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EVALUATION OF OPERATIONAL AND SAFETY-ORIENTED SIGNALS IN FOCUS: THE SAFETY OF MACHINERY AND CONNECTIVITY

New gateway, new Safety Fieldbox and a new 3D camera – just some of the exhibits that Schmersal will be showcasing at SPS. All three components will be live demonstrated in an IIoT demonstrator to highlight the practical benefits that continuous connectivity has to offer – especially in terms of the safety of machinery.



Fig. 1: The demonstrator at SPS will show a use case for the Industrial Internet of Things (IIoT), from field level to the cloud and incorporating the safety of machinery.

What is the best way for safety switchgear devices to communicate with higher-level controllers? What does wiring look like in the field, and how can data from field level best be analyzed – in other words, with the greatest benefit for the machine's operating company?

Goal: the best possible use of data

These questions are increasing in importance thanks to the ever growing number of available options and because of the substantial difference that connectivity can make to productivity, reliability and operating convenience. Schmersal's focus at SPS will

be to bring clarity to the situation – with innovations at product level, but also with an IIoT demonstrator to demonstrate how these innovations make safety circuit wiring easier and provide the user with valuable additional information – both at safety-related level and with operational signals that can go on to help generate Key Performance Indicators (KPIs) or be further processed or stored in a cloud infrastructure.



Fig. 2: Also new is a range expansion for the Safety Fieldbox, which can now also communicate via EtherNet/IP with CIP Safety and EtherCAT with FSoE.

Safety Fieldbox with new fieldbus protocols

On to the innovations. Many machine engineers use the Safety Fieldbox to easily and reliably wire up to eight different safety switchgear devices and to forward their data to a safety controller. At SPS, Schmersal intends to showcase two new variants. The Safety Fieldbox now has the capability to communicate not just via the PROFINET/PROFIsafe protocol, but via EtherNet/IP with CIP Safety and EtherCAT with FSoE as well. This means that the designer can now configure the machine's safety functions independently of the fieldbus system, as the three variants cover the widest possible range of control systems used internationally.

Enhanced error diagnosis

Schmersal has developed the SD Bus to simplify the capture and evaluation of (non-safety-oriented) diagnostic data. SPS is the perfect backdrop against which to launch a new SD Gateway, in this case differentiated from previous variants by both a webserver and a microSD memory card. With these, users can evaluate event logs live through the web interface and read out the diagnostic data of all connected safety switchgear devices in plain text in the browser. Diagnostic data can be transferred to the machine controller over different fieldbus protocols, while solenoid interlocks and control panels can be directly controlled via the web interface.



Fig. 3: Schmersal will be showcasing a new SD Gateway with fieldbus connectivity and integrated webserver at SPS.



Fig. 4: The new 3D ToF camera (top left in figure) offers a three-dimensional image of the automation process, with just a single sensor.

State-of-the-art optoelectronics: 3D ToF camera

With the AM-T100 3D Time-of-Flight camera, Schmersal is tapping into a whole new market in industrial automation and optoelectronics. The camera uses the time-of-flight measurement of emitted infrared light pulses to create a 3D image of the scene with millimeter accuracy, available as a point cloud, using just a single sensor. With this technology, the camera can determine the position and dimensions of an object or record the fill level of a container.



Fig. 5: Schmersal's new AM-T100 Time-of-Flight camera provides 3D depth images with millimeter accuracy.

IIoT demonstrator: show what's possible

Two of these cameras will supply the signals for the IIoT demonstrator that Schmersal will have on display at SPS. As part of the demonstration, Schmersal will show a conveyor belt transporting an open-top container filled with small parts. The cameras will be installed above the conveyor belt. One will capture the fill level of the open container, while the other will monitor the centering of the container on the conveyor belt as a 'virtual tunnel'.

The data recorded by the cameras will be sent to high-performance image processing software for processing. The resulting data, combined with those from the PROTECT PSC1 safety controller and a PLC, will be saved and analyzed. A clear dashboard will enable the information and results of the analysis to be examined. Different kinds of visual and acoustic alarm output can be used to alert pre-determined limit values being exceeded or anomalies being identified.

Typical assignment: determining KPIs in production

With these data, further processing software can be used to determine the ratio of good to bad parts or deviations from visually detectable default values and to incorporate these values into the production-related KPIs (Key Performance Indicators). This approach also makes it easy to determine 'Overall Equipment Effectiveness' (OEE).

From the controller to Edge Gateway with OPC UA and to the cloud

The IIoT demonstrator allows the data captured by the cameras to be evaluated in the on-site controller and then forwarded on to an Edge Gateway via OPC UA. From there, the same data can then be fed into a cloud infrastructure. There is then an integrated chain of information, giving users a number of options in use.

Schmersal will also be showcasing and demonstrating this infrastructure on its stand at SPS. Amongst other things, it creates connectivity in the safety circuit and thus the prerequisite for greater flexibility and 'leaner' wiring in the field, whilst at the same time improving the availability of the machine or system, as well as process transparency.

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