

Low-Cost Sensing and Data Management in SmartAQnet

Matthias Budde¹, Johannes Riesterer¹, Marcel Köpke¹, Paul Tremper¹, and Till Riedel¹

¹ Karlsruhe Institute of Technology, Institute of Telematics, Pervasive Computing Systems / TECO, Karlsruhe, Germany,
E-mail: budde@teco.edu

Continuously integrating data from heterogeneous sensors and other sources in one data management system is an intricate task. Besides appropriate modelling and data storage, solutions for data input and output and data processing are required. In the SmartAQnet project [1], we adopt the OGC SensorThings standard and API [2] for data management. We present the status of our integration efforts and the current input and output interfaces and processing capabilities of our system. This includes different possibilities for data visualization.

As a practical end-to-end example, we present our low-cost sensing activities in the SmartAQnet project. We introduce the employed sensor nodes, smartphone application and sample visualizations from measurements conducted in the recent intensive operation periods (IOPs) of the project. Further results on the topic of low-cost sensing that were achieved in the SmartAQnet project include the characterization of cheap laser-scattering sensors [3] and empirical research concerning the effects of laymen on data quality in measurements with low-cost sensors and mobile sensing technology [4].

References

- [1] Matthias Budde, Till Riedel, Michael Beigl, Klaus Schäfer, Stefan Emeis, Josef Cyrys, Jürgen Schnelle-Kreis, Andreas Philipp, Volker Ziegler, Hans Grimm, Thomas Gratza (2017) SmartAQnet: Remote and In-Situ Sensing of Urban Air Quality, Proc. SPIE 10424, Remote Sensing of Clouds and the Atmosphere XXII, 104240C
- [2] Steve Liang, Chih-Yuan Huang, Tania Khalafbeigi (2016) OGC SensorThings API Part I: Sensing, Publisher: Open Geospatial Consortium
- [3] Matthias Budde, Almuth D. Schwarz, Thomas Müller, Bernd Laquai, Norbert Streibl, Gregor Schindler, Marcel Köpke, Till Riedel, Achim Dittler, Michael Beigl (2018) Potential and Limitations of the Low-Cost SDS011 Particle Sensor for Monitoring Urban Air Quality, ProScience 5, p. 6-12, doi:10.14644/dust.2018.002
- [4] Matthias Budde, Andrea Schankin, Julien Hoffmann, Marcel Danz, Till Riedel, Michael Beigl (2017). Participatory Sensing or Participatory Nonsense? – Mitigating the Effect of Human Error on Data Quality in Citizen Science. IMWUT 1(3)