INTERNET OF THINGS TECHNOLOGIES FOR THE EFFICIENT COLLECTION OF HYDROLOGICAL MEASUREMENT DATA

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**CHALLENGES**

- Collecting sensor measurement data of a huge amount of unknown IoT devices
  - Plug-and-play integration of new devices is required
- Transmission of raw data from low resource devices to a central data server
  - Communication overheads should be avoided
- Interoperable transmission of measurement data
  - Standardized interfaces ensures the interconnection between IoT devices and users via the web
OGC SensorThings API

- Interconnection of IoT sensing devices over the web
  - Open, geospatial-enabled and standardized
  - Based on OGC Observations and Measurements model (JSON encoding)
  - REST principles for creating and accessing observation data
  - MQTT extension for publish/subscribe patterns
52°NORTH SENSORTHINGS API MODULE

• Sensor Things API module extends the 52N Sensor Web Server
  • Common management and storage functionalities
• Interlinking between Sensor Observation Service, SensorThings API and REST API
  • Observation data can be published via MQTT and is accessible via SOS and REST
  • Shared model for observation data following O&M
• Open source implementation available on GitHub: https://github.com/52North/sensorweb-server-sta
52° North SensorThings API Module

Service Layer
- REST

Data Access Layer
- 52N Rest API
- 52N SOS
- 52N STA
- DB Access Series API
- DB Access STA
- Timeseries Data
- STA Extension

Clients

REST + MQTT

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**Pre-Operational Deployment**

- Area of study: Wupper region in North-Rhine Westfalia (Germany)
  - Wupperverband as responsible water authority
  - Operates several river dams and sewage treatment plants
- Successful evaluation: feasibility demonstrated
- Lightweight and robust integration with low overhead
**VISUALIZATION**

- Helgoland Sensor Web Viewer
  - Lightweight web app for exploration, analysis and visualization of sensor data
  - GitHub repository: [https://github.com/52North/helgoland](https://github.com/52North/helgoland)
**Future Challenges**

• Handling more complex data types
  • E.g. profiles, data collected by mobile sensors
  • High volume data streams

• Improving semantic interoperability
  • Vocabularies
    • Important: names of observed parameters
  • Sensor metadata

• Interoperability testing between different software packages
ANY QUESTIONS OR SUGGESTIONS?

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