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 bandwidth and coverage of computer networks as well as distributed computing systems allow extended analyses. Functionality 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.

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 sensors. 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.

Project partners

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