



## **A low cost Mobile Network System for monitoring climate and air quality of urban areas at high resolution: a preliminary application in Florence (IT) metropolitan area**

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The combination of the “Heat island effect” coupled with higher frequencies of extreme events (e.g. heat waves) due to climate change is of great concern for human health in urban areas. Anomalies of summer 2003, mentioned as possible typical climate for the near future summers (Schär et al., 2004), caused about 7,000 deaths in Italy and over 35,000 in the whole Europe. Furthermore, more than 50% of world’s population is living in urban areas and, given the unprecedented urbanization rate that is expected in the next future, cities will likely be exposed to a growing environmental pressure in the following decades. Accordingly, climate monitoring of urban areas is gradually becoming a key element of planning that cannot be disregarded for an efficient public health management and for the development of a city scale Heat Waves Warning System tool, which is based on meteorological forecast of both air temperatures and humidity at a synoptic scale (Pascal et al., 2006).

Building on these premises, a low cost Mobile Weather Station (MWS), to be placed on urban public transport, has been assembled. This mobile station logs every minute both meteorological variables (i.e. temperature and air humidity) and air quality parameters (i.e. atmospheric CO<sub>2</sub> concentration and noise detection); the geographical position of each MWS’s measurement is also recorded thanks to the built-in GPS antenna. The system, equipped with a data logger for data storage based on the open-source hardware platform Arduino, can also transmit data in real time via GPRS.

The quality of meteorological and environmental data acquired by MWS was evaluated both on pre-existing steady meteorological stations of the metropolitan area of Florence (Petralli et al., 2010), and on professional research-grade data logger (Campbell CR800), logging air temperature in a non-aspirated shield by means of sensors at fast (thermocouple) and slower (digital) time response.

Two prototypes of stations were thus designed specifically for buses or tramways and four MWSs were then installed on Florence public transport means (tramways and buses); the system is designed either to log further pollution parameters (i.e. fine particles) and to be extended to other Florence mobile vectors in order to get high resolution maps (in space and time) of meteo/environmental variables in the urban area. Coupling spatial distribution of the extreme events with information regarding those areas frequented by individuals more sensitive to climate extremes (e.g. elder people and children), prompt countermeasures (e.g. pre-warning of the nearest sanitary structures) could be timely taken.

### References:

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