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PERSONALIZING AIR POLLUTION EXPOSURE ESTIMATES USING LOW-COST SENSORS AND DATA FUSION TECHNIQUES

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ABSTRACT

Air pollution is ubiquitous and assessing its health effects requires accurate monitoring of human exposure. The traditional method of assessing human exposure is to estimate population-wide annual (long-term) or daily (short term) average exposure concentrations, using fixed monitoring networks and air quality models.

This type of assessment, operating on aggregated data does not provide a representative measure of an individual's personal exposure as it assumes exposure of individuals to the air pollution levels at their residential address and ignores the impact of individual mobility and activity patterns, especially time spent away from home. Low-cost air quality sensors have significant potential for providing estimates of personal exposure to air pollutants. We discuss two different approaches in which low-cost sensors for air quality can be used towards providing personal exposure and dose estimates along a user-specified path in an urban environment. The first approach represents a direct exposure where the subject is carrying a low-cost air quality sensor while moving through the environment, for example on foot or by bicycle [1]. The second approach is an indirect exposure estimation by integrating over a user-specified path with the concentration information derived from real-time air quality maps produced by data fusion techniques using low-cost air quality sensors and model information [2]. Users can then consult their individual exposure to air pollution in near real time using a mobile phone application. This information can help users adopt changes to their daily routines to reduce exposure to air pollution.

References:

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[2] Lahoz, W. A. and Schneider, P. (2014): Data assimilation: making sense of Earth Observation, Front. Environ. Sci., 2(16), 1–28, doi:10.3389/fenvs.2014.00016, 2014.