HOW TO GET AWAY WITH MONITORING:

Lessons learned from conceptualization and construction of a low-cost and self-made device for monitoring of particulate matter

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CONSTRUCTION

A monitoring device (P.ALP) for $PM_{2.5}$, was successfully conceptualized, designed, and implemented using **low-cost sensors and technologies** *(and tarting from almost no knowledge about)*.

FEATURES:

- Low-cost (about $120)
- Low power consumption
- High temporal resolution
- Miniaturized/portable
- Open access software
- R codes are freely used for data analyses

highly customizable device

allows selection of data format and descriptive statistics of interest

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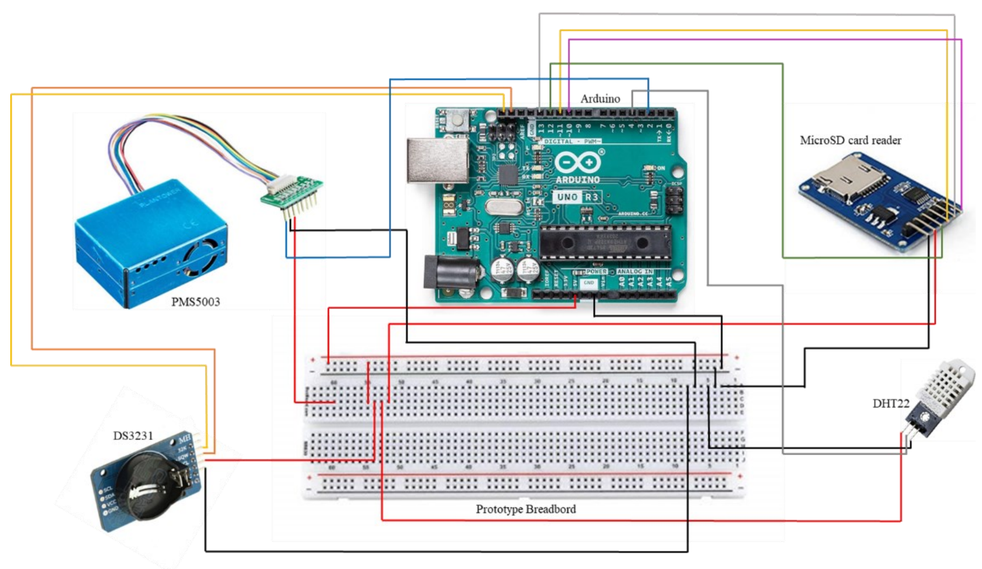
IN-CHAMBER EVALUATION

- P.ALP needs to be **calibrated** to improve its performance.
- P.ALP is able to follow the **concentrations trends with reasonable accuracy** even without any post-correction factor application.
- P.ALP can be improved and adopted in a very wide range of **applications** and **study designs**.

e.g. applications in sensor networks



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IN-FIELD EVALUATION

- The P.ALP, is able to follow $PM_{2.5}$ concentration **trends** with reasonable accuracy in different microenvironments.
- P.ALP performs differently depending on the **microenvironment** in which P.ALP was tested and on the $PM_{2.5}$ concentrations.

The devices can monitor the $PM_{2.5}$ variations with acceptable results but the performance can't be considered satisfying at very low and very high $PM_{2.5}$ concentrations

One of the main characteristics of the P.ALP is its **adaptability** to a very wide range of applications and study designs - thanks to its **open-source concept.**

The reduced **dimensions**, the **cost**, the very low **power consumption**, and the high **spatiotemporal resolution** of the data provided, makes the P.ALP device a **promising instrument** to improve exposure assessment studies both in environmental and occupational settings.

The P.ALP purpose it's not to replace reference-grade direct reading instruments, but it should be paired with these latter aiming to provide more data that could raise their spatio-temporal resolution and provide a wider amount of useful information with reasonable budgets.

Results from both the in-lab and in-field evaluations, outlined that the P.ALP could measure **temporal concentration trends** of $PM_{2.5}$ Ensuring sufficiently reliable performance - if compared to (more expensive) reference instrumentation.

Calibration factors are needed to improve the P.ALP's performance, especially in terms of accuracy.

P.ALP PROJECT

Curious to get some more details?

All materials related to the P.ALP project are available OPEN ACCESS and collected at this link

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QUESTIONS, COMMENTS, SUGGESTIONS and TIPS are more than welcome: Just stick a note here with your notes!