CAN Newsletter Online

CAN sensors for deeply embedded networks

In many rolling stock applications, deeply embedded CAN networks are used. At the Innotrans tradeshow 2022, several companies exhibited sensors with CAN interfaces.

Deeply embedded networks are invisible for the driver and the passengers (Source: Adobe Stock)

Deeply embedded CAN-based networks are used in rolling stock for different purposes. This includes temperature monitoring when measuring vibrations and shocks or to evaluate environmental influences in the under-floor area. Pressure sensors are used, for example, to measure the differences at tunnel entrances and exits. Of course, there are also speed and acceleration sensors applied to display the measured values to the driver and the passengers. Some of these sensors are deeply embedded in brake controllers, door controllers, engines, etc. The most implemented standardized higher-layer protocol is CANopen. CANopen for rolling stocks is internationally standardized in IEC 61375-3-3.

Condition monitoring sensor

At Innotrans 2022 with around 140 000 visitors, Ephy Mess exhibited its Vibrotherm sensor providing a CAN interface. The product has been developed jointly with ASC. It measures vibration and temperature. The pre-processed data are communicated via the CAN interface. The Vibrotherm sensor system enables time-synchronous acquisition and analysis of accelerations and temperature. In addition, FIR and IIR filters as well as algorithms for extracting feature vectors are already preconfigured. The triaxial accelerometer of the sensor system is based on MEMS (micro-electromechanical systems) technology with a capacitive operating principle offers a configurable measuring range between ±2 g and ±40 g. It allows sampling rates of up to 4 kHz per sensitive direction. The integrated electronics enable the acquisition of accelerations with a resolution of 20 bit. The temperature is measured between -40 ° C and +125 ° C with a sampling rate of up to 50 Hz achieving a resolution of 15 bit. The device monitors the properties and behavior of mechanical parts, especially when critical vibrations as well as oil temperatures on motors, bearings, or gears have to be acquired and analyzed synchronously.

Temperature and CO_2 sensors

One of the more than 2800 Innotrans exhibitors was Sensit. Besides temperature sensors, the Czech company presented its KSC 520 CO_2 sensor, which comes in the near future with a CANopen interface. The CO_2 measuring range of 400 ppm (parts per million) to 5000 ppm. It meets the EN 50155 standard requirements. The company also exhibited devices for air-conditioning featuring combined temperature and relative humidity sensor elements connectable to CANopen networks. Additionally, CANopen I/O modules with analog ports were shown.

Pressure sensors

CAN in Automation (CiA) member Trafag headquartered in Switzerland exhibited in Berlin its CANopen CMP 8270 pressure sensors. They can be applied for deeply embedded networks measuring the pressure in lubrications systems, door closing systems, pantographs, bogies, brakes, sanding units, diesel engines, air-conditioning systems, etc. The pressure sensors fulfil the requirements of the EN 50155 standard. The CANopen interface supports the CiA 404 device profile for measuring devices. The measuring range is 0 bar to 0,2 bar up to 0 bar to 600 bar. The ambient temperature range is -40 °C to +125 °C.

Encoders and inclinometers

Visitors from over 131 countries attended the Innotrans tradeshow. Of course, just a few of them were interested in deeply embedded sensors, which were mainly exhibiting in hall 27. One of them was FSG, a CiA member, offering a range of sensors including angular position, tilt angle, and rope length transmitters. They provide functional safety functionality and CANopen connectivity. Some of them are used in drive and bake levers. One of them is the MH1023-MU rotary encoder featuring redundancy. It complies with SIL-2 safety integrity level.

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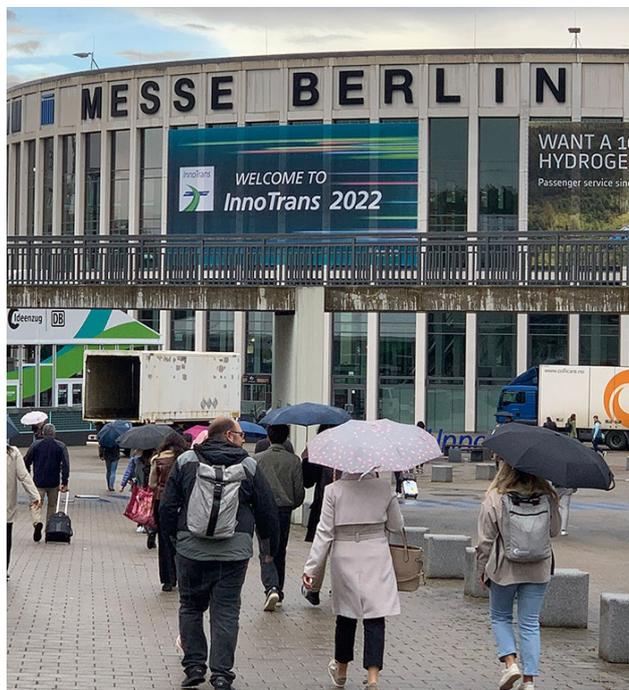
From September 20 to September 23, the Innotrans opened its doors in Berlin, Germany (Source: CiA)