Boreal Ecosystem Recovery & Assessment
An NSERC Collaborative Research & Development Program

Internet of Things Team: An Extendable & Interoperable Web Architecture

James Badger, BSc

University of Calgary, Department of Geomatics Engineering

jpbadger@ucalgary.ca

Research Team:

Steve Liang, Kan Luo, Soroush Ojagh, Sara Saeedi

University of Calgary, Department of Geomatics Engineering

Project Summary

We have deployed the Open Geospatial Consortium (OGC) SensorThings API standard to accelerate development and sensor data collection through common interfaces and data models. This standard was recently developed to provide a modern application-to-application system for collating sensor data from multiple sources and of different types. OGC SensorThings API uses the OGC Observations and Measurement model for representing sensor data and metadata. This model abstracts the different parts of data collection into different classes, which strictly define the constraints (allowed types and data) on each step of data collection. While strict, the model does cover many use cases due to the experience and collaborative input from OGC members. We are using OGC SensorThings API to collect historical and near real-time sensor data and serve that data via a public web interface. Any compatible client may connect and access the data for analysis for visualization, including a web dashboard developed by our team. The data may also be combined with data hosted in other server instances of OGC SensorThings API, allowing us to compare against datasets published by other organizations.

Management Implications and Lessons Learned

Utilizing an interoperable and open standard has simplified the process of building the data pipeline from remote in-situ sensors to the internet, and finally to clients for re-use. This reduces the number of design decisions necessary for the research team, who can instead focus on improving sensor data collection and developing visualization tools. We are also able to publish our code and processes as open source, allowing us (and other researchers/developers) to build on this development in future projects.