

## Environmental Quality Demonstrator

Written by Administrator

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City environment monitoring is a continuous endeavor in many world cities. The monitoring is mostly developed for the air quality assessment, but latest efforts consider the environment impact on the living conditions as a whole, including electromagnetic and light radiations and acoustic noise level.

Besides the ongoing scientific-quality measurement activities, a growing number of low cost and distributed solutions are experimented trying to compensate for the lack of spatial distribution and to provide the city managers and the public at large with the data they need to make more informed decisions for improving the environment quality or avoid health risks.

While polluting less certainly helps the environment, more viable and less economically adverse solutions can be implemented, but require a deeper understanding of the causality and dynamics involved. The low cost and maintenance, scalability and versatility of the WSN-based system proposed addresses both the large as the small cities' and towns' needs. Also, providing health risk level to the general population can help avoid health issues, further improving the living conditions and the cost of health assistance required.

The system will be developed for ease of use and maintenance. The modular construction will allow to both add sensors to an existing node as well as to add nodes to an existing network so that the end user to be able to scale up and upgrade the system as needed. Also the user interface to acquired field data should be easy to access and understand and provide easy to enable and configure notification options

This demonstrator will provide a WSN-based system for a comprehensive and fine spatial grain real-time monitoring of city-wide pollution levels for air quality, acoustic noise, light and electromagnetic radiations. Although the single WSN nodes provide less accuracy than the currently used fixed stations, the WSN data as a whole is more reliable and is able to cover the whole city with a spatial grid that can be refined as needed.

The WSN-based system will be able to accurately capture area-wide dynamics in real time and further process the field data with specialized algorithms on the application server itself or allow for post-processing in specialized labs to establish the correlations between different types and levels of pollution and city activities or weather conditions.

Download brochure [here](#) - *Coming soon*

## Location

The EQ demonstrator consists of an administrative WSN network allowing real time monitoring of environmental parameters. The installation will be done in the city of Pisa in the suburban [area of Montacchiello](#)

## Context

The distribution, the number and the type of sensors, have to be in agreement with the local authorities.

In this context, the types of parameters to extract and the area to monitor have to be significant for the environmental analysis. Depending on these constraints and according to the cost and the covered area we expect to deploy between 10 and 20 nodes

The WSN-based system will be able to capture parameters necessary to provide dynamics of supervised area. These parameters are used for real time analysis to be processed by the application server, or collected to be post-processed in other labs and compared with different types of reference scenario for pollution or other activities.

Even if the WSN data are less accurate than current fixed stations for environmental parameter analysis, the low costs and modularity make the whole WSN data more reliable and customizable in terms of dimension of the covered region and of information granularity.

## Capabilities

The demonstrator offers the following features:

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- Collection of geo-located data in real time
- Consists of independent nodes capable of measuring different parameters such as: air quality (CO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, etc.), noise levels, light conditions, and temperature fingerprints
- Full coverage of the deployment area selected in the municipality of Pisa
- An application server for storage and processing of data
- An intuitive user interface accessible through the browser for authenticated users
- Interactive notification alert on a web browser interface.
- Displaying of data on different formats: interactive on maps, using logs or showing graphs
  
- Self-powered nodes with rechargeable batteries through solar cells.

## System benefits

- This product could be a good compromise in term of cost and results with the current analysis systems.
  
- In addition it should be considered a good equipment to monitor the environmental conditions and quality and to foresee proper structural or temporary alternatives.
  
- This WSN-based system is very resilient in relation to the WSN characteristics of spatial distribution and redundancy. For these reasons a small failure have a small impact on measurements accuracy
  
- The demonstrator will use commercial nodes and sensors. Thanks to the low-cost hardware, the little need for maintenance, easy connections (power and network independent) and great modularity of the system, we expect to be able to use this WSN system in other cities or different scenarios (e.g. rural areas or areas of crops)