IDEA

http://www.idea-project.be

Intelligent
Distributed
Environmental
Assessment

There is a growing concern about the impact of **environmental stressors** on the quality of life and the health of people. To assess these, detailed **local measurements** are often essential.

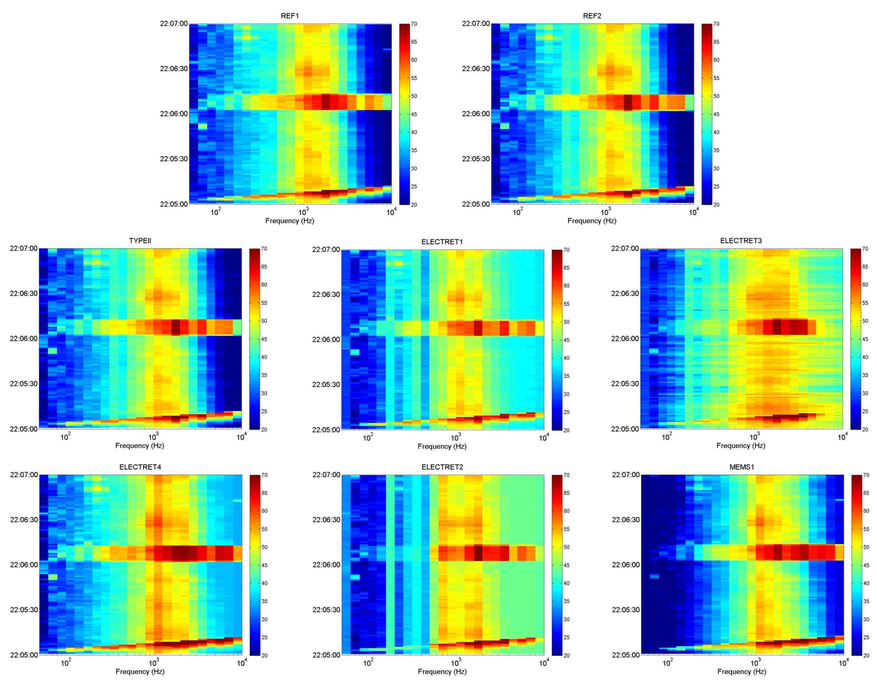
The IDEA project focusses in particular on **traffic-related environmental stressors** that have a very **local character** such as **(ultra) fine particulate matter** and **noise**. The spatial extent and temporal detail obtained by most measurement networks today is insufficient to meet these local demands and the cost for further extension of "classical" measurement networks is high.

An important goal of IDEA is to develop an **extensive measurement network** of less performant (and thus much **cheaper**) **sensors** that makes use of bio-inspired **intelligent** systems to reduce the loss of quality of global data. Increasing bandwith and coverage of **computer networks** as well as **distributed computing** systems allow extended analyses. Functionalities of interest are improved interpolation, source identification, creating reliable alarms, and feeding models for short term prediction.

Sensors

The search for **adequate but affordable** microphones and air quality sensors is an important task within the IDEA project. The availability of cheap sensors is an important prerequisite to come to the application of such **extensive** monitoring networks. On- and off-shelf sensors were thoroughly **tested**, both in controlled **labo** conditions and in realistic **outdoor** environments.

Microphone testing set-up outdoors



Simultaneous time-frequency plots at all tested microphones during the emission of a frequency sweep and pink noise by the outdoor loudspeaker

Project partners

UNIVERSITEIT GENT · INTEC · KERMIT · vito vision on technology · ERASMUS HOGESCHOOL BRUSSEL · VERHAERT

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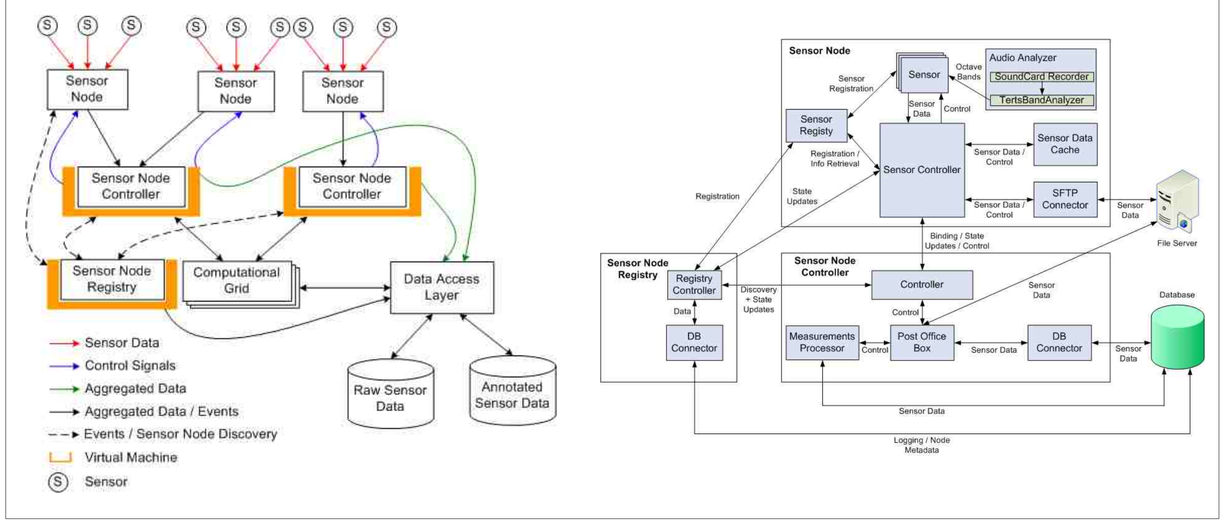
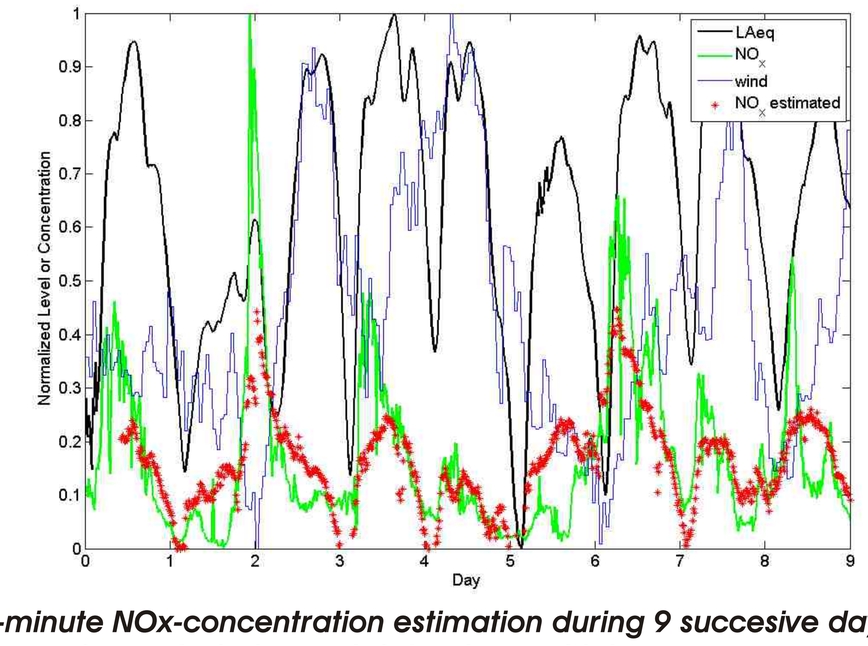
Network architecture

In order to fulfill the goals of IDEA, a **flexible** network architecture was designed. **Distributed computing** (load balancing) is an important aspect, since computational power is needed at various locations within the network. At each sensor node, Single Board Computers (SBC) are used to perform basic sensor processing. **Robustness** of the architecture is of main concern and data loss should be minimized during network failure. Furthermore, **plug-and-measure** is an important goal.



Adding intelligence

In IDEA, intelligence will be added to the network at **different levels**. In a first stage, it should help keeping the measurement network **operational**. An important task will be an early and automatic **detection of bad sensors**, by time series analysis or by cross-checking with nearby (high-quality) sensors.
In a second stage, the availability of both noise levels and air pollutant concentrations should help **interpolation** of data in between nodes. **Proxies** could be used to estimate expensive-to-measure pollutants. The underlying assumption for these is that air and noise emissions share the same dominant source (road traffic).
At a higher level, intelligence opens the way to various **applications** going beyond simply presenting measured data. **Source recognition** of strong polluters and **traffic steering** is of interest.



15-minute NOx-concentration estimation during 9 succesive days by using noise and wind speed data along a highway