Airnominal

Introduction

- Air pollution is an acutely dangerous environmental problem, that kills 7 000 000 million people a year, more than 500 000 of those in EU. [1][2]
- A majority of the global population breathe air that exceeds WHO guideline limits containing high levels of pollutants according to studies made by World Health Organization [4]
- It is estimated that diseases attributed to air pollution are now on par with other health risks such as unhealthy diets and tobacco smoking [3][5]
- Even though sensors and other measurement equipment is cheap and readily available, data that researches use still usually comes from two to three stations in an area
- Large datasets of high spatial resolution are not available
- Informed public can make choices that reduce their exposure to air pollution[6]

Objectives and goals

Goals

- To design an open platform of air quality measuring stations that allows researchers to exchange air quality data
- To make the whole system compatible with virtually all microcontrolers and wide range of sensors
- To make system easy to use for beginner programmers and capable enough for serious research work

Objectives

- To creating a library, that serializes sensor data into required protocol, so it can be stored or sent to the central server
- Create a database and backend system fast enough to process many gigabytes of data a large constellation could send a second
- Creating friendly and nice-looking user interface - accessible as a website or as a PWA.

Methods

Library

- Made in pure C++, compatible with any C++98 and newer compilers
- Communication is supported on any system, that can transmit to a http server

Server

- Using Flask framework
- Compatible with many different SQL databases via SQLalchemy ORM
- Allows station and user authentication
- Allows API access for researches

Website

- made in Vue JS using Typescript
- Can be installed as a PWA on Android and IPhones
- Includes map of all stations
- Shows data in interactive graphs

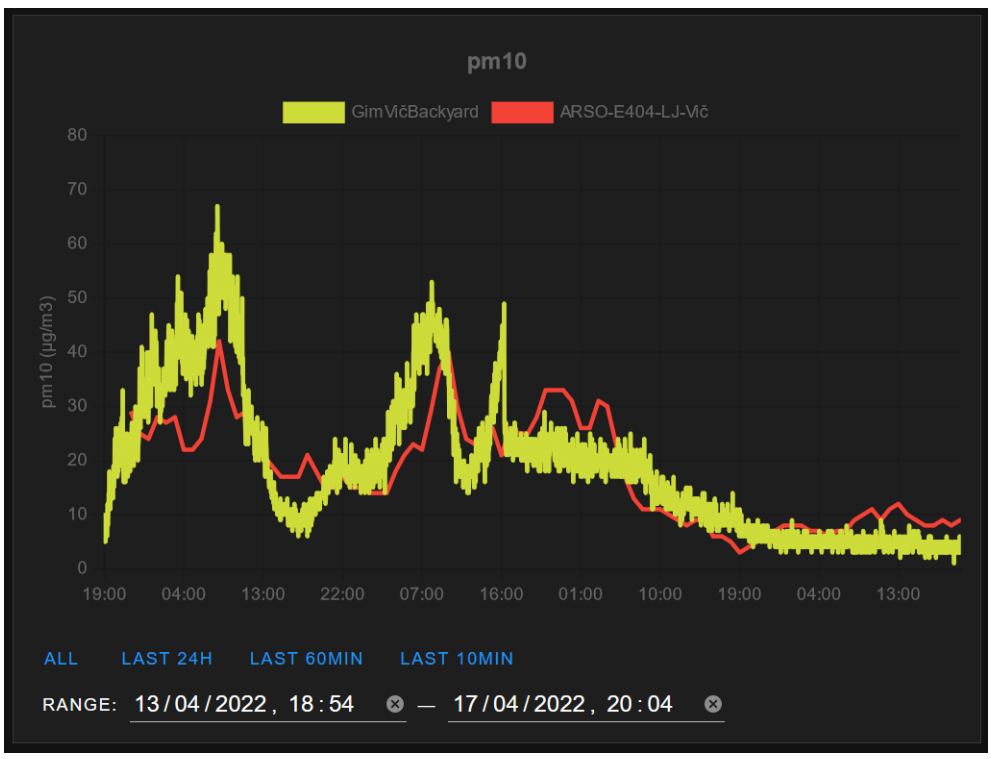
All source code can be seen:
https://github.com/ChristofferNorgaard/Airnominal

Results

- The system has been tested on limited number of stations without difficulties
- All collected data can be seen on Airnominal
- Performance is an issue because of use of interpreted Python programming language

Conclusion

The main unique aspect of our project is that is does not restrict users to any specific measurement station, allowing them to customize the equipment completely to suit their needs. Initially, our product will be targeted towards individuals and specific public institutions. As the platform grows, more and more data will become available for researchers, increasing scientific value of the project. We plan on improving the platform in the future as part of the main Erasmus+ project.



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