Project Proposal

Presentation and alerting system for environmental data from wireless sensors (2017)

Project/company name: SwecinAB, Upwis AB

Project name: Big Data fusion and presentation of environmental data
Date for this description: 20170217

Contact persons and contact info:
SWECIN ; Sten Yondt sten.yondt@swecin.se
UPWIS AB ; Kjell Brunberg kjell@upwis.com
UU:

Project period: START spring 2017 – END autumn 2017

Short background/presentation: technology and markets

Swecin AB is a company within environmental data supervision systems, with a focus on water and other environmental pollution sensing and supervision system. Focus is to provide surveillance systems for Smart City or Industrial plants with a large number of wireless sensors with Internet of Things architectures. The wireless or wired sensors shall measure environmental parameters, initially air and water pollution from various sources in cities or industrial plants. Other important parameters are also acquired and collected in an Internet database ("the cloud"). Technology for the wireless sensors is provided by Upwis AB - a company focusing on development and provisioning of wireless sensors & IoT communication equipment and software.

Swecin AB is now in need for a light weight, portable and scalable complete sensor to HMI system that will be used as a base for business presentations and demonstrations. Cloud database, user HMI and gateway functions/solutions to wireless sensors may be provided locally on a laptop to avoid international problems with connectivity and tariffs. Special focus shall be provision of a basic solution that may be the base used for up-

Project description: One initial part of the project is a background study of existing Smart city projects and technologies for large scale sensor storage and data fusion. Additionally, studies of existing presentation and alert generation concepts and solutions. The project shall be defined to cover following areas with focus on scalability and standards – storage and analytics to use and improve data from low cost sensors, databases for real time data storage and retrieval, presentation solutions with GIS and/or graphics in PCs or smartphones. Critic alert channels (sms, paging, mail, voice calls,..). Key areas: Data fusion, database applications, networking, correction of environmental sensors, statistics, environment, meteorology, theoretical fluid mechanics mm
Aim of project is to develop a basic small footprint solution, scalable from database in PC to full-blown cloud based with AI analytic support, using data in a time-series data stream from a large number of geographically deployed "low cost" wireless sensors. Also, data from other Internet sources, such as YR, SMHI, more expensive reference monitoring stations and other methods (AI) may be added. Basic system shall be small and modular, able to be run on a standard laptop, but technologies selected must be modular and scalable to enable a further development into large country wide solutions where modules are separated and used on different instances.

**Descriptions of the project goal(s):** Achieved results shall be presented in a report and a running prototype to be used in a workshop. Results shall include a review of current research documentation in the selected areas, presentation of the results and performance from selected and implemented software.

1. **Literature study of current know-how within smart city environments where low cost wireless sensors are used.** Selection of appropriate databases and formats, presentation and solutions for best interpretation of large and small systems. Find one "good-enough" solution that follows or improves current ideas for Smart Cities. Studies of measurement and presentation methods (GIS, curves, trend presentations and how these shall be correlated with total environmental parameters that are available as Open Data in Internet. - for best "good enough" but scalable application result.

2. **Design of "Big Data" Cloud application with optional correction algorithms that combines time-series data from wireless "Smart City" sensors with other data (historical data, GIS map and topology data bases and external weather information) into a 2D GIS based demonstrator with optional alarm channel support.**

3. **Evaluation phase and live demo presentations with selected “end users”** (Kommun / municipality, industrial plant owners and other possible stake holders).

The challenge lies in finding an "good enough" combination of scalable databases and presentation concepts that accepts realtime time-series data streams (MQTT) from different sources such as "low cost" wireless sensors deployed in a grid in municipalities.

Creation of algorithms and HMI solutions for presentation of old data – and also to enable set alarm levels, where incident data shall be directly sent to a smartphone, pager, or e-mail server with fault/threshold data and to enable.

Also, importance shall be taken to achieve easiness to diversify and adopt or scale up the proposed solution, enabling usage as sales tools or demonstrators – later with large numbers of sensors – refining the solution to industrial usage in next steps.