Project

Environmental Supervision

What means fine dust?

Fine dust are small particles.

Dangerous especially:

Less than 10um – “PM10”: here starts the respirability by the lung

Less that 2.5 um – “PM2.5”: here will nearly all particles going into the blood

Less than 10nm – in scientific discussions – everywhere here starts the respirability by the cells

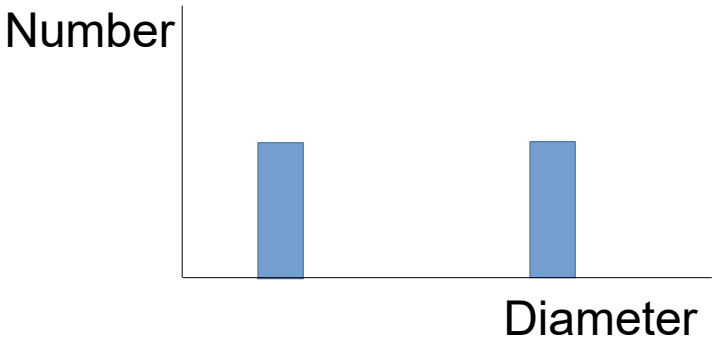
A speciality by measuring particles

The result can be shown in different kinds, the primary kind is depending from the measurement method!

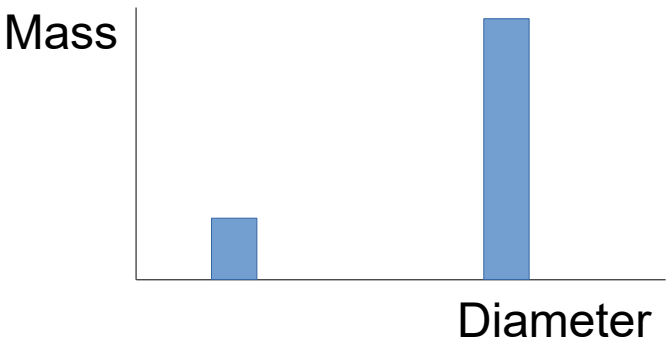
1. Mass distribution (volume distribution):
How many of the mass of the particles are in a size range.

2. Number distribution:
How many of the particles (in pieces) are in a size range

Example for number distribution



Example for mass distribution



Calculations between number- and mass distribution

Calculations are only possible under the assumption of:

→ All particles are spherical particles

→ All particles have the same density

In practise, that is not so!

- The common method to measure particle pollutions is the gravimetric analysis. (sucking through a filter – measuring of particles in a size range by a balance) This leads to a mass distribution (ug/m3), but need (a lot of) time with a low Number of samples over the time.

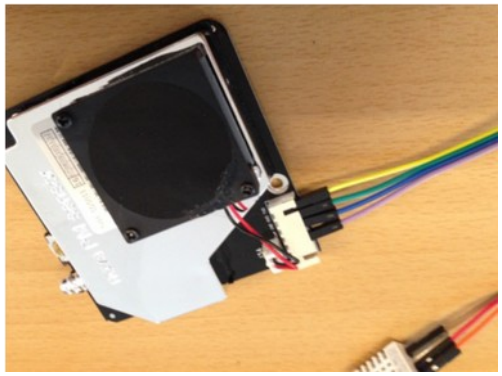
- Very fast are optical principles (e.g. scattering light, light blockade) This leads to a number distribution (number/m3). Measurement is very fast, with a high number of samples over the time – real time applications are possible

Aims of the project

Since 2016 is available a cheep sensor for measurement of the amount of particles in classes of PM10 and PM 2.5

An international network including database was realised by a university in Germany to collect data of fine dust from all over the world. It´s an open project with the invitation to participate for everyone. We will participate!

In this project, we would like to realise the measurement system (Sensor and microcontroller exist, software is to download from a web page) and add the system to the international database. A measurement point at the Wibautstraat in Amsterdam is to realise.



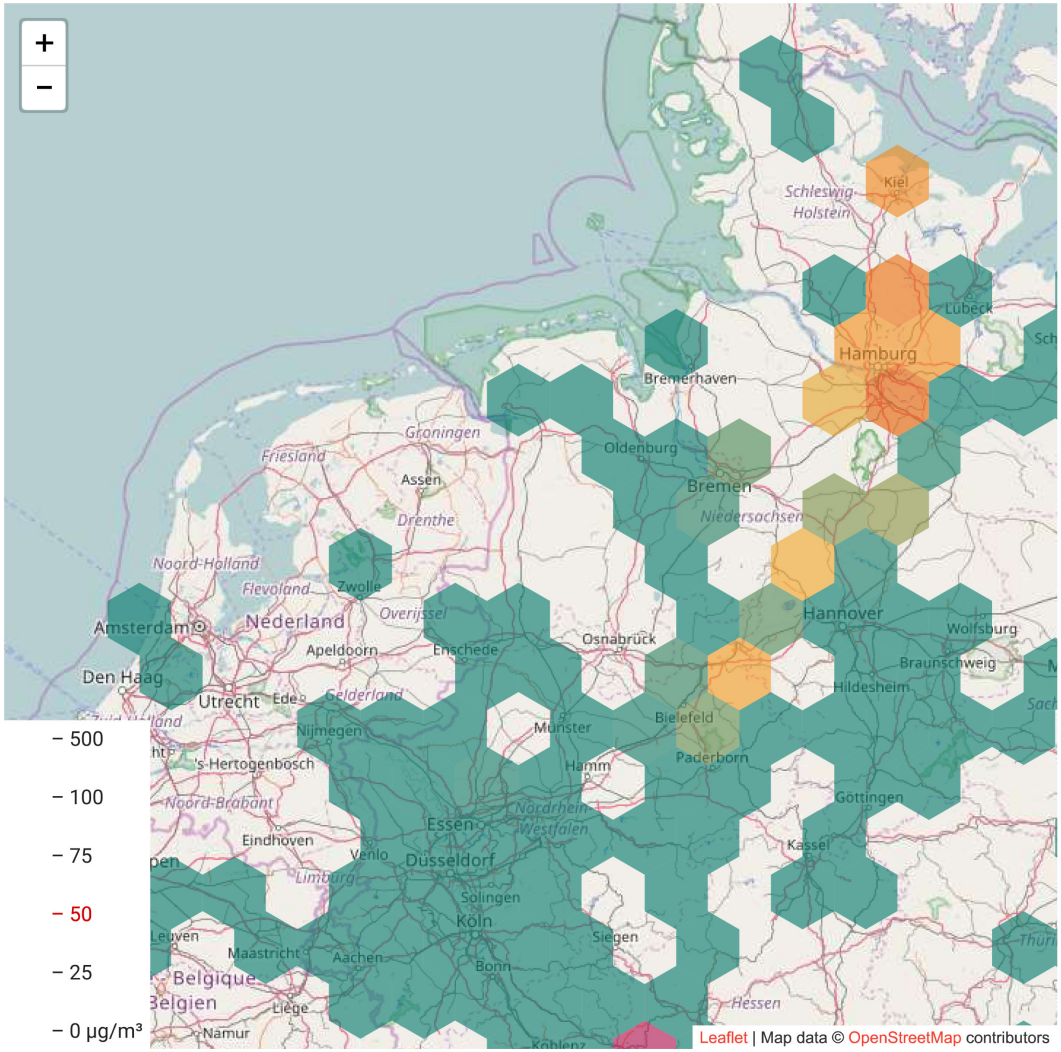
Optical sensor for PM10 and PM2.5

u - controller

Database

Current map of measuring points

12.8.2017 openData Feinstaub Map



− 500
− 100
− 75
− 50
− 25
− 0 µg/m³

(close)

Erklärung einblenden

#Sensors 13

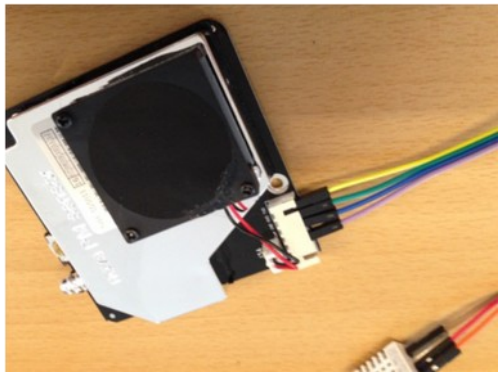
Sensor ID	PM10 µg/m³	PM2.5 µg/m³
mean	28	17
(+) 564	14	11
(+) 1008	22	13
(+) 1226	19	18
(+) 1284	3	3
(+) 2019	14	12
(+) 2187	19	17
(+) 2301	17	14
(+) 2305	13	12
(+) 3597	37	22
(+) 3897	114	41
(+) 4391	33	22
(+) 4563	22	16
(+) 4567	32	23

http://netherlands.maps.luftdaten.info/#7/51.915/11.812 1/2

Possibly additional aims

If there is enough time and enough man power:

Could be realised a mobile stand alone device with storage and evaluation of the data on a PC



Sensor

u - controller

PC

PC / Laptop

Vielen Dank für Ihre Aufmerksamkeit!

Thank you very much for your attention!

谢谢您的关注！

Большое спасибо за внимание!

Plusieurs Grâce à pour votre attention!