

## Section Sciences et Ingénierie de l'environnement Design Project 2010 (semestre de printemps)

### Proposition n° 30

#### Energy Forecast for Environmental Sensing Nodes

##### Encadrant externe

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##### Descriptif du projet

*SensorScope Sàrl* has developed an environmental measurement system capable of producing high temporal and spatial measurements at low cost and requiring a minimal maintenance. This system is based on multiple, solar-powered sensing stations which communicate wirelessly and organize themselves into a sensor network. Sensing stations include several external sensors including air temperature and humidity, surface temperature, incoming solar radiation, wind speed and direction, precipitation, soil moisture and pressure at ground level. Stations can be easily and rapidly deployed and have already been employed for multiple field experiments, ranging from built environments to alpine glaciers.

As *SensorScope* station's power supply consists of a battery and a solar cell, the sampling and broadcasting frequencies depend almost exclusively on the available energy. This project attempts to create a model which computes a budget of the available energy in real-time and predicts if the current sensing/broadcasting schedule is sustainable or if sensing/broadcasting can be increased or needs to be decreased.

### **Objectifs et descriptif tâches**

The project objectives can be summarized as follows:

- Get familiar with the provided SensorScope stations;
- Get familiar with the software infrastructure for the SensorScope stations;
- Identify algorithms for pattern extraction and predictive control suitable to be deployed on a resource-constrained sensor node;
- Chose an algorithm, implement on the SensorScope stations, and analyze its performances under different environmental conditions influencing its energy budget.

### **Divers**

Work breakdown: 25% theory, 50% software development, 25% deployment and experiments

Prerequisites: Experience using Matlab and C/C++, basic measurement skills, interest in battery/solar power systems

Keywords: environmental sensing, sensor networks, power management

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