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Sensor web enablement in a network of low-energy, low-budget amateur weather stations

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Sensor Web Enablement (OGC SWE) has developed in into a powerful concept with many potential applications in environmental monitoring and in other fields. This has spurred development of software applications for Sensor Observation Services (SOS), while the development of client applications still lags behind. Furthermore, the deployment of sensors in the field often places tight constraints on energy and bandwidth available for data capture and transmission.

As a „proof of concept“ we equipped amateur weather stations with low-budget, standard components to read the data from its base station and feed the weather observation data into the sensor observation service using its standard web-service interface. We chose amateur weather station as an example because of the simplicity of measured phenomena and low data volume. As sensor observation service we chose the open source software package offered by the 52°North consortium. Furthermore, we investigated registry services for sensors and measured phenomena.

When deploying a sensor platform in the field, power consumption can be an issue. Instead of common PCs we used Network Storage Link Units (NSLU2) with a Linux operating system, also known as "Debian SLUG". The power consumption of a "SLUG" is of the order of 1W, compared to 40W in a small PC. The "SLUG" provides one ethernet and two USB ports, one used by its external USB hard-drive. This modular set-up is open to modifications, for example the addition of a GSM modem for data transmission over a cellular telephone network.

The simple set-up, low price, low power consumption, and the low technological entry-level allow many potential uses of a "SLUG" in environmental sensor networks in research, education and citizen science. The use of a mature sensor observation service software allows an easy integration of monitoring networks with other web services.