FUTURE DEVELOPMENTS AT A GLANCE

THE INDUSTRIAL INTERNET OF THINGS: COLLECTING DATA, ANALYSING INFORMATION AND IMPROVING PRODUCTION

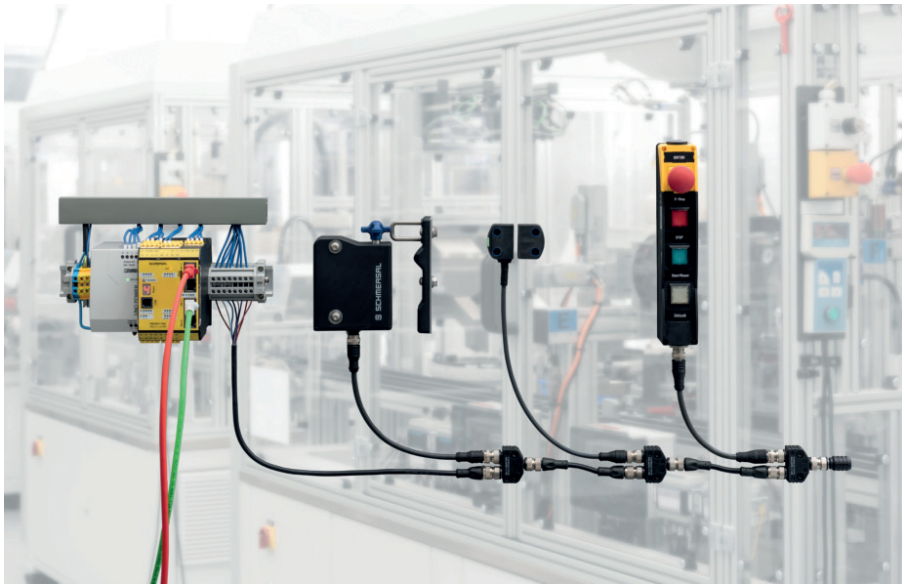

Fig. 1: The serial diagnostic bus (SD bus) from Schmersal makes it easier to make additional data and information available.

The Industrial Internet of Things or IIoT has an important role to play as both a technology and a concept within the fourth industrial revolution. Devices, machinery and applications are being networked together so that they can share data and information. These can then be evaluated and analysed, thus helping to contribute to improvements in the efficiency of production and to minimising downtimes. But exactly how can this concept be implemented, and what benefits does it actually offer? Volker Heinzer, strategic product manager at the Schmersal Group, offers answers to these and other questions in this interview.

Fig. 2: Volker Heinzer,
strategic product manager, Schmersal Group

The IIoT is a big promise within the Industry 4.0 concept, but what technical requirements need to be met for it to be implemented? Where are the pitfalls?

Volker Heinzer: The Industrial Internet of Things is a concept that aims to make data and information from industrial production more accessible and usable. Its principal objective is to improve efficiency and productivity in industrial processes.

One of the most important requirements for the IIoT is that all devices, sensors and actuators involved in communication can actually communicate. Digital networking of devices is essential to being able to intelligently monitor production processes.
The use of standardised communication protocols, such as AS-i, IO-Link, etc. as well as proprietary approaches, such as our serial diagnostic bus (SD bus), makes it easier to provide additional data and information that go beyond the signals you typically get from devices.
On existing machinery and systems, the capture of essential data and signals is often impeded by copyright protection (IP) or warranty claims, which often means that the data and signals needed have to be generated by parallel tap-off on the device itself or with additional sensors.
Intelligent, easily scalable HMIs (human machine interfaces) and edge gateways with software architecture that is independent of platform can significantly accelerate application creation. This makes it easy to capture and evaluate data and information, especially from existing machinery, and to pre-process that information. The core functionalities, such as the control system and visualisation, the gateway function between the OT and IT environments and, last but not least, local protection against IT infrastructure failures are available independently and in parallel.
Finally, the requirements regarding the presentation of all relevant data and information need to be defined early on in liaison with all involved. The question of the appropriate terminal device (stationary HMIs, mobile devices, such as laptops, tablets and smartphones) must also be clarified.
Plus, control systems, HMIs and gateways connect the world of machinery and systems with the world of IT. This harbours certain risks and requires that appropriate security measures be implemented, with the keyword here being ‘cyber attacks’. All devices must meet minimum standards of security and the applicable standards, such as MD 2006/42/EC, IEC 62443, must be taken into consideration.

When we talk about the benefits and opportunities, we often hear terms like condition monitoring, predictive maintenance and machine learning. Can you explain these terms a little?

Volker Heinzer: Condition monitoring is the continuous monitoring of the condition of a machine or system, which involves measuring relevant parameters, such as vibration, acoustics and temperature, using sensor systems. This enables early detection of potential problems and failures, and forms the prerequisite for predictive maintenance. That’s because the data that

are captured can be analysed using models, so that predictions can be made that enable predictive maintenance. In the past, machine parts were replaced at fixed intervals, maybe once a year (preventive) or when something failed (reactive), but predictive maintenance focuses on the actual state of system components. This approach has the effect of lowering maintenance costs and reducing downtime. Machine learning can be used to identify complex patterns within the data so that forecasting becomes more accurate. With example data, users can quickly recognise when parts are likely to fail. This can also help to boost the efficiency and quality of production.

Can we conceive new business models based on data collection and analysis?

Volker Heinzer: Undoubtedly. Schmersal is currently working at pace to develop new business models on this very basis. Our goal is ultimately to give our customers the option to outsource the entire responsibility of taking care of the safety of their machinery. This would mean Schmersal being responsible for the safety of its customers' machinery 24/7. We call it Safety as a Service or SaaS and it would involve us, or the specialists in our tec.nicum division, taking over all condition monitoring, overall equipment effectiveness and energy management activities.

What is your assessment of the current use of AI in relation to the IIoT?

Volker Heinzer: When it comes to AI, we're still in the starting blocks and haven't even come close to exhausting its full potential. Nevertheless, the benefits are already becoming apparent. As an example, we can use AI to identify and evaluate abnormalities in production processes or during system and machine operation. 'Normal' behaviour is taught in so that deviations from that pattern can be identified, analysed and classified according to their effects. This can help to improve availability, create predictable maintenance cycles and ensure consistent product quality.

Fig. 3: Schmersal's IIoT concept essentially offers four solution approaches: energy management, calculation of KPIs, condition monitoring and predictive maintenance.

Let's talk specifically about the IIoT solutions that Schmersal has to offer. What solutions can you give customers?

Volker Heinzer: Schmersal's IIoT concept essentially offers four solution approaches: energy management, calculation of key performance indicators (KPIs), such as overall equipment effectiveness (OEE), condition monitoring and predictive maintenance.

Networking machinery, generating data, analysing and processing data. All of these activities create new gateways that could compromise the security of machinery and systems. How can the IIoT itself contribute to guarding against cyber attacks and what measures are being put in place in Schmersal's solutions and products to continue to ensure safety and security?

Volker Heinzer: In addition to protocols like the hypertext transfer protocol (https) or secure shell (SSH), the virtual private network (VPN) allows you to establish a protected network connection while operating over public networks, like the internet. VPNs encrypt internet traffic and disguise a user's online identity. This means that machinery and systems are well protected against cyber criminals and hackers. VPNs allow for secure device management, secure configuration and programming, independently of location, anywhere in the world.

As a strategic product manager, your focus is always on the future. What developments do you foresee in the industry in the years to come and how will Schmersal position itself in relation to them?

Volker Heinzer: We will continue to expand the range of services around our products. Where just a few years ago products were at the forefront, services are now increasingly moving into focus. The 'digital transformation' marches on. Topics such as the digital twin, combined with the structure and communication of administration shells, as well as simulation, are topics of current focus and challenges that Schmersal is facing up to. And with everything, we continue to focus keenly on the growing needs of customers, all with the aim of designing more secure and more efficient processes for them and for us and developing new services together.

Technical article, published in:
GIT SICHERHEIT 4/2024,
www.GIT-SICHERHEIT.de,
Wiley, pubishing house

K.A. Schmersal GmbH & Co. KG
Möddinghofe 30
42279 Wuppertal
Phone: +49 202 6474-0
info@schmersal.com
www.schmersal.com