

"Home of Today" Beckhoff Home Automation controls the intelligent home



→ The intelligent home offers plenty of hidden potential for architects, contractors, building companies, and ultimately for homeowners. What had previously been regarded as an interesting vision for the future has become reality at the Home of Today. The control concept of the Home of Today is based on standard automation components from Beckhoff that integrate all IT standards such as Microsoft operating systems, Ethernet connectivity and e-mail.

Bill Gates introduces E-home technology in the "Home of Today"

On January 31, 2005, Bill Gates, Microsoft Corporation's Chairman and Chief Software Architect introduced the E-home technology system at the Home of Today in Munich (Germany). The project aims to encourage the development of designs for modern forms of living. Microsoft was the leading partner for the E-home installation and made its software technology available for the infrastructure at the Home of Today.

This project is the first "networked home" in Europe with involvement of Microsoft. Microsoft was supported by partners such as Beckhoff, who installed the intelligent building control system. Due to its open interfaces based on IT and Windows standards, the PC- and Ethernet-based control solution from Beckhoff is extremely well suited for building control.



Ethernet network as the basis for communication

All data points required for home automation are connected directly to the Beckhoff Bus Terminal system. Local I/O stations are distributed throughout the home and networked with the central PC Control via Ethernet. Control tasks are dealt with by an Embedded PC CX1000 from Beckhoff running Windows CE. The standard Ethernet network is used for PCs, telephones, home entertainment, and as a bus system for building control tasks. This eliminates the need for a second sub-system.

Another Industrial PC from Beckhoff – a 19 inch C5102-type built-in PC equipped with Windows XP – is used as the central building server that controls all soft-



During the presentation of the intelligent building services at the Home of Today, Hans Beckhoff, demonstrated the core of the E-home technology, the Embedded PC CX1000 with Windows CE operating system, to Bill Gates. Hans Beckhoff: "Our PC and Ethernet control solution is an ideal platform for building automation. A modern home can have integrated IT, media and control functions that can be cost-effectively provided with user-friendly design with our Windows-based PC Control technology in conjunction with the Microsoft Media Center PC. Our Bus Terminals form the application-oriented interface to the domestic electrical system."

ware modules provided by the partners and all data that are relevant for building control. All building control functions can be displayed and activated via four Beckhoff Control Panels distributed throughout the house. Messages can be retrieved via SMS, video, voice mail or e-mail via a touch screen interface. The Control Panels are integrated in the network via Ethernet.

The TwinCAT automation software forms the home automation control center. Depending on the hardware and the application, Windows XP, Windows CE or the new Windows XP Media Center Edition are used as the operating system. TwinCAT serves as a convenient editor for writing the application software. Software components for all building functions are available to the user. Further software modules can be linked in via open interfaces, enabling communication between the building server, control PCs and sensors/actuators via Ethernet. The control functions either run in the background or based on the personal configuration of the user.

In an interview with Ronald Heinze, chief editor of building & automation, managing director Hans Beckhoff talks about Home Automation from Beckhoff.

Your company is very successful with machine automation. How did you become involved in building automation?

| **Hans Beckhoff:** We have been using open automation systems based on PC-compatible control technology right from the start. This is the basis of the success of our company. Using this approach, we managed to break up existing machine automation market structures. We are convinced that this paradigm shift is now beginning to reach building automation. Meanwhile, our technology has been used successfully in a wide range of building projects. After all, our company was established from a skilled trade background, and this continues to be one of our domains today. Building automation, therefore, suits us very well. Building automation already makes up a significant single-digit proportion of our sales, with a tendency towards continued growth.

How did the co-operation with Microsoft come about?

| **Hans Beckhoff:** We have been co-operating with Microsoft for some time in a variety of applications. This led to a high degree of mutual trust. Our first Ethernet-based building automation project was the Microsoft headquarters in Munich, which was completed five years ago. Today, our Windows-based PC Control technology and the Microsoft Media Center PC form a high-performance package for e-homes that can be used to realize a wide range of projects. The Home of Today will serve as a catalyst for this technology in the home automation sector.

Do you really think that private clients will take up the technology?

| **Hans Beckhoff:** Absolutely, we are currently witnessing the rapid development of this interesting market. Like with all new applications, there will be "early home automation adopters" who don't want to miss out on modern comfort and convenience. With future price reductions, the technology will then enter the wider market. Our primary targets are electrical engineers and architects, but also private clients. The consumer has to be able to see the benefits. We are also in touch with housing companies wishing to offer added value for their houses and apartments, for example, in the context of sheltered accommodation.

What role does the electrical trade play in your considerations?

| **Hans Beckhoff:** An important one, because we are convinced that this technology will open up new market opportunities for this sector. The technology will enable the electrical trade to establish new areas of activity. This is why we intend to prepare a starter kit that will offer easy access to this technology and can be used in conjunction with the Windows Media Center. Software options, for example, lighting or security applications, will be made available in co-operation with the project partners.



TwinCAT as the central control unit allows the communication with the messaging system (voice mail, e-mail) from Tobit Software, the front end system from 3Soft and the access control system from Scemtec Automation. The light management system from TridonicAtco is integrated via the Bus Terminal system using DALI bus technology.

All data points in a single system

The Bus Terminal stations distributed throughout the home for connecting the data points are either equipped with Ethernet Bus Couplers or Embedded PCs. The wide variety of Bus Terminals available enables integration of all the sensors and actuators installed at the Home of Today. Sensors installed at the house include the following:

- | Push-buttons for lighting control
- | Motion and occupancy sensors
- | Window and door contacts
- | Weather station for recording climate data (precipitation, wind, brightness, humidity, external temperature)
- | Room temperature
- | Measuring devices for water and electricity consumption

Actuators control the following functions:

- | Switching and dimming of lights and sockets (also in the garden)
- | Lighting control via DALI bus system

- | Heating and ventilation control
- | Control of shutters, blinds, window and door drives
- | Control of garden irrigation, pond pumps
- | Access system with electronic identification of the occupants
- | Wide range of fault and emergency messages

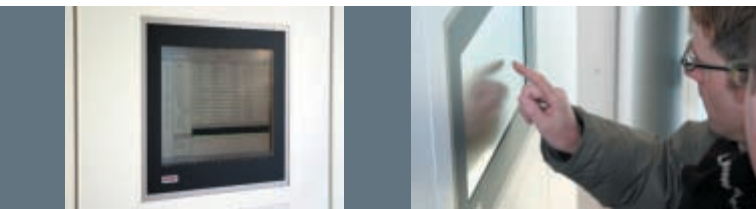
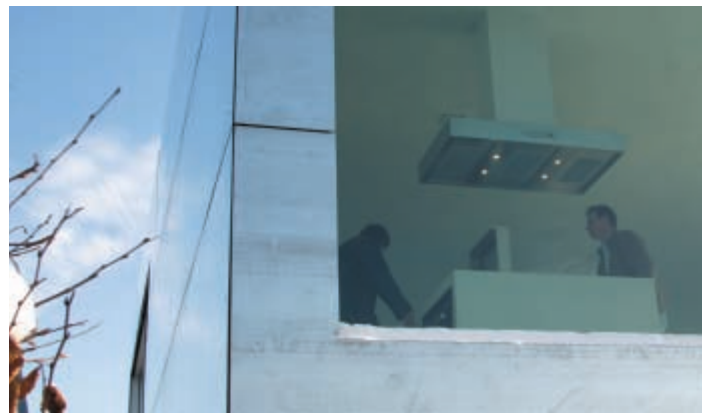
All data can be called up on any media PC or operating panel, which can also be used for generating messages via e-mail or SMS.

Since the PC control system is freely programmable, it is possible to implement almost any functionality. For example, the Home of Today enables various basic scenarios for lighting, blind and climate control during the day, at night, on weekends or for special events. Illumination, room temperature or background music can be adjusted automatically according to preset personal preferences.

Intelligent building control

The networked home offers much more than just comfort and convenient operation. Cost reduction through optimization of energy consumption and security are other important considerations. The Beckhoff control system can adjust the electrical energy consumption according to external conditions.

The heating system, for example, can be turned down automatically during the night or switched off completely when windows are open during the day. The home also "considers" its occupants. The night-time heating control temperature is not simply reduced on a timer basis like in conventional systems – it is auto-



Home of Today

matically adjusted to the actual utilization. In conjunction with occupancy sensors, the lighting can be switched off and the heating control temperature reduced automatically. Lighting levels and temperatures can automatically be adjusted to the actual weather conditions. Unlike in conventional systems, not only the brightness is modified, but also the "color temperature" (depending on the time of day and personal preferences), providing particularly pleasant living space illumination. The system can be customized for each occupant. At the same time, energy costs are minimized. Energy consumption is measured continuously and displayed via the Control Panels in the home. The entire house can be strategically controlled to minimize energy consumption.

The indoor air quality can be monitored via suitable sensors and the climate can be adjusted as required. Blind control depending on the sun's position is also possible. The blinds are controlled precisely depending on temperature, daylight and illumination, i.e. they are not simply moved up or down, but optimized in terms of the opening angle.

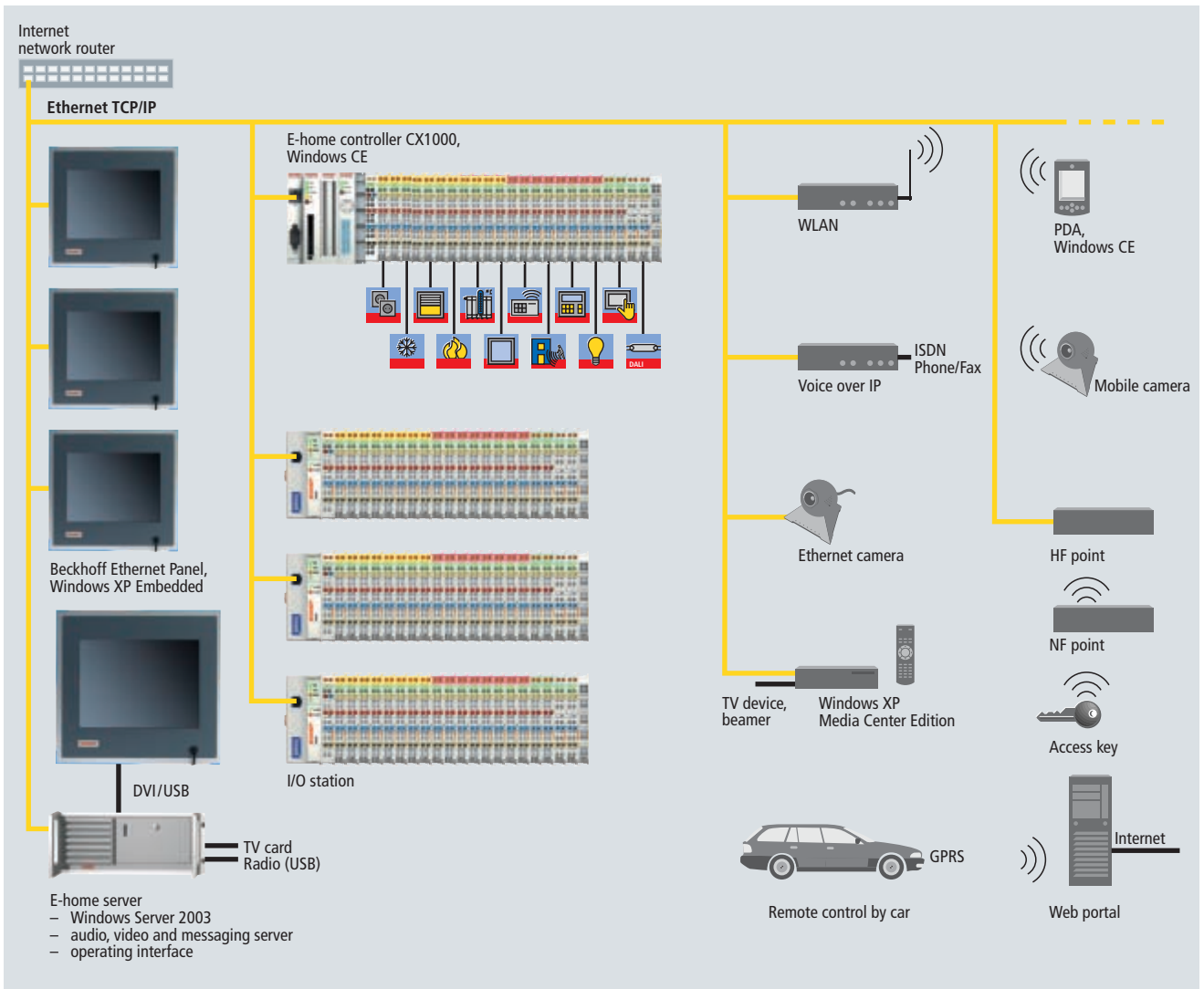
When it comes to security, Home Automation also offers a wide range of benefits such as automated access control or simulated occupancy. In the Home of Today, contacts fitted to doors and windows report unauthorized access via SMS as standard, or via a personal, secure website. When the occupants leave the building, all specified items such as ovens or irons are switched off automatically. The doors can be locked at night based on a timer.

Can the Home of Today be built? Certainly! In 2001, "SZ-Magazin" invited renowned architects from Germany and abroad to take part in an architectural competition: The search for the "Home of Today" was on. The design specification called for a dwelling located on the edge of a large central European city that was suitable for four people, with a usable floor area of approximately 200 square meters, a 500 square meter plot and pure construction costs not exceeding about 250,000 euros.

The design was realized by Munich-based architectural firm, Allmann Sattler Wappner in the grounds of the 2005 National Garden Festival in Munich. "Haus der Gegenwart gGmbH" acts as the economic and legal agency, with "Magazin Verlagsgesellschaft Süddeutsche Zeitung GmbH", "Bayerische Hausbau GmbH" and "Fördergesellschaft Landschaftspflege Bayern e.V." acting as partners.

The Home of Today will be completed by spring 2005 on a plot made available by the city of Munich. It will be used for research, education activities and cultural events. The purpose and aims of the Home of Today and Haus der Gegenwart gGmbH include research and the promotion of modern living.

Home of Today
www.haus-der-gegenwart.de



The universal Beckhoff control technology is used in a wide range of building automation applications, including offices, industrial and domestic buildings.

The automation partners of the Home of Today

The networked home is already "state of the art"

The Home of Today combines modern architecture and lifestyle of the future with intelligent technology that is available today. The difference between the Home of Today and similar projects that use the latest prototypes from development departments is that it uses standard products that are already commercially available.

Georg Schemmann, manager of Building Automation at Beckhoff: "With Home Automation used in the Home of Today we want to demonstrate what is already possible using standard components today. The target groups we have in mind for this project are building companies that can use the technology to offer added value for their houses and apartments, and private clients who can have the technology installed through specialized dealers."

In addition to Microsoft and Beckhoff, further technology partners are involved in the implementation of the intelligent building services: As universal messaging specialists, the company Tobit Software not only deals with the integration of the electronic messaging system, but also provides quality entertainment through the provision of multimedia content. 3Soft designed the ergonomic user interface that enables the home to be controlled via the TV remote control unit. Design specialists, A3plus are responsible for refining the graphics and ergonomics aspects of the user interface. Radio technology from Scemtec Automation helps to open doors without contact and enables messages to reach occupants wherever they happen to be. Last, but not least, TridonicAtco provides the digital lighting control system.