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Efficient Information Network for Intelligent Buildings

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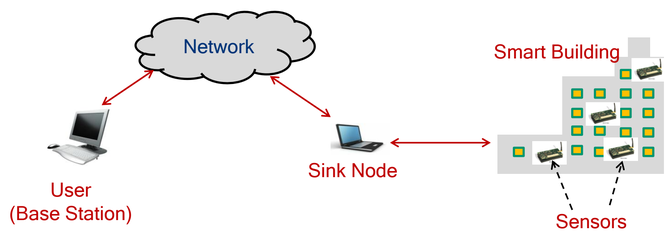
Motivation

- Recent development of wireless communication protocol for building automation applications and the availability of low-cost sensing and processing module of wireless sensor devices bring current interest to develop the smart building.



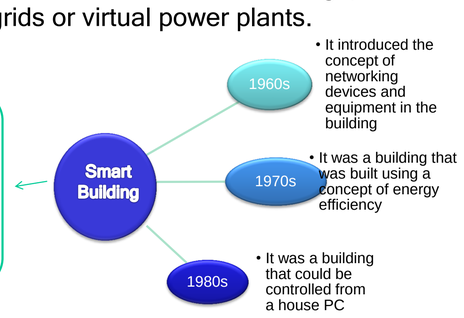
Main Objectives

- Design efficient information network to make Buildings 'greener' and 'smarter'.
  - Monitor and control the fun functionalities inside, according to the building structure, indoor and outdoor environment.
  - Optimize the energy consumption.
  - Improve safety and security.
  - Reduce operating expenses.

Project Background

- Information communication technology (ICT) enables smart buildings to communicate both with its inside devices and appliances, which they can also control, and with its surroundings. Furthermore, they can adapt to grid's conditions and communicate with other buildings, hence creating active micro grids or virtual power plants.

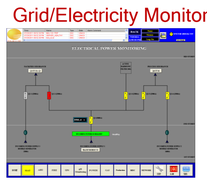
Today smart building comes with additional subsystems for managing and controlling renewable energy sources, house appliances and energy consumption using wireless communication technology.



Intelligent/ Smart Buildings

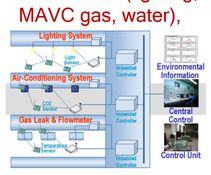
Objectives: By utilizing pervasive sensing of embedded devices with sensors and communication technologies. Through ICT to provide information on user's real time preferences according to the price, metrics, outside environment etc.

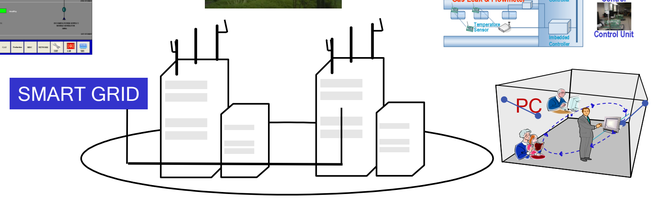
Grid/Electricity Monitoring



Residential Urban Building

Building Infrastructure Network BMS (lighting, MAVC gas, water),

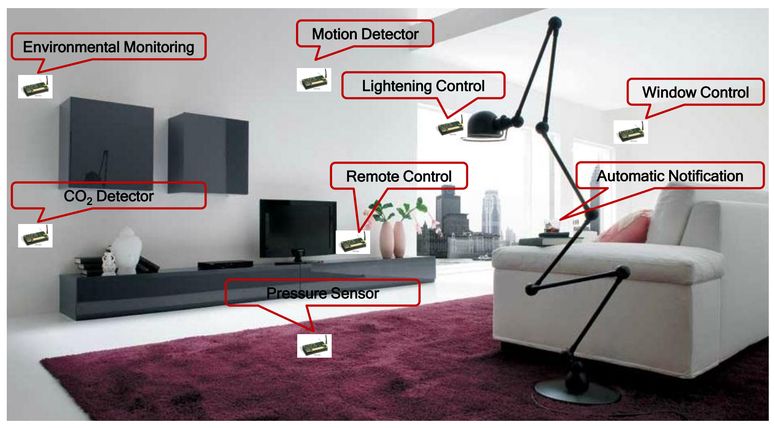




Why Smart Building?

- Energy management is becoming a key concern in all aspects.
- Make new/ existing buildings:
  - More energy efficient
  - More economical to operate
  - Easier to manage with centralized controls
  - Increase operating efficiency

Services in Smart Building

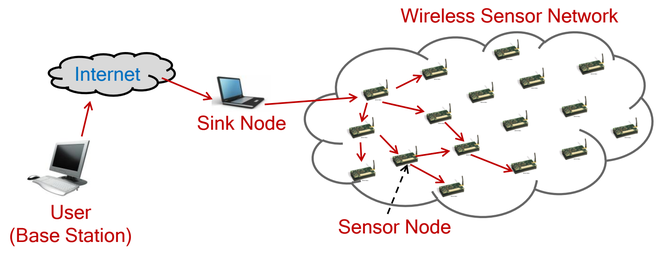


Technologies Involved

- Wireless Sensor Network
  - can be used to reduce energy consumption of HVAC (heating, ventilation, air conditioning, lighting and other related equipment) systems by exploiting the context-aware capability of sensors.
- Internet of Things
  - focuses on interactions between humans and physical objects rather than on sensing and reporting low level information such as temperature data.
- Machine-to-Machine Communication
  - is a combination of various heterogeneous electronic, communication, and software technologies.

Wireless Sensor Network (WSN)

- The WSNs used in smart building management systems consist of different types of sensor nodes measuring parameters such as temperature, humidity, light, asphyxiating gases/smoke, occupancy, and energy consumption.



Internet Of Things (IOT)

- The "Internet of Things" refers to the idea of pervasive, ambient connections between physical objects and the virtual world.
- In the future, everything will be connected to the internet

Machine-to-Machine Communication (M2M)

- Designing applications for home network area is a part of the future internet engineering project.
- Designing applications for monitoring and intelligent management, such as electrical energy consumption in distributed locations.

Expected Results

- The level of potential savings depends to a high degree on the building parameters and the usage profiles.
- The maximum energy saving potential can be achieved using a combination of different automation functions.
- A high-level of potential savings with regard to the electrical energy are possible with constant lighting control.

Future Goals

- Utilise the advanced technology in order to develop energy efficient applications/ services for 'smart' building
- To Optimize the energy efficiency in 'smart' building
  - Use energy only when it is necessary.
  - Use the exact amount of necessary energy.
  - Apply the energy in the highest possible efficiency.