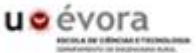




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Nodes and Sensors for Multipoint Data Collection

Area 2 – Technologies

Lesson 4 – Proximal Sensing

Sequence ID – 16

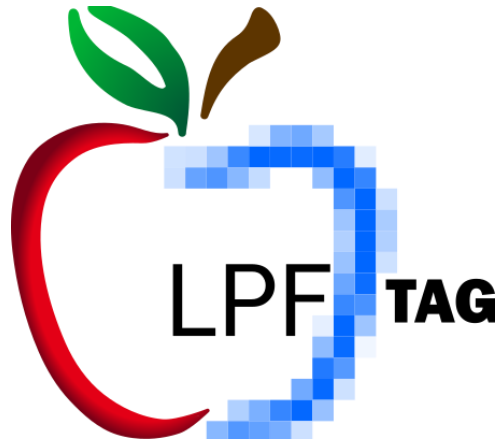
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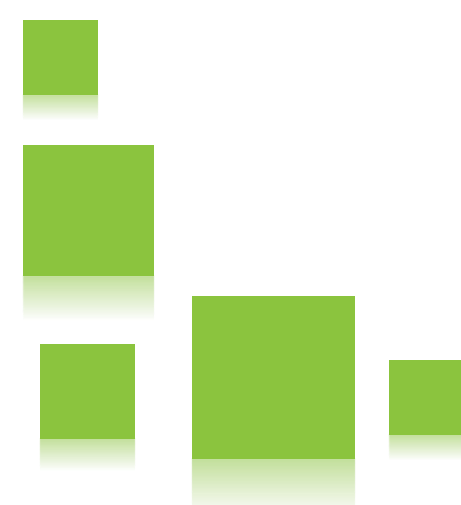
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DISCLAIMER

A2.L4.T4 Nodes and sensors for multipoint data collection

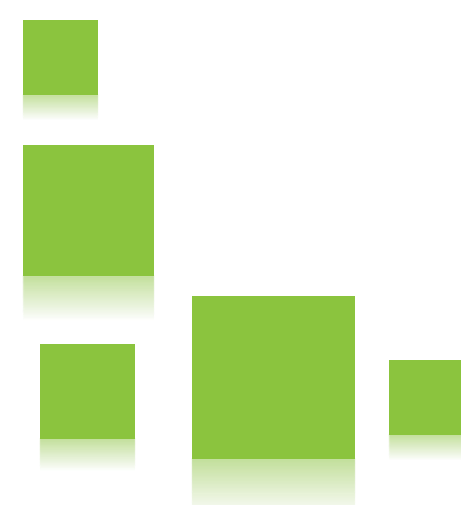
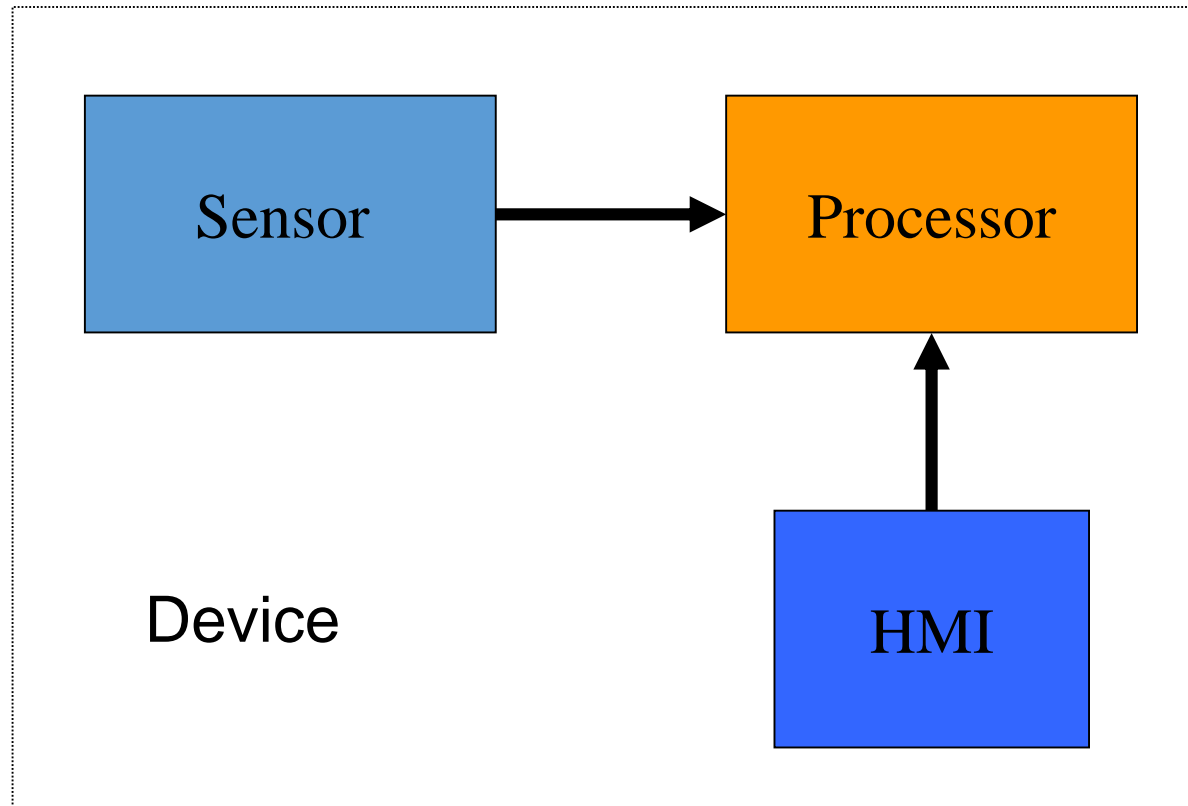
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Eva Cristina Correa, Universidad Politécnica de Madrid, Spain

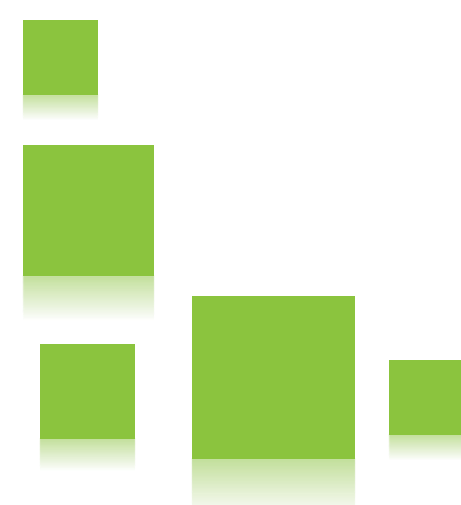
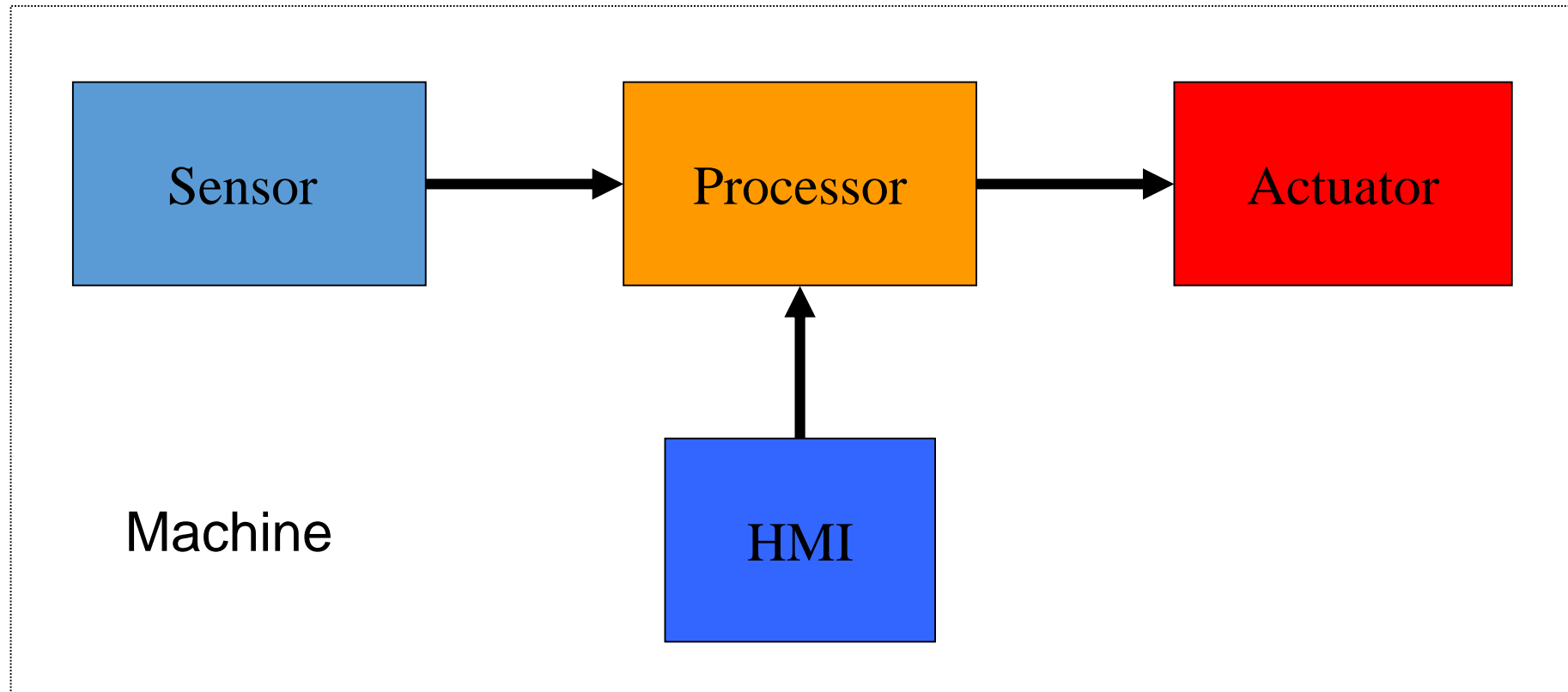
Belén Diezma Iglesias, belen.diezma@upm.es, Universidad Politécnica de Madrid, Spain

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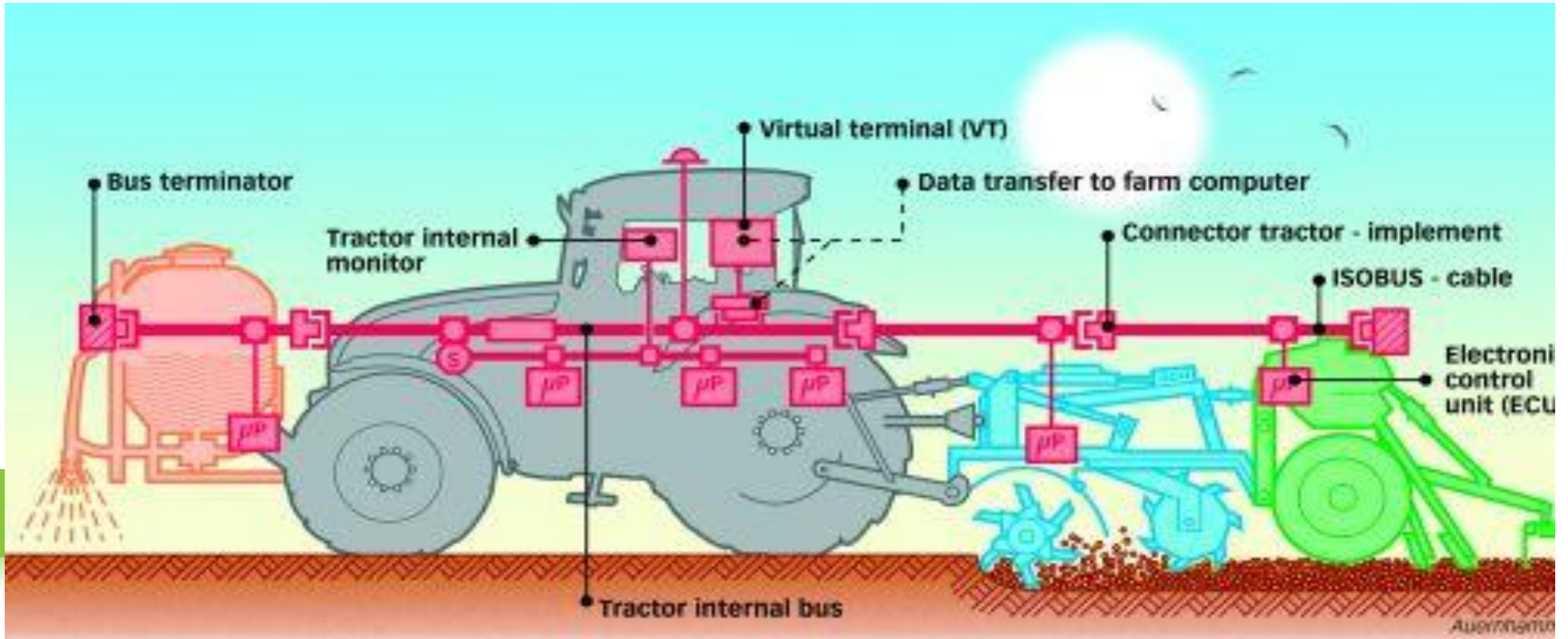
Instrument

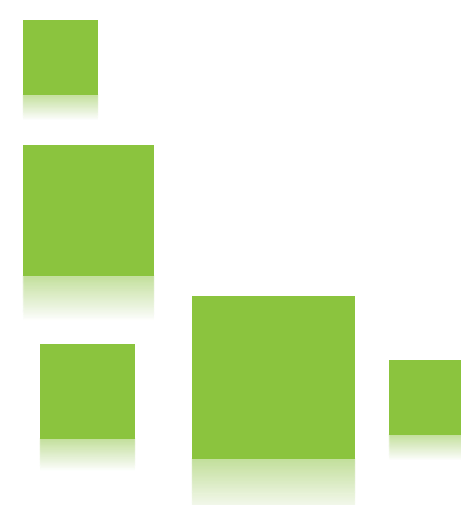
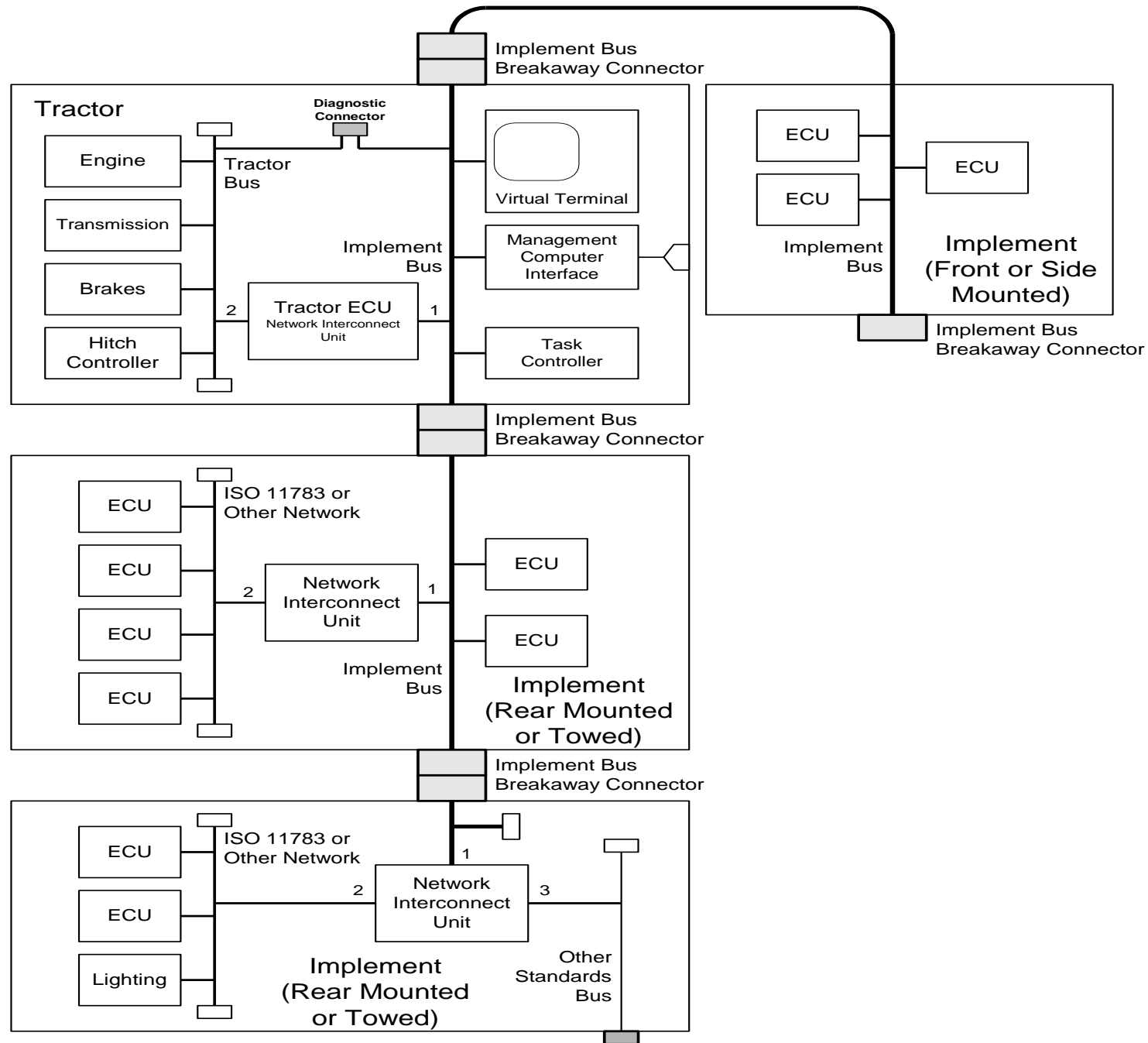


Machine with Electronic Controls

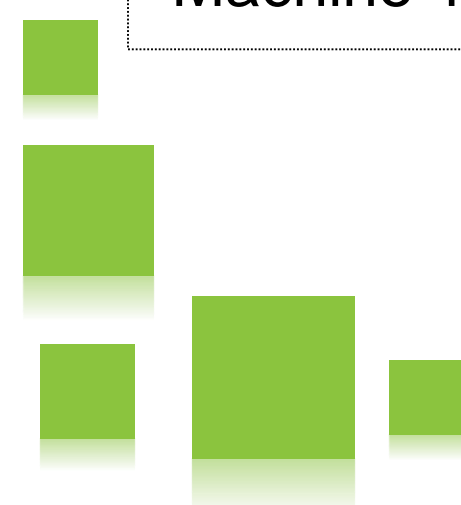
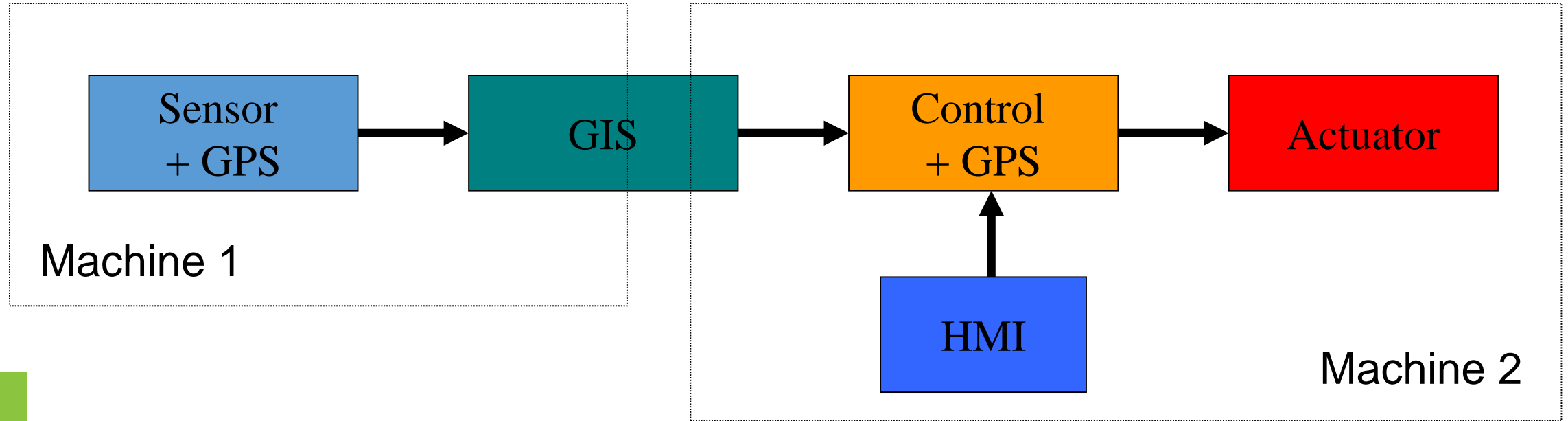


Automotive Unit with ISOBUS Communication





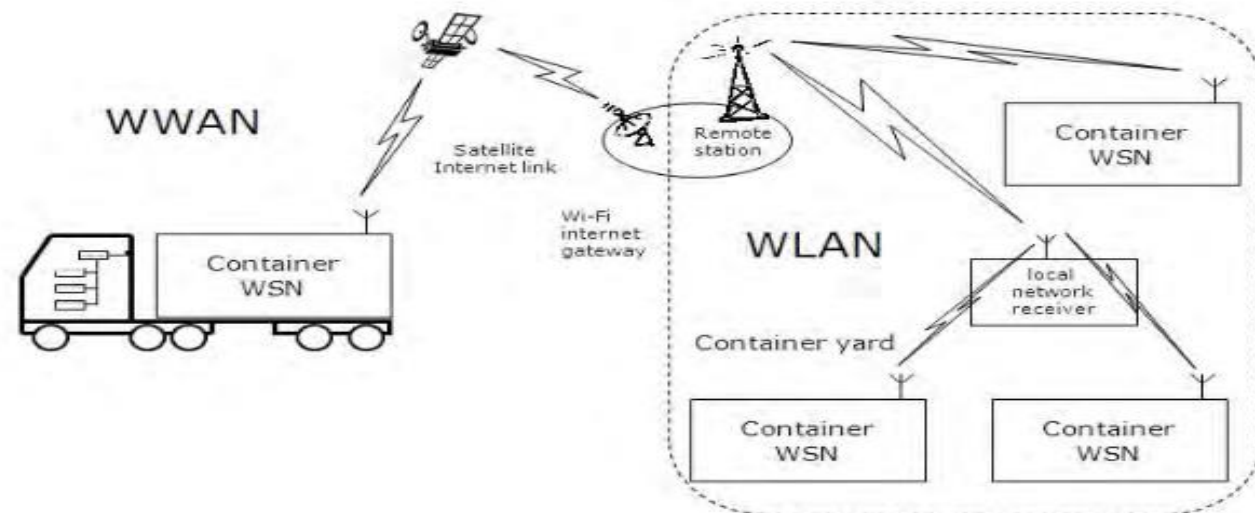
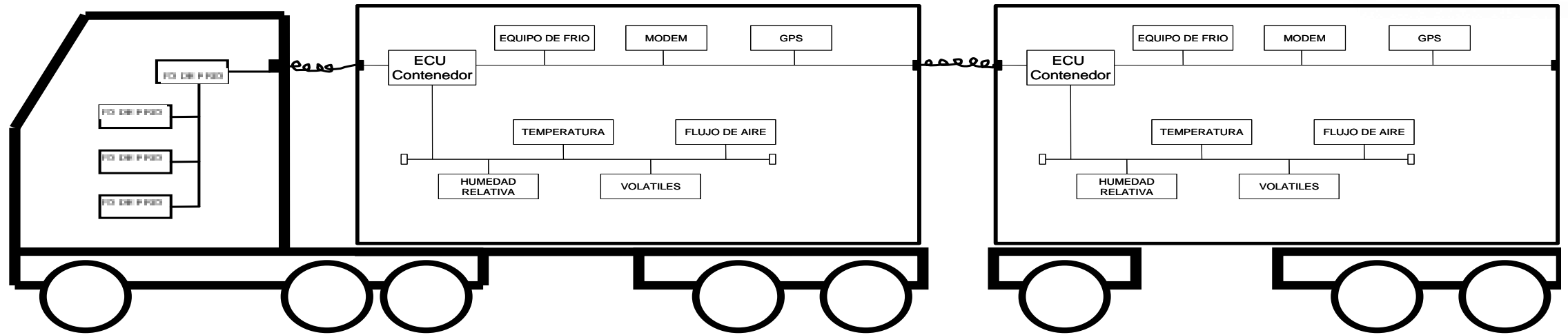
Precision Agriculture Scheme



Sensors And Networks

- Multi-distributed supervision (sensor technologies)

Staying Wired... or Go Wireless?



RFID

Radio-frequency identification

Originally developed for short-range product identification

Recognised as able to provide well-structured traceability systems for data collection

WSN

Wireless sensor network

Enables environment sensing together with data processing

Able to communicate with other sensor systems and exchange data with external users

RFID

Active	Semi-passive / Passive
100 m	10 cm – 3 m
Larger batteries	Battery only used to power the sensor



www.temptrip.com



www.rfcode.com



easy2log®

caenrfid.it

Loggers



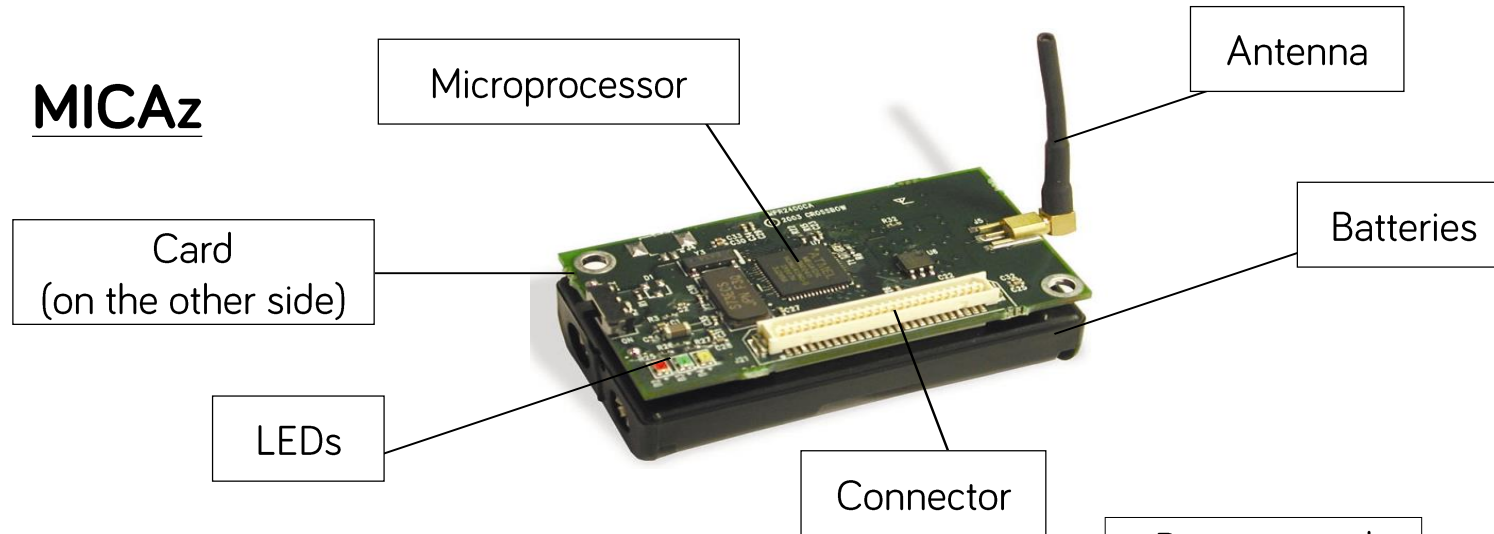
www.ibutton.com



www.microdaq.com

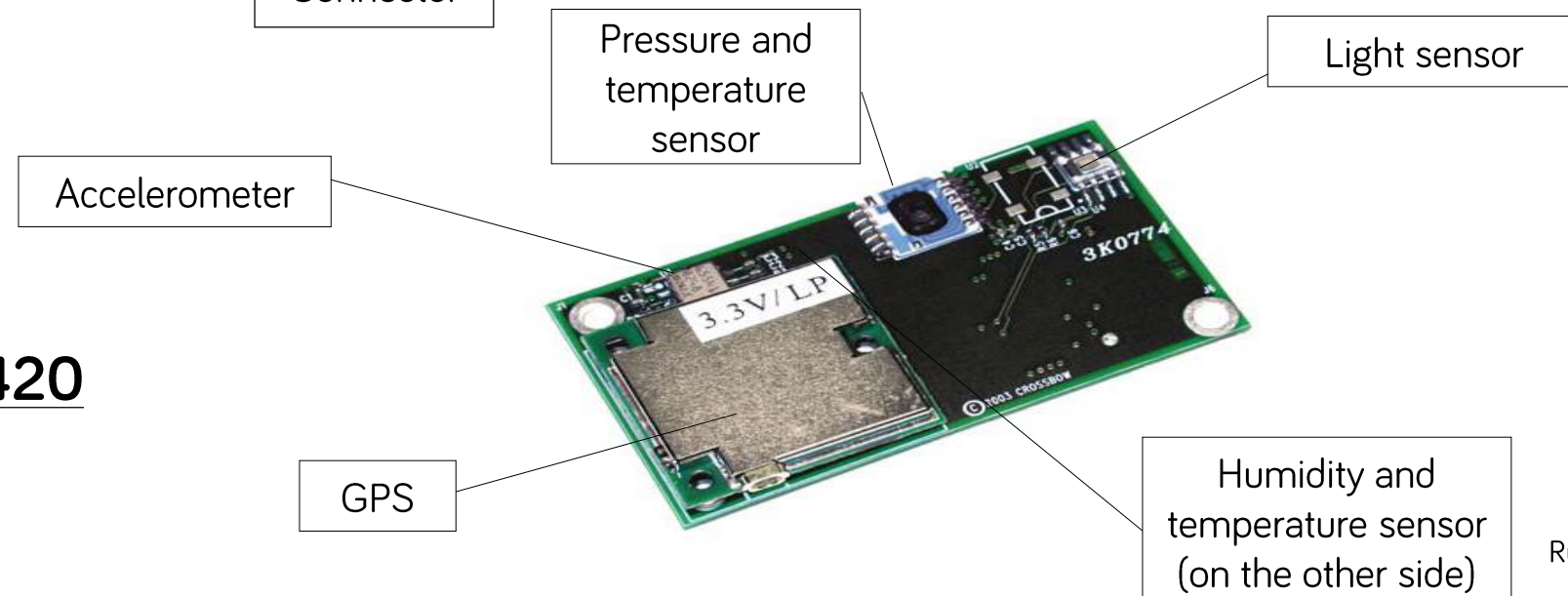
Elements in a Crossbow Mote

MICAz

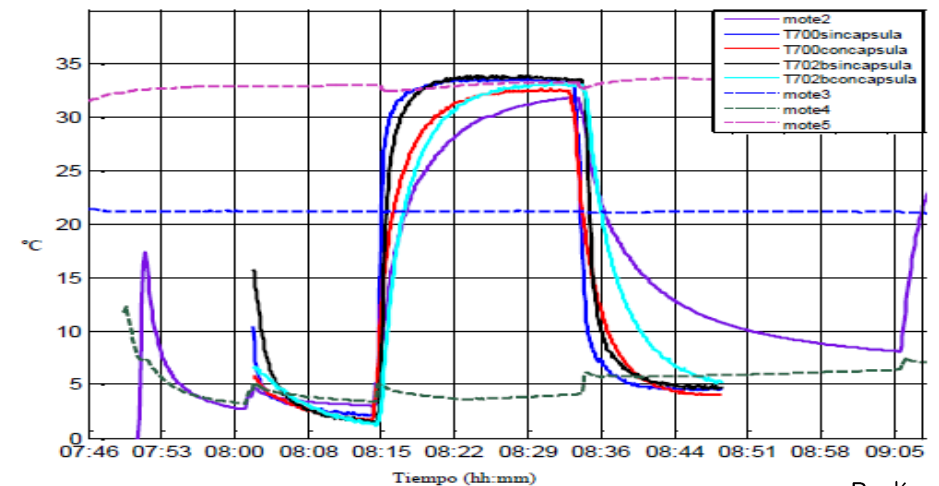
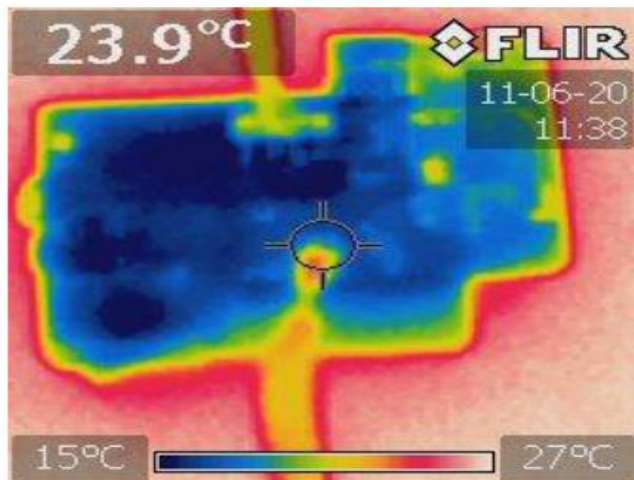
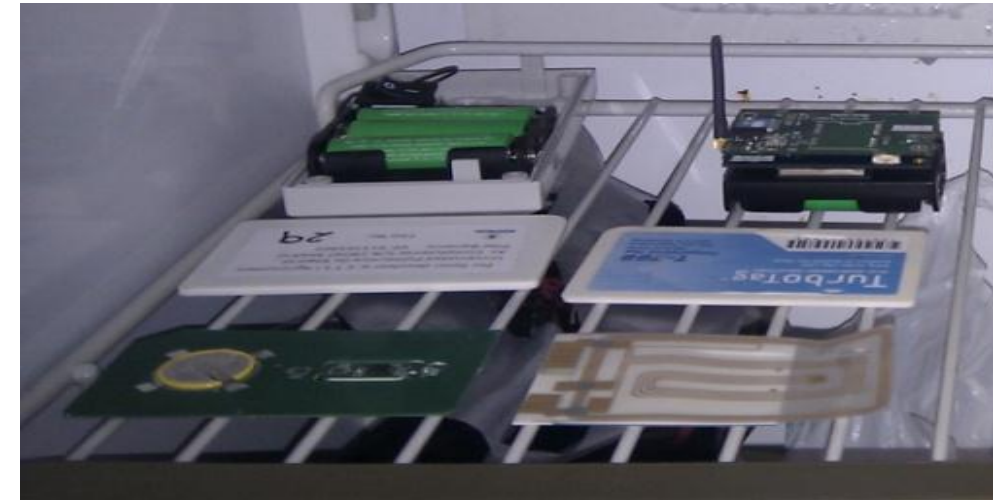


- Pressure-Temperature *Intersema MS5534A*
- Light *TAOS TSL2550*
- Humidity-Temperature *Sensirion SHT11*
- *ADXL202JE*
- GPS *Leadtek LR9546*

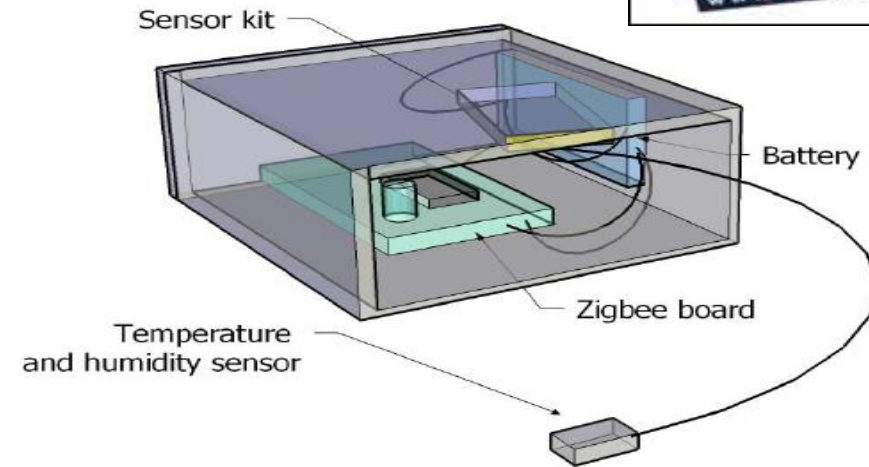
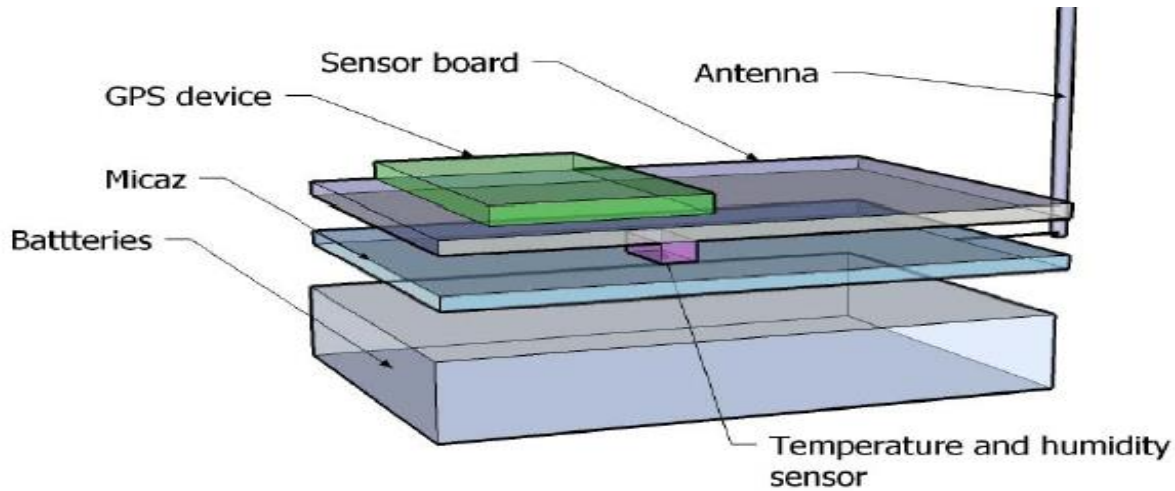
MTS 420



Housing or the Counterpart Effect



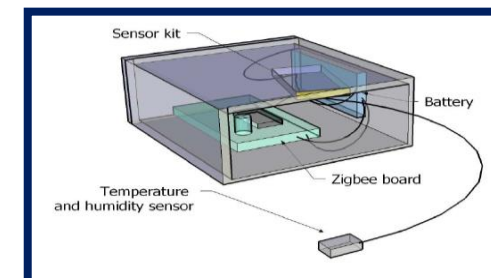
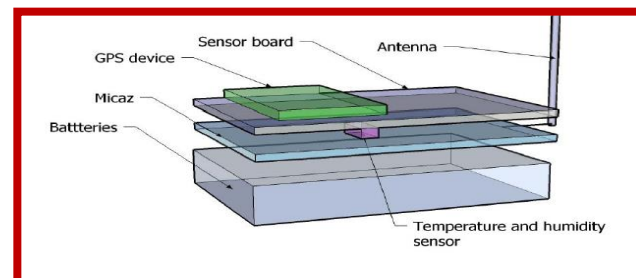
Evaluation of WSN Technologies



Self-Heating (or the Heisenberg dilemma)

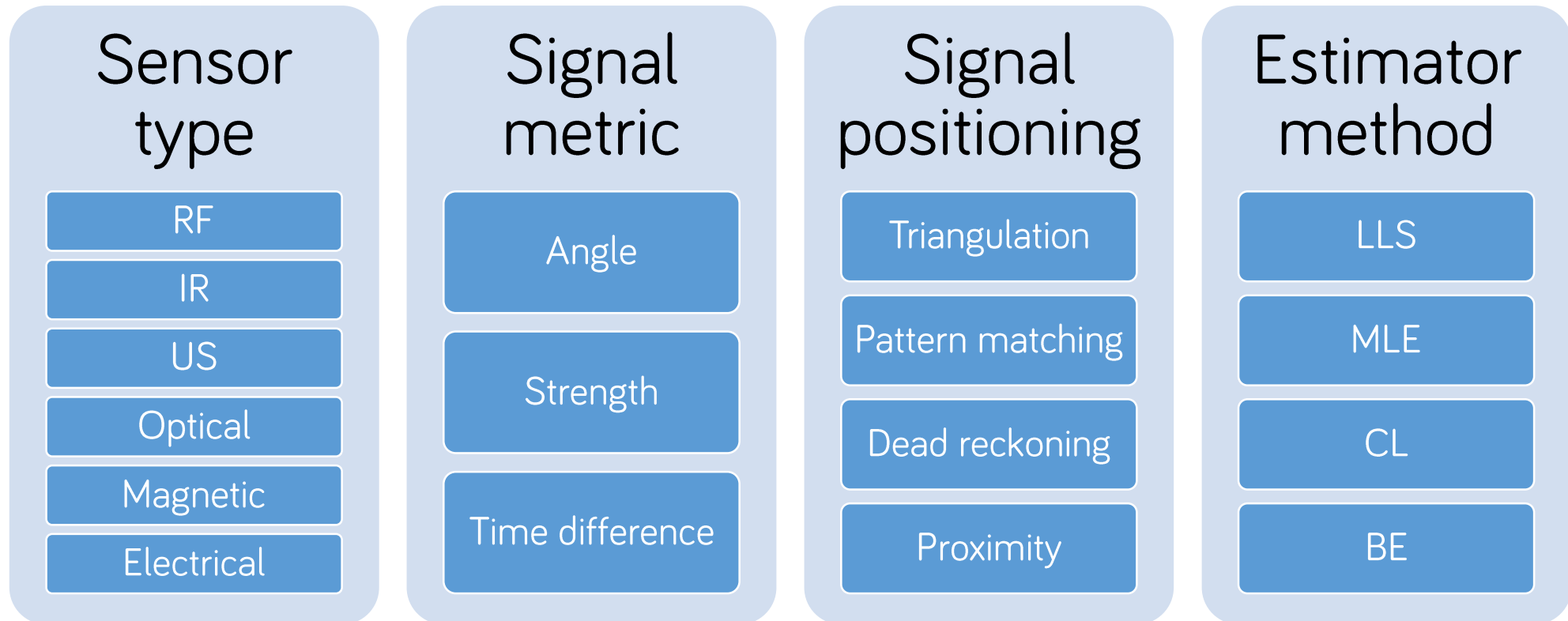


	Mean RH (%)		Mean T (°C)	
	Xbow	Xbee	Xbow	Xbee
Empty room	62.6±3.8	84.3±1.7	8.40±1.1	3.60±0.3
Trough 13 pallets	62.1±0.7	84.1±2.1	8.86±0.5	3.71±0.4
Inside pallet 6	67.6±2.1	86.0±3.3	9.06±0.3	3.68±0.5

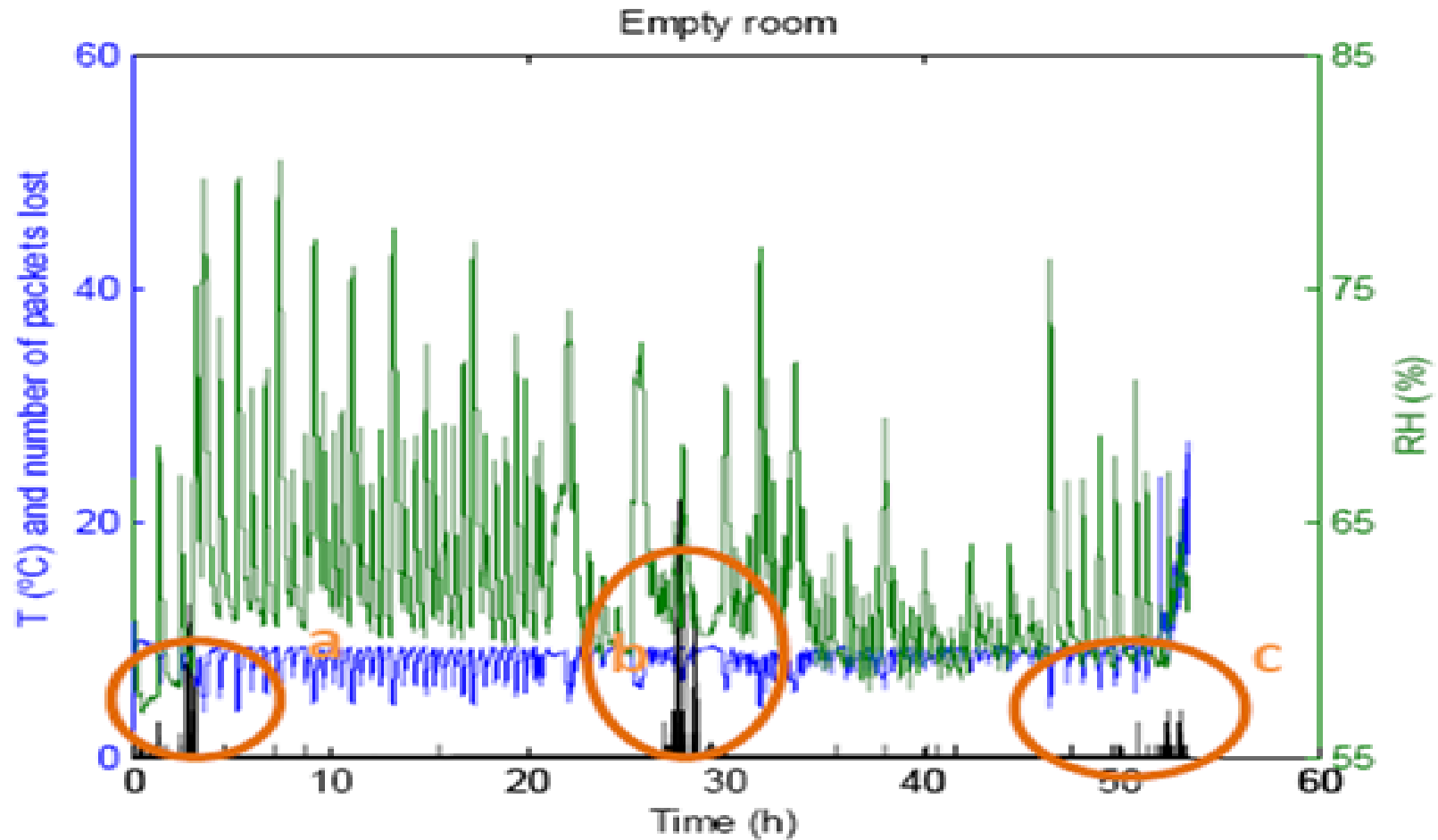


Auto-positioning

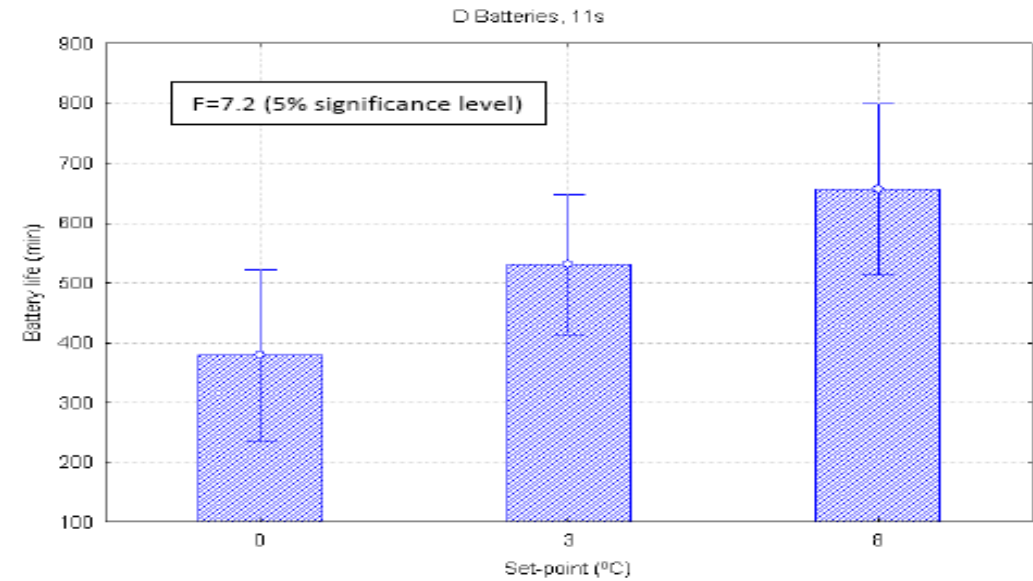
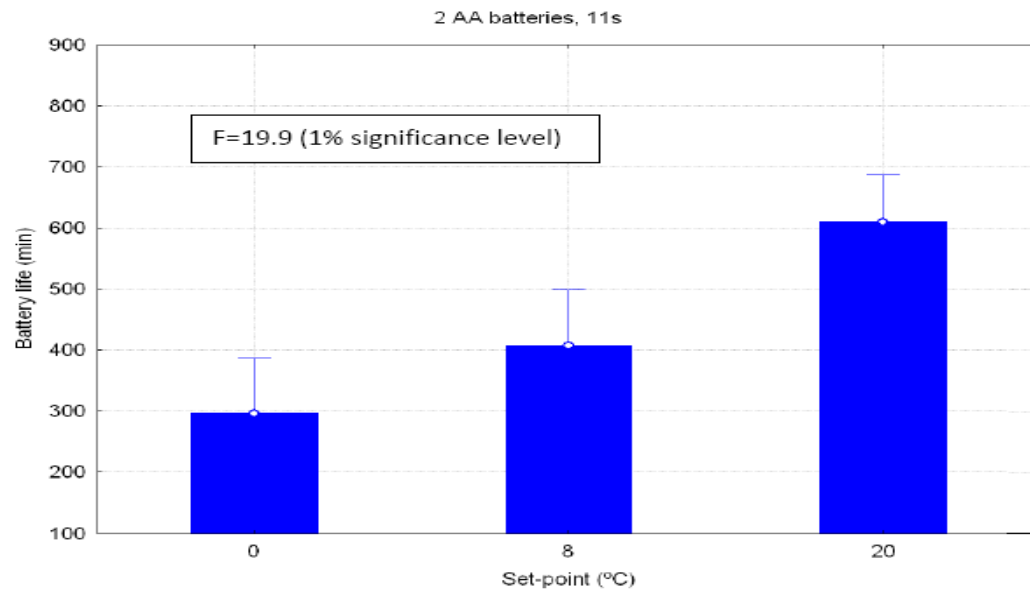
For automatic location acquisition of sensor nodes in inside spaces, local positioning systems (LPS) are essential, as the GNSS satellite-based system is unavailable.



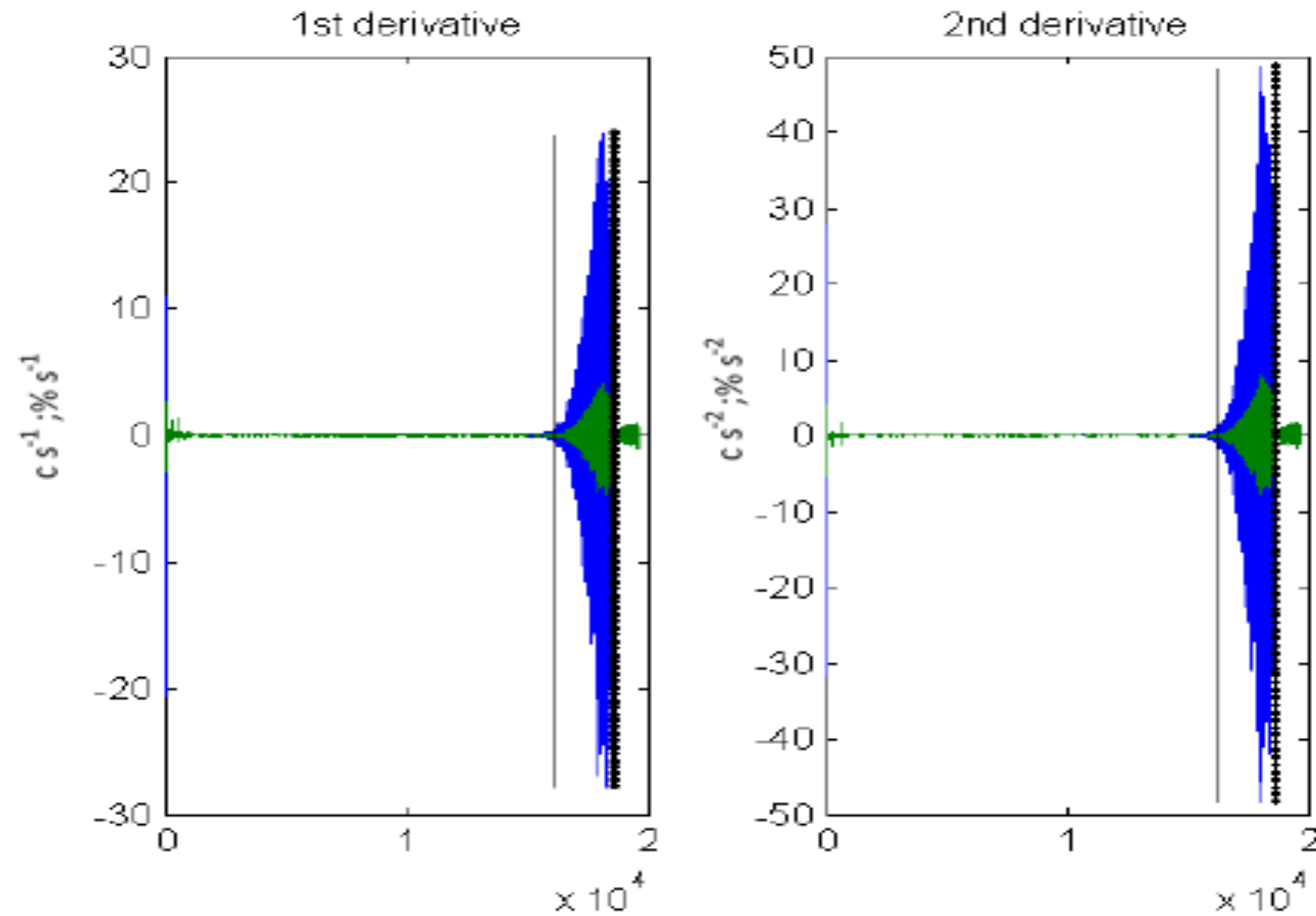
Transmission: Lost Packets



Effect of Temperature on Battery Life



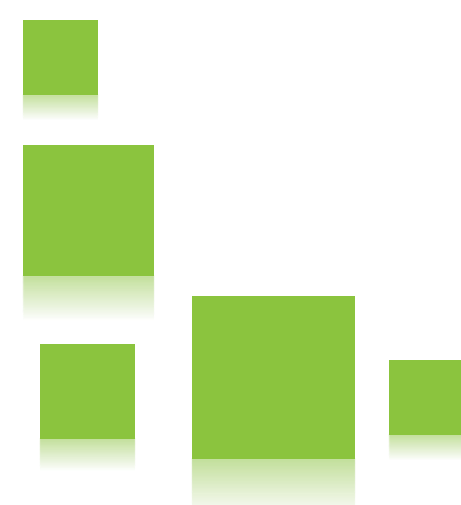
Battery Fault Detection





Data Integrity

- When SCADA inter-operates with new components, sensors, and networks, its vulnerability to data alteration increases
- If WSNs are to be used for certification purposes, data integrity has to be guaranteed
- Unobservable changes, defined as compromised readings consistent with the system state, are the most threatening



Summary

- Multi-distributed supervision technologies (RFID and WSN) are available at trial level
- The analysis of the dynamic response of sensors and the occurrence of uncontrolled sources of variation is of utmost importance
- Multi-distributed supervision technologies are not used for certification due further details remaining to be fixed (robustness of transmission, auto-location, data integrity)
- Multi-distributed supervision technologies are used at voluntary level above legislation requirements