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February 01/18

SPECIAL ISSUE

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Cover Story:

The Rise of Edge Computing





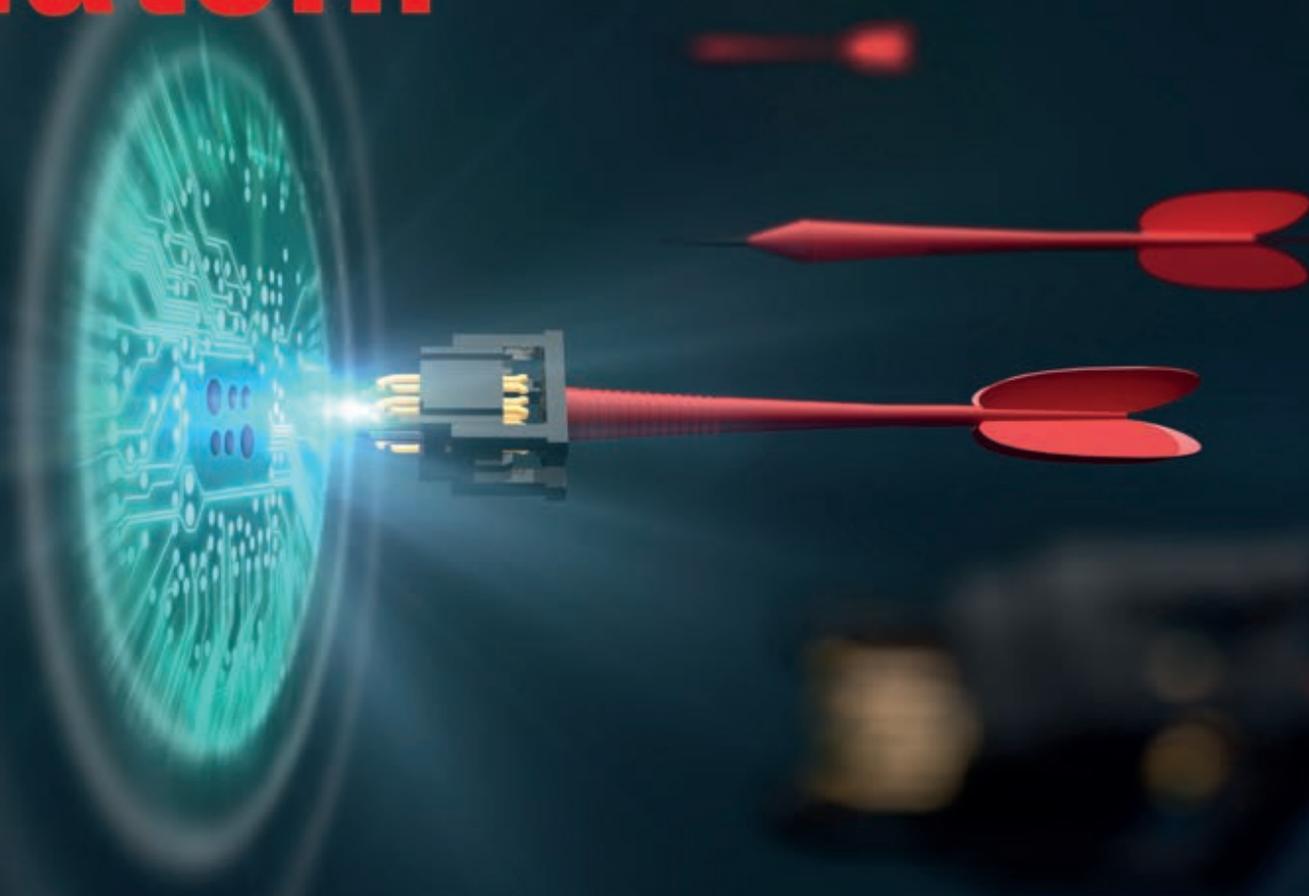
Smart lighting control with DALI 2.0 software stack for XMC1000 microcontrollers

Amongst other things, the XMC1000 microcontroller family with ARM® Cortex®-M0 offers optimised peripherals and functionalities for smart lighting control. This makes it possible to address a host of different applications both indoors as well as in commercial buildings.

It is within this environment that DALI (Digital Addressable Lighting Interface) has established itself as a standardised interface for controlling lighting control gear. With DALI 2.0, interoperability between components from different manufacturers has been further improved, whilst the integration of sensors significantly extends the possibilities for smart lighting applications. Infineon has partnered with Xenerqi to develop a DALI 2.0 software stack for its XMC1000 microcontrollers. This significantly reduces development time and costs....

Read more in the article starting on page 10.

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Dear Readers,



For you as experts in the development of embedded systems it's usual since years to start the new year with the embedded world exhibition and conference in Nuremberg. And it's also no surprise for us that this event is growing from year to year – it demonstrates and proves the growing importance of embedded technologies for our daily life. There is probably no area where you will find no embedded system intended to improve our lifestyle. Think about cars, homes, energy supply, industry,

communication and so on and you will find a multitude of embedded systems in all of them.

The embedded world exhibition & conference 2018 will be held in the fairgrounds of NürnbergMesse from 27th February until 1st of March. This year, the theme of the embedded world conference is "Embedded Goes Autonomous". It means that the conference is putting the spotlight on one of the key issues for the sector. The capabilities of processors have grown so much that new technologies like machine learning and AI are close to being applied. This will enable completely new systems that will perceive the environment around them autonomously, draw conclusions from it and make decisions. The embedded world conference is reflecting this trend with its theme "Embedded Goes Autonomous". As well as a separate conference focus on this topic, "Embedded Vision" – the computer-assisted processing of images – is also very strongly associated with autonomous applications. Consider autonomous driving, for example, or diagnostic imaging in medicine. Overall, the program in 2018 is subdivided into seven conference clusters: Internet of Things, Embedded Vision, Autonomous Systems, Security & Safety, Embedded OS, and Hardware Engineering. The electronic displays conference will explore current topics relating to OLEDs, touch technology and much more.

The main thematic focus of the panel discussion "Safe for the Future" will be the protection of networked embedded systems in the Internet of Things. This time round, the key issues to be explored will include the measures that can be implemented to protect critical infrastructures, what critical infrastructures and applications are, and which measures can be adopted for supposedly non-critical applications. But the issues of safety and security do not just play a major role in the panel discussion and congress but are also at the heart of the trade fair action. At the special "Safety & Security Area" in Hall 4A, visitors can find out how to protect embedded systems from attack, design attack-proof hardware and software for embedded solutions and monitor attack routes in the embedded sector.

As you can see visiting Embedded World in Nuremberg is an absolute Must for anybody involved in the embedded industry. It would be a pleasure to meet with you at the show – you'll find us in hall 3A booth 524. Looking forward to see you there.

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Editor



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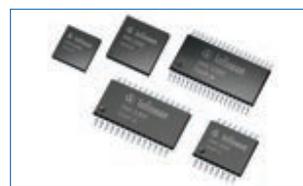
Cover Photo: Mouser Electronics

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Edge computing in IoT is opening new opportunities for embedded designers. FPGAs can be used to aggregate data, and once in place can also process that data and deliver real time analytics. Coupled with DSP and multicore processors, intelligent nodes and gateways can provide more useful information back to the cloud, reducing power consumption and extending battery life.

DALI 2.0 software stack for microcontrollers saves costs 10



This article introduces a DALI 2.0 software stack for XMC1000 microcontrollers. This stack was developed by Infineon in close cooperation with Xenerqi and accelerates design of LED lighting applications.

Enhanced reliability and performance in motor control encoder applications 16



This article focuses on key benefits for motor control applications using the 50 Mbps (25 MHz) ADM3065E RS-485 transceiver and the ADSP-CM40x mixed-signal control processor. The RS-485 transceiver is designed for reliable operation in harsh environments such as motor control encoders, with added noise immunity and (IEC) 61000-4-2 electrostatic discharge (ESD) robustness.

Cable connection concept for remote embedded modular computers 20



For three decades, industrial PCs have used two types of internal architecture: motherboards and passive backplanes. A new PCI Express over cable concept will improve the capabilities of the next computers on smaller footprints by ten times, according to the manufacturer.

Liquid cooling expands applications for CompactPCI computers 24

When the first electronic computer with almost 17,500 tubes went into operation in 1946 with ENIAC, the power loss of 175kW required special cooling. If today, seventy years later, smartphones with over 3 billion transistors and only half a watt power consumption are considered, the progress is impressive and cooling no longer seems an issue. But far from it: with increasing hunger for computing power, the issue of lost power and waste heat is of new importance.



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The Rise of Edge Computing

By Mark Patrick, Mouser Electronics

Edge computing in IoT is opening new opportunities for embedded designers. FPGAs can be used to aggregate data, and once in place can also process that data and deliver real time analytics. Coupled with DSP and multicore processors, intelligent nodes and gateways can provide more useful information back to the cloud, reducing power consumption and extending battery life.



■ Through the advent of the Internet of Things (IoT), there has been significant interest generated in edge computing. Like Cisco fog computing, this means putting more processing power at the edge of the cloud, which helps to reduce the overall power consumption from the sensor node to the data centre. This represents a significant opportunity for embedded designers, who are demanding more sophisticated algorithms at the sensor and the gateway. While there has been considerable activity over the last few years in apps and software to support data centre hardware, the move to edge computing will need a much broader base of software, running on higher performance embedded systems.

Hardware is becoming available in both the embedded and industrial markets that will address this. It generally utilises dual or quad-core processors, such as the KeyStone system-on-a-chip offering from Texas Instruments at the nodes and Intel Core i7 in gateways from suppliers like ADLINK that are capable of handling both the sensor data and the analytics. This will be essential with tens of billions of IoT devices expected to connect to the network. Current IoT architectures tend to only deploy analytics in a data centre context once all the information has been collected, but as IoT deployments increase, data will simply not be provided quickly enough. To be truly

useful, analytics will really need to be placed at the true edge, directly into the devices. “The situation we have at the moment is that data is being sent to a massive data lake where it is not being used,” said Chad Boulanger, Global VP of Business Development for IoT Analytics at software development company Greenwave Systems. “As the IoT continues to grow, this is not going to add value. The only way to do that is to do as much as possible at the true edge of networks - within the actual devices - so that the machine knows that something is wrong right there and can take appropriate action. If the data has to travel from another part of the network, that could have a detrimental impact.”

According to a report by market researchers Gartner, there will be 20.4 billion connected IoT devices in use globally by 2020. The sheer quantity of data that will be transmitted from these devices is driving adoption of edge computing, where connected devices and sensors transmit data to a local gateway device instead of sending it back to the cloud or a designated data centre.

Edge computing is well suited for IoT applications because it allows for quicker data analytics and reduced network traffic. Real-time data analysis for decision making purposes is thus possible - aiding in factory optimization,

predictive maintenance, remote asset management, building automation, fleet management and logistics. But edge computing is not just about analytics. Adding more energy-efficient methods for handling algorithms quickly and locally can save power reserves in remote battery-based nodes, reducing the amount of data traffic and thereby extending operational lifespan. Using digital signal processing (DSP) provides the ability to use more sophisticated algorithms for analytics and data processing, while increased memory capacity allows data to be buffered for longer low-power states. Flexible I/Os enable a more distributed heterogeneous processing architecture. This combination provides the flexibility needed for OEMs to quickly deliver new innovations.

The challenge is providing the right level of performance in embedded devices. Alongside analytics, one of the first steps is to increase the prevalence of computer vision. This requires more dedicated DSP blocks in the embedded processors, as well as much greater focus on the skills of the embedded designer. This focus on edge processing is also driving programmable logic technology further into embedded sensor systems, with products such as the iCE40 UltraPlus FPGAs from Lattice Semiconductor leading the way. This has eight times more memory and twice the DSP resource, plus improved I/Os over

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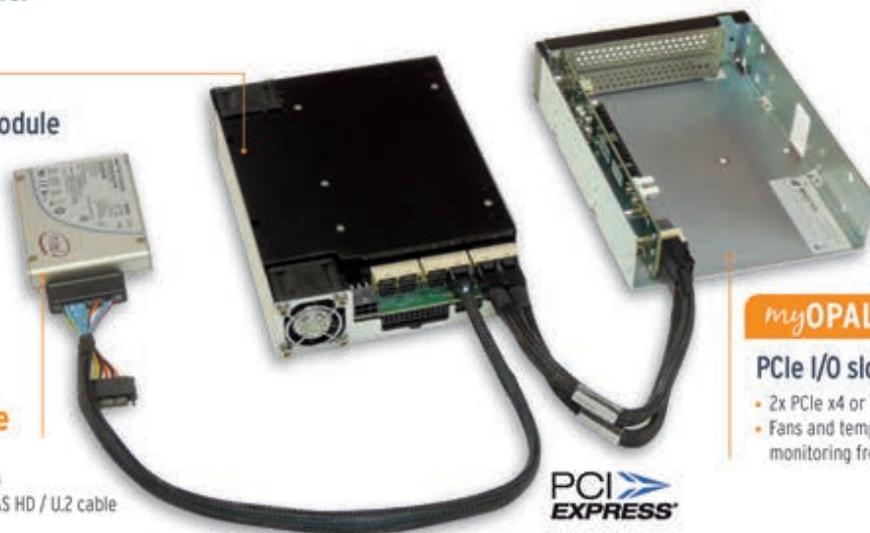
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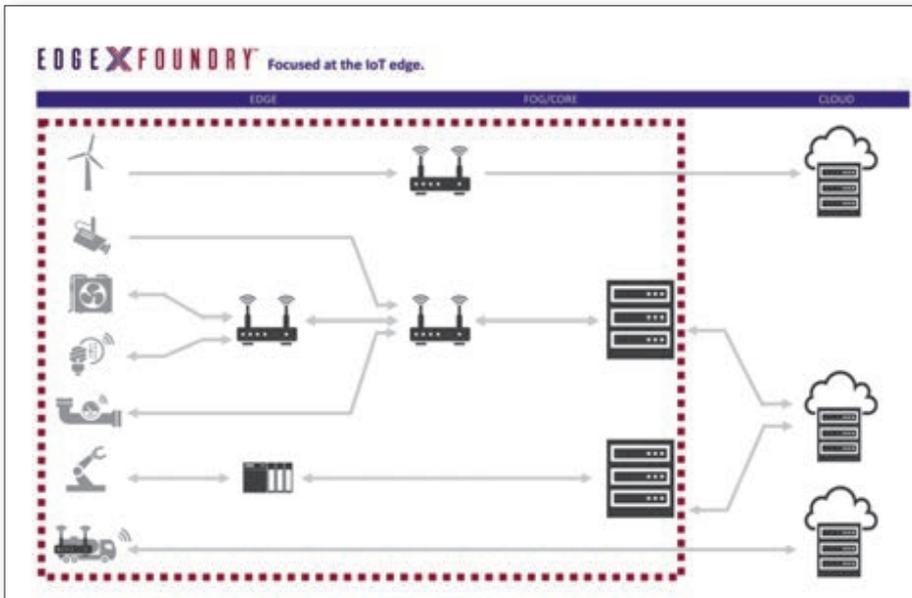


Figure 1. Moving processing to the edge of the network is becoming essential for IoT. (Source: EdgeX Foundry)

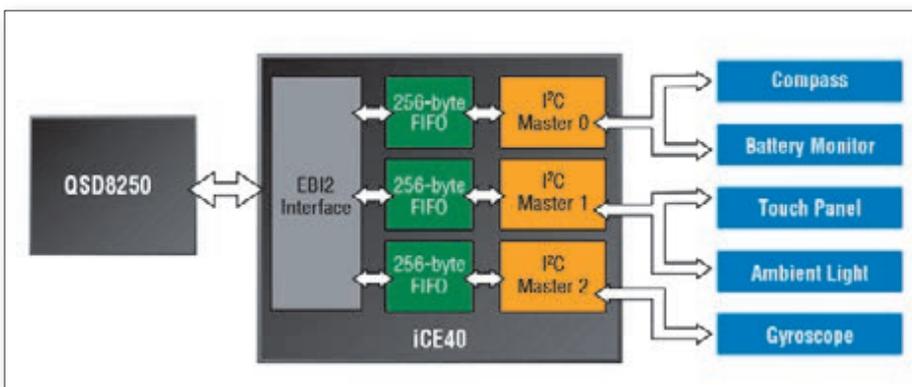


Figure 2. iCE40 FPGAs can be used for aggregating and accelerating data handling at the edge of the IoT network.

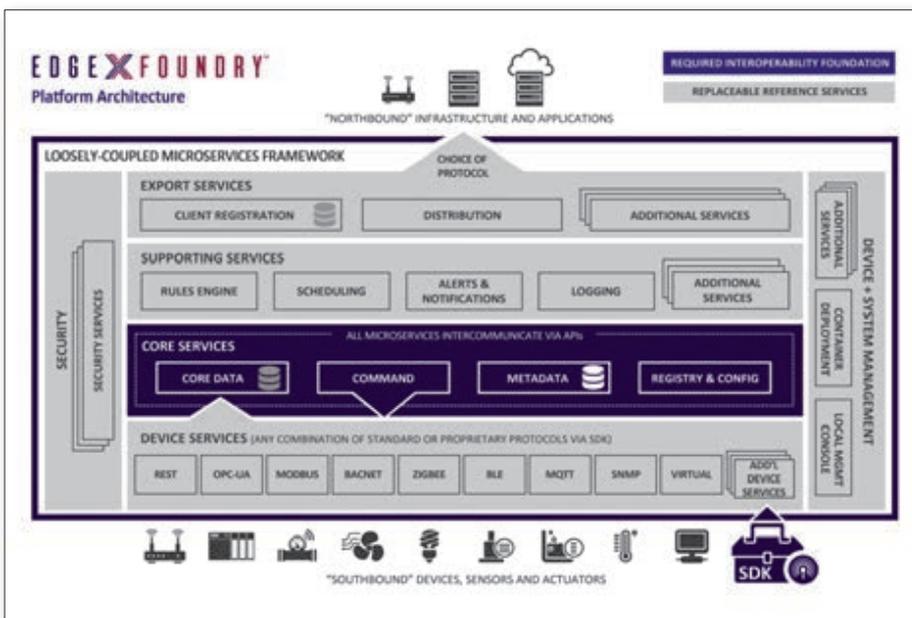


Figure 3. Handling more of the IoT processing at the edge of the network (Source: EdgeX Foundry)

previous generations. As a result it can provide the higher levels of performance needed by edge computing devices that are constantly on, always ready to instantly process commands locally without going to the cloud. There is support for functions such as gesture detection, facial recognition, audio enhancement, audio beam forming, phrase detection, double tap, shake-to-wake and pedestrian dead reckoning (PDR). As well as 1.1 Mbits of SRAM and 8 DSP blocks, the FPGAs in this family incorporate up to 5K look-up tables (LUTs) and non-volatile configuration memory (NVCM) for instant-on applications. With under 100 μ W used in standby and compact QFN packages, they are highly suited to deployment in space-constrained environments with power limitations. Key applications include always-on sensor buffers and distributed processing for mobile devices at sub-1mW power consumption, always-on sensor functionality while the AP is in sleep mode, etc.

But edge computing is not just about more powerful hardware. FogHornSystems for example has developed a platform that it says can provide real-time analytics on ultra-small footprint edge devices. This allows developers to get data from IoT applications, reducing bandwidth usage and cost. It minimizes latency and increases reliability, as well as providing real-time responsiveness.

The embeddable software Lightning Micro of the company has a small memory footprint (less than 256 MBytes) for data processing and real-time analytics at the edge using a C++ SDK. The data is fed in via IoT protocols, such as OPC-UA, MQTT and Modbus, and the real-time streaming analytic engine can be configured through an easy-to-use expression language and hundreds of built-in functions. Greenwave Systems is also looking at how analytics can be implemented at the edge of the network. It has teamed up with Wind River to port its AXON Predict analytics engine to VxWorks - allowing customised analytics that boost computational power and real-time intelligence in industrial IoT designs.

To give VxWorks developers a tool to analyse and autonomously respond to high-volume streaming sensor data at the source, AXON Predict will provide developers with embedded analytics that learn patterns, provide insights and take actions inside connected device operations and behaviours. This edge analytics engine allows developers to build a set-and-forget application with intelligence and process critical data at the edge of a network in real-time. This enables machines and smart sensors to collect information at every step of the network, automatically detect

anomalies and take immediate action right at the source of input. Enhanced security features bolster the analytics engine and will provide enterprises with yet another layer of data and device protection. Bringing all the elements together, the Linux Foundation has launched the open source EdgeX Foundry project in order to build an open framework for edge computing. This will involve developing a range of microservices that can sit on a various operating systems and hardware (from x86 to ARM). AMD, Analog Devices, Dell and sensor company RFmicron, as well as energy harvesting specialists EnOcean Alliance, have all signed up.

The Linux Foundation points to industry fragmentation and the lack of a common IoT solution framework continuing to hinder widespread adoption and stalling market growth. The complexity of the current landscape and the broad variety of components creates paralysis. EdgeX is intended to solve this by making it easy to quickly create IoT edge solutions that have the flexibility to adapt to changing business needs. Businesses currently have to invest a lot of time and energy into developing their own edge computing solutions, before they can even deploy IoT solutions to address business challenges. EdgeX will foster an ecosystem of interopera-

ble components from a variety of vendors, so that resources can be spent on driving business value instead of combining and integrating IoT components. Adopting an open source edge software platform is going to be the way forwards. This will allow hardware makers to scale faster with an interoperable partner ecosystem, benefiting from more robust security and system management, while sensor/device makers can write an application-level device driver with a selected protocol through use of an SDK. Likewise system integrators can get to market faster by combining together plug-and-play ingredients with their own proprietary technology. ■



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Product News

■ N.A.T.: 2U MicroTCA.4.1 chassis for telecom, industrial and high energy physics research applications

N.A.T. announced the NATIVE-R2, a powerful new 2U MicroTCA (MTCA.4.1) chassis that is particularly suited to telecommunications, industrial and particle physics research applications. Supporting a single MCH and power unit, the NATIVE-R2 can accommodate six horizontally-mounted AdvancedMC (AMCs) modules (five mid-size and one full-size), up to five MicroRTMs and a JTAG switch module (JSM).

The NATIVE-R2 enables developers to build a compact, multi-purpose computing system for a variety of applications by integrating cost-effective AMCs. The compact design and support for PCIe Gen3 x8 makes the NATIVE-R2 ideal for applications with high connectivity requirements, such as high energy physics and telecom edge, access and aggregation equipment. Optional support for White Rabbit, an Ethernet extension protocol for precision timing of network nodes, provides sub-nanosecond accuracy synchronization, particularly useful for the high energy physics community.

[News ID 5827](#)

■ F&S: efus COM with NXP i.MX 6ULL ARM Cortex-A7 CPU

efusA7UL is an addition to the efus COM product family by F&S Elektronik Systeme, lining up with the pin compatible efus COMs based on i.MX 6Solo/ DualLite/ Quad/ Quad-Plus and i.MX 6SoloX. The board uses a NXP i.MX 6ULL ARM Cortex-A7 CPU with up to 900MHz. It offers up to 1GB DDR3L RAM, 512MB SLC NAND Flash and 32GB eMMC, as well as 2x Ethernet (10/100Mbit), 2x USB, 2x CAN and up to 4x I2C, 4x SPI, 6x UART, 2x SD-Card and I2S for Audio.

[News ID 5874](#)

■ Kontron: industrial-grade ZINC19 rackmount series in 2U and 4U rack units

Kontron now offers its ZINC19 rackmount series with 7th generation Intel Core and Intel Xeon processors making it a perfect fit for complex control and computing tasks. Demanding graphics and image processing applications are made possible by a number of optional high-performance graphics cards. The system is specifically designed for continuous operation in rough industrial environments and can withstand exposure to extended shock, vibration and temperature levels.

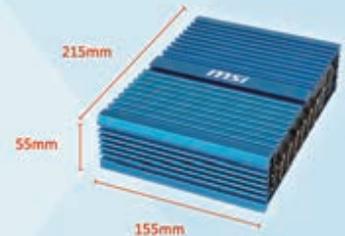
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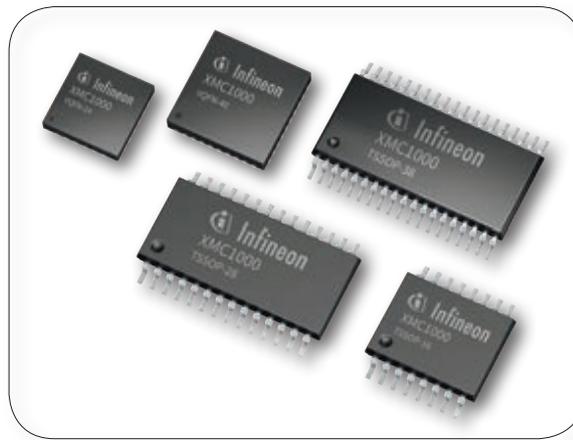
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DALI 2.0 software stack for microcontrollers saves costs

By Marcelo Williams Silva and Georg Huba, Infineon Technologies

This article introduces a DALI 2.0 software stack for XMC1000 microcontrollers. This stack was developed by Infineon in close cooperation with Xenerqi and accelerates design of LED lighting applications.



■ Amongst other things, the XMC1000 microcontroller family with ARM-Cortex-M0 offers optimised peripherals and functionalities for smart lighting control. This makes it possible to address a host of different applications both indoors and in commercial buildings. It is within this environment that DALI (Digital Addressable Lighting Interface) has established itself as a standardised interface for controlling lighting control gear. With DALI 2.0, interoperability between components from different manufacturers has been further improved, whilst the integration of sensors significantly extends the possibilities for smart lighting applications. Infineon has partnered with Xenerqi to develop a DALI 2.0 software stack for its XMC1000 microcontrollers. This significantly reduces development time and costs.

Smart lighting solutions extend conventional LED lighting with new functionalities such as wired and wireless connectivity, programmability, sensors, improved lighting quality and intelligent colour mixing. With special peripherals and functionalities, XMC microcontrollers are predestined for numerous modern LED lighting systems. For instance, automatic dimming and colour control for multi-channel LEDs is supported. In addition to the LED control, the MCUs of the 1200, 1300 and 1400 series can also handle DALI or DMX commu-

nication. Furthermore, the XMC microcontrollers can be used to implement the power supply for the LED driver, supporting all standard two-stage switched-mode power supply topologies.

The key features of the XMC1000 family for smart lighting systems are: automatic brightness control (based on high-frequency pulse modulation), flicker-free dimming via 9 output channels, automatic exponential dimming and linear intensity changes for natural, eye-friendly brightness and colour changes, high-speed integrated analog comparators for current control, and closely coupled peripheral functions for various digital power conversions.

The introduction of the LED into all areas of lighting technology has led to extensive changes in the control of lights. What was once controlled in the past with phase dimmers or an analog 1...10V interface is now digitally connected. The most popular standardised interface DALI – originally designed for dimming fluorescent lamps – has established itself as the standard for lighting design, driven by the success of LED lights. With DALI 2.0, interoperability has been further enhanced, whilst the integration of sensors opens up new possibilities for smart lighting applications. The XMC1000 family with the ARM Cortex M0 core is available in the XMC1100,

XMC1200, XMC1300 and XMC1400 series with flash versions up to 200 KB and enclosures with up to 64 pins. Even the entry-level XMC1100 series, with its basic feature set, provides many industrial applications with cost-effective access to the 32-bit world with 12-bit AD converters and powerful 16-bit timers of Capture/Compare Unit 4 (CCU4). The XMC1200 series includes additional application-specific features such as a peripheral unit for capacitive touch applications and for the control of LED displays (LEDTS), high-speed analog comparators and an innovative Brightness and Colour Control Unit (BCCU). The BCCU permits flicker-free dimming and colour control of LEDs with virtually no processor load. What is more, versions are available for the extended temperature range from -40 °C up to 105 °C.

Last but not least, the XMC1300 series is specifically designed for motor control and digital power conversion applications. In addition to a particularly powerful Capture/Compare Unit 8 (CCU8) with two compare channels and asymmetric PWM functionality and a position interface (POSIF) for precise detection of the motor position, it also offers a mathematical coprocessor. The latter permits efficient sensorless FOC (field-oriented control) solutions for electric motors. The XMC1300 series also offers variants for the

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Figure 2. Block diagram of the XMC1000 microcontroller unit

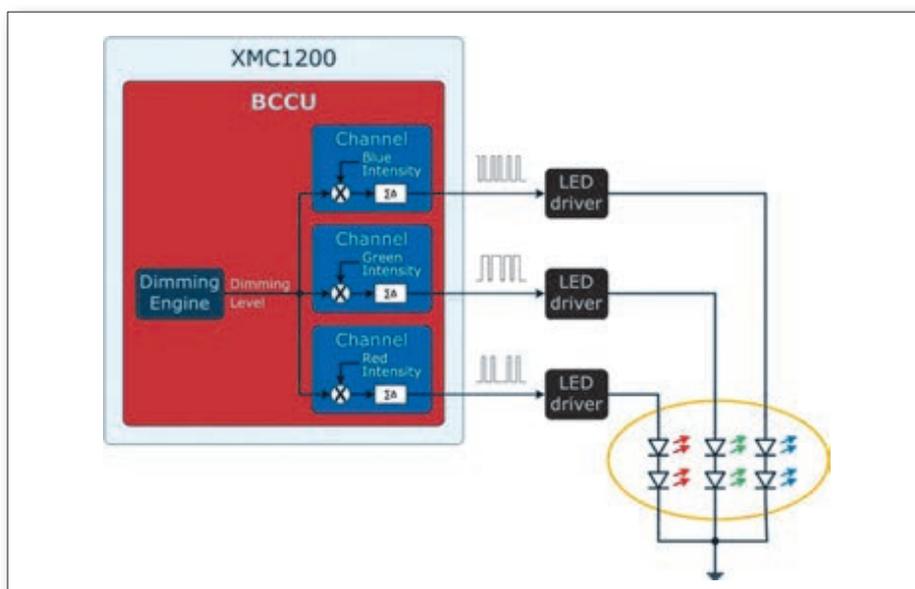


Figure 3. The BCCU (Brightness and Colour Control Unit) facilitates flicker-free dimming and colour control of LEDs with virtually no processor load.

temperature range up to 105 °C. In addition to the features of the XMC1200/1300 series, the XMC1400 derivatives offer up to four serial channels (control of 4-channel LEDs), significantly increased processing power (more than 70 percent) and enhanced connectivity (e.g. CAN). The XMC1200, XMC1300 and XMC1400 series feature the innovative BCCU

unit mentioned already. The basic function of the BCCU consists in automatically providing dimming signals at the port connections for external LED drivers. The BCCU is designed for automatically controlling the dimming and the colours of multi-channel LED lamps with minimal code input. One development goal was the flicker-free display.

However, not every change in luminance is perceived by the observer as flicker. The corresponding threshold of perceptibility is frequency-dependent and has been determined empirically. These findings have gone into the design of the BCCU. A key feature is the automatic high-frequency brightness modulation (PDM with 12-bit resolution). This generates an individual bitstream for each of the nine channels in total. The high frequency produces a high resolution for the brightness value and/or the colour value in RGB applications. This permits a flicker-free display, whilst supporting a wide range of different LED drivers and/or high-performance LEDs.

The BCCU integrates three dimming engines. These facilitate the exponential change in brightness. The exponential dimming and linear change in intensity make the dimming steps and colour changes appear totally natural to the human eye. The three dimming engines can be assigned to any of the nine channels. This means it is possible, for example, to control three RGB lights or one street light with up to nine LED strings. The BCCU also provides trigger signals for the A/D converter. This in turn permits synchronised measurement of currents in multiple LED strings, for example.

The linear walker plays an important role in the colour change of RGB lamps. This adjusts the frequency of the bitstream for each channel so that, starting from colour X, the target point of colour Y in the colour space for each of the three channels (red, green, blue) is reached at the same time within a predetermined time. The colour transition is considerably more pleasant and natural to the human eye with this method. In addition, no complex software algorithms are required.

DALI is probably the most common interface for lighting control with regard to the light. Products for numerous applications (multi-function lights, multi-channel lights, emergency lights, etc) are available today from a wide range of manufacturers. All these devices are standardised and classified in the DALI standard IEC 62386.102. The different device types (device types 0-8) are defined in the standard parts 201 to 209. For example, device type 6 specifically describes LED control gear, and device type 1 the characteristics of DALI emergency lighting devices. Data communication, parameter sets and topology are also defined in IEC62386.

DALI 2 is designed to close gaps in the original standard and allow for better interoperability. Originally describing only control gear and general communication, DALI 2 opens the world of sensor technology to manufacturers and users. IEC 62386 has therefore been

extended with Part 103 (control devices). New device types from the field of sensors, such as buttons, light sensors, motion sensors and remote control interfaces, are now defined in the standard. In its first version, DALI works according to the pure master-slave principle, which limits extensive sensor functions.

DALI 2 makes it possible to communicate control commands and operating data for light operating devices as well as sensor functions across manufacturers. With DALI 2, 64 light operating devices and 64 sensor control devices can be operated together in one line. Building automation systems can also process the sensor information and optimise it with other data, such as heating/ventilation/air conditioning. Central maintenance functions can monitor lamp status, power consumption, or switching cycles, and depict these functions visually in the form of statistics.

DALI 2 also laid the foundation for far-reaching interoperability. For the first time, a standardised operating device is not only controlled according to the master-slave principle, but also event-controlled communication between the application controller and the control device is possible. Backward compatibility with DALI 1 installations is also ensured. To ensure full compatibility, it is necessary to test against the standard. The DALI 2 standard (IEC 62386 Part 101/102 – Edition 2.0 2014-11) improves the predictability of gear control. With this in mind, Xenerqi and Infineon have developed a DALI 2 software stack for the XMC1000 family, and the software has been approved for Xenerqi LED drivers and Infineon XMC LED current control explorer kit. With the approved stack and the XMC single-chip solution for DALI 2.0 users can almost halve the development time and also save costs. The DALI 2.0 control gear stack is designed for integration into a host application that provides a solution for DALI 2.0 control gear with one or more DALI controls. The corresponding instances are defined in accordance with IEC 62386-101: 2014 (Ed2.0), Section 3.16. as devices that are connected to the bus and receive commands to drive at least one output directly or indirectly. The stack implements all DALI 2.0 protocols for gear control.

This includes the following functions: processing of all DALI commands from the DALI bus, monitoring for all corresponding error conditions on the DALI bus, processing of the corresponding light output for gear control with timing and sequence fade conditions, processing of configuration changes requested by the DALI controllers via the bus interface, DALI short address assignment, including assignment of random addresses in coordination with the DALI controllers, and manage-

ment of delays and other timing conditions in relation to DALI operations. The DALI 2.0 slave stack is not a stand-alone solution. The stack and its associated library provide the core functionality and software components needed to develop a DALI 2.0 control. Application developers must therefore configure

the stack and its components according to their specific control solution. The stack supports all functions as specified in the general requirements for DALI 2.0 control gear. However, the stack only implements the functionalities that apply across all control devices. Application-specific DALI functionality for

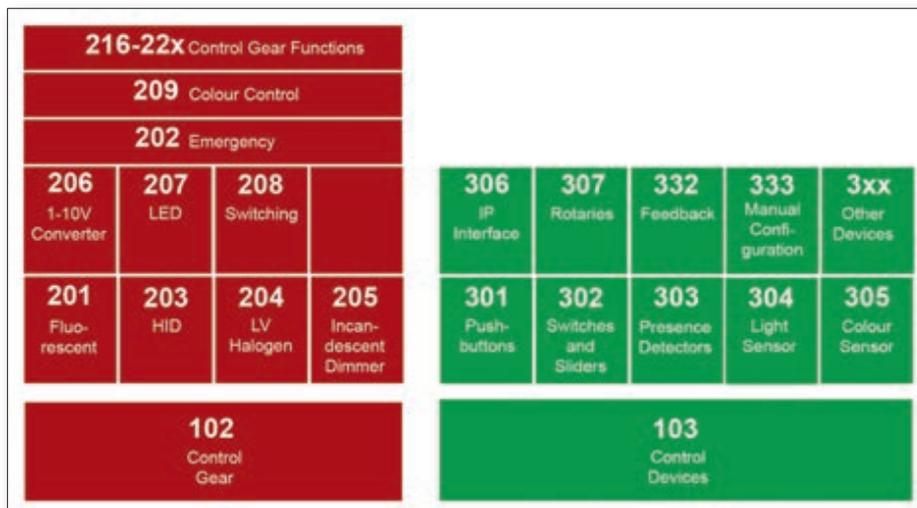


Figure 4. DALI 2.0 extends the IEC 62386 with Part 103 (control devices). New device types from the field of sensors, such as buttons, light sensors, motion sensors and remote-control interfaces, are now defined in the standard.

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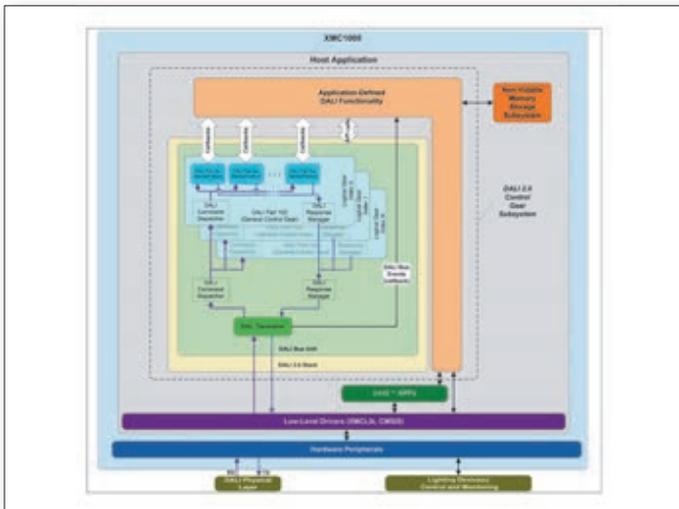


Figure 5. DALI 2.0 software stack for Infineon's XMC1000 microcontroller family

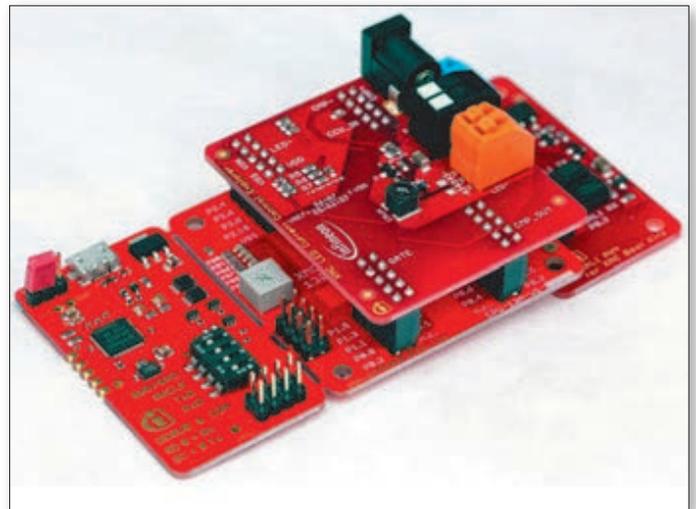


Figure 6. The DALI 2.0 software stack has been approved for the XMC LED current control board.

control gear, especially the hardware-dependent functions, must be implemented via the host application. This also applies to optional DALI 2.0 control functions. In addition, the stack defines callback functions that it uses for the interface and management of the application-specific functions. Software development for the XMC microcontrollers can be performed in two ways – either via the standard peripheral library (XMC Lib) or via DAVE apps. Although using the XMC Lib means working on a low level of abstraction, the full

functionality of the peripherals can be used flexibly. However, some hardware know-how is required. In addition, compilers from third-party providers can be used. With the DAVE apps, you develop on a higher level of abstraction and use specific application examples. Consequently, no detailed hardware knowledge is necessary. The use of DAVE Version 4 is the requirement here. The free development platform includes all necessary tools like GNU compiler, debugger and data visualisation. In addition, DAVE apps are available

for a variety of applications as well as LED lamp control. Infineon also offers several LED evaluation boards for the XMC1000 family. The already-mentioned XMC LED current control board features a 15W DC/DC buck controller, a DALI PHY and extensive documentation. The DALI 2.0 stack is approved for this board. DALI 2.0 design examples are in preparation. In addition, other RGB/LED kits (with DALI and DMX Phy) are available with a standard LED driver as well as an RGB / LED Arduino lighting shield. ■

Product News

Würth at embedded world 2018

Würth Elektronik eiSos exhibits at embedded world numerous new products in 0402 and 0603 packages, supporting the advancing miniaturization of assemblies. Another key topic at the Würth Elektronik eiSos exhibition booth is suppression – one example of use is for signal lines with the help of high frequency optimized multilayer ferrites. WE-MPSB is among the stars. This worldwide first series of SMT ferrites with specified peak current capability is optimized for filtering high frequency DC/DC switching controllers in harsh industrial environments. Additional important products in the trade show program are the WE-MAPI, some of the world's smallest wound metal alloy storage inductors, the WE-LAN-AQ-10/100

Base-T transformers with improved return loss and crosstalk properties, as well as the new MagI³C power modules. With MagI³C-VDDMM (Variable Step Down MicroModule), Würth Elektronik eiSos extends its product series of power modules with high power density, very few external components and excellent electromagnetic compatibility with a specially compact solution in the LGA-6EP housing. The MagI³C-VDRM (Variable Step Down Regulator Module) is now available in the TO263-7EP package – ideal for prototype construction. In the field of electro-mechanics, high quality WE-COM-USB-3.1 type C connectors are unveiled. These and other developments reflect Würth Elektronik's expectation that USB is set to make rapid gains in industrial applications. Illuminat-

ing examples in the true sense for outstanding product design are found in the field of LEDs. In the spotlight: WL-SMDC Horticultural Ceramic LEDs 3535. With its light spectrum, this new series of compact LEDs is ideal for lighting plants in breeding and laboratory facilities. More news from this division of Würth Elektronik eiSos: WL-SMCW 0402 and 0603 compact – miniature LEDs for SMT assembly. WL-SFTW PLCC-6 RGB is a powerful combination of red, green and blue LEDs for displaying any colors in applications such as decoration and background illumination. Of particular interest, especially for sensor manufacturers, are infrared LEDs of which there are no fewer than four new models to be seen on the Würth Elektronik eiSos booth. [News ID 5961](#)

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Product News

ams: NFC smart sensor IC ideal for smart labels used in cold-chain monitoring

ams introduced the AS39513 NFC sensor tag and data logger IC for smart labels which enables more efficient and accurate monitoring of the condition of assets such as food, pharmaceuticals and healthcare products in storage and in transit. The new device is a complete digital sensor with an NFC front end that can easily be integrated into smart labels. A unique ID as well as logged temperature and other data stored in its internal memory can be read by any authorized NFC reader such as a smartphone or tablet

[News ID 5866](#)

Bridgtek brings its PanL technology to ISE 2018

Bridgtek is set to reveal the latest innovations regarding its PanL smart automation platform to European audiences, when the company exhibits at Integrated Systems Europe in Amsterdam. Via a series of exciting new demonstrations, it will be able to show ISE attendees the breadth of possibilities that this technology has, and provide system integrators with valuable

examples of how to apply it to their next generation home/building automation designs.

[News ID 5939](#)

TI: SimpleLink MCU platform supports Amazon FreeRTOS for quick cloud connectivity

Enabling developers to quickly and securely connect Internet of Things endpoints to the cloud, Texas Instruments announced the integration of the new Amazon FreeRTOS into the SimpleLink microcontroller platform. Amazon Web Services (AWS) has worked with TI in the development of an integrated hardware and software solution that enables developers to quickly establish a connection to AWS IoT service out-of-the-box and immediately begin system development.

[News ID 5816](#)

Sensirion presents carbon dioxide and RH/T sensor module at AHR Expo 2018

At this year's AHR Expo 2018 trade show in Chicago, Sensirion, the expert in environmental and flow sensor solutions, is introducing the SCD30 – a humidity, temperature and carbon

dioxide concentration sensor. CMOSens Technology for IR detection enables highly accurate carbon dioxide measurement at a competitive price. Along with the NDIR measurement technology for CO₂ detection, a best-in-class Sensirion humidity and temperature sensor is also integrated on the same sensor module. Ambient humidity and temperature can be outputted by Sensirion's algorithm expertise through modeling and compensating of external heat sources without the requirement for any additional components.

[News ID 5901](#)

Infineon: fully integrated SVID and PVID enabled voltage regulator

Infineon Technologies introduces the latest Integrated Point-of-Load (IPOL) family which combines ease of use with high power density. It is the industry's first fully integrated regulator offering PMBUS, SVID and PVID functionality for powering Intel CPU POL rails, chipsets and ASIC/FPGA. With 50 percent space saving compared to alternative external power solutions, this is the smallest solution size of its class.

[News ID 5918](#)

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Enhanced reliability and performance in motor control encoder applications

By Jens Sorenson and Richard Anslow, Analog Devices

This article focuses on key benefits for motor control applications using the 50 Mbps (25 MHz) ADM3065E RS-485 transceiver and the ADSP-CM40x mixed-signal control processor. The RS-485 transceiver is designed for reliable operation in harsh environments such as motor control encoders, with added noise immunity and (IEC) 61000-4-2 electrostatic discharge (ESD) robustness.



Rotary encoders are widely used in industrial automation systems. A typical use of this type of encoder is for electric machines where the encoder is connected to the rotating shaft, and thereby provides feedback for the control system. While the primary purpose of the encoder is angular position and speed measurement, additional features, such as system diagnostics and parameter configuration, are common as well. Figure 1 shows a motor control signal chain using RS-485 transceivers and microprocessor to interface between the absolute encoder (ABS encoder) slave and industrial servo drive master for closed-loop control of an AC motor. The RS-485 communication link between the servo drive and ABS encoder typically requires high data rates up to 16 MHz and low propagation delay timing specifications. The RS-485 cabling typically extends to a maximum of 50 meters, but in some cases can be as long as 150 meters. Motor control encoder applications are challenging environments for data communications, because electrical noise and long cable lengths affect the integrity of RS-485 signaling.

RS-485 signaling is balanced, differential, and inherently noise immune. System noise couples equally to each wire in an RS-485 twisted pair cable. One signal emits the opposite of the other signal, and electromagnetic fields coupled onto the RS-485 bus cancel each

other out. This reduces the electromagnetic interference (EMI) of the system. In addition, the enhanced ADM3065E 2.1V drive strength allows greater signal-to-noise ratio (SNR) in communications. Adding signal isolation to the ADM3065E can be easily implemented using the ADuM141D. The device is a quad-channel, digital isolator based on Analog Devices iCoupler technology. It can operate at a data rate of up to 150 Mbps, making it suitable for operation with the 50 Mbps ADM3065E RS-485 transceiver (figure 2). Direct power injection (DPI) measures the ability of a device to reject noise that is injected into the power supply or input pins. The isolation technology used in the ADuM141D has been tested to the DPI IEC 62132-4 standard. The noise immunity performance exceeds that of similar products. The device maintains excellent performance over frequency, but other isolation products exhibit bit errors in the 200 MHz to 700 MHz frequency band.

ESD on the exposed RS-485 connectors and cabling for the encoder to motor drive is a common system hazard. The system-level IEC 61800-3 standard relating to EMC immunity requirements for adjustable speed electrical power drive systems requires a minimum $\pm 4\text{kV}$ contact/ $\pm 8\text{kV}$ air IEC 61000-4-2 ESD protection. The ADM3065E exceeds this

requirement with $\pm 12\text{kV}$ contact/ $\pm 12\text{kV}$ air IEC 61000-4-2 ESD protection. Figure 3 shows the 8kV contact discharge current waveform from the IEC 61000-4-2 standard compared to the human body model (HBM) ESD 8kV waveform. Figure 4 shows that the two standards specify a different waveform shape and peak current from one another. The peak current associated with an IEC 61000-4-2 8kV pulse is 30A, while the corresponding peak current for the HBM ESD is more than 5 \times less, at 5.33A. The other difference is the rise time of the initial voltage spike, with IEC 61000-4-2 ESD having a much faster rise time of 1ns, compared to the 10ns associated with the HBM ESD waveform. The amount of power associated with an IEC ESD waveform is much greater than that of an HBM ESD waveform. The HBM ESD standard requires the equipment under test (EUT) to be subjected to three positive and three negative discharges - while in comparison, the IEC ESD standard requires 10 positive and 10 negative discharge tests. The ADM3065E with the IEC 61000-4-2 ESD ratings is better suited for operation in harsh environments compared to other RS-485 transceivers that state varying levels of HBM ESD protection.

A number of communication protocols are used for encoders; for example EnDat, BiSS, HIPERFACE, and Tamagawa. Despite their

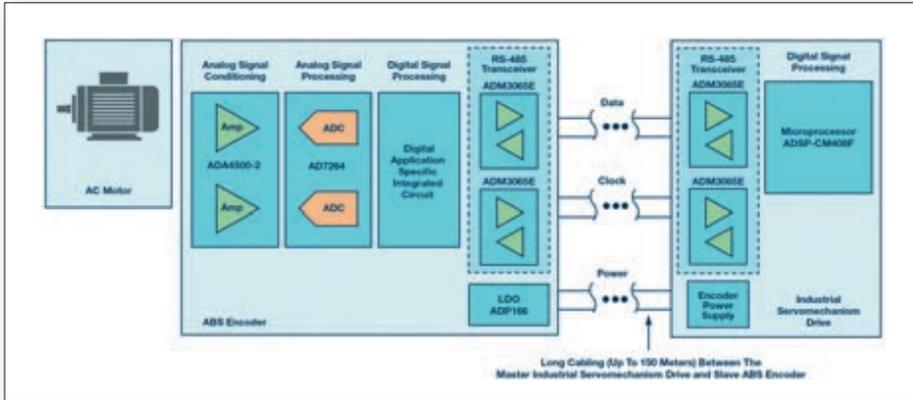


Figure 1. Using RS-485 to interface between the absolute encoder slave to servo drive master for closed-loop control of an AC motor

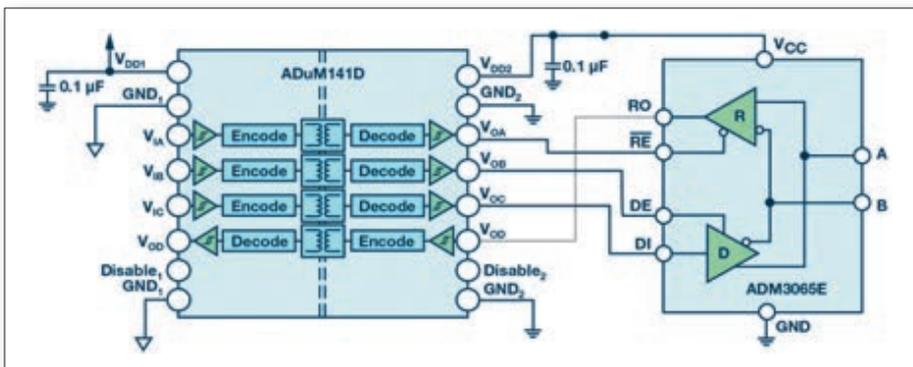


Figure 2. Signal isolated, 50 Mbps RS-485 solution (simplified diagram – all connections not shown)

differences, the encoder communication protocols have similarities in regard to implementation. The interfaces of these protocols are serial bidirectional pipes that comply with either the RS-422 or RS-485 electrical specifications. While there are commonalities in the hardware layer, the software required to run each of the protocols is unique. Both the communication stack and the required application code are specific to the protocol.

This article focuses on hardware and software implementation of the master side of an EnDat 2.2 interface.

Delays fall into two categories: first, there is the transport delay of the cable, and second, there is the propagation delay of the transceivers. The speed of light and the dielectric constant of the cable determines cable delay with typical numbers of 6ns/m to 10ns/m. When

the total delay exceeds half a clock period, the communication between the master and the slave breaks down. At this point, the designer has the following options: lower the data rate, bring down the propagation, introduce delay, or compensation on the master side. Option 3 compensates for both cable delay and transceiver delay and therefore is an effective way to ensure that the system can run with high clock rates on long cables. The disadvantage is that the delay compensation increases the system complexity. In systems where delay compensations are either not possible, or in systems with short cables, the value of using transceivers with a short propagation delay is evident. A low propagation delay enables a higher clock rate without having to introduce delay compensation in the system.

A master implementation consists of a serial port and a communication stack. Because the encoder protocols do not comply with standard ports, such as a UART, the peripherals found on most general-purpose microcontrollers cannot be used. Instead, the programmable logic of an FPGA enables implementation of dedicated communication ports in hardware and support of advanced features such as delay compensation. While an FPGA approach is flexible and can be tailored to the application, it also comes with disadvantages. When compared to a processor, an FPGA is costly, power hungry, and has significant time-to-market. The implementation of the EnDat interface discussed in this article is done on the ADSP-CM40x from Analog Devices, which is a processor targeting motor control drives. Besides peripherals for motor control, such as pulse width modulator (PWM) timers, analog-to-digital converters (ADCs), and sinc filters, the device has highly flexible serial ports (SPORTs). These SPORTs

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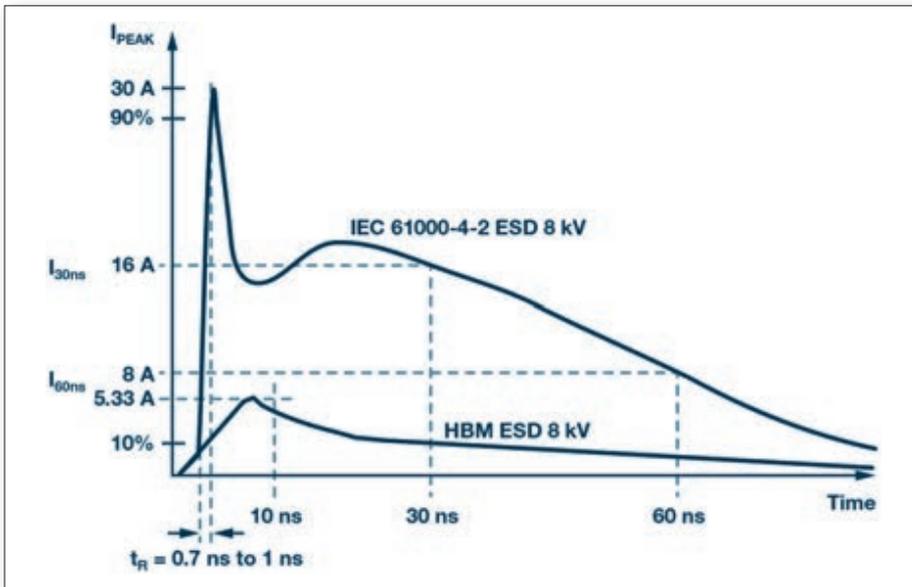


Figure 3. IEC 61000-4-2 ESD waveform at 8kV compared to the HBM ESD waveform at 8kV

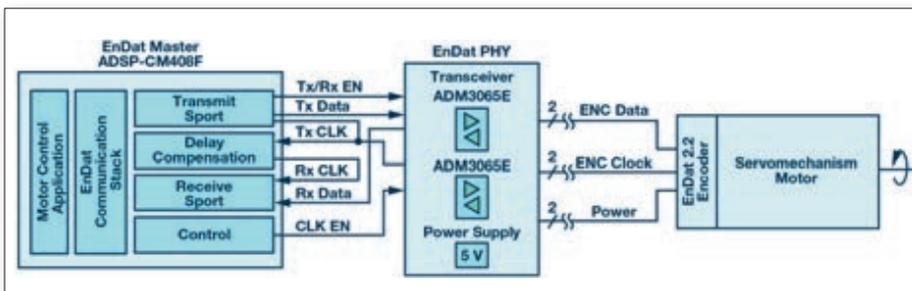


Figure 4. Experimental setup

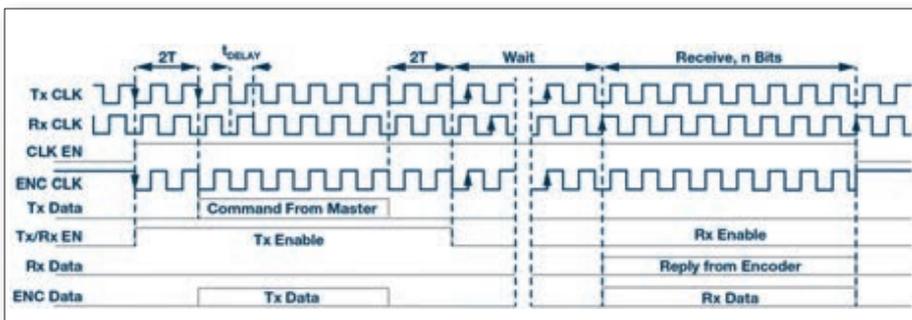


Figure 5. EnDat transmit/receive sequence

are capable of emulating a number of protocols, including encoder protocols such as EnDat and BiSS. Because of the rich peripheral set, it is possible to perform advanced motor control, as well as interfacing to an encoder with the same device. In other words, the need for an FPGA is eliminated.

The EnDat 2.2 test setup is shown in figure 4. The EnDat slave is a standard servo motor from Kollmorgen (AKM22) with an EnDat encoder (ENC1113) mounted to the shaft. Three pairs of wires (data, clock, and power lines) connect the encoder to the transceiver board. There are two transceivers and power supply for the encoder on the EnDat PHY. One of the transceivers is used for the clock and the other transceiver is used for the data line. The EnDat master is realized with ADSP-CM40x using a mix of standard peripherals and software. Both the transmit port and receive port are implemented with flexible SPORTs.

The EnDat protocol consists of a number of different frames of varying length. However, these frames are all based on the same sequence, as seen in figure 5. First, the master issues a command to the slave, then the slave processes the command and performs the necessary calculations. Finally, the slave sends the result back to the master. The transmit clock (Tx CLK) is generated by the processor ADSP-CM40x. Because of delays in the system, the data from the encoder will be out of phase with the transmit clock before they get back to the processor. To compensate for transport delay, tDELAY, the processor also issues a receive clock (Rx CLK), which is delayed by tDELAY compared to the transmit clock. Bringing the receive clock in phase with the data received from the slave is an effective way to compensate for the transport delay.

The clock signals from the processor are continuous, while the EnDat protocol specifies the clock must only be applied to the encoder during communication. At all other times the clock line must be held high. To handle this,



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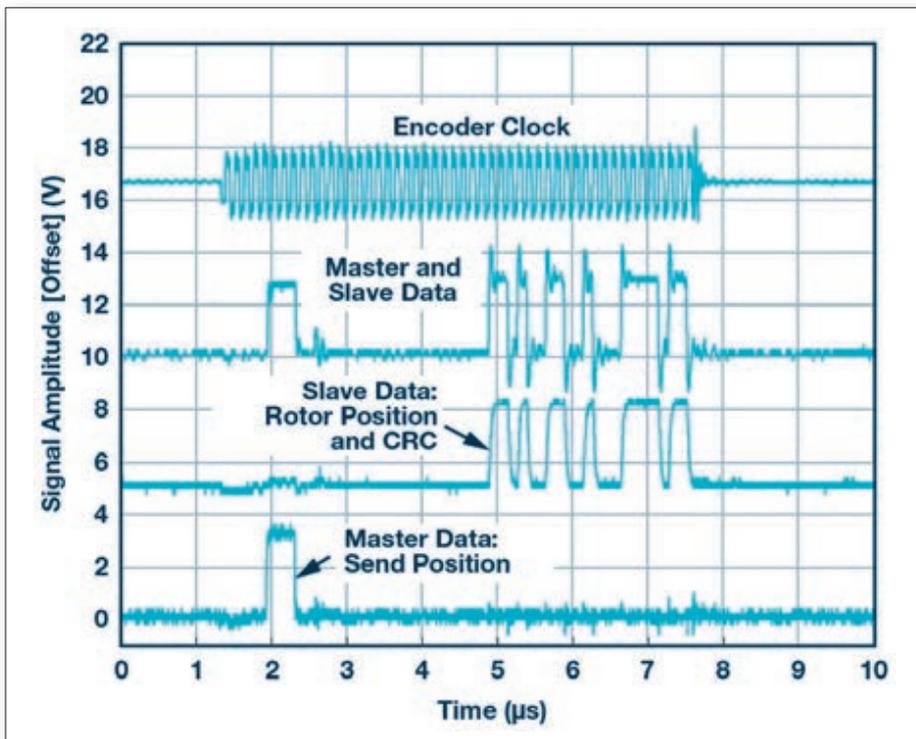


Figure 6. EnDat data exchange

the processor generates a clock enable signal, CLK EN, which is fed to the ADM3065E data enable pin. After exactly two clock periods (2T) the master starts clocking out the command on Tx DATA. The command is 6 bits long and is followed by two 0 bit. To control the data direction through the transceiver, the processor sets Bit Tx/Rx EN high while transmitting.

While the slave prepares a response, the system enters a wait state where the master continues to apply clocks, but the data line is inactive. When the slave is ready to respond, the data line receive data is pulled high and the response is sent immediately after. After receiving the n bits response, the master stops

the clock by setting CLK EN signal low. At the same time, the ENC CLK signal goes high. The data flow is half duplex and the traffic on the combined data line is shown as ENC data. Figure 6 shows test results from the EnDat system. The clock frequency used in the test is 8 MHz and the delay compensation is achieved by phase shifting the receive clock. The bottom signal is the command from the EnDat master. The command shown here is send position, which is two 0s, followed by six 1s, and ended with another two 0s. In total, the command is 10 bits long. The response from the encoder is the third signal from the top. The combined data line is the second signal from the top. Finally, the top signal is the clock applied to the encoder. ■

Product News

Phaedrus Systems: automated fault injection function for TESSY 4.1 from Razorcat

Razorcat has announced that the forthcoming release (4.1) of the TESSY unit and integration test tool will support automated fault injection. With automated fault injection, developers of hardware and software for embedded systems and components can conveniently generate and manage test cases to be implemented in unit tests, integration tests and component tests automatically without changing the source code – saving time and money.

[News ID 5897](#)

Green Hills expands automotive integrated cockpit coverage to NXP i.MX 8 families

Green Hills Software has announced the availability of the safe and secure INTEGRITY real-time operating system and supporting products/services portfolio for the i.MX 8 family of applications processors from NXP Semiconductors. The trusted 64-bit INTEGRITY run-time architecture is supported by ASIL-certified development tools, embedded cryptographic tool kit and cloud-based secure credential management system.

[News ID 5819](#)

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Cable connection concept for remote embedded modular computers

By Frederic Aupetit, ECRIN Systems

For three decades, industrial PCs have used two types of internal architecture: motherboards and passive backplanes. A new PCI Express over cable concept will improve the capabilities of the next computers on smaller foot prints by ten times, according to the manufacturer.



Figure 1. Concept of myOPALE

■ For three decades, industrial PCs have used two types of internal architecture, motherboards and passive backplanes : ATX motherboards with slots for ISA, PCI and PCIe I/O extensions connected perpendicularly to the motherboard, or smaller form factors like EBX/miniITX variants for 1U chassis and since 1994, PICMG 1.0 and 1.3 passive backplanes, where a single board computer and its I/O cards are connected vertically to offer more I/O sites and better MTTR for industrial and test bench systems.

The major evolution during the last 25 years has essentially concerned only the size of the housing, which has shrunk from standard 4U/2U 19" rackmount to Box PCs, so-called fanless PCs. In all cases, the SBC and its I/O cards have remained physically and mechanically connected through Peripheral Component Interconnect, nowadays PCI Express, a local bus standard developed by Intel Corporation in 2004 and now promoted by PCI-SIG. The PCI Special Interest Group is the consortium responsible for specifying the PCI, PCI-X and PCIe computer buses since 1992. This PC backplane interface standard is not optimal in many cases. In 1U 19" chassis, only two I/O cards can be mounted, and mechanical fixing and cards exchange are complex in 1U and 2U chassis due to riser or butterfly backplane interconnects. Reli-

ability of the contacts is not optimal and customization NRC will be necessary in most appliances. Furthermore, connectors of all I/O boards and SBCs are located at the same side of the chassis, usually at the rear panel. If specific connectors are needed (BNC, XLR, SMA, RJFTV, MIL-DTL-38999...), all I/O cards and computer boards have to be moved, as an entire block, inside the housing, and chassis depth will therefore increase drastically.

There is also no universal method to dissipate waste heat from hot spots, and in most of the cases, chassis customization will generate NRC and extra cost for recurrent. Customized appliances will usually require a complete mechanical and electronic redesign.

ECRIN's myOPALE concept is based on four major principles. It breaks the mechanical link between the computer mainboard and its I/O cards thanks to PCI Express over cable interconnection. It uses building blocks in a standard half-height 5.25" form factor. The re-use of universal deployed interconnect standards from SNIA (Storage Networking Industry Association) that encompass cables, connectors, form factor sizes and housing dimensions, is possible. These specifications enable multi-source products and solutions. And finally, it includes the cooling system into the building block.

PCI Express was introduced by Intel in 2004 as the new Peripheral Component Interconnect serial bus. Today, PCIe is very popular as the PC backplane interface standard, but it is still less known as a high-speed cabling interface. The serial technology and embedded clocking within each differential signal pair allow PCIe protocol to be used at full speed across a motherboard or over a cable with the benefits of high performance, low power and reduced costs. The cabled version of PCIe features the same high-speed differential line pairs as one that transfers data on PCBs, as well as a number of additional signals – known as Sideband signals. One PCIe lane consists of two pairs of cables individually shielded for EMI protection – one

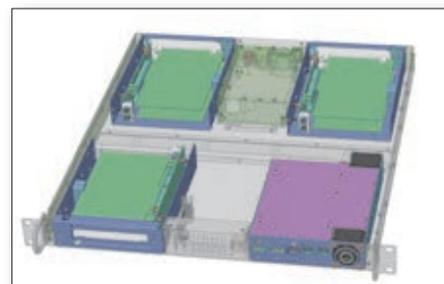


Figure 2. Configuration based on one myOPALE-CPU driving three myOPALE-IO, allowing to integrate up to five I/O cards in 1U/19" rackmount.

transmit-pair and one receive-pair. Sideband signals provide additional functionalities, but are not directly involved in the PCIe data transfer. The myOPALE concept integrates most advantages of PCI Express over cable inside the rack. In this concept the PCIe backplane bus is conceptually stretched to operate over a cable from CPUs to secondary I/O backplanes, physically located anywhere in the chassis. Thus it offers many advantages in a small footprint 1U 19" rackmount, but also very interesting capabilities for other integration formats beyond the limits of the previous IPC generation.

The choice of the Mini-SAS HD (SFF-8643) connector for PCIe over cable was also electrically the best solution thanks to its multi-source and price/quality ratio. It is COTS ready and able to use standard cables from 30cm to 1m and lockable connectors to protect against shock and vibration in harsh environments. The high bandwidth of 12Gbps for PCI Express Gen3 protocol and 8 differential links for 4X lanes PCIe Gen3 enable high data throughput. Eight Sideband signals for the control plane between myOPALE-CPU and myOPALE-IO building blocks are available. Compatibility with new NVM Express storage media and networks, availability of standard adapter cable from Mini-SAS HD (SFF-8643) to U.2 (SFF-8639) is ensured. Availability of M.2 and PCIe 4X form factor boards to Mini-SAS HD will allow to integrate myOPALE-IO modules into standard PCs.

Mechanically ECRIN Systems has adopted the SNIA SFF-8500 specification that defines the configuration characteristics associated with 5.25" drives bay for the following reasons: ideal format for 1U/19" rack mount (41.3mm x 146.1mm), well adapted to full-height PCIe I/O cards, compliant form factor with custom COM Express carrier board easy integration into rack, desktop or tower chassis. The set of specifications includes external dimensions, connectors, connector placement, mounting holes and interface pinouts to assist manufacturers for system integration.

The CPU module incorporates all features of embedded computers into an SFF 5.25" site with 200mm depth only. These are: 6th or 7th Gen Intel Core, Intel Xeon E3-1500 series; up to 32GB Dual Channel DDR4 with ECC for Intel Xeon SKUs; I/O on front panel with 2x DisplayPort, 1x GbE, 4x USB 3.0; legacy I/O on rear panel with 2x SATA3 ; 3x USB 2.0 (on Micro-Fit 24-pin connector). Internal bay for one 2.5" SSD SATA3, 12VDC power supply (+5Vstb for ATX mode) and the most disruptive technology point with 24x PCIe Gen3 lanes through six Mini-SAS HD connectors (4x PCIe lanes per Mini-SAS HD connector) offer lot of benefits for embedded IIoT systems.

The design is based on COM Express Type 6 that integrates embedded low power SKUs with 10 years life support. In Skylake and Kaby Lake versions, Intel Core i7 or Xeon E3-1500 CPU with Chipset platforms are selected, which directly drive 24 PCIe Gen3 lanes as their expansion bus. They can be grouped by 8/8/4/4 or 8/4/4/4/4 which allows to drive up to five I/O cards per processor. PCIe cable adapter on the carrier card is quite simple by routing to the connector, and provides some signal conditioning to guarantee the signal integrity is met at the other end of the cable. Because these adapters are simple, they are inexpensive. Because they don't con-

vert the PCIe protocol into anything else, they provide higher performance and don't require any software drivers (as do such others as thunderbolt, InfiniBand, firewire, USB, Fiber channel...). Throughput and latency, offered by PCIe over cable in myOPALE system, are the best of any other protocol or I/O adapter.

Power supply may be used in AT or ATX-mode. In AT-mode, 12V input is fine. +5VStb is generated internally to support Wake-on-LAN function and AMT Remote Power-on. In ATX-mode, +5VStb signal input is provided via a 6-pin power connector to myOPALE-CPU which monitors PS-ON to drive

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Figure 3. myOPALE-CPU building block in half-height 5.25" form factor with its own monitored cooling system mixing conduction cooled and push-pull airflow technologies.



Figure 4. Blade with expansion slots demonstrates the capability to integrate 6-in-1 system in 4U/19" rackmount. Each blade can drive up to two I/O cards.

the power supply unit. The cooling system is based on an aluminum mono-block composed of two areas: one conduction-cooled cold plate that takes away heat from its CPU hot spot up to fins cooled by a forced air-flow system (2x 40mm fans in push-pull mode). Temperature and fan speed are monitored by the embedded CPU. Sideband control signals selected from Mini-SAS HD cable



Figure 5. Just by integrating one COTS PCIe or M.2 adaptor to miniSAS-HD card, you can add myOPALE-IO on the front panel of your PC for audio, broadcast, communication extensions.

allow myOPALE-CPU to manage and monitor each myOPALE-IO without extra cabling. Power and Reset buttons, storage activity and Default LEDs are available on the front panel and simultaneously on a rear Micro-Fit 24-pin connector for remote control. The myOPALE-IO module can integrate up to two full-height I/O cards in a standard 5.25" drive bay with 200mm depth.

Half-length I/O cards will be completely enclosed in the housing, while full-length cards can protrude from the back without any inconvenience. A retaining bracket system for card lock will protect low profile and full-height I/O modules against shocks and vibrations stress. Two versions of myOPALE-IO exist with different passive backplanes: two PCIe Gen3 4X I/O sites and one PCIe Gen3 8X I/O site. For both versions,

PCIe connectors are mechanically in PCIe X16 format to accept all types of I/O boards in PCI Express (x1, x4, x8 and x16) format. The myOPALE-IO backplane converts Mini-SAS HD connectors to standard PCIe direct linear connectors, ready to accept any type of COTS or Custom PCIe I/O cards. ECRIN Systems integrates also two other functions: a DC/DC converter from 12VDC to 3.3VDC and an automatic 2-fan control system from a Look Up table. Sideband control signals from Mini-SAS HD connector allow the control of the power supply, and monitor local temperature and fan speeds.

The ability to run PCIe over cable at full performance with software transparency opens up a range of new applications for CPU and I/O system re-positioning in a rack. myOPALE extends the PCIe bus structure to dedicated PCIe I/O hardware. PCIe over cable provides a simple method for extending applications that need more I/O boards than could be fitted in a standard Industrial PC based on backplanes. Designing compatible end-points is straightforward because the PCIe interface is available as a gate array library.

Having backplane performance available over a cable expands the myOPALE usage model to encompass many high-end mono- and multi-chassis applications including more I/O expansion with different system integration capabilities, disk array subsystems based on NVMe interface, high speed video and audio editing equipment, quick trading with many pairs of CPU/FPGA in one system, medical imaging systems, etc. ■

myOPALE will be demonstrated at embedded world on the ECRIN Systems booth Hall 2- 449

Product News

MicroSys: smart control on ARM based industrial system on modules

The current lineup of highly integrated system-on-modules with NXP Layerscape and Power Architecture CPUs by MicroSys, feature a custom supervision and power controller. For this purpose, a NXP Kinetis K02 device was integrated. It combines an ARM Cortex-M controller with 128KB Flash memory. Previously, such controllers were commonly found in datacenter and cloud computing hardware – mainly in the x86 world.

[News ID 5962](#)

ADLINK at Embedded World 2018

ADLINK Technology enables computing at the edge of the network, whether that network be the public Internet or an enterprise information technology (IT)/operational technology (OT) network. With the main goal of driving data-to-decisions, ADLINK provides

solutions to connect the unconnected and simplify the design, development and deployment of Industrial Internet of Things (IIoT) applications. Through the integration of computing power, rugged design, high availability and industrial I/O, ADLINK has made a name for itself providing reliable products of superior quality for cost-effective solutions. This allows our customers around the world to significantly reduce time-to-market (TTM) burdens while minimizing total cost-of-ownership (TCO) with customization and system integration advantages, keeping manufacturing costs low and extending product lifecycles.

The Factories of the Future can't be built overnight. Their current infrastructure needs to be upgraded by using advanced technologies such as Artificial Intelligence (A.I.), Robot Operating System (ROS), Data Distribution Services (DDS), Time Sensitive Networking

(TSN) and more. At Embedded World, you will gain the insights and blueprint of how ADLINK can help you to transform the current factories to Factories of the Future.

[News ID 5968](#)

Advantech introduces scalable i.MX 8 Qseven module at Embedded World

At Embedded World 2018, Advantech introduces its NXP i.MX 8 QuadMax Q7 v2.1-compliant computer-on-module, the ROM-7720, which is designed for graphics-intensive IoT applications. Answering the market needs of graphics computing in IoT edge nodes, Advantech has collaborated with NXP to develop this new Qseven module, aiming to realize multi-display human-machine interfaces, advanced driver assistance systems, robotic vision, precision advertising systems, and medical image processing.

[News ID 5979](#)

Product News

ADL announces 75 x 75mm Intel E3800-series Edge-Connect SBC

ADL Embedded Solutions announced its compact ADLE3800SEC SBC with Edge-Connect. This ultra-compact 75 x 75mm form factor is a full-featured, standalone SBC for rugged, embedded applications. The Edge-Connect architecture allows for added I/O expansion and connectors in a variety of baseboard/breakout board configurations (flat, vertical, odd-shapes, etc.) for rugged, portable/mobile applications such as unmanned systems, robotics, remote datalogging, wearable computing or portable medical devices.

[News ID 5869](#)

MEN: new M-module with eight relay outputs

The M-Module has been developed according to the ANSI Mezzanine standard and extends a carrier board with eight relay outputs, which can be read out via a read-modify-write access. The M-Module M43N supports eight relay outputs with free potential switching of the signals. The status of each relay can be read out via the read-modify-write access. The

implemented relays guarantee maximum reliability and long service life. All components of the M43N are firmly soldered to shock and vibration and are approved for a temperature range of -40 to +85°C.

[News ID 5839](#)

congatec now listed on APLUS Système Automation's line card

congatec has expanded its French sales partner network and is now listed on the line card of APLUS Système Automation. The company, which is one of France's leading distributors of industrial computing technology, will sell the congatec product portfolio from its five locations in Paris, Lyon, Toulouse, Nantes and Lille.

[News ID 5849](#)

FRAMOS becomes corporate member of Embedded Vision Alliance

FRAMOS recently joined the Embedded Vision Alliance as a corporate member. The Embedded Vision Alliance is a worldwide industry partnership bringing together technology providers and end-product companies

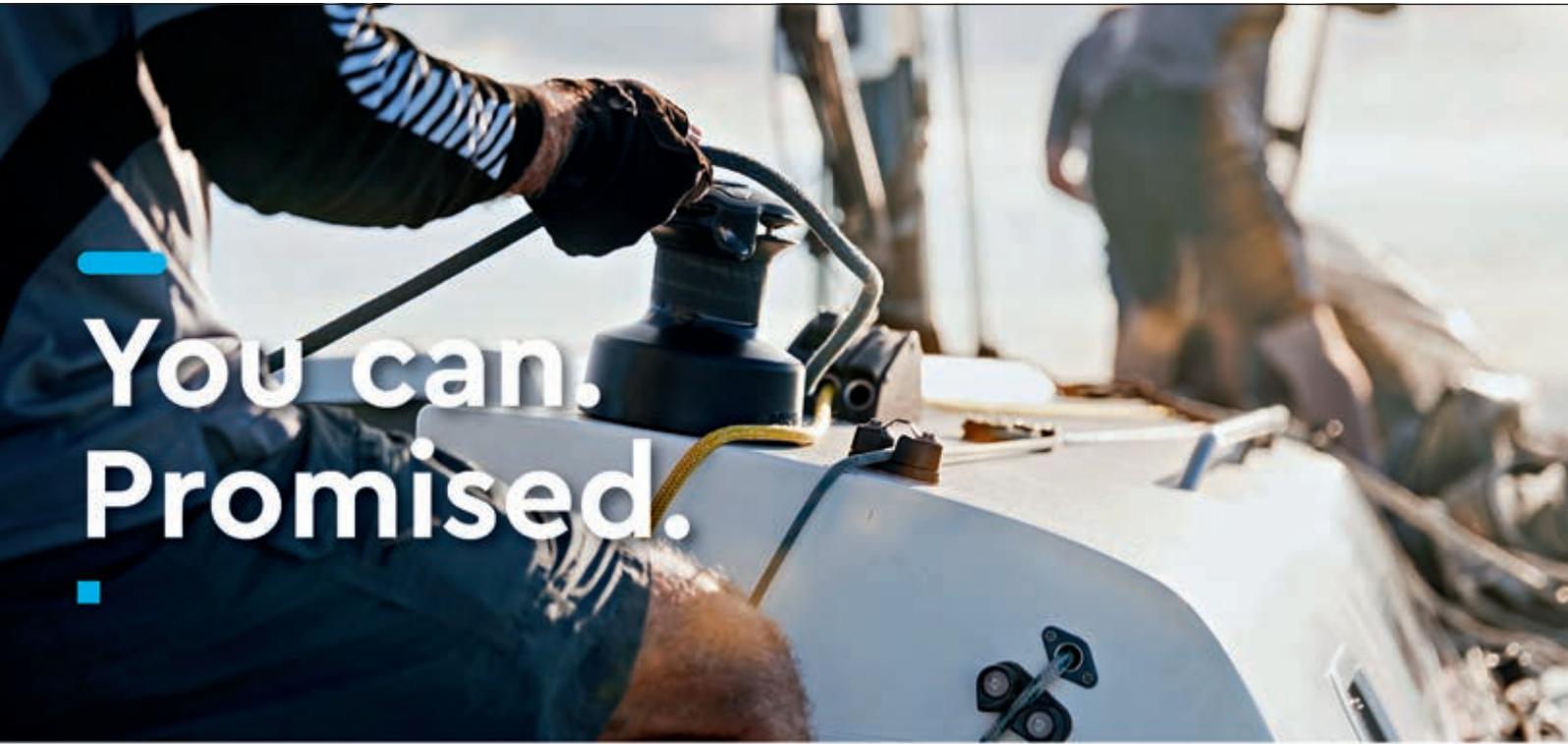
who are enabling innovative and practical applications for computer vision for a wide range of markets. In light of the growing importance of truly integrated vision systems, FRAMOS looks forward to collaborating with the Alliance to gain early insights into new markets, technologies, applications and standards, as well as increased influence over the direction of the industry.

[News ID 5933](#)

PICMG displays 23 member company products at Embedded World

PICMG will have a booth at Embedded World to display seven embedded computer architecture types with product examples from 23 companies. The architectures featured in the PICMG booth include COM Express, CompactPCI Serial, CompactPCI Serial Space, MicroTCA/AMC, AdvancedTCA, CompactPCI, and SHB Express. PICMG will also have information on its new Industrial IoT initiative. A white paper on the organization's vision for new IIoT specifications will be available in the booth.

[News ID 5973](#)



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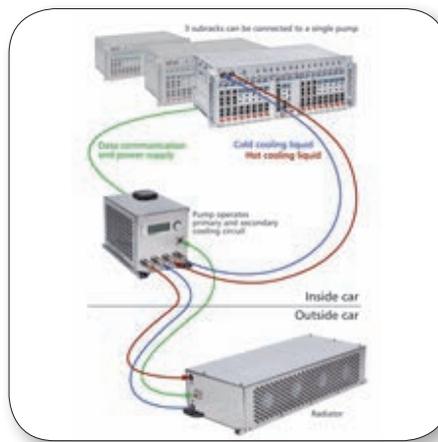
embedded world 2018, Hall 1, Booth 1-578



Liquid cooling expands applications for CompactPCI computers

By Manuel Murer and Wolfgang K. Weber, EKF

When the first electronic computer with almost 17,500 tubes went into operation in 1946 with ENIAC, the power loss of 175kW required special cooling. If today, seventy years later, smartphones with over 3 billion transistors and only half a watt power consumption are considered, the progress is impressive and cooling no longer seems an issue. But far from it: with increasing hunger for computing power, the issue of lost power and waste heat is of new importance.



■ A typical industrial computer based on CompactPCI Serial with a 3U European card format generates a power loss of 50 to 80W in the form of waste heat with its XEON 3 processor. Such systems typically use high-performance graphics cards based on the NVIDIA GeForce GTX or the Quadro family, for the visualization of raw data, pre-processing and events. This adds up to 150W more. It is easy to network these systems via the built-in Ethernet interfaces or the CompactPCI serial backplane, thus further increasing the computing power. Systems with 5 or 8 CPU modules are easily possible without problems. Easily? Yes, if the high-power loss of more than one kilowatt inside the volume of barely more than a shoebox would not overwhelm normal cooling systems.

One application for such computers is now to be found in the highly current topic autonomous driving. All manufacturers in the automotive industry are doing research on this subject and are on the roads with test vehicles. They capture relevant data from which they derive the insight as to which data and algorithms are required, and already partly react with these data autonomously (steering, braking, accelerating), albeit under the highly focused supervision of the test engineers and test drivers. These test systems are typically protected in the trunk of the vehicle, along

with all other system and sensor electronics. This adds a further problem to the conventional exhaust air cooling of the multi-processor systems with high-performance fans: it is not only a problem to remove the waste heat from the subframe, there is also the question of what to do with the heat inside the luggage compartment, in the immediate vicinity of the other devices. Inside the trunk, this would soon lead to massive problems in all test systems.

These two problems are solved by the new system CoolConduct from EKF, which was developed to maturity in the spring of 2017 in cooperation with a German specialist of industrial liquid cooling systems. It consists of three coordinated components.

1) A newly designed, 19" compatible conductive plate is integrated above the subassembly of the subrack. A coolant is passed through the plate and is the primary heat exchanger for the components to be cooled.

2) A unit with (redundant) cooling pumps and a coolant tank is connected to the subrack by two bayonet couplings, which can be placed several meters away from the subrack. The bayonet couplings are blow-back proof, i.e. they can be connected and decoupled in the field without coolant loss. The secondary cooling circuit is connected to the cooling pump with

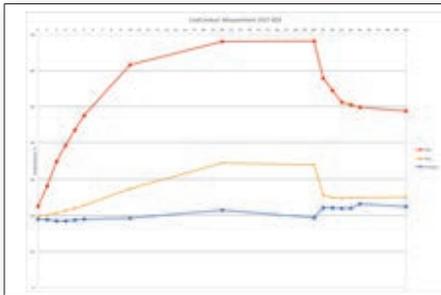
a further heat exchanger, which cools the coolant in the outside area. By means of these two circuits, the system can be used and cooled independently of the ambient air. Above all, there is no entry of dirt into the subassemblies via cooling.

3) Back to our presented trunk workspace for our multiprocessor system: the primary heat exchanger cools the processor and graphics modules in the rack and transfers the heat via the medium to the secondary heat exchanger. This is mounted underneath the vehicle, transversely to the direction of travel, and transfers the heat to the environment, supported by the airflow. The entire system monitors itself, any errors are, of course, reported to the test system itself and processed.

Up to here, the system is certainly impressive by its robustness and thermal performance alone. However, the actual innovation patented is the way in which the modules are connected to the primary heat exchanger in the subrack. The current technology with so-called wedge locks, which was used primarily in the military sector, required specially designed and therefore expensive assemblies for this purpose, which required great effort to be kept up-to-date with the latest technology. With the EKF technology, current computer assemblies (COTS) from the company-specific assembly program are



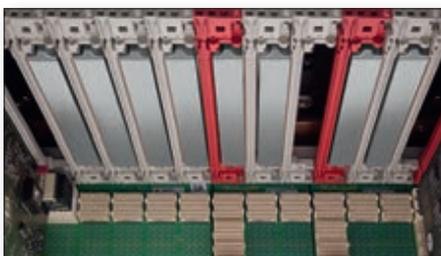
The entire waste heat of this video module is collected and transferred to the upper end surface (bottom left in the picture).



Temperature inside the rack at several measurement points. T=0 Starting system w/o CoolConduct. At T=30 starting of the coolant pump. At T=35 stable conditions



In the thermographic image, the temperature difference in the cooling tubes between primary and secondary heat exchangers can be seen very clearly



Looking up at the heat transfer modules. In the background, the CPCI serial bus backplane can be seen.

used. The inverse, three-dimensional image of the assembly side is milled into a metal block and thus forms a form and, above all, heat-tight connection, specific to this assembly, to the primary heat exchanger. These conductors are made of pure copper for optimum energy transport. At the upper end of each

such copper conductor is a planar surface, which is coupled to a special transfer module placed between the respective upper guide rails. These transfer modules are connected to the primary heat exchanger and have a high thermal efficiency and thus ensure the very efficient heat transfer. As a result, the modules can be plugged into the subrack at any time in the field and can be easily removed for maintenance purposes, without the need for special tools and without having to disassemble the subrack. This preserves one of the essential advantages of the 19" technology, namely the easy module replacement in the field.

Often, development teams of experimental software rely precisely on this possibility to change the software or the sensor system in the field, and to then continue with the experiment. Further applications are the expansion of CPU modules or the change of mass storage. It is not only the high packing density and the small installation space of an industrial computer that can require a special management of the waste heat.

There are many applications which require the cooling of computer systems separate from the ambient air, in order to prevent the penetration of e.g. explosive gases, dusts or oil-laden air. Such conditions of use can be found on drilling platforms as well as in open-cast mining or in the paper-making industry, where sulfuric acid air pollutants will often result in the creeping death of modern computers, since their solder joints contain an increased amount of silver, legally required by the changeover to lead-free solder (RoHS regulation).

Further examples of high-performance computer clusters in a confined space can be found not only in the purely civilian sector. Current fields of work are armored, self-propelled vehicles for use in areas of conflict, simultaneous license plate tracking across multiple highway lanes as Homeland Security application, and face detection in hot, dusty environments. Another example that is both obvious and at the same time has an exotic ring to it, is automated, computer-assisted waste sorting.

The CoolConduct system from EKF offers new possibilities for the test system planner as well as for the automation specialist to allow for arbitrary computing power in his application. The advantages of high cooling performance even in harsh environments, the use of modern, up-to-date computer technology, and the ability to change the assemblies in the field is rounded off by another feature that is hardly to be expected considering the advantages: due to several intelligent details, the system is only half as expensive as traditional professional solutions available on the market. ■

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LP-150 Pico-ITX Embedded board
 based on Rockchip RK3128



PICMG 1.3 Half-size SBC & Barebone
 HE-B72 & CMB-B72 fanless barebone
 based on Skylake-H



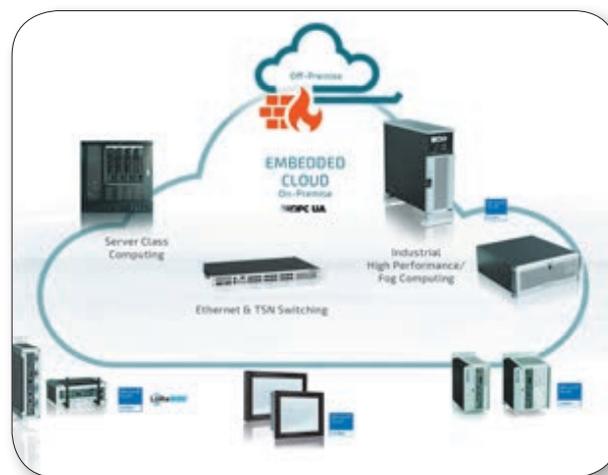
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New IoT standards, products and small form factors at embedded world

By Norbert Hauser, Kontron S&T AG

Kontron presents a multitude of new products at embedded world, including a Fog Computing starter kit, scalable IOT/Edge gateways, Fog computers and HMI, the Embedded Server ZINC Cube with latest Intel processors, Computer-on-Modules, motherboards, and single board computers.



■ Visitors will learn how Kontron together with S&T supports enterprises with the latest technologies, products, and services in their digitalization and IoT strategies from the Cloud to the field level. A highlight is the availability of the new Time Sensitive Networking starter kit. The starter kit consists of a KBox C-102 as an industrial computer/Fog computer for central control through the integrated networking card for TSN, as well as the corresponding software. This allows for enterprises to create seamless connections between the field level, Operational Technology (OT), and Information Technology (IT), making possible real IIoT or Industry 4.0 based on the Ethernet Protocol standard. For the configuration and the monitoring of their TSN networks, users require the suitable tools. Existing prototypical implementations facilitate the configuration of the appropriate TSN streams and offer graphical user interfaces. For monitoring and debugging purposes, the common tools can be employed, as long as they cover the features specific to TSN, such as synchronization status.

The Kontron solution offers accuracies of under 100ns for clock synchronization among its networking elements. Packet jitter typically doesn't rise above 1µsec. Packet-length-dependent latencies are around 2.5µs (64 Byte)

for the TSN switches. These characteristics already cover a lot of applications at the field level well. In parallel, new solutions expanding the new OPC UA standard by adding real time capabilities over TSN are being developed. They are based on running TSN switches in what is called cut through mode for minimal latency. This procedure potentially satisfies the highest demands for control technology.

The global OPC UA interoperability standard enables the seamless, secure, and reliable flow of information among the devices of various manufacturers and thus significantly drives convergence of industrial infrastructures. OPC UA is an ideal choice for meeting the new demands in security, data modeling, scalability, and expandability. With the standard PCI Express network card and the associated network and switch drivers for Linux, industrial computers can be connected through redundant ring-, line-, daisy-chain-, or star-shaped TSN networks. The Kontron TSN network card includes an integrated switch for redundant networks with two (PCIE-0200-TSN) or four (PCIE-0400-TSN) gigabit ethernet ports. It meets all specifications of IEEE 802.1, such as timing and time synchronization, traffic scheduling, frame preemption, stream reservation protocol, and others (via update where applicable). Future exten-

sions of the TSN specifications can be integrated through software updates in the FPGA (Field-Programmable Gate Array). For OEM customers, Kontron offers a private labelling version of the networking card with software services included. This enables OEM customers to expand their portfolio with TSN-connected products. Like all Kontron products, the TSN network card is especially suited for rough industrial environments and can be run in industrial temperature ranges from -40 to +85 ° C. Kontron will present an Embedded Cloud live demo based on the TSN system and OPC UA in combination with various IoT- and TSN devices such as an Embedded Server. In this scenario, it implements the use of Embedded hardware and cloud elements in a Time Sensitive Network.

Tailored for its vision of the Embedded Cloud, Edge, and Fog Computing, Kontron introduces its first Embedded Server available as a product. The successor to the Cube evaluation platform offers a Single Intel Xeon processor with a compact, cost-optimized design type with expanded storage functionality.

In assembly lines and production facilities, the trend is towards machine and plant control through touch-controlled visual user interfaces. To suit the harsh conditions of



Figure 1. The new Kontron TSN standard networking card. As a stand-alone networking card, it renders every compatible device Time Sensitive Networking (TSN)-ready. The TSN specifications guarantee timely, high availability delivery of data packets.

industrial settings, Kontron offers two product families of industry-grade HMI (Human Machine Interface): FusionClient and FlatClient. Both families are equipped with the latest generation of Intel Core i7 processors. All HMIs of the FusionClient family are IP65 protected at the front and designed specially for use in industrial environments. They have an extremely high shock and vibration resistance and can be run in temperature ranges from 0 to +50 °C. All FusionClient models feature an easy-to-clean, scratch-resistant, anti-glare front glass, and are available with or without a PCAP Multi-Touch screen.

The screens are available in display sizes from 12.1 inches (30,7 cm) to 21.5 inches (55 cm). Individual options can be integrated to expand the range of functions. For instance, an RFID reader mounted invisibly behind the front glass can be used for implement authorization and security levels for comprehensive



Figure 2. The modular FusionClient HMI combines an edgeless, easy-clean, IP65 protected and anti-glare pure glass interface with the industry proven performance and flexibility of the Kontron COM Express Computer-on-Module.

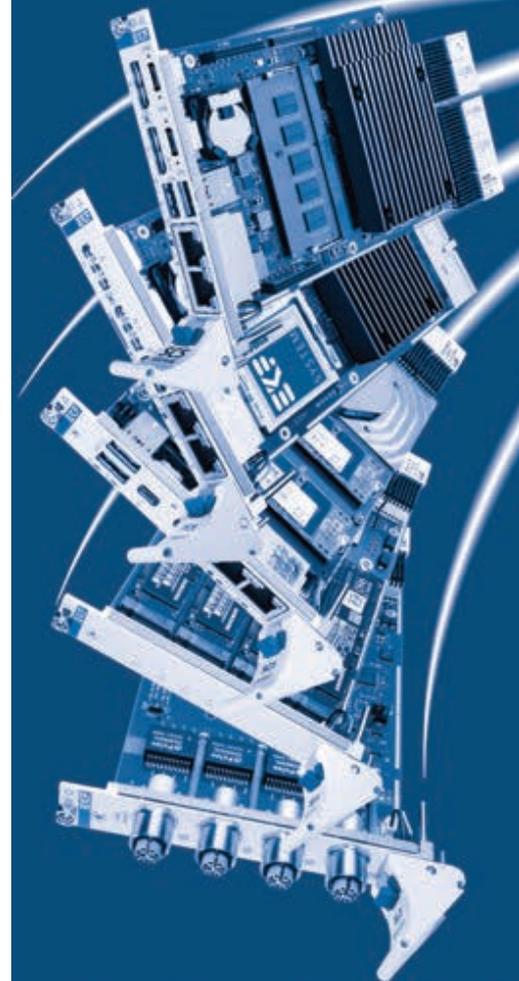
access control. An LED alarm rail, optionally available as well, offers high user friendliness and optimized visualization of processes and machine state. For an even easier integration into existing network structures, Wi-Fi can be integrated as well. On demand, Kontron FusionClient series supports Kontron WideLink, a technology that implements video and telemetry data communication through a standard CAT6a Ethernet cable at up to 100 meters distance, remotely connecting control computers free of interference.

Kontron FlatClient PCs are designed for industrial applications. They offer maximum flexibility at attractive pricing. Through the update to the latest Intel processor technology, users benefit from marked graphics- and computing performance increases. The FlatClient family panel PCs have proven themselves successful in high-volume implementations in industrial applications. They are available in numerous versions covering four display sizes from 10.1 inches (25,7 cm) to 23.8 inches (60,5 cm) screen diagonal. They are available in both 16:9 and 16:10 widescreen format, as well as 4:3 and 5:4 standard format. Kontron is one of a select few manufactures in the marketplace offering up-to-date processor and display technology in 4:3 and 5:4 regular format devices. FlatClients feature a full-metal casing and are available in versions for independent operation with VESA mount or as built-in devices. They are optionally available with PCAP, resistive touch screen or safety glass and can be equipped with RFID readers.

The FlatClient panel PC family is structured in two distinct lines: the ECO Line features Intel Atom processors, while the PRO Line is based on Intel Core CPUs. The ECO Line devices are equipped with two Gigabit Ethernet (GbE)-, one HDMI, one VGA, two USB 2.0 and one USB 3.0 port. The PRO Line offers three Gigabit Ethernet (GbE), two DisplayPort and four USB 3.0 interfaces. Optionally, both lines can

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Figure 3. COM Express Type 7 with latest Intel Xeon processor: Typ 7 Module with carrier board

be equipped with serial interfaces (RS232, RS422, RS485), an audio output, and an RFID module with a CF/SD card reader. Depending on the processor used, FlatClient PCs support the Windows 7 and Windows 8.1 operating systems including Embedded versions, Windows 10 IoT, and Linux. The design of the FlatClient models can be customized to meet customer requirements, for example by freely choosing the color of the front and back of the devices and adorning them with individ-



Figure 4. Tailored for its Embedded Cloud vision and Edge- and Fog computing, the first available embedded server from the Cube evaluation platform already unveiled with a Single Intel Xeon processor in a compact, cost-optimized design with extended storage functionality will be presented

ual logos. All devices are characterized by their fanless design, are highly shock- and vibration resistant, and feature an easy-to-clean, anti-glare and scratch-resistant front glass with IP65 protection. All FlatClient panel PCs are CE and cULus certified. The latest Kontron KBox A-250 is based on a PicoITX-2.5"-

SBC and comes equipped with the latest Intel Atom processors. Their favorable price makes them especially suited to use as an entry IoT gateway and when requirements for additional interfaces are low. The new KBox A-150 is based on 3.5"-SBCs with scalable performance from Intel Atom, Intel Celeron, Intel Pentium up to Intel Core i processors.

At embedded world, Kontron will present, for the first time ever, Computer-on-Modules with a Q7 form factor, which will be offered alongside the COM Express and SMARC 2.0 form factors going forward. These modules are already available with NXP i.MX low-performance processors optimized for networking tasks, and Intel Atom processors for SMARC. With its new Q7 form factor products, Kontron addresses customers using products of this format already, opening a migration path to the SMARC 2.0 standard. All new SMARC 2.0 modules can be equipped with the original security solution APPROTECT which protects data and application integrity end to end. With APPROTECT LICENSING, new business models such as licensing or pay-per-use can easily be implemented. ■

Product News

Advantech opens expanded European Service Center in Eindhoven

Advantech officially opens its new European Service Center — with dignitaries from Taiwan and the Netherlands — invited to tour the newly expanded smart facility, warehouse and production plant. The Advantech European Service Center (AESC) will double the size of its warehouse and office space and see production capacity nearly tripled, helping the firm drive regional growth and meet customers' growing Industry 4.0 needs.

[News ID 5948](#)

Eurotech and ALTEN Calsoft Labs partner on innovative solutions in the IoT space

Eurotech announced a partnership agreement with ALTEN Calsoft Labs, a digital transformation, technology consulting, enterprise IT and product engineering services company, that offers best of the breed offering for Industry verticals in the Internet of Things domain. Eurotech selected ALTEN Calsoft Labs as key partner to increase its Global presence because of their extensive deep industry and business process expertise, passion for customer excellence, and proven global IT services delivery model and network. ALTEN Calsoft Labs offers best of the breed solutions for Industry verticals like Manufacturing, Automotive, Education, Healthcare & Life Sciences, Networking & Telecom and Retail.

[News ID 5956](#)

Axiomtek: 2-slot fanless barebone system with new modular design and optimized expandability

Axiomtek release the IPC962-511-FL, its newest 2-slot fanless industrial barebone system with great flexibility and customizability in accordance with its outstanding modular design. The new 2-slot IPC barebone system is powered by the 7th/6th generation Intel Core and Celeron processors up to 35 W with the Intel® H110 chipset, featuring high performance capability. The ultra-compact industrial computer provides flexible expansion options with one I/O module slot and two PCI/PCIe expansion slots.

[News ID 5960](#)

Concurrent: XMC storage module for high-performance command and control applications

Concurrent Technologies announces a new XMC storage product that is designed to provide very high sustained read/write performance when mated to the company's XMC host products including processor, switch and carrier boards. XM 620/x01 is an XMC module with two M.2 sites, each of which supports Type 2242, 2260 and 2280 M.2 storage devices. Each M.2 device has a x4 PCI Express (M-key) connection to the host card to optimize performance dependent on the devices fitted.

[News ID 5818](#)

Lanner: IoT-ready solution for machine vision and physical security

Lanner release the LEC-2137, an I/O rich IoT-ready industrial box PC powered by Intel Celeron N3350 or Atom x7-E3950. Measuring 198 x 57 x 143.8mm, the LEC-2137 is a thin client gateway that can be configured with either a total of 6 Ethernet ports or 2 Ethernet ports and 4 PoE ports. It comes with 1 COM port, 1 HDMI (3840 x 2160), 1 VGA (1600 x 1200), dual USB 3.0 and dual USB 2.0 ports, 1 2.5" HDD/SSD drive bay and -20 ~ 55°C operating temperature range, making it the ideal multi-port communication gateway for both machine vision and physical security.

[News ID 5953](#)

acceed: starter kit for preventive condition monitoring

Don't wait until the damages have occurred: that is the objective of anticipatory servicing, also known as preventive condition monitoring. Cracks and breaks come as a result of changed oscillation frequencies, in particular on motor bearings. You simply need to recognise them early in order to anticipate sudden failure and standstills. Sound emission testing based on high-speed data recording serves to recognise damages to roller bearings early and a cost-efficient starter kit is available for this purpose from acceed.

[News ID 5846](#)

Product News

MEN: all-round carefree switch package

The G102 managed Ethernet switch is equipped with a 29 Gbit/s switch matrix, and provides up to 25 Gigabit Ethernet ports for high-speed communication. To expand the system, there are now a number of line cards available with additional interfaces. The G102 switch offers the user a 29 Gbit/s switch matrix, and up to 25 Gigabit Ethernet ports for their high-speed applications. Three Gigabit Ethernet interfaces on X-coded M12 connectors, as well as a service access are available at the front panel.

[News ID 5836](#)

DATA MODUL presents several highlights at embedded world 2018

At embedded world in Nuremberg, DATA MODUL will be using its extended stand to exhibit products relating to displays, display optimization and embedded visual solutions. The extra exhibition space will be used this year to present the core competence of optical bonding in a more differentiated manner. Now with four different bonding procedures (LOCA, OCA lamination, air gap bonding and gel bonding), DATA MODUL is the only company to offer all the important adhesive options in-house, enabling it to supply the right display optimization for any industrial demand, even in the more demanding industries such as the medical sector. Models of all four procedures will be shown for the first time at embedded world.

The BeamPro 2 is the result of a development cooperation between DATA MODUL and the Californian technology company Suitable Technologies. It is a telepresence robot which

makes it possible to visually and acoustically depict conference / meeting participants in the form of a mobile HMI monitor solution when they cannot be present. A number of sensors, microphones, PCAP easyTOUCH and other interfaces and features enable direct participation and have now been reinstalled in the new version of the successful BeamPro and / or jointly optimized. The basis for this is formed by a newly developed COM Express Baseboard together with the latest, high-performance Intel Core i5 CPU of the seventh generation in DATA MODUL's COM Express module. The result will be communicating with visitors at embedded world.

[News ID 5903](#)

Manhattan Skyline: SMARC Computer on Module

SMARC is the first COM standard to be built specifically for modern ARM-Cortex system on chips (SoCs), aiming to efficiently pass along ARM benefits such as low power consumption to COTS designs.

[News ID 5855](#)

HEITEC: subrack elements enable cost-effective, easier designs

At embedded world 2018, HEITEC will present current system solutions for various application areas that illustrate the process "from the idea to the product" in addition to new products in its subrack program. A number of new designs within the subrack portfolio will be presented, which are enabling new design possibilities: HeiCool ECO is a 1U plug-in cooling fan solution with a high energy saving potential for various installation options such as 19" mounting or insertion into a cabi-

net or firm integration into a subrack. Despite this modularity, the individual parts are compatible with the HeiCool line and extend the range of performance. AC voltage 230V is covered by default, but this is easily convertible if required. HeiCool ECO can be used very well as a retrofit option or for applications without own ventilation.

[News ID 5919](#)

IBASE: COM Express CPU module for factory automation

IBASE Technology launches a new ET975 COM Express Computer-on-Module based on the ultra-low voltage 7th Generation Intel Core i7/i5/i3 processor produced using a 14 nanometer manufacturing process technology. Characterized with product longevity, performance computing and low power consumption, the ET975 is suitable for applications found in factory automation, kiosk, communications, medical imaging and digital signage environments.

[News ID 5876](#)

AAEON: wide DC input and temperature support subcompact board

AAEON launches the GENE-SKU6 W1, a 3.5" subcompact board with the specifications needed to handle harsh, unstable conditions. When hardware is used for outdoor, factory automation, or in-vehicle applications, you can't always be sure that its DC input will remain stable. However, since businesses can't afford for their systems to shut down, they need computers that can withstand power fluctuations and keep on running.

[News ID 5873](#)

Computer On Modules for Server Applications

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High Expansion Capability

32 Pairs PCIe interface



Powerful graphics in squared form factor

By Wolfgang Kamp, Datakamp

AMD graphics technology is entering the eNUC world: manufactured entirely in Germany, the embedded eNUC board from Datakamp features rugged multimedia capabilities and long-term availability.



Figure 1. The all-in-one eN-GXSOC has been designed and developed for 24/7 use in harsh industrial environments and utilizes an innovative passive cooling system.

Commercial NUC systems are nice little products that can reside on office desktops or in private TV racks without requiring much space. They offer customers all the performance and connectivity they need for internet browsing, media streaming, office applications, home automation and so on. Adapted to the embedded world, the standardized embedded NUC (eNUC) form factor also offers a freely programmable platform for developing smart IoT gateways and manifold other embedded control systems and industrial thin clients that demand a powerful small form factor and high cost efficiency.

Applications built on eNUC benefit from the standardization of the form factor and this offers various advantages. Support by various board manufactures offers the freedom to choose the best solution. Long-term availability is guaranteed, this ensures that design efforts are secured. Engineers can expect system designs to have the same interfaces because a dedicated set of interfaces is part of the specification. A broad ecosystem of accessories ranging from heat spreaders to cabling and housings makes it easy to purchase components from third parties so that own NRE costs are reduced to the max. As a derivative of a commercial standard, it can deliver lowest component costs for the embedded industries because there is often an option avail-

able that is manufactured in commercial mass production. The fact that a larger community of designers is working with the form factor ensures continuous improvements of the standard. The vendor independent standardization body SGET e.V. helps the community to withstand against proprietary solutions.

These standardization benefits make the eNUC form factor very attractive for many low-power small form factor applications in various embedded and industrial markets for which abundant interface options are provided. The eNUC Type 2 interface is specified for connectivity intensive systems and includes interfaces such as 2x LAN, 2x USB, 1x mini PCI Express and/or mSATA expansion, 2x UART or COM ports and external single power connector as mandatory. Other recommended features include 1x video out (i.e. HDMI, DP, RGB, LVDS internal or external) as well as 1x SATA, 2x additional USB, 1x SD/mSD socket, 1x audio and a minimum product lifetime of 5 years plus support of extended temperature ranges. With all these interfaces packed on a footprint measuring only 4 x 4 inches or 101.6 x 101.6mm, an eNUC board can serve many different applications directly off the shelf, making this rugged form factor instantly field deployable. One of the latest new designs based on this attractive form factor is the eN-GXSOC from Datakamp

with the second generation AMD Embedded G-Series SoC (System-on-Chip). Application areas for this board are small form factor systems in multimedia, infotainment and point of sale as well as medical, industrial automation and control. What makes this board so appealing? It is the AMD accelerated processing unit that provides impressive graphics capabilities combined with scalability and flexibility in cost, performance and power. It is also the first real x86 SoC which takes architecture improvements one step further and integrates the I/O controller on the same chip as the APU, making it the ideal fit for applications requiring ultra-low power and small form factor processors – so it seems designed for the eNUC world.

The second generation G-Series SoC (code name Steppe Eagle) that is now becoming available with the new eNUC boards expands upon the capabilities of the AMD embedded G-Series SoC platform, bringing scalable performance, power and price across CPU, GPU, multimedia and I/O controller hardware, lowering integration effort for more cost-efficient designs. Together, the new G-Series processors deliver immersive, graphically rich experiences across a broad range of applications, from entry-level to mainstream gaming, digital signage, imaging, and industrial control. With this processor Datakamp has

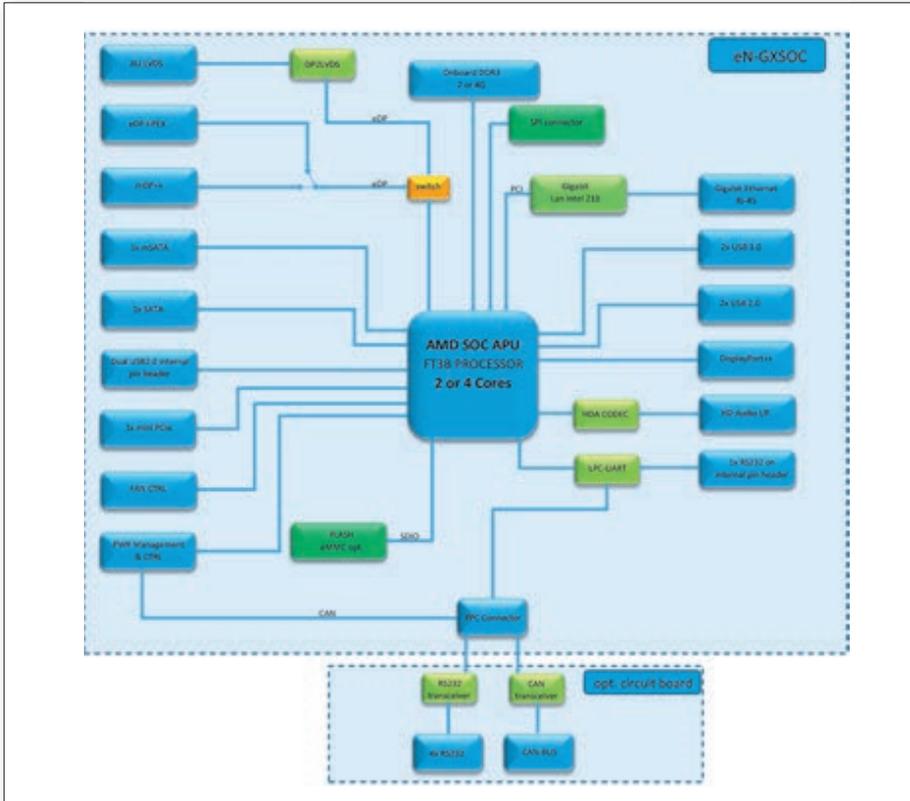


Figure 2. Despite the small form factor, the eNUC eN-GXSOC PC offers a comprehensive set of I/Os.

developed a 4 x 4 inches multimedia engine that supports all features required for graphics intensive applications. Even support for the LED backlight power for the LCD is realized as a modular option. The board further supports embedded DisplayPort via I-PEX for display connectivity, making it highly flexible in terms of supported displays. Depending on the required performance, the boards are highly scalable from the dual-core GX-212JC with 6W up to the quad-core GX-412HC with 7W thermal design power (TDP), trans-

forming them into high-performance, low-power SoC designs with integrated powerful graphics core. They provide the appropriate performance for playing video material in 4K resolution. Even a color depth of 10 bit can easily be activated in the operating system graphics card driver (catalyst). The integrated Radeon graphics supports two independent displays. The connection is established via DisplayPort++, eDP on I-PEX or mDP++ and dual-channel 24-bit LVDS. For generic expansions and IoT connectivity the system

offers 2 x USB 3.0, 4x USB 2.0, an internal mini PCIe slot as well as 1x Gigabit Ethernet. Storage media can be connected via 1x mSATA and 1x SATA. Besides the standard RS232 port, an extension board offers the option to add 4x RS232 as well as CAN bus. High Definition Audio rounds off the feature set. According to the eNUC specification, the eN-GXSOC provides a single power connector for a wide-range power supply from 12 to 36 VDC.

The all-in-one eNUC board has been designed and developed for 24/7 use in harsh industrial environments. It utilizes an innovative passive cooling system that transfers the thermal power directly to the housing and ensures real long lifecycles of the board and the overall system. Reliable and fast SSD mass storage in the form of mSATA or eMMC devices also avoids any moving parts in the system. The RAM memory is furthermore soldered directly to the SBC, increasing shock and vibration resistance and making it even suitable for in-vehicle applications. Supported operating systems include Microsoft Windows and Linux, especially embedded Yocto Linux.

As the eN-GXSOC is entirely manufactured in Germany, customers can rely on high quality production including tests of each single unit, ensuring that massive field deployments can be executed without any trouble due to board failures. Its EMS partner Ihlemann AG guarantees high-end quality printed circuit board assembly. The board is available as a commercial off-the-shelf product or in tailor-made variants in line with customer special requirements. The development and engineering of hard- and software components can be drawn on as an individual performance or as a project. ■

Artificial Intelligence on the Edge

By Fabrizio Del Maffeo, Aaeon

This article introduces UP AI Edge, a platform which is fully powered by Intel technology and integrates: Intel Apollo Lake-I CPU, Intel Cyclone 10 gx FPGA, and Intel Movidius Myriad 2 VPU (Video Processing Unit), and represents a completely new paradigm for AI in the industrial embedded market.



Top side of the UP Core Plus mainboard

■ Deep Learning, Machine Learning and Artificial Intelligence (AI) have recently reached the hype of expectation in the consumer market. While pure AI still seems to be far away, sophisticated Machine Learning solutions have reached the plateau of productivity and are part of our everyday life. Some of these technologies are now entering the industrial and the Internet of Things market, spreading intelligence in our connected world. Hereby, the biggest constraints of the field deployment of AI on the Edge used to be as follows. 1) Cost of the solution: no optimized hardware was available and the most common solution was to use a high-performance CPU + GPU. 2) Power consumption of the solution: a CPU + GPU approach delivers high performance at high thermal dissipation power. 3) Robustness of the solution: the technologies used were designed for big data centers, where temperature range, vibration and other industrial requirements were not needed.

Recent progress in Machine Learning technology, as well as new silicon chips, permits to expand AI from cloud computing to edge computing. AAEON Technology Europe and its line UP Bridge The Gap are now releasing an unique platform, which can overcome all the previous limitations: UP AI Edge. This platform is fully powered by Intel technology and it integrates: Intel Apollo Lake-I CPU,

Intel Cyclone 10 gx FPGA, and Intel Movidius Myriad 2 VPU (Video Processing Unit). UP AI Edge delivers unmatched performance and it represents a completely new paradigm for AI in the industrial embedded market.

The mainboard is UP Core Plus, a credit-card-sized board (55 mm x 90 mm) powered by Intel Apollo Lake-I family. Intel Apollo Lake-I platform is a 64-bit QuadCore architecture with extremely high performance in only 9.5W of TDP (x5 – 3940). The board supports up to 8GB Dual Channel DDR4 2.400 MHz, DP up to 4K, eDP, 2 USB 2.0, 1 USB 3.0, 1 USB 3.0 OTG, WiFi 802.11 AC 2T2R, 2 x CSI and it has two 100-pin high speed connectors to expand it.

The companion board UP AI Plus is powered by Intel Cyclone 10gx (105KLe-220KLe), has 1 GB DDRIII, and is DPin connected to the Cyclone for Video Acquisition, and USB Type-C and GPIO connected to the Cyclone for data acquisition. LVDS in connected to the Cyclone for Camera acquisition, GBit Ethernet, USB 3.0 and mini-PCIe connected to the mainboard via the 100-pin connector. Thanks to a collaboration with Basler, the worldwide leader of industrial Machine Vision camera solutions, UP AI Plus is compatible with selected Basler cameras, which can be seamlessly connected via LVDS. UP AI Plus can be used to process streams of high speed raw

data – e.g. from cameras – or to run video acceleration, real time video data analysis, video acquisition and many other functions. Different applications can run just by loading the specific IP inside the FPGA.

Because of the mini-PCIe, the companion board UP AI Plus can host UP AI Core, a mini-PCIe module powered by Movidius Myriad 2. Myriad 2 is the most advanced low power technology for running a neural network on the edge and for processing video images. It has been adopted by DJI for their professional drones, as well as from Amazon and Google for different other products. UP AI Core is fully compatible with the Intel Neural Compute Stick libraries and tools. UP AI Edge will also be available as an industrial rugged AI gateway for deployment in harsh environments.

For software support, UP AI Edge will be supported by the UP Community and from the Intel Network Compute Stick for all the software questions related to UP AI Core (Myriad 2). UP AI Edge will be in mass production in June 2018, but people can start pre-ordering it to support the project from April onwards on Kickstarter, as well as from May 2018 on UP Shop and with all resellers and partners of UP and AAEON. The price will start at \$399 US for the complete platform. ■

Product News

DDC: cost and space saving 280W IFEC & PED aircraft power solution

Data Device Corporation introduces a new 280W converter to supply 28V power for IFEC electronics and USB charging ports for Portable Electronic Devices (PED), to up to 18 aircraft seats, with a compact, high output, and cost-effective solution that delivers power efficiency performance > 92% (power factor > 0.95) at 115VAC 400Hz and max load. Additional features are over-current protection, thermal shut-down and short-circuit protection.

[News ID 5891](#)

EKF: quad M.2 PCIe/NVMe SSD carrier board

With a total capacity of 8TB as of current, EKF presents the SE4-TEMPO, a peripheral slot card for CompactPCI Serial systems, equipped with four M.2 sockets for SSD modules. Each M.2 socket can accommodate an NVMe type SSD module, with a PCI Express x4 Gen3 interface for superior data transfer rates.

[News ID 5925](#)

SECO signs agreement with French ChipSelect

To further develop its potential in this area, and in line with its strategy of establishing collaborations with experienced partners with a strong knowledge of the local market, SECO signed an agreement with ChipSelect to expand its sales force in France. Recognised as a trusted advisor by the market, ChipSelect is a French organi-

sation for embedded electronic solutions with dedicated technical expertise in supporting the architecture definition and design phase for the distribution channel and customers, and with competitive market understanding for architecture conversion.

[News ID 5942](#)

MEN: CompactPCI PlusIO SBC with Intel Atom Apollo Lake-I

MEN presents the latest member of its CompactPCI Intel CPU product family, which has been growing for more than eleven years now. The F26L is based on Intel's latest Apollo Lake-I platform with either two or four cores, and improved graphics options. As usual, the CompactPCI PlusIO board is backward compatible to all predecessors of this family.

[News ID 5833](#)

N.A.T.: MicroTCA.4.1 LLRF backplane

N.A.T. announced a new MicroTCA.4.1 low level radio frequency (LLRF) backplane for the distribution of high precision RF and clock signals in embedded computing systems aimed at high energy physics research and other applications: the NAT-LLRF-Backplane. Originally developed by DESY, the Deutsches Elektronen-Synchrotron, and now licensed by N.A.T., the NAT-LLRF-Backplane provides three extra slots for RF/clock signal generation and distribution modules. It provides high-frequency signal distribution in the range of DC to 6GHz (27 single-ended

channels, star topology) and low-jitter CLK channels (22 differential pairs, star topology).

[News ID 5831](#)

ADLINK: IIoT-ready rugged, compact IoT gateway/controller

ADLINK Technology introduces a robust and reliable IIoT-ready combination embedded controller and IoT gateway. ADLINK's MXE-210 offers a small footprint and is fully operable in harsh environments from -40 to 85°C, making it an ideal choice for industrial automation, transportation, agriculture/aquaculture, and smart city applications. Functioning as both a gateway and embedded controller, the MXE-210 bridges the gap between Operations Technology (OT) and Information Technology (IT) data interchanges, with support for third party manufacturers via its wide range of industry standard compliances;

[News ID 5830](#)

IBASE and Quividi partner to provide fully compatible digital signage players

IBASE Technology and Quividi, the industry standard for Audience Analytics in digital signage, announce their partnership to provide Quividi-compatible digital signage players. The IBASE SI-613-QT player has been officially tested by Quividi, ensuring its full capability of running Quividi's VidiReports 6.x software in a single screen/ single camera mode, as well as in a dual screen/ dual camera mode.

[News ID 5972](#)



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New oscilloscopes address expanding development needs

By **Alix Paultre**, Editor

This article introduces a new series of oscilloscopes which feature all necessary functions to thoroughly test the behavior of complex embedded systems.

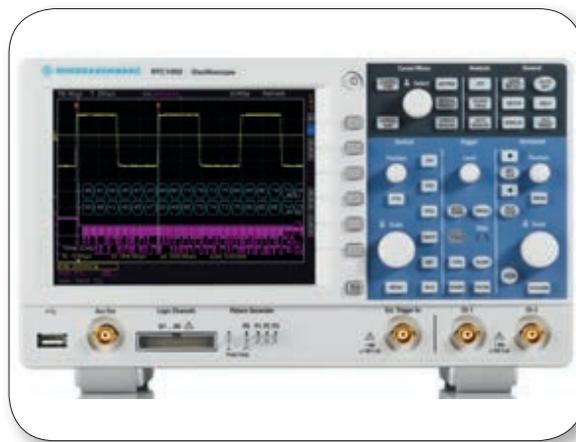


Figure 1. Directly addressing the need for a highly functional cost-effective T&M device, the RTC1000 oscilloscope series offers a compact eight-in-one instrument.

■ Test & Measurement is arguably one of the most difficult disciplines to master in electronic design engineering. Your math must be good, and your imagination broad, to create a great design, but if you can't dial that great design in and make it a viable product, you will die a penniless beggar (or worse, have to share credit with your buddy that can use the 'scope better than you).

T&M is undergoing another renaissance, as it must whenever industry goes through any disruptive change. You can only test a system with a device that has a higher resolution/speed/capacity than the one being tested. In other words, if your ruler lines aren't smaller than the features on what you are trying to measure, you will only be as precise as those markings.

This requirement is exacerbated by the nowadays (actually always) need to test at almost every stage of development and production. It is almost impossible to attain six-sigma reliability without intelligent oversight at every step, from the bench to the box. That means everyone in the process must have (and use

properly) test equipment that is accurate, fast, and functional. This can get expensive, obviously. This cost issue is also a barrier for small shops that may only need one device, but can't afford the latest bells-and whistles machine.

The good news is that the same advances that are driving electronic product development are also impacting the T&M space. High instrument integration enables compact form factors and the ability to create a competitive system for the average user at a price they can afford. One example of this trend can be found in the Rohde & Schwarz RTC1000 oscilloscope series.

Directly addressing the need for a highly functional cost-effective T&M device, this compact eight-in-one instrument can act as an eight-channel logic analyzer, a four-channel pattern generator, and a protocol analyzer for I2C, SPI, UART/RS-232, CAN, and LIN, as well as a digital voltmeter, component tester, spectrum analyzer, and counter. Available in models from 50 MHz to 300 MHz, they offer bandwidth upgrades via software license all the way to 300 MHz bandwidth. The

two-channel oscilloscopes have maximum sample rates of 2 Gsample/s and a memory depth of 2 Msample. All models come as standard with LAN and USB interfaces. This convergence also enables more functionality to be put into larger systems as well. For example, to serve more professional users with greater needs, Rohde & Schwarz used the same integrated approach to create the RTM3000 and RTA4000 series, with 10-bit vertical resolution to enable power measurement that fulfills the stringent requirements demanded by advanced electronics development.

Operating with bandwidths of 100 MHz, 200 MHz, 350 MHz, 500 MHz, and 1 GHz, the RTM3000 oscilloscope has a 5 Gsample/s 10-bit ADC, with 40 Msample (80 Msample interleaved) per channel acquisition memory (with an optional 400 Msample segmented acquisition memory), and the RTA4000 oscilloscope offers bandwidths of 200 MHz, 350 MHz, 500 MHz, and 1 GHz. The RTA4000 is also suited for analyzing serial protocols, with an acquisition memory depth up to 1 Gsample, and the same 10-bit ADC, but with even more memory and a 100 Msample (200

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Figure 2. The RTA4000 series is also ideal for analyzing serial protocols, with an acquisition memory depth up to 1 Gsample.

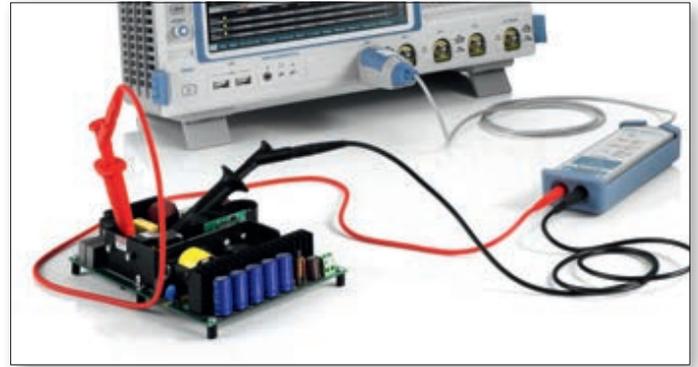


Figure 3. The RT-ZHD probes use high levels of internal system integration to help eliminate erroneous readings.

Msample interleaved) per channel acquisition memory, and standard 1 Gsample (1,000 Msample) segmented acquisition memory. Power measurements, such as ripple and noise measurements of a DC line, demand an oscilloscope with high vertical resolution, low noise and excellent DC gain linearity. The 10-bit ADCs of the RTM3000 and RTA4000 series support 1024 vertical positions, 4x better than legacy 8-bit oscilloscopes, and essential for ripple and noise measurements. While the R&S RTM3000 series comes in two- and four-channel models, the R&S RTA4000 series oscilloscopes are exclusively four-channel models. The expanding demand for compact, highly efficient switched-mode power supplies, inverters, and electric drives demands the use of leading-edge semiconductors and components, creating new challenges for T&M equipment. It doesn't help to have great bench T&M gear if your probes aren't able to deliver good, clear, and precise information to the device. One example of how companies are addressing this need is the new family of high-voltage differential probes from Rohde & Schwarz, that enable measurements with

extremely high signal integrity. The RT-ZHD high-voltage differential probes are well suited for measurements on modern power semiconductors, and with a bandwidth of up to 200 MHz, they can even measure very fast switching edges. The four models have maximum peak voltages from 750 V to 6000 V, and exhibit excellent common-mode rejection across the entire frequency range that effectively suppresses fast-switching common mode signals.

With an integrated offset compensation that operates independently of probe attenuation and the oscilloscope's vertical settings, they can measure very small ripple voltages with a large DC component. With an offset compensation of up to 2000 V, they cover a very large range of measurement applications, and have a DC measuring accuracy of ± 0.5 percent. The probes also feature an integrated ProbeMeter that measures DC offset with ± 0.1 percent accuracy, with the readings displayed directly on the oscilloscope. The RT-ZHD probes also use high levels of internal system integration to help eliminate erroneous read-

ings, and enable the oscilloscope to automatically recognize the configured attenuation factor and other probe settings to display the correct voltages and reliably detect incidents such as overvoltage. Probe functions can also be accessed via the SCPI remote control interface, making the probes a good choice for automated tests as well. Two other examples are the R&S RT-ZD002 and R&S RT-ZD003 differential probes with maximum input voltages up to 700 V and 1400 V, respectively. These 25 MHz probes boast very low inherent noise for their class of around 7 mV (RMS) and 14 mV (RMS), respectively. Their BNC interface makes them a perfect fit for R&S RTC1000, R&S RTB2000 and all standard oscilloscopes.

The pressures of T&M on the electronics engineer will never go away, as the field is caught up in a perpetual "Red Queen's Race" of constant change as T&M devices strive to stay ahead of the embedded systems they are testing. The latest highly-integrated cost-effective devices available today can help you stay ahead of the pack. ■

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Product News

PEAK-System: latest technology on show at embedded world 2018

PEAK-System presents new and upcoming products at the embedded world 2018 in Nuremberg. After the CAN FD interface PCAN-M.2 for the modern M.2 slot, the stackable plug-in card PCAN-PCI/104-Express FD for PCI/104-Express systems follows having up to four CAN FD channels. For the connection to LIN networks, the company releases the PLIN-USB, an easy-to-use PC USB interface. It supports the LIN protocol according to ISO 17987 and complies with all LIN specifications up to version 2.2.

PEAK-System also shows the brand new PCAN-MicroMod FD plug-in module for developing your own hardware with CAN FD connection and I/O functionality. Various motherboards provide peripherals for specific requirements. An evaluation board facilitates the development of own boards. Another highlight is the PCAN-Router Pro FD. The router with six CAN FD channels can be individually programmed or configured with Windows software. In addition to forwarding messages and editing the CAN data, the data traffic can also be recorded. The battery-powered PCAN-MiniDiag FD completes the exhibition appearance. The diagnostic device in practical handy format detects transmission rates, counts error frames, and measures termination as well as bus load. Service technicians and developers can quickly gain access to CAN and CAN FD networks and perform inspections.

[News ID 5982](#)

Rohde & Schwarz: innovative T&M equipment for next generation designs at embedded world

Rohde & Schwarz will be presenting its T&M instruments with the tagline "Oscilloscope innovation. Measurement confidence". Three new oscilloscope series R&S RTC1000, R&S RTM3000 and R&S RTA4000 will be on show

to the general public at embedded world 2018. These oscilloscopes are equipped with cutting-edge technology, a smartphone-like touchscreen and far more features than conventional instruments in their class. Together with the R&S RTB2000 oscilloscopes introduced in 2017, the T&M expert now offers market-leading 1000, 2000, 3000 and 4000 class instruments.

The R&S RTM3000 oscilloscopes are designed for DC power and voltage measurements like ripple and noise measurements. Especially for the increasingly stricter tolerance limits are oscilloscopes with a 10-bit vertical resolution and a vertical range up to 500µV/div with full bandwidth a perfect solution. In addition, the 80 Msample memory depth allows measurements over long time periods with high sampling rates. The R&S RTA4000 oscilloscopes have an even larger memory of 100 Msample per channel, making them ideal for analyzing serial protocols and power-on/off sequences. They offer a 1 Gsample segmented acquisition memory and have a 10-bit resolution to clearly display fine details.

The cost-effective R&S RTC1000 is extremely compact and can be upgraded with numerous additional functions: eight-channel logic analyzer, four-channel pattern generator, digital voltmeter, component tester, spectrum analyzer, counter, and protocol analyzer for I2C, SPI, UART/RS-232, CAN and LIN. Users can expand the bandwidth from 50 MHz to a maximum of 300 MHz via software license – something no other device in this price class offers. In addition to its oscilloscopes, Rohde & Schwarz will be demonstrating new probes to meet current challenges in the field of power measurement. A new 1:1 power rail probe with 4 GHz measurement bandwidth detects even the smallest coupled RF signals in sensitive embedded components used for mobile and IoT applications. For this highly sensitive, very low-noise probe, a 6 GHz model of

the extremely powerful Windows-based R&S RTO2000 series of lab oscilloscopes is recommended. Other probes on display include a probe for measuring battery life as well as new probes for power electronics measurements up to 6000 V that offer a measurement bandwidth of up to 200 MHz, a particularly high common mode rejection ratio and for this type of probes- the best DC measurement accuracy of 0.5 percent.

[News ID 5937](#)

Rigol: real-time spectrum analyzers, electronic loads and decode options for oscilloscopes

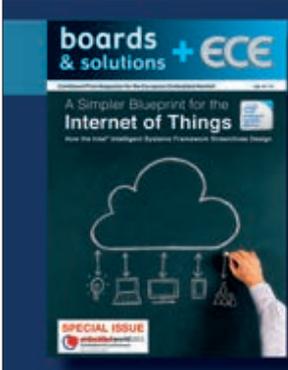
At embedded world, Rigol Technologies will present a number of actually introduced innovations in addition to instruments for test and measurement applications. The new RSA5000 Series Real-time Spectrum Analyzers are based on Rigol's newly developed Ultra Real technology, with the newly created complete platform making it possible to perform real-time measurements. The RSA5000 series is featured by its compact, elegant design, its operation via touch screen and its wide range of possible applications. With an additional 3.2 / 6.5 GHz tracking generator, it can also be used as a "scalar" network analyzer. The modular RSA5000 series provides GPSA, RTSA, EMI and VSA functions.

[News ID 5932](#)

INSYS icom collaborates with Microsoft to accelerate IoT solutions

INSYS icom has joined Microsoft Azure Certified for Internet of Things, ensuring customers get IoT solutions up and running quickly with hardware and software that has been pre-tested and verified to work with Microsoft Azure IoT services. Microsoft Azure Certified for IoT allows businesses to reach customers where they are, working with an ecosystem of devices and platforms, allowing for faster time to production.

[News ID 5899](#)



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Simplified multicore debugging in real-time safety-critical applications

By Jens Braunes, PLS

This article introduces version 4.10 of the debugging tool UDE, which makes debugging and runtime analysis of complex control unit software much more convenient and efficient than in the past.



■ PLS Programmierbare Logik & Systeme is presenting version 4.10 of the Universal Debug Engine (UDE) for the first time at embedded world 2018 in Hall 4, Booth 4-310. The UDE 4.10 features numerous completely new and improved functions for debugging, testing and system analysis of complex multicore applications in real-time and safety-critical embedded systems. For the comprehensive support of the latest multicore systems – such as Infineon AURIX 2G family with up to eight programmable processing units or the S32V from NXP with its powerful Cortex-A53 cores – among other things the multicore management has been further optimized, which for example allows synchronous stopping and starting of several heterogeneous cores. Especially for users of ARM Cortex-based SoCs, PLS has extended its instruction set support. The latest version of the UDE now allows users to debug code in AArch32 and AArch64 execution modes simultaneously.

Moreover, with UDE 4.10, developers will also have even more efficient graphical visualization options for analyzing the runtime behavior of applications. Based on the recorded trace data, the program sequence or the call

depth can be quickly displayed over time, and that even for very large amounts of data. The visualization of the program flow makes it very easy to draw conclusions – for example, for load distribution or synchronization of software distributed on several cores – without much additional effort.

Another outstanding new feature of the UDE 4.10 is the support of ASAP2 descriptions for control unit software. ASAP2 or A2L files describe how physical values, characteristic curves and other parameters of control units are mapped and converted to program variables, internal memory structures and data types. The user can now work directly with the parameters of the electronic control unit and change them without having to worry about their actual representation in the microcontroller memory. Of course, user values are checked for their validity and for allowed value ranges. This makes debugging and runtime analysis of control unit software much more convenient and efficient than in the past. The UDE 4.10 also makes work much easier for developers of complex timer algorithms for the Bosch Generic Timer Module (GTM). Where previously only assembler code was used, devel-

opment and debugging in conjunction with corresponding compilers from Tasking or HighTec can now be done on the basis of C source code too.

Especially for the AURIX 2G family, the integrated FLASH programming module of the UDE 4.10 and the separately available FLASH/OTP programming tool UDE/Memtool have been extended with additional functions for smooth support of software-over-the-air. This means that it is now possible to create the prerequisites on the device for secure software updates via an existing internet connection later in the field. In addition to UDE 4.10, PLS introduces two new trace modules for its UAD2next, the all-round access device for state-of-the-art debugging and target communication via CAN. The first module supports parallel trace and offers up to 250 MBit/s transfer speed with 1 bits and 125 MHz (DDR). The second module supports serial trace interfaces based on the AURORA protocol and transmits the trace data generated by the target via two lanes with a transfer speed of up to 1.25 GBit/s. Both modules can easily be plugged into the robust expansion slot on the front of the UAD2next. ■

FPGAs enable development of safety-critical embedded systems

By Michael Henze, MEN Mikro Elektronik

Electronics are always safety-critical when faults or failures endanger human lives or can cause major environmental and/or material damage. Safety-critical systems must therefore always function reliably. Essential functional safety can be realized with FPGA logic.

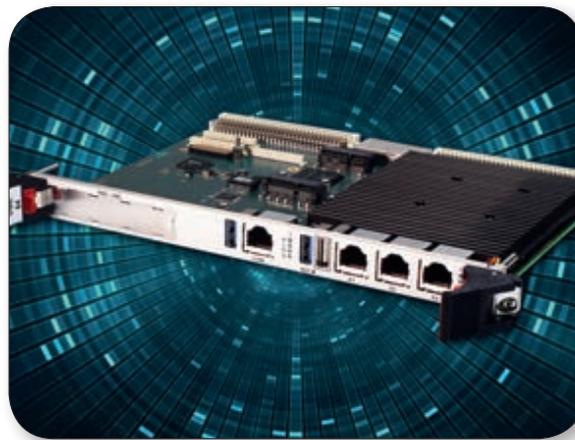


Figure 1. A board with FPGA implementation is the 6U high-performance SBC with 16 cores and FPGA-based VMEbus interface. It is used in the LHC of the CERN Institute and is not only technically considered a safe board among developers.

■ The specifications for safety-critical embedded systems are often given for specific industries and are subject to strict standards. There is no scope for errors in hardware or software. Typical applications can be found in trains, buses, ships and aircraft as well as in more complex applications in industrial automation, medical technology or the energy industry. The factor of functional safety must be accorded particular importance in this context. But is it possible to design a system in such a way that it absorbs all known risks through its design? This includes accidental failures caused by component failures, EMC influences or cosmic radiation as well as possible design errors that can be avoided during development by appropriate processes. And is it possible to certify systems according to the safety standards of the different markets if most of the available standard components do not cover these standards by default? A self-generated verification is usually very time-consuming - especially if the components are complex. In addition, it is sometimes only possible in cooperation with the component manufacturer, as this also requires an insight into the production processes. But do they go along with it? Often not, because functional safety is a niche market for most suppliers of standard components used in embedded computers. But how can this dilemma be overcome and yet function-

ally safe systems developed? A very good alternative to the retrospective testing of standard components, as prescribed by the EASA certification memorandum EASA CM - SWCEH - 001, is the use of Field Programmable Gate Arrays, or FPGAs for short, in which the function is mapped in a new and compliant manner to the respective safety standards. This solution is ideally suited for the exact fulfillment of the safety-critical requirements of the respective industries. It even opens the possibility of efficiently implementing even highly customer-specific designs with small batch sizes and offering them at attractive prices. This makes them the suited basis for ensuring application-specific functional safety. The advantage of FPGAs is that it is not necessary to redevelop everything. Rather, functional IP building blocks can be combined as required, which saves both costs and development time. This is possible not only for the design of a specific FPGA, but also for the design of a board or system with several FPGAs, which receive their highly individual functionality via the respective FPGA adaptations.

However, before a safety-critical design can be qualified and certified, a proof of its behavior in the event of an error must be provided. This is comparatively easy with development tools for FPGAs. In the virtual development environment for FPGAs, even serious or

complicated errors can be provoked to test the error behavior of the system or to check whether the system has a defined error behavior. This form of simulation is not common in software, but is part of the basic tool for FPGA design - it is also used for so-called normal developments, which do not have to meet any functional safety requirements. In this respect, FPGAs do not require any additional tool-chain effort. The simulation can also be used not only to prove the correct error behavior, but also to prove the correct implementation of a function. It is therefore possible to create complete simulation reports, which can then be submitted to TÜV or other certification service providers, for example.

Monitoring of proper conditions is also extremely important in the safety-critical area, as this is the only way to detect failures and initiate appropriate actions. For example, temperatures, the functionality of components or the receiving of data must be monitored and analyzed to achieve a safe state in the event of deviations from setpoint values - such as stopping a machine or stopping a train in a controlled manner. However, finished components for the connection of input and output units - such as serial interfaces or GPIOs - rarely contain such monitoring functions as are required for functional safety, for example in accordance with EN 50129 for



railways or in accordance with IEC 61508 for electronic systems with a safety function. Such functions can also be mapped very efficiently in FPGAs if there are no suitable microcontrollers. The integration of such monitoring functions into FPGAs also offers the advantage over microcontrollers that they are freely configurable and can be adapted to the application.

The saying never change a running system particularly applies to functionally safe systems. On the one hand, the costs for verifying functional safety in accordance with the standards are high and must be reproduced every time a change is made - which means that they are very cost-intensive. On the other hand, when changes are made, there is always the risk of installing a new error. For this reason, systems have been used for decades without revision, especially in rail transport and aviation. This also necessitates an obsolescence strategy for components, since standard components for industry are rarely available for more than 5 to 10 years. FPGAs offer decisive advantages here. The function is not in a dedicated component, but in the programming itself. As a result, component discontinuations are comparatively easy to handle, since the code can be ported to new FPGAs with identical functionality. Project lifetimes of more than 30 years are no problem, even if the FPGA manufacturer has to be changed. This also provides independence from a certain supplier.

With FPGAs, it is also always possible to integrate additional functions at a later date - for example, to upgrade the system. This flexibility naturally also has an effect at the beginning of the product lifecycle: if some of the hardware functions are implemented in FPGAs, this part can be tested parallel to further development. Such a procedure saves time during subsequent commissioning and testing of the entire system.

One of the most common requirements, especially in the safety-critical area, is the support of extended temperature ranges - usually from -40 to +85°C. Even here, there are often problems to find appropriately qualified standard components. However, at the latest with an extremely extended temperature range of -55 to +125°C, it becomes considerably more difficult or impossible to get components for the various hardware functions. However, FPGAs offer a sufficiently wide range for these extreme temperatures.

The most important strategy for making a system less risk-prone is redundancy - i.e. the functionally identical multiplication of important components in order to be able to compensate failures of individual components without any problems. A component that paralyzes the entire system due to its failure is called Single Point of Failure (SPOF). Any important building block can be such an SPOF. In aerospace applications, for example, memory errors caused by cosmic radiation are a problem. These lead to effects such as Single Event Upsets (SEU) or Multi-Bit Upsets (MBU), where one or more bits in memory elements jump from 0 to 1 or vice versa. If critical components such as a CPU in multiple redundancy with voting are present, this increases functional safety and availability. Such redundancies including voting functionality can be built up with FPGAs, which offers the advantage that this logic can be easily copied in every instance by copying and pasting the IP logic. In the FPGA, this redundancy is repeated again in order to be able to complete its calculation, if an FPGA flip/flop fails. As a result, an almost SEU-immune implementation can be realized, when using a flash-based FPGA.

In the safety-critical environment, predictable execution times are also required in addition to reliability. The system must react to an external event in a defined time, even in the worst case. However, typical computer architectures use interrupts and DMA topologies that can negatively affect the response times of individual tasks when

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Figure 2. The standard FPGA on the Rugged-COM Express module CC10C with ARM i.MX6 processor provides flexible, customizable I/Os.

another task requests the same resources. The required deterministic behavior - i.e. exactly predictable in terms of time - is then difficult to achieve. For this reason, such solutions are not used for hard real-time requirements. FPGAs support real-time capability, however, since they are built in parallel. This means that the different processes do not compete with each other, but take their own predefined path, which is not disturbed by other events. This makes it much easier to ensure deterministic real-time capability with clearly defined behavior over time.

In the context of functional safety in times of the Internet of Things, Industry 4.0 and Mobility 4.0 one sooner or later also comes across security in the sense of protection against manipulation. Here too, FPGAs offer many possibilities to protect the application against manipulation, unauthorized access or duplication of data. For example, a unique

key can be programmed in the FPGA. There it is stored in encrypted form in a non-volatile memory. This key can then ensure that data can only be read by applications and people who know this key. The key can also be used to identify the device communication with other devices. Because it is hardware-based, it can no longer be manipulated on the software side, which always uniquely identifies the device. A code, which is implemented in hardware cannot be copied as easily as software. In this way, an FPGA can assume valuable security functions that go much further than, for example, a Trusted Platform Module. They even have a very specific advantage over standard solutions, because if they are programmed individually, they are much less susceptible to hacking.

In addition to all these advantages of FPGAs, there are also limits to their use. On the one hand, there are the costs. They are, of course, more expensive than standard components manufactured in large batches. FPGAs can also only be used to a limited extent to implement complex solutions, because from a certain level of functionality it is better to switch to a combination of software and hardware, since microcontrollers and application processors already have a fundamental logic including various I/O interfaces off-the-shelf, which would have to be developed for FPGAs.

Nevertheless, you can do a lot with FPGAs of course. For example, x86 logic already exists in FPGAs. But we are still a long way from reproducing the entire software logic that exists for x86 in FPGAs. Advantages and disadvantages must therefore be weighed up depending on the application and existing standard components. In principle, FPGAs offer flexible and safe alternatives for almost

all challenges, where on the hardware or software side you would long ago have come up against development limits. Many applications that rely on functional safety cannot do without FPGA logic today. Companies such as MEN Mikro Elektronik specialize in such FPGA-based platforms for safety-critical embedded systems and are also familiar with the requirements of specific industries. In some industries it is common practice, for example, that FPGA development is not considered in the standards, but solution providers today like to rely on the simulation results of FPGA development tools to save documentation effort for certification.

In spite of all the effort involved in development, FPGAs can also save considerable time in terms of certification expenses, which sometimes cost more than the development itself. And there are already many MEN function blocks that are used in certified applications. On the one hand, they fulfill core functions of the boards. On the other hand, they represent specific I/O functions. For example, MEN IP building blocks for FPGAs include: graphic and touch display controllers, fieldbus interfaces such as CAN and MVB, different UARTs like RS232 or RS485, Ethernet and HDLC interfaces, SRAM and flash memory controllers, and GPIO, digital I/O, counter, quadrature decoder and PWM functions.

All these IP cores can be combined with cores provided by Altera (Avalon Bus) or the Open Cores Community (Wishbone Bus). Bridges developed by MEN from Wishbone-to-Avalon and Avalon-to-Wishbone round off the application-ready FPGA logic range, which is continuously being further developed and can of course also be adapted and/or extended to customer-specific requirements. ■

Product News

● MEN: exceptional graphics performance on CompactPCI Serial

The latest CompactPCI serial peripheral card G232 from MEN provides excellent graphics performance with the Radeon E6465 GPU from AMD and is particularly suitable for multi-display applications. With its Eyefinity technology from AMD, the G232 multi-display controller can independently control up to four displays, or combine them into a large display with a common content via daisy chaining.

[News ID 5835](#)

● Avalue: embedded products with 6th gen Intel Core processor

Avalue announces embedded products powered by 6th Generation Intel Core Processor, including ECM-SKLU, EPC-SKLU, and APC-2132. The 6th generation Intel processor offers lower

power consumption and better system performance than the last generation. The TDP is only 15 watts and 26-37 watts while the computer is running on full power: this new platform delivers 80% (max.) lower CPU power consumption with 26% CPU performance improved!

[News ID 5902](#)

● Kontron announces Astone France as new distributor

Kontron has entered into a sales partnership with electronics distributor Astone Technology. Based in Montrouge and represented at five additional locations in France, the specialist for the sale of electronic components expands its existing partnership with Kontron Asia, formerly Quanmax. Its portfolio encompasses boards and modules as well as systems and flat screens for industrial applications. The sales partnership significantly

expands Kontron's presence in France in the industrial automation, healthcare, energy and infotainment sectors. Astone supports Kontron's increased commitment in France by adding 20 specialized sales engineers.

[News ID 5965](#)

● Artila: gateway system meets increasing demand for high-speed mobile internet

The dissemination of Internet around the world changed the way people communicate, the evolution of the information and communication technology allowed the creation of new types of services involving electronic devices with huge potential. Internet of Things offers new possibilities and new services to end users, since they could learn more about other entities present in the surrounding environment.

[News ID 5928](#)

Optical bypass technology enhances security in road traffic management

By Thorsten Ebach, EKS Engel

Nowadays the smooth flow of road traffic is significantly dependent on suitable data communication. Optical bypass technology, which functions similar to a railway turnout, protects networks against multiple points of failure. This means if a certain part of the network fails, it will not affect the function of the remaining network.



■ There is a requirement for uninterrupted operation for networks in traffic control, as prescribed e.g. in the road tunnel equipment and operation guideline (RABT). But redundancy methods are not suited to meet this requirement, despite switching in only a few milliseconds. The reason is that if multiple failures occur simultaneously an interrupt of the data communication is inevitable. To prevent this, EKS Engel has implemented optical bypass technology, up to now mainly used in traditional IT, into the industrially integrated optical bypass x-light which withstands the harsh environments in traffic control systems. The x-light works in a protocol transparent way and therefore supports Ethernet as well as all field busses and even numerous interfaces like RS-485. The optical bypass also works seamlessly with third-party network devices and can be integrated either in ring or line topologies.

Various kinds of traffic-control equipment, e.g. intelligent traffic guidance systems, warning signals for wrong-way drivers, or roadside emergency telephones, constantly monitor the flow of traffic to ensure the highest degree of security. Tunnels are additionally equipped with fire alarm systems and smoke extraction systems. Nowadays nearly all these traffic management systems are linked via fiber optic cables, mainly with single-mode

transmission systems featuring attenuation of only 0.3dB per kilometer up to 100km. With transmission-distances up to 5km maximum, mainly multi-mode fiber cables are in use with attenuation 1dB per kilometer. Even in terms of reliability, fiber optics is the measure of all things because it is not sensitive to electromagnetic fields. Fiber optics consists of insulating material, which means data is transmitted via an electric insulator. Therefore, there are no potential equalization currents which are much dreaded in larger extended plants. There is also no risk of damaging connected devices even in the event of direct lightning strikes.

Active network components like Ethernet switches or field-bus converters are put through their paces by their manufacturers prior to delivery. But despite this, failures in operation cannot be completely avoided. The main reasons are, apart from incorrect use, problems in hardware and software and power failure.

To avoid problems within the network several protection methods are in use. Power failure can be compensated at least for a certain time with an uninterruptible power supply (UPS). Software is evaluated or rather validated as well as tested with structure, function, and so-called black-box tests. The magic word in

hardware is redundancy, which means that devices, plug connectors, and wiring are present twice. Also, the network has a redundant layout which results in a kind of hot standby effect: if a device or the network itself fails, the system switches automatically over to a redundant one.

But this is often a complex and costly strategy. To solve this problem the ring topology was developed. In a ring topology, the data communication has one direction, but in case of an interruption it works in the other direction. This maintains the function of the network. The ring topology, also often used in traffic management systems, builds in redundancy which ensures fast switching, achieving the premier class of safety against failure. In contrast to line topology it can cope with a single point of failure, i.e. the failure of one participant. But if there is a failure of another subscriber or more (multiple points of failure), even ring topology is overstrained. To avoid situations like this, networks are monitored with systems which display the state of the active components, like FiberView, and the condition of the individual fiber transmission lines, to detect excessive attenuation.

Optical bypass technology takes one step further because it starts at the network participant level. This could include all devices featuring



Figure 1. The x-light bypass is parallel connected to the subscriber via two optical duplex ports. If the subscriber connection fails, it will be physically bridged.

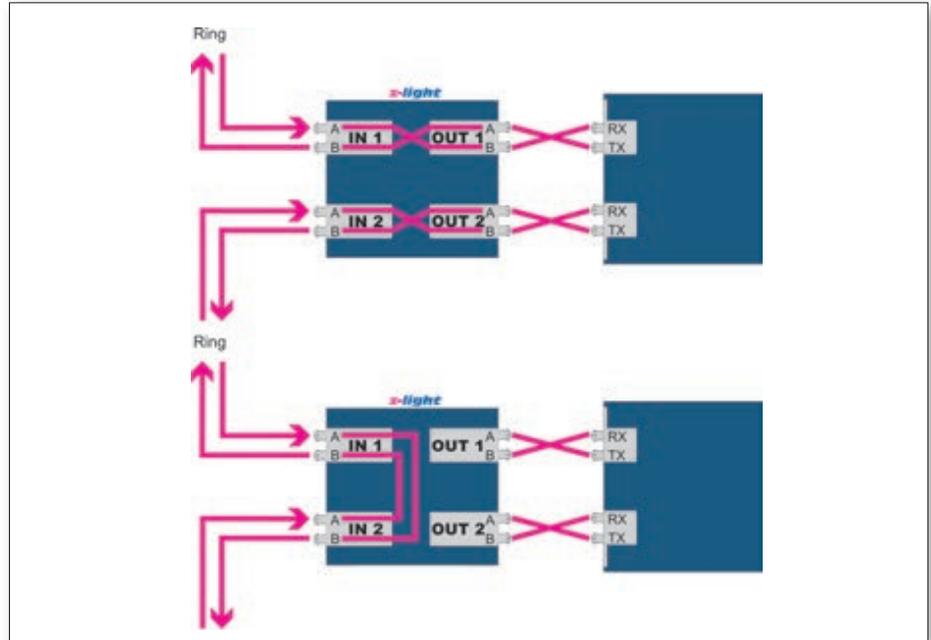


Figure 2. In normal operation, the optical bypass sends the data to the parallel connected subscriber (on top). In the case of failure, data is not transmitted to the output but to the second input (below).

an optical port. If one of them fails the bypass takes over and maintains the data communication between adjacent participants. Therefore, the only application affected is the one controlled by the failed subscriber. The remaining network continues to be kept in function physically, and therefore works even with multiple points of failure. This is also valid even if the bypass, which is powered either by the protected participant or a separate power supply, no longer receives any power at all.

So, how does this work? With optical bypass technology fiber transmission lines are switched over physically immediately after a failure occurs at the respective participant. The principle is similar to railway turnouts working with strong electromagnets: if no current flows the turnout automatically switches and this is why the bypass technology works even without any voltage which is the trick. Since the bypass technology works

at the physical level of the network it is protocol transparent and vendor independent. X-light is parallel connected to the respective participant via two optical input and output duplex ports. In case of disturbance its differential relay sends a signal to the electrical port of x-light and thereby activates the bypass function. After that the data is not transmitted any longer to the faulty participant but to the next participant in the network, in other words, the participant is bridged physically. To reconnect it safely later on to the network, e.g. after booting, there is an individual adjustable turn-on delay.

With optical bypass technology, networks of traffic management systems are not only protected against the effects of hardware and software errors, breakdown of power supply, shortfall of defined values, and so on, but parts of the network can also be specifically disconnected, e.g. for maintenance work. For

this purpose, a voltage is applied to the electrical port of the respective bypass and therefore to the linked participant. This disconnects the connected participant physically from the network without the need to disconnect fiber connectors. Disconnecting connectors could eventually cause problems because of dirt particles which could get into the link.

An optical bypass is not only of worth in traffic management systems but also in all cases where power failure could cause serious problems. This includes production lines in automotive industry, plants in the petrochemical sector, and wind farms. Since the x-light has been developed as stand-alone device, retrofitting is no problem and neither transmitting protocols nor manufacturer-specific standards play a role. Integrating the bypass function into an Ethernet switch or field bus converter would lose this flexibility despite the fact that it would be possible. ■



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Product News

AAEON: COM Express type 10 module powered by 7th gen Intel Core U

AAEON launches the NANOCOM-KBU, the world's first COM Express Type 10 board to be powered by a 7th Gen Intel Core U Processor. With its powerful CPU, the trailblazing NANOCOM-KBU has onboard 4GB DDR4 memory and a graphics engine that supports 4K applications. In addition to its Core processor, the NANOCOM-KBU boasts an upgraded embedded controller structure with a real-time interrupt for faster response rates, and it addresses a customer demand for power control and battery management systems.

[News ID 5906](#)

Atlantik Elektronik: highly integrated wireless embedded IoT gateway from Lantronix

Atlantik Elektronik presents the highly integrated wireless embedded IoT gateway. Measuring less than the size of a postage stamp, the compact xPico 200 embedded IoT gateways deliver robust Ethernet, Wi-Fi and Bluetooth connectivity, enterprise-grade security, and integrated manageability features that are ideal for industrial IoT applications. The robust and compact solution combines best-in-class wired and wireless connectivity, industrial grade design and intelligent networking that enables resource-constrained product development teams to reduce total cost of ownership and time to market for their industrial IoT solutions.

[News ID 5927](#)

Mercury Systems announces acquisition of Themis Computer

Mercury Systems announced the acquisition of Themis Computer. Themis is a designer, manufacturer and integrator of commercial, SWaP-optimized rugged servers, computers and storage systems for U.S. and international defense programs. The acquisition of Themis furthers Mercury's ability to offer customers critical and differentiated capabilities across the sensor processing chain. By acquiring Themis, Mercury will enhance the scale and breadth of our rugged and secure server capabilities as well as small and custom form factor tactical computing solutions.

[News ID 5978](#)

ADL offers substitute for Edison, Galileo and Joule series SBCs

ADL Embedded Solutions offers with Intel's BayTrail SoC series and its latest single board computers the perfect substitute for developer boards of Intel's Edison, Galileo and Joule series affected by the announcement of discontinuation. Intel's end-of-life announcement has surprised many customers involved

with low power systems. Developers of typical applications such as mobile computing, wearables, IoT and IIOT are now anxious that they have opted for the wrong technology and their development efforts have been in vain. Furthermore, they are worried about a re-design that requires a great deal of efforts and expenses which delays their products' time to market.

[News ID 5868](#)

Pixus: 9U RiCool OpenVPX chassis with superior cooling

Pixus Technologies now offers over 392 CFM (cubic feet per minute) of airflow in a front-to-rear cooled rackmount chassis platform. The 9U RiCool chassis platform features up to 32 OpenVPX backplane slots in the 3U size and up to 16 slots accommodating 6U cards. Powerful reverse impeller blowers reside directly above the boards. They pull air from below the card cage and blow the exhaust 90 degrees out the back. This allows the use of RTMs without adding chassis height. The fans are individually hot swappable, enhancing reliability and minimizing downtime.

[News ID 5907](#)

Allegro MicroSystems: ISO 26262/ASIL-D power management IC for automotive control units

Allegro MicroSystems Europe has announced a new power management IC that integrates a buck or buck/boost pre-regulator, four LDOs, and four floating gate drivers. The pre-regulator uses a buck or buck/boost topology to efficiently convert automotive battery voltages into a tightly regulated intermediate voltage complete with control, diagnostics, and protections. Allegro's ARG82800 device is targeted at the automotive market with end applications to include electronic power steering (EPS), transmission control units (TCU), and advanced braking systems (ABS).

[News ID 5915](#)

4D Systems: global distribution agreement with Arrow Electronics

4D Systems has signed a distribution agreement with Arrow Electronics to provide global distribution and support for its leading intelligent graphics solutions. 4D System's unique market leading modules and graphics processors are suited to a wide range of applications in diverse markets. With this new collaboration, 4D Systems will be able to leverage Arrow's established expertise and broad, diverse customer base to reach a wider global audience and accelerate sustainable growth for the company's continually evolving range of graphic display modules and associated IDE development software and tools.

[News ID 5885](#)



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Arrow Electronics presents 'sensor-to-sunset' IoT portfolio at Embedded World

Under the theme "From Sensor to Sunset," Arrow Electronics will display its comprehensive, fully integrated IoT portfolio at Embedded World, including sensors, wireless connectivity, gateways to cloud platforms, data aggregation and visualization, analytics and security, and beyond.

Arrow will be exhibiting an extensive range of boards, development tools and systems-on-modules for the maker community and the professional developer. Arrow helps turn ideas into working prototypes and then helps makers get them into production as quickly and smoothly as possible.

At Embedded World 2018 Arrow will introduce a number of new boards including an addition to the SmartEverything range called Tiger, which is based on the NXP KW41 multi-protocol wireless MCU; a new version of the ARIS board called ARIS Edge-S3 that supports more advanced feature and display capabilities; and CYC1000, a low-cost board based on an Intel PSG Cyclone 10 FPGA. There will also be several new 96boards mezzanine options for the DragonBoard 410, which deliver functionality including a camera solution, Ethernet and POE extension, and increased security.

One featured display will come from Toposens, a Munich-based start-up that won Arrow's 2017 Innovators Award for its 3D ultrasound sensor technology. Based on the principles of echolocation, Toposens' near-field detection technology enables the position of people and objects to be determined precisely.

[News ID 5882](#)

Rutronik: focus on IoT, security and sensing at embedded world

Rutronik Elektronische Bauelemente will be hosting two booths at embedded world 2018 with a focus on the Internet of Things, security and sensing.

RUTRONIK EMBEDDED offers visitors system concepts ranging from networked sensor hubs to gateways and enterprise solutions. The emphasis for displays, storage media and embedded boards is on robustness and long-term availability. Digital signage, medical,

transportation and solutions for raw industrial applications are just some of the markets for which Rutronik will be showcasing exhibits at embedded world.

RUTRONIK SMART embraces highly integrated wireless solutions, special high-security semiconductors, sensor technology and cloud services. This allows mass-market IoT devices for end consumers to be built very small and in a particularly energy-efficient manner. Many exhibits show consistent security concepts. Members of the Rutronik GDPR team of experts will be available on the stand to discuss such matters. In addition, visitors will be given a copy of the security white paper drawn up by the team of experts.

Special attention is given to the topic of Smart Embedded Battery Management. Rutronik presents different battery system solutions (Lithium-ion batteries, Ultra Caps, Hybrid Energy Storage System), algorithms for battery modeling and battery diagnostic methods.

[News ID 5890](#)

PLS: UDE 4.10 simplifies multicore debugging and system analysis

PLS Programmierbare Logik & Systeme is presenting version 4.10 of the Universal Debug Engine (UDE) for the first time at the embedded world 2018. The UDE 4.10 features numerous completely new and improved functions for debugging, testing and system analysis of complex multicore applications in real-time and safety-critical embedded systems. For the comprehensive support of the latest multicore systems – such as Infineon's AURIX 2G family with up to eight programmable processing units or the S32V from NXP with its powerful Cortex-A53 cores – among other things the multicore management has been further optimized, which for example allows synchronous stopping and starting of several heterogeneous cores.

[News ID 5883](#)

Mouser signs global agreement with Keysight Technologies

Mouser Electronics announces a global agreement with Keysight Technologies. The Keysight product line available from Mouser Electronics includes oscilloscopes, benchtop power supplies, waveform generators, and digital multimeters. From high performance to

extreme value and bandwidths ranging from 50 MHz to 200 MHz, Keysight offers oscilloscope solutions to meet evolving needs. Keysight Technologies InfiniiVision 1000/2000 X-Series oscilloscopes are engineered to provide industry-proven technology at low prices. These oscilloscopes feature professional-level functionality for measurements with industry-leading software analysis and accessible expertise.

[News ID 5867](#)

Rohde & Schwarz: new embedded oscilloscope family with 10-bit vertical resolution

The new R&S RTM3000 oscilloscope offers bandwidths of 100 MHz, 200 MHz, 350 MHz, 500 MHz and 1 GHz. The products incorporate a proprietary 5 Gsample/s 10-bit ADC, and each model includes 40 Msample (80 Msample interleaved) per channel acquisition memory with an optional 400 Msample segmented acquisition memory.

[News ID 5910](#)

Express Logic: ThreadX SMP certified for use in safety-critical IoT systems

Express Logic announced that its ThreadX SMP RTOS has achieved the highest level of SGS-TÜV Saar certification for embedded development in safety-critical systems using symmetric multicore processing architectures. SGS-TÜV Saar, a joint venture of Germany's SGS Group and TÜV Saarland, is the world's leading accredited, independent company for testing, auditing, verifying, and certifying embedded software for safety-related systems.

[News ID 5920](#)

NI: test smarter with enhanced LabVIEW NXG

NI announced a new release of LabVIEW NXG, the next generation of LabVIEW engineering system design software. Engineers can now test smarter with LabVIEW NXG – quickly set up your instruments, customize tests to your device specifications, and easily view results from any web browser, on any device. This new version of LabVIEW NXG introduces key functionality and reinvents long-standing benefits, particularly for engineers developing, deploying and managing automated test and measurement systems.

[News ID 5944](#)

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Conrad introduces C-Control 10 IoT starter kit

Conrad introduces the new IoT starter kit C-Control 10. Developed in collaboration with Elco Industrie Automation and Microtronics, the kit simplifies entry into the Internet of Things market, Industry 4.0, and digitization for enterprises and developers. It consists of the IoT board, an integrated M2M SIM, several sensors, general purpose analog and digital inputs, USB, SPI, UART, I2C and GPIO as well as a Bluetooth interface.

[News ID 5911](#)

SGeT: open standard connects embedded devices to the cloud

Introducing the Universal IoT Connector (UIC), the Standardization Group for Embedded Technologies (SGeT) has released the first purely software-related standard ever since its inception six years ago. This was preceded by the insight of manufacturers, system vendors and users that a universal IoT connector that standardizes the connection between hardware and cloud is needed for a comprehensive rollout of Internet of Things applications. Previous standardizations often focussed on communication and protection only and thus on the higher software- or communication layers. Or to put it short: where it comes to the application and thus the useful part of IoT solutions. However, data first has to reach the level, where it can be collected, transported and finally processed or stored. Although it is possible to access and control hardware resources such as sensors, actuators or embedded systems through the eAPI for embedded hardware via a defined interface, all hardware I/O communication has to be done manually for each and every edge- and cloud connection until now. When replacing hardware, updating, or even changing manufacturers, many, if not all, customizations need to be made from scratch, possibly for all affected layers, right through to the final application.

[News ID 5981](#)

PragmaDev gives away ETSI SIP conformance test executables

PragmaDev Studio supports different modeling and testing technologies which are ideal to describe the interactions between generic entities. The testing technology implemented in PragmaDev Tester module is the one used by ETSI (European Telecommunications Standards Institute) to publish conformance tests to its protocols. The Session Initiation Protocol (SIP) is a protocol for multimedia communications over Internet Protocol. SIP is a text based protocol and the standard defines the format of messages exchanged as well as the sequence of the messages. ETSI has published the conformance test cases in TTCN-3.

[News ID 5878](#)

Kontron: FlatClient Panel PC now featuring 7th gen Intel processors

Kontron is equipping its FlatClient family of Panel PCs with the latest 7th Gen Intel Core-processors. The rugged Panel PCs designed for industrial applications offer maximum flexibility at a favorable price. Users benefit from improved graphics and computing performance through the update to the latest processor technology. The FlatClient Panel PCs have proven themselves successfully in high-volume implementations in industrial applications. They are available in numerous versions covering display sizes from 25.7 to 60.5 cm. They are available in both 16:9 and 16:10 widescreen format, as well as 4:3 and 5:4 standard format. Kontron is one of a select few manufactures in the marketplace offering up-to-date processor and display technology in 4:3 and 5:4 regular format devices.

[News ID 5976](#)

Express Logic: X-Ware IoT platform achieves Thread product certification

Express Logic announces that its industrial-grade X-Ware IoT Platform is an official Thread Certified Product and the only such solution from an independent RTOS provider. Created by the Thread Group, Thread is a reliable, low-power, secure, and scalable mesh networking solution that provides a foundation on which any application layer can run. The X-Ware IoT Platform, powered by Express Logic's high-performance ThreadX RTOS and NetX Duo dual IPv4/IPv6 TCP/IP stack, provides industrial-grade implementations of IPv6 over Low Power Wireless Personal Area Networks (6LoWPAN), Constrained Application Protocol (CoAP), and Datagram Transport Layer Security (DTLS).

[News ID 5895](#)

SEGGER: Embedded Studio and J-Link support Amazon FreeRTOS

SEGGER's cross platform Embedded Studio and the market leading J-Link debug probe fully support Amazon FreeRTOS with a straightforward user experience out of the box. The boards that have been selected by Amazon Web Services (AWS) to get started with Amazon FreeRTOS are already supported by Embedded Studio and J-Link.

[News ID 5822](#)

LieberLieber: LemonTree for product family engineering

The rapidly-growing automotive supplier Preh Car Connect is re-establishing its software development on the Product Family Engineering methodology. Preh engineers, already long-time Enterprise Architect users, were recently introduced to LemonTree from LieberLieber. The new concept was unveiled in a joint presentation and is nothing short of ambitious.

[News ID 5949](#)



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Wibu-Systems and Winbond to highlight trusted computing at Embedded World

Trusted Computing Group (TCG), in partnership with OpenSystems Media (OSM), will demonstrate and discuss secure embedded and IoT devices and data at Embedded World. TCG is a not-for-profit organization that develops, defines and promotes open, vendor-neutral, global industry standards, supportive of a hardware-based root of trust for interoperable trusted computing platforms. OSM is the leading media outlet for engineers working on embedded, IoT, industrial, and military applications.

The TCG program includes daily live demonstrations by the member companies Wibu-Systems and Winbond on how to protect IoT and embedded devices and data using several TCG specifications implemented for security purposes. The demonstrations will be augmented with a lecture by Dr. Florian Schreiner, IT Security and Platform Security Specialist of Infineon Technologies, who will present “TPM 2.0 for Enhanced Security in Software Updates of Industrial Systems” on March 1, 2018. On February 28th and March 1st, Wibu-Systems will demonstrate license management with Trusted Platform Modules (TPM) powered by CodeMeter, the company’s flagship technology for protection, licensing and security. The data about technical know-how theft has always been alarming, but now the Internet of Things is bringing a new dimension to this phenomenon: counterfeiting, reverse engineering, tampering, and cyberattacks are skyrocketing, even in a Trusted Computing environment.

[News ID 5945](#)

MicroSys: RTOS Microware OS-9 Version 6.1 with embedded graphics XiBase9

IoT and Industry 4.0 require new approaches to operate machines. In addition to local human machine interfaces at the machine, web-based services to manage and survey functions remotely are a key ingredient to move forward in industrial automation applications. Fast, reliable and secure communication infrastructures, established browser technology and smart devices are the foundation for location independent man machine interaction.

[News ID 5884](#)

Sensirion: pressure-resistant mass flow meter for gas mixing medtech applications

The SFM4200 mass flow meter is a new star in the Sensirion range. Thanks to its high-pressure resistance, it can be operated at pressures of up to 8 bar and measures flow rates up to 160 slm with a rapid signal processing time of 0.5 ms. It is particularly suitable for gas mixing in medical applications.

[News ID 5955](#)

Socionext: graphics controller for in-vehicle remote display applications

Socionext has developed the “SC1701” series, the third generation of its high-performance graphics display controllers. In addition to further strengthening the graphics function enabling 4K resolution and deep color processing for state-of-the-art in-vehicle display systems, Socionext incorporated APIX3 technology supporting increased demand for high speed video and data connectivity up to 12 Gbps.

[News ID 5952](#)

Logic Technology: free seminars addressing software insecurities

The ever-increasing connectedness of electronic systems provides a whole new world of opportunity. But with that opportunity comes a brand-new challenge; keeping your functional system safe and secure, especially when there is a need for certification. Free seminars in Munich, 6 March 2018; Frankfurt, 7 March 2018; and Eindhoven, 8 March 2018; will highlight several issues to consider when designing a functionally safe secure system and will detail how, alongside features such as domain separation and rootkit protection, the security features of the application code itself provide an essential slice in a “Swiss Cheese” defence of a connected system.

[News ID 5954](#)

Lauterbach: TRACE32 extends embOS awareness to RH850

Lauterbach has extended the kernel awareness for the embOS Real-time Operating System from SEGGER Microcontroller to the RH850 family of microprocessors from Renesas. TRACE32, the class leading debug tools from Lauterbach, already supports embOS on ARM, PowerPC, RX, SH and NIOS-II families and this tried and tested technology has now been extended to include RH850. The embOS awareness plugin for TRACE32 allows the developer to visualise RTOS resources and objects such as task lists, mailboxes, timers and semaphores. Developers are free to investigate interrupt routines, drivers and application code all from within the familiar environment of TRACE32.

[News ID 5935](#)

Infineon: striving for autonomous driving development

Infineon is joining the Apollo Program of Baidu. Based on Baidu’s ability in AI and autonomous driving, as well as Infineon’s advantage in automotive electronics hardware platforms, both parties will cooperate in depth to promote rapid development of autonomous driving technology to improve people’s intelligent life. Marking an important fusion of Infineon’s automotive electronics ecosystem and the Apollo automotive ecosystem built by Baidu, the cooperation will create

more opportunities for both parties’ partners to join hands to promote the progress of the intelligent automotive industry.

[News ID 5888](#)

ON Semi: rapid installation of battery-free smart passive sensors for IoT applications

ON Semiconductor has announced a complete wireless battery free sensing solution kit (SPSDEVK1) that allows the company’s innovative Smart Passive Sensors to be rapidly integrated into Internet-of-Things applications. The SPSDEVK1 solution kit is plug and play ready for users to immediately measure, aggregate and analyze the data for various IoT applications.

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