Temperature, Relative Humidity, Particulate matter (PM1.0, PM2.5, PM10)

Features

- 2 high quality sensors tracking 5 air parameters
- Particulate Matter laser scattering counter
- Open source hardware & software
- Arduino compatible
- Integrated WiFi Internet connectivity
- USB port for power, debug and configuration
- Built-in air pump for active flow
- Direct and Cloud data access via API
- IOT / Internet of Things
- Low power consumption
- Ultra low cost

Applications

- Low cost Automated Monitoring
- Home monitoring
- Citizen science
- Smart Cities

Description

The traditional balance between performance and cost is a thing of the past with the new uRADMonitor SMOGGIE device, designed for mass deployment to generate block level particulate matter readings. The "Smoggie" is a smog fighter with it high performance Particulate Matter sensor that uses laser scattering to count the individual particles.

With the built in Wifi Connectivity, the device will report all measurements to the uRADMonitor servers.

It is an ultra low cost device, where all its building blocks have been cost optimised except for one: its quality.

The design is open source, with complete hardware and software details publicly available on Github. It comes pre-programmed, but further modifications on its software are possible using Arduino. By default, all measurements are sent to the uRADMonitor servers, and are accessible with the API or can be viewed online. This makes it convenient for the classroom, for workshops or citizen science projects.

The uRADMonitor network is a global array of interconnected monitoring stations, focused on continuous Environmental Surveillance. Its purpose is to generate fully transparent open data, used to assert the quality of our environment. The uRADMonitor SMOGGIE data is accessible in real time via an API interface directly from the uRADMonitor cloud.

Sensors

The uRADMonitor SMOGGIE is designed as an ultra low cost IOT Environmental detector with a high precision Particulate Matter PM2.5 laser scattering sensor and a MEMs sensor for temperature and humidity. A built in fan assures an active air flow stream across the sensing elements. The device connects to your wireless Internet Router via WiFi, to send the readings online.

Sensor	Parameter	Minimum value	Maximum value	Absolute Accuracy
MEMS	Temperature	-40 °C	+85 °C	± 1°C
	Humidity	0% RH	100% RH	± 2 %
Laser Scattering	PM1.0 PM2.5 PM10	0 µg/m³	1000 µg/m³	± 5 %

Specification

| Parameter	uRADMonitor AIR
Internet connection	WLAN connectivity to WiFi Internet Router
Standards	WLAN 2.4GHz IEEE 802.11 b/g/n
Wireless frequencies	2.400–2.4835 GHz ISM band
Chip	Espressif esp8266
Modem certifications	CE, FCC
Size and weight	70x42x47 mm (length / width / height) , 95grams
Enclosure Protection	IP65
Power Supply parameters	micro USB 5V / 500mA . Max unit consumption 1 W
Recommended Use Ratings	Temperature: -20°C to +65°C Humidity: 0RH to 95RH

uRADMonitor SMOGGIE connected via a Micro USB Cable

Usage guide

- **Installing the unit**

For mounting, use the two holes in the bottom of the housing bracket. Ensure that you properly connect the power cord and secure it against vibration where necessary. Screw carefully because the case is brittle. Distance between the center of the holes is 58 mm. Use two M2 / 30mm screws.
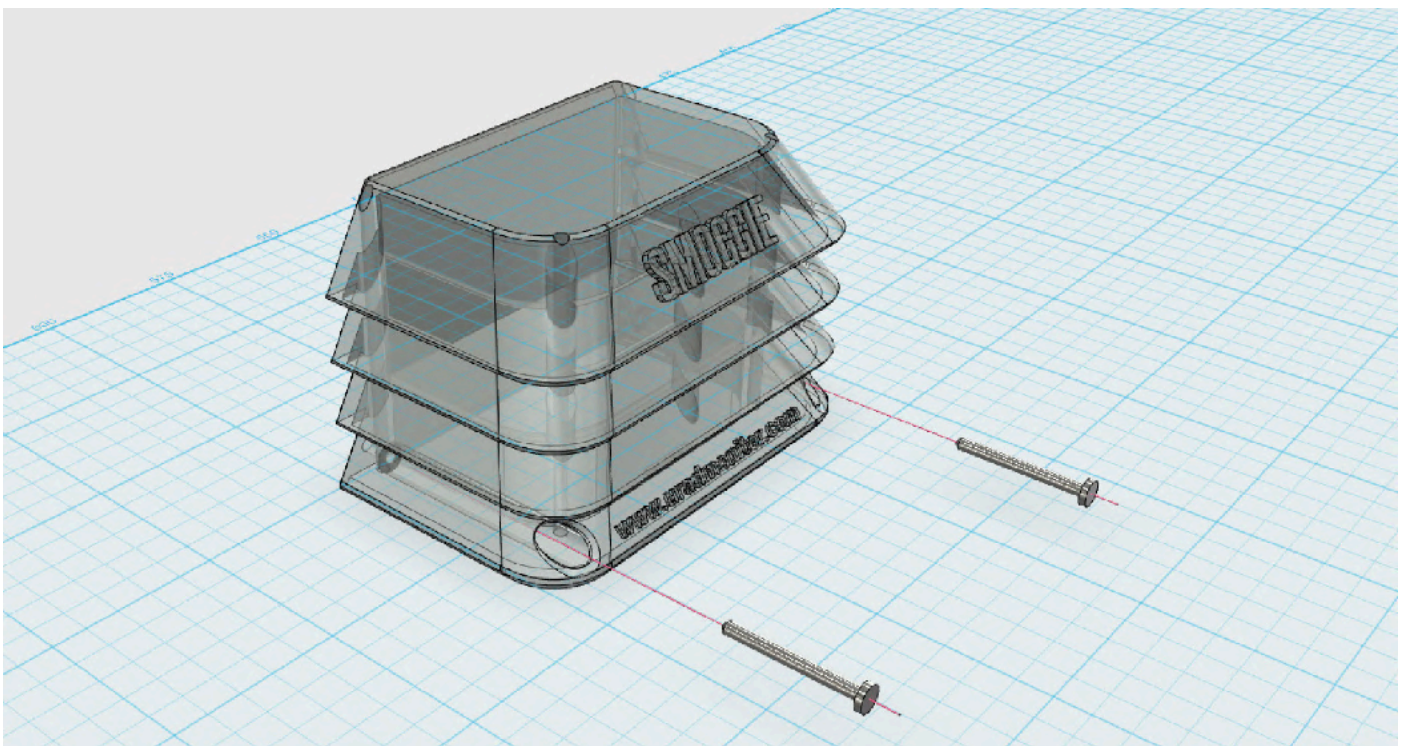
- **Power supply**

The SMOGGIE uses a standard micro USB connector that is used to power the unit with a regular phone charger. The unit takes 5V to run.

- **Outdoor use and exposure to elements**

The unit comes in a plastic enclosure that protects the sensitive electronics from the elements. It can be directly installed outdoors. Make sure the USB connector faces down, so no rain can get inside. Do not cover the air circulation holes.

- **Precautions**

Do not expose the device to a large amount of dust such as in the woodworking centers. Do not expose theappliance to solvents or to a large amount of concentrated vapors of chemicals (acetone, paints, alcohol, butane, propane, etc.), because the sensors can wear out, or the measurements may become inconclusive. Do not expose the apparatus to mechanical shocks. Wherever possible, mount the appliance in a vertical position to extend the life of the built-in fan mechanisms.

- **Warranty**

uRADMonitor SMOGGIE is covered by a 12 months warranty for any defects in material or workmanship, under normal use.

Data access

uRADMonitor is designed for easy and open data access. The SMOGGIE device only needs to be connected to the power supply and to the WIFI network and the data will be immediately available - here's dashboard-04:
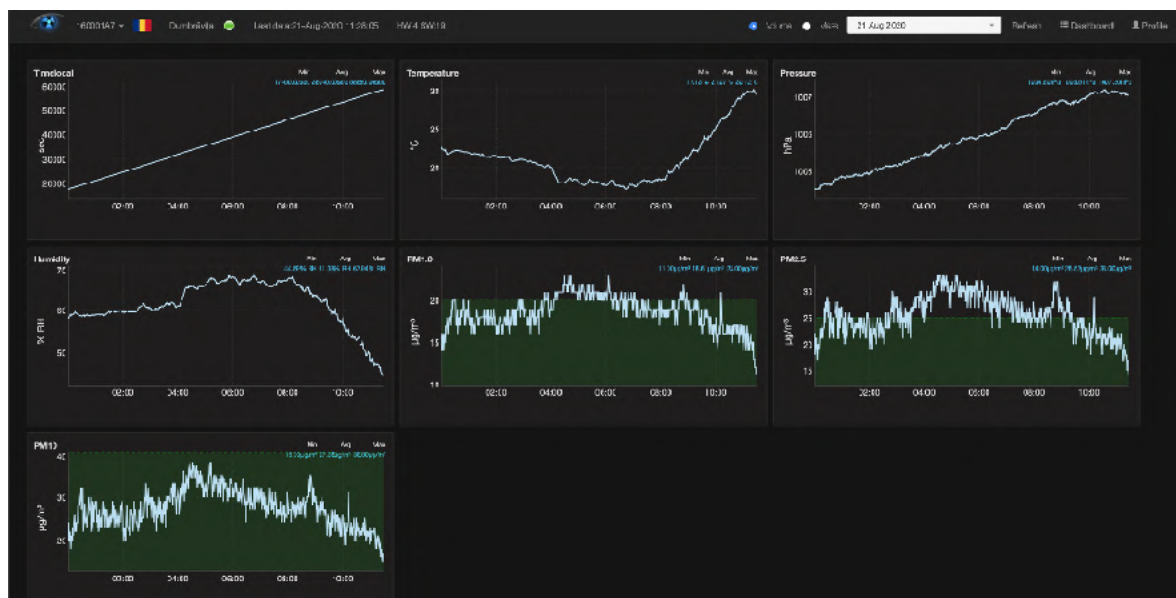
The data sets can be accessed directly, for display in third-party software applications, for integration with other systems (Home Assistant, Alexa, etc.) or for display on information panels - uRADMonitor unit installed in Bucharest:

The data can be accessed in two ways:

- **Local access**

Applies where the uRADMonitor unit is part of a LAN network. The uRADMonitor unit serves an internal webpage accessible via port 80. To access the content open the unit's IP in your LAN network on a computer or a phone. The webpage served is as follows:

The JSON link points to a JSON formatted data source, that can be polled periodically to access the uRADMonitor unit readings. As this is done directly by connecting to the uRADMonitor unit, the server compensation layer is not used, so you would receive the raw readings. This is not the preferred way, and additional compensation must be

implemented (eg. Temperature offset to compensate for internal heating, other corrections, etc). This functionality is offered rather for debugging and decentralized operation in critical situations such as server failure or malfunction.

- **Data access via the Server RESTful API**

This is the preferred data access method. REST API does not require the client to know anything about the structure of the API. Rather, the server needs to provide whatever information the client needs to interact with the service. An HTML form is an example of this: The server specifies the location of the resource, and the required fields. The browser doesn't know in advance where to submit the information, and it doesn't know in advance what information to submit. Both forms of information are entirely supplied by the server. Lookups should use GET requests. PUT, POST, and DELETE requests should be used for creation, mutation, and deletion.

The API is called for both directions of data transfer (upload and download). The uRADMonitor devices use the API to upload their measurements to the server, for further processing and storage in the database. The API is then used to access data by the frontend, the mobile app or third party systems that need the uRADMonitor data.

To use the API, please refer to the dedicated manual:
https://www.uradmonitor.com/api
https://www.uradmonitor.com/dashboard/

For questions regarding the use of the API you can contact us at support@uradmonitor.com

The use of uRADMonitor devices and the data sets generated by them can only be done in compliance with the general terms of use (TOS) presented on our website.

Health impact

Many of the parameters measured by Model SMOGGIE can have a negative health impact, ranging from simple allergies to various cancers. Therefore the device gathers valuable data on the quality of our environment.
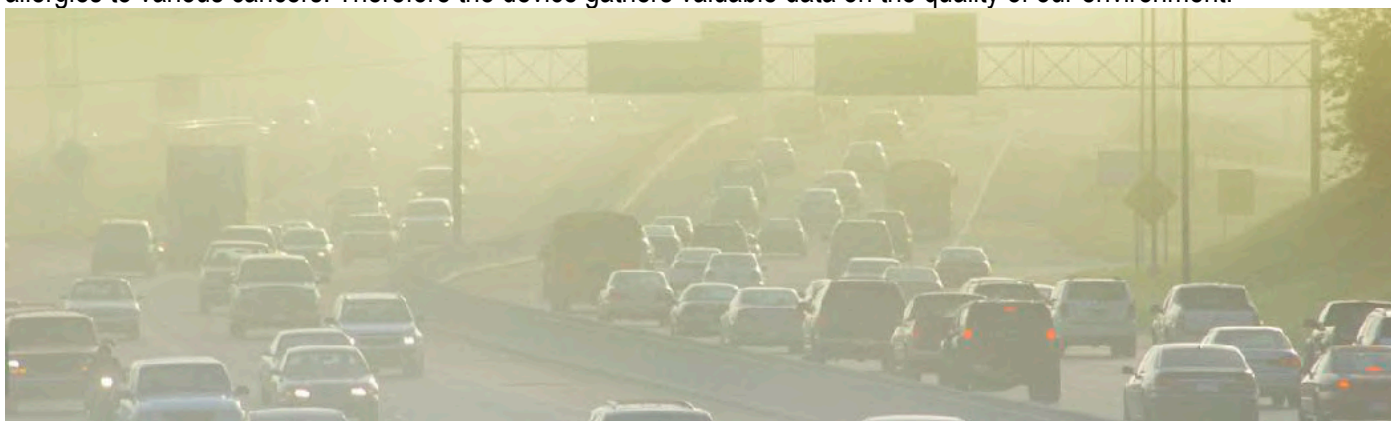
Particulate matter PM2.5 refers to small particles with a diameter of up to 2.5 microns. These particles can penetrate deep into the lungs , causing allergies, respiratory and cardiovascular diseases [1]

[1] Health and Environmental Effects of Particulate Matter (PM), US Environmental Protection Agency