

## SPS 2023: Smart product solutions

For the three days from 14 to 16 November 2023, the 16 halls of the Exhibition Center Nuremberg (Germany) opened the doors for the 32<sup>nd</sup> edition of the SPS. 1229 exhibitors showcased their automation innovations to more than 50000 visitors.



(Source: Mesago/Arturo Rivas Gonzalez)

Networked automation technology is the key to success. “We are proud to have achieved results such as these with this year’s SPS, and the figures speak for themselves. Due to the high demand from exhibiting companies, we preempted this positive growth by expanding exhibition halls to 3C and 8. This proved to be the right decision,” explains Sylke Schulz-Metzner, Vice President SPS at Mesago Messe Frankfurt. The SPS conference program included topics ranging from digital transformation, Industry 4.0, industrial communication, safety & security, data-driven and intelligent concepts for control and visualization, and sensor innovations, to drives and sustainability through automation. In addition to the classic automation topics of control technology, drive technology, and sensor technology, software & IT is becoming an increasingly important issue in manufacturing. As a result, attention is increasingly turning to the use of artificial intelligence and IT security in the automation world.

CAN in Automation has been participating in the trade show with its own stand in hall 5. About 40 products on six panel walls have shown CAN and CANopen devices from CiA member companies. Additionally to the visitor speeches at the stand, the CiA editorial team was “on

the way” across the halls to collect information about CAN-related trends and new products.

### Motion control

As in the previous exhibition years, the most important topic for the CAN-based automation have been motion control solutions. The most of them support the CiA 402 ▶



Figure 1: Stepper motor drive platform from Elra (Source: Elra Antriebstechnik)

CANopen device profile for drives and motion control also internationally standardized in the IEC 61800-7 series. The exhibited CiA 402 products ranged from high-power inverters to tiny stepper motors and servo controllers.

For example, Elra Antriebstechnik, a recent CiA member, provides a stepper motor drive platform for Nema 23, Nema 24, and Nema 34 motors. The device can be supplied with 24 V<sub>DC</sub> to 60 V<sub>DC</sub> and provides a holding torque of 12 Nm. TIM is an integrated servo motor solution by STXi Motion for applications with limited control cabinet space and a decentral machine architecture. The manufacturer also provides the ZED servo drive with output currents of 23 A. The devices support the STO (safety torque off) function and are suited for implementation in automated guided vehicles (AGVs), for example. STXi also offers customized end-to-end motion solutions. The Danish manufacturer JVL has introduced a 33-mm-long integrated servo motor for 3 kW to 4,5 kW. The MAC083 integrated servo motor (for 83 W) and the MAC231 (for 320 W) integrated brushless DC motor are the further recently-developed products by JVL. The Italian company Mini Motor has presented the FCL brush-less linear servo motor with integrated drive and multi-turn absolute encoder. The WFCL device variant enables a wireless CoA (CAN over air) link using the CANopen higher-layer protocol. Wireless communication up to 60 m between according devices is possible.

## Sensors

Also important for the automation solutions are encoders, sensors reading the position of a movement.



Figure 2: EAM580RS encoder by Baumer (Source: Baumer)

For instance, Baumer recently introduced the EAM580RS encoder for mobile machinery, especially such as loader and tower cranes as well as mobile working platforms. It supports the safety integrity level SIL 2/PLd according to IEC 61508, ISO 13849:2023, and IEC 61800-5-3. The single- or multi-turn encoder variants are available with CANopen and J1939 connectivity.

Another exhibiting company, EBEElektroBauElemente provides customized sensors and motion solutions. For example, a customized double rotary encoder implements two CAN interfaces, redundant signal processing, preparation, and output, thus enabling deployment in safety-relevant applications. A further encoder with two CAN interfaces for safe position detection has been

shown by Fritz Kuebler. The Ants LES02D is a compact (126 mm x 55 mm x 37 mm), contactless measuring system with a resolution of 0,5 mm and a travel speed of up to 10,5 m/s. For instance, it can be used to determine absolute position values of an elevator car via a non-contact measuring principle.

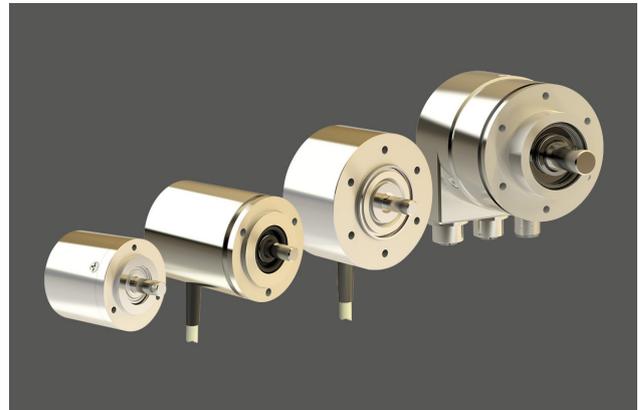


Figure 3: Safety sensor range from TWK (Source: TWK)

TWK has exhibited its new safety sensor range at the show. The compact encoders and inclinometers are offered with SIL 2 or SIL 3 certification. Such sensors are in demand, especially in the field of autonomous vehicles such as AGVs and AMRs (autonomous mobile robots). Safety sensors ensure that the steering angle, wheel speed, and position of any mounted tool are always reliably available. A further safety aspect is the vehicle tilt. TWK offers safety tilt sensors, the so-called inclinometers. In addition to the 360° dynamically-corrected angle signal, these provide a speed signal and raw values. The encoders and inclinometers are available with CANopen Safety and J1939 Safety interfaces.

The Italian company Lika offers a wide range of encoders such as rotary encoders, magnetic encoders, draw-wire encoders, and linear encoders. Beside others, CANopen and DeviceNet connectivity is provided. The manufacturer also supplies one- or two-axis inclinometers used in CANopen networks, for example the recent IXB and IXC devices. The company's Drivocod rotary actuators (e.g. RD4 and RD5 with CANopen) can be used for decentralized automation of positioning axes.

Krohne Messtechnik is specializing in process measurement technology. Offered portfolio includes sensors, systems, and accessories for flow, level, temperature, and pressure measurements. Process analyzing solutions are provided as well. For the equipment, different customized communication interfaces can be realized. For example, in the Batchflux 5500 flow meter a CANopen interface has been implemented.

## HMIs: Human-machine interfaces

On the SPS, ifm electronic has shown its products such as sensors, controllers, I/O modules, HMIs, gateways, and software for automation and digitalization of customer's facilities. The devices are available with CANopen and J1939 connectivity as standard. For example, the new ▶



Figure 4: 4,3-inch Ecomat touch-screen displays (Source: ifm electronic)

rugged 4,3-inch Ecomat touch-screen displays are dedicated for use in mobile working machines, agriculture and forestry machines, as well as in municipal machines. The HMIs support CAN CC (classic) with CANopen and J1939 higher-layer protocols.

The Mvisio HMI from Zander Aachen is available in different variants. For instance, the Mvisio 7 with a 7-inch touch-display is dedicated for applications in packaging machines, cutting equipment, filling plants, gluing stations, plastic injection molding machines, etc. The IP66-rated device bases on a 1-GHz ARM Cortex A8 processor. Beside others, it supports CANopen NMT (network management) manager functionality to control CANopen-connectable devices.



Figure 5: CAN-CBX-Bridge-FD (Source: ESD Electronics)

## Gateways

ESD Electronics has exhibited the CAN-CBX-Bridge-FD. The DIN-rail mountable bridge enables for connecting CAN CC and CAN FD networks with data buffering. Exchanged data can be filtered by variable masking. The networks can operate with different bit rates. Configuration of bit rates and frame filter settings can be selected via a rotary switch. Galvanic isolation of CAN networks is built in to reduce ground loops. The two CAN FD interfaces support a maximum data-phase bit rate of 8 Mbit/s. 1 Mbit/s is the possible bit rate on the CAN CC side. Deutschmann Automation has presented the Unigate Falcon Profinet gateway with an optional CAN interface.

The compact DIN rail module is based on the ARM Cortex-M processor technology.

The company's exhibited starter kits are arranged in such a way that a connection of a product to the selected communication network (e.g. CANopen or DeviceNet) at the laboratory bench is possible in a fast and reasonable manner. B-Plus has shown its Isobus-capable gateways such as B-Isobus IO Gateway, the B-Isobus CAN Gateway, and B-Isobus AUX-N Gateway. These devices should enable standardized connectivity between ECUs (electronic control units) within agricultural machines (e.g. tractors) and Isobus-connectable implements.

## Embedded boards

Seco has presented its Smarc release 2.1.1 (smart mobility architecture) module SOM-Smarc-Genio700 with

a CAN CC port. The system on module can be used for development of fanless industrial applications with high demands on graphics and AI performance, informs Seco. The SOM-Smarc-MX93 computer-on-module (COM) provides two CAN CC interfaces.



Figure 6: MIO-5377R SBC with two CAN CC ports (Source: Advantech)

Advantech has introduced embedded single board computers (SBCs) with the latest 13<sup>th</sup> generation Intel Core processors bringing performance enhancements and making the products suitable for smart factories, machine automation, machine vision, transportation, medical, retail, and edge AI applications. The product range includes MIO-5377R SBC with two CAN CC ports and the MIO-4370 with one CAN CC interface.

## Stationary and remote control

The Irish exhibitor Horner Automation is a designer and manufacturer of complete factory automation control solutions consisting of programmable logic controllers, I/O modules, and human-machine interfaces able to communicate (among others) via CANopen and the proprietary CsCAN network. The embedded PCs UC-8220 and UC-4400A from Moxa support CANopen and DeviceNet higher-layer protocols. The manufacturer also produces PCI cards to connect CAN-based networks to a PC. Bamboo Dynamics, a brand from Blackbear Techhive in Taiwan, produces TCC (True control CAN) controller series. These devices are used to control roller systems deployed e.g. for movement of transportation boxes in logistic and factory automation applications. Errevi Automation, another member of the Blackbear group, acts as system integrator developing and manufacturing such complete solutions.



Figure 7: Imet radio remote control solutions (Source: Imet)

Several companies have presented their remote-control solutions on the fair. Such solutions consist of a controlling device with a (wireless) transmitter and a receiver device to be integrated in a controlled application. Tele Radio offers the customizable Exter system for the ▶

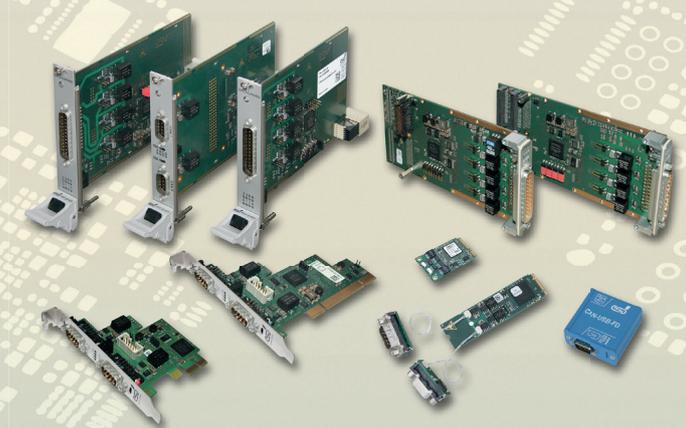
external control of trucks from Volvo. Additionally, the company offers the Panther, Tiger G2, and Puma remote controls, which can fulfill safety requirements up to SIL 3 (safety integrity level). The systems support CANopen and J1939 higher-layer protocols. A further manufacturer of remote-controls supporting CANopen on the receiver device, is Imet Radio Remote Controls from Italy. Simple and more sophisticated devices are offered for different applications. Arcon produces and customizes safety radio remote controls used e.g. in hazard zones on the construction sites. The supported higher-layer protocols include CANopen, CANopen Safety, DeviceNet, and J1939.

## Miscellaneous

Gantner Instruments has exhibited its test and measurement technology solutions. The recent Q.station X and Q.monixx edge devices for monitoring, control, and remote configuration provide CAN CC connectivity. The hand-held measuring unit HMG 4000 with a 5,7-inch touch screen by Hydac Electronic fulfills measuring tasks in stationary and mobile machines. The unit provides ten channels for acquisition of analog and digital signals. An additional CAN interface enables connection of 28 transmitters. The CAN interface supporting J1939 and further higher-layer protocols can also be used to connect the HMG 4000 to an existing CAN system and to monitor the networked sensors.

The German company Safety System Products (SSP) has developed the Safety Simplifier. The device flexibly collects safety-related signals from light curtains, emergency-stop HMIs, or safety switches and forwards the signals to a higher-level controller via a CAN network or wirelessly. In case of emergency, it can interact with connected devices according to a programmed scenario. For example, several Safety Simplifier units can be located in a fabric hall to provide the required safety precautions up to PLd or PLe performance level.

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of



**CANopen<sup>FD</sup>**

**CAN<sup>FD</sup>**

## CAN FD-Interfaces

### Various Form Factors

- PCI, M.2, PCI Express<sup>®</sup> Mini, PCI Express<sup>®</sup>, CompactPCI<sup>®</sup>, CompactPCI<sup>®</sup> serial, XMC/PMC, USB, etc.

### Highspeed FPGA Design

- esdACC: most modern FPGA CAN-Controller for up to 4 channels with DMA

### Protocol Stacks

- CANopen<sup>®</sup>, J1939 and ARINC 825

### Software Driver Support

- Windows<sup>®</sup>, Linux<sup>®</sup>, optional Realtime OS: QNX<sup>®</sup>, RTX, VxWorks<sup>®</sup>, etc.

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