Agrisense
Collecte de données agile
dans un contexte de parcelles connectées

ModStatSAP :
Réseaux de capteurs, phénotypage et modélisation

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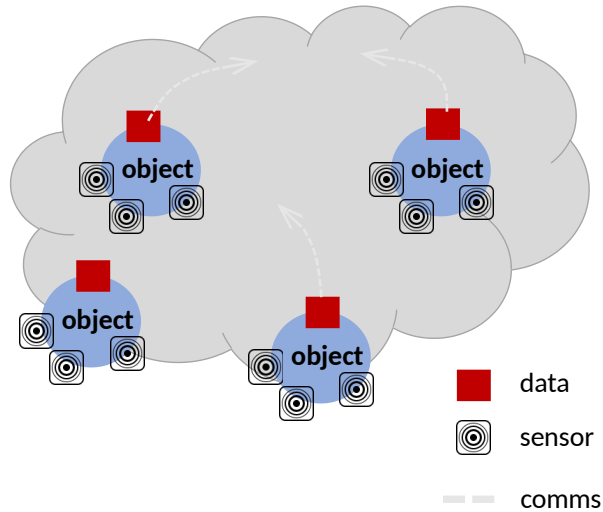Professor at IMT / IMT Atlantique
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Assocoate professor / Rennes University
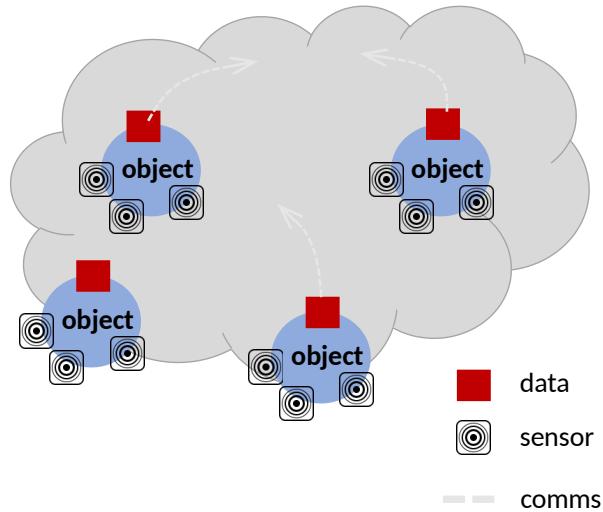Member of IRISA E4SE team

E4SE, who are we?
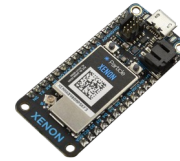
Smart Spaces

Application domains

data

sensor

comms

E4SE, who are we?

Smart Spaces

Different types of IoT device

object

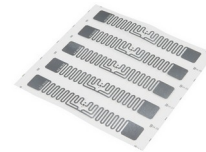object

object

object

■ data

◉ sensor

‑ ‑ comms

High-end IoT devices

Low-end IoT devices

RFID tag

E4SE, who are we?

Smart Spaces

On-device sensors
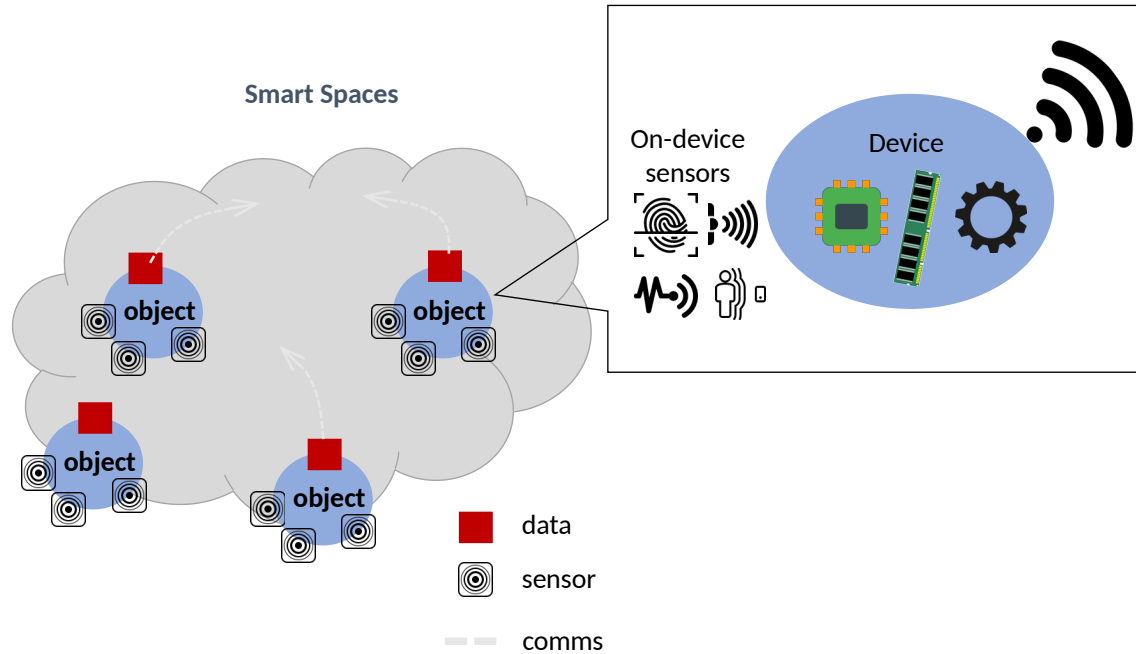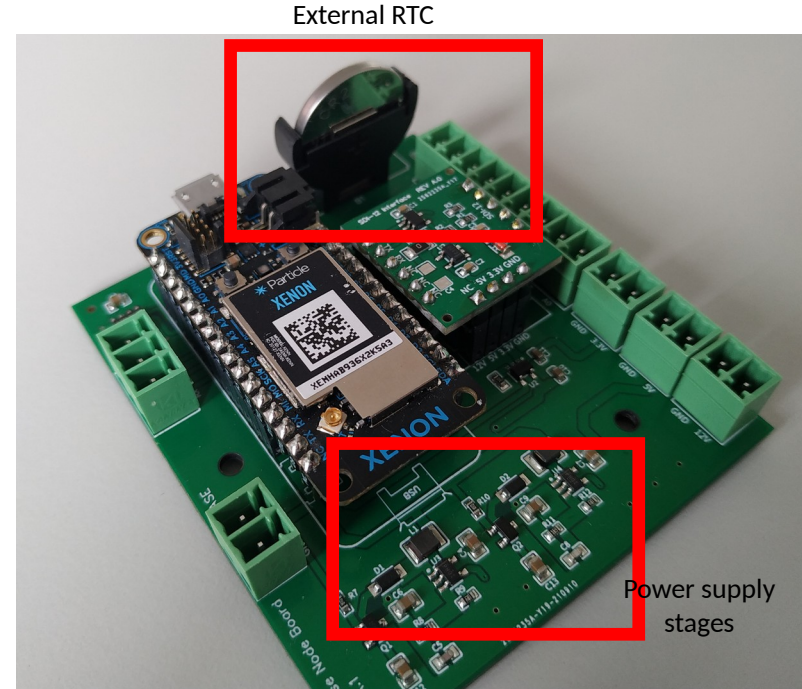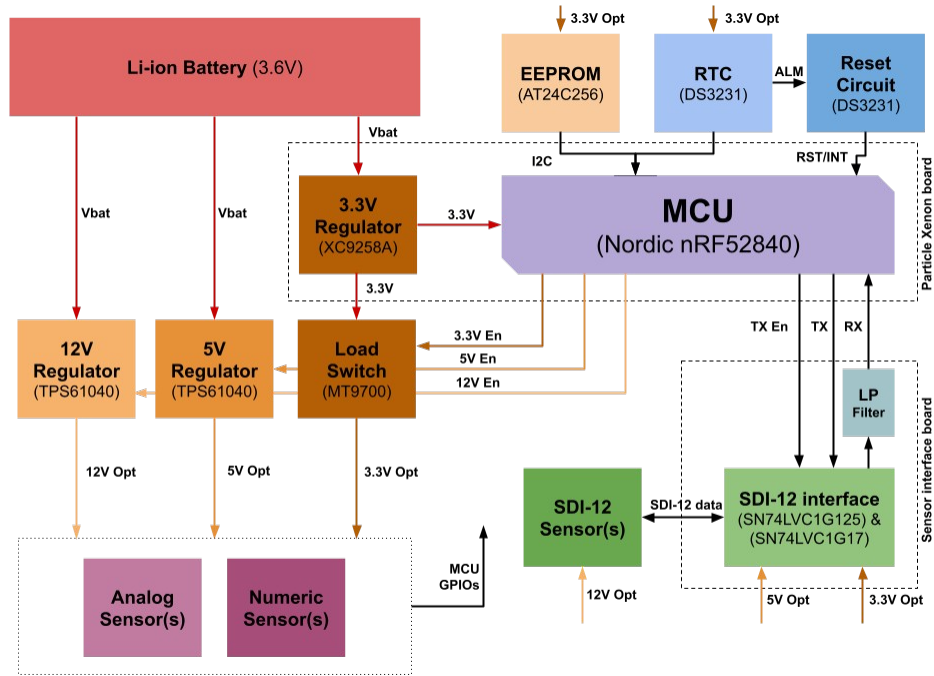
Device

data

sensor

comms

Our approach

- The use of IoT technologies has mostly been carried out under the paradigm of massive data collection
  - Logging as much information as possible, storing the data on remote server
  - Implementing statistical and IT methods to extract meaningful information/context
- A more frugal design ?
  - Use as less resources as possible …
  - … while having the possibility to use much more when it is required
  - How to locally and dynamically modify the data collection to build a given information/perception with the appropriate quality level ?
- Requirements
  - A fine-grained control on how data is produced by IoT nodes and collected from the environment
  - ➢Agrisense platform
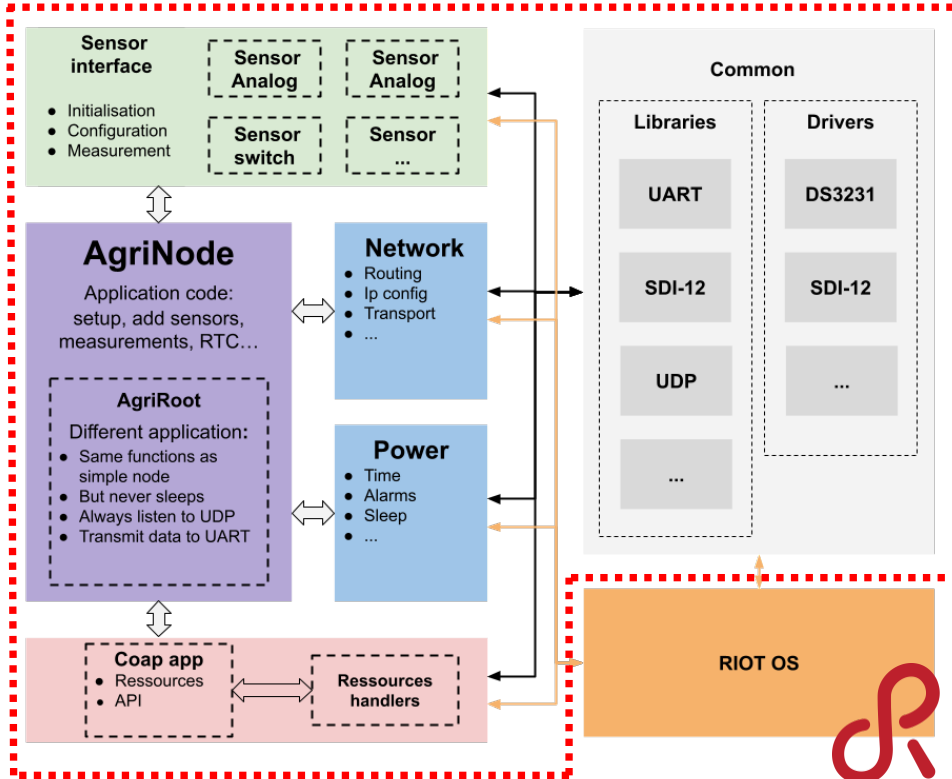
Design AgriSense platform

- A joint project EASE-Demecology (INRAe)
  - IoT low-end devices
    - Low power "on the shelf" MCU
  - Open source embedded OS
    - RIOT OS
  - Open HW interfaces
    - Several power supply stages
    - Ability to drive real (and complex) industrial sensors (SDI12)
  - Fine grained control on power management
    (active mode / deepest sleep mode)
    - Long lasting autonomy
    - Target of the order of a few µA

- Results: a set of APIs
  - To control the node
  - To process data locally
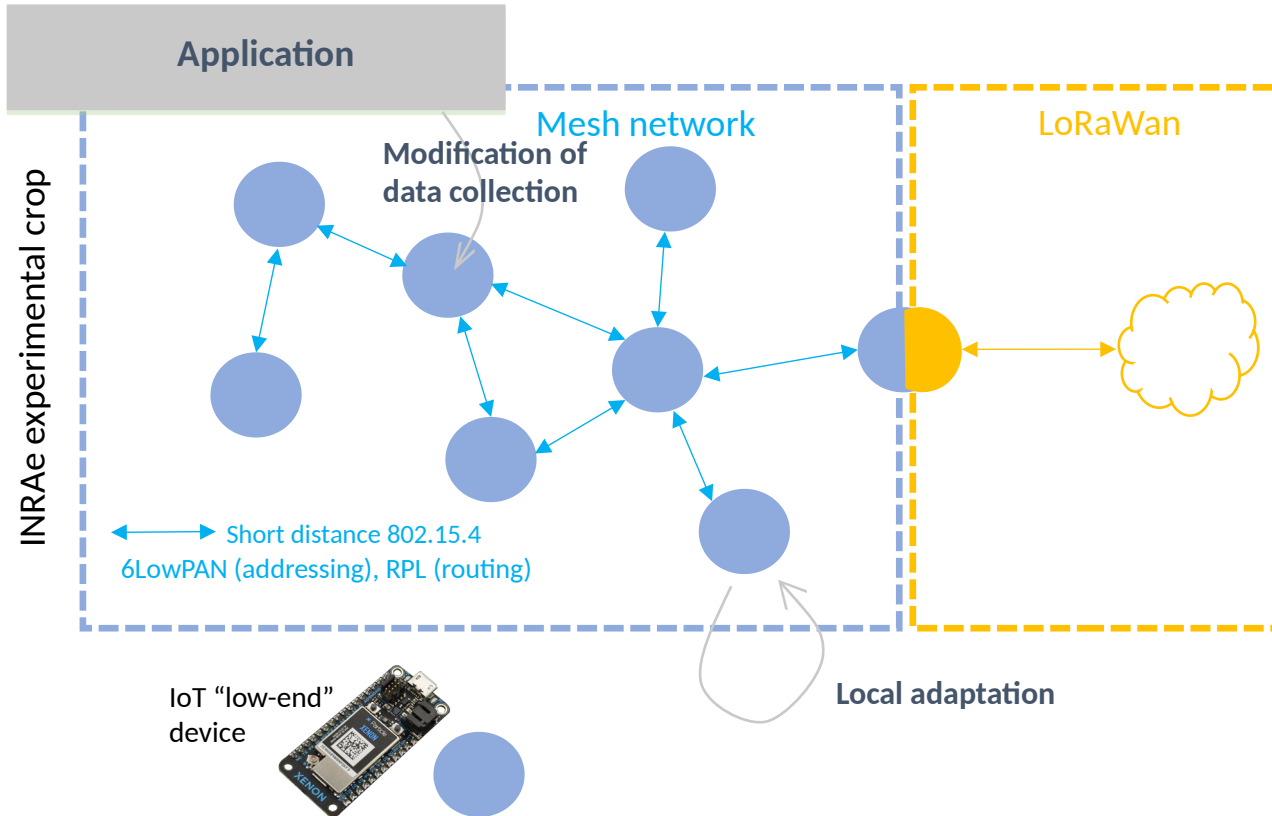 - to adjust finely the resource consumption

Design of an open HW (open PCB)

External RTC

Power supply stages

Design of an open SW architecture

First deployed infrastructure

Application

Mesh network

LoRaWan

INRAe experimental crop

Modification of
data collection

Short distance 802.15.4
6LowPAN (addressing), RPL (routing)

IoT "low-end"
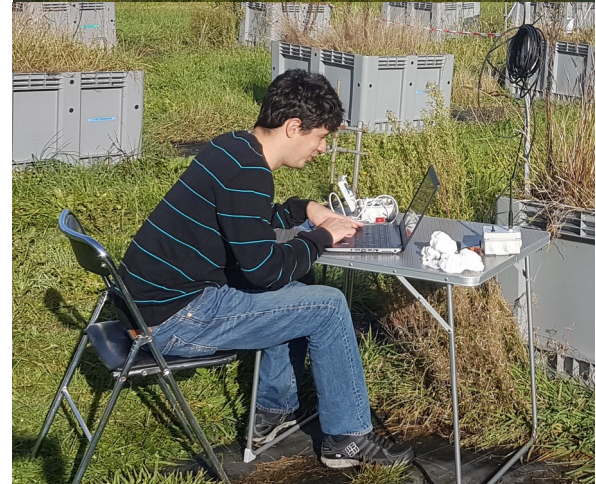device
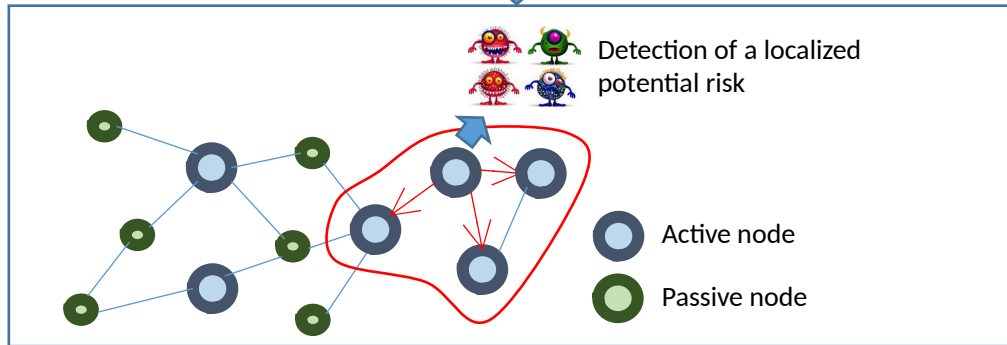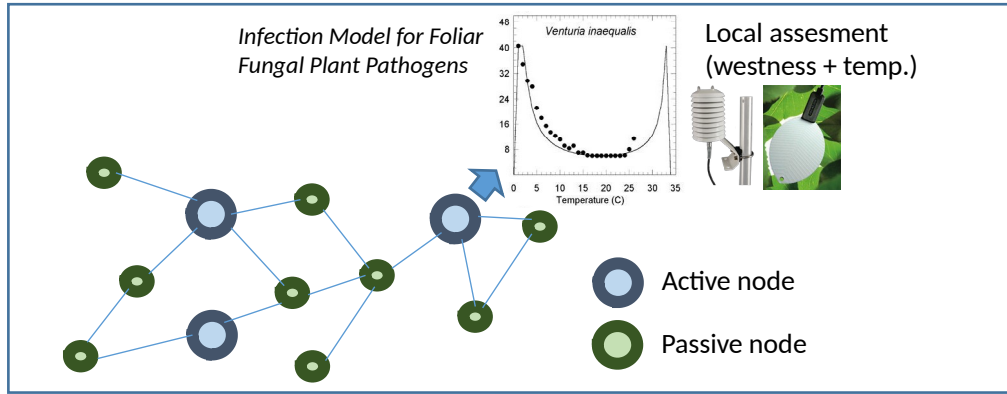
Local adaptation

First results

First application: Smart agriculture
Detection of plant diseases

Agrisense: next steps

- Agrisense 1st phase
  - POC
  - First study/experimentation based on a generic infection model for foliar fungal pathogens

- New research challenges
  - Design of generic services
    - To be able to describe app requirements in terms of perception quality
    - To identify automatically which information are reality needed during the perception elaboration process

- To open the platform to new applications
  - More complex models for Smart Agriculture
  - Smart building / Smart city

Questions / Comments