Salzburg University of Applied Sciences presents a showcase project for building automation

Smart zenon: Automate buildings and gain valuable data

Salzburg University of Applied Sciences has completed an exciting project that is both practical and futuristic. In a project carried out by the University's students and its cooperation partner COPA-DATA, the HMI/SCADA software zenon is used to make the University building smarter and, in addition, to gain data for research projects.
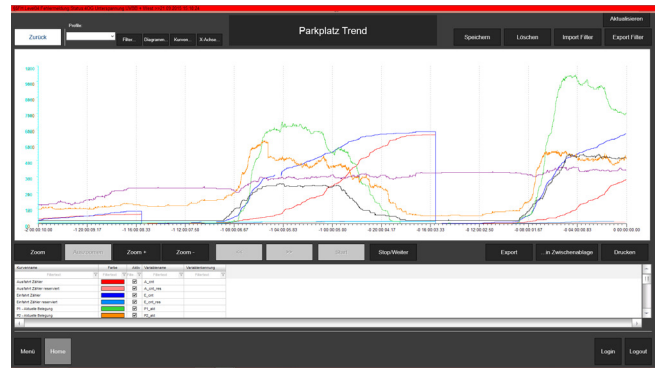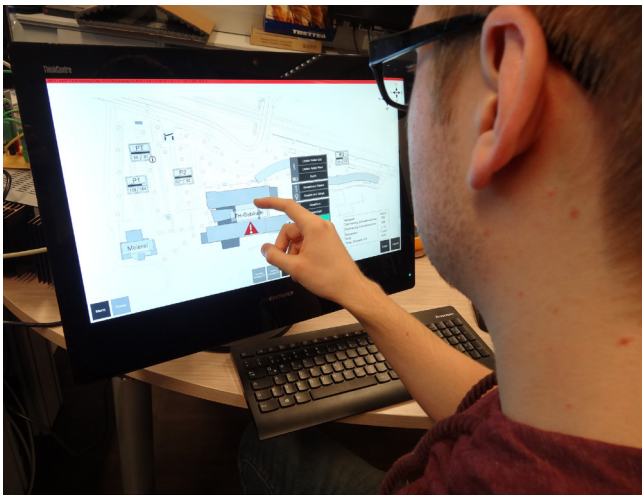

For over ten years, the University of Applied Sciences in Puch near Salzburg has been educating ambitious engineers, as well as social and economic experts and health, media and art professionals. At the same time, a long-term partnership connects the University with COPA DATA. In 2013, various interests combined. The University's building services team wanted to expand the existing building control systems that were originally delivered upon building completion and adapt them to their needs. The directors of the Information Technology and Systems Management degree program at the University and COPA-DATA were looking at the possibility of generating real process data with which algorithms for analyses

and storage could be tested. The solution: in a joint project, the University students renewed the building control services from scratch, implemented an interactive visualization for mobile devices and created the basis for the development of an ISO-50001-compliant energy management system for the University.

SYSTEMATICS IS THE BEST BASIS

The Salzburg University of Applied Sciences has hundreds of rooms for technology, administration, teaching and research. These vary considerably in location, size and configuration. Additionally, it has an underground parking facility and two

The parking space capacity is displayed graphically for specific time periods.

Perfect overview of the University of Applied Sciences. The visualization was optimized for display on touch screens and is thereby easy to use using mobile devices.

large open-air parking lots. Thousands of sensors and actuators, distributed across the buildings were already in place. The existing building control system was utilizing some of these, but with a crucial disadvantage. Christof Haslauer, student assistant, remembers: "The choice of the variable names was unfortunate and followed different naming conventions. Secure assignment of variables was therefore not possible within the large system that we had planned."

As a result, the project began with a Sisyphus-like job. The student team had to rename all variables and embed them in a clear nomenclature that applied across the entire building. Only in this way could it be ensured that during engineering the correct variables would be chosen from the 15,000 now available. Without this time-consuming preliminary work, it would be impossible, for example, to accurately identify and switch a particular light switch in a particular room.

A further important contribution to the systematic was the creation of the room data sheet. In practice, this means that in the new building control system each individual room is furnished with all relevant data. This includes room measurements, geographical orientation and purpose; details on technical features will also be available in the near future. This offers two important advantages for the University of Applied Sciences. On the one hand, each individual room can be visualized and directly controlled in the building control system. For this, the zenon Production & Facility Scheduler module (PFS) is used. This can centrally switch according to predefined schedules. On the other hand, building administration employees are

given valid data that support the planning of events and room allocation.

INTERNAL BUILDING SERVICES UNDER CONTROL – EVEN REMOTELY

Originally, during the initial construction of the University of Applied Sciences buildings, zenon was implemented for visualization and control by an external service provider. This has now been updated to the latest version and the engineering has been newly adapted. The key component of the new visualization is the large touch pad, which offers an overview of the entire building and allows the user to zoom right into the detail of an individual room. Additionally, a fixed component of the project is a zenon Web Server Pro that allows decentralized access via a browser. Authorized signatory and infrastructure manager, Hartwig Reiter: "Interior and exterior lighting is displayed and controlled here, as are shading slats and emergency calls in the University buildings. The Production & Facility Scheduler allows us to control processes in an automated manner as well as tailor them for individual events." The parking lots have also come under the property management's view. Every parking space is equipped with induction loops that are scanned by the system. Occupied and available parking areas can be identified at all times. And the capacity, for any time frame, can be displayed just as easily, by touch, using clear diagrams.

When it comes to hardware, the entire system runs on a server within the building services system. As well as zenon Runtime, the zenon Web Server Pro has been deployed.

www.copadata.com

An overview of all rooms on one floor. The individual status is displayed in color schemes.
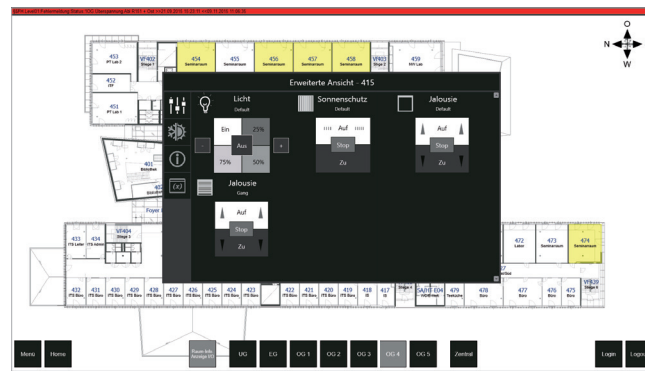
Each room can be displayed individually and controlled with a WPF menu.

A VPN connection has been set up too, because mobility is particularly important at the University of Applied Sciences. Building engineers can now remotely access the system from anywhere in the building; gaining an overview without having to use a desktop computer. Access is also possible from home. Even after work or at the weekend a switch can be adjusted or an alarm fixed very quickly and without an extra trip to the University.

STANDARD SOFTWARE FOR INDIVIDUAL RESULTS

The new control and visualization system for the building control technology was implemented by students using standard software. zenon was used here, particularly the following modules: Alarm Message List (AML), Chronological Event List (CEL), Production & Facility Scheduler (PFS) and the zenon Web Server Pro. Additionally WPF is used for some menus as well as a Microsoft SQL Server 2012 for room booking and parking administration.

The user interface was developed with standard zenon elements. WPF was implemented for the interactive menu with which individual rooms can be visualized and controlled. Connection to the building technology takes place via KNX; the parking lot is controlled via BACnet. Both protocols are already integrated in zenon as standard, which significantly simplified engineering and reduced engineering time. The relative data could be simply imported in a few mouse clicks.

Use of the zenon Message Control module is planned in the next extension stage. Then alarms will be sent as text or voice message to the appropriate person. Thus, problems can be quickly rectified.

ENERGY MANAGEMENT AND SMART BUILDINGS

The system is now ready for further enhancement stages. Two developments are of particular interest. The infrastructure of the University of Applied Sciences should be equipped with an Energy Data Management System according to ISO 50001 in the medium-term. zenon already offers ready-made modules for this enhancement. The next step will involve the installation of electricity meters needed for detailed analysis and control operations. In addition to ISO 50001, another goal is to integrate more of the existing bus systems into the visualization.

The implementation of new systems for Smart Buildings and Smart Cities are planned in further joint projects between the University of Applied Sciences and COPA-DATA. So, for example, equipment and buildings can be simulated, showcases drawn up for feasibility studies, and scenarios developed for the implementation of ISO 50001. A self-learning building, that can interpret manual switching operations and derive rules out of these, is also on the wish list. These plans are perfectly supported with real data because so much data has already been collected from the building management technology's basic system.

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What became very clear was how important the precise structuring of the data points at the beginning of the project had been. Only then were the students able to rapidly implement an ergonomic interface for the user.

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REINHARD MAYR, PRODUCT MANAGER AT COPA-DATA

However, the further development of the building services of the University of Applied Sciences is not staying within the student project of the Information Technology & Systems Management degree program. Employees from external companies that are responsible for the building technology are being zenon trained and updated on the current project. In the future, the team will thereby be in a position to undertake individual adaptations themselves. "For me this project is a fine example of a successful cooperation between a university, students and the private sector. A real win-win-win situation, where all those involved can profit from gained experiences and sustainable results," summarizes Simon Kranzer, project supervisor and research associate in the Information Technology & Systems Management degree program.

SMART BUILDING AUTOMATION AT SALZBURG UNIVERSITY OF APPLIED SCIENCES

▶ All rooms cataloged and visualized individually
▶ Automated switching of light and sun protection
▶ Emergency call points integrated in the building
▶ Overview of parking spaces
▶ Approx. 15,000 variables
▶ Extension to Energy Management System according to ISO 50001 planned
▶ Data basis for own project