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INSPIRING INNOVATIONS

1

Figure 1: Intelligence through digitalization: Building automation elevates all communication processes in and around the building to a new level.

Building intelligence: Digital transformation in building technology

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Introduction

In today's construction and real estate industries, the "smart" in a smart building is what takes its quality to the next level with functions that define an entirely new building standard. A new IoT-based framework combines a management and control unit with energy monitoring to create an intelligent platform that will help builders make smart buildings a reality (Fig. 1, lead image).

While previously a building's location was what mattered most, today priorities have changed considerably. Equipment, comfort, efficiency, and services are becoming increasingly important. In smart buildings, the communication processes that the building offers its users and operators are growing in importance. These processes have created a new set of requirements and new business models for planners, equipment providers, and operators.

Smart buildings do more than simply establish efficient processes for better energy supply and more comfort; they also allow flexibility for the optimized use of space and more services. Users provide building operators with a wealth of information that can be used to develop new business models. Even without cloud-based service platforms, buildings offer comprehensive information that is not otherwise immediately accessible to operators. The conventional building automation industry often gets in its own way here, insisting on compliance with standards and communication structures from the 90s.

Users and benefits take center stage

First and foremost, the services must be easy for residents to use. Smartphones and tablets are the preferred human-machine interface. But the technology needs to be more than just easy to use; it must impart a sense of joy and fun for everyone living and working in these buildings, so it must be modern and flexible. This is the only way to ensure that new services can be easily integrated into the overall system. Smart buildings must add genuine value and meet the user's perceived needs (Fig. 2).

In recent years, countless buildings have experienced improvements in energy efficiency, while also reducing construction and maintenance costs. At the same time, living and working areas, especially in urban areas, are increasingly viewed as a lifestyle factor. When we consider climate change, more ecological and sustainability aspects come into focus, but we need to balance this with optimizing construction and operational costs.

Electromechanical engineering for embedded systems

Embedded systems are not just the hidden champions of electromechanical automation. They are a marketplace for investment and innovation. Embedded systems are an essential subsystem of electromechanical automation in building automation as well. As such, they measure and process signals and data, control processes, and form the interface between physical systems, their users, and their environment. For this area of application, Phoenix Contact offers a wide range of electromechanical solutions – from board-to-board connectors right through to complete electronic housings.

Figure 2: The smartphone as the command center: In smart buildings, the user holds all building management functions in the palm of their hand.

Modern IoT platforms for smart buildings

Today, open IoT platforms are becoming common in building automation. In many other industries, open control platforms have long been established and are considered indispensable. In the building and construction industry, many are just now starting to appreciate transparent, data-based communication. An open control platform as the foundation of a building operating system opens up completely new possibilities: indoor navigation, co-working spaces, and user-controlled room automation are just a few examples.

The integration of these technologies is not possible without standardization of communication via software. The communication protocols of conventional automation systems are not consistent. The conventional automation pyramid is starting to cede ground to networked communication. This raises new questions: How are the existing sensors integrated? What kind of expertise is required? Will the conventional standards be complied with? Is the data secure? And, last but not least, what does the cost-benefit analysis look like?

Operating systems for smart buildings

New IoT-based ecosystems can support standard communication protocols such as BACnet, KNX, MP-Bus and DALI, as well as new IoT-based protocols, making it easy to integrate multi-vendor sensors and actuators. For example, the Emalytics system from Phoenix Contact develops its own uniform data structure independent of the data source, any subordinate bus systems, and the protocol used. All the data entered into and standardized in the system is immediately available to the entire IoT network (Fig. 3).

PHŒNIX CONTACT

INSPIRING INNOVATIONS

Figure 3: Data exchange via drag and drop: As an IoT-based building management system, Emalytics makes relevant data immediately available throughout the entire network.

From planning through construction and operation of the building, determination of appropriate communication protocol is extremely important. An advanced building automation system always provisions for adequate communication. This means everyone involved in the project can concentrate on a uniform, state-of-the-art system from day one, as well as location-independent engineering, both online and offline. This facilitates software updates and upgrades without interrupting operation, ensuring that the building remains up-to-date with the latest technology throughout its entire life cycle.

A drag-and-drop engineering tool can simplify the exchange of data between the various devices. This tool has proven extremely helpful during commissioning and system expansion. No additional engineering is necessary for data exchange between individual controllers. The system provides secure, encrypted data exchange between individual controllers in the network and the building automation management single-handedly.

Data security through "Integrated IT Security"

Building IoT systems require numerous security functions. Comprehensive user administration allows for needs-based role and authorization management. Lightweight Directory Access Protocol (LDAP) and Active Directory support is also an integral component of the software. The password mechanisms are adjustable; the password only needs to be changed the first time the software is used. In a complete cybersecurity concept, the system communicates using proven Transport Layer Security (TLS) encryption; comprehensive logging mechanisms, including the use of security certificates, are also crucial.

Summary: Communication for smart operations

Emalytics, the IoT-based ecosystem from Phoenix Contact, serves as the digital heart of a smart building. The software integrates the conventional building technology into the building IoT network of the future. The superordinate framework allows for classic communication channels as well as new, IP-based protocols; with open interfaces, the user can integrate existing systems into the building management system. The user can easily control, evaluate, and utilize data according to requirements to optimize supply processes in buildings. Communication serves as the basis for multifaceted, user-oriented smart operation.

The focus is on more than just technical communication. The importance of interpersonal communication between everyone involved cannot be overstated. After all, when the people who are responsible for the "dwelling," which is what the building is at its core, fail to communicate with one another during the planning stages, the components installed in the building will not be able to properly communicate with one another either. Integral planning from day one needs to become a matter of course; everyone involved in the project needs to coordinate closely and early on with one another to guarantee the success of a building project.

Learn more at **www.phoenixcontact.com/buildings**

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Phoenix Contact develops and manufactures industrial electrical and electronic technology products that power, protect, connect, and automate systems and equipment for a wide range of industries. Phoenix Contact GmbH & Co. KG, Blomberg, Germany, operates 50 international subsidiaries, including Phoenix Contact USA in Middletown, Pennsylvania.

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