Radiation-resistant FPGA features CAN connectivity for mission-critical applications

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In 1982, Udo Fuchs, Manfred Schmitz, and Werner Witt established MEN. The company is one of the CiA founding members. Today, MEN employs about 230 people. The company is focused on mission-critical computer-systems and board-level products. They are mainly used in rail vehicle, airborne, and commercial vehicle applications. All printed circuit boards are produced and tested in Nuremberg, in order to achieve the requested quality. The company is IRIS, AS 9100, ISO 9001, and ISO 14000 certified. It runs daughter companies in France and in USA.

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Manfred Schmitz:
"Most of our products provide CAN interfaces; CAN is for our customers like a UART."

MEN's oldest and largest CAN customer is the Oerlikon Textile group (with its brands Schlafhorst, Barmag and Saurer). Since 1993, the company produces the HMI-based host-controller hardware. The Schlafhorst machines are equipped with about 150 CAN nodes; the I/O modules are made by the machine builder. The 3000 controllers are produced by MEN. "We never make application software," said Manfred Schmitz, one of the two CEOs, "and we never install our products in machines and vehicles. This is the business of our customers."

The focus of the company has changed over the years: Nowadays, most of the systems and boards are used in mission-critical applications. An important group of customers are suppliers for and manufacturers of rail vehicles. This includes among others Ruf and Selectron in Switzerland, CAF in Spain, Alstom and Thales in France, Bombardier in Canada as well as Voith, Knorr-Bremse, and Siemens in Germany. In the future, MEN will supply safety-related equipment up to SIL 4 for automatic train control systems such as ETCS (European Train Control System) and PTC (Positive Train Control).

Another market addressed by the company is the airborne industry. One of the first customers was the Airbus enterprise. For the A-400M military transportation aircraft, MEN's engineers developed even an FPGA with a triple-redundant CAN module. The ▷

Modules for trains featuring CAN connectivity

For display and box computers

Designed for harsh environmental conditions in mobile markets, the SC24 single-board computer for display and box computer applications is equipped with the G-series processor by AMD. All interfaces are led to an extension card. "The modular design is qualified and tested by MEN to meet the operating temperatures of -40 to +85°C and prepared for e1 certification," said Aurelius Wosylus from AMD. The product is suitable for example for fleet management systems and for digital signage applications.

For space limited applications

Dedicated for railway, avionics, agricultural or construction machines or medical equipment, the ESMini MM2 COM (95 mm x 55 mm) is equipped with Intel's 1,6-GHz Atom E600 processor. It consumes 5 to 7 W. The module provides several interfaces including CAN, Ethernet, USB, and SATA. It comes with LVDS and SDVO for graphic applications. The product features a 2-GiB DDR2 SDRAM, which is soldered against shock and vibration. Different mass storage media can be accommodated directly on the carrier board. If the specified temperature range (-40°C to +85°C) is not sufficient, air-cooling can be applied on top of the conductive coolingcover, which encloses the module.

Respirator by Hamilton using an embedded CAN network

CAN implementation is able to detect and correct any single-failure. The FPGA is also radiation-resistant.

In medical and health-care systems, several CAN-connectable controllers have been designed in. For example, B-Braun has equipped its infusion-pumps with such products, and Hamilton controls its respirators with CAN-linkable single-board computers and Computer-on-Modules. For industrial applications, the company provides a broad range of off-the-shelf boards with system integration service. However, more than 50% of the sold products are adapted to the customer needs or are entirely application-specific. Last year, the company sold about 60% of its electronics in Germany.

"We know all the standards and regulations for mission-critical applications," explained Manfred Schmitz. "We have specialized ourselves to railway, aircraft, and commercial vehicle industries." The automotive customers include ZF (Germany) designing fleet management equipment, Telemotive developing datalogger, one of the leading agriculture machine manufactuers producing Isobus-connectable agriculture vehicles, and Joy Mining manufacturing mining vehicles. In all of these applications CAN connectivity is required. "In many of our products we use FPGA with our own CAN implementation," said Manfred Schmitz. "In some applications, we implement CANopen as the higher-layer protocol, but most of our customers are using just CAN layer-2 software."

MEN supplies also products to the Phileas project running in the Netherland: The driverless bus uses redundant controllers with CAN connectivity. The system implements triple-redundant controllers, and is SIL-4 compliant. This means that one system consists of three single-board computers in a 2-out-of-3 configuration. Each is installed in a different place in the vehicle, so as to avoid a complete system failure in case of a collision. Every single computer obtains data from all sensors via two CAN connections and compares them with the other two computers' results. ◀