



Web-based remote sensing of building energy performance

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The present paper describes the design and the deployment of an instrumentation system enabling the energy monitoring of a building in a smart-grid context. The system is based on a network of wireless low power IPv6 sensors. Ambient temperature and electrical power for heating are measured. The management, storage, visualisation and treatment of the data is done through a web-based application that can be deployed as an online web service. The same web-based framework enables the acquisition of distant measured data such as those coming from a nearby weather station. On-site sensor and weather station data are then adequately treated based on inverse identification methods. The algorithms aim at determining the parameters of a numerical model suitable for a short-time horizon prediction of indoor climate. The model is based on standard multi-zone modelling assumptions and takes into account solar, airflow and conductive transfers. It was specially designed to render accurately inertia effects that are used in a demand-response strategy.

All the hardware or software technologies that are used in the system are open and low cost so that they comply with the constraints of on-site deployment in buildings. The measured data as well as the model predictions can be accessed ubiquously through the web. This feature enables to consider a wide range of energy management applications at the district, city or national level.

The entire system has been deployed and tested in an experimental office building in Angers, France. It demonstrates the potential of ICT technologies to enable remotely controlled monitoring and surveillance in real time.

Web-based data management, remote sensing, real time monitoring.