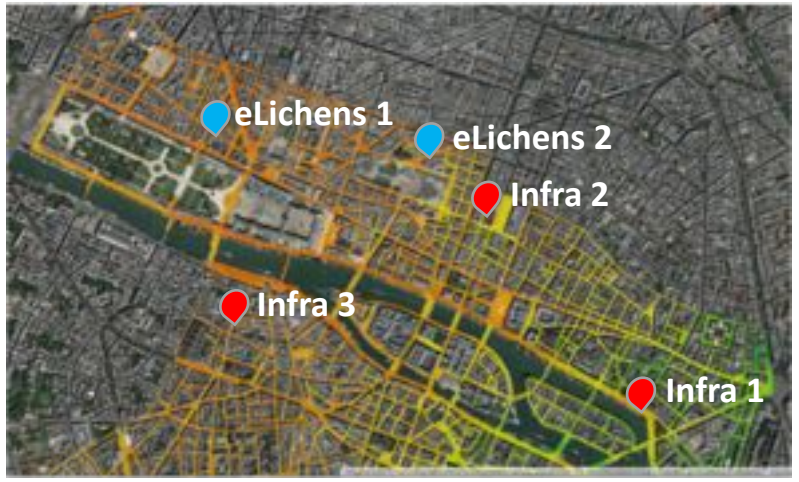
Models ONLY
No data assimilation

Paris 2017-06-20 at 11:00

Competition vs. eLichens
Accuracy of 500 meters vs. 10 meters
No real time validation vs all time validation
No unpredictable events vs. real time events

With data assimilation using eLichens

Autonomous Sensing Station



Paris 2017-06-20 at 11:00

eLichens trusts the model to predict the trends **&** Correct the bias using real-time sensors data

Thank You