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TUTORIAL

Future Challenges for Building Automation: Wireless and Security

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Synopsis

Building Automation Systems (BAS) are a key technology for increased comfort and cost efficient operation in buildings and homes. They provide equipment, software and services for automatic control, monitoring and management of building services such as heating, ventilation and air conditioning (HVAC) as well as lighting/shading. Furthermore, the use of BAS enables sustainable (green) buildings, where energy consumption and emissions can be significantly reduced, thereby promoting ecological, economic and comfort benefits. Still, not all the potential of these systems has yet been unlocked. Integration of heterogeneous systems mainly from the safety and security domain, sensor sharing and fusion, security, ubiquitous (wireless) service availability and autonomous system operation represent challenges in building automation that require an evolution of the current practices and systems to be solved.

This tutorial will provide the attendees with advanced building automation knowledge. Starting from state-of-the-art open systems, current and future perspectives especially regarding the integration of wireless technologies and security related services will be thoroughly explained and critically evaluated. Up-to-date mechanisms and approaches for managing and securing wired and wireless building automation networks will be presented in theory and practice. The tutorial will start with an introduction into building automation systems clarifying the requirements, challenges and benefits that go along with the use of both wireless and wired solutions. Then, the most important state-of-the-art protocols and technologies such as BACnet (ISO 16484-5:2007), LonWorks (ANSI/EIA-709) with LonWorks/IP (ANSI/EIA-852), and KNX (ISO/IEC 14543-3) featuring KNXnet/IP (EN 13321-2) will be carefully analyzed. Special attention will also be given to wireless technologies such as

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IEEE 802.15.4, ZigBee 2007 and EnOcean. Next, requirements for secure communication in the building automation domain will be discussed. Finally, we will present mechanisms and features for setting up, managing and securing communication in wired and wireless building automation networks both in theory and practice.

Intended audience

The tutorial is recommended for but not limited to specialists from the following domains:

- Control Systems & Applications
- Sensors, Actuators & System Integration
- Factory Automation & Industrial Informatics
- Emerging Technologies

Tutorial topics and outline

- Introduction to building automation: Requirements and challenges
- Wired vs. wireless: Specifics of wireless in building automation
- State-of-the-art systems and technologies: A discussion and comparison of BACnet, LonWorks, KNX, ZigBee and EnOcean
- Security requirements, proven and suitable practical approaches
- Management and integration aspects in theory and practice

About the Speakers

Wolfgang Kastner is Associate Professor for Computer Engineering since 2001. Since 1997, his research interests are in the area of control networks and automation systems with an emphasis on home and building automation. His current research targets the integration of building automation networks concentrating on open standards. Dr. Kastner is founder member of the IEEE Industrial Electronics Society Technical Committee for Building Automation, Control, and Management (IEEE-IES TC BACM).

Wolfgang Granzer works as a project assistant in the field of automation systems. Since 2005, his research interests are security issues in automation systems and embedded networks. Recently, he finished his PhD thesis in the area of security in building automation.

Christian Reinisch is a university assistant since 2008. His main research focus lies on wireless technologies for automation systems. He also investigates smart homes and “green” buildings. Presently, he teaches several courses for both undergraduate and graduate students and is involved in several research projects.

All speakers are with the Automation Systems Group of Vienna University of Technology, Austria.