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Électronique Informatique Automatique et Systèmes

## ON-LINE MONITORING STATION FOR ENERGY DIAGNOSIS IN BUILDINGS

### Energetic context

- Energy consumption of buildings in France:
- 46% of global energy consumption
  - 25% of the green gases emission
- French legislation: **Need to improve energy efficiency**
- "Règlementation Thermique" (RT 2005)
  - "Diagnostic de Performance Énergétique" (DPE 2006)

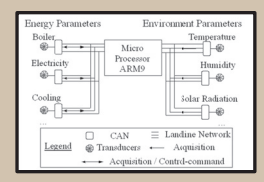
- Ways to improve energy efficiency:
- Define energy characteristics of building
  - Calculate criteria (solar, inertia, thermal loss...)
  - Compute global energy performance
- Develop Energy performance assessment, management and enhancement using BEMS**

### Objectives of the project

Designing a BEMS (Building Energy Management System)

- On-line monitoring environmental and energetic parameters**
  - Measure outdoor and indoor temperatures
  - Measure outdoor and indoor humidity
  - Measure electric consumptions for cooling and heating
- On-line computing the global energetic indicator**
  - Define the energy performance category of the building

- Compare the energy performances of different buildings
- Estimating the renewable energy resources of the location**
  - Measure solar irradiance
  - Measure wind speed
- Computing advanced heating or cooling control (develop with simulation)**
  - Use optimal model predictive control
  - Use optimal fuzzy logic control



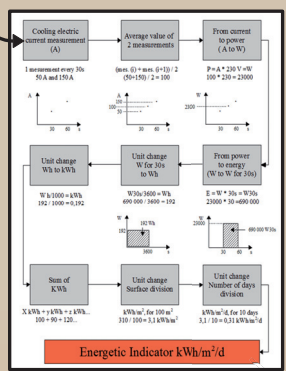
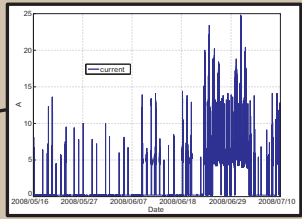
BEMS communication scheme

### Financial support



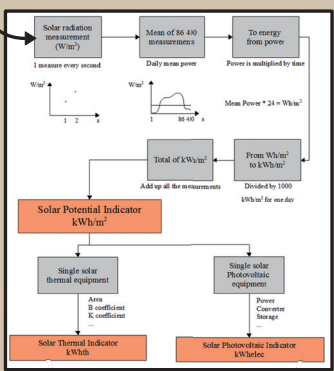
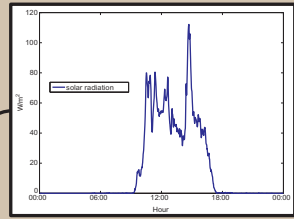
### BEMS application and results

Electric current of the air-conditioning system



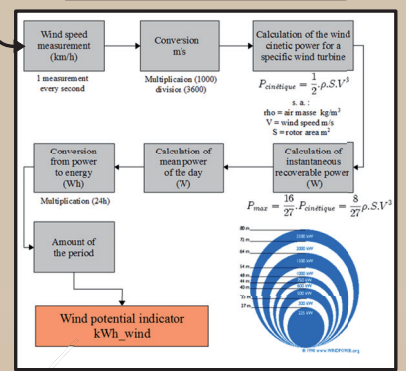
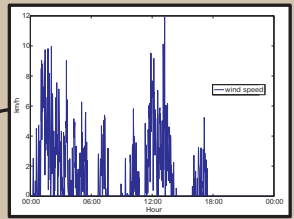
Air-conditioning energy calculation

Solar irradiance



Solar potential estimation

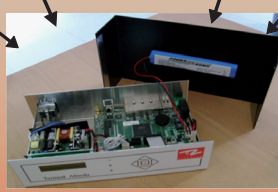
Wind speed



Wind potential estimation

**Industrial partners**

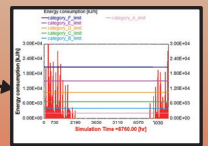
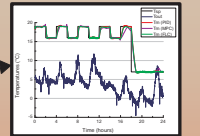
- Solar research consultancy
- Development of traceability solutions
- "Centre Scientifique et Technique du Bâtiment"



BEMS Prototype

Heating control with MPC scheme

Define energy performance category



Building Simulation 2009, Glasgow. Poster Session P-2-2 Commissioning and Validation.

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