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Common sensors for ingenious applications

What is the Internet of Things without sensors? Anyone from the world of sensor technology would respond by asking "what is a brain without ears, eyes and nose?" in return. It's not a question anymore if the Internet of Things is the future. And it's not a question if we need sensors to collect valuable data. We now have to ask how we can get the most out of the available sensors and what we can do with the data.

Almost every branch is talking about the Internet of Things and experimenting how this industrial revolution could benefit their business. The key to this is having the right sensors in place that collect useful data and a system analysing this data to provide valuable information.

Pilot Project Life Cycle Tower ONE

The Rhomberg building "Life Cycle Tower ONE" (LCT ONE) is home to a new pilot project between the Zumtobel Group, Rhomberg GmbH and Bosch Software Innovations that came to life in spring 2016 (photo 1, 2). Tridonic sensors were attached to the existing lighting infrastructure LITENET by Zumtobel Lighting which is connected to the cloud-based "IoT-Suite" by Bosch Software Innovations. The data is collected through the luminaires, processed to the IoT-Suite and analysed by Bosch. Through the dashboard that was programmed especially for this purpose, the user receives the results in understandable and user-friendly graphics. One of the graphics shown in the dashboard is a heat map which displays how frequently occupied the different rooms of the building are. In the course of the day, the energy consumption is calculated and information about cost saving is provided. This helps the building manager to reduce maintenance costs and improve the productivity of space. Now the experts are even working on optimizing the cleaning service.

New sensor applications

The sensors used in this pilot project are PIR sensors and optical camera sensors. PIR (Pyroelectric ("passive") InfraRed) sensors collect data by intercepting with infrared. The sensor is used to detect moving, living objects, i.e. humans and animals. In the heat map each PIR sensor provides one pixel, including a factor specified in percent to show the occupancy (graphic 3). As this view is not very detailed, optical camera sensors were added. These sensors work like a camera but process the information immediately and provide many pixels to the heat map. Through this, the map reaches a much higher granularity (graphic 4). "Even though these sensors are not an innovation itself, the data they provide are used for new applications" Georg Terlecki-Zaniewicz, one of the Project Managers in charge of the pilot project, explains. "With this installation we are now able to create new applications that go beyond lighting" he continues. "Space management and remote monitoring are the new applications used at LCT ONE at the moment. In future it will even be possible to extend the functionality of a lighting system by enabling indoor navigation. In addition, a lean interaction with other trades of a building, e.g. the HVAC system, automatic blinds, or the security system will reduce the complexity while adding new value-adding services." The beauty of having all the trades connected, lies in the more holistic analysis: full transparency about how a building is used will enable building operators to minimize operating costs and maximize user satisfaction. Office users, for example, will

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not have to adjust to automated building settings (e.g. temperature, light) anymore, but buildings will adjust to users' behaviour.

Sensor fusion

The next big step in sensor technology is sensor fusion where data from existing sensors is taken and combined. The results have a much higher accuracy and the "knowledge" of the complete system is enhanced. Furthermore, presumptions can be made based on the data, enabling new services. Imagine a hotel with 25 stories. A person leaves his room and walks down the aisle towards the elevators. A connected system detects the person leaving the room, the route he or she takes and presumes that the person intends to use the elevator. Based on this presumption, the system can then trigger a command to the elevator and send it to the floor on which the person is at that moment. The result: the person's time waiting for the elevator is markedly reduced. "This example shows that sensor fusion in connected systems can detect what is going on and presume what will happen in future" says Eduardo Pereira, Application Innovation Architect at Tridonic (Photo 5). Pereira is one of the specialists at Tridonic's sensor competence centre in Ennenda, Switzerland, working for the Zumtobel Group. "I believe that there is a huge market for this technology and many areas that can profit from sensor fusion. More customer comfort, increased safety and a bigger cost-saving potential are only three examples."

The example of the pilot project in the Lifecycle Tower ONE in Dornbirn illustrates that sensor technology offers vast application possibilities. According to Pereira, sensor technology works like the smartphone business: before smartphones were available no one needed them. Once they were introduced to the market and users unlocked the phone's value, they now cannot imagine a life without a smartphone anymore. The same applies for sensors. The powerful technology is progressing very fast and many possible applications are waiting to be discovered. The specialists at Tridonic, together with their partners, are convinced that they will activate more applications in future. "Sensors are the eyes, ears and nose for the Internet of Things and the range of possibilities go beyond our imagination" Eduardo Pereira comments with an inspirational smile.

Photos:



Photo 1 and 2: In- and outside view of the Life Cycle Tower ONE in Dornbirn (© Müller Norman A.)

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Graphic 3 and 4: Visualisation of Dashboard used in the Life Cycle Tower ONE



Photo 5: Eduardo Pereira, Application Innovation Architect at Tridonic in Switzerland explains the power of sensor fusion (© Tridonic)

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Melanie Speichinger joined Tridonic as Head of PR in March 2015. She is responsible for internal and external communications with an emphasis on the topic connected lighting. She started her career as a PR consultant at Ketchum Pleon in Düsseldorf. From 2009 until 2015 she worked as PR and Marketing manager for Metro Group and was responsible for international communication, branding and publishing. She holds an M.A. in American studies, Computer Linguistics and Business Informatics.