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November 05/17

Cover Story:

## Combining flash storage and security meets industrial requirements

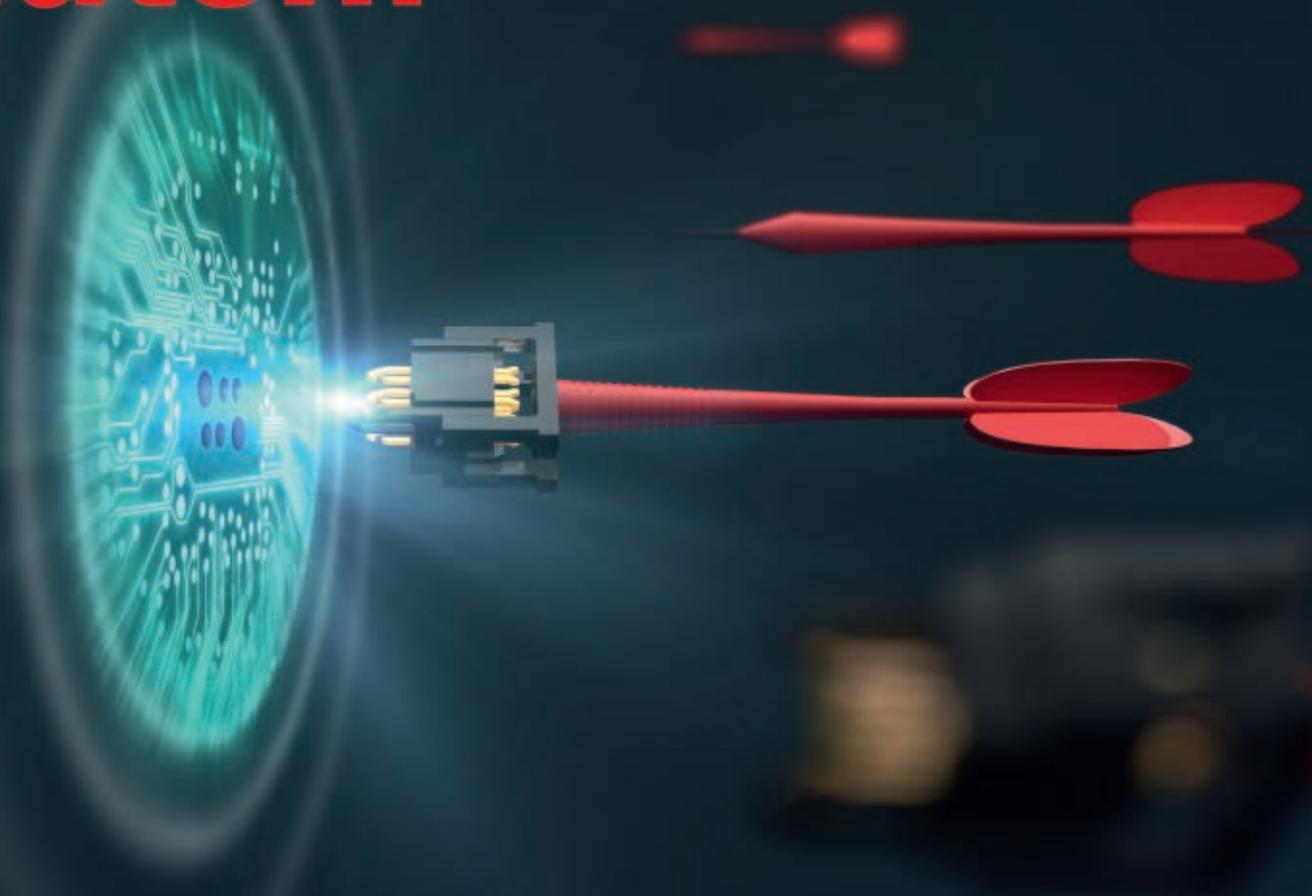
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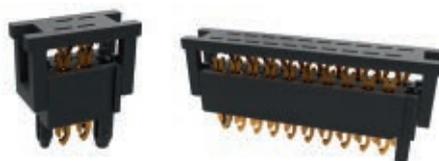
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## Dear Readers,



If you have a look in the international weather reports nowadays you'll realise a dramatic change in climate which causes severe weather in nearly all part of the world. The extremely strong hurricanes in the Caribbean which reaches sometimes even Ireland in Europe are one of many examples which proves this situation. And also, the thunder storms in Germany gained strength and caused much more destruction than in the past. And I believe this situation will continue or even worst accelerate. This

will increase the challenges to operate embedded systems outdoors. But also in similar harsh environments like industrial automation there will be an increase in requirements for embedded systems caused by the totally automated deserted production halls in which only machines will work and communicate to each other. There will be no longer any necessity to create shop floors in which human beings and robots work in cooperation, which means you have to take in account the well-being of humans.

While discussions about the Industrial Internet of Things (IIoT) and its promises of cost-efficient, nonstop operations carry an opportunistic tone among executives, it is system integrators (SIs) who have to grapple with the reality of figuring out how the different platforms in a network can communicate with each other. What turns SIs world upside down is the hodgepodge of protocols in the three divergent domains of network architecture: Operation Technology (OT), Information Technology (IT), and the IIoT. Each domain comes with its own set of protocols that effectively creates non-interoperable silos, making it impossible for useful data to reach those who need it on an enterprise level to make important decisions, and leaving SIs at their wit's end. Matters are further complicated by the fact that both the OT and IT departments are unfamiliar with the protocols used in each other domains. This trend must be reversed quickly, because as the IIoT makes inroads into automation, OT and IT are converging. More in this issue.

The SPS/IPC/Drives 2017 which will be held from 28. to 30. November in the Exhibition Centre Nuremberg, is Europe's leading exhibition for electric automation and will show all the new products, trends and innovations within this industry. According to organizer Mesago Messe Frankfurt the trade fair offers the visitors a platform to search the right solutions for their automation tasks. The topic of Industrie 4.0 is developing from a vision to reality and once again will be a main focus of the exhibition. In the age of digital transformation, IT and automation are increasingly merging and this will be reflected this year as never before. Alongside topic based special display areas, presentations, many products and examples of applications devoted to digital transformation, hall 6 has a new thematic focus, which will address these new challenges in production technologies. You should take this chance to achieve intelligent production and should also take the chance to visit ICC Media booth 160 in hall 3A to talk to the ICC Media team.

I'm looking forward to see you there.

*Yours Sincerely*

Wolfgang Patelay  
Editor



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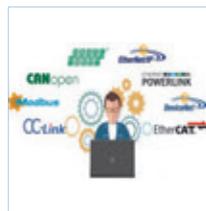
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**Smoothing out interoperability issues in smart factories 10**



This article takes a closer look at the challenges that system integrators face with Operation-Technology-to-OperationTechnology, OperationTechnology-to-Information-Technology and OperationTechnology-to-IIoT interoperability, as well as the solutions available to ensure nonstop connectivity throughout converged networks.

**Tackling the challenges of IoT device development 16**



This article describes the ARIS (Arrow Renesas IoT Synergy) development platforms, which leverage the Renesas Synergy framework and address the specific needs of IoT device developers in ways that many established conventional embedded development platforms cannot do.

**COM modules designed for industrial applications from edge to cloud 20**



This article explains the requirements digitalization will bring to the manufacturing industry, and how powerful COM Express modules can help to meet the demands for the embedded high-performance computing (eHPC) that is needed.

**Functional Safety system developments from MCU vendor point of view 26**



This article highlights the importance of Functional Safety for system development, already a complex exercise and becoming even more complex. Component manufacturers will play a decisive role, especially MCU vendors. Application developers will need support for high-end functional safety systems, but they can accelerate development and save engineering costs.

**Data Distribution Service in autonomous car design 29**

Builders of autonomous vehicles face a daunting challenge. To get a competitive edge, intelligent vehicle manufacturers must deliver superior driving experience while meeting demanding requirements in distributed systems design for safety, resilience, security, scalability, fault tolerance, and fast data processing.



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# Combining flash storage and security meets industrial requirements

By Oliver Winzenried, Wibu-Systems

*CodeMeter offers the protection, licensing, and security technology required nowadays in embedded solutions – ready for the Industrial IoT. The combination of flash storage and security in one device enables solutions never thought possible with separate devices.*



■ Wibu-Systems is a leading vendor of sophisticated security and licensing software tools and hardware secure elements (CmDongle) for all common types of software. The flagship technology, CodeMeter, safeguards the integrity of data, applications, and digital communication, while adding versatile and granular licensing capabilities to pave the way for innovative business models. Both capabilities are combined in CmDongles with integrated flash memory for the strongest and most comprehensive production technology in the market. CodeMeter enables to meet the following trends in the Industrial Internet of Things. Connected systems are replacing closed infrastructures, software is replacing hardware, business models are evolving, the architectural landscape is diversifying, and new use cases and services are being released.

Illegal counterfeiting, re-engineering, and illicit copying are threatening the invaluable know-how of companies everywhere. This is not a new danger, as similar threats, such as sabotage, manipulation, or espionage via malware or wiretapping, have long become a sad, but all too familiar reality. The time of isolated solutions has long passed, as industry is moving towards the connected world of IIoT (Industrial Internet of Things). This opens new avenues for attacks, as machines have begun to communicate via TCP/IP networks

that are open and inherently insecure. A soft underbelly has been exposed to new types of threats. Protection strategies are now required in many places where they were never needed before. Reports about hacked cars or medical devices accessed surreptitiously from simple laptops abound and demonstrate how important data security and integrity have become in our daily lives. Hackers cost the economy millions, as evidenced by the recall of 1.4 million Jeeps by Fiat Chrysler in the United States after a hacker attack.

CmDongles with integrated flash memory include the CodeMeter smart card chip with added space for more than 1,000 licenses and cryptographic keys and the full complement of CodeMeter security functions. The built-in flash memory can be accessed like any disk and includes different sized data partitions. Each CmDongle with flash memory comes with a CmPublic and CmSecure partition that can be read and written to through the CodeMeter API without being recognized as a disk by the host. The USB stick models include additional CmPrivate and CmCdRom partitions. The four partitions are unique to these highly integrated dongle designs and easily configured to accommodate new product or design strategies to match the user needs. CmDongle is available in USB stick, microSD card, SD card, CF card, and CFast card versions.

Whatever the form factor, the full CodeMeter security feature set is always on board. This includes symmetric and asymmetric encryption, signatures, and the storage of X.509 certificates. The card versions are equipped with SLC flash memory, while the industrial-grade USB model has up to 8GB SLC (Single Level Cell) flash memory, compared to 2-bit MLC (Multi Level Cell) flash memory for its commercial-grade cousin. Selected CmDongle variants with flash memory can operate at temperatures from -40°C to +85°C. The SLC flash memory technology was chosen for its long lifespan, low power consumption, memory protection with AES encryption, and long availability in the market. In short: these CmDongles are ready for industry!

Why add flash memory if all CodeMeter security features are available on the non-flash CmDongles as well? Because of the many benefits of the combination product. The first is lower costs. In economic terms, any reduction in the number of components implies a reduction in administration costs. It also enables industrial-grade design. The devices promise a longer productive life of its components operating without breaks or faults. CmDongles with flash memory are designed, produced, and prepped for industrial applications. Their long life and long availability reduce the Total Cost of Ownership



Figure 1. The CodeMeter product portfolio is available in various form factors



Figure 2. All the security software is integrated in the CodeMeter ASIC

(TCO) and increase profits. The smaller form factor allows security functions to be included in very-small-scale devices. Combined devices consume less power than separate solutions. The combination product can be used with new software to upgrade the security of existing devices. Devices already in the field can be upgraded without any changes to their hardware, as the standard form factors USB stick, microSD card, SD card, CF card, or CFast card cover the entire range of common mobile flash memory solutions. Four special data partitions offer opportunities for new products and functions, such as secure storage of highly sensitive data on mobile devices, mobile software solutions, and greater security overall. The built-in combination of smart card chip and flash memory adds to the security of the design. Gambling machines, ATMs, or other devices that are popular targets for tampering and other cyberattacks can benefit from this unique quality.

How much revenue a manufacturer generates with a device can only be known once all costs incurred during the entire life of the device are deducted (commonly referred to as TCO). This includes the simple cost for the components as well as the spending on logistics, administration, certification, repairs and servicing, replacements, training, main-

tenance, or other lifecycle expenditures. For comparison, CmDongles with integrated flash memory disk come at a higher upfront price than consumer flash memory cards that typically employ MLC/TLC (Triple Level Cell) flash memory technology. Their economic advantage lies in the reduced need for logistics, administration, and certification: fewer parts mean simpler and cheaper provisioning. A single unit has to be procured, only one item introduced in the ERP system, and only one component stored, monitored, or replaced. Components for industrial applications are typically available for many years in identical formats. Firmware and internal electronics remain unchanged in order to work reliably in all OEM applications. Another advantage lies in greater equipment reliability. The CmDongle comes with a range of certifications to make full certification of the embedded device easier and less expensive. In a TCO calculation, the higher purchase price becomes a negligible factor.

Device availability and reliable operations are the prime directive for industrial applications. For integrated flash memory, this means that no data can be lost in case of power outages. Data integrity must be guaranteed even after many access cycles. Wibu-Systems uses only SLC and 2-bit MLC flash memory with high-

end industrial flash memory controllers made by Hyperstone with its unique hmap flash firmware. Hyperstone, the only maker of flash memory controllers in Europe, specializes in industrial applications. Swissbit, the maker of CmCards for Wibu-Systems, is known for its industrial-grade memory products made in Germany. It uses Common-Criteria-certified smart card chips like Infineon SLM97 with EAL5+ certified hardware and Cryptolib. The electronic components and manufacturing partners were selected with long life, reliable operations, and the long-term availability of identical CmDongles with fixed bill of material (BOM) in mind. These CmDongles come with industrial-grade properties and can optionally be delivered with conformal coating. They achieve an unbeatable MTBF (Mean Time Between Failures). In commercial terms, the costs of machine stoppages or service repairs caused by faulty memory far exceed the upfront investment into long-life, high-reliability cards with SLC flash. There are certain applications with less stringent requirements and more emphasis on value-for-price which can benefit from 2-bit MLC flash and the excellent Hyperstone hmap firmware.

Product qualification is an expensive and time-consuming, but inevitable process for many industrial applications. CmDongles are qualified according to the following standards: compliance and regulatory tests, e.g. EMC (Emission, Immunity, ESD for CE, FCC, IC, VCCI, KCC, RCM) and registration of conformity (VCCI, KCC, UL), environmental tests (TC, UHAST, HTS, THB), robustness tests, e.g. hazardous gases, corrosion, free fall, shock, vibration, and lifetime tests. These tests are costly, as some require hundreds of samples and external labs need to be commissioned for tests and measurements according to the JEDEC, CISPR, UL, USB, MIL, IEC, EN standards. All of these tests guarantee reliability in industrial applications where use of consumer-grade products would be highly risky.

The life expectancy of a memory card depends on its internal design and technology. MLC flash memory technologies can distinguish more states of the cell compared to the regular two states, meaning that four or eight different charge states (in the case of the TLC) are identified when writing to or reading from the floating gate transistor. Each cell can hold more than one bit with this technology. Such MLCs are cheaper, because more bits are available per square inch, but they are also more susceptible to disruption, making bit errors and catastrophic failure more likely. In the end, the life expectancy of the memory is reduced. Processes to correct bit errors become increasingly complex when more than one bit is expressed in each

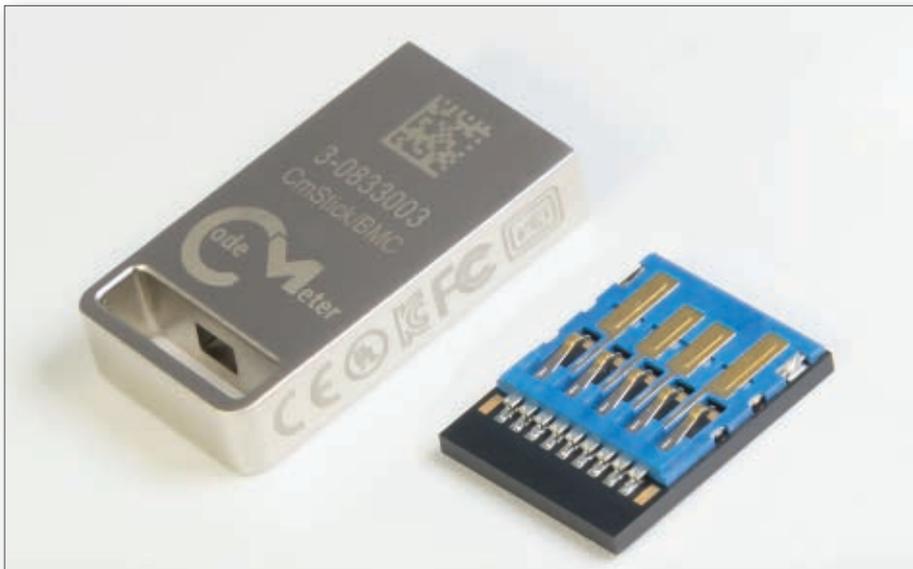


Figure 3. The new CmStick/BMC 16GB uses the latest SiP (System-in-Package) technologies with die stack in the SiP module

cell. 2-bit MLC flash with Hyperstone hmap firmware are a good compromise for some applications, whereas SLC flash offers the ultimate in reliability and life expectancy.

At the chip level, manufacturers need to know which objectives they are pursuing. If the goal is to save costs or achieve high write speeds, as in the case in most consumer-grade flash products, durability, MTBF, electric stability, or power consumption are not as important. Since Hyperstone has committed itself to industrial-grade designs, its goals are long-lasting availability, reliability, data

integrity after power failures, and low power consumption. These attributes require additional resources and intelligent capabilities in the controller. The patented hmap firmware manages internal controller functionality, such as early acknowledgement, in an industry-ready manner to ensure that no data is lost when the power supply is disrupted.

Many embedded devices are tiny and use every last bit of available space. However, most embedded systems include flash memory storage for applications and other data. If this original flash memory card is replaced

with a CmDongle with integrated flash memory, the same form factor and same number of interfaces now comes supercharged with maximum security. The smallest version of CmDongle with flash memory comes as a microSD card. At only 11mm × 15mm × 0.7mm in size, it fits even the tiniest devices – a great opportunity for making the controllers, sensors, and engines of the Industrie 4.0 world more secure. The new CmStick/BMC 16GB uses the latest SiP (System-in-Package) technologies with die stack in the SiP module to accommodate the smallest form factor with USB interfaces, highest reliability, humidity and shock resistance.

Industry and legislators are responding to the increasing threats of cybercrime with new regulations or changes to the old rulebooks. This is happening in Europe, Asia, the United States and the rest of the world. One recent example is the US Cybersecurity Improvement Act of 2017. Technical protection measures are already required by law for medical devices. New devices have begun to include security by design, but many legacy devices will remain in use until they are eventually replaced by newer machines. These devices can now benefit from the ability to retrofit security technology in an easy and streamlined manner. Security measures can be added whenever normal smart card connections are available. The existing hardware remains untouched, and only the software needs to be adjusted for the new security functions. Little effort is needed to bring old technology up to the newest standards of security. ■

## Product News

### ■ EKF: CompactPCI Serial 7th gen XEON E3 v6 processor CPU card

EKF presents the SC5-FESTIVAL, a rich featured high performance CompactPCI Serial CPU board, equipped with an Intel Xeon E3 mobile workstation processor for demanding applications. For scalability, the SC5-FESTIVAL is also available with a 7th Generation Intel Core processor. The SC5-FESTIVAL front panel is provided with two each GbE, USB 3.0, and DisplayPort connectors. As an option, two USB 3.1 Type-C front receptacles are available in addition, one including also DP ALT Mode support.

[News ID 5661](#)

### ■ CommAgility: processing module adds flexible RapidIO to increase bandwidth

CommAgility announced the AMC-4C6678-SRIO, a high performance DSP processing module in the compact Advanced Mezzanine Card form factor. The new board is an update of CommAgility's previous AMC-4C6678, and adds 20Gbps Gen2 RapidIO (SRIO) to

an AMC.4 compliant backplane, to increase bandwidth and flexibility. RapidIO complements the module's full Gigabit Ethernet infrastructure.

[News ID 5689](#)

### ■ Axiomtek: accelerating IoT development with IIoT gateway

Axiomtek has announced the ICO300-83B, a rugged DIN-rail fanless embedded system powered by the low-power consumption Intel Celeron processor N3350. The DIN-rail industrial IoT gateway featuring reliable operation, sufficient storage, and rich I/O options is an ideal solution for smart energy and smart automation fields.

[News ID 5647](#)

### ■ IBASE: PICMG 1.3 full-size CPU card powered by 7th/6th gen Xeon/Core processors

IBASE launches its new IB990 PICMG 1.3 full-size CPU card. The board supports the latest 7th/6th Generation Intel Xeon/Core i7/

i5/i3 processors with speeds up to 4.0GHz. Based on the chipset family formerly known as Skylake, Intel C236 and Q170 Express chipsets, the high-performance IB990 SBC is built with two DIMM sockets to support DDR4 2133 MHz memory modules with up to 32GB in total and six superfast SATA III ports featuring RAID 0/1/5/10 and 6 Gb/s speed.

[News ID 5623](#)

### ■ Concurrent: rugged 3U VPX processor with 10G Ethernet

Concurrent Technologies latest product combines high performance processing with multiple 10 Gigabit connections for deployment in computer applications requiring higher bandwidth local area network connectivity. The single slot BA 1TR/501 features a 4-core Intel Xeon processor E3-1505M v5 with 16GB of DDR4 ECC DRAM and a rich assortment of I/O interfaces including dual 10 Gigabit and dual Gigabit Ethernet connections.

[News ID 5637](#)

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# Smoothing out interoperability issues in smart factories

By Edward Lin, Moxa

*This article takes a closer look at the challenges that system integrators face with Operation-Technology-to-OperationTechnology, OperationTechnology-to-InformationTechnology and OperationTechnology-to-IIoT interoperability, as well as the solutions available to ensure nonstop connectivity throughout converged networks.*



Figure 1. There are many protocols used in the industry.

■ While discussions about the Industrial Internet of Things (IIoT) and its promises of cost-efficient, nonstop operations carry an opportunistic tone among executives, it is system integrators (SIs) who have to grapple with the reality of figuring out how the different platforms in a network can communicate with each other. What turns SIs world upside down is the hodgepodge of protocols in the three divergent domains of network architecture: Operation Technology (OT), Information Technology (IT), and the IIoT. Each domain comes with its own set of protocols that effectively creates non-interoperable silos, making it impossible for useful data to reach those who need it on an enterprise level to make important decisions, and leaving SIs at their wit's end. Matters are further complicated by the fact that both the OT and IT departments are unfamiliar with the protocols used in each other domains. This trend must be reversed quickly, because as the IIoT makes inroads into automation, OT and IT are converging. There is good news, though. Solutions are available to bridge these interoperability issues through a variety of protocol conversions.

OT-to-OT communications in factories are not as simple as they used to be. This can mostly be attributed to the IIoT, which has brought gazillions of sensors and machines to

the Internet on a massive scale. These types of communications are not going to get simpler anytime soon, as the rise in connected IoT devices is expected to jump by 15% in 2017 to reach a whopping 20 billion, according to a new report from IHS Market. This surge to get connected is impacting factory floors in such a big way that M2M communications have evolved into communications between divergent operational subsystems to fulfill data collection and analytics. The snag, however, is that the heterogeneous systems that fall under OT, such as manufacturing executive systems (MESs), supervisory control and data acquisition (SCADA) systems, programmable logic controllers (PLCs), and the machines and sensors on the plant floor, all run their own protocols; consequently, the age-old issue of non-operability rears its head again and a multitude of protocol conversions are required.

A good example of where efficient communications between disparate OT systems on the factory floor benefit operations is having the heater, ventilation, and air-conditioning (HVAC) system work in sync with the production system. When the workload of the latter increases, it alerts the former to start up to ensure that production will not be interrupted by overheating or freezing temperatures. The growing complexity of operations processes

brings more and more heterogeneous systems into the equation. This means more devices and more protocols. Installation and setup require more time to plan the architecture and perform device commissioning. For SIs, it is all about saving time and costs. They don't want to spend long hours on device commissioning and configuration, or on protocol conversions. However, it is not uncommon for them to spend hours on communication and troubleshooting programming when using communication modules or small PLCs. Thus, SIs want an easy way to simplify protocol conversions so that they can rather spend their limited time on their core tasks, such as programming.

More and more operators are taking advantage of industrial protocol gateways to accomplish the mass configuration of devices and protocol conversions between different devices to keep operations running smoothly. For example, in an electricity room, bridging a large number of Modbus RTU power meters to a Modbus TCP network is usually extremely time-consuming due to the configuration of the slave ID routing table. A convenient solution includes an auto device routing function that automatically detects the commands from a SCADA system and sets up the slave ID routing table. With only one click, this configuration can be achieved

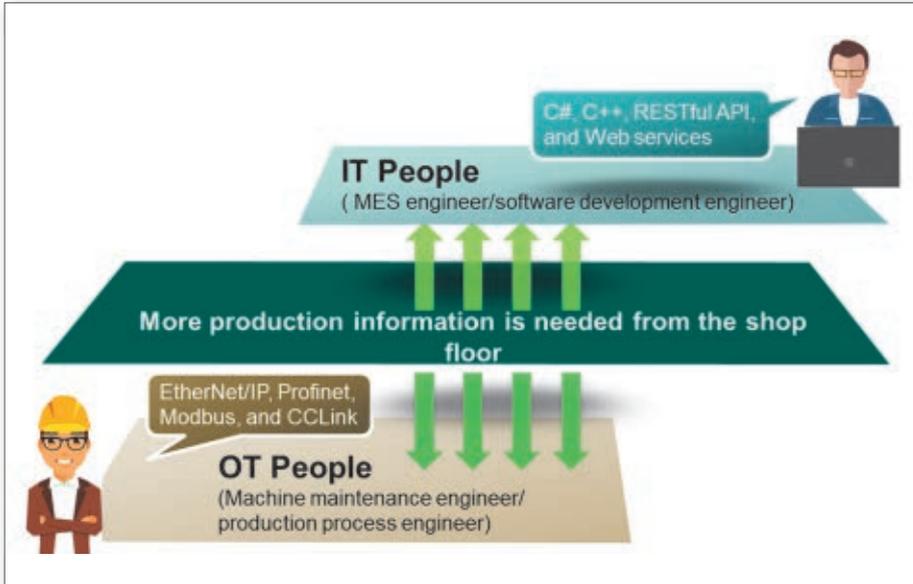


Figure 2. There is more information exchange needed between OT and IT.

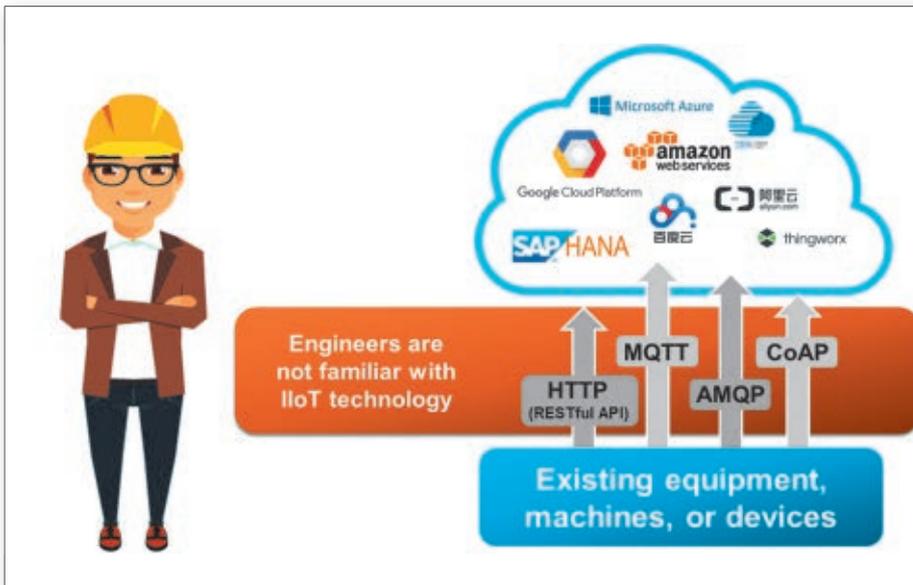


Figure 3. Engineers are nowadays not familiar with cloud technology.

within a minute. Furthermore, a ready-to-use protocol gateway that supports the multiple industrial protocols commonly used in OT (such as PROFIBUS, PROFIBUS, EtherNet/IP, and Modbus) simplifies protocol conversions, resulting in significant cost- and time-savings.

Close cooperation between IT and OT professionals is fundamental to leverage any smart application IIoT platform. Although OT and IT approaches to problem-solving differ vastly, they both work towards the same goal: optimized production. To be successful, both domains need access to industrial data. IT departments, which oversee Enterprise resource planning (ERP) and sometimes MES, need to review this data to form the bigger picture and then develop solutions for each of the issues that hamper an operation reliabil-

ity. OT professionals are more closely involved with the physical operations on the factory floor and have to figure out how to make all the divergent systems, fitted mostly with proprietary technologies, work together. On the other hand, a positive trend in the era of Industry4.0 is that OT staff increasingly recognize the importance and convenience of IT technology in helping them achieve their goals.

IT departments face an increasing demand to collect production data from shop floors in order to optimize production. For IT staff, this is not an easy task as they are not familiar with the process of collecting data via industrial protocols. Concurrently, OT staff members face a similar predicament in that once they have transferred OT data to the IT layer, IT departments often request interfaces

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they are not familiar with. This can potentially spark a power struggle between the domains over interfaces and protocols. In the age of Industrie 4.0, it is not in the best interest of any organization to keep the OT and IT domains apart; therefore, eliminating the knowledge gap between them and aligning them more closely deserve operation managers' undivided attention.

A multi-protocol integrated device will make the lives of SIs much easier here. For example, a smart I/O that supports various protocols—such as Modbus/TCP and EtherNet/IP for IA engineers, and SNMP and RESTful API for IT engineers - allows communications with different interfaces, which is certainly a step in the right direction to bridge the divide between OT and IT. This solution makes it possible for both IT and industrial automation (IA) engineers to conveniently retrieve data from the same I/O device.

Demonstrating just how much OT and IT are worlds apart from each other is the fact that OT network devices are always treated as transparent, making it difficult to monitor them—even in the case of emergencies. This adds to the frustration of network operators - as troubleshooting becomes almost pointless when they are experiencing downtime. Of course, this situation cannot be accepted, as situational awareness is very important for

network operators in order to ensure continuous production and prevent abnormal situations. Ensuring continuous visibility of all network devices and the status of a network in a control room is top priority. However, to capture abnormal events on the shop floor and then interpret the information about these perceived events in real time is quite challenging, due to the complexity of the protocols and networks.

For production lines that employ OT protocols, Ethernet switches that support PROFINET, Modbus TCP, and EtherNet/IP protocols enable engineers to simultaneously view data and the network status at a central site on a SCADA system or locally on an HMI. If an industrial protocol fails, the switch reports it, and the PLC sends an alarm so that the situation can get fixed immediately. Leveraging IT expertise and sensibilities can speed up troubleshooting, reduce system downtime, and increase situational awareness.

In boardrooms, executives expect data mining and analytics to pay dividends in reduced operation costs, optimized production, and predictive maintenance to minimize downtime. As one would expect, this data needs to be collected from field sites, and it has become the job of OT engineers to transfer this data from the devices in the field to the cloud, where it is stored for analytics purposes. This

new addition to their job description takes OT engineers somewhat out of their comfort zone as they would rather focus on programming that adds value to their specific field instead of communications tasks.

OT engineers lack of IT knowledge is definitely their Achilles heel. As it is, sending data from an edge device to the cloud can be time-consuming, and OT engineers' unfamiliarity with IT technology only compounds the process. In the race to IIoT connectivity, the biggest challenge for them is to cut down on the time to set up and program the networking connections between edge devices in the field and the cloud.

To spare engineers lots of programming effort and reduce time and costs, an embedded computing platform that supports versatile interfaces, coupled with a software suite that integrates a ready-to-use Modbus engine and cloud connections such as AWS, enables fast integration between devices in the field and the applications required for the IIoT. Furthermore, for those who want to adopt OPC UA in order to unify automation interfaces, a software suite solution is available that provides both an OPC UA server as well as cloud connection capabilities. The beauty of this solution is that it requires no extra costs to implement additional architecture for cloud connectivity. ■

## Product News

### ■ Cincoze: rugged workstation with 7th/6th gen Intel Xeon E3 and Core processors

Cincoze expands its product offering by introducing new rugged workstation DX-1000. The system is based on workstation grade Intel C236 chipset to support 7th/6th Generation Intel Xeon E3 and Core Processors in LGA 1151 package. The DX-1000 Series can play 4K UHD content through Intel Gen9 graphics engine with two DDR4 SO-DIMM sockets up to 32GB memory which delivers outstanding computing performance for high-end and multi-task applications.

[News ID 5697](#)

### ■ ARBOR: modular Box PCs for flexible expansions

ARBOR Technology present its new ARES-1970 Series of intelligent modular BOX PCs with high configuration and application potential. Based on Intel 6th generation Core i Skylake-U platform, the fanless embedded controllers deliver excellent computing performance and low power consumption. Currently, there are three models differentiated in terms of their I/O configurations, form factor and power Input so as to optimally

address deployment requirements in various fields. The product review is now available for download. Supporting modularized design and customizable, stackable I/O expansion boards, the ARES-1970 Series minimizes cost and space requirements, as well as fits individuality and tailor-made customer solutions.

[News ID 5675](#)

### ■ Axiomtek: IIoT gateway enables quick connection to the cloud

Axiomtek announces the upcoming availability of ICO120-83D, an industrial IoT gateway designed to simplify device-cloud connection and accelerate industrial internet of things development. It was specifically designed for smart energy and smart automation fields that need to collect and transfer data from large numbers of end devices.

[News ID 5671](#)

### ■ IIE: Medical Box PC to provide smart healthcare for operating rooms

As the elderly population increases, the medical industry also enters the era of information operations. Using electronic devices to deliver, store, and capture the clinical data has

become a trend. For this reason, IIE develops a high quality and reliable medical communication system, the HTB-100-HM170 medical grade embedded system, to meet a strict medical, safety and EMC testing that complies with ISO13485, IEC 60601-1(V3.1) and IEC 60601-1-2(V4.0) standards.

[News ID 5679](#)

### ■ AAEON: network appliance provides secure deployment for mission-critical frameworks

AAEON launches the ICS-6270, a fanless-based and industrial-grade network appliance which facilitates security solutions and critical infrastructure in an IoT context, and is powered by the Intel Atom Apollo Lake. Designed to streamline security management in unmanned and harsh environments, the ICS-6270 provides secure deployment for mission-critical frameworks, supporting both Windows and Linux operating systems, and is built to supplement existing network platforms in industrial environments with minimal configuration.

[News ID 5674](#)



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# Targeting new vertical markets and increasing internationality

## Interview with the Management of Garz & Fricke

*AFINUM has invested in Garz & Fricke with headquarters in Hamburg. Company founders Matthias Fricke and Manfred Garz explain the reason behind this decision.*



*Matthias Fricke (Garz & Fricke), Elias Tuerk (AFINUM), Manfred Garz (Garz & Fricke) and Kai Roolf (AFINUM)*

**Boards & Solutions:** AFINUM typically invests in the healthy medium-sized sector. What will the inflowing capital be used for?

**Manfred Garz:** The main idea is to use the inflowing capital to finance growth measures that we would not be able to implement at the desired pace otherwise. We intend to develop local sales in the German-speaking countries, which we are currently focusing on, and to increase international sales in Europe and North America. In addition, our engineering and in-house production capacities will be significantly expanded, because we also want to maintain our reputation for high quality and supplier reliability in the future of course, even with an increasing number of clients and projects.

**Boards & Solutions:** How high is the investment in the company, in euros and as a percentage?

**Manfred Garz:** It is important to guarantee continuity, and we have done just that. We – the two founders Manfred Garz and Matthias Fricke – are going to remain crucially involved in the company in any eventuality and continue to manage operations as the sole managing directors. AFINUM holds a majority interest in Garz & Fricke GmbH, but the par-

ties involved have agreed not to publish any further details about the exact percentage or the purchase price.

**Boards & Solutions:** Is the investment set for a certain time period?

**Matthias Fricke:** The main goal of the investment is to financially support further growth measures such as foreign trade and the development of small/new industry segments. In that respect, there is no time objective for the duration of the financial investment of AFINUM.

**Boards & Solutions:** What are the favoured future target markets, and what are your plans for international expansion?

**Matthias Fricke:** Of course, those areas where we are market leaders or particularly strong, such as control and operating units and interfaces for cigarette-vending machines with telemetry, so called smart-vending. This so-called smart vending was virtually already an IoT application before this term was even created. Our clients – OEMs and systems integrators – mainly come from the vending machine, restaurant electronics, safety/security technology, medical and laboratory technology, digital signage, industry automation, and transportation sectors. This also applies

to operating units for professional high-end coffee machines for restaurants and catering. We are well-positioned in the field of HMIs for laboratory technology, which will be developed further in the future; we also intend to grow in the associated medical sector. Internationally, we are planning to increase our base of clients and sales partners in Europe significantly. We have also earmarked increased involvement in North America.

**Boards & Solutions:** “...and continue to manage operations as the sole managing directors” – What will this look like?

**Manfred Garz:** As we have already said, operations will continue to be managed by us, and we will of course keep an eye on strategy – remember that we by now have more than 25 years of experience. In the case of large-scale strategic decisions or associated large financial investments, AFINUM is of course also involved, and we will come to an agreement beforehand. We even welcome this involvement, because one of the aims of the investment was to involve the high level of expertise of AFINUM in many areas as well as capital, for example in potential further acquisitions etc.

**Boards & Solutions:** Can you tell us a bit about the main points of your strategy?

**Matthias Fricke:** The inflowing capital will be used to significantly increase resources in sales, development, product and project management, and production. This should generate accelerated revenue growth, e.g. by targeting new vertical markets while simultaneously increasing international engagement. I have already mentioned some of these markets, and there will be others in the near future. Local-in-house development and production is one of the core skills of Garz & Fricke, and will remain an integral part of our future growth strategy. Amongst other things, it will ensure that we have the necessary flexibility and guaranteed quality, which is necessary to be a long-term player in the embedded market.

**Boards & Solutions:** What significance will the new company building have?

**Manfred Garz:** It will be our own headquarters, tailored to suit our needs and wishes. The new construction and the relocation are absolutely necessary and a prerequisite to achieve our planned growth objectives, because our constant growth and increase in personnel over the past few years have had us literally bursting at the seams in the building we are currently renting, both in the production areas and the office space we have available. It is also an additional motivational boost for our employees to soon be working in an ultra-modern, spacious working environment, designed with the latest ergonomic aspects in mind. In addition, transport accessibility has been increased significantly. Last but not least,

we have kept our great advantage of being close to the university in Hamburg.

**Boards & Solutions:** What support will AFINUM provide?

**Matthias Fricke:** AFINUM sees itself as a partner and reliable company that supports its investments and their management in the achievement of its long-term goals, and stands with them as a strategic pillar for operatively responsible company management. Our main principle is to make a significant contribution to positive further development and growth. AFINUM has extensive consulting expertise and experience to offer, which is what makes it such a great sparring partner, e.g. for add-on acquisitions, organisation and process optimisation, and much more.

**Boards & Solutions:** You have just celebrated the company's 25-year anniversary. It would be fair to say that it is an established company. Is there any specific reason for making this step with an investor now?

**Manfred Garz:** Things are looking good for us right now for various reasons, especially because of increased demand from abroad, and high growth in end markets such as catering and medical technology, which is set to develop further. This has resulted in a need for greater capacity, which will provide opportunity for further growth after our relocation.

**Boards & Solutions:** Thank you very much.

**About AFINUM**

AFINUM invests in successful mid-market companies. Since its foundation in 2000, we accompanied many companies in various industries and situations in their further development. Today AFINUM is one of the leading mid-market investors in German speaking Europe. We know the specific challenges, opportunities and limitations of the mid-market. Therefore our investment focuses on offering tailor-made solutions for every entrepreneurial challenge. We understand the mid-market entrepreneur as well as his needs and seize them in a creative and constructive way.

**About Garz & Fricke**

Garz & Fricke is a medium-sized enterprise for microelectronics. We have been established in 1992 and we design and manufacture exclusively at our home base in Hamburg. Our customers are OEMs and system integrators, mainly from the automation, catering technology, mobile computing, security, medical, measurement and control, transport, aviation and naval industries which appreciate our high level of vertical integration. To us "Made in Germany" not only means a local integration of end products, but our own design and production of the entire electronics within one site - from the first idea to the final industrial serial product.

**Product News**

■ **Advantech: slim embedded barebone system with Intel N3000 and X5-E8000**

Advantech announced the release of its latest thin bare-bone fanless system EPC-S101 with Intel Celeron N3160/N3060 or Intel Atom x5-E8000 processor. Designed with Advantech 3.5" PCM-9310 Single Board Computer, EPC-S101 provides abundant I/O ports and Advantech IoT software WISE-PaaS/RMM implementation for remote devices management, and flexible mounting methods ready for use in various industrial and commercial application fields.

[News ID 5634](#)

■ **Kontron: recording and processing CCTV on trains with TRACe**

Kontron introduces TRACe V40x-TR, a new fanless computer specifically designed for IP-based video surveillance on passenger trains. TRACe can store, process and analyze imagery in real time, or stream video recorded by surveillance cameras. In standard configurations, the robust TRACe V40x-TR is compli-

ant with the EN50155 standard for electronic equipment on rolling stock and provides outstanding performance, reliability, and storage capacity for demanding railway environments. TRACe V407-TR is based on a 6th Generation Skylake Intel Core i7-6600U (dual Core @ 2,6 GHz) processor with soldered 8 GB DDR4 memory and 32 GB SLC Flash; TRACe V403-TR is based on an Intel Core i3-6100U @ 2x2,3 GHz processor.

[News ID 5646](#)

■ **Acromag partners with ECRIN to offer extremely small mission computer**

Acromag announces the integration of their AcroPack I/O product line into the μONYX SFF Computer from ECRIN Systems. ECRIN Systems is a valued distributor of Acromag Embedded Solutions and has steadily expanded their capabilities to include the design and manufacture of their own small form factor computer solutions.

[News ID 5667](#)

■ **Portwell: compact fan-less embedded system supports wide industrial temperature range**

Portwell announces the launch of the WEBS-13D1 fan-less embedded system featuring Intel Atom processor E3900 product family. Its rugged and compact design, plus low power consumption, makes WEBS-13D1 a perfect solution to support applications for kiosk, image processing, digital signage, medical and the harsh environments of factory automation.

[News ID 5621](#)

■ **Eurotech: IoT gateway with integrated LTE connectivity plus expansion modules**

Eurotech expanded its IoT offering by introducing a new IoT gateway ReliaGATE 10-12, a compact IoT gateway featuring LTE connectivity for industrial and lightly rugged applications. ReliaGATE 10-12 is based on the TI AM3352 Cortex-A8 (Sitara) processor running at 1GHz, with 1GB of RAM, 4GB of eMMC and a user-accessible microSD slot.

[News ID 5651](#)

# Tackling the challenges of IoT device development

By Amir Sherman, Arrow Electronics

*This article describes the ARIS (Arrow Renesas IoT Synergy) development platforms, which leverage the Renesas Synergy framework and address the specific needs of IoT device developers in ways that many established conventional embedded development platforms cannot do.*



■ As more and more consumers and business teams encounter the concept of IoT and understand the opportunities it brings, the desire to harness its potential in millions of individual scenarios will be irresistible. The possibilities are limitless: maintaining an installed base of printer/copiers, managing a fleet of delivery vehicles, keeping control of industrial processes, monitoring the environment to improve air or water quality, accelerating medical research, cutting the costs of healthcare, improving comfort in the home, capping domestic utility consumption. The list doesn't just go on – it will never be complete.

IoT device developers need flexible hardware/software platforms to help create the smart, connected “things” that will handle sensing and local processing at the extremities of the IoT, and share data with the Cloud either directly or via upstream gateway devices. Suitable platforms must support the fundamental values of IoT devices, including low power consumption, high energy efficiency, and versatile communication options encompassing industry-standard protocols like Wi-Fi, Bluetooth Low Energy (BLE), NFC, Thread, and ZigBee. Arrow is responding to this emerging need through its growing family of ARIS (Arrow Renesas IoT Synergy) development platforms. Leveraging the Renesas Synergy framework, the ARIS concept addresses spe-

cific needs of IoT-device developers in ways that many established conventional embedded development platforms cannot do.

The Renesas Synergy platform is well suited to IoT development, supporting scalability and compatibility and enabling developers to reuse proven code to save development time. In future, the platform will be extended; new technologies will be employed, and new features will be permanently implemented, to launch embedded design applications more quickly and efficiently on the market.

It is based on the Eclipse Open Source integrated development environment (IDE) and hence offers a high level of flexibility as well as easy access and familiar user controls. The complete Renesas Synergy platform, which includes the Renesas Eclipse Embedded Studio (e<sup>2</sup> Studio) IDE as well as extensive ready-to-use software and application examples that can be easily adapted to the ARIS Board, can be downloaded and installed free of charge from the Renesas Synergy Gallery.

ARIS boards are developed in conjunction with Italian embedded specialist Reloc, which is strongly focused on IoT development, and has not only perfected the ARIS hardware but has also handled driver implementation and generated middleware for managing

the peripheral devices to enable the boards to run out-of-the-box. The first ARIS IoT board, introduced in 2016, brought together the efficient and high-performing Renesas S7 microcontroller, featuring a 240MHz ARM Cortex-M4 core, with a rich set of sensors, and support for Wi-Fi, BLE 4.1/4.2 and NFC wireless communications including fully integrated software stacks. Ethernet and USB ports are also provided, while indicator LEDs, pushbuttons, a TFT-LCD controller, and a resistive touchscreen controller give the option to implement a sophisticated user interface. Ready-to-use on-board sensors include a three-axis acceleration sensor and two-axis gyroscope, a thermal sensor, and a humidity sensor. Device security and future-proofing are assured through features such as the integrated crypto bootloader and support for over-the-air (OTA) firmware updates.

Now, to help meet the specific challenges facing designers of small resource-constrained devices like smart sensors at the extreme edges of the IoT, Arrow has extended the ARIS concept by introducing the ARIS EDGE platform. ARIS EDGE is based on the ultra-low-power Renesas S1 32MHz ARM Cortex-M0+ microcontroller with analog and digital peripherals. Key features of the board are illustrated in figure 1.



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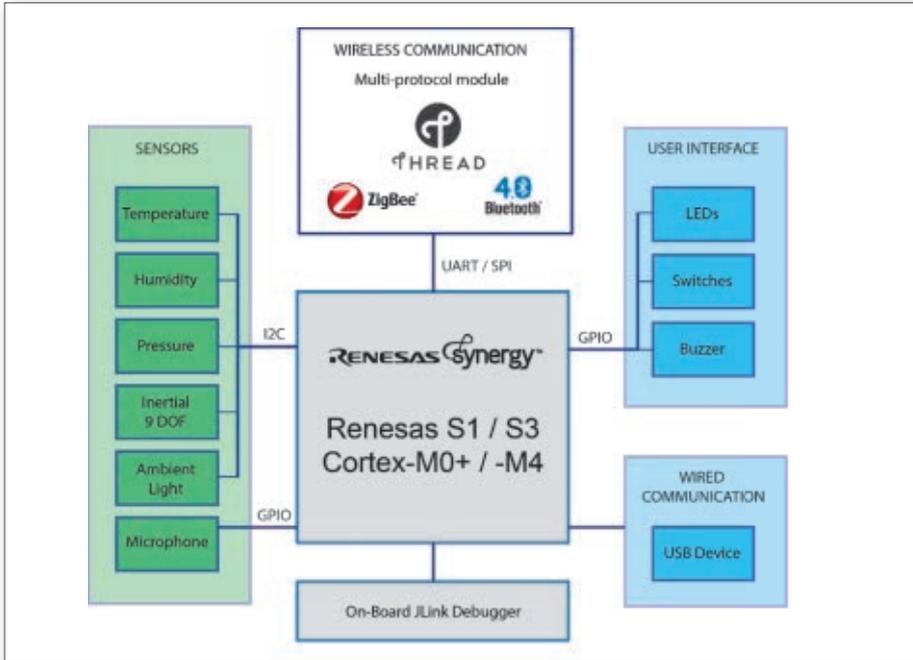


Figure 1. ARIS EDGE block diagram

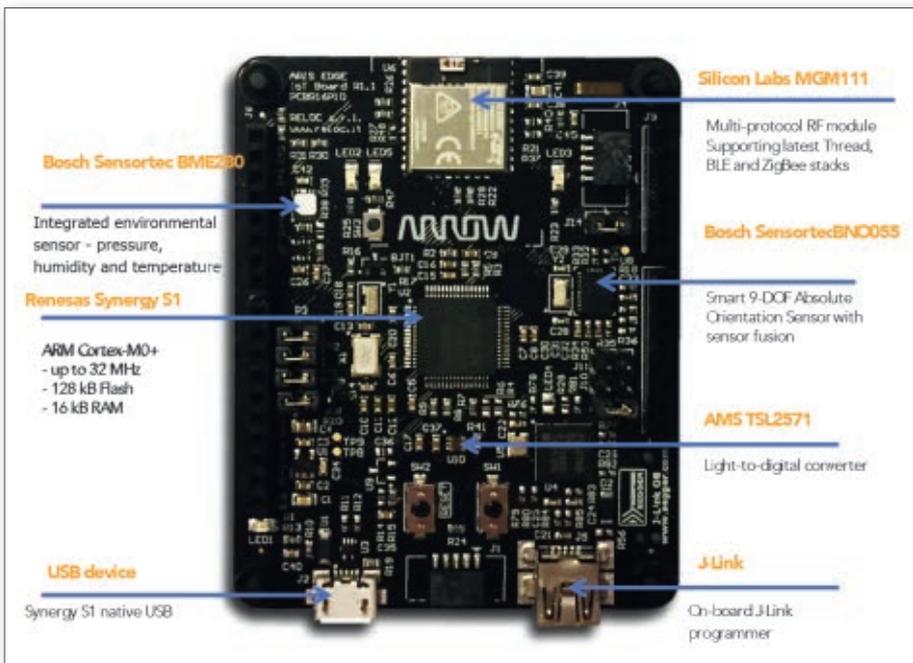


Figure 2. ARIS EDGE part description

The on-board Silicon Labs MGM111 multi-protocol RF module supports BLE 4.1/4.2, ZigBee and Thread. Modules enable the fastest time to market and are suited for use in products that will be built in lower volumes. The fully certified MGM111 module integrates all components (crystals, RF passives and antenna) required for a system-level implementation. At +10 dBm this module meets the worldwide regulatory requirements for IEEE 802.15.4 2.4 GHz radio used in both ZigBee and Thread networks. By incorporating the Thread stack, ARIS EDGE can be used for developing connected domestic

IoT devices, benefiting from properties of Thread that help ensure reliable and secure communication, with high energy efficiency and easy interoperability. As a versatile platform for developing edge devices, the board also integrates a rich set of sensors including the state-of-the-art BNO055 Application Specific Sensor Node (ASSN) from Bosch Sensortec. This is a 9-axis absolute orientation sensor containing a MEMS accelerometer, gyroscope and geomagnetic sensor, with sensor fusion running on a 32-bit microcontroller, in a space-efficient 5.2mm x 3.8mm x 1.1mm SiP device.

A MEMS microphone and TSL2571 ambient light sensor (ALS) are also integrated, and a BME280 integrated environmental sensor handles pressure, temperature and humidity sensing. This advanced device is developed specifically for IoT mobile applications to simplify the integration of environmental sensing within tight constraints on power consumption and physical size. The unit combines individual high linearity, high accuracy sensors for pressure, humidity and temperature in an 8-pin metal-lid 2.5mm x 2.5mm x 0.93mm LGA package, designed for low current consumption (3.6µA at 1Hz), long-term stability and high EMC robustness. Figure 2 gives an understanding of the board's size,

shape and layout. In addition to providing a fully integrated hardware/software platform, ready to run with drivers and protocol stacks on board, the approach with ARIS also provides higher-level sample software to help users jump-start application development. Accordingly, ARIS EDGE comes with several software demonstrations that are relevant to IoT-edge devices. One example is a mesh networking demo that allows multiple ARIS EDGE boards to be connected to an ARIS IoT board, which acts as a gateway to push sensor data from the EDGE boards to a Cloud service. A second demo lets users explore how to view the board sensor data in real-time using a dedicated app running on a mobile

device. There is also a demo that exercises the BNO055 absolute orientation sensor, which allows the absolute position of the board in space to be viewed on an Android device. IoT evolution is happening everywhere, all the time, right now. Equipment developers need an efficient, optimised device-development platform that not only accelerates time to market but – even more importantly – helps satisfy specific constraints such as very low power consumption and appropriate wireless connectivity. ARIS IoT and ARIS Edge platforms address this need by bringing together best-in-class software and hardware that are architected from the ground up for developing IoT gateway and endpoint devices. ■

## Product News

### ■ Rohde & Schwarz: quality depends on reliable T&M equipment

At this year's productronica trade fair, Rohde & Schwarz is focusing on innovative T&M solutions for next generation wireless communications technologies, including the Internet of Things, fifth generation mobile radio (5G), as well as automotive radar and infotainment systems. Under the slogan "Your quality in safe hands," Rohde & Schwarz, a leading manufacturer of T&M equipment, will showcase new measuring instruments and test systems for development.

[News ID 5684](#)

### ■ Renesas: long-term support with new RZ/G Linux platform

Renesas Electronics announced the Renesas RZ/G Linux Platform featuring the industrial-grade Civil Infrastructure Platform Super Long-Term Support Linux kernel, which enables Linux-based embedded systems to be maintained for more than 10 years. The new Renesas RZ/G Linux Platform provides a verified Linux package with cloud-maintenance and development options that makes it easy for embedded developers to leverage Linux for high-performance industrial equipment

[News ID 5676](#)

### ■ Cadence achieves "Fit for Purpose - TCL1" certification in support of ISO 26262 standard

Cadence Design Systems has achieved the industry's first comprehensive "Fit for Purpose - Tool Confidence Level 1 (TCL1)" certification from TÜV SÜD, enabling automotive semiconductor manufacturers, OEMs and component suppliers to meet stringent ISO 26262 automotive safety requirements. To achieve certification, Cadence provided its tool and flow documentation to TÜV SÜD for evaluation, and TÜV SÜD confirmed the Cadence flows are fit for use with ASIL A through ASIL D automotive design projects.

[News ID 5669](#)

### ■ Phaedrus Systems: compiler validation service launched

Phaedrus Systems is launching a compiler validation service and is backing it with a library of white papers on compiler validation. Compiler validation is essentially the highly controlled, repeatable and reproducible testing of a compiler using a validation suite - a recognised set of test programs. The purpose of such testing is to provide a reliable indication of how well a compiler complies with the standard for the language that it implements.

[News ID 5665](#)

### ■ Express Logic: ThreadX RTOS surpasses 6.2 billion total deployments

Express Logic announced that its ThreadX RTOS has surpassed 6.2 billion total deployments. This milestone has been verified in a new report by VDC Research of Natick, a highly respected leader in embedded systems market research. VDC's report highlights the long-time presence and continued explosive growth of ThreadX throughout the market for deeply embedded devices and its role as the cornerstone of the X-Ware IoT Platform connectivity solution.

[News ID 5657](#)

### ■ Logic Technology: Datalight releases NitroBoot 2.0

Datalight has released NitroBoot 2.0. NitroBoot, the fastest boot solution for embedded devices, has been shipped in more than 13 million devices. In October, companies that want faster boot time for their devices will have more flexibility in integrating NitroBoot into their designs, with three different editions, Lite, Pro and Automotive. The Lite edition is perfectly tailored to designs where startup conditions do not change from one boot to another, or where budgetary restrictions would have otherwise made inclusion of the software prohibitive.

[News ID 5631](#)

### ■ Rohde & Schwarz: new family of compact, portable test instruments for RF measurement

Rohde & Schwarz launched the R&S ZNL network analyzer and the R&S FPL1000 spectrum analyzer to offer flexible solutions for the most important RF measurements. These include the characterization of components such as antennas, attenuators, filters and amplifiers, as well as measurements on signal sources including spectral measurements, analog and digital signal demodulation and accurate power measurements.

[News ID 5633](#)

### ■ Mouser: Cypress PSoC 6 BLE Pioneer Kit brings low-power, flexible MCU to IoT designs

Mouser Electronics is now offering the PSoC 6 BLE Pioneer Kit, which enables designers to begin innovating with the PSoC 6 microcontroller from Cypress Semiconductor. PSoC 6 BLE 6 is the industry's lowest power, most flexible microcontroller with built-in Bluetooth Low Energy wireless connectivity and integrated hardware-based security in a single device for Internet of Things applications.

[News ID 5708](#)

### ■ Keysight: agile vector adapter delivers enhanced realism for EW threat simulation

Keysight Technologies introduced an agile vector adapter which extends the capabilities of the UXG X-Series agile signal generators to generate complex pulsed signals and waveforms based on IQ data for more realistic electronic warfare threat simulations. The N5194A UXG X-Series agile vector adapter enables the industry's highest fidelity agile threat simulations when used with Keysight's commercial off-the-shelf, UXG X-Series agile signal generators for aerospace and defense applications.

[News ID 5653](#)

### ■ SYSGO launches ELinOS 6.2 with PowerPC 64 and security services

SYSGO has launched version 6.2 of its Linux operating system - ELinOS - which is optimised for embedded applications. The new version is based on Linux kernel 4.9 with long-term support and real-time upgrades, and now supports Yocto Linux project kernels via a “generic platform BSP” too. ELinOS Security Services also help to close security loopholes quickly.

[News ID 5645](#)

### ■ Wind River advances IIoT with secure device lifecycle management

Industrial IoT can only generate value for customers if connected devices are actively monitored and managed. To ensure these devices are secure, operational, and performing at the highest possible level, device management should be designed in as part of an IoT system architecture from the start, as it is a key IoT enabler and critically important component in IoT deployments today.

[News ID 5639](#)

### ■ MACOM: RF Energy Toolkit for GaN-on-Si-based systems

MACOM announced that its RF Energy Toolkits are now available for order, meeting surging customer demand for a flexible and cost-effective development platform that helps accelerate their time to market with high-performance, power efficient solid-state RF systems. Targeted for use in commercial markets ranging from cooking, lighting and industrial heating/drying to medical/pharmaceutical, automotive ignition systems and beyond, MACOM's RF Energy Toolkits enable engineers to quickly and easily take advantage of GaN-on-Si as a high-precision, high-efficiency energy source.

[News ID 5659](#)

### ■ HCC Embedded achieves ISO 9001:2015 quality management system certification

HCC Embedded has attained ISO 9001:2015 quality management system certification. Achieving ISO 9001 certification is a testament to HCC's commitment to quality management principles, continuous improvement, and strong customer focus. HCC's objective is to provide all software and services with the highest quality possible by implementing strong processes that provide risk management and continuous improvement. ISO 9001:2015 certification demonstrates that organizations can link business objectives with operating effectiveness.

[News ID 568](#)

### ■ LDRA announces tool suite for Medical Devices

LDRA announced LDRA tool suite for Medical Devices, a variant of its LDRA tool suite specifically tailored to help companies achieve IEC 62304 compliance and faster development of safety- and security-critical medical device applications. The LDRA tool suite for Medical Devices automates software quality analysis and testing while providing a traceable, auditable workflow from requirements through deployment for Class II and Class III medical devices.

[News ID 5711](#)

### ■ IAR Systems updates Embedded Workbench for RL78 MCUs

IAR Systems announces a new version of IAR Embedded Workbench for RL78, the renowned C/C++ compiler and debugger toolchain for Renesas RL78 Family of microcontrollers. Version 3.10 adds new debugging capabilities and an updated integrated development environment with enhancements to window management and docking, customizable toolbars, and new tutorials. All these new additions improve workflows and accelerate development for users of the toolchain.

[News ID 5648](#)

### ■ ST: open development platform for secure car-connectivity applications

The Modular Telematics Platform (MTP) from STMicroelectronics provides an open development environment for prototyping advanced Smart Driving applications, including vehicle connectivity to back-end servers, road infrastructure, and other vehicles. The MTP integrates a central processing module based on the just-launched Telemaco3P secure automotive-telematics processor and a comprehensive set of automotive-connectivity devices both on the board and in plug-in modules, ensuring development flexibility and extensibility.

[News ID 5683](#)

### ■ LieberLieber Software: next-generation doors for cats and dogs

Petwalk, the Austrian specialist for automatic dog and cat doors, is on an expansion course. In order to meet the strict safety regulations required for access to the American market, the company sought the support of LieberLieber. Together, they are now developing a model-based solution that demonstrably meets all safety regulations.

[News ID 5706](#)



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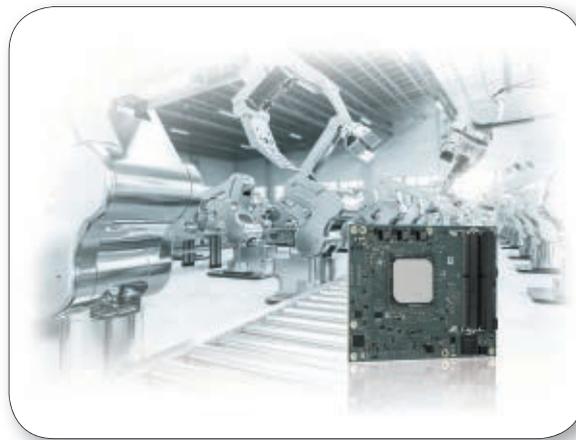
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# COM modules designed for industrial applications from edge to cloud

By Norbert Hauser, Kontron

*This article explains the requirements digitalization will bring to the manufacturing industry, and how powerful COM Express modules can help to meet the demands for the embedded high-performance computing (eHPC) that is needed.*



■ Manufacturing companies around the globe are faced with digital transformation of their production lines. Automation and smart manufacturing concepts erase the barrier between enterprise systems such as ERP, CRM, and order processing and process control. To benefit from the added efficiency, reduced cost and new business models inherent in the digital transformation of manufacturing, enterprises have to adapt their systems to serve in production environments. Edge, fog and cloud applications demand enhanced computing power. Traditional server approaches cannot provide the required robustness for operation in harsh industrial environments. Modular systems based on the well-established and tested COM Express modules provide an efficient solution. Type 7 is a new variant which for the first time ever meets the demands for embedded high-performance computing (eHPC).

In contrast to most business and IT applications, many production tasks cannot be easily outsourced to a cloud, although it would be useful in terms of simplification, cost saving, and maintenance. In spite of modern infrastructures such as TSN-based networks, the physical length of the lines with the associated latencies means real-time control out of the cloud is out of the question. Also, many companies do not want to see their entire pro-

duction data and know-how to be stored and processed off-premise. Edge and fog computing can provide a solution to this conundrum. This means moving the cloud physically closer to production or consolidating data by on-site pre-processing. Of course, there are robust, industry-grade edge gateways available. Their performance, however, is limited. In many scenarios, it is more cost-efficient and service-friendly to maintain ample computing power directly on site. A key enabler for cost-efficiency can be wide scalability, highest availability, and reliability – three qualities which are generally required in industrial applications. These features have also been long associated with standardized computer modules (COMs). So, what could be better than to base an on-premise, scalable computing infrastructure on proven module systems? This design would be scaled for today's demands, with the option of easy upgrading later.

One of the main advantages of the use of COMs is the largely pre-integrated platform. Customers can fully concentrate on the development of their own applications. This is where the know-how for the respective solution and also the actual core competency and the added value of their companies are based. Ideally, the module supplier offers a carrier board containing all required interfaces. If, however, special functionality (in the indus-

trial field, this usually means special fieldbus interfaces) is missing, using the module supplier know-how of existing solutions (IP) and resources will save time, resources, and trouble. This applies in particular to elements which require specific knowledge and experience, most importantly safety and security. Proven, standardized, cross-platform concepts that reduce time-to-market costs through synergy effects are ideal. A perfect manufacturer should have extensive experience in the production of standardized modules and a broad portfolio of customer references based on the specific application. Under current embedded module standards, the highest scalability with regard to maximum power dissipation (and thus indirectly also maximum computing power) is offered by the PICMG COM Express standard. For instance, its Basic form factor, measuring just 95 x 125mm, can easily use processors with a TDP (thermal design power) of 50 watts and more. The rapidly growing demand for high computing and network performance in the modular and embedded market has also led to the PICMG redefining the COM Express standard, based on the COM Express Standard Type 6, which dominates the current embedded market. Partially reorganizing the connector signals, it has dropped graphic signals altogether and replaced them by four 10 GBit interfaces to support faster external Ethernet connections. In addition, eight

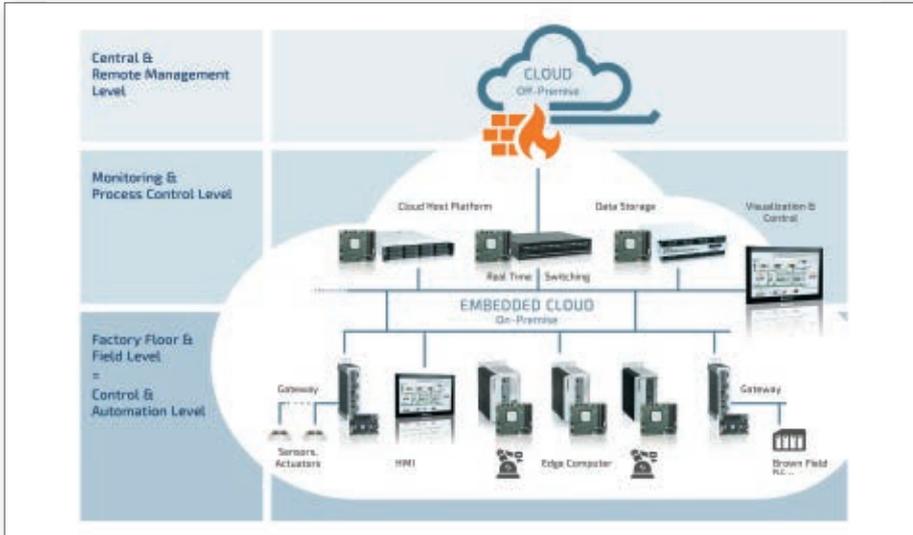


Figure 1. Embedded cloud computing

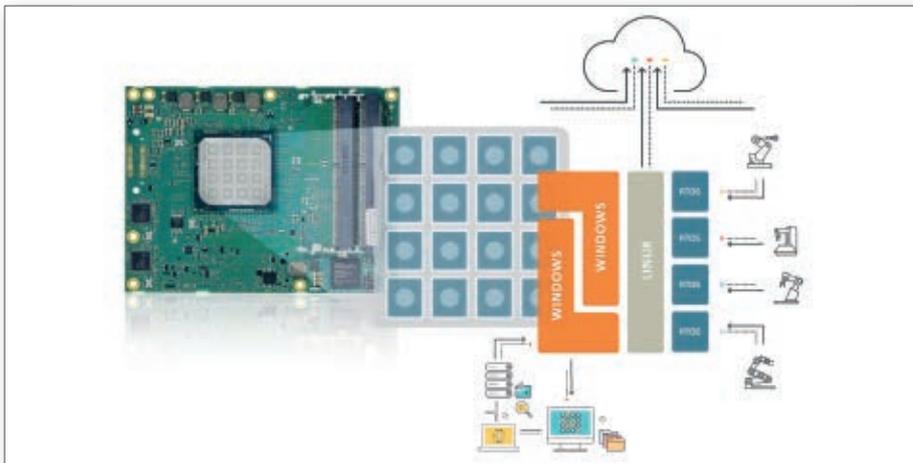


Figure 2. Consolidated real-time system with eHPC

additional PCI Express lanes have been added to achieve higher throughput. A further advantage of the design concept of COM Express is that the modules can be used not only as mezzanine (plug-in) boards for a carrier board, but also as a complete single-board computer (SBC). This makes building multi-module systems particularly easy. Depending on the thermal design, up to nine Type 7 modules in the Basic size and thus up to 144 CPU cores can be accommodated in a single 19" plug-in unit.

To protect against attacks, a comprehensive, cross-platform security concept comprising both hardware and software components is indispensable. State-of-the-art solutions contain modules for copy protection, IP protection (licensing), protection against reverse engineering and tampering. This allows comprehensive license management and completely new licensing and business models, such as billing according to usage time and test periods for certain features. Big Data is the trend of the future and more and more data must be reliably recorded and processed physically close to

machines and the cloud. Interfaces to sensors and actuators are largely established technologies, but the requirements for computing power grow disproportionately. Embedded solutions with interchangeable computer-on-modules (COMs) offer a singular price/performance ratio and future-proof investments. The robust design allows safe use in the vicinity of production environments.

The option of outsourcing control functionality to real-time embedded high-performance computers (eHPC) and their physical proximity to the production equipment lead to further cost savings through consolidation without sacrificing safety or functionality. Automation concepts offer increased productivity, more flexible production and allow for better efficiency. But these benefits are dependent on an IT architecture that is both scalable and powerful. Edge, fog and cloud applications based on embedded high-performance computing using COM Express Type 7 modules offer a cost-efficient way of reaping the benefits of digitalization in manufacturing. ■

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# Standards for embedded modules with the latest Intel Atom processors

By Harald Maier, TQ-Systems GmbH

*Users are faced with the question of how they can optimally use the latest generation of Intel Atom processors.*

*Which module standard covers application requirements the best and helps to exploit the advantages of these processors? It pays to take a closer look, especially in the case of very tough requirements.*



*COM Express Compact module with the latest Intel Atom 'Apollo Lake -I' processors, 8GB soldered DDR3L RAM including ECC support, extended temperature range and options like conformal coating and nano-coating*

■ Originally marketed under the 'Apollo Lake -I' product name, Intel now has three derivatives on the IOTG embedded roadmap: Intel Atom x7-E3950, Intel Atom x5-E3940 and Intel Atom x5-E3930. With these devices, the company is addressing the broader embedded market as well as industrial applications. An extended temperature range, high reliability, long service life and features that support tough real-time applications and virtualization should be highlighted here.

Those who are less concerned about temperature range or usage scenarios can also consider the Celeron N3350 or the Pentium N4200. These were previously sold under the 'Apollo Lake' code name and do not possess any special modifications for tough embedded use. Instead, they address PC-typical applications, for which low performance is typically sufficient, but they also have sufficient reserves to handle short-term peak loads (cf. turbo mode factor). All five devices are pin-compatible and are also uniform in terms of their external interfaces. All of these devices impress with very good performance-per-watt ratios and excellent graphic properties with up to three high-resolution 4K display interfaces. The use of standard module form factors has become established in recent years, especially for x86 embedded processors. Key concepts here are interchangeability, scalability, upgrade capa-

bility, second-source strategy, time-to-market and future viability. The following module standards have successfully established themselves in the German and international x86 embedded markets: COM Express (Mini, Compact, Basic), defined by PCI Industrial Computer Manufacturers Group (PICMG), COM.0, SMARC, defined by Standardization Group for Embedded Technologies (SGeT), SDT.01, and Qseven, defined by SGeT, SDT.02. SMARC and Qseven cover the lower performance range of x86 processors, whereas COM Express is able to cover the full bandwidth of performance. Which module standard is best suited for applications with the new Intel Atom processors depends entirely on the technical requirements and environmental conditions of the application.

The Qseven form factor was introduced in 2008 for solutions based on the Intel Atom. Its dimensions are rather compact at 70mm x 70mm. The majority of interfaces offered by the new Intel Atom processors can be made available to the carrier board. Unfortunately, only two of the three possible display outputs can be used. One of the three USB 3.0 interfaces must also be omitted. Users who wish to use the MIPI-CSI camera interface are forced to connect a flat cable directly to the module. Connection to the carrier board is made via a 230-pin card edge connector. Gold-plated

contact surfaces are provided on the module, which are inserted into the plug connector of the carrier board. This represents a clear advantage in terms of costs. Some users who want to use the new Intel Atom processors for especially rugged applications consider this type of contacting to be critical in terms of shock, vibration and risk of contamination, and they worry about mid-term contacting problems. With regard to sturdiness, the low PC-board thickness and mechanical integration continue to be recurring topics of discussion. The mechanical stresses that components and solder joints are subjected to might impair reliability and service life. The maximum power consumption of Qseven modules is limited to 12W by the specification and the connectors used. Therefore, it may be necessary to throttle back the maximum computing and graphic performance. Unfortunately, the premium processor variant, the Intel Atom x7-E3950 with 12W TDP (thermal design power) exceeds the module performance limits in terms of total power consumption.

The SMARC, like the Qseven, uses a card edge connector, so here too there is debate about issues relating to ruggedness, reliability and long service life. The dimensions of the short version are just 82mm x 50mm. This means that SMARC is the smallest of the form fac-

	Atom x5-E3930	Atom x5-E3940	Atom x7-E3950	Celeron N3350	Celeron N4200
Code Name	Apollo Lake -I	Apollo Lake -I	Apollo Lake -I	Apollo Lake	Apollo Lake
Use Conditions (specified reliability)	Embedded / Industrial	Embedded / Industrial	Embedded / Industrial	Mobile / PC/Client	Mobile / PC/Client
CPU Cores	2	4	4	2	4
Cache	2 Mbyte				
CPU frequency HFM / Turbo	1.3 / 1.8 GHz	1.6 / 1.8 GHz	1.6 / 2.0 GHz	1.1 / 2.4 GHz	1.1 / 2.5 GHz
Temperature T <sub>junction</sub>	-40 °C / +110 °C	-40 °C / +110 °C	-40 °C / +110 °C	0 °C / +105 °C	0 °C / +105 °C
Max. Memory Speed / Channels	DDR3L: 1866 MT/s (Dual) LPDDR4: 2133 MT/s (Quad)	DDR3L: 1866 MT/s (Dual) LPDDR4: 2133 MT/s (Quad)	DDR3L: 1866 MT/s (Dual) LPDDR4: 2400 MT/s (Quad)	DDR3L: 1866 MT/s (Dual) LPDDR4: 2400 MT/s (Dual)	DDR3L: 1866 MT/s (Dual) LPDDR4: 2400 MT/s (Dual)
Max Memory	8 Gbyte				
Memory ECC Option	Yes (DDR3L)	Yes (DDR3L)	Yes (DDR3L)	No	No
Intel® HD Graphics (Gen. 9)	500	500	505	500	505
GFX: No. of Execution Units	12	12	18	12	18
GFX: Base / Burst	400 / 550 MHz	400 / 600 MHz	500 / 650 MHz	200 / 650 MHz	200 / 750 MHz
Thermal Design Power (TDP)	6.5 W	9.5 W	12 W	6 W	6 W

Categorization of the latest Intel Atom E3900, Celeron N and Pentium N processors which Intel is offering for the embedded market with long-term availability.

tors considered here, which also makes the module somewhat more robust than the Qseven despite its very thin PC-board. The 314 pins of the module plug connector offer more signals overall than on the Qseven. Additional signals are available for graphics and MIPI-CSI to permit broader utilization of the capabilities of the new generation Intel Atom processors. Overall, the defined pin-out is more advanced and aligned to future needs than that of the Qseven, and this can be of benefit to special new designs. When the SMARC module is operated with 5V supply voltage, the full performance range of the new Intel Atom processors can be covered. In this case, the potential limitations in the upper performance segment that occur in the Qseven do not apply.

The COM Express Mini module, which also has a very compact form factor (84mm x 55mm), primarily impresses with its very rugged construction with regard to mechanical design, plug connectors, PC-board and cooling connection. Consequently, the COM Express Mini offers ideal support for the new 'Apollo Lake -I' processors that are designed for tough environmental conditions in embedded and industrial applications. The 220-pin module plug connector also provides a large share of its interfaces for the carrier board. However, as was the case for the Qseven, there are limitations with regard to MIPI-CSI, USB 3.0 and third-party graphic interfaces. Since the pinout only offers single-channel LVDS (or alternatively eDP), there are also limitations in connecting high-resolution internal displays. It may be necessary to provide an eDP bridge on the carrier board that generates dual-channel LVDS. Some module manufacturers have responded to this need and have prioritized variants populated with eDP pin-outs. The COM Express Mini offers sufficient reserves for all Intel Atom derivatives with up to 28W of reliable power consumption.

Users whose focus is on rugged and reliable Intel Atom designs with a lot of functional range and full performance capability will find that the COM Express Compact is a very good choice. Although its dimensions are larger at 95mm x 95mm, there is still enough available space to offer memory versions with fully equipped 8GB dual-channel DDR3L memory and an ECC option (automatic error correction). This is an important aspect for fully exploiting the computing and graphic performance of the new Intel Atom processors. Depending on the application area, there are module variants with two DDR3L SO-DIMM sockets (high flexibility in system configuration, but without ECC) or with soldered ROM (with ECC and high reliability under shock, vibration and harsh environmental conditions).

The COM Express Compact offers two plug connectors, each with 200 pins, so that nearly all interfaces of the new Intel Atom processors are available on the carrier board. This means that all three of the processor graphic outputs can be used with full performance capability and resolution. All three USB 3.0 interfaces are available as well. These signals are only lacking when MIPI-CSI cameras are used.

Since application areas for the new Intel Atom processors are so wide-ranging, all of the embedded module standards discussed here can demonstrate justification for their existence. In new, very compact designs, especially in the area of mobile applications, SMARC appears to be overtaking the Qseven form factor over the mid-term. Under harsh duty conditions, the COM Express is usually preferred. The Mini version is impressive here based on its small dimensions. Users who wish to exploit the entire performance range of the new Intel Atom processors for industrial applications generally find the COM Express Compact to be the best choice. ■



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# Embedded modules simplify processor integration

By Florian Gross, Texas Instruments and Ralf Orschau, Phytex

*This article presents the advantages provided by the new TI Sitara AM572x processor integrated in the modules offered by Phytex.*

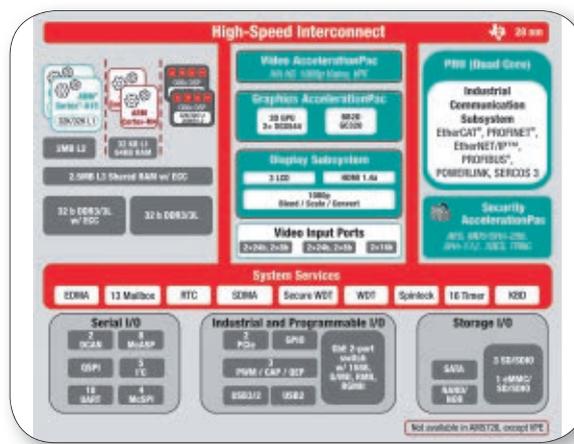


Figure 1. Block diagram of Texas Instrument ARM Cortex-A15 processor AM572x

Industrial customers face significant challenges whenever they introduce a new process platform, regardless of whether they design it themselves or prefer to purchase a third-party module instead. This is mainly a result of the on-chip analog sections of increasingly complex processors nowadays, which have higher hardware and software requirements than previously. This can lead to costly and lengthy development cycles.

As a solution to this dilemma, module vendors readily integrate EMC-critical components at the module level. As a manufacturer of embedded modules, Phytex has many years of experience concerning EMC-aware layout for high-speed signals. Relevant components are integrated into the module, which plays the role of an additional component on the carrier board. This separation between processor environment and application greatly simplifies the design of the carrier board.

Each module comes with a hardware-specific Board Support Package (BSP). Phytex adapts the BSP to its hardware, which leads to significant time and cost savings for the customer. Designing the software for new processors usually takes as much time as the design of the hardware. Upon request, the company will also make any module-related driver adaptations for the final products. Based on the long-

term relationship between Texas Instruments and Phytex, the module manufacturer has access to selected processors like the AM572x processor in an early development stage. This shortens the time-to-market, meaning the module can be made available to customers earlier. Based on a single- or dual-core ARM Cortex-A15 architecture, the AM572x processor is available in different configuration levels featuring up to two C66 DSPs supporting the main processor in HMI applications,

etc. In the past, this would have required two separate processors. Automotive applications benefit from the processor Profibus protocols and its temperature range of -40 °C to 105 °C.

When it comes to performance, the two ARM Cortex-A15 cores clocked at up to 1.5GHz (3.5DMIPS/MHz) and the two C66 DSPs are supported by 2 x 32 bits of DDR3/DDR3L memory, with one of these memories featuring ECC (Memory Error Detection). For the

AM57x product family							
	ARM Cortex-A15 (MHz)	C66x DSP (MHz)	ARM Cortex-M4 (MHz)	Graphics	Video Accel	Display Subsys	PRU-ICSS
Layout Compatible	1.5GHz, 1.5GHz	750MHz, 750MHz	213MHz, 213MHz	3D, 3D, 2D	1080p	Yes	PRU-ICSS5 (Quad Core)*
Pin-to-Pin Compatible	1.5GHz, 1.5GHz	750MHz, 750MHz	213MHz, 213MHz				PRU-ICSS5 (Quad Core)*
Layout Compatible	1.5GHz	750MHz	213MHz, 213MHz	3D, 2D	1080p	Yes	PRU-ICSS5 (Quad Core)*
Pin-to-Pin Compatible	1.5GHz	750MHz	213MHz, 213MHz				PRU-ICSS5 (Quad Core)*
	500 MHz	500 MHz	213MHz, 213MHz				PRU-ICSS5 (Quad Core)*

\*PRU-ICSS can be used for slave industrial communication protocols such as PROFIBUS, PROFNET, POWERLINK & EtherNet/IP\*\*

Figure 2. Comparison of different AM572x processor variants



Figure 3. phyCORE-AM57x processor embedded module and possible applications

first time, the SGX544 dual-core 3D graphics acceleration unit and video acceleration for a 1080p HD stream have been integrated in a TI Sitara processor, enabling the MCU to drive multiple displays.

For industrial automation applications, the AM572x processor provides significant benefits resulting from its two on-chip instances of the PRU-ICSS (Programmable Real-time Unit – Industrial Communication Subsystem), providing support for almost all industrial fieldbus protocols. Cooperating with third-party suppliers, TI provides stacks and firmware for Profibus, EtherCAT, Profinet, and EtherNET IP slave operation. In addition, master configurations are planned for Profibus and EtherCAT. Stacks and firmware have been integrated and tested in the TI System Development Kit (SDK) for TI-RTOS (Real-Time Operating System), which can be downloaded for free at the company website. The TI-RTOS kernel is a basic real-time operating system specifically designed for TI products. The on-chip C66xx DSPs provide an addi-

tional advantage for industrial automation applications. For instance, they can be used to implement motor monitoring and error detection schemes. For this purpose, the DSPs are accessed via OpenCL in order to perform a spectrum analysis based on the FFT algorithm (Fast Fourier Transform). By detecting motor frequency variations, this reveals any imbalances or other faults.

Phytec develops the phyCORE-AM57x processor module based on the AM572x processor. With the feature set described above, the module lends itself particularly to HMI, aviation control, industrial automation, machine vision, medical imaging, and networking applications. Using the phyCAM-P interface, cameras and automotive sensors can be connected to the phyCORE-AM57x processor module. To suit different market requirements, the company uses mechanically robust connectors on the module. Alternatively, the module can be directly soldered to the carrier board using the company's proprietary DSC technology. The components were selected based on their long-

term availability, their suitability for industrial applications and their extended temperature range. If required, a protective coating is also available for the module.

A development kit for the phyCORE-AM57x processor will be provided, facilitating a quick entry into the design of a custom carrier board and corresponding applications. The kit consists of the phyCORE-AM57x processor module suitable for industrial use and volume production, a universal carrier board, circuit diagrams and a comprehensive software package. The latter includes a build environment based on the YOCTO project. All relevant documentation is also included. In addition, free support is provided for the start-up phase. The complete microelectronics stage is manufactured by Phytec at its Mainz factory. The company provides customers with insight into the production process in order to negotiate any customizations that might be necessary in the manufacture of certified products.

The example described demonstrates how module providers can cooperate with semiconductor manufacturers in order to design modules matching the high performance and complexity level provided by modern processors. The integration of EMC-critical components into the module also reduces the time to market and the design effort required for customer projects. Consequently, module design can start while the processor is still prepared for volume production. In addition, the modules provide guaranteed long-term availability and are suitable for industrial applications. By letting all project partners concentrate on the core competencies, this concept brings sustainable advantages for industrial customers who also benefit from the elimination of lengthy and costly in-house development projects. ■



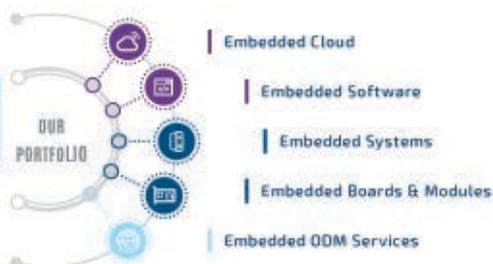
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# Functional Safety system developments from MCU vendor point of view

By Thomas Kellermann, Renesas

*This article highlights the importance of Functional Safety for system development, already a complex exercise and becoming even more complex. Component manufacturers will play a decisive role, especially MCU vendors. Application developers will need support for high-end functional safety systems, but they can accelerate development and save engineering costs.*



■ The term Functional Safety has become a topic of great interest. Functional Safety generally means that malfunctions of the operating systems or applications that lead to any kind of threat or even accident have to be avoided. Of course, this basically includes human health and environment, but also material integrity can be of high interest. In other words, functional safety is that part of the overall safety that depends on failure-free operation of a system.

But how can such dangerous events be avoided? For sure, on the one hand it is quite important to minimize the risks. Actually, the risk minimization is only reasonable to a certain extent. Thus, it is fundamental in the field of functional safety to identify and understand potential risks and failure causes of a system. If ideally all potential failure causes are known and the consequences understood it is possible to define usable countermeasures. Thus, failures are detected before a hazardous event occurs and with the needed functional safety reaction the safe state is initiated. The safe states can be quite different depending on the application. A heater can be made safe by simple power-off, a safety barrier might need to be closed, a crane might be made safe by freezing the current position, and a motor control unit could need a specific power-down procedure. Just looking at the differ-

ences between safe states reveals the variety of functional safety applications. Every application is different and has its own peculiarities and thus potential failure causes and related safe states. This makes a functional safety analysis very complicated and interesting at the same time.

As mentioned at the beginning functional safety is currently one of the major trends in lots of industries. The topic is much more present than some years ago and still rapidly growing. Actually, functional safety should grow up together with the usage of IT in safety-critical applications. In reality it needed some experience and unfortunately also some accidents to lead to the beginning of functional safety in the early eighties. Since then we have had a significant and constant growth of IT and embedded systems that control safety-related applications.

For sure the presence of functional safety in the last few years is quite different for specific areas. In some special sectors, such as process industry, it has already been considered for a long time. Later the automotive area needed functional safety which is established and well known today. For getting embedded systems into our cars more and more functional safety was needed. The situation is similar in every sector where humans are transported by any

kind of electric or electronic controlled device, no matter if on water, in the air or on railways. Human lives are reliant on correctly working systems thus functional safety is vital.

Today additional areas are accelerating the growth of overall functional safety devices. One reason is that it is driven by current major trends like Industry 4.0, Internet of Things and Smart Home/Building. A lot of new safety applications arise in these sectors due to increased integration of intelligence. In parallel the existing safety applications get much more complex.

Industry 4.0 moves factories to intelligent and flexible production clusters. Separation and encapsulation of safety-critical workflow steps is continuously being reduced. Man and machine are working side-by-side or even hand-in-hand. Autonomous systems in decentralized real-time production require build-in safety functionality to allow such safe human-machine collaborations to reduce physical safety barriers like safety locks or safety fences. All this leads to an increase in functional safety related applications. Due to the Internet of Things, embedded systems and generally IT are now conquering a wider area of home and building automation. This increases the potential risks of all this additional intelligence.

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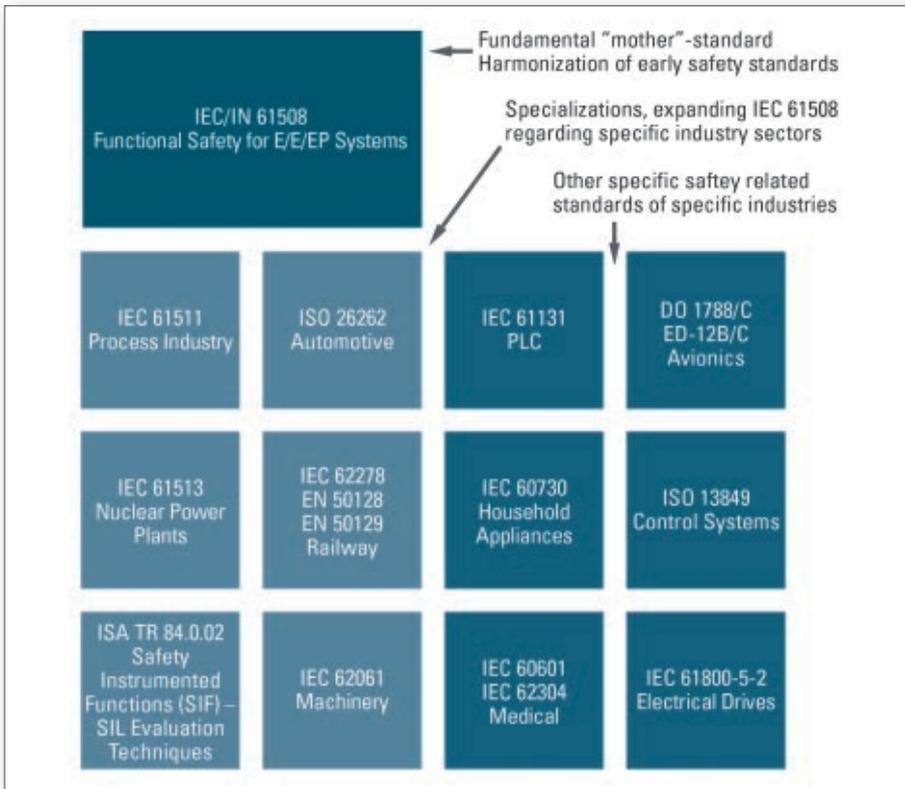

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Figure 1. Functional Safety Standards

At first sight there are many standards related to functional safety. These standards have many similarities and differ often only slightly, e.g. in definitions. The most important standard is the IEC/EN 61508. This fundamental Functional Safety standard for E/E/EP (electrical, electronic or programmable electronic) applications harmonized former safety standards. This standard is usually the basis for Functional Safety developments and expanded by additional industry sector specific standards. Some of these additional standards are directly referred as an adaption or expansion of the IEC 61508.

Developing a safety application, especially with embedded systems inside, can be very complex. Historically, a lot of safety critical systems established safety simply by physical separation. In case of a not present separation like an opened access or flap the complete system was also physically separated from electricity. This guarantees a really high safety but can be quite inefficient from the productivity point of view and also expensive. The target of modern safety applications is to combine adequate functional safety with high performance of the system. A safety developer is always confronted with the compromise between functional safety and availability. Usually a higher availability and high performing system increases the complexity and the needed efforts of functional safety considerations. Therefore, a detailed hazard and risk analysis has to be done. The goal is to identify every potential

failure, understand the consequences of it, estimate the probabilities of its occurrence, and lastly to identify countermeasures to detect any occurrence of each risk. For a safety analysis of a system all components and their interactions have to be considered. This includes the hardware components, the hardware design and also the application software. Based on this safety analysis countermeasures of all critical failure scenarios can be made.

Additionally, it is very important to get a complete understanding of the timings of a safety critical application. It is mandatory to understand in which time failures could occur and fit the timing of needed countermeasures. Here the so-called Process Safety Time (PST) related to the application has to be evaluated. This is the minimum time in which a failure leads to a hazardous event and for sure the needed countermeasure has to be faster. Looking on the variety of safety applications the PST can be in a lower millisecond range up to even multiple seconds. In a safety analysis the big picture always has to be understood with all its critical and partially high complex components. In modern systems one of the most critical and complicated hardware components are complex ICs and especially microcontrollers (MCUs).

In almost every modern electronic application a kind of MCU is integrated. All the different flavours of MCUs have in common that they usually are the complex heart of the

application. Developing a safety application or system requires special attention to these devices. But how deeply can developers, safety consultants or programmers understand the behaviour of an MCU? Plausibility checks of output data, watchdog usage, test calculation, cyclic notifications, software diversity for checks and much more are widely used safety mechanisms that are integrated to guarantee the correct operation of an MCU. Also, simply redundant MCUs are used performing the same operation; then the output data of both is compared to be equal. This hardware redundancy reduces the risk of a failure drastically without understanding the detailed MCU operation. In the end these are all quite good safety mechanisms. But unfortunately, from a safety analysis point of view this might be not sufficient. To develop a high-quality safety system a deeper understanding is mandatory to get realistic values of failure rates and safe failures. This is not only important to develop a hard deterministic safety application. Furthermore, it is mandatory regarding the different safety standards. For a safety qualification and classification real figures and values are needed as proof.

Detailed knowledge of the hardware is mandatory to develop a complex high performing safety application. This is even more true for complex devices like MCUs, where developers and external experts have a very limited insight. This is the moment when the MCU vendor needs to come into play. Optimally, a silicon vendor can provide FIT (Failure in

Time) rates for the function blocks of the MCU. The silicon vendor therefore has to do a detailed MCU hardware safety analysis. This costs money and time but gives the customer – the final application developer – the best basis to make a solid failure probability calculation. Alternatively, the MCU vendor can also provide raw data e.g. chip area of function blocks. With this data and usage of common used formulas from standards (e.g. from IEC62380, SN 29500) FIT values can be estimated.

In addition to the theoretical values, a big MCU vendor can also record field data. A detailed analysis of faulty devices which are returned from the field can give additional information regarding permanent failures. At this point it should be noted that modern MCUs rarely show random damages apart from those caused by wrong operation conditions. Beside the supplying this safety related data, the MCU vendor may also offer solutions that support the final safety application development. This can be self-test software as for example is the case for the Renesas Safety Solution. This Safety Solution Package supports devices from Renesas RX MCU series. This self-test software which tests the CPU, RAM, and ROM could also be developed by an external software developer. Key is that the MCU manufacturer owns the design data, and therefore the coverage of the self-test software can be measured. By inserting discrete logical failures to the real MCU netlist and proofing the software detection of these logical failures the absolute coverage of a self-

test software can be determined. This is not possible without the extensive chip design information. External core self-test software developments similar to the early versions of the Renesas self-test software do normally not reach a sufficient diagnostic coverage. During the development of the Renesas core self-test software, multiple test and improvement runs are therefore done to reach the target of more than 90% fault coverage. Such proven results help not only safety application development, they make the final certification process easier. This example shows on the one hand that a lot of effort is necessary to develop a highly efficient Functional Safety software especially self-test software. On the other hand it points out how important the support of an MCU manufacturer can be.

As said in the beginning, safety system development is very complex exercise, and in the future applications will become even more complex. Therefore, it will be very important to build up an application piece by piece with prepared Functional Safety considering hard- and software modules. Ideally the parts come with a certification. Though every application is different the usage of modular safety components, hard- as well as software, is a less extensive workload for safety developers. In the future, component manufacturers will play a decisive role especially MCU vendors. Application developers will need support to get high-end functional safety systems. Additionally, they can accelerate the development and save a lot of engineering costs. ■

## Product News

### ■ Cadence: Xcelium logic simulation technology for Arm-based servers

Cadence Design Systems and Arm announced early access to the Cadence Xcelium Parallel Logic Simulation on Arm-based servers, providing a first-of-its-kind low-power, high-performance simulation solution for the electronics industry. Prior to manufacturing, verifying that SoC designs function correctly is a massive task accounting for over 70 percent of the EDA compute workload, and is a key driver for growth and transformation of the datacenter.

[News ID 5710](#)

### ■ Express Logic: X-Ware IoT platform to enhance device connectivity in smart home automation

Express Logic announces that its Industrial Grade X-Ware IoT Platform will soon include support for the Thread networking protocol. Created by the Thread Group, Thread is a reliable, low-power, secure, and scalable mesh networking solution that provides a founda-

tion on which any application layer can run. Designed for devices and things that reside in the places where people live and work, Thread is an IPv6 networking protocol built on open standards for low-power 802.15.4 mesh networks, which easily and securely connect hundreds of devices to one another and directly to the cloud without draining battery life or one single point of failure.

[News ID 5704](#)

### ■ LDRA streamlines automation for software safety and security compliance management

LDRA announced enhanced automation capabilities in the LDRA tool suite that will save time and money for those companies that must adhere to and prove compliance with functional safety and security standards. This unprecedented level of automation streamlines compliance by providing the infrastructure for transparent and auditable development workflows necessary in industries such as automotive (ISO 26262), medi-

cal devices (IEC 62304), industrial controls (IEC 61508), nuclear energy (IEC 60880), and aerospace (DO-178) and defense (DEF-STN 00-55).

[News ID 5696](#)

### ■ Keysight: lightweight integrated handheld RF and microwave analyzer

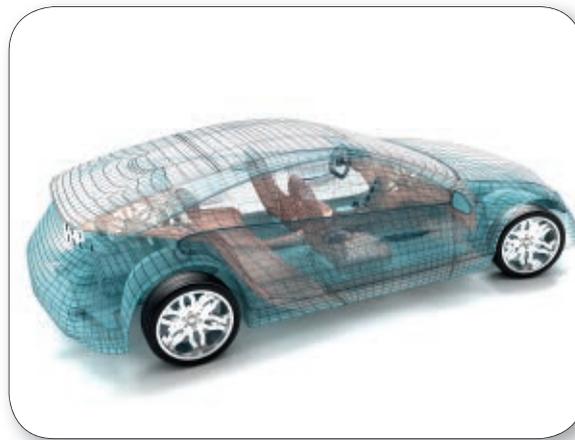
Keysight Technologies announced new enhancements for its FieldFox handheld RF and microwave analyzers. FieldFox analyzers now connect to Keysight's 89600 VSA software, the industry's leading toolset for signal demodulation and vector signal analysis. The FieldFox to 89600 VSA link provides a powerful combination of hardware and software for design and troubleshooting of devices using signal formats, including APCO-25 and TETRA for public safety radio, IEEE 802.11p for wireless vehicular communications, low-power wide area networks and other formats for the IoT, cellular communications including LTE, WCDMA and GSM.

[News ID 5642](#)

# Data Distribution Service in autonomous car design

By Stan Schneider, CEO Real-Time Innovations

*Builders of autonomous vehicles face a daunting challenge. To get a competitive edge, intelligent vehicle manufacturers must deliver superior driving experience while meeting demanding requirements in distributed systems design for safety, resilience, security, scalability, fault tolerance, and fast data processing.*



(source: Getty images / iStock / alex-mit; 25537824)

■ An autonomous car is a highly distributed dynamic system of extreme complexity, where component objects continuously make real-time local decisions based on system-wide constraints and approximate global state. With respect to autonomous car design, RTI explains the relevance of the most widely adopted, open, industry-leading standard for real-time and embedded systems: Data Distribution Service (DDS). DDS provides a proven foundation for highly resilient and responsive distributed control systems. Its real-time performance, high reliability, open architecture, and publish/subscribe decoupling greatly accelerate and simplify distributed system development, making it highly applicable for autonomous cars. DDS is the only technology that can deliver microsecond latency, IEC 26262 safety certification, top security, and operational proof in billion-dollar product lines.

Smart machines (such as autonomous cars) are changing the world and driving the current phase in the evolution of the Industrial Internet of Things (IIoT). Indeed, the Industrial Internet is where some of the most exciting innovations are developing – innovations that are reshaping infrastructure for industries from medicine to power generation. The IIoT relies on new networking standards such as DDS for real-time applications in medicine, energy, transportation, and remote monitor-

ing and control (SCADA). DDS middleware provides reliable, physics-speed connections between smart devices and subsystems that make up hospital networks, power grids, fleets of unmanned military vehicles, and now autonomous cars.

One of the important benefits of DDS is that it allows developers to design high-level publish-and-subscribe application programming interfaces instead of writing low-level networking code. By eliminating potentially tens of thousands of lines of custom application code and its certification evidence, Connex DDS Cert helps developers save millions of dollars in cost while reducing risk and accelerating time-to-market. With DDS, modules communicate by simply publishing the data and commands they produce and subscribing to the data they need. Connex DDS handles all of the communication details. These include discovery and presence detection, routing, reliability, failover, serialization, and state synchronization for late joiners. For time-critical applications, it provides real-time quality of service control and visibility.

While implementation details for autonomous cars are still tightly guarded design secrets, deployment examples in adjacent markets provide a wealth of information about DDS and its ability to solve the most challenging

connectivity problems. The following use cases have one or more connectivity requirements in common with autonomous cars. In the case of autonomous cars, requirements span three main areas: performance, safety, and integration. Systems must ensure performance to successfully connect components, optimize safety at every level of a fully autonomous system, and make it easier to integrate complex, reliable software from diverse components.

Familiar names such as Audi and Volkswagen are among the carmakers that have already introduced RTI Connex DDS to enable high-performance connectivity for testing and enhancing smart cars today. Audi was able to replace a proprietary fiber network and test rig with a DDS data-bus, giving the company a flexible way to connect multiple simulation vendor systems. RTI middleware enables a modular test environment with the speed to handle data coming from all of the electronic systems in a vehicle during simulated operation. The autonomous vehicle algorithms are part of the Volkswagen effort in driver assistance and integrated safety. The system combines radars, laser range finders, and video to assist safe operation. VW uses RTI Connex DDS to help drivers avoid obstacles, detect lane departures, track eye activity, and safely negotiate turns. The DDS protocol connects

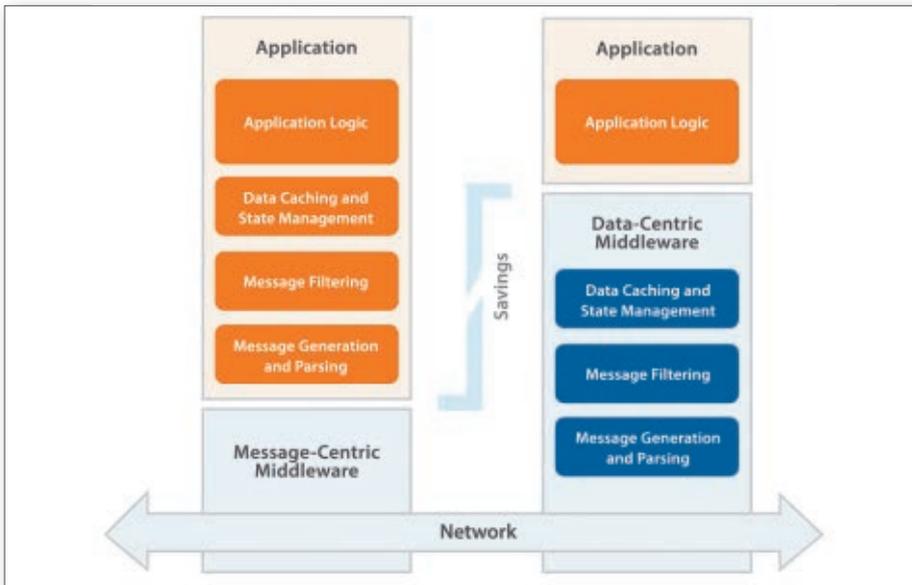


Figure 1. Unlike message-centric connectivity models, data-centricity offers superior modularity, simplicity, and scalability.

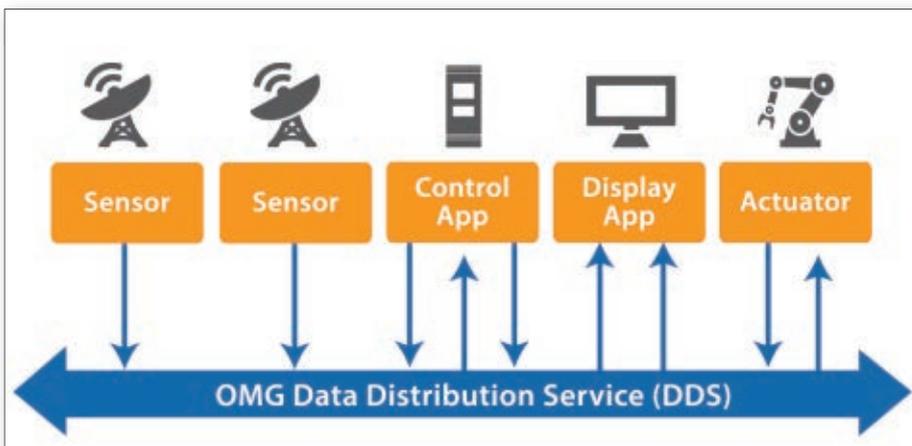


Figure 2. DDS enables seamless connectivity between sensors, actuators and applications.

all of the required components to create a single, intelligent machine with driver-assistance features and integrated safety. In its journey towards fully autonomous cars, Volkswagen has already taken advantage of DDS technology to reach some major milestones. In 2013, the DDS middleware of the company was deployed in an electric vehicle capable of autonomously driving to and from a recharging station after dropping off passengers.

Engineers of aeronautic and defense systems have long relied on RTI infrastructure technology to develop unmanned aircraft as well as unmanned vehicles for deployments on land and under water. DDS compliance aligns with many open architecture initiatives, including the Future Airborne Capability Environment, UAS Control Segment Architecture, and Open Mission Systems. Connex DDS Cert also helps developers of unmanned air systems prepare for integration into the National Air Space (NAS). To operate in the NAS, UAS will have to be certified to the same

safety standards as civil aircraft. This can be particularly challenging since most UAS software was not designed to be certifiable. UAS also have complex communication requirements, with flight-critical components distributed across the air and ground segments. Connex DDS Cert accommodates UAS communication requirements while minimizing the amount of custom code that must be certified. Stringent safety requirements within this industry segment closely resemble automotive compliance specifications. The certification process depends on close collaboration between technology vendors and solution designers – and in the case of autonomous cars, RTI has already established working relationships with vehicle manufacturers. These joint efforts and investments will ensure the required certifications and safety levels the automotive industry requires.

Advanced device connectivity is changing medical practices, lowering costs, and improving patient outcomes. Some medical applica-

tions of DDS demonstrate how it can be used to integrate complex, distributed subsystems and devices in a manner that ensures the required performance. For example, RTI Connex DDS provides precise, distributed control for the subsystems within leading-edge computed tomography (CT) imagers. In hospital infrastructures, RTI DDS implementations are also in use to connect a myriad of technologies for patient monitoring and diagnostics that power modern hospital equipment.

DDS continues to evolve in tandem with smart devices and distributed systems. Unlike other middleware, DDS emerged more than a decade ago to address real-time, physics-speed connectivity. It is the only middleware capable of satisfying the three fundamental requirements. 1) Reliability: if five minutes – or five milliseconds – of downtime is a disaster, DDS implements natural redundancy to ensure continued operation. 2) Performance: if the system needs millisecond or microsecond response, it provides fast peer-to-peer connections. 3) Integration at scale: if the system integrates ten or more applications, or deals with thousands of addressable data items, data-centric DDS eases complex data flow.

To minimize overhead, the DDS publish-subscribe model delivers fine control of quality of service (QoS) parameters including reliability, bandwidth control, delivery deadlines, liveness status, resource limits, and security. It includes an explicitly managed communications data model, with a choice of connection types. Furthermore, it is data centric, with inherent understanding about the contents of the information being managed and shared. It features inherent automation (no hard-coded interactions between applications and devices) and device discovery (easy add-on of new devices without any configuration changes required). Compared to traditional point-to-point communications, DDS offers a superior data-bus with plug-and-play simplicity, scalability, and an architecture that can evolve while maintaining exceptional performance levels. Scalability and integration capacity of DDS are also instrumental in enabling connections of the car with other vehicles and their own environments, including external systems such as traffic monitoring.

With a long history of successes in similar IIoT applications, RTI has become a trusted expert assisting the innovators of future autonomous cars. The ease of integration and flexible, reliable, and fast publish-subscribe data model of the RTI Connex DDS middleware are suited to addressing many of the toughest challenges posed by autonomous cars. This includes vehicle subsystem integration and control, spanning driving control, safety, infotainment, and diagnostic functions as well as intervehicle

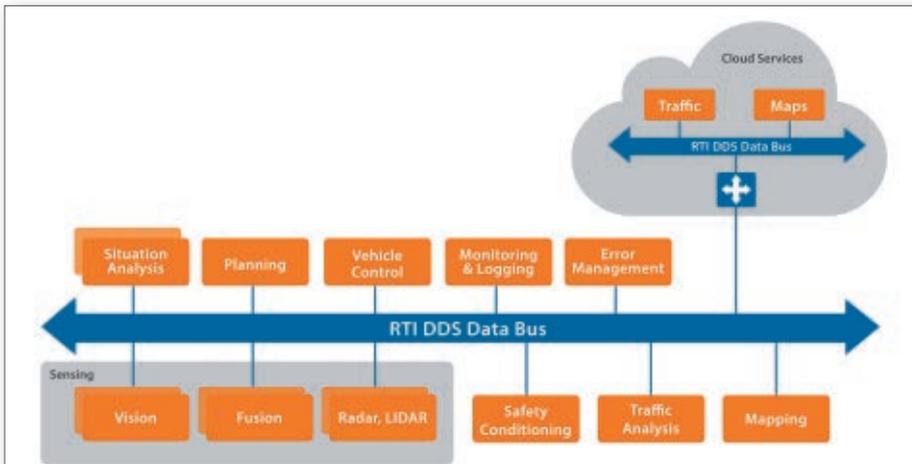


Figure 3. DDS in connected vehicle architecture

interactions, for collision avoidance and optimized travel experiences. Tracking and control functions are used for fleet management, traffic monitoring and management, crisis management, and government agency coordination. Sensor and camera data aggregation is per-

formed at millisecond speeds, local and remote feedback loops are available, as well as reliable communications over unreliable channels (for example, wireless, cellular) and ability to operate within redundant environments (intelligently delivering only one copy of data). This

results in rapid time to market for safety-certifiable infrastructure, using RTI Connex DDS Cert. From its inception, DDS has addressed the broadest range of real-world industrial systems and it remains the only common real-time connectivity platform in such widespread use. More than a dozen implementations are available today, with the growing ecosystem strengthening the standard.

The IIoT and DDS continue to foster bold new intelligent machines – and now even cars that can drive themselves. At the forefront of real-time connectivity, RTI continues to partner with industry-leading developers and technology innovators to extend the DDS standard and ensure it aligns with the needs of the most demanding applications, such as autonomous cars. The current portfolio of RTI Connex solutions meet the connectivity needs of the most complex subsystems and simplify the integration of the in-vehicle and remote systems that contribute to safe, reliable, autonomous car experiences. ■

## Product News

### ■ Cadence: Genus synthesis solution improves multi-functional printer SoCs design development

Cadence Design Systems announced that Fuji Xerox used the Cadence Genus Synthesis Solution to improve the development of its multi-functional printer SoCs. The Cadence solution enabled Fuji Xerox to reduce its timing closure schedule more than 50 percent and achieve up to 16 percent area reduction for its sub-blocks, resulting in an eight percent total chip area reduction when compared with its previous solution.

[News ID 5638](#)

### ■ Logic Technology: faster electronics test development with XJTAG Boundary Scan v3.6

XJTAG has launched a major update to its XJDeveloper software. XJTAG v3.6 includes several new productivity and automation-focused enhancements, allowing engineers to setup tests for even the most complex boards in significantly less time. XJTAG's unified test and programming IDE, XJDeveloper, is an intuitive development and debug environment that makes it quick and easy to set up and run JTAG tests, detecting faults on high-density boards without costly test fixtures or functional testing.

[News ID 5643](#)

### ■ Allegro: sensorless sinusoidal three-phase gate controller

Allegro MicroSystems Europe has introduced the release of a three-phase, sensorless, brushless DC motor controller for use with external N-channel power MOSFETs. Allegro's A4964 is specifically designed for the automotive market with target applications to include engine cooling fans and oil and water pumps. It is designed to provide the motor control functions in a system where a small microcontroller provides the communication interface to a central ECU and intelligent fault and status handling.

[News ID 5663](#)

### ■ Toradex launches easy-to-integrate camera module

Toradex launch the new OV5640 5MP MIPI-CSI camera module. This is an add-on board for the Apalis family of system on modules (SoMs) compatible with the Ixora carrier board. The CSI camera module uses an OmniVision OV5640 camera sensor with built-in autofocus. The OV5640 is a low-voltage, high-performance, 1/4-inch, 5-megapixel (2592x1944) CMOS image sensor.

[News ID 5672](#)

### ■ FRAMOS: 5 Megapixel CMOS backside illuminated image sensor

The new ON Semiconductor AR0521 is a 1/2.5" image sensor with a 5 Megapixel resolution, offering 60 fps for excellent video performance. The 2.2  $\mu\text{m}$  Back Side Illuminated pixel technology enables clear, sharp digital pictures while the sensor's ability to capture both continuous video and single frames makes it the perfect choice for security applications. A demo kit is available for the AR0521 along with additional services provided by the global imaging experts at FRAMOS.

[News ID 5670](#)

### ■ ARCCORE: AUTOSAR starter kit for NXP Arm Cortex based S32K automotive MCUs

ARCCORE is broadening access to the rapidly evolving automotive market with the introduction of a new starter kit for NXP's widely adopted S32K family of Arm Cortex-based microcontrollers. Automotive OEMs increasingly mandate the use of the open and industry-leading AUTOSAR standard in their ECUs where it simplifies development through software reuse and improved code quality and reliability.

[News ID 5680](#)

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# Coding safe and secure applications

By Richard Bellairs, PRQA

*Safety and security are different but there are some common ways to achieve them in high integrity applications, as this article explains.*

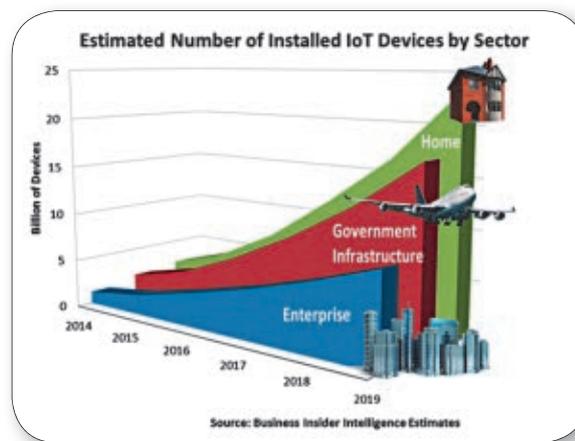


Figure 1. Estimated number of installed IoT devices by sector

■ The world is becoming far more connected, and systems are vulnerable to malicious attacks via these connections. There have already been some high-profile examples that are shaking the industry out of any complacency that may have existed. Safety in high integrity systems has long been a priority while security has not received the same focus, even though safety and security do have to meet different sets of rules and protocols. However, though they are intrinsically different, they do share some common themes and, because of this, when considering the coding aspects, it is possible to adopt a holistic approach. The need to address these concerns is present in every application, especially in safety critical systems; that said, it can be hard to provide a formal definition of what is secure and what is safe when talking about software development.

There are functional safety standards such as IEC61508 or ISO26262, but comparing the requirements in industry-recognised coding standards for high integrity systems with those in coding standards for security critical software, the common ground tends to expand. The discussion over safe and secure features of a language such as C or C++ is limited by the nature of the language itself; hence, what tends to emerge are styles and methodologies aimed at preserving safety and security

in the application of one of more coding standards. The growth of interconnected devices able to provide advanced services, generally called the Internet of Things (IoT), is expected to expand exponentially in the next few years. While the promises of efficiency and cost reduction brought by this evolution are indeed attractive, with them come heavy concerns about security. The recent hack that allowed two researchers to take remote control of a modern SUV reverberated worldwide as a wake-up call for manufacturers and customers: if a technologically advanced system such as a modern high-end car can be subject to this kind of attack, what will happen to the most common, low-budget interconnected equipment that will represent the bulk of the many billion systems that will make up the IoT? Although the threat is well understood, the integration of security as a native element to drive development and business processes in a similar way to functional safety is still to come. This is far from reassuring given the number and level of risks presented by security vulnerabilities.

Ingraining a culture where processes that preserve security and safety coexist efficiently takes time and effort. The approach to be taken is by nature holistic and cannot be limited to single compartments or development stages. For example, the SUV hack exploited

weaknesses and vulnerabilities at many different levels – architecture, service permission, password generation algorithms and so on. As a consequence, a sound product development process should integrate security hardening actions at all levels and allow them to coexist efficiently with the already demanding functional safety requirements. But what happens if the focus is only on software development? More specifically, what are the choices available to a developer with the task to programme a safety critical application and the need to be sure the application is also secure? Assuming sound measures have been applied at the requirements and design stages, it is time to choose how to translate them in efficient, secure, high integrity software.

Functional safety has two main families of reference standards dealing with software lifecycle organisation: IEC61508 and derived standards; DO178B/C and companion documents such as DO330. IEC61508 concerns functional safety of electrical, electronic and programmable electronic (EEPE) safety-related systems. It covers hazards caused by failure of the safety functions. Since it may be applied to any safety-related system that contains an EEPE device, its scope is pretty broad. Almost all major safety-related industry standards not connected with avionics are derived from IEC61508.

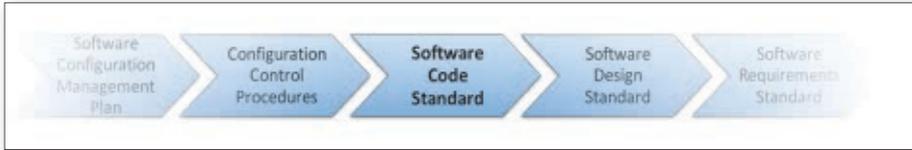


Figure 2. Definition and documentation of the software development process

DO178C plus its companion documents DO330, DO331, DO332 and DO333 form the standards for any commercial avionics applications. DO178C is mandatory for any commercial avionics project looking to achieve FAA Certification. DO178C is more software-focused than IEC61508; the software safety level (or IDAL – item development assurance level) is determined from safety assessment and risk analysis and mapped on five levels, from A (catastrophic) to E (no effect).

For safety-critical applications, the definition of criticality of code has been widely analysed and there are standardised methods to qualify it and define proper ways to handle the development process. Safety integrity levels (SIL) in IEC61508, automotive SIL (ASIL) in ISO26262, software SIL (SSIL) in EN50128 or IDAL in DO178C are all examples of the same concept – to quantify the risk reduction required for a function according to the risk analysis and qualify the actions to be undertaken to assure this level is reached. Almost all industry-recognised functional safety standards prescribe the adoption of design and coding standards depending on the SIL targeted. Even if there is no authoritative indication of which coding standard is suitable for functional safety, one of the main references in this is MISRA C. ISO26262-6 acknowledges for the C language that MISRA C covers many methods required for software unit design and implementation, and its diffusion reaches all the major safety-critical applications, such

as machinery, medical, nuclear power and railways. With DO178B/C, the situation is not so different. These standards require a thorough definition and documentation of the software development process. The base set of required documentation and lifecycle artefacts includes rich and detailed planning, and coding standard application is part of this list.

Coding standards such as MISRA define a subset of the target language. This avoids or limits usage of features and constructs that might lead to undefined or unspecified behaviour. Practices such as tolerating dead or unreachable code, which can cause issues when considering traceability and verification, are generally discouraged. Coding standards for high integrity applications tend to enforce features that produce a predictable behaviour. MISRA C: 2012, as an example, discourages the use of dynamic memory on the grounds that misuse of standard library facilities to manage dynamically allocated memory can lead to undefined behaviour. When the choice is made to use it, particular attention should be given to avoid unpredictable outcomes.

ISO/IEC27001: 2003 specifies the requirements for establishing, implementing, maintaining and continually improving an information security management system. It is based on the PDCA (plan, do, check, act) model, shared with all main management standards. Risk assessment and business

impact analysis are used to identify and manage possible risks to the confidentiality, integrity and availability of information. A more detailed view on application security is taken by ISO/IEC27034: 2011, which provides guidance in defining and implementing information security controls by processes integrated in the system development lifecycle. As such, it's not a software application development standard, but does rely on existing standards. Moving towards security-oriented coding standards, the scenario is varied; it is possible to find secure coding standards for C and C++, as well as Java, Perl, PL/SQL and others.

There is a rich variety of techniques available to assess code security. Different issues can be tracked down using static analysis, dynamic and runtime evaluation, data flow and control flow tracking, taint analysis, executable analysis and heuristic analysis. These techniques can be effective and easy to implement depending on existing support for the selected language, built-in facilities, libraries and so on. The main reference point for security coding standards is CERT, which has for many years been publishing coding standards aimed at security enforcement. CERT coding standards are directly linked to real-world vulnerabilities found in the field by the common weaknesses enumeration (CWE). The CWE is a community-developed dictionary of software weakness types. The downloadable list of weaknesses can be navigated according to specific relationship contexts.

The CWE is related to a broader collection of publicly known information security vulnerabilities, known as CVE (common vulnerabilities and exposures), which is now the standard for common identification of

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vulnerabilities. CVE identifiers, also called CVE-IDs, provide reference points for data exchange for information security products and services. They are useful for analysing coverage and effectiveness of tools and services in regards to specific classes of vulnerabilities. NIST's national vulnerability database, the US government repository of standards-based vulnerability management data, contains more than 73,000 CVEs. MISRA C:2012 and CERT C can be considered champions of safety and security for the

C language. Table 1 contains a quick comparison. There are noticeable differences between CERT and MISRA coding standards, but it's possible to define a strategy that results in the effective application of both on the same codebase.

Tools such as those available from PRQA are the most effective way to implement such a strategy. Such tools perform deep analysis of software code to prevent, detect and eliminate defects and automatically enforce coding

rules to ensure standards compliance. They bring the added benefit of improved software maintainability and thus reduce overall development costs. Designing a safety-critical application while also optimising its security can be demanding. Safety and security require a set of strategies, processes, tools and skills that may not overlap, or may even conflict. Automated code analysis tools are an effective way to avoid coding defects that can lead to safety issues and security vulnerabilities as part of a holistic approach. ■

## Product News

### RTI announces new technology incubator for the IIoT

Real-Time Innovations announced RTI Labs, a free program for customers that provides early access to new technology developed for the IIoT. Customers who take advantage of RTI Labs have the opportunity to optimize their IIoT systems with advanced technical capabilities and potentially influence the RTI product roadmap.

[News ID 5686](#)

### ARCCORE offers "Safety out of the Box" for automotive software projects

To give embedded software developers in the automotive sector a kick-start for their safety relates projects, ARCCORE is now introducing a new safety solution. With the new platform, developers can quickly and cost efficiently design an application software which is fully compliant with the safety requirements of ISO26261 up to ASIL D.

[News ID 5682](#)

### Green Hills: INTEGRITY-178 tuMP OS selected for airborne demonstrator

Green Hills Software has been selected by Infinite Dimensions Integration to provide its INTEGRITY-178 tuMP multicore operating system for the Resilient Embedded GPS/Internal Navigation System Prototype Pilot (R-EGI). Infinite Dimensions' R-EGI prototype is based on the Raspberry Pi3 platform, which incorporates a quad-core Cortex-A53 ARMv8 SoC from Broadcom.

[News ID 5692](#)

### Future Electronics: Nebula IoT development kit now available

Future Electronics has announced the launch of their Nebula IoT Development Kit with partners Cypress Semiconductor and Murata. Kits are now available to purchase. The Nebula board is an IoT cloud ready board that allows developers to quickly prototype and deploy their IoT ecosystems. Wireless connectivity is supported by the Murata 1DX module, which is powered by the Cypress CYW4343W Wi-Fi and BT/BLE combo SoC.

[News ID 5624](#)

### Corelis introduces version 8.5 of its boundary-scan tool suite

Corelis announced the availability of version 8.5 of its ScanExpress Boundary-Scan Tool Suite. The new software update features support for continuous logging of sampled data to file in ScanExpress Debugger, multiple user interface enhancements for the ScanExpress Viewer fault identification system, improved MSP430 & NANDrive device support, two new processor support packages for ScanExpress JET, plus numerous improvements spanning the complete suite of ScanExpress software applications.

[News ID 5635](#)

### Logic Technology: high quality graphics using only internal memory

Users expect smartphone look and feel, not acknowledging the constraints of limited resources on microcontroller setups. The user expectations require 16-bit color depth normally pushing one to use external SD-RAM for two framebuffers. This requirement for

external memory increases the complexity and cost of the hardware development and production cost. We experience a hard push from high volume product manufactures towards saving of external RAM, accepting only a minor UI performance limitation.

[News ID 5664](#)

### SEGGER: Embedded Studio IDE now free for Nordic SDK users

SEGGER Microcontroller has announced that, through close collaboration with Semiconductor, it has been able to make SEGGER's professional cross platform integrated development environment Embedded Studio available for free to all Nordic Semiconductor customers. The agreement signed between SEGGER and Nordic Semiconductor entitles Nordic customers to use Embedded Studio with any Arm Cortex-M based device in the popular nRF series of wireless SoCs without any charges being accrued.

[News ID 5694](#)

### IAR: unique development tool line-up for Arm

IAR Systems enables companies worldwide to create high performance embedded applications with ensured code quality. IAR offers wide device support, the best code optimizations and comprehensive debugging functionality, as well as integrated code analysis tools. For companies working with safety-critical applications, development tools certified for functional safety according to IEC 61508 and ISO 26262 is also available.

[News ID 5701](#)

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■ **IAR Systems and Secure Thingz collaborate for easier IoT security implementation**

IAR Systems and Secure Thingz announced the next step in their collaboration to provide new technology in order to simplify the development of secure, connected devices. With the rapidly evolving IoT comes an urgent need for new ways of ensuring security across development, production and use of connected products. Manufacturers must find strong and efficient methods to protect their brands as well as prohibit counterfeiting or overproduction, and should integrate these methods as part of their regular workflow.

[News ID 5705](#)

■ **AMBER wireless presents its design kit for Raspberry Pi**

AMBER wireless, a Würth Elektronik eiSos Group company, offers a design kit with which developers can realize applications for wireless connection in the sub-GHz band. AMBER PI is a plug-on board for the Raspberry Pi 3B. Besides the power-saving sub-GHz wireless interface from AMBER wireless, the board is equipped with integrated sensors for temperature, humidity, air pressure and movement.

[News ID 5625](#)

■ **Wibu-Systems becomes active member of Plattform Industrie 4.0**

Wibu-Systems takes its co-operation with Plattform Industrie 4.0, the association developing joint recommendations around Industrie 4.0 for all stakeholders, to a new level and signs up to become an official and active member of the ecosystem. Plattform Industrie 4.0 was launched at the Hannover Fair in 2013 as one of the innovative projects in the "Action Plan High-Tech Strategy 2020" promoted by Germany's Federal Government. Since then, it has expanded to include a larger number of enterprises and representatives from various associations and trade unions as well as academia and politics.

[News ID 5702](#)

■ **Winbond: TrustME secure flash memory aligned with platform security architecture from Arm**

Winbond Electronics announced an expansion of its TrustME Secure Flash products portfolio aligned with Platform Security Architecture (PSA) from Arm. As the industry's first Common Criteria EAL5+ certified secure Non-Volatile Memory, now with support for PSA, the TrustME W75F Secure Flash enables SoC and MCU vendors to design highly secure and certifiable solutions for the Internet of Things, mobile, artificial intelligence and other demanding security applications.

[News ID 5700](#)

■ **Microsemi: PolarFire FPGAs pass PCI SIG's PCIe endpoint compliance suites**

Microsemi announced its PolarFire FPGAs have achieved a key milestone by passing the Peripheral Component Interconnect Special Interest Group's (PCI SIG's) PCIe endpoint compliance suites, working at 5 Gbps. This certifies the product has passed rigorous testing of the compliance workshop, with the PolarFire FPGAs now included in the organization's coveted integrators list.

[News ID 5687](#)

■ **ST: motor driver simplifies motion control for battery-operated robots and appliances**

STMicroelectronics' STSPIN32F0A programmable motor controller contains fully integrated gate drivers for three external MOSFET half-bridges, an STM32F0 microcontroller, as well as a 3.3V DC/DC switching converter plus a 12V LDO, giving designers flexible motor-control options in a lightweight and compact 7 x 7mm outline. The 48MHz microcontroller, with 32Kbyte on-chip Flash, can run motor control algorithms such as 6-step sensorless, field-oriented control or position-sensed control, as well as the user application.

[News ID 5681](#)

■ **ON Semi: imaging SOCs enable big vision with smaller automotive cameras**

ON Semiconductor continues to make major advances within the rapidly growing automotive imaging sector with the announcement of two new highly integrated 1.0 Megapixel CMOS image sensing products. The new parts provide a complete solution with the image sensor and processing functionality integrated within a low power system-on-chip (SoC) that simplifies and speeds adoption in applications such as rear and surround view cameras.

[News ID 5662](#)

■ **Xilinx: monolithic RFSoc integrates RF signal chain for 5G wireless, cable remote-PHY and radar**

Xilinx announced delivery of its Zynq UltraScale+ RFSoc family, a breakthrough architecture integrating the RF signal chain into an SoC for 5G wireless, cable Remote-PHY, and radar. Based on 16nm UltraScale+ MPSoC architecture, the All Programmable RFSocs monolithically integrate RF data converters for up to 50-75 percent system power and footprint reduction, and soft-decision Forward Error Correction (SD-FEC) cores to meet 5G and DOCSIS 3.1 standards. With silicon samples already shipping to multiple customers, the early access program for the Zynq UltraScale+ RFSoc family is now available.

[News ID 5636](#)

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■ **Sensirion: multi-pixel gas sensor now available globally**

The siloxane-resistant SGP multi-pixel gas sensor is now available worldwide through Sensirion's distribution network. Based on Sensirion's innovative MOXSens technology, the SGP offers a unique combination of long-term stability and multi-pixel technology that opens up new possibilities for environmental monitoring. Traditional metal-oxide gas sensors suffer from poor long-term stability caused through irreversible contamination by siloxanes. Sensirion's proprietary MOXSens technology provides the SGP with an unmatched robustness against these contaminants that results in unique long-term stability and accuracy.

[News ID 5614](#)

■ **TI: single-chip ultrasonic sensing microcontrollers for smart water meters**

Texas Instruments unveiled a new family of MSP430 microcontrollers with an integrated ultrasonic sensing analog front end that enables smart water meters to deliver higher accuracy and lower power consumption. In addition, TI introduced two new reference designs that make it easier to design modules for adding automated meter reading capabilities to existing mechanical water meters.

[News ID 5626](#)

■ **Sensirion: complete sensor system on a single chip**

The humidity sensor SHTC1 has been designed to overcome conventional limits for size, power consumption and price-performance ratio in order to fulfill the requirements of the consumer electronics market and products like Elgato's latest temperature and humidity monitor. By using Sensirion's CMOSens technology, the SHTC1 offers a complete sensor system on a single chip, consisting of a capacitive humidity sensor, a band-gap temperature sensor, analog and digital signal processing, A/D converter, calibration data memory and a digital communication interface supporting I2C fast mode.

[News ID 5650](#)

■ **Conrad launches "TRU Components" as new brand**

Conrad introduces "TRU Components" as a strong, new brand specifically for active and passive components as well as for electromechanics, cables and wires. The "TRU Components" brand stands for high-quality, state-of-the-art products that meet the requirements of professional users – from engineers and design houses to researchers and developers at electrical manufacturers and universities, to renowned entrepreneurs and bulk buyers in the areas of automotive, medical or information technology.

[News ID 5649](#)

■ **Cypress: ultra-low power Wi-Fi and Bluetooth combo solution**

Cypress Semiconductor announced a new combo solution that delivers ultra-low power Wi-Fi and Bluetooth connectivity to extend battery life for wearables, smart home products and portable audio applications. The new Cypress CYW43012 solution prolongs battery life by leveraging 28nm process technology to cut power consumption up to 70 percent in receive mode and up to 80 percent in sleep mode when compared to current solutions.

[News ID 5615](#)

■ **Mouser: ADuCM302x ultra-low-power MCUs for IoT solutions now available**

Mouser Electronics is now stocking the ADuCM3027 and ADuCM3029 ultra-low-power microcontrollers from Analog Devices. Serving as the brain of connected solutions, the ADuCM302x series microcontrollers outperform other general-purpose processors with a high ULPBench certified score of 245.5 points, and are designed to enable longer battery life and lower operating costs in Internet of Things applications without sacrificing security and reliability.

[News ID 5612](#)

■ **ON Semi: preconfigured development suite provides easier way to build hearing aids**

ON Semiconductor is unveiling the Ezairo Preconfigured Suite (Pre Suite), a development toolkit enabling turnkey solutions based on the company's Ezairo 7100 Digital Signal Processor. The wireless-enabled Ezairo 7150 SL is the first hybrid module to be supported by the Ezairo Pre Suite, with a firmware bundle that makes it easier to build wireless-enabled hearing aids. It features Wide Dynamic Range Compression (WDRC), adaptive noise reduction, support for directional microphones, acoustic feedback cancellation, and environmental classification.

[News ID 5688](#)

■ **Infineon: high SNR MEMS microphones complement Amazon AVS far-field development kit**

XMOS has launched its VocalFusion 4-Mic Dev Kit for Amazon Alexa Voice Service (AVS) for far-field applications. The kit integrates Infineon's high SNR microphones to ensure highest performance and reliability. XMOS now offers the first Amazon AVS development kit with a linear mic array for far-field applications. The 4-Mic Development Kit features crystal clear voice capturing even in noisy environments. This enables commands to be accurately captured from across the room for processing by the Alexa cloud-based speech recognition system.

[News ID 5655](#)



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■ **Socionext: module for hybrid codec solution to accelerate “Media Cloud” initiative**

Socionext has developed the M820C server module. This module features the company’s hybrid codec technology equipped with the multi-format codec, IC MB86M30 and high efficiency processor, SC2A11. This development is part of Socionext’s “Media Cloud” initiative to improve processing efficiency for the ever-increasing video data in the data center. The M820C achieves high-performance transcoding as well as advanced and efficient video data processing.

[News ID 5608](#)

■ **Silicon Labs: wireless clocks support 4G/LTE and Ethernet**

Silicon Labs has introduced a new family of high-performance, multi-channel jitter attenuating clocks for 4.5G and Ethernet-based Common Public Radio Interface (eCPRI) wireless applications. The new Si5381/82/86 clocks leverage Silicon Labs’ proven DSPLL technology to deliver an advanced timing solution that combines 4G/LTE and Ethernet clocking in a single IC.

[News ID 5618](#)

■ **Toshiba: high-voltage multi-channel solenoid and unipolar motor driver IC**

Toshiba Electronics Europe launch a multi-channel solenoid and unipolar motor driver IC that delivers high-voltage and low ON resistance drive. TB67S111PG incorporates four channels each consisting of one low-side MOSFET and a free-wheeling diode connected to drain. This enables it to control each channel independently and realises a design that is suited to driving the solenoids and unipolar motors.

[News ID 5622](#)

■ **Sensirion acquires automotive division of AIC**

Sensirion acquires the automotive business of Auto Industrial Co, a provider of automotive sensor modules. The acquisition expands Sensirion’s global footprint and strengthens its automotive sensor module business. The acquired company will operate under the name Sensirion Automotive Solutions as a legally independent entity of Sensirion. AIC and Sensirion have been collaborating very successfully for many years.

[News ID 5610](#)

■ **Rutronik: new small quantities storage facility**

Rutronik Elektronische Bauelemente has set up a small quantities storage facility. The new storage facility allows the distributor from Ispringen to quickly supply development engineers and companies that have smaller requirements with single items and partial quantities. The small quantities are available exclusively on the e-commerce platform. The smallest ordering unit in this case is a single item.

[News ID 5668](#)

■ **Rapid adds Pickering Electronics to its reed relay range**

Rapid Electronics has partnered with Pickering Electronics to become their first official distributor in the UK. Pickering Electronics is a long-established manufacturer of Single-in-Line (SIL/SIP), Dual-in-Line (DIL/DIP), Through-Hole, Surface Mount and custom configuration reed relays in 1 Form A, 2 Form A, 1 Form B, 1 Form C and 2 Form C. Users will have access to a wide variety of Pickering’s product ranges through Rapid Electronics online shop, including Pickering’s latest innovation – the Series 120 4mm<sup>2</sup> Reed Relay range.

[News ID 5666](#)

■ **MEDWEL: embedded fanless system with E3900 processors for medical applications**

MEDWEL, a part of the Portwell group, announces the launch of the MEDS-BS200, embedded fanless system featuring Intel Atom processor E3900 product family. Its special and compact design, plus low power consumption make the MEDS-BS200 a perfect solution to support applications for visualization and computing solutions in medical application.

[News ID 5703](#)

■ **ANSI and VITA ratify ANSI/VITA 48.8 air-flow-through cooling standard for VPX**

VITA announces the ratification by ANSI and VITA of ANSI/VITA 48.8-2017 “Mechanical Standard for Electronic VPX Plug-in Modules Using Air Flow Through Cooling?”. This standard has completed the VITA and ANSI processes reaching full recognition under guidance of VITA. The VITA 48.8 Working Group was sponsored by Lockheed Martin, Curtiss-Wright Defense Solutions, and Abaco, and chaired by Curtiss-Wright Defense Solutions.

[News ID 5656](#)

■ **Infineon accelerates automated driving advancement**

At its OktoberTech 2017 Technology Forum, Infineon will demonstrate the latest semiconductor solutions underlying autonomous driving, including new radar sensors. The company recently made available to early adopters a complete radar chipset solution. It includes a 77/79 GHz Monolithic Microwave Integrated Circuit, a high-performance multi-core microcontroller with a dedicated sensor processing unit and a safety power supply to accelerate the development of advanced radar systems.

[News ID 5654](#)

■ **Huber Signal Processing: highly linear RF precision amplifier**

HUBER SIGNAL PROCESSING extends its test & measurement products with the RFA 600. Like the predecessor RFA 300, the RFA 600 provides a gain of 20 dB, a highly linear frequency range with  $\pm 0.25$  dB, a switchable 50 or 0  $\Omega$  output, and an output amplitude of 22 V. The frequency range now goes from DC up to 600 MHz. Typical Applications are radar, ultrasonic, ATE, VHF transmitter, data calbe drivers, HDTV cable drivers and many more.

[News ID 5677](#)

■ **Janz Tec: emIOT gateway series offers various wireless interfaces**

Janz Tec is expanding its portfolio of embedded PCs and is launching the IoT Gateway series emIOT, which complements the well-known emPC product line with systems specifically designed for networking machines and processes – as the basis for IIoT applications. All IoT gateways are also available with optional, tailor-made industrial security features from Janz Tec’s Security Ecosystem toolkit.

[News ID 5652](#)

■ **u blox launches full-featured Bluetooth 5 module NINA-B3**

u blox is announcing the launch of its full Bluetooth 5 compliant NINA-B3 wireless MCU module. Featuring Bluetooth low energy long range connectivity, high data transfer rates and supporting Bluetooth mesh and 802.15.4, NINA B3 caters to applications in smart buildings, smart cities, and the Industry 4.0, including smart lighting systems, industrial sensor networks, asset tracking solutions, and building automation systems.

[News ID 5640](#)

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■ **Rutronik presents sensor MLX75023 and chip MLX75123 from Melexis**

MLX75023 Time-of-Flight (TOF) sensor together with MLX75123 companion chip provides a complete TOF solution. The MLX75023 supports up to QVGA resolution with unpaired sunlight rejection. The chipset offers performance, flexibility, simplifies the design and allows a very compact 3D camera. The MLX75123 TOF companion chip and the MLX75023 TOF optical sensor array chipset, has been designed to facilitate the design and minimize component count of a TOF camera aiming for sunlight robustness and operation over a broad temperature range.

[News ID 5627](#)

■ **VadaTech announces AMC580 Zynq UltraScale+ module**

VadaTech announces the AMC580, an AMC FPGA Carrier with Xilinx Zynq UltraScale+ (XCZU19EG) FPGA and dual FMC (VITA-57) sites. The module supports flexible clocking with on-board jitter cleaner, and the FPGA connects to DP0-9 and all FMC LA/HA/HB pairs on both FMC sites. The FPGA has an interface to a single DDR4 memory channel (64-bit wide with ECC) which allows for large buffer sizes to be stored during processing.

[News ID 5690](#)

■ **AAEON announces collaboration with Stream Technologies**

AAEON Technology Europe and Stream Technologies have integrated their LoRa solutions to enable cost effective, secure and scalable LoRa network deployments. The news emerges from an existing partnership between the two companies which includes an integration between AAEON's hardware and Stream's cellular connectivity services. The cellular solutions have been deployed by a wealth of customers geographically across multiple verticals including smart vending and industrial automation.

[News ID 5620](#)

■ **AAEON: next-gen network security computing with FWS-2272**

AAEON launches the FWS-2272, an ultra-compact fanless network appliance which boasts the smallest physical design on the current market. With a significant boost in performance, it is powered by Intel N3350 SoC, formerly Apollo Lake. Designed to consolidate networks in secure and virtualized environments, the FWS-2272 is easy to configure and implement into existing hardware and network infrastructures, providing dual support for both wireless and wired connections. Its compact design is consolidated by a tough casing and an aluminum heatsink to enhance thermal management.

[News ID 5641](#)

■ **ST: advanced automotive processors with built-in security**

STMicroelectronics announces its latest automotive processors featuring a dedicated, built-in security module. Millions of connected cars are already on the road, and industry analysts predict there will be more than 250 million by 2020. Connected services supported by on-board telematics units, Wi-Fi hotspots, Bluetooth devices – and aftermarket equipment such as on-board diagnostics (OBD) dongles -- enable drivers and passengers to be safer, more productive, socially connected, and better entertained on their journeys. Unfortunately, all this connectivity builds a real surface of attack for hackers.

[News ID 5678](#)

■ **Toshiba: reference board solution for TZ1200 App-Lite graphics processor**

Toshiba Electronics Europe launch a new reference design board for their TZ1200 App-Lite graphics processor. At the heart of the system is the ultra-low power TZ1200 App-Lite graphics processor based on a high-performance 32-bit ARM Cortex-M4F processor capable of operating at 96/ 120MHz with just 70µA/MHz current consumption in active mode.

[News ID 5609](#)

■ **Vecow launches ARS-2000 Series Compact Embedded Box PC**

Vecow has rolled out her new generation Compact Embedded Box PC, ARS-2000 Series Fanless Embedded System. Powered by 7th Generation Intel Core i7/i5/i3 U-series SoC (Kaby Lake-U/Skylake-U), 3-port GigE LAN with 2-port M12 PoE+, 32 Isolated DIO, 1 Isolated COM, 1 PCIe x4, 4 USB 3.0, fanless -40 to 85°C operating temperature, outstanding system performance, multiple I/O connections, 6V to 36V power input with 80V surge protection, ignition power control, smart manageability, rugged reliability, and all-in-one integrated features.

[News ID 5632](#)

■ **Winbond: TrustME secure flash memory supports TCG DICE architecture**

Winbond Electronics announced an expansion of its TrustME Secure Flash products portfolio based on the Trusted Computing Group (TCG) Device Identifier Composition Engine (DICE) Architecture specification. As the industry's first Common Criteria EAL5+ certified Secure Flash, and now with the addition of support for the TCG DICE, the TrustME W75F Secure Flash provides designers with secure memory solution for Internet of Things, mobile, artificial intelligence, and other demanding applications that call for a secure root of trust, privacy, authentication, code and data confidentiality.

[News ID 5707](#)

■ **IBASE: ultra slim signage player for outdoor digital signage deployments**

IBASE Technology debuts its SE-102-N, an ultra slim, fanless digital signage player that measures only 19.5mm thick. The media player enables the retail, food and hospitality segments to deliver compelling and valuable content in dual high-definition HDMI displays to targeted audiences in outdoor environments.

[News ID 5698](#)

■ **Sensirion: single-use liquid flow sensor for biomedical applications**

Sensirion will be attending the COMPAMED 2017 trade fair in order to present its single-use liquid flow sensor LD20 aimed at the fast, precise and reliable measurement of the lowest flow rates. The showcased flow sensor series is based on a successful design study that was first presented in 2014 and has already received several international awards. Product development of the LD20-2600B, the first representative of the new single-use sensor series, is now complete and it is ready for high-volume production.

[News ID 5673](#)

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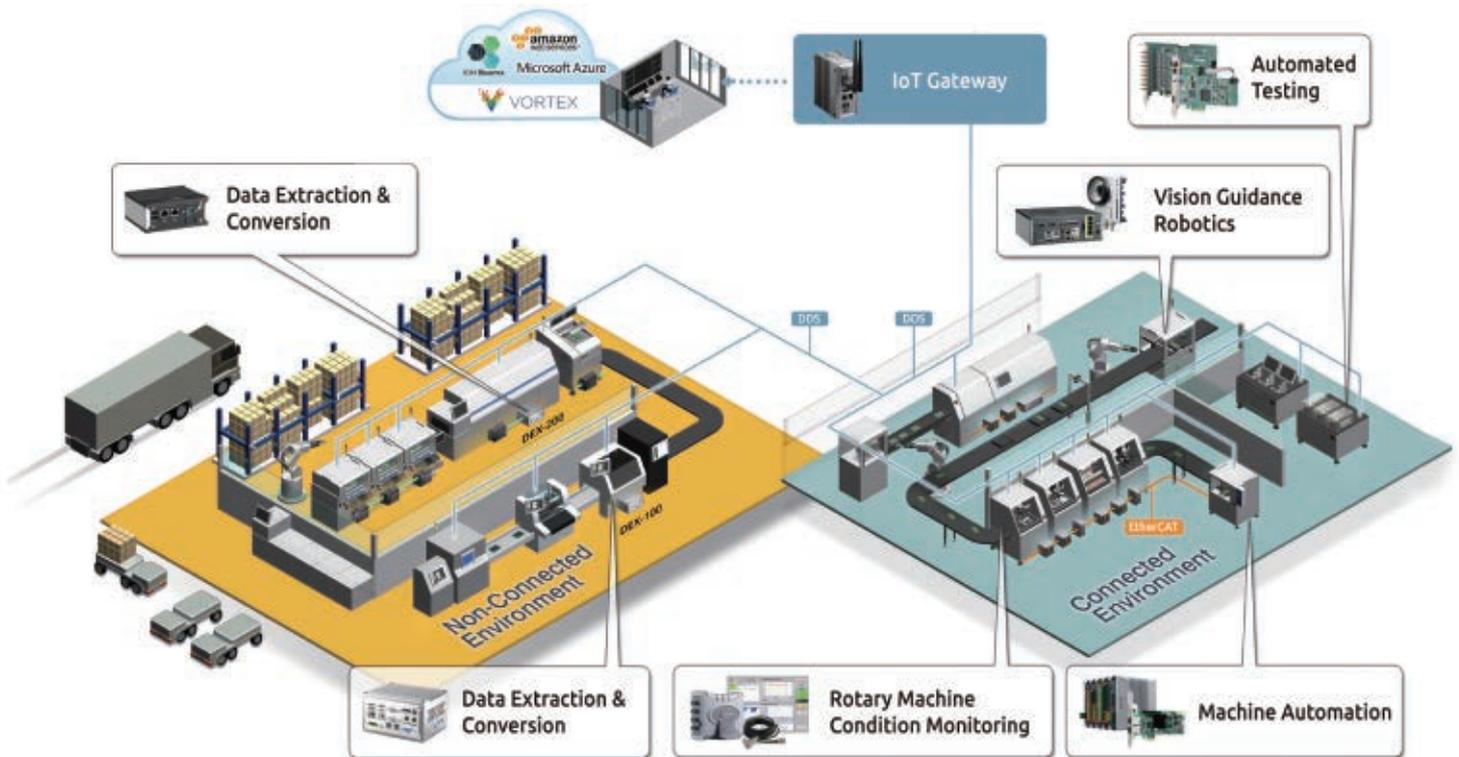
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