Let’s Construct Europe’s Future
With Innovative Buildings and Infrastructures
Construction and Societal Challenges

Radisson Blu Centrum Hotel - WARSAW
04 / 05 October 2011

Piotr Dymarski – Mostostal Warszawa S.A.
Neil Grabham – University of Southampton
TIBUCON Project Motivation and Concept

EU Building Energy Consumption 40%

60% of that Energy used in heating/cooling

Potential Energy Saving 30%

Heating/Cooling System Performance Improvement

Retrofittable

Central Control Unit
Simulation
User Interface

Self Powered Multi Magnitude Wireless Sensor Network

New Building

Distributed Condition Monitoring/Sensing
Actuation Scheme
Simple Actuators

Smart Actuators
 Wireless Network
TIBUCON Project Objective

- Development of ultra low power units to control HVAC system.
- Development of the Hybrid Power Harvesting Unit (photovoltaic, thermoelectric, vibration energy) to power sensors.
- The wiring and battery removal for a control point in HVAC system.
First prototype

- External Antenna [opt]
- Push Buttons [dbg]
- Solar Panel
- Led [dbg]
- PIR
- USB [dbg]
- T/RH
- Light Sensor
Objectives & Pilot

- More efficient HVAC structure in terms of energy consumption and thermal comfort for new installations
Objectives & Pilot

- More cost effective and less invasive tool for HVAC retrofitting

Existing building - Spain
Energy Forms Available in the Built Environment

Within the built environment energy may be present in many forms:

- Light, from both natural and artificial sources
- Vibrational, from machinery or equipment
- Thermal, from heat from building elements and the HVAC system
- Air flows, from both natural and artificial sources
- Mechanical movements caused by interaction with the building occupants
Types of energy harvesters

For each of the potential energy sources in the ambient environment there are harvester technologies available, some examples are:

- **Light** – Solar cells
- **Vibrational** – Electromagnetic harvesters
- **Thermal** – Thermoelectric harvesters
- **Air Flows** – Miniature turbines
- **Mechanical** – User powered devices

![Perpetuum](image1), ![Micropelt](image2), ![Boon Edam](image3)
Results to achieve

- **Cheaper installations** due to cabling reduction (up to 80% of total cost for a control point in HVAC system – “Wireless mesh networks for energy-conservation retrofits”, “Wireless Sensor Networks for Smart Buildings, A Market Dynamics Report”)

- More **cost effective** and less invasive tool for HVAC retrofitting,

- Increased awareness of own energy consumption,

- **Reduction of the energy bill** (will be studied),

- **Better thermal comfort**, 
Consortium

- Industry
  - Mostostal
  - Giroa
  - E&L Architects

- Research organisations / universities
  - Tekniker
  - KHK
  - University of Southampton
Consortium

- ICT + EBB = **ICT + ENERGY + BUILDINGS**… so bring together experts from all these different worlds.

**TIBUCON case:**

- **Buildings&Construction:** Mostostal, E&L Architects
- **ICT:** Tekniker, University of Southampton
- **Energy:** Giroa, Katholieke Hogenschool Kempen

- **ESCO-Energy Services Companies.** The profile of this kind of companies makes them very attractive for an ICT-EEB consortium. They are experts in energy, in solutions for improving the efficiency, in the validation of installed solutions.
Visit project website

Welcome to TibuconProject


Towards Integral Building CONnectivity

Welcome to TIBUCON. This project brings together experts, stakeholders and end users in ICT to jointly promote and deliver a new ICT component towards the energy use abatement and comfort improvement in new and existing buildings.

The current project proposes a solution beyond the existing wireless based HVAC control systems, derived from the use of Self Powered Multi Magnitude Wireless Sensor Network (SP-MM-WSN) for building thermal condition monitoring. The SP-MMWSN completely avoids the use of cables and replaceable batteries, thanks to the combination of extremely energy efficient wireless communication technology, ultra low power electronics, and the power harvesting concept. The use of SPMMWSN therefore, results in an easy-to-deploy and maintenance free building monitoring system that makes it the ideal candidate for either new or existing HVAC installations.

TIBUCON is funded by the European Commission under the Seventh Framework Programme. The project consortium consists of academic and industrial partners throughout Europe covering the ICT and construction areas.

TIBUCON is coordinated by Pietr Dymarski, Mostostal Warszawa, Poland. The project duration is 3 years starting from 1st September 2010.

For more information please contact us at...

http://www.tibucon.eu
Thank you for your attention