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AIRQino Low cost air quality monitor

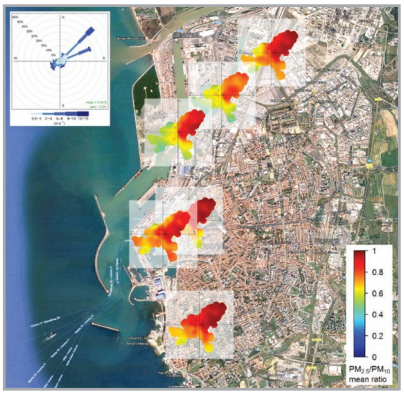
Air pollution, especially in urban areas, has become of paramount importance after the industrial revolution and the growing amount of population living in cities compared to rural areas. Environmental regulations foresee a number of reference monitoring stations to evaluate airborne pollutants levels across wide urban areas. Unfortunately, due to the extremely high-cost of said stations, only few of them can be deployed, making the interpolation of pollution information across the wide area difficult and potentially missing some specific spatio-temporal features of the airborne pollution's daily trends. The AIRQino sensor boards have been designed with this in mind. While they are by no means a substitution to the regulatory stations, they can greatly enhance and complement their measurements. Being inexpensive and rugged, the AIRQino monitoring stations can be deployed in high numbers across the whole urban area and thanks to their web-enabled capabilities they can provide information about air pollution at a greatly resoluted spatial mesh and in real-time.

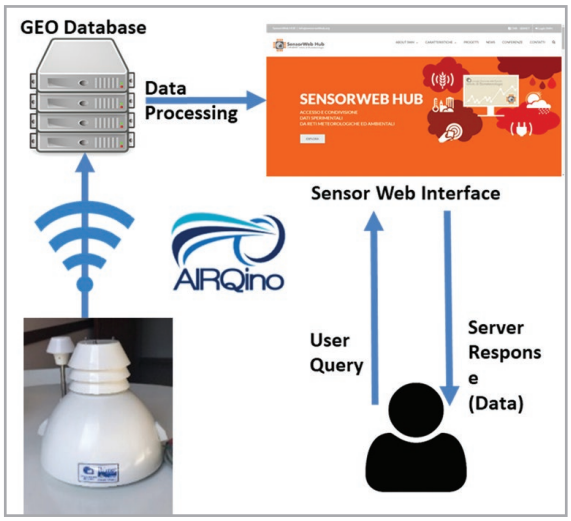
The alternative solutions compute the traffic flow reconstruction from data collected from traffic flow sensors, which are scattered in the city. They are typically located on the crossroads and/or along the major roads segments.

AIRQino® is a complete air quality sensors board equipped with a set of industrial SMD sensors. The board is Arduino Shield compatible, integrated with low cost and high resolution sensors, dedicated to monitoring the environmental parameters and air quality pollutants (Humidity, Temperature, CO, CO2, O3, NO2, VOC, PM2.5, PM10) in urban environment. The board integrates a microprocessor unit (MCU) that acquires all the sensors installed and packages collected data for transmission.

The AIRQino boards deploys a variety of different sensing elements that monitor different pollutants. These elements are based on different technologies. The gases monitored by AIRQino sensor board include also reactive gases, the air-flow inside the waterproof box is designed to minimize the gas interference. A small brushless fan blow air out the box. This create a depression that attract air from the inlet window.

The AIRQino MCU is linked to a GPRS shield that enables it to transmit data using the GPRS protocol to a dedicated web server. This enables the AIRQino to transmit all of its data whenever and wherever there is cellular signal coverage and do it in real time each time the sensors record a measurement. CNR IBIMET has built a dedicated infrastructure for the AIRQino transmitted data (figure 2). It is composed by: a central Geo Database for data storage and management; a GIS engine; a web application for viewing, querying and performing analysis. The interoperability of this system is guaranteed because all its components are based on the Open Data approach and open source services and follow the INSPIRE, OGC (Open Geospatial Consortium) directives and standards. This infrastructure allows to easily store, visualize and download AIRQino data. The interface is designed following Internet browsers specifications allowing the visualization of collected data in different formats and it can be customised and integrated in different IT systems. This potentially enables high-tech smart cities applications: if high levels of pollutant are detected, for example, the smart city infrastructure could respond by diverting traffic from certain areas or emit warnings on smartphones running a dedicated app.





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