"The data processing moves into the edge"

Should IoT be integrated directly into the device, into a machine part, or directly into the sensors and actuators? SYS TEC Electronic answered these questions in an interview.

The edge controller Sysworxx CTR-700 uses the CANopen implementation for communication in the field level (Source: SYS TEC Electronic)

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IoT (Internet of Things) pursues the approach of using new technologies and communication concepts to make data available in a cloud, connect it, and to generate further benefits from this aggregated data. The most common methods here are data transmission via MQTT or the connection of data to the cloud via OPC UA. Current developments go one step further and regard edge computing as a way of automating and interconnect processes at the point of action, i.e. where data is generated - in industrial production environments, directly at the machine. With which methods is it worth going one step further? Should IoT be integrated directly into the device, into a machine part, or directly into the sensors and actuators? Dr. Frank Jungandreas, Senior Engineer at SYS TEC Electronic and Nadine Mensdorf, Product Manager at SYS TEC Electronic answer these questions.

Q: How do you classify CANopen? What does SYS TEC Electronic connect with CANopen?

Nadine Mensdorf: CANopen has long since established itself as a replacement for proprietary backplane buses within devices. CANopen can be found on the market in special-purpose machines, in battery management systems, commercial vehicles, in the lift sector, and in the mobility sector. It combines sensors and actuators in one machine and transmits status values, process data, or triggers other actions. Just as CAN is used in the automotive industry, CANopen is used for special vehicle superstructures such as fire trucks, cranes, or agricultural machinery. Ourselves as well as our customers have adapted the SYS TEC Electronic CANopen stack over many years for various controllers and terminal devices in various applications. Numerous customized developments and manufactured products contain our solution. We also use CANopen for current inquiries, projects, and customer solutions. Our product portfolio includes our CANopen chip, the Sysworxx I/O modules based on it, and our industrial controllers. We offer terminal devices for use on the DIN rail, embedded control units, as well as customized individual solutions. In addition to many other protocols, our CANopen implementation is used on all our IoT controllers with IEC 61131-3 PLC programming system for communication on the field level. This also applies to our edge controller Sysworxx CTR-700 as well as our single chip IoT controller Sysworxx CTR-100.

Q: CANopen and IoT - how does it fit together?

Dr. Frank Jungandreas: The IoT idea is often initially explained by connecting data with the cloud and the connection of devices to the cloud through protocols such as MQTT or OPC UA. But how do you effectively get cleansed, pre-processed data that is relevant for evaluation? If you look at a system as a whole, data can often be pushed directly to the cloud via its controller. This brings us to edge computing, i.e. decentralized data acquisition and processing, combined with gateway functionality, which serves as an interface to higher-level systems. With this in mind, viewing a machine in the capital goods sector as a self-contained object is a very high-level approach. Internally, its functionality combines several executing and monitoring devices, sensors and actuators. The intelligence for the Internet of Things should start where the "things" are located - i.e. exactly where data is generated: within the industrial production processes, i.e. directly in the machine. If we look at the "things" in detail as individual devices with a dedicated functionality, we have to begin to provide each object in the system with intelligence and link them together. Ethernet-based technologies clearly predominate on the level for connecting individual devices in industrial production environments. In contrast, this technology is rarely used within a machine on the fieldbus level. The reasons why it often makes more sense to rely on CANopen within a machine than to use IP-based technologies are manifold. On the one hand, the vast majority of microcontrollers used today in machine control systems already have one or more CAN interfaces integrated. The transmission of data via CAN requires significantly less energy than Ethernet-based systems, and there are numerous cost-effective tools on the market for commissioning and troubleshooting. The automotive industry is a good example of how powerful CAN is. Within the vehicles, CAN is used to communicate the status of various components, transmit process data, and trigger actions. At the same time, CAN provides the external service interface, which can be used to read out error information and telemetry data. CANopen offers just as many advantages in the field of automation for use within a machine. Lean, energy-efficient communication units can be quickly implemented with inexpensively available hardware.

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