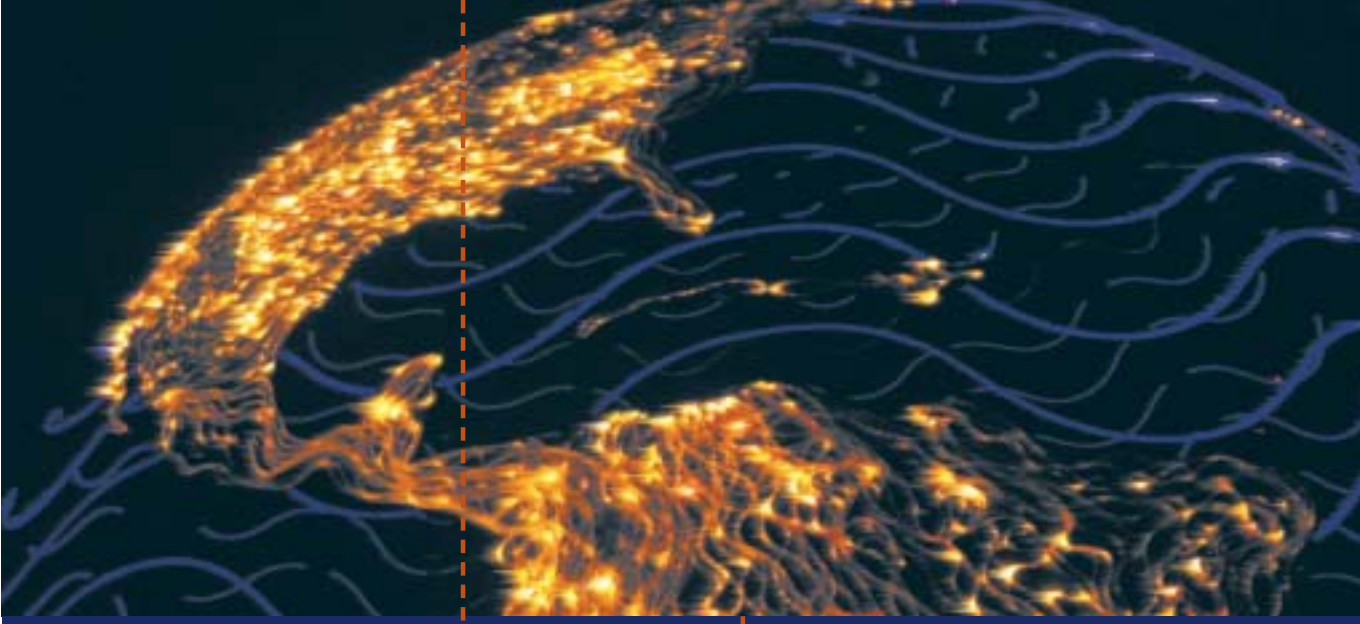

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perpetuum

MAINTENANCE FREE WIRELESS SWITCHES & SENSORS

01

INTERNATIONAL EDITION

REVOLUTIONARY
What's the best radio system for building automation

INNOVATIVE
Low-power consuming radio technology without batteries

ENABLED BY ENOCEAN
SPACE – Siemens Munich:
an office goes high-tech

NETWORKED
A farewell to cables in industrial automation

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+++ NEWS +++ German Chancellor Gerhard Schröder presents EnOcean GmbH with a certificate for outstanding technological innovation. The company received the international Hermes Award 2004 Top 5. +++

+++ These symbols will help you to match the content of the articles in the magazine with the various applications of EnOcean technology +++

Automotive **Building Automation** **Manufacturing** **Logistics** **Medical** **Refers to all applications**

The power of unused energy
enocean

German Chancellor Gerhard Schröder with Markus Brehler of EnOcean

EDITORIAL

Dear Reader,

Munich, November 2004

There is a quiet revolution going on. Imagine a world where doctors can implant sensors in their patients to continuously monitor chronic conditions. A world where tires are constantly monitored from the inside to make sure that their pressure is always correct for the load being carried. A world where the partition walls in offices can be moved around at will and the light switches and air-conditioning controls can simply be stuck to the walls wherever convenient, with no need to worry about wiring. These are just a few minor examples of the kind of applications that become possible when you create a wireless sensor that requires no batteries.

This is what EnOcean's technology is all about. We are using a unique combination of wireless and batteryless technologies to create a whole new world of sensors!

These sensors scavenge minute amounts of energy from the environment around them, perhaps from a slight temperature change, the vibration caused by a small movement or the pressure of someone flicking a switch. This energy is then used to transmit very short, ultra-low-energy radio signals which contain data collected by the sensor. The sensors require no batteries and therefore no maintenance.

Eliminating the need for maintenance not only drastically reduces the life-cycle costs of a sensor, it also opens the door to numerous new applications.

This is the first international issue of perpetuum, the customer magazine of EnOcean. We started out in 2001 and, having successfully introduced our technology to our home market – Germany, we are now going international. We presented our products outside Germany for the first time in our booth at the 2004 Wireless Sensing Solutions Conference, from September 21-22 in Rosemont, Illinois, USA.

Inside this magazine, you will find details of some of the highlights of our technology and its applications. Let us inspire you with the power of unused energy!

Markus Brehler,
Chief Executive Officer

REVOLUTIONARY

WHAT'S THE BEST RADIO SYSTEM FOR BUILDING AUTOMATION?

This is a question which systems integrators, electrical installation planners and even architects and private house builders are having to consider more and more often. There are many aspects to bear in mind, and the decision is complicated by the wide range of systems on offer and the large number of relevant performance parameters. This article looks at a selection of radio technologies and considers the most important performance parameters – What are the key factors to watch out for?

By Frank Schmidt, Chief Technology Officer

A systematic analysis of individual requirements regarding the performance, costs and flexibility of the desired radio system quickly narrows down the choice. Let's take a closer look at this decision-making process.

DECISION 1: LARGE OR SMALL DATA VOLUMES?

Do you want to transmit moving images by radio, link up computers wirelessly or operate your printer without cables? If so, you need a radio system with a high data rate which can transmit large volumes of data in a short time. This level of performance is achieved by the radio standards WLAN or Bluetooth - but they do require a lot of power. This means that they are not suitable for battery operation over longer periods.

However, most automation functions only require brief radio transfers of small amounts of information. Switching lights and equipment on and off, operating blinds, and in particular transmitting information from radio sensors such as climate control detectors, position sensors or smoke detectors all fall into this category. If you wish to implement applications like these, you have another decision to make to further narrow down your choice of technologies.

DECISION 2: WHAT ENVIRONMENT?

This is a vital point when it comes to ensuring reliability of radio transmission. Radio data sent out simultaneously by several transmitters situated near a receiver will "collide", and cannot be evaluated by the receiver. This causes relatively few problems in a detached residential property because the radio channel is only used by a fairly small number of radio sensors and radio switches, so it is never overloaded. Proprietary battery-operated radio solutions offered by various installation technology manufacturers will work sufficiently well here, in spite of their relatively low data rates which makes the transmissions prone to collision. However, the situation is quite different in larger buildings. Here, there may be many radio components in a small space. It is therefore vital to select a radio system which is properly able to cope with this risk. A low-cost method of preventing unwanted data collision is to keep radio transmissions very short by increasing the data rate used for transmission. The "ZigBee" standard is a step in this direction.

DECISION 3: IS ZERO-MAINTENANCE IMPORTANT?

If the maintenance input associated with changing batteries in radio sensors and radio switches is a disadvantage, batteryless systems are also available. EnOcean GmbH is currently the only technology provider for such products. The technology has been developed on the basis of practical experience with existing radio systems. It is well worth taking a closer look at the specific features of this radio system.

	EnOcean	Typical proprietary radio system	ZigBee 802.15.4	Bluetooth 802.15.1	WLAN 802.11
Frequency (MHz)	868 / 433	868 / 433	868	2450	2450
Data rate (Kbps)	120	~10	20	720	11000...54000
Range (m)	300	300	100	10	100
Energy requirement	extremly low	medium	low	high	very high
Batteryless operation possible? *	yes	no	no	no	no
Risk of data collision/ channel capacity loading	very low	high	medium	high	very high
Optimum solution for the following tasks	Zero-maintenance batteryless sensors and switches	Battery-operated switches and sensors	Battery-operated switches and sensors	Networking printers and DAs with a computer	Web, e-mail, video

* Feasibility of implementation was evaluated as involving a small additional cost compared to battery systems.

ENERGY REQUIREMENTS

The radio protocol requires just 0.12 µWs to reliably transmit 1 bit of data over 300 m (of open space). An EnOcean radio switch requires 50 µWs of energy for a complete radio command. Both these values are extremely low – around 100 times lower than standard battery-operated radio switches.

TRANSMISSION RELIABILITY

The extremely short telegrams (one switch telegram lasts just 0.5 milliseconds) and an intelligent strategy of repeating each transmission step several times ensure excellent collision-resistance and provide protection from sporadic and periodic radio interference. Thus, over 99.9% of the signals sent by up to 500 EnOcean transmitters installed in close proximity to one another and each transmitting once a minute are actually received.

SCALABILITY AND RADIO TOPOLOGIES

The EnOcean telegram structure is very flexible and can be extended in terms of data structure, data volume, encryption procedures, frequency bands and modulation methods. In addition to the uni-directional switches and sensors, bi-directional EnOcean modules support more complex radio topologies including intelligent sensor systems such as star/mesh networks.

INTEROPERABILITY

The ever-expanding community of users of EnOcean radio technology has already created a wide range of compatible radio components. This means that products from different manufacturers can operate together via the radio interface. For example, signals from radio switches produced by PEHA or omnio, room thermostats made by Thermokon or Stuhl Regeltechnik and radio receivers from WAGO, Beckhoff or Wieland can be received and processed so they are understood by the relevant Bus system.

CONCLUSION

No radio system can fulfil all of the different requirements equally well. The WLAN and Bluetooth radio standards are suitable for applications with high data volumes. Controlling building functions or transmitting sensor data opens up the possibility of using wireless sensors or switches. However, in functional buildings it is not acceptable to have to maintain battery-operated devices. Here, maintenance-free systems based on the EnOcean radio system can also be created for large buildings where numerous radio devices are installed.

REVOLUTIONARY

RADIO SOLUTIONS – BEST PLANNED AS PART OF OVERALL SYSTEM

By Frank Schmidt, Chief Technology Officer

When the first steam-powered vehicles were invented, they had wheels (proven technology - even horse-drawn carriages had wheels) and – to push them along – they had legs. Legs?? Well, why not? The horses had legs too ... Curiosities like these are often seen when new technologies are introduced – "tried-and-tested" solutions are not always logically re-evaluated. In the case we're looking at here – the growing use of radio solutions – there is a risk that existing cable connections will simply be directly replaced by radio solutions. From this perspective, the radio modules need to offer identical interfaces to the cables, and their value is measured by comparing their reliability and cost with that of the cables used before.
This kind of "cable-centred" thinking can easily lead us to underestimate the potential of radio solutions in the overall system.

LET'S LOOK AT A TYPICAL SCENARIO FROM INDUSTRY

Sensor technology with sensor module STM 100

Cable-linked sensors are used on a moving part of a machine - for example a slide or a gripper arm. These specialist cables are expensive and break easily because they are under constant strain. They therefore require regular maintenance and replacement, which costs money and causes downtime – good enough reason to check out the advantages of a radio solution. What do we have to look out for?

Cost. The cable costs x, maintenance and replacement entail costs of y per year. If the radio solution costs less for the same performance, it will be considered. Or won't it? Well, the following finer points need to be borne in mind here.

Added value to the system. Radio solutions are particularly useful when their additional benefits are used rather than when they simply replace a cable.

Availability. In contrast to the cable, sensor information is available anywhere within a specified radius. Additional receivers can also use the sensor information, for example to optimise material transport or to gather sensor information in fixed or mobile nodes.

Bi-directional communication with TCM 120 transceiver module

Rolling door with RCM 120

Forklift with PTM 200

Radio switch with STM 100

Scalability. Once the radio link has been set up, additional sensors can be installed without any considerable extra cost, for example to enhance process quality.

Flexibility. Alteration work can be carried out easily. This is a major advantage, particularly when regular refits are required.

Mobility. Mobile operating devices can be carried by people or vehicles. This can considerably enhance the efficiency of processes.

RELIABILITY OF THE OVERALL PROCESS

The reliability with which a cable can transfer information seems to be a real practical limitation to the use of radio technology. However, a chain always breaks at its weakest point, so there is no point making individual links particularly strong. What's the use of having a cable with a fault probability of 10^{-9} (which means that one in a billion transmissions go wrong) if the operator forgets to order material on schedule every thousandth time?

The process will then fail at least once every thousand times. So the reliability of a transmission medium has to be evaluated within the context of the overall process. In individual cases, you can't get round the need to analyse which factors hold up the overall process most often. Once you know this, the very wide range of possible uses of radio sensors often offers some useful assistance.

MAINTENANCE-FREE RADIO SOLUTIONS

There is one major advantage of cables which we mustn't underestimate – they are (largely) maintenance-free. EnOcean's zero-maintenance radio components which run on ambient energy also offer this advantage. There is now a whole range of different manufacturers' products based on EnOcean technology which can be used in the scenarios we have described – as radio sensors, switches and operating devices, receivers with load outputs, repeaters, and interfaces to computers or cabled systems. You can read about how EnOcean accommodates specific customer requirements and develops new products to high quality standards in Matthias Heiden's article on page 11.

STM 100 sensor module in action

Dr. Wolfgang Heller, Product Line Manager (left) and Armin Anders, Product Marketing Director (right)

In the "Innovative" section of perpetuum, we will be bringing you regular updates about our products and their applications. In this first edition, we'll show you the series-produced radio modules which are already available:

Transmitters:	*PTM 100, PTM 200, STM 100*
Receivers:	*RCM 110 / 120*
Transceivers:	*TCM 110 / 120 / 130*
Field strength measuring device:	*EPM 100*

We'll also be giving you a preview of our latest products.

Downloadable from www.enocean.com

LOW-POWER RADIO TECHNOLOGY WITHOUT BATTERIES!

Flexible and environmentally-friendly solutions for building and industrial automation.

Wireless transmission of data and signals is already a fact of life. It's used in many areas of our daily lives – in mobile phones, cordless phones and laptops, for example. Many machines use wireless transmission without us even realizing it. It's already an important market in the telecommunications sector, and is known as "M2M" (machine to machine) communication.

When it comes to building installation technology, radio solutions can be employed in a number of useful ways – for example in light switches which can be positioned wherever you want them, radio-controlled exterior temperature sensors, wireless window and door contacts, and even wireless energy consumption meters for radiators!

EnOcean's revolutionary technology offers a whole series of new potential applications in buildings. Its small radio transmitter modules require no batteries or power packs and have an indoor range of up to 30 m with excellent transmission reliability. Different kinds of energy generators, such as our piezoelectric generators, convert ambient energy into electrical energy when you flick a light switch. The amount of energy released when the switch is pressed is so small that it would be nowhere near sufficient for conventional radio systems. But now, after many years of intensive research work at Siemens AG, we have managed to develop a unique low-power radio system which on average requires 100 times less energy than other battery-operated systems. EnOcean GmbH, a spin-off company of Siemens, has the job of developing and marketing radio modules suitable for use in building technology as well as other areas.

EnOcean radio modules are ideal for creating radio switches and sensors for operating, control and detector systems. They can be flexibly built into existing systems, and can even be used to achieve wireless control of all operating functions and processes via a wide range of sensor functions. Thanks to the self-sufficient energy generators, EnOcean radio transmitters and sensors do not require any maintenance at all!
They are the perfect symbiosis between conventional technology and radio technology.

ENOCEAN TECHNOLOGY

- **Batteryless and maintenance-free!**
- **868 MHz / 433 MHz and other frequencies possible**
- **300 m range in open spaces with high interference resistance and minimum radiation output**
- **30 m range indoors (depending on building material, supply ducts, etc.)**
- **Small, very robust and hermetically-sealed remote switches and sensors can be produced**
- **Lower risk of causing fire in the building**
- **Environmentally-friendly**

GREENER

People often argue against the use of radio technology in buildings because of the electromagnetic radiation it produces and because of the need to constantly use batteries.
On behalf of EnOcean, the respected Ecolog Institute has evaluated low-power radio light switches equipped with EnOcean technology. The results are surprising, showing that the amount of radiation released by an EnOcean radio switch is far lower than that of a conventionally wired switch.
Why?
The reason lies in the fact that when a conventional switch is operated, a spark emission – a broadband pulse of radiation – is produced directly at the switch. This pulse more or less disappears after travelling a short distance. However, it nearly always hits the person operating the switch. With a radio switch using low-power electronics, there is no spark emission. Instead, a radio signal lasting for one thousandth of a second is sent to a receiver. The electricity is then switched at the receiver, which is usually a few meters away from the person, which means that the broadband radiation pulse (electrosmog) dissipates in the air.
The lack of cables in the wall means that the level of low-frequency 50 Hz radiation is also reduced.

PTM 100 – THE SWITCH MODULE

- Self-sufficient radio transmitter, power supply from button actuation (piezoelectric)
- Compact design
- Mechanical interface for
  - up to four rocker switches
  - up to eight buttons
- Unique 32-bit identification

PTM 200 – THE SUPER-SLIM MINIATURE SWITCH MODULE

- Maintenance-free energy supply from button actuation
- Optionally – one or two rockers or up to four push-buttons can be installed
- Dimensions: 40 mm x 40 mm x 11.2 mm
- Actuation path: 1.5 mm
- Actuation force: approx. 5 N

STM 100 – THE SENSOR MODULE

- Maintenance-free sensor module
- Supplied by mini solar cell, 1 cm x 2 cm
- Will operate for several days in complete darkness
- Periodic presence signals
- Three A/D converter inputs
- Four digital inputs

INNOVATIVE

RCM 110 AND RCM 120 – THE RECEIVER MODULES

- Radio receiver and actuator control modules for receiving and pre-processing EnOcean radio transmitter signals
- Basic functions include switching, blind control, dimming and use as a serial interface for Bus systems
- The power section is dimensioned and integrated by the user depending on his power requirements
- simple teach-in procedure for up to 30 radio transmitters
- Memory function (for light and blind scenes)

above: RCM 110 und 120

TCM 110 / 120 / 130 – ENOCEAN BI-DIRECTIONAL

- 5V voltage supply
- 30 mA power consumption
- Dimensions: 42 mm x 24 mm x 5 mm

TCM 110

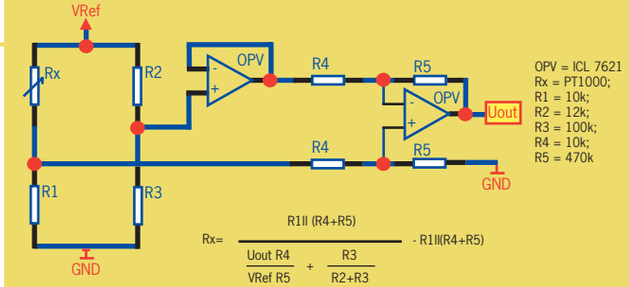
- Single-level repeater for EnOcean radio telegrams

TCM 120

- Bi-directional radio device
- Modem functionality
- Serial interface

TCM 130

- Software API for TCM 120 hardware
- Programmable in C-language
- Bi-directional serial interface support
- 4 Digital / analog inputs, 4 digital outputs



The additional circuitry shown here allows temperature information from a Pt 1000 resistor to be measured using the STM 100. The measuring range is set at around -20ºC to +50ºC. R2 serves to set the temperature offset. The measuring range can be set via the R5/R4 resistance ratio.

STM 250 – WINDOW CONTACT, WIRELESS AND YET MAINTENANCE-FREE

- Maintenance-free energy supply from daylight
- Will operate for several days in complete darkness
- Immediate signal transmission whenever window is closed or opened, triggered by window magnets
- Periodic presence signals
- Contact detector (110 mm x 19 mm, height 15 mm) can be fitted to all windows

above: STM 250, window contact – wireless and versatile

EPM 100 FIELD STRENGTH METER

Electrician's installation aid for EnOcean radio components. For range analysis and simple evaluation of signal quality and/or detection of interference sources.

EVA 100 EVALUATION KIT

A test board to simplify integration of EnOcean radio modules.

right: EVA 100
left: TCM Bi-directional radio device

QUALITY

PRODUCT DEVELOPMENT AT ENOCEAN

There are numerous challenges involved in creating batteryless radio technology products. Simultaneously developing self-sufficient energy systems (such as the piezoelectric converter), energy-saving digital and analogue circuits and the software for efficient energy management and radio protocol control requires extensive interdisciplinary expertise.

By Dr. Matthias Heiden, Chief Engineering Officer

Product success requires a systematic product development process in order to achieve the set objectives in terms of deadlines, costs and quality. The development process is divided up into individual sections which are delineated from one another by important sub-objectives known as project milestones.

The step from one project stage to the next is only taken once all the requirements of the previous stage have been fulfilled. A formal review process with tried-and-tested checklists ensures an effective process flow and ongoing monitoring of project progress. With customer-specific developments, the client is involved in the development process and in checking off the various milestones.

At the beginning of the process, a preliminary team assesses the product concept in terms of its functional scope, market launch schedule, manufacturing costs, quantities and prices, and draws up a product plan scenario which serves as a "profile of requirements" ("Definition approval D0"). In the next step, this profile of requirements is further refined using specific customer surveys to assess market circumstances and by taking a closer look at technical feasibility. This work produces a rough technical implementation concept which can be submitted for approval ("Concept approval D1"). Once the D1 milestone has been approved, the development team is tasked with making a detailed assessment of the profile of requirements and coming up with a final, binding project description giving details of all the relevant investments, time schedules and resources. Once the project description has been approved ("R1 deadline"), the product features are agreed and the actual technical implementation work begins.

Turning the project description into a product suitable for series production involves three implementation stages:

- **The A sample** (experimental prototype) features all the critical basic functions for operation at room temperature. The assemblies are put together using hardware, software and possible housing components to create preliminary devices with the correct mechanical dimensions. A samples are used for purposes of internal demonstrations, but are not intended for evaluation by the customer.
- **B samples** (prototypes) fulfil the entire product specification but do not yet meet statutory requirements regarding electromagnetic compatibility and radio technology. Since they may still malfunction, they are in principle only intended for internal evaluation by selected reference customers.
- **C samples** (pre-series) are manufactured in a manner which takes account of all production-related processes and are used to demonstrate the technical maturity of the product and the entire production process. They have to fulfil all statutory requirements. Once approved, C samples can be delivered to selected customers for purposes of field trials in the same way as series products.

Once internal and external field trials have been successfully completed, the supply approval is given and the proposed quantity of the product can be released onto the market. The product-specific project team is dissolved and the ongoing management of the product, for example constant monitoring of quality data from the production environment and the field and possible follow-up campaigns, is handed over to the product support department.

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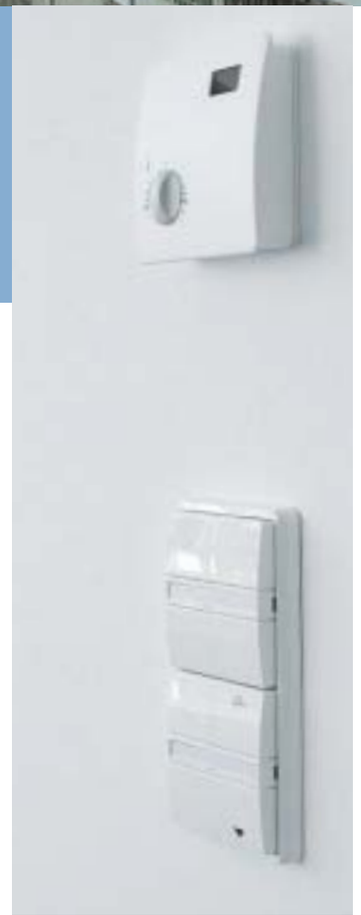
BATTERYLESS RADIO TECHNOLOGY FOR FENG SHUI-CERTIFIED OFFICE COMPLEX

In September 2003, Bosch und Siemens Hausgeräte GmbH, one of the three world's leading domestic appliance manufacturers, moved into its new premises in Munich, Germany. EnOcean batteryless radio switches and room sensors have been installed in around 150 managerial offices and meeting rooms in the aviva MUNICH office complex, which was built with the principles of Feng Shui in mind.
By Peter Pernsteiner, journalist

ENOCEAN TECHNOLOGY AT AVIVA MUNICH

A first glance at the new aviva MUNICH office complex is enough to tell you that the architects wanted to create a building with style which would give the people working in it a true feeling of well-being. As well as a large fountain, two fully-glazed courtyards with trees, green spaces and water features enhance the appearance of the building, which offers a full 54.000 m^2 of office space and has been certified for its Feng Shui credentials. The needs of its tenants were taken into account during building.

Bosch und Siemens Hausgeräte GmbH (BSH) occupies around two-thirds of the office complex, which was completed in the summer of 2003. The company was able to exert considerable influence over the detailed planning of the building during the construction phase. For example, Thomas Leipold, who is in charge of facility management technology at BSH's head office, was very keen to ensure that the building's 150 offices and meeting rooms, which are accessed through connecting doors, should retain flexibility in terms of their installation technology. BSH also wanted maximum freedom in the way that the premises are subdivided. "Our product portfolio is constantly developing, which means that we are often changing focus and forming new staff groups. We have up to 400 internal transfers every year, a large number of which require alterations to be made to room sizes and divisions", says Mr. Leipold. When planning the building's electrics, the Knab engineering practice was therefore asked not to install electrical equipment in any wall apart from the walls of the central corridor. Fischer&Fey engineers were asked to apply the same strategy to the climate control technology. The two companies therefore got together and segmented the ceilings and intermediate floors so that every window-width room section (approx. 135 cm wide) has two independent lighting circuits (one next to the window and one next to the corridor) and a cooling system installed in the floor which can be independently and flexibly adjusted using TCP/IP-networked room control units. These room controllers, which can be configured centrally, normally operate completely independently and typically supply the electrical and climate control equipment in five to eight neighbouring offices.



In the separate managerial offices, batteryless piezoelectric radio switches have been installed to control the blinds and the lighting (below). Solar-powered radio room thermostats have also been fitted.

CABLE-FREE PARTITION WALLS

"Although the light and blind switches in the secretaries' offices and the open-plan offices could be wired directly to the room controllers, we had to find a different solution for the areas where partition walls are in use, and we wanted the installation outlay to be as small as possible", explains Thomas Leipold. Radio switches seemed the most obvious solution. Nevertheless, there had always been a serious problem with power supply with this technology in the past. Batteries usually had to be replaced once a year – a time-consuming and expensive task in the long term. Moreover, regular data collisions caused by too many data telegrams being sent over the radio channel at once were a fact of life in large office complexes using the radio switches commonly available. Fortunately, BSH had for some time been monitoring the development of EnOcean's revolutionary radio switches using piezoelectric elements for energy generation. This technology uses extremely short radio telegrams with random multiple transmission, giving the EnOcean switches outstanding transmission reliability and making them the ideal solution for large office complexes with hundreds of radio switches. When systems integrator Imtech and building automation systems supplier Beckhoff were working out the detailed planning for the building, they had to ensure that the correct receivers for the radio range were integrated into the Bus coupler system. "Once the field Bus room controllers are networked, it's not necessary for every room controller to have its own receiver. We mainly got away with only one or two radio receivers for each fire protection zone on a floor of the building", explains Thomas Leipold.

EASILY ADJUSTABLE

Thanks to the TCP/IP networking of decentralized room controllers, all switching tasks can be flexibly adapted by a central control computer to suit people's individual requirements. For example, if somebody doesn't want all the lights next to the window or the corridor in their office to be switched on or off at once, this can be accommodated by simply installing an additional EnOcean switch and making the correct software adjustment to the room controller. The same applies if a manager prefers convenient control of the lighting and blinds in his office from his desk as well as via a wall switch.

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The fully-glazed courtyards also ensure that the staff working in aviva MUNICH enjoy a pleasant environment.

Since the field Bus room controllers don't just control the electrics – they also operate in conjunction with room temperature sensors to adjust the cooling systems installed in the floors, it also seemed logical for Fischer&Fey to install radio connections for the room temperature sensors in the areas where partition walls are in use. Here again, EnOcean radio technology was chosen. Thermokon room thermostats fitted with an EnOcean radio module with mini solar cells were used.

CONCLUSION:

EnOcean's versatile technology proved its worth during the planning phase of the aviva MUNICH office complex. However, it was only able to demonstrate its full potential after the building's new occupants had moved in. People's individual requirements can now be quickly satisfied, thanks to the maintenance-free radio switches and room sensors.

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CLEVER USE OF ENOCEAN TECHNOLOGY

An insurance company builds a new home for itself in central Vienna, Austria. The imposing UNIQA Tower is 21 storeys and around 75 metres high. It is a future-focused building offering cutting-edge workplaces, space for cultural events and a great deal of flair for workers, customers and visitors.

By Andreas Schneider, Executive Vice President

It is the glass which gives the building such a feeling of openness. It has a double-glazed facade which offers excellent insulation and is part of an intelligent system for climate control, lighting and shade. It is geothermally heated. According to its website (tower.uniqa.at), "the UNIQA Tower is full of good intentions: To be environmentally-friendly and cost-effective. To save energy by using natural resources. And to offer its staff the optimum working environment." Inside, it also features a very open design and offers maximum flexibility.
Achieving the right interior climate in the office space was one of the biggest challenges. Users can adjust the climate control settings in most of the rooms via a WEB user interface on their office PCs to create a climate that's pleasant for them. However, due to the architectural design – which features neither fixed partition walls nor corridor walls – and the need to make flexible use of the space, there was nowhere to fix or cable room temperature sensors. And since the climate-control system in the building consists of an air-source system with cooling systems installed in the floors, measuring the temperature of the expelled air is not useful from a systems point of view.

Mr. Peischl, a planning engineer from the Altherm engineering office handling the project, therefore decided that installing wireless, maintenance-free radio temperature sensors from Thermokon in the LON-Bus network was the only practical and innovative solution to the problem. The sensors are simply mounted on the walls and are powered by energy from small solar cells. They transmit their temperature information via very short radio telegrams to radio receivers which are installed at central points in the floors.
Mr. Peischl explains the corporate philosophy of Altherm. "As a technical engineering practice, we used our expert consulting, planning engineering

The UNIQA Tower in Vienna, Austria: Engineer Gerald Peischl from Altherm took the decision to use the Thermokon solution

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Thermokon SR04 EasySens sensor

and calculation skills to develop innovative, future-focused solutions for the heating, air-conditioning, climate control, sanitary facilities, electrical equipment and environmental technology. Our know-how in building technology is based on expertise in natural sciences, technical science, economics, ecology and environmental science. We have already handled a large number of projects in this way in the past. This expertise and the motivation to constantly learn more as we handle economically and ecologically balanced projects as part of a team with architects and building owners is what our work is all about." This philosophy was successfully applied to the UNIQA Tower using EnOcean technology and Thermokon sensors.

TOP-QUALITY SENSOR SYSTEMS FOR BUILDINGS TECHNOLOGY

"In the UNIQA Tower, we used our latest technology, the groundbreaking EasySens radio sensor system. We believe in creating tailor-made solutions for temperature, relative humidity, air quality and light levels. Our objectives are to achieve a high level of comfort, enhanced well-being, simple yet intelligent control and – last but not least – to be sparing with our planet's energy reserves.

OUR PHILOSOPHY: TRANSPARENCY, COURAGE, HONESTY AND A WILLINGNESS TO LEARN.

We know that our products and services will only impress people if they are constantly being updated, are flexible and feature groundbreaking innovations", says Mr. Gaida, Managing Director of Thermokon Austria.

Further information about the UNIQA Tower and reference sources: tower.uniqa.at
Executing firm: Johnson Controls Austria GmbH, Vienna: **www.jci.com**

Thermokon SR65 external temperature radio sensor

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SPACE – SIEMENS MÜNCHEN: AN OFFICE BUILDING GOES HIGH-TECH

Over the past few decades, the demands placed on modern office buildings have changed considerably. The latest technology and new materials have boosted the need for flexible workplace design, optimum lighting and air-conditioning, and have enhanced our awareness of environmental aspects. The office complex leased by Siemens Real Estate in Boschetsriederstrasse in Munich, Germany, has recently been renovated and has been totally transformed almost overnight thanks to the use of European Installation Bus/Konnex (EIB/KNX) and batteryless radio technology.

By Andreas Schneider, Executive Vice President

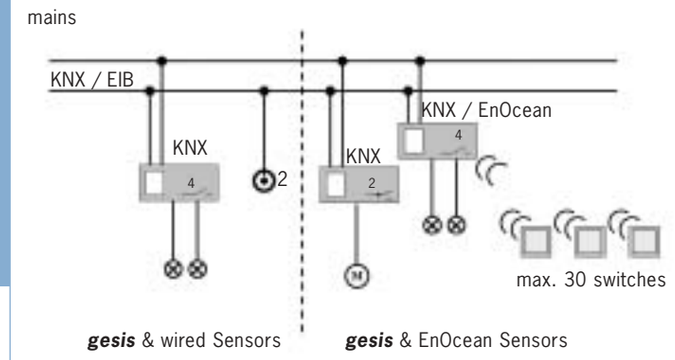
The aim of the project was to create a flexible workplace system in the building used by Siemens and to give individual employees optimum working conditions. Prior to the renovation work, the offices were divided by rigid walls with conventional cabling. The building has an east-west aspect, so the south-facing offices were well lit. However, the corridors and the north-facing offices required extra daytime lighting. To minimise the period for which the building would be out of service and reduce the associated additional costs, the renovation work needed to be carried out in the shortest possible time.

PLUGABLE RADIO CONTROLLED INSTALLATION SYSTEM

To achieve these objectives, Wieland Electric trialled its plugable gesis rc installation system together with an EIB/KNX interface based on batteryless radio technology from EnOcean before the renovation work began. When the technology was demonstrated, its benefits were clear to planning engineers, installation engineers, facility managers and users alike. The radio technology would boost flexibility. Moreover, using the EnOcean technology would eliminate the quality problems and maintenance needs associated with batteries. Prefabricated cables for the wired EIB/KNX and 230 V mains systems meant minimal installation times. Since the proposed system was based on the Konnex standard, the benefits of a central buildings automation system could also be utilised. Following the renovation work, every section of the building now features an open design, and the partition walls in the offices have a contemporary look with plenty of glass. All the technology, including the lighting and the cutting-edge climate-control and air-conditioning system, is accommodated in the ceilings. Wieland supplied all the technology and the operating equipment required for the project. The new electrical equipment above sub-distribution panel level is based on the pluggable gesis installation system featuring EIB/KNX. gesis rc radio receivers are installed in the intermediate ceilings to receive the signals from radio switches which may be up to 20 m away. They receive the EnOcean radio telegram and pass it to the EIB/KNX system, where it is used to activate local and central functions (see system diagram). The operating elements employed are PEHA Easyclick radio switches. These use a piezoelectric crystal to convert the energy generated when a switch is pressed – and therefore require no batteries.

Wieland gesis RC with
Euopean Installation Bus/Konnex connection

Scheme EIB / KNX with EnOcean-radio



TIME-OPTIMIZED INSTALLATION PROCESS

As well as using cutting-edge products, the designers also paid a great deal of attention to achieving top quality and to minimizing time. All the time-consuming parts of the project – such as producing the cable sets for the buildings sections and all the systems configurations work – were therefore outsourced so that they could be prepared in parallel ready for final installation.
Mr. Gerhäusser, buildings systems technology project coordinator for Wieland Electric GmbH, describes the installation work. “We brought in a team from Syspa to handle the systems integration work. They did a perfect job of managing the EIB and radio systems by pre-configuring all the components according to the project plan. This involved aligning the transmitters and receivers, for example. This preparation allowed the installation engineers to work very quickly and without any hitches. The renovated areas were only out of service for a short period, and the costs were kept down. Our customer was really impressed!”

NETWORKED

RISING TO THE CHALLENGES OF THE CHANGING WORKPLACE

Perpetuum interviewed Detlef Kurras, head of the electronics/IT department of Obermeyer Planen + Beraten in Munich, Germany.

What do you expect from an office building now and in the future?
The office building needs to be able to develop in response to the changing needs of the workplace – which means being appropriate for current workflows and being adaptable to accommodate future functions without large investments of time and money. Multinational companies, for example, are increasingly working to a project-based model, which means that they set up teams of people for limited periods of time – and that calls for flexibility in the way office space is used.

We're talking about changing requirements – what does that mean precisely?
OBERMEYER operates internationally and puts together project teams which are composed to suit the task in hand. To do their work effectively, the teams need a tailor-made working environment that offers the right communications connections, lighting, switches and sockets. These facilities need to be made available quickly and efficiently. To make sure that our notion of the flexible office matches what reality expects of it, we need to be considering the cost aspects of it in our plans today.

What do we need to do to make sure we can use flexible technology properly?
We need to think in structural terms – we already talk about structured cabling. People have been installing flexible and structured communications networks for nearly a decade now, but other aspects of installation technology are lagging a long way behind. What's the point of having electrical ducts when the wall can't respond accordingly?

Why batteryless radio technology?
Installation technology equipped with auxiliary energy sources requires a great deal of maintenance and, in my opinion, shouldn't be used in large quantities without careful consideration. The need to regularly replace batteries needs to be planned into facility management budgeting as a cost block – it's an expense we didn't have with wired installation technology. It calls for additional staff, which is an expensive resource in Germany and other countries.

So OBERMEYER has fitted out an existing building with EnOcean technology?
As planning engineers, we aim to take account of the entire life cycle of a building – an objective we've been able to meet with an office building. A radio system like that offered by EnOcean gives us maximum flexibility when it comes to accommodating tenants' requirements. Our client wanted to be able to let the building in sections but also as a whole. Using radio technology allows us to offer office spaces measuring 200-300 m². The tenant can use the space as he sees fit, dividing it into smaller units if he wants to. With this leasing concept, the tenant might get ten switches (depending on the area he's renting), and can position them wherever he wishes so as to create his own personal or business-focused room structure. We have selected TOPLON System 750 room controllers from Wago with Peha batteryless radio switches. Everything – from the smallest unit to the entire building – can be operated centrally or decentrally. This installation structure is extremely useful, particularly when there is a change of tenant.

Can you tell us three advantages of batteryless EnOcean radio technology?
Flexibility for the entire facility, simplicity, reduced costs.

www.opb.de

NETWORKED

NEW BATTERYLESS RADIO PRODUCTS FROM WAGO

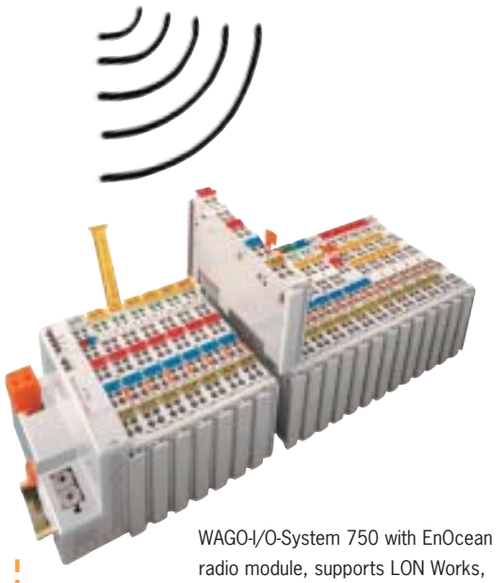
WAGO integrates EnOcean radio technology and is strategically expanding its product portfolio by adding new products for commercial buildings and industrial applications.

By Achim Fecke, Buildings Automation Product Manager and Bernd Vollriede, Electronics Product Manager at WAGO Kontakttechnik GmbH

EnOcean technology is increasingly being accepted by planning engineers and project managers and is finding its way into their projects. The main reasons for its use include reduced fire risks, simple installation on glass and concrete, shorter installation times, flexibility during and after installation, reduced dirt and noise emissions during installation and conversion work, and the fact that the technology is maintenance-free.

WAGO is now presenting the compact EnOcean WINSTA®-Box as part of its WINSTA® range of plug-in buildings installation technology. This product comprises the EnOcean receiver module together with the necessary switching relays in a WINSTA®-Box. The WINSTA®-Box is equally suitable for wall, floor and ceiling installation and can be quickly and easily connected using prefabricated or home-made WINSTA® cables.

EnOcean radio telegrams



WAGO-I/O-System 750 with EnOcean radio module, supports LON Works, Ethernet, TCP/IP, MOD-Bus, Profibus, DP-Bus.

Its wide range of combination options from the comprehensive WINSTA® connector system and batteryless radio technology offers planning engineers a great deal of fresh room for manoeuvre. The WINSTA® connectors are designed to prevent reverse polarity, so devices are quick and reliable to install, for example as a complete blind control system with 4 two-way contacts, or as a four-channel module for lighting control with 4 normally-open contacts. Operating and display elements facilitate start-up. The external antenna, connected via an SMA jack, ensures reliable reception of the EnOcean telegrams.

The EnOcean radio module in the WAGO-I/O-System 750 is now also equipped with an SMA jack. This enhances its functional reliability and provides the user with the required degree of flexibility in positioning the automation components. Combined with maintenance-free push-buttons, switches and sensors from other manufacturers which also use EnOcean technology, the WAGO-I/O-System 750 opens up new avenues in buildings automation. It also optimizes maintenance and operation, and allows conversion work to be carried out easily when the use of premises changes. The maintenance-free push-buttons, switches and sensors can be placed anywhere in the room, and transmit a signal which can be evaluated by the WAGO-I/O-System 750 typically 30 m inside buildings or up to 100 m in halls. It does not matter what material the devices are affixed to.

The useful applications of EnOcean technology are not restricted to commercial buildings either. They also offer wide-ranging potential in the industrial sphere. WAGO is therefore launching a four-channel radio receiver in a 70 mm DIN-rail housing. The radio technology sensors or switches can be positioned anywhere, eliminating time-consuming and expensive cable installation work in hard-to-reach areas or on moving parts.

www.wago.com

Compact WAGO WINSTA®-Box for wall, floor and ceiling installation

Messe Frankfurt exhibition grounds, hall 1 and hall 6 equipped with WAGO-I/O-System 750 and Thermokon EasySense wireless room controllers SR04 for effective temperature distribution.

NETWORKED

STEUTE AND WAGO - RADIO TECHNOLOGY CONNECTS WITHOUT BATTERIES!

A FAREWELL TO CABLES – IN INDUSTRIAL AUTOMATION TOO

EnOcean partner steute Schaltgeräte GmbH & Co. KG this year for the first time unveiled switchgear units which require no batteries and operate completely independently without cables. These units, whose range of possible applications is exceptionally broad, were met with considerable interest by potential users.

By Georg Töpler, Head of Sales and Marketing at steute Schaltgeräte GmbH & Co. KG

WAGO 4-channel radio receiver
Right: steute radio switches, batteryless with solar cell

It is obvious even to laypersons what benefits batteryless radio technology can bring to building installation and automation systems. Removing the need to lay cables between switches and lamps, blinds or doors not only saves a lot of time and money, it also brings great flexibility, since the switch or electrical device can later be placed somewhere else without having to drill and lay new cables in the plasterwork.

While its application in industrial automation may be less obvious, batteryless radio technology is every bit as useful in this area. This becomes clear just from looking at an automated manufacturing plant, where every movement is performed by an electric drive and monitored by several position switches or sensors. Every single component requires both an energy supply and a control cable to exchange information. In practice this leads to a whole mass of cables for even smaller machines.

NOBODY WANTS CABLES

The cables linking sensors, actuators and controllers are a necessary evil for all concerned. They are needed because, in most cases, there is no other way to transport energy and information. Machine constructors' main bugbear is the time it takes to install cables, a factor driving the growing popularity of data bus systems that replace the many point-to-point connections with a central loop. Alongside the cost in time, vulnerability is an important concern that mainly affects end users, who cannot afford to spend time tracing cable faults in today's high-availability world. Radio therefore offers benefits from this perspective too, provided that it can prevent or automatically detect errors.
Thirdly, automation often involves rotating parts. Supplying these parts with information and power using e.g. slip rings is extremely complex and causes considerable wear. In other applications, sensors and actuators are difficult to access, because they operate in aggressive atmospheres, for example, or in hazard areas. In other cases, for example with robots, cables are subject to frequent movement, causing them to wear out quickly even if protective measures such as energy chains and guides are provided.

NEW FREEDOMS FOR INDUSTRIAL AUTOMATION

Of course these are not new considerations, and efforts have been made to tackle them in the past. For example one major sensor manufacturer has developed wireless proximity switches to be used in sealed production cells for automated manufacture. The control signals are transmitted by radio, while power is supplied by an electric field.
Of course, solutions of this type are extremely limited in their use. This is not the case with the technology developed by EnOcean, which gives industrial switchgear units new freedoms and can also be deployed universally. steute Schaltgeräte GmbH & CO. KG in Löhne, Westphalia was quick to recognise this fact. This was perhaps not surprising, given that the company is a niche provider of switch equipment for use in demanding environments, and has already pioneered the use of wireless switchgear units in an extremely specialized sector.

MANY BENEFITS

The company therefore decided to make use of EnOcean's innovative technology in order to offer the industrial automation market completely independent batteryless wireless switchgear units for the first time. The wide range is also an important criterion, given the large size of some production plants, such as the production lines used in the automobile industry. The large amount of switchgear units used in one single plant also makes failsafe identification a crucial factor. The EnOcean radio modules' 32-bit addressing provides a compelling solution in this regard. After all, it was important for steute and users that radio transmissions take place on a freely-available frequency with an assured future to ensure that customers' investments are protected.

Coded unlocking via radio to avoid injury from rotating parts.

SWITCHGEAR UNITS FEATURING BATTERYLESS RADIO TECHNOLOGY PREMIERE AT HANOVER FAIR

The unveiling of these "EnOcean inside" switchgear units at the Hanover Fair 2004 was well-timed, since, in theory at least, most show visitors were already familiar with the "No batteries, no limits" technology thanks to EnOcean's Hermes Award nomination. In reality, however, the devices provoked astonished reactions when they were demonstrated in a straightforward setup at the booth. Visitors were able to activate a signal lamp on the roof of the booth using a position switch with a solar module.
They were especially impressed by the power of the solar cell, whose integrated energy reservoir ensures reliable data transmission even after several days of darkness. The fact that transmission failures are automatically detected is also an obvious benefit that can, for example, increase the availability of production plants. EnOcean developed this function, which is an important prerequisite for deployment in automation technology, specifically for industrial applications.

NETWORKED

COMPATIBILITY WITH CONTROL SYSTEMS KEY

The compatibility of solutions with standard control systems is a key factor for users. Since industrial automation mainly involves complex, networked plants, “stand-alone solutions” are often unacceptable, regardless of what other benefits they may bring. There is much more demand for integrated standards. This integration is ensured among other things by EnOcean’s partnership with WAGO.

The radio modules are able to communicate with standard industrial control systems via the WAGO system’s EnOcean receiver modules. Other major manufacturers of electronic connectors and industrial control systems offer similar interfaces.

BOOST EXPECTED FROM RADIO TECHNOLOGY

steute has now equipped several switch series with the EnOcean radio modules. In addition to the position switches very often used in automation technology, the program also includes pull-wire switches and door handle switches with batteryless radio technology. The company is anticipating a real boost in sales from this series and believes it has great market potential, with freely-positional switchgear units that are quicker and cheaper to install expected to appeal to customers in the automation sector.

NUMEROUS APPLICATION POSSIBILITIES

Industrial automation offers many interesting applications for wireless switchgear units. Most automation plants require switch commands to be transmitted to rotating or moving parts, a process that is much simpler using radio than conventional transmission methods. But it’s not only on highly complex plants that the production benefits of radio technology can be demonstrated. A simple yet apt example is provided by the warehouse doors found at many workplaces. If a forklift approaches, the driver has to pull on a pull-wire switch to open the door. steute/EnOcean technology enables the driver to open the doors directly from the forklift without stopping. Another example that has already been implemented is door handle switches on safety doors and guard fences round machine tools. The wireless switch enables users to trigger functions inside the machine from the outside and give commands to the control system without complex cabling having to be installed. This is particularly useful for large-scale plants, which often require additional safety doors or maintenance hatches to be fitted when they are being installed on-site. Wireless radio technology makes this process much easier.

INDUSTRIAL SWITCHGEAR UNIT WITH BATTERYLESS RADIO TECHNOLOGY – THE BENEFITS:

- Elimination of cables makes for simpler installation, saving time and money
- Short distances: Switches can be positioned freely, thus improving ergonomics
- Ideal for controlling rotating or moving parts

ENOCEAN RADIO TECHNOLOGY OFFERS ADDITIONAL BENEFITS:

- High range (up to 300 m)
- Visual contact between transmitter and receiver not required
- High security: Transmission errors are detected and notified
- Available frequency whose future is assured

www.steute.com

NETWORKED

THE BATTERYLESS IDEA FROM ENOCEAN IS CATCHING ON

Since the market launch of the Easyclick series of batteryless radio products from PEHA, there has been a marked growth of interest in the new technology. The batteryless and maintenance-free wall transmitters are becoming increasingly popular with customers.

By Hans-Ulrich Ballach, Head of Marketing and Development at PEHA

Easyclick flush-mounted receiver, obtainable as single- or dual-channel light and blinds actuator

The market launch of Easyclick batteryless radio products from PEHA has been receiving a lot of attention from the media. And response from customers has been way above expectations. So we started a contest with the chance of winning prizes as a way of getting customers actively involved in the process of devising new products. Naturally enough, the question to be answered was: “For what application would you use batteryless radio technology?”

The feedback was tremendous, and highly diversified, assuring us that there are still a whole number of product applications waiting out there. We rewarded the best suggestions with the Easyclick sets illustrated at the bottom of page 29. Each consists of an Easyclick wall transmitter and a special Easyclick receiver. They enable batteryless and wireless control of standard lamps, electrical appliances, light sources or motor-driven roller blinds.

These Easyclick sets are available from electrical wholesalers at an introductory price.

We received so many inquiries that in the meantime we have developed an Easyclick receiver that can be operated in Push-Button mode. This works as follows. As long as the send button is pressed, the relay contact on potential (max. 600 VA) remains made. Releasing the send button produces an off signal. The outputs are interlocked, so a motor control with a dual-channel wall transmitter is also possible.

We also have an Easyclick repeater in the product portfolio. The first version of this is flush-mounted. It will double the range of an Easyclick wall transmitter, which is excellent anyway, to meet operating requirements in the most difficult situations.

Easyclick products are generating increasing interest from industry. We have joined up with producers of prefabricated houses, manufacturers of roller blinds and HVAC specialists on highly promising projects.
As a result of our intensive marketing, numerous planning engineers and architects have become aware of the possibilities presented by batteryless radio technology, and have now started to implement it. One example is the aviva project (54,000 sqm) of Bosch und Siemens Hausgeräte GmbH in Munich; and there are a number of other building projects on the same scale. In this segment PEHA usually supplies the Easyclick wall transmitters, and other producers are responsible for the sensor technology and building automation components with EnOcean receiver modules.

Dialog wall transmitter, dual-channel (white) and Dialog wall transmitter, four-channel (aluminium), EnOcean PTM100 four-channel piezo transmitter module

Easyclick DIN-rail receiver, four-channel

Dialog wall transmitter, four-channel (on glass)

The advantages of Easyclick products are very clear:

- Maximum flexibility in placing the transmitters
- Attachable to glass and other materials
- Maintenance-free because batteryless
- Simple learning process between transmitter and receiver
- Very secure and reliable through unique, patented wireless transmission
- Open-ended expansion at low cost
- Simple retrofitting of objects, no cables or batteries
- Fast installation, short outage
- Reduced costs

www.peha.de

Easyclick switch and receiver socket adapter for light control, blinds control, intelligent socket

NETWORKED

EASYSENS – SUCCESSFUL IN FIRST MAJOR PROJECTS

Cooperation between EnOcean and Thermokon is beginning to bear fruit.

By Dirk Debus, Head of Development, Thermokon Sensortechnik GmbH

Batteryless radio sensors from Thermokon are already in use in a number of major projects. Just half a year after the official market launch of the first EasySens products, cooperation between Thermokon and EnOcean was showing first signs of a significant impact. This magazin (see page 12) spotlights the sensors working in the aviva Munich office complex. Here the air-conditioning receives current readings of room temperature and is told which temperature to set by solar-powered radio sensors.

Thermokon sensors with EnOcean radio technology are used in various halls of the Frankfurt exhibition grounds for precise temperature detection. Depending on the style of an event, the halls are split up differently. Wireless communication delivers the temperature values needed to air-condition the halls. Sensors travel with the particular hall arrangement to allow optimization of the HVAC during an event.

A current major project for use in office complexes is the UNIQA Tower in Vienna. The building has a net floor area of some 31,000 sqm (about the same as five soccer pitches), and here Thermokon wireless sensors detect readings of room temperature on the different floors. The instrumentation and control engineering in place in the modern structure, with its glass facades and glass interior walls, is really only made possible by the use of freely located radio sensors. Whole rooms or floors are divided by glass or movable walls, which makes corresponding demands on the HVAC. The solution: sensors attached to glass send their information by way of LON radio receivers fitted in the ceilings to the instrumentation and control facility. Johnson Controls Austria GmbH in Vienna is responsible for the design and installation of the entire instrumentation and control engineering.

In addition to the wireless technology of course, the fact that the solar-powered sensors require no maintenance is also a vital factor. The maintenance investment and the insecurity of continuously operating, battery-powered wireless systems have always been a drawback.

The use of EasySens presents a number of advantages compared to wired sensor installations:

- Wireless sensors allow simple installation and flexibility in placement
- Solar-powered, autonomous radio sensors are maintenance-free compared to battery-powered wireless solutions
- Open interfaces between the sensor technology and controller simplify integration
- Sophisticated wireless technology ensures a high level of transmission reliability

The advantages

- No batteries, so maintenance-free
- Simple installation without laying cables
- Flexibility in upgrading for modernization
- Direct attachment at representative measuring points
- Cost-effective system solutions
- Interference-free wireless transmission in 868 MHz band
- Up to 30 m range in buildings, up to 300 m free propagation
- Environment-friendly and resource-saving
- Simple system expansion with add-ons from other producers

SRC-FTT LON EasySens receiver, direct transfer of all radio telegrams received by LON FTT to the building services management system or a superordinate controller system
or
SRC-RS 485 EasySens receiver, direct transfer of all radio telegrams received by the RS 485 to the building services management system or a superordinate controller system
Inquire for links to other systems

SRO4PST EasySens wireless room controller with setpoint dial, presence button and five-step ventilator switch

From left: Henk Schipper, Diana Kuyt, Harald Zygan, Hermann Knol

VSK AWARD 2004

The correctness of Thermokon's product policy in launching the batteryless EasySens radio sensor system was demonstrated at the international ventilation/air-conditioning show VSK from 9 - 13 February in Utrecht, Netherlands, where it won the VSK Award 2004. EasySens was presented on the stand of Thermokon representative Betec Controls B.V., Vaassen. The system was chosen by an international jury as the most innovative product in air-conditioning, winning out against the products of highly reputed companies.
Further products are due to follow from Thermokon, creating a full range of sensor technology for building services management.

email@thermokon.de
www.thermokon.de

Thermokon

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Easyclick wall mounted transmitter, 2-channel

BATTERYLESS RADIO TECHNOLOGY EASYCLICK

Niko was established in the year 1919 by the De Backer brothers in Sint-Niklaas, Belgium. It fairly soon became the leading name on the Belgian market for switches and sockets. In 1966 Niko won international recognition through the Inter 70 program.
By Robert Bothe, Buisness Development Manager at Niko N.V.

The Inter 70 from Niko was the first large-area switch to receive a design award. That opened the way for exports in Europe. Today Niko employs more than 400 persons. Following on from the success with switches, Niko was first to commence the production of dimmers. Its product range now includes no less than 3,500 different items: attractive switch selections, telephone and data connectors, door answering installations, motion detectors, music distribution systems, lighting controls and sophisticated building system engineering. Niko is not only active in the domestic sector, its products also go into industrial plants, service enterprises, offices, workshops, hospitals and hotels. Niko offers the matching installation material for every kind of undertaking.

As an overall solution for functional building, Niko developed lighting control systems like DALI, high-performance dimmers as well as data networks and connectors. Today Niko is a firm believer in batteryless radio technology from EnOcean.

www.niko.be

Niko Easyclick flush-mounted receiver, obtainable as single- or dual-channel light and blinds actuator

NETWORKED

Beckhoff Bus Terminals: wireless adapter for EnOcean radio technology

NEW AUTOMATION TECHNOLOGY

Beckhoff implements open automation systems based on PC-compatible control technology. The product spectrum includes the Industrial PC, Fieldbus Components, Drive Technology and automation software.

By Georg Schemmann, Head of Building Automation at Beckhoff Industrie Elektronik

Beckhoff Building Automation integrates the IT and automation worlds into building automation using communication standards like Ethernet and TCP/IP. The Beckhoff Bus Terminal system enables all data points relevant for building automation, e.g. the EnOcean wireless transmitter, to be connected direct.
The KL6023 wireless adapter for EnOcean radio technology allows cableless automation inside and outside a building. The signals of the batteryless EnOcean transmitters are received by the wireless adapter and converted to an RS-485 signal. The receiver is positioned so that it can work optimally in a wireless environment. Preprocessing of the signals direct at the antenna ensures maximum transmission reliability and range. Transfer of the substantially less sensitive digital signals to RS-485 standard to the Bus Terminal system is by way of a cable up to 300 m in length. The serial Bus Terminal KL6021-0023 further process the signals and deliver them to any kind of bus system. The Bus Terminal is responsible for an electrically isolated power supply to the wireless adapter. An advantage in many applications is the direct linking of signals by Ethernet in the Beckhoff Bus Terminal Controller BC9000, with simultaneous linkups to superordinate systems. The watertight case allows installation practically anywhere in a building. Dust and dirt are not critical. The status LEDs of the wireless adapter are visible during startup with the cover closed. They show every received telegram, classified as errored or errorfree, to support startup. Wireless adapters can also be housed in other suitable cases to match user requirements. Beckhoff wireless adapters are in use for example in the Munich corporate headquarters of Bosch und Siemens Hausgeräte GmbH (BSH), where the wireless technology is fully integrated into the building automation concept. More than 25,000 I/O data points are connected through the Beckhoff Bus Terminals by Ethernet to the PC controller. Some 140 wireless buttons and 40 room control units send their data uncabled and without external power to about 70 KL6023 wireless adapters.

info@beckhoff.com
www.beckhoff.com

BECKHOFF

NETWORKED

WHY ENOCEAN?

Saving resources and using regenerative energy are deeply rooted at Stuhl Regelsysteme. All products are devoted to the economical and thus ecological use of energy.

By Andrea Stuhl, CEO, Stuhl Regelsysteme GmbH

The building from which the company operates was erected 15 years ago on bioconstructive principles. So it was only natural to decide on self-sufficient control components. We were pleased to find in EnOcean a competent partner who has developed technology that fits in with our general approach, including the powering of our award-winning products.

PROFILE OF STUHL REGELSYSTEME GMBH

Since 1975 Stuhl Regelsysteme has been developing and producing control engineering technology, from a simple two-state controller through to bus-based building automation. The company has almost 40 employees. Contrary to the common trend, the philosophy at Stuhl is to aim for as much production depth as possible. The entire product range is manufactured at the site in Spalt, Germany. Customers include big-name corporations and even competitors. Stuhl now has a range of some 350 items of control equipment, and sees itself very much as an OEM supplier. Custom solutions, even in small numbers, are its specialty. In the german Tucherschloss model project, a unique fusion of building automation components and esthetics was created. Building automation can be experienced at the interface between high-tech and history.
The illustrated product design won the Design Plus award at the light+building show in 2002, as well as the ISH 2003 Design Plus award. The control unit also received the Innovation Award for Architecture & Technology 2003 as the first unit of its kind on the market suitable for blind persons. The SF Comfort has also been nominated for the Design Award of the Federal Republic of Germany 2004.

SF comfort sensores

Designpreis der Bundesrepublik Deutschland Nominiert 2004

WHY USE THE STUHL ADAPTER MODULE SAM WITH ENOCEAN TECHNOLOGY?

For convenient control of eight or twelve rooms, the Stuhl Adapter Module SAM offers a unique combination of extremely simple installation, fully autonomous functionality and timeless design. All necessary settings and assignments can be made direct with the SAM. Installation and operation require no additional aids or equipment. This comprehensive functional package plus innovative, batteryless wireless technology from EnOcean make the Stuhl adapter module the ideal solution in all areas of residential and commercial building where no extensive building automation technology is existent or required.

www.stuhl.com

Stuhl Regelsysteme GmbH

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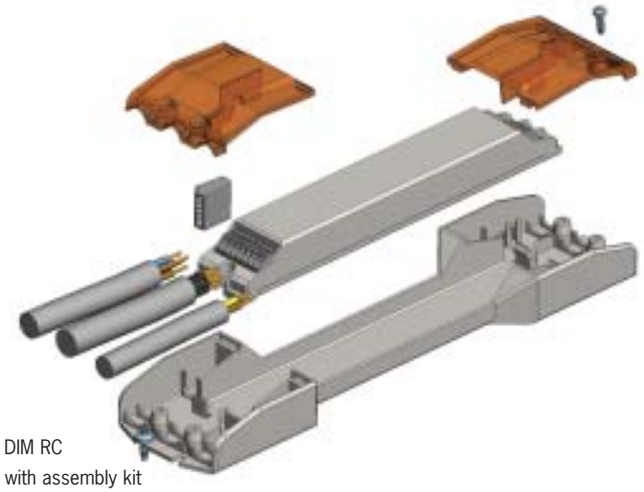

TOUCH DIM RC
module with assembly kit

OSRAM

OSRAM GOES FOR ENOCEAN TECHNOLOGY

The OSRAM brand has existed now for almost 100 years, and for many consumers the name is synonymous with the classic light bulb. Less well-known is the fact that OSRAM has grown into a high-tech enterprise of the light sector, operating 54 production plants in 18 countries.

By Axel Pilz, PM Light Management Systems at OSRAM GmbH

As one of the world's biggest light producers, with more than 35,000 employees, OSRAM now earns more than 40% of its turnover with innovative products like optoelectronic semiconductors and microprocessor-controlled electronic ballasts for the operation of fluorescent lamps.
An innovation in light control, the TOUCH DIM function of the OSRAM DALI electronic ballast offers an especially simple and low-cost way of dimming room lighting individually and conveniently, and of saving energy at the same time. The TOUCH DIM dims and switches direct with a conventional button, no control unit is necessary. The large number of projects already implemented demonstrate the growing popularity of this kind of light control. The obstacle to date was that the light needed at least a four-wire lead. Retrofitting existent installations, typically three-wire, meant that a new lead had to be laid. Underplaster wiring (ruled out in historical buildings) combined with high labor costs, dirt and noise, and the temporary loss of the rooms for use all stand in the way of modernization.

The newly developed, 21-mm-high TOUCH DIM RC receiver module for light installation, based on the EnOcean RCM 120 module, is a convincing solution. In conjunction with batteryless radio buttons (EnOcean) the module allows operation of two light groups with up to 15 ballasts each. The simple learning process between the transmitter and receiver makes implementation of several control points per receiver or operation of several receivers from one control point extremely simple. For planning engineers and operators of premises the batteryless - and thus maintenance-free - transmitter technology is an important criterion.
The extremely high transmission reliability – virtually no difference between wired and wireless control is noticeable to the user – and the very good support right from the start by EnOcean were decisive for OSRAM's decision to implement the system on this platform.

www.osram.com

NETWORKED

UPDATING AND UPGRADING THE TRADITIONAL

Wieland has set itself the objective of questioning traditional technologies and going new ways. In the gesis connector system Wieland offers the foundation for flexible, fast and faultfree installation in buildings.

By Andreas Fenn, Product Manager, Wieland Electric GmbH

Cooperation between the market leader in pluggable electrical installation and EnOcean has produced an innovative solution for building system engineering, meaning that we are now able to offer pluggable, decentralized units for lighting and blinds control based on EnOcean's wireless technology. Lighting and blinds control may not seem to be anything particularly out of the ordinary – so what is new? In many buildings there is no special focus on the electrical installation, and many are still being erected without a Bus system in place. But demands for flexibility continue to rise. Many shy away from moving on from a conventional installation to a Bus system. This is the gap at which the wirelessly controlled gesis units are aimed. The system can be implemented regardless of the size of a building.

HANDLING WITHOUT SOFTWARE

This is a requirement that is fully satisfied by EnOcean. Without software, just at the press of a button, switches are assigned to the right outputs. Multiple assignments are quite straightforward. The learning of switches, the handling of the entire system, is so simple that it can be mastered in no time at all. There is no need for time- and cost-consuming training. Everything that is needed comes in the installation kit.

EVERYTHING REUSABLE

For complete conversions the switches can be collected up, all assignments cleared from the switchgear units at the press of a button, and the plug is pulled on the switchgear to disconnect it from power and load. Plugable end users like lights can also be taken out of the system quickly and easily. All leads and units can be used again anywhere like "lego".

MAINTENANCE-FREE AND ENVIRONMENT-CONSCIOUS

EnOcean technology has made it possible to produce batteryless radio switches that are absolutely maintenance-free. That is good in terms of budget and the environment. But what about environmental pollution through the wireless waves?

gesis RC – plugable connection between lights and ballasts

The sensor only receives energy when a switch is operated for example, so the amount of energy wirelessly transmitted is extremely small. In a conventional switch on the other hand, every switching operation produces a high-energy break spark. This is substantially larger in terms of high-frequency radiation than in the case of the EnOcean switch

INTEROPERABILITY

Users are quite free in their choice of switches. Integration of EnOcean technology is open to all producers, thus creating interoperability. This ensures that Wieland units can be driven by all EnOcean switches on the market.

www.wieland-electric.com
www.gesis.com

COMPANY PORTRAIT

Wherever anyone in the world makes electrical connections, the components conceived and produced by Wieland Electric of Bamberg are very likely to be used – practical, secure, lasting, handy and reliable, guaranteed. Combining competence and quality.

The European Installation Bus/Konnex plays a major role in building system engineering. gesis RC connects EnOcean to this Bus system. Ask for a consultation.

Wieland Electric is an international, medium-sized business with subsidiaries in Canada, the USA, Britain, France, Spain, Italy, China and Poland. Since 1910 the company has focused on the production of detachable connections in electrical and electronic applications. Wieland presently produces more than 50 million terminals monthly. An independent jury of well-known economists rated the company one of the 100 best in Bavaria, Germany. This success is the result of concentrated and hard work by people who plan, develop, produce and advise with commitment and motivation.

Challenges are actively tackled by Wieland Electric to create competent solutions. "Produce in Bamberg to serve the world market" is the company's motto.

RATIO WIRELESS BUS SYSTEM – THE START OF A NEW ERA IN ELECTRICAL INSTALLATION

To meet demands for more safety and security, more convenience, less use of energy and efficient maintenance in functional and residential buildings, the system idea needs to be promoted in building services engineering. Instead of single systems combined at large expense by wired interfaces into an overall system, this can now be implemented simply and cost-effectively by the Ratio® wireless bus system.

By Christian Genter, Managing Director at omnio AG

DESIGN PLUS
winner light+building 2004

omnio

BUILD TODAY WITH TOMORROW IN MIND

Every function in conventional electrical installation needs a separate line and every control system a separate network. By contrast, the batteryless Ratio® wireless bus system allows all technical facilities like lighting, shade, heating, ventilation, security, etc. to be networked and linked in a straightforward way. Extensive needs can be solved clearly and economically.

SUBSTANTIAL BENEFITS IN TERMS OF COST AND IMAGE

For the architect/electrical planning engineer:
- Simplified planning, planning in modules
- New approaches to wiring and cabling
- Separation of inside and outside installation, thus very few breaks through outer walls
- Better integration of switches, buttons, sensors into the architecture

For the installer:
- Cost savings through simple installation for the usual planning
- Simplified wiring and cabling
- Faster time to install
- Less installation material
- Changes requested during the building phase and later are generally possible by simple reteaching of the actuators and without opening up walls
- Image gain through the use of innovative technology
- Distinction from the competition
- Consulting expertise for architect, planning engineer and building owner

For the building owner:
- More convenience in operating all facilities
- More comfort through less electromagnetic pollution
- Customization of the technology
- Enhancement in value of the property
- Investment security through new, flexible technology

THE RATIO® WIRELESS BUS SYSTEM – A FULLY INTEGRATED SOLUTION FOR BUILDING SERVICES ENGINEERING.

TOTAL FLEXIBILITY

No matter whether a new building or a conversion, the Ratio® wireless bus system is fully flexible. Ratio® requires no extra planning and no laptop. Programming can be performed by a simple learning process. Many functions can be implemented, such as individual control in a room, central control (e.g. at the house exit), timed functions, learning and recalling scenes, and lots more.

OMNIO AG

Since early 2002 the Swiss company Omnio AG has focused fully on the development and production of equipment with EnOcean technology. Would you like to expand your own product range by a line based on EnOcean technology, or launch into this technology for the first time? We can support you with our expertise. Five highly qualified development engineers are ready to guarantee that the procedure goes off right, from the first contact through to the final production documentation.
www.omnio.ch

COMPANIES THAT WORK WITH ENOCEAN TECHNOLOGY

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www.wago.com

Osram GmbH
www.osram.com

Thermokon Sensortechnik GmbH
www.thermokon.de

Schlaps & Partner Nachrichtentechnik – Systemsteuerungen GmbH
www.schlaps-automation.de

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Omnio batterielose Funklösungen AG
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www.gesis.com

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www.heliosventilatoren.de

steute Schaltgeräte GmbH & Co. KG
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Balluff GmbH
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Stuhl Regelsysteme GmbH
www.stuhl.com

Niko N.V.
www.niko.be

VISIONARY

VISIONS FOR COMMUNICATION IN INDUSTRIAL APPLICATIONS

The future study by Siemens and Roland Berger foresees four major trends in information and communication technology: human/machine interaction, embedded devices, grid computing and, as an intersection of these three, realtime communication. Central significance will attach in future to mastery of communication systems. The following

VISIONARY

Prof. Dr.-Ing. Andreas Grzemba, professor of computer science, digital technology and industrial communication systems of the faculty for electrical engineering and media at Deggendorf University of Applied Sciences

developments can be determined at the field and automation level:

POWERLINE

In future it will no longer be accepted that a data line is necessary in addition to a power supply for the nodes. There will be growing emphasis on systems that offer powerline transmission, i.e. power supply and information transmission on the same line.

WIRELESS SYSTEMS

In the industrial field these are still viewed critically. The systems must prove their reliability in an environment heavy with interference, and must be secure against hacker attack. Bluetooth is an example of a system that can use frequency hopping to switch to other undisturbed frequency bands, and also offers encrypted methods of transmission. The main use of wireless systems is presently for operation and maintenance. When it comes to sensors and actuators, the problem is to solve the powering. You only have to think of building system engineering in large buildings. If you had 4,000 sensors for example (there are EIB systems with many more components) on a wireless basis with a battery lifetime of ten years, an average of one battery a day would have to be replaced, which no operator would accept. This means that systems are needed that work without batteries.

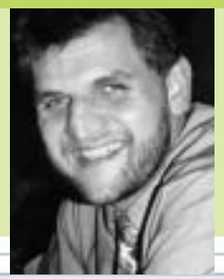
OPTICAL TRANSMISSION MEDIA

These will probably only be used in special applications, for example in an explosive scenario and environments fraught with electromagnetic pollution, because they are relatively expensive and not easy to work with. Plastic optical fibers only have a maximum thermal stability of 85°C and a minimum bending radius of 5 cm. Multicore glass fibers, also used in telecommunications, may have thermostability of more than 150°C and a much smaller bending radius, but assembling them is still a problem. To be able to master the configuration and operation of large networks, self-configuration, self-healing and self-adaptation to changed environmental conditions play an increasing role. This is also called autonomic computing and is still in its infancy. IBM is pursuing very intensive fundamental research in this field.

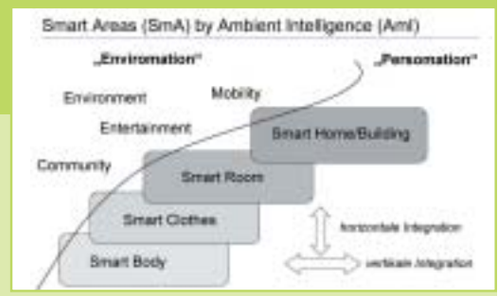
VISIONARY

„SMART AREAS" AND „AMBIENT INTELLIGENCE" IN BUILDING AUTOMATION

Building automation is currently going through a phase of enormous change. New technologies and their follow-on developments are appearing at ever shorter intervals. The major impetus comes from the fast pace of developments in modern information and communication technology, microsystems and mechatronics.



Prof. Dr. Martin Becker, Biberach University of Applied Sciences, Building Systems Engineering Faculty of Building Automation and Control Systems



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In addition to the well known two-wire line data transmission, bus systems now allow data transmission by powerline, wireless, infrared and Ethernet. This leads to a greater mesh of building automation with telecommunication, multimedia and the data processing infrastructure in a building. But through the increasing use of microelectronics and microsystem technology, the components of building system engineering are changing in the direction of mechatronics. Mechanical and electronic components are merging into a system unit, for example bus-capable, electronically driven pumps and valves, bus-capable electronic controls in windows and doors, even electronic tap fittings and toilet flushing with a "nose" for automatic spraying of a fragrance and cleaning after use.
Examples of current research are the integration of (micro)electronics in textiles and clothing (smart clothes) or new forms of integrating electronic appliances in furniture, room and façade elements (smart room). The focus here is on human flexibility, mobility and individual interaction, so the subject of intuitive human/machine interfaces (future interfaces) also has to be considered.
Smart sensors and actuators produce the decisive key to mobile and decentralized networking within and between smart areas by ambient intelligence.

Miniaturized, energy-autonomous and wireless-based components are an excellent basis, especially with a view to flexible installation and simple retrofitting. There is a huge market for building renovation and modernization where flexible installation and operating concepts really come into their own because subsequent cabling and wiring mean an enormous time and cost investment, quite apart from the disturbances that go along with installation work. Market researchers speak of huge market potential for wireless based components and systems in building automation and safety engineering. Very different communication systems were installed in the laboratory for building automation and in a demonstration building at the Biberach University of Applied Sciences in different test environments (e.g. seminar room, office room, lab room), and these are now being investigated and compared in real operation. The questions to be answered include the possibilities and barriers of decentralized, bus-based automation systems using different transmission media, and the engineering effort for conversion and expansion. Current research and student projects are aimed at developing simulation models in which new control concepts for building, room and façade automation can be investigated.
www.fh-biberach.de/studium/gebauedeklimatik

INQUISITIVE

SELLING CUSTOMIZED DEVELOPMENT SERVICES

Do you have an innovative idea for fitting your application with wireless sensors? We can help you find a solution fast. Ideally, one of our products may match in the first place. The integration of our batteryless radio modules is documented in detail and application notes help you develop your system environment. To start development, we offer you the EVA 100 evaluation kit, with which you can start up EnOcean technology in next to no time. There are also a whole number of system partners who are already acquainted with EnOcean technology and can offer you design services for integrating our modules. Some can be found here in perpetuum or at **www.enocean.com**. We will gladly put you in touch with these partners.

Sometimes it makes economic sense to develop a specific product variant. Even if existing products do not fit your application directly, you should still talk to us. We are working on a whole range of very different technologies and components that supply our wireless modules with power from ambient energy. We will gladly show you how our technology can be integrated into your system, and discuss the technical and commercial framework for a customized development project. Our core competences are mechatronic systems, low-power consuming radio electronics, materials engineering, antenna development and software. Development of your project is process-controlled and to the highest quality standards.

Speak to us and find out.

Sales Contact
Phone: +49-89-6734689-30
Fax: +49-89-6734689-55
e-mail: info@enocean.com

ENOCEAN TEAM

from left to right: Andreas Schneider, Oliver Sczesny, Beatrix Peters, Philipp Göttler, Heiko Noll, Angelika Henhammer, Andreas Fischer, Marcos Frago, Margarethe Wimmer, Dr. Joseba Arroyabe, Uwe Thumm, Dirk Lumbeck, Sabine Quinten, Michael Grzan, Dr. Wolfgang Heller, Gotthard Sauer, Armin Anders, Reinhard Unterreitmayer, Frank Schmidt, Dr. Matthias Heiden, Markus Brehler, Andreas Riegler

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Phone: +49-211-9511-0
Fax: +49-211-9511-111
Contact: Michael Braun, applications engineer/product marketing

in England:
TDC (Telecom Design Communications) Ltd.
Stroudley Road, Basingstoke, Hampshire,
RG24 8FN, England
Tel.: +44-1256-332800
Fax: +44-1256-332810
E-Mail: web.sales@tdc.co.uk
www.tdc.co.uk

In Switzerland:
Telion AG
Rütistrasse 26, 8952 Schlieren
Phone: +41-1-732-1638
Fax: +41-1-732-1649
E-mail: pfurrer@telion.ch
www.telion.ch

CONTACT

EnOcean GmbH, Kolpingring 18a, D-82041 Oberhaching, Germany
Phone: +49-89-6734689-0 Fax: +49-89-6734689-50
E-mail: perpetuum@enocean.com
Information at: **www.enocean.com**

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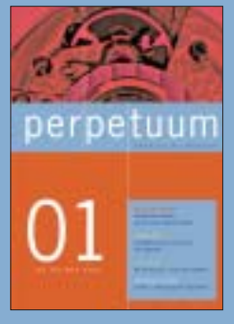

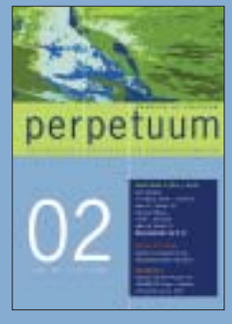

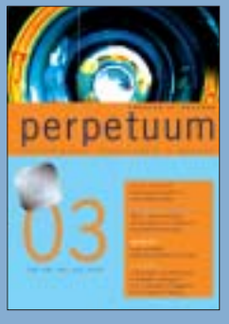

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