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OpenSense RTD 2010

FNSNF

Intentional Networked Mobility for Urban Pollution Monitoring

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Mobility in the OpenSense Network

Uncontrolled mobility

- Tram-anchored nodes:
  - relatively **high predictability**
  - highly constrained trajectories
  - only in Zürich
- Bus-anchored nodes:
  - **lower predictability** (improved by context information from vehicle data bus)
  - loosely constrained trajectories

Overall good urban coverage, but areas outside public transport network remain unreachable.

Intentional mobility

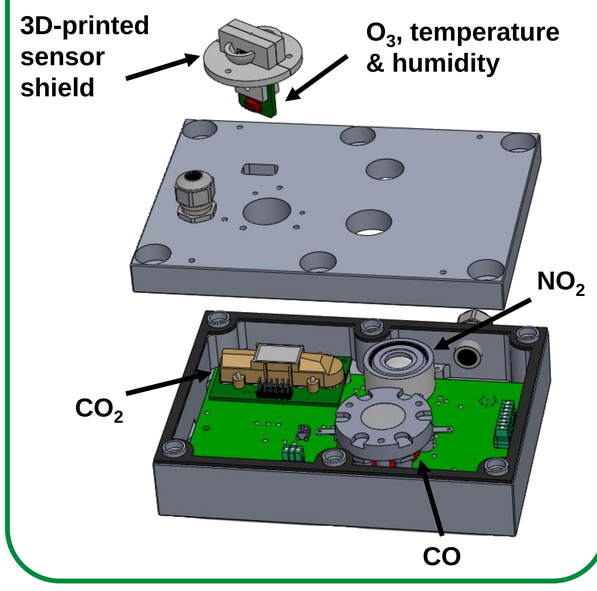
eVehicle-anchored node (100% electric):

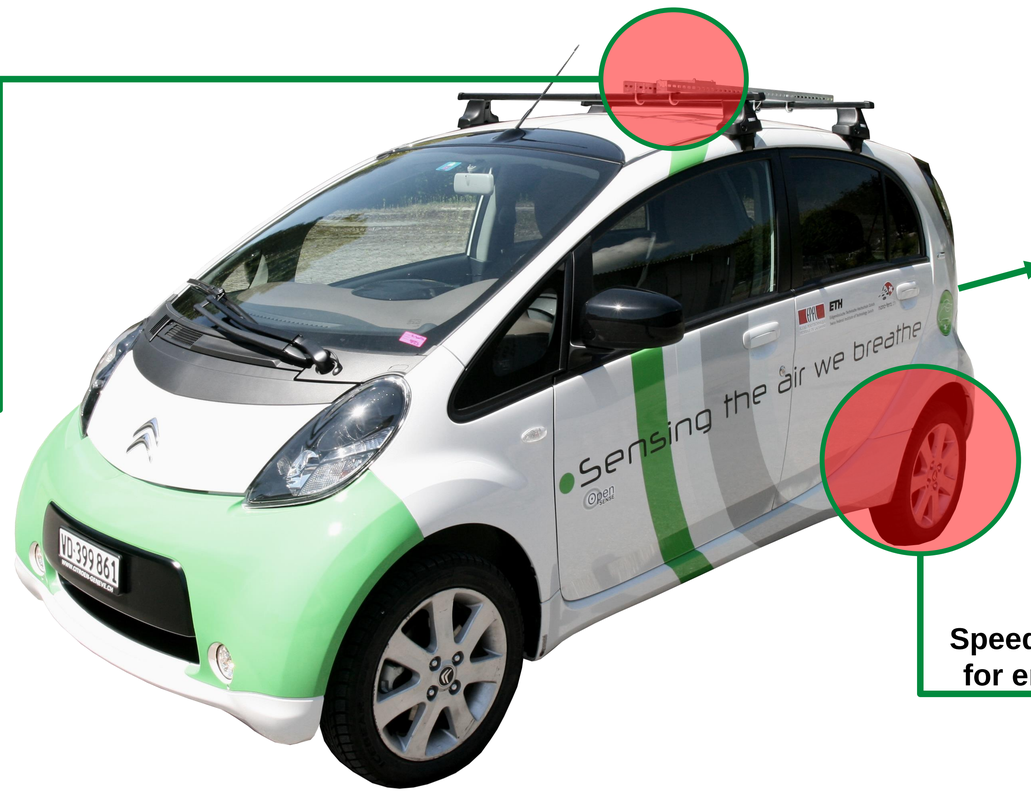
- dedicated OpenSense resource
- clean platform – **no self contamination of measurements**
- planned or system-directed mobility
- trajectories constrained only by road network

Flexible mobility – all areas accessible by car in a city can be reached

The Platform

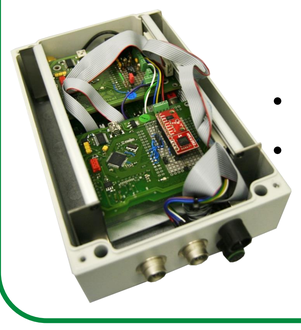
Exploded view of current passive sensor-box





Data-logger & enhanced localization module

- built around **automotive CAN bus**
- GPRS **uplink & local storage**
- **fused GPS + dead-reckoning** (speed-pulse & gyro)
- 3-axis **accelerometer**
- public transport **vehicle context** (using bus simulator)



Speed-pulse signal needed for enhanced localization

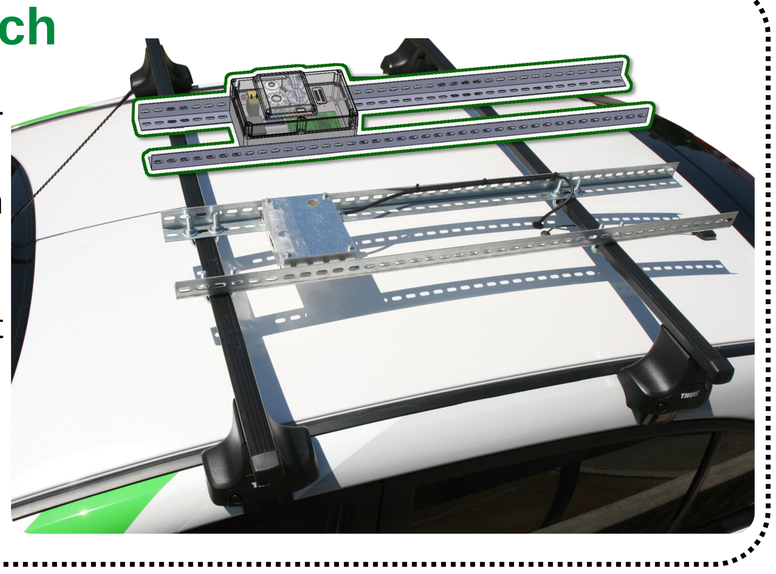
Citroën C-Zero electric car – donated by the EPFL Transportation Center in collaboration with Citroën Switzerland

System Test-bench

A **common platform** for testing in parallel:

- passive vs. active, open vs. closed gas sampling
- wind sensing
- evaluation of different localization methods

Current passive sampler in parallel with active sampler (in development)



OpenSense "Super-node"

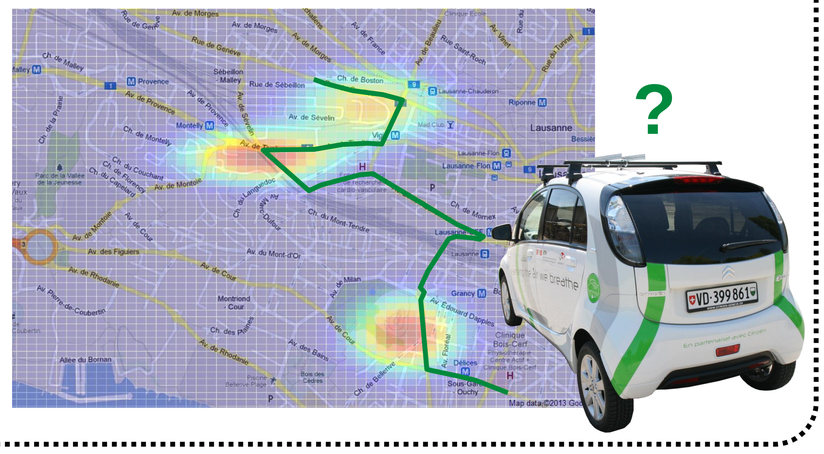
Sensor Calibration

On the fly calibration of bus-anchored nodes

Regular drives by NABEL station to ensure calibration of eVehicle sensors

Decreasing Uncertainty

In the longer run, an automatic **navigator for decreasing the uncertainty** of the air pollution estimation model



Targeted Investigation Tool

Go **beyond public transport mobility** constraints:

- measuring in otherwise unreachable areas
- increasing sample rate on particular links
- stop/measure/go scenarios

Areas in Lausanne unreachable through bus-anchored nodes