Developing a Modular Array of Environmental Sensors for Epidemiological Investigations of Pediatric Asthma

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New York Citizens are under increased exposure to Black Carbon (BC), Particulate Matter ($PM_{2.5}$), and Poly-Aromatic Cyclic Hydrocarbons (PAH) originated from anthropogenic combustion of diesel, densely accumulated in the most transited highways of the city. A set of air monitors were acquired to detect gases and particles through various wavelengths, and samples were collected on Teflon filters through outside and residential sampling. To solve for issues of subject compliance when wearing the devices, real-time assistance of a Smart Watch connected to an Air Monitor was tested to prove the effectiveness of two firmwares (MAxv1_07-c10 and MAxv1_07-c10) that can detect air monitor movement and usage. An Aethalometer unit was used to test the measurement of Polyaromatic Cyclic Hydrocarbons (PAH) in comparison to the particulate loading from a Manhattan apartment by extracting organic compounds from Teflon filters, and identifying compounds through mass spectrometry such as Pyrene, Chrysene, B[a]A, B[b]F and B[k]F. The obtained results from these experiments were: 1) Validating a fully functional firmware (MAxv1_07-c09) that can track air monitor movement, alert the subject, and motivate continuous usage of the device for subject compliance; and 2) Aethalometer data from a Manhattan apartment gives no indication of a possibility that a MicroAETH air monitor can be used to accurately measure PAH compounds through mass-spectrometry.