uRADMonitor SMOGGIE
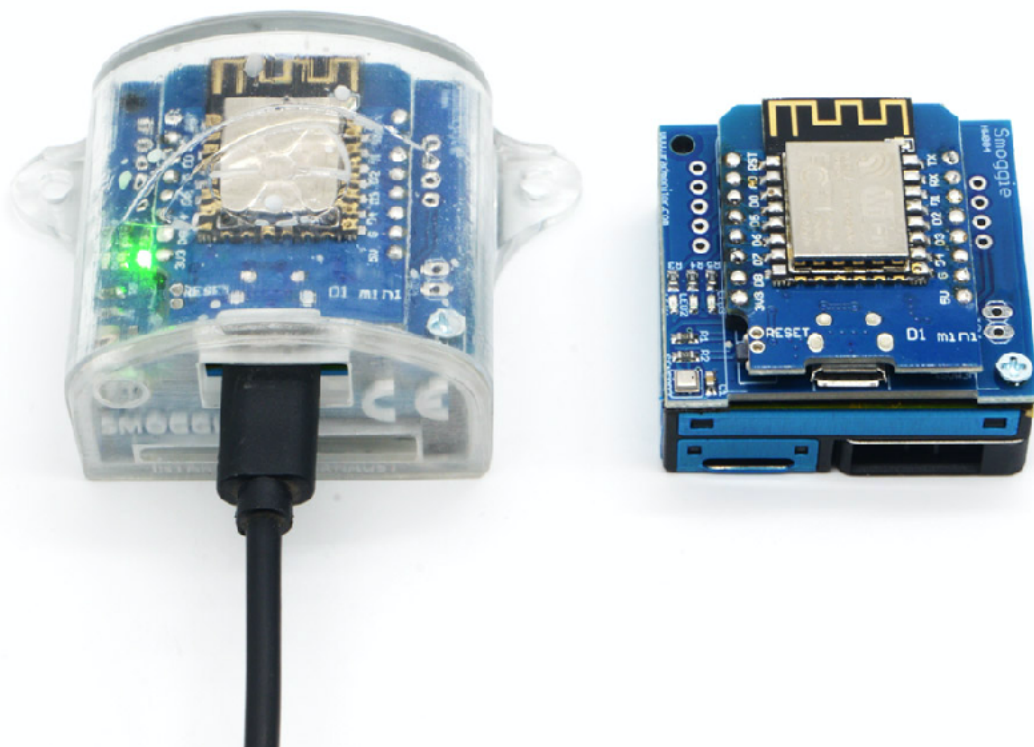## Low Cost Environmental Monitoring

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

Features

- 2 high quality sensors tracking 6 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

Congratulations, you've just received the latest SMOGGIE version!

SMOGGIE - COMPACT AUTOMATED AIR QUALITY MONITOR
[**4th**] hardware version

Innovation is at the core of the uRADMonitor project simply because we use the latest and best technologies in sensors and communication. This pushes our development efforts to constantly improve our products. For SMOGGIE, in just one year we iterated through 4 distinct hardware variants and you just got the latest!

The 4th SMOGGIE comes in a transparent resin enclosure and adds LEDs to indicate the pollution level! At a glance you can see if the unit shows green, yellow or red, corresponding to real time pollution levels. The form factor remains the same so this is still world's smallest automated IOT air quality monitor.

Read more on the product page, www.uradmonitor.com/products or follow us on Facebook www.facebook.com/uradmonitor to get the latest news. Thank you for your support! uRADMonitor just got one unit bigger.

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 the BME280 from Bosch for temperature, pressure, 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
Bosch BM280	Temperature	-40 °C	+85 °C	± 1°C
	Pressure	300 hPa	1100 hPa	± 0.25 %
	Humidity	0% RH	100% RH	± 2 %
Plantower PMSA003	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
Modem Chip	Espressif esp8266
Modem certifications	CE, FCC
Antenna connector	PCB antenna
Enclosure Protection	IP30
Supply Voltage	micro USB 5V
Dimensions	35x35x20 mm (excl. sup and enclosure)
Weight	50g
Mounting	fixed
Recommended Use Ratings	Temperature: -20°C to +65°C Humidity: 0RH to 95RH
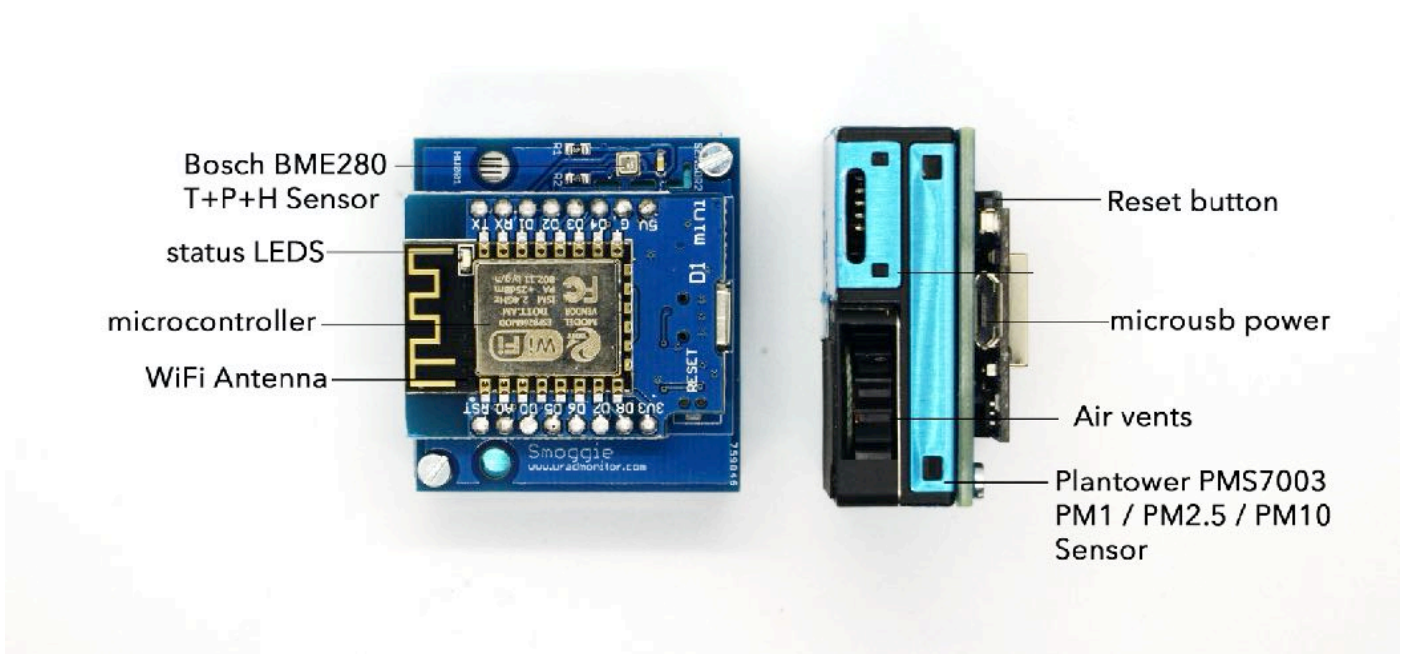
uRADMonitor SMOGGIE assembled circuit board diagram in hardware version 1

Usage guide

- **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 the appliance 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.

- **Installing the unit**

For mounting, use the two holes in the housing bracket. Ensure that you properly connect the power cord and secure it against vibration where necessary. If your SMOGGIE has a transparent resin case, screw carefully because the case is brittle.

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 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.

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