

Supplementary Materials:

Liliana Velea ^{1,2,3}, Mihaela Tinca Udriștioiu ^{2,4,*}, Silvia Puiu ⁵, Radu Motișan ⁶ and Dragos Amarie ⁴

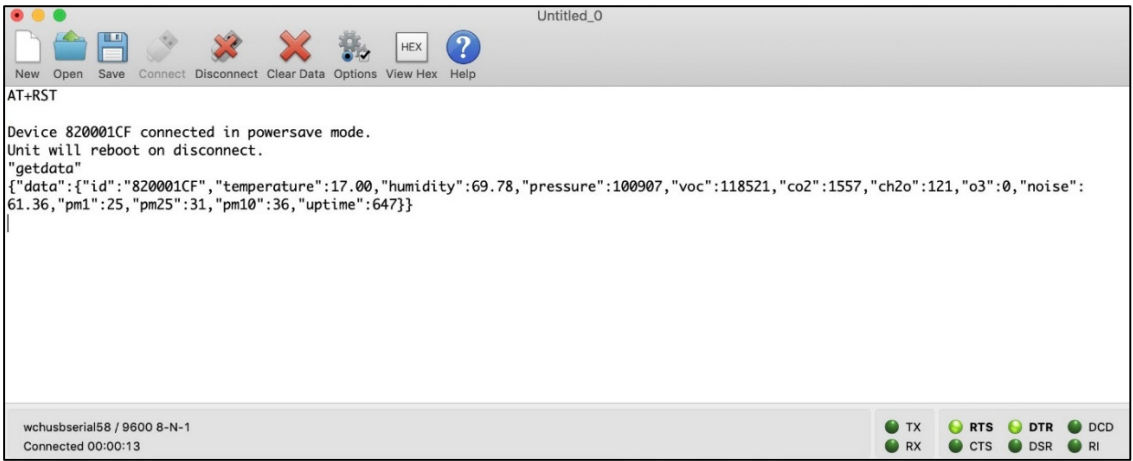


Figure S1. Local vs. decentralized data access data via a USB cable on uRADMonitor® sensors.

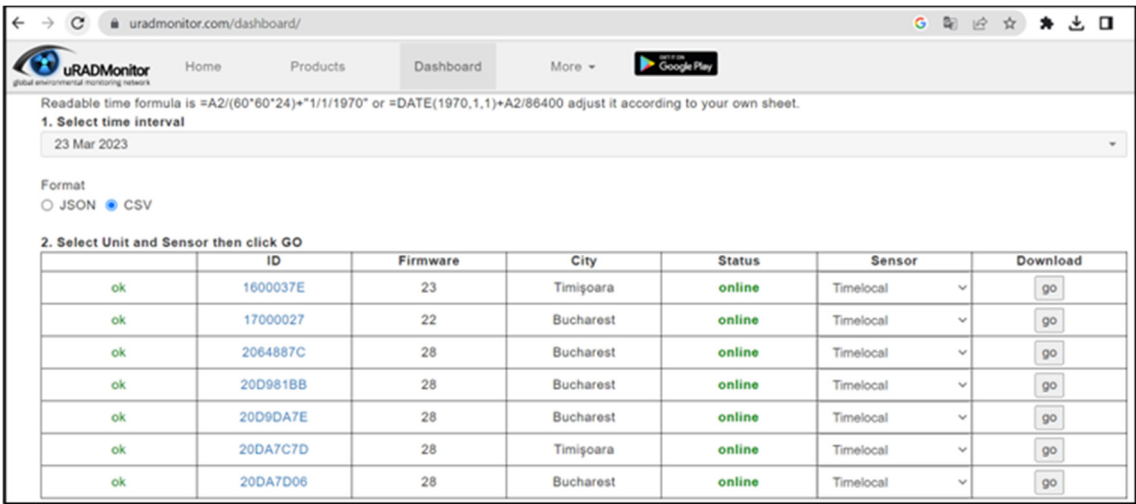


Figure S2. Example of the Dashboard Data download options as .json and .csv file format.



Figure S3. uRADMonitor® Mobile App for sensor data visualization.

The *Community Air Sensor Network* (CAIRSENSE) is a global network of air quality sensors installed and maintained by community groups. Their project empowers

communities to monitor air quality and advocate for policy changes. [25, same reference as in the main article]

The *Smart Citizen*® network is an international community-driven platform for monitoring environmental data using low-cost IoT sensors. It received funding from the European Community's H2020 Programme under Grant Agreement No. 689954. The platform enables individuals and communities to monitor air quality, noise pollution, temperature, and humidity in their areas. [26]

The Public Laboratory for Open Technology and Science, or the *Public Lab* network, is a community-driven platform for environmental monitoring using DIY sensors founded in the wake of the 2010 BP oil disaster - the largest oil spill in US history, during an information blackout for residents and the rest of the world. The platform provides tools and resources for individuals and groups to build their own environmental monitoring devices and share data with others. [27–28]

The *Eye on Earth* initiative is a global network of environmental data contributed by governments, organizations, and individuals and endorsed by the European Environment Agency (EEA). This initiative uses the principles of a Shared Environmental Information System (SEIS) for Europe. The network includes data on air quality, water quality, biodiversity, and other environmental indicators. [29]

The *Global Learning and Observations to Benefit the Environment* (GLOBE) Program, started in 1994, is a worldwide network of students, teachers, and scientists who collaborate to monitor and collect data on environmental conditions using IoT sensors. The program gathers climate, land cover, and water quality data. [30]

The *HabitatMap*© was started in 2006 by Brooklyn activists with a shared interest in developing a technology to address the health concerns in the surrounding Brooklyn and Queens boroughs of New York City. In 2011 they launched AirCasting, an open-source environmental data visualization platform. In 2015 they rolled out AirBeam, a palm-sized companion air-quality instrument. HabitatMap allows individuals to monitor air quality in real-time and create maps that show air quality data across a city or region. [31]

The *Imperial County Community Air Monitoring Project* is a collaborative group of communities and academic, non-governmental, and government partners designed to fill the need for more detailed data on particulate matter in an area that often exceeds air quality standards. [32–33]

The *Citizen Weather Observer Program* (CWOP) is a volunteer-based network allowing individuals to own a personal weather station and share their station's live data with the National Weather Service, emergency managers, wildland firefighters, and Universities worldwide. Meteorologists use the data to improve weather forecasting and understanding of climate change. [34]

Technical information

The Accuracy Lab Test and Certification [45] from the *National Research and Development Institute for Industrial Ecology* used two Sven Leckel LVS3 aerosol measurement samplers. The difference between the particulate matter concentration PM10 determined by the reference method and our sensors was assessed by the Pearson correlation coefficients for trueness error ($r_{PM10} = 0.85 - 0.88$) and classified as "a very good direct correlation for PM10 ... on the tested concentration range, when the concentration of particulate matter grows, same does the error of trueness."

The Field Evaluation of the MagnasciSRL uRADMonitor [45] from the *Air Quality Sensor Performance Evaluation Center* used MetOneBAM, GRIMM, and Teledyne API T640 reference instruments. It was concluded that: "*The three uRADMonitorA3 sensors' data recovery ... is 99.9%, 81.6%, and 99.9%, respectively, for all PM fractions.... PM10 mass concentration measurements measured by uRADMonitor A3 sensors do not correlate with the corresponding GRIMM, FEM BAM, and T640 ($R^2 \sim 0.15, 0.20, \text{ and } 0.38$, respectively, 1-hr mean) and underestimate PM10 mass concentration measured by the reference instruments. [However,...] No sensor calibration was performed by SCAQMD Staff prior to the beginning of this test.*"

After making the sensors, the manufacturer benchmarks them against a reference sensor. Calibration graphs are produced. For automated systems like uRADmonitor sensors, the calibration is embedded in the equipment's software, as the three evaluation labs recommended. In conclusion, any pollution episode recorded by our sensors is even more dramatic in reality.