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Feb 01/13

A Simpler Blueprint for the Internet of Things

How the Intel® Intelligent Systems Framework Streamlines Design

SPECIAL ISSUE

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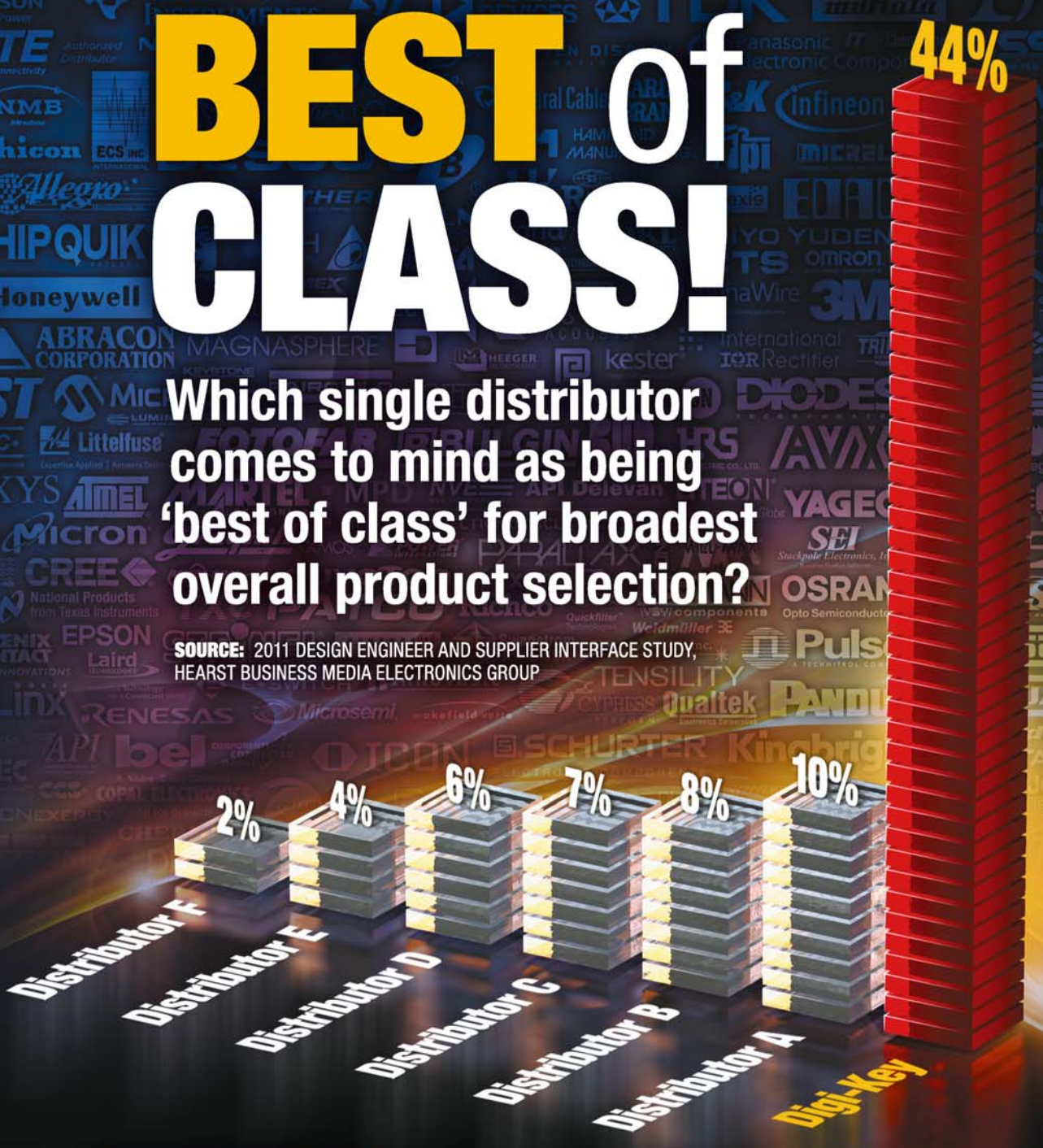

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Dear Readers,

The turn of the year was quiet recently and the usual start in a new year is close for the embedded community – embedded world 2013 Exhibition & Conference which will be held in the showground of Nürnberg Messe from 26th to 28th of February. And once again it seems there is no limitation to its growth. Eleven years after its birth it is now the world's biggest international exhibition and conference event on embedded system technology. "Embedded world will remain focused in 2013 but still grow appreciably. It is the largest event in the world for embedded system technologies and the most professional shop window," explains Alexander Mattausch, Exhibition Manager of the embedded world Exhibition&Conference at Nürnberg Messe. "We are very pleased about yet more growth in terms of display space, number of new exhibitors and international share of exhibitors, which confirms the importance of the event," he adds. Therefore this event is nowadays an absolutely necessity be for all of us in the Embedded industry.

Beside the exhibition which covers five halls (Halls 1, 2, 4, 4A and 5) the conference will be located in the NCC East of the fairgrounds. Due to the trend towards unlimited access and use of the Internet via portable devices safety and security are two of the top themes at the embedded world Conference 2013 as well as ultra-low power. These themes apply to the whole conference with its varied segments. The electronic displays Conference is according to the organizer one of the most important information and opinion platforms for developers, researchers, users and decision-makers. The highlights in 2013 are the sessions on touch screens and automotive displays and practical presentations on E-Signage and display market data round off the programme. I believe this year s event will give a good overview over the recent and future trends - like the Internet of things - in the embedded industry.

The issue of how to design components and devices fast and simple for use in the Internet of things is topic of our cover story starting page ?? and describing how the Intel Intelligent Systems Framework enables a streamlined Design of safe and secure devices for these application. And there is also coverage about the ultra-low power trend. The Infineon article starting page ?? introduces an new MCU family based on the Cortex-M0 processor core which can be tailored to various low-power applications in the industry. And you will find also the "missing link" for the general standardised use of ARM processor cores in this issue – Kontron is presenting the COM-Standard SMARC for ARM and SoC designs. Short opinion articles about trends in the embedded industry round up this special embedded world issue. There s no doubt that still a lot of new developments are going on in the embedded industry – do not hesitate to visit the embedded world 2013 and discuss all the upcoming topics with other members of the embedded community.

I m looking forward to meet with you at our booth in hall 5 booth 137.

Sincerely

Wolfgang Patelay
Editor

Cover Photo
Intel

A Simpler Blueprint for the Internet of Things

PAGE 6

The Intel® Intelligent Systems Framework provides a blueprint for hardware, operating systems, and tools that simplifies the delivery of interoperable intelligent solutions.

MCUs with ARM Cortex-M0 core enable 32-bit power at 8-bit prices

PAGE 22

The trend towards replacing 8-bit with 32-bit microcontrollers is clear. According to market observers almost half of developers in German industry are planning this switch. The price level has been the limiting factor, but Infineon now caters for this situation with its new XMC1000 family, using the standard Cortex-M0 processor core.

Choosing the right embedded flash disk for various applications

PAGE 26

This article describes how flash controllers can be used to directly embed flash drives onto PCBs and into systems. Hidden bill-of-material including firmware versions or additional costs can be avoided and control over component lifetimes maximized. Drives can be configured according to the application-specific requirements.

Rocking and rolling: functional safety on 3U CompactPCI

PAGE 42

Innovative products are rather rare in common CompactPCI. New CPU boards usually sport the latest Intel processor generation and make an upgrade in interface speeds or memory components. A different, new approach in 3U format shows where true challenges lie hidden – not only for rolling stock applications.

SMARC – new Computer-on-Module standard for ARM/SoC designs

PAGE 46

With Smart Mobility ARChitecture (SMARC), SGET has ratified the first manufacturer-independent Computer-on-Module standard for purebred ARM/SoC designs. The specification was developed specially for Smart Mobility, but many stationary applications also profit from these highly efficient SFF modules. Several modules, evaluation platforms and starter kits are already on the market.

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A Simpler Blueprint for the Internet of Things

By Jim Robinson, General Manager, Segments and Broad Market Division,
Intel® Intelligent Systems Group

The Intel® Intelligent Systems Framework provides a blueprint for hardware, operating systems, and tools that simplifies the delivery of interoperable intelligent solutions.

The Internet isn't just for people anymore. Billions of devices are poised to make more than a trillion connections, creating opportunities for data collection and data analytics on a scale never seen before. The resulting business intelligence promises to make organizations more efficient and competitive, and help them anticipate future opportunities. To meet the demand for these networked systems, original equipment manufacturers (OEMs), system integrators, and developers must find more streamlined ways to offer advanced capabilities from edge devices to the data center and cloud.

Last September, Intel and the 250+ global member companies of the Intel® Intelligent Systems Alliance announced an important advancement: the Intel® Intelligent Systems Framework.

This specification provides a blueprint for hardware, operating systems, and tools that simplifies the delivery of interoperable solutions. The specification is designed for excellent scalability, enabling cutting-edge connectivity, manageability and security across applications. By assembling these components in a framework, the specification gives developers a reliable path to lower deployment costs, improve ease of integration, and accelerate the promise of the Internet of Things. Defining capabilities rather than specific implementations, the Intel Intelligent Systems Framework provides a degree of openness and flexibility that allows nearly any company to participate in this transformational opportunity. Basing products on framework-ready solutions, developers can focus more attention on innovative features and services that deliver greater product differentiation.

The Value of Networks of Intelligent Systems

Around the world, intelligent systems are replacing stand-alone, special-purpose devices and enabling networks of appliances that provide new services, capabilities, and revenues. The best of these intelligent systems offer holistic and scalable connectivity, security, and manageability, plus interoperability with past and future systems. Compared to stand-alone devices, a network of intelligent systems devices working together provides the opportunity to achieve much larger purposes. Consider a network combining smart parking meters, license plate readers, Internet gateways, servers, and a mobile phone app that shows real-time availability of parking spaces, takes reservations, and provides price differentiation to different customer segments. Municipalities that implement such a system could conceivably increase parking revenue and utilization while increasing citizen satisfaction, decreasing traffic circling blocks for a spot, and perhaps even reducing accidents in its urban core. Solutions like this would interest traffic-congested cities.

Market analyst firm IDC predicts in its 2011 report, "Industry Developments and Models, Intelligent Systems: The Next Big Opportunity," that of the billions of connected devices making up the Internet of Things by 2015, more than a third will be intelligent systems. These intelligent systems are being used to:

- Create alternative energy solutions and integrate them into a smart grid.
- Design health care systems that automate and enable proactive and predictive patient care.
- Develop manufacturing systems that improve efficiency, reduce defects, integrate with the supply chain, and decrease manufacturing costs.
- Make mass transit systems, commercial trucking operations, and personal vehicles safer and more efficient using everything from aggregated data on vehicle health, weather, traffic, and road conditions to new safety innovations like self-steering cars.
- Engage consumers in new ways with digital signage that actually recognizes gender, age bracket and dwell time to provide content that is more compelling and relevant, driving more meaningful interactions.

For end users, these connected intelligent systems provide a way to extract immense value from a wide variety of data sources. Harnessing and combining both machine-generated and user-created data holds the potential to improve lives, spur incredible advances in productivity, provide unprecedented levels of business intelligence, and create new, industry-shifting services. The ultimate value of the Internet of Things will depend on this ability to derive intelligence from data captured at every step in the system—from sensor controllers to edge gateways to cloud to client.

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TOP TOPICS

- Architectures and trends in embedded processing
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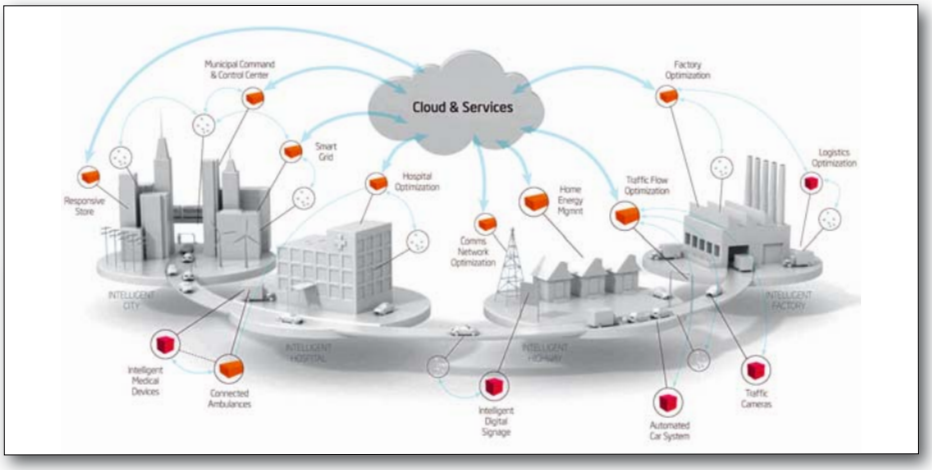

Figure 1. With the growing emphasis on increasing the flow of information to the cloud, the shift from isolated, fixed-function systems to an Internet of Things based on networked intelligent systems is increasing its already fast pace.

The Need for a Framework

Any solution that requires the connectivity, management and security of multiple devices over time is one that can benefit from the fundamental capabilities outlined by the Intel Intelligent Systems Framework. This specification provides a flexible blueprint to accelerate the evolution from today's fragmented, incompatible embedded systems to fully realized networks of intelligent systems that readily exchange and analyze data at all points. Consider a retail chain with point-of-sale (POS) systems, digital signage, surveillance cameras, warehouse RFID scanning systems, smart vending machines, and a networked building automation system. If each system has a unique platform, which is generally the case, connecting everything to the cloud and managing and securing them presents a complicated, expensive proposition. Maintenance operations on these devices and their reliability over time will also be aggravated lacking a common framework for manageability and security.

The Intel Intelligent Systems Framework provides the needed recipes to design intelligent, connected devices with the high-performance compute capabilities needed to collect, manage, and analyze data to transform it into valuable business intelligence. The framework addresses the fragmentation in today's market by providing the Alliance a standardized and open platform to use in actively building solutions for developers. The framework features baseline validated components from Intel and Alliance partners that provide connectivity, manageability and security capabilities. This menu of options can be mixed and matched, providing more flexibility than a fixed set of solutions. Intel processors supported in the framework include Intel® Xeon® processors, 2nd and 3rd generation Intel® Core™ processors with Intel® vPro™ technology, and Intel® Atom™ processors. These Intel products and their chipsets provide a full range of connectivity solutions and I/O for heterogeneous networks. Including technologies like Intel vPro technology provides advanced remote manageability and security capabilities.

Within the Alliance, Intel is working with system vendors, independent software vendors (ISVs) and systems integrators, as well as forming cloud-to-device services, that build upon the framework. This group will work closely with the Open Data Center Alliance (a consortium of leading global IT organizations helping speed the migration to cloud computing) to ensure seamless integration of these devices within the data center and the cloud. Intel and the Intel Intelligent Systems Alliance are making the framework free of charge to select customers and prospects. Intel Intelligent System Framework-ready board and system solutions are available from Premier members of the Alliance, including Advantech, Dell, Kontron, and Portwell. Board solutions are also available from Associate members, such as Eurotech, and General members, such as Digi International. Other companies releasing supporting products soon include Arrow Electronics, Avnet, Axeda, and WebHouse.

To complement these board solutions, Associate members of the Intel Intelligent Systems Alliance, such as McAfee and Wind River, are providing components such as:

- Operating system and middleware (Microsoft Windows, Wind River Linux, and Wind River VxWorks)
- Security solutions (such as McAfee Embedded Control and McAfee Deep Defender™)
- Remote manageability capabilities that support third-party management consoles
- Workload consolidation solutions that use virtualization to lower capital and operating expenditures and enable fewer devices to do more tasks

The Framework in Action

By flexibly combining the key ingredients of the framework, developers can provide organizations with a full spectrum of devices that can interact intelligently over a network through a variety of wired and wireless technologies. Returning to the retail chain example, the benefits from such a network of intelligent systems become readily apparent. Having digital signage connected to inventory data, for instance, enables retailers to ensure that signs advertise only items that are in stock. Bringing the POS data into the loop, a retailer can measure how successful particular signage advertising is at driving sales. By monitoring with surveillance cameras the high-turn items on store shelves, retailers can use video analytics to alert store employees when items need to be restocked. Directing cameras at the checkout area and connecting them to POS systems can help automate checkout staffing and provide a variety of loss prevention measures. Retail chains can benefit in other practical ways from the Intel Intelligent Systems Framework, particularly with regards to security and manageability. Every connected device needs to be secured, but integrating multiple security solutions into the back end drives up costs. A much better idea is a unified solution that secures systems across the board and drives down total cost of ownership (TCO) by simplifying everything from installation to upgrades.

The framework provides the hardware, operating system, and software that enables use of off-the-shelf security products like McAfee Embedded Security software. This software secures a wide range of embedded devices and automates the enforcement of software change control policies on them. McAfee Deep Defender, another off-the-shelf product, further strengthens this security by taking advantage of the hardware-assisted security enabled by McAfee DeepSAFE™ technology. This technology's first-of-its-kind integration with Intel processors enables it to reside between the memory and operating system to perform real-time memory and CPU monitoring to reveal and remove advanced, invisible attacks. The result is next generation, hardware-assisted endpoint security that can be applied almost anywhere the framework is used: POS terminals, self-checkout devices, kiosks, handheld devices in retail stores, point-of-care medical modalities (X-ray, ultrasound, CT-scan, MRI devices), ATMs, thin clients in enterprises, critical infrastructure for process control systems or SCADA devices, industrial plant controllers, storage appliances, and more.

Manageability is a similar TCO-reduction story. Millions of devices are connecting to networks, requiring intelligent systems to be reliable,

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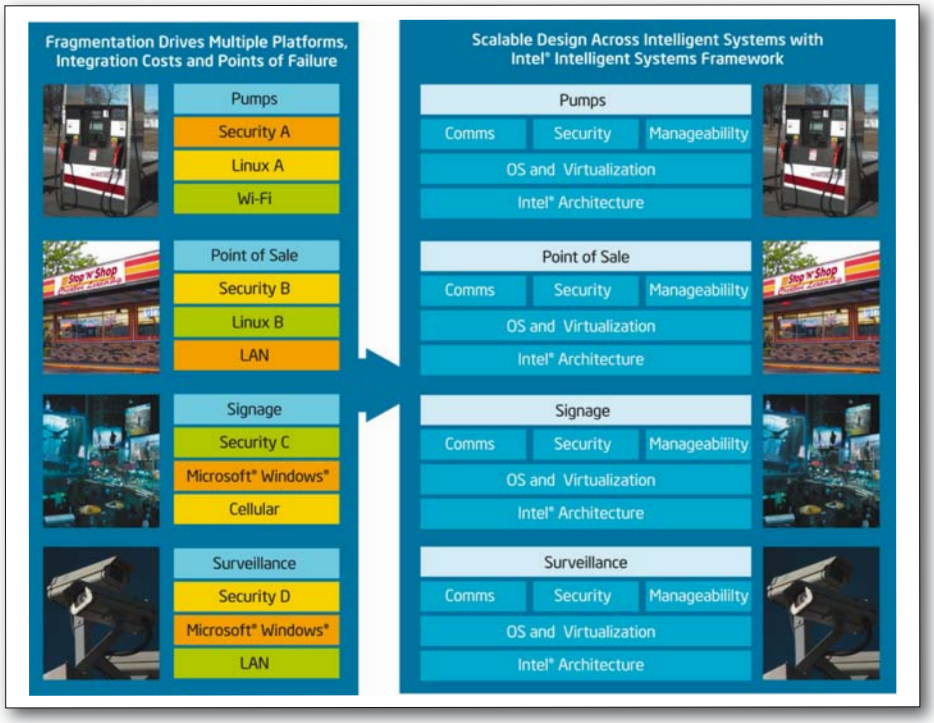

Figure 2. A look at how a retail chain, such as a mini-mart operation offering gas, could improve connectivity, security and manageability by selecting products based on the Intel® Intelligent System Framework.

available, and upgradeable. In-person service calls are expensive, but the remote manageability provided by Intel vPro technology and third-party management console products has a small marginal cost, enables the use of a single solution across a wide variety of devices, and allows many maintenance, management and repair tasks to be done from a centralized location. The result is a quick return on investment (ROI).

Intel vPro technology is also a key component to enabling the virtualization necessary for workload consolidation solutions. Matched with an appropriate hypervisor, its Intel® Virtualization Technology (Intel® VT) component enhances the capabilities of traditional software–based virtualization solutions, providing a hardware-assist that boosts platform performance and robustness. Such robust virtualization enables consolidated platforms to provide more integrated services, conserve costs, enable simultaneous data collection and analysis, as well as improve the reliability of real-time components.

Gathering Momentum

The Intel Intelligent Systems Framework is more than an idea. It's a solution quickly gathering momentum. Intel is working with a growing number of Alliance manufacturers, ISVs, and system integrators to create cloud-to-device services that use and build on the framework. As an organization that provides the processing performance, connectivity, manageability, and security developers need to speed smart, connected systems to market, the Alliance provides the perfect breeding ground for framework-ready solutions.

Wind River - The Wind River Intelligent Device Platform is a complete software development environment built for Machine-to-Machine (M2M) applications (Figure 3). A key software enabler of the Intel Intelligent Systems Framework, it provides a simple yet powerful software platform to design, build, and operate intelligent, connected embedded devices.

The Intelligent Device Platform is built on Wind River's embedded Linux operating system and tools, and includes integrated middleware addressing connectivity, manageability, and security at the device level. Where the Intel Intelligent Systems Framework is the end-to-end framework (device to data center and in between), the Intelligent Device Platform is the embedded device software stack that aligns with this framework. The platform provides the security and manageability required for device development across multiple connectivity options, including 3G, Bluetooth, Ethernet, Wi-Fi, ZigBee, and Z-Wave.

Digi International - The Digi M2M Solution Builder Kit for M2M applications incorporates a Kontron M2M platform based on the Intel® Atom™ processor E620T to provide an end-to-end solution that includes hardware, software and services (see Figure 4). Designed to simplify the development of connected M2M devices, the kit provides a certified gateway with all available connectivity options, such as 2G/3G cellular, dual-band Wi-Fi, Gigabit Ethernet and 802.15.4. Future connectivity extensions such as 4G/LTE cellular, Bluetooth 4.0 and ZigBee can be easily added. The iDigi Device Cloud, a public cloud platform-as-a-service, is a part of the platform and provides remote management and secure data integration to help with the deployment of remote connected devices. The kit includes the Wind River Linux development environment tailored for cloud-connected M2M applications.

Dell - Dell is working with Intel, Milestone Systems, AXIS Communications, and Ingram Micro to produce a technology bundle and training program to help ease the adoption of digital security solutions and maximize IT integration. At the heart of the solution is a framework-ready Dell R420 server using the latest Intel® Xeon® processor E5-2400 product family and an Intel® Ethernet Server Adapter. The Intel Xeon processor E5-2400 series provides the necessary performance to offer scalable high definition resolution with the latest analytics for improved security and business intelligence. Thanks to its support of the Intel

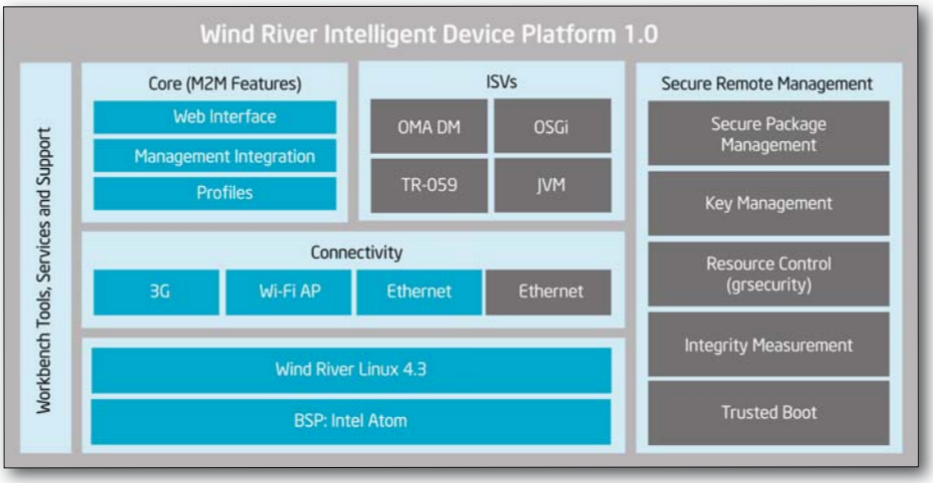

Figure 3. Diagram of the Wind River Intelligent Device Platform.

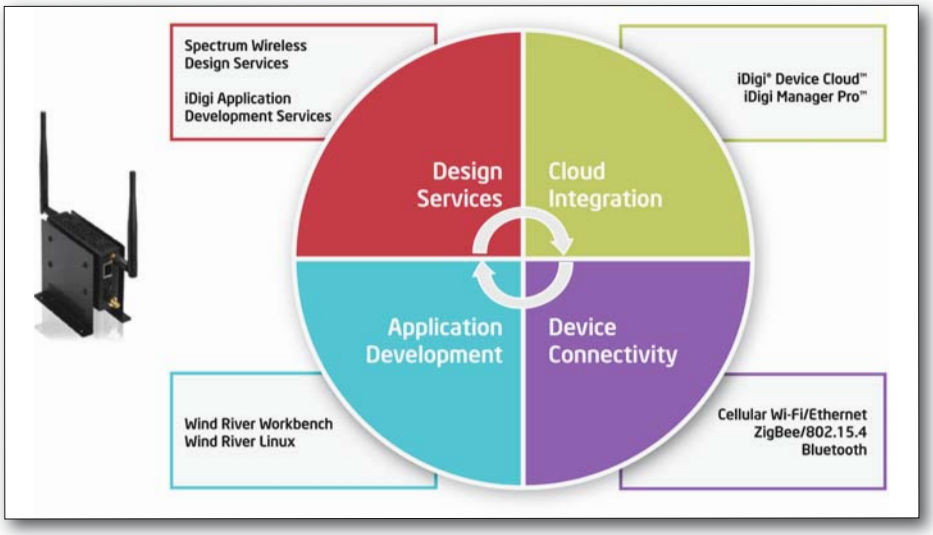

Figure 4. Digi M2M Solution Builder Kit.

Intelligent Systems Framework, this solution offers high interoperability with a wide range of solutions.

Take Advantage of the New Era of Intelligent Computing

IDC predicts that by 2015 more than six times more microprocessor cores will ship in smart systems than in PCs. Each one of these intelligent systems has the capacity to provide vastly enhanced user experiences and increased information flow to the cloud, data centers, and back, creating all kinds of new opportunities for developers and original equipment manufacturers. Through next-generation solutions like the Intel Intelligent Systems Framework that facilitate connecting, managing, and securing devices and data in a consistent and scalable manner, Intel and the Alliance provide a fast path to this extremely connected future. ■

For information on the latest products and services from Alliance members supporting the Intel Intelligent Systems Framework, see: intel.com/intelligentsystems-alliance-solutions. For more information about the Alliance, visit: ***intel.com/go/intelligentsystems-alliance***

Product News

Hall-Stand 4-408

LDRA has integrated its tool suite with NI LabVIEW

LDRA has integrated its tool suite with NI LabVIEW Virtual Instruments. The LDRA-NI solution offers HIL simulation, a technique used to develop and test the complex real-time embedded systems commonly found in military and aerospace designs. The integration with the LDRA tool suite ensures that full software analysis is applied to the systems under test on the simulated target hardware. With the ability to test software systems up to DO-178 Level A, LDRA includes code standards enforcement, structural coverage analysis including modified condition/decision (MC/DC), object code coverage, unit testing, data and control coupling, and requirements traceability.

News ID 14891

Hall-Stand 4A-206

Freescale: secure prepaid utility meter reference design

Freescale Semiconductor and INSIDE Secure today announced a secure prepaid utility meter reference design with near field communication connectivity that OEMs can use to quickly and cost-effectively bring to market electricity meter products. Secure prepaid meters, such as this reference design developed by Freescale and INSIDE Secure, address this need by adding sophisticated smart card security mechanisms that have been proven in the banking industry. Products based on this reference design are protected from fraud because they employ a VaultIC security module and NFC technology to safely load energy credits from a smart card or an NFC-enabled phone.

News ID 15001

Preview: highlights of embedded world 2013

February 26 – 28 in Nuremberg/Germany

End of February, the embedded community meets again for three days in Nuremberg. It is the world's biggest international exhibition and conference event on embedded system technology.

■ The positive trend of the past years is continuing and the number of international companies exhibiting has risen appreciably. The embedded world exhibition and conference from 26–28 February provides the latest products, highly specialized services, interesting special areas and an informative supporting programme. It is the gathering of the international embedded community.

Machine-to-Machine Communication (M2M) is attracting a big response in 2013. Last year there was such a big demand from the exhibiting companies that the organizers decided to add a second M2M Area. Around 25 exhibitors present their new products for wireless communication between machines in halls 4 and 5. Suppliers of components for wireless machine-to-machine communication and communication modules for terminal equipment, system integrators who implement remote maintenance solutions, and telecommunication companies wanting to develop the remote maintenance market reach their target groups by exhibiting in the M2M Area. A variety of exhibiting companies from France present their products in a pavilion organized by the export promotion company Ubifrance in hall 4. They include the embedded specialists TECHWAY, Spectracom, AdaCore and Allfourtec. Serbian companies in the embedded technologies segment can be found under the roof of SIEPA: Geneko, IMPT, Mikroelektronika, bitgear wireless designer and Seakus have registered to exhibit. Six companies from the USA also exhibit in a pavilion of direct exhibitor PC/104, including Kontron, Sundance, Versalogic Cooperation, Adlink Technology and RTD Embedded Technologies.

The area of the pavilion for young innovative companies is also growing. 11 firms have registered so far and occupy a display space of some 240 m². This is the largest number of exhibitors to date. The embedded newcomers presenting their top products and innovations here include companies such as ProximusDA, gestigon, Helion, Timing Architects, and many more. The keynote for the 11th embedded world Conference will be given by Stuart McClure, President and CEO of Cylance. He is one of the leading minds in the embedded community and besides current trends will present his visions of the sector. This time the keynote focuses primarily on the security of embedded systems. McClure's lecture shows how vulnerable to attack embedded systems actually are. McClure gives his keynote at 11:00 on 26 February 2013. Admission to the keynote is free for all visitors to embedded world.

The organizer's tip for embedded world 2013: The clever ones use the online registration facility on www.embedded-world.de to register as a visitor in advance and ensure fast and free on the day! ■

Exhibitors List – embedded world 2013

Company	Hall - Stand
2J s.r.o.	5-210
3D Plus SA	1-129
3S	4-603
4-noks	4-345
7Layers	4-444a
AAEON	1-442/1-306
ABS	4-131
AbsInt	4-327
Acal Bfi	4-448
Accemic	4-630
Accutronics	2-515
acontis	1-538
Acromag	1-612
Acrosser	2-519
ACTRON	1-360
Acute	4-111
AdaCore	4-544f
ADACSYS	4-615
Adaptive Network Solutions	2-429
ADATA Technology	1-145
ADD-IPC	2-510
Adeneo	5-340
Adesto	1-424
Adeunis	5-212
ADKOM	1-357
ADL Embedded Solutions	1-542
ADLINK	2-419
admatec	1-268
ADMESS	4-121b
ADR	4A-306b
AMD	4-540/2-420
Advantech	2-110
af inventions	4A-124
AFRA	4-324
AFT	4-307
Agilent	4-208
aicas	5-429
ALL4TEC	4-544d
Allegro Micro Systems	4A-122
Almanar	5-216
Alpha Display	5-213b
altec	4A-402
Altera	4-436
Altium	5-445
American Megatrends	1-638
Ampire	1-264
ams	1-424 4A-407
Analog Devices	4-234
ANDUS	1-323
AnSem	4-109
ANSEN	4-444j
ANTYCIP	4-612
APAC OPTO	4-240
Apacer	1-507/4-240
APdate!	4-139
APLEX	2-416
Applied Micro	4A-122
apra-norm	2-323
APRO	1-611

Company	Hall - Stand
ARBOR	2-425
ARM	4-336
Arrow Electronics	4-228/5-340
Art of Technology	2-328
as electronics	4-541
Asociace	4-642
Aspider M2M	4-444f
ASRock	2-430
Astrodyne	4-240
Atlantik Elektronik	2-206
ATMEL	5-311
Atmel	1-424
Atollic	4-108
ATP Electronics	1-306/2-520
Attend	2-403
Avnet Memec	4A-122
AXIOMTEK	1-435
Axsem	4-444h
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b-plus	1-430
basysKom	5-438
Batronix	4-605
Bayer DSP Systeme	4A-103
Beckhoff	5-340
Berner & Mattner	5-326
Bicker Elektronik	2-117
Bitgear Wireless	4A-509
BITKOM	5-225
Bitreactiv	5-140a
bitshift	5-332
BitWise	5-340
Biwin	2-516
BLANKOM	5-215
Blue Pearl	4-615
Bluegiga	4-246
Bluetechnix	4-234
Bolymin	1-424/1-161
Bopla	2-211
Bosch	4A-420
BRESSNER	1-374
Brunel	4-402
bsquare	5-340
Byte Paradigm	1-105
Cactus	2-410
CAD-UL	4-201
Cadence	4-609
CalPlus	4-205
CAN in Automation	1-118
CAST	4A-506b
Cermate	4A-505
CES	5-412a
CETECOM	4-123
Channel Microelectronic	1-219
Chess eT International	4-109
Christ-Elektronik	5-305
Cinterion	4-443
Cirrus Logic	4A-122
Cluster Mikrosystemtechnik	1-430
CMX Systems	4-204

Company	Hall - Stand
CN Group	5-426
Cogent Computer	1-109
Coilcraft	5-406/4A-122
Collion	4A-306c
coming	4-324
comlet	2-401
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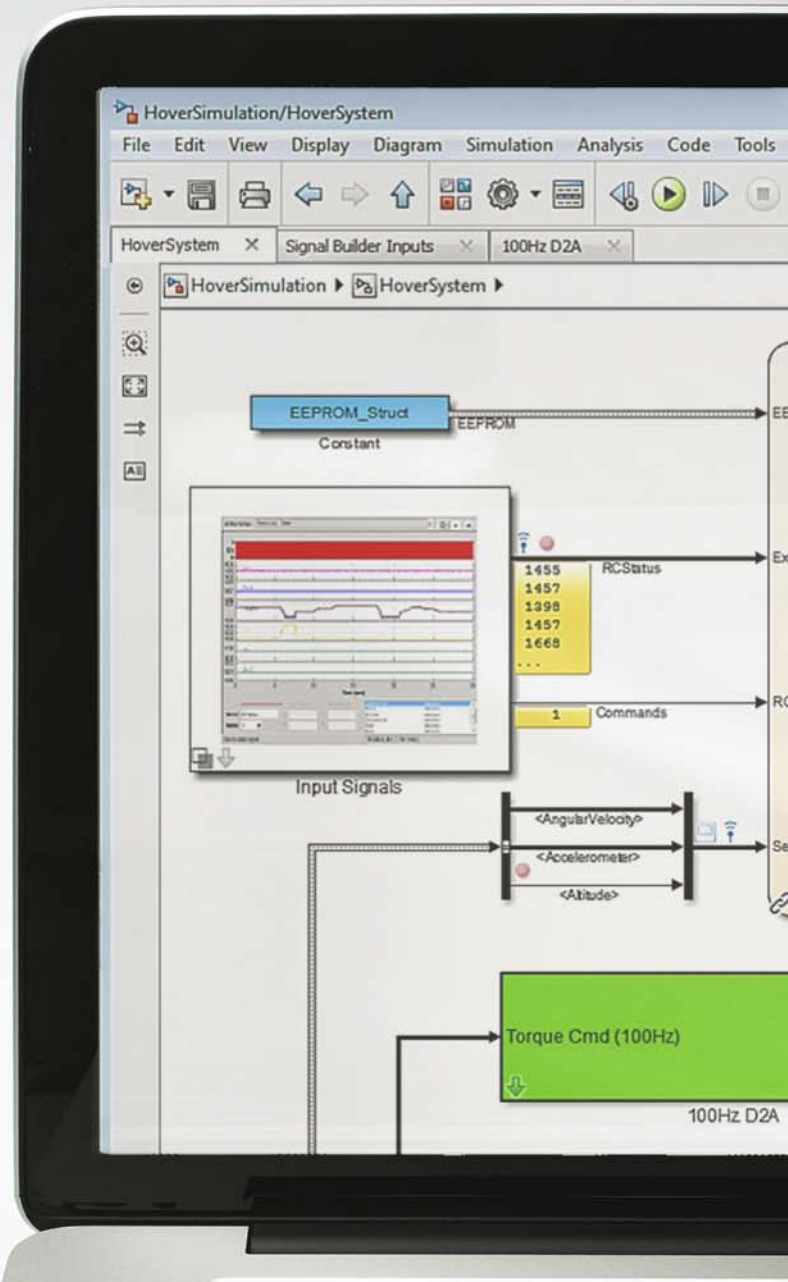

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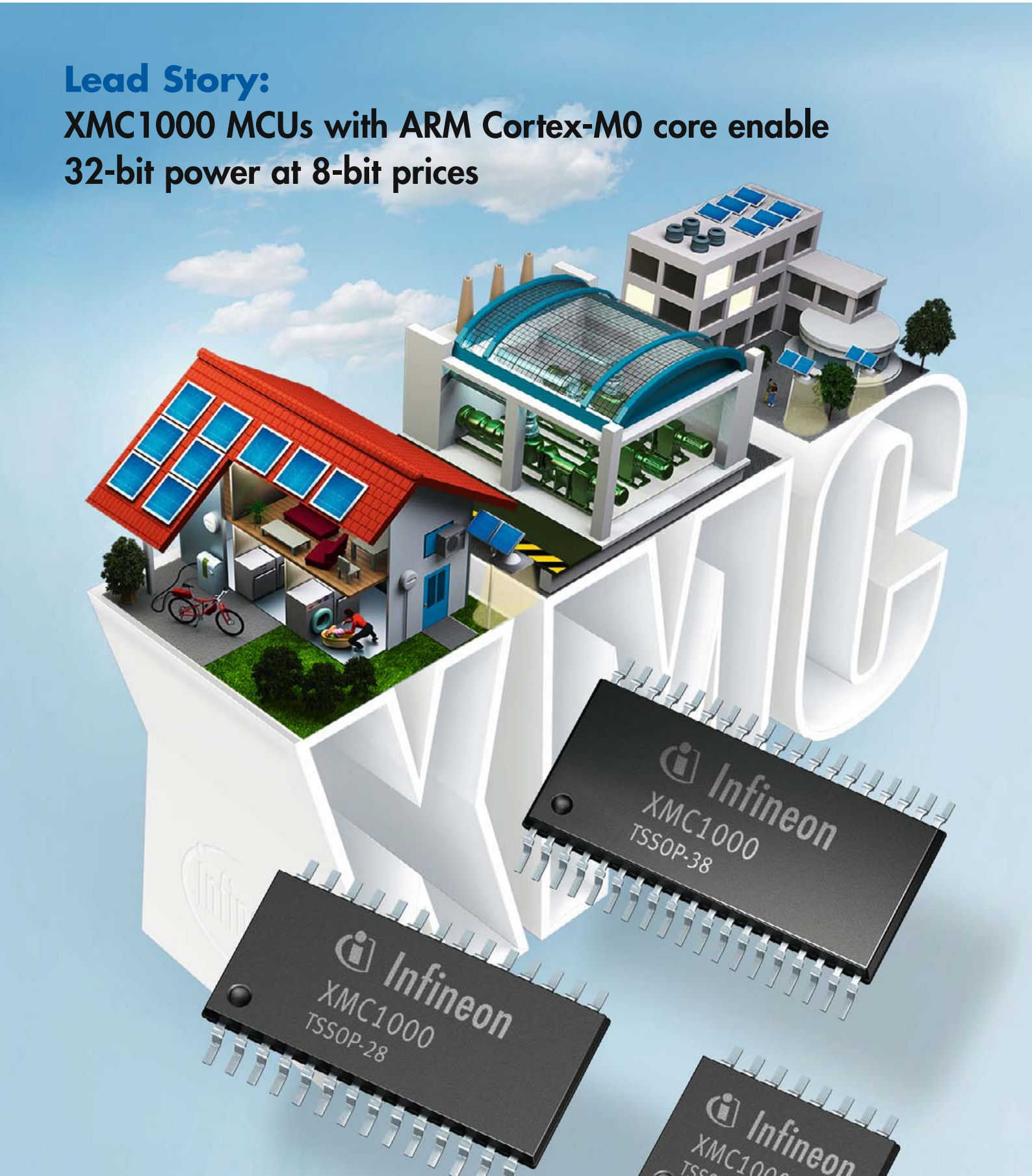
Lead Story:

XMC1000 MCUs with ARM Cortex-M0 core enable 32-bit power at 8-bit prices



MCUs with ARM Cortex-M0 core enable 32-bit power at 8-bit prices

Dirk Heinen and Arno Rabenstein, Infineon Technologies

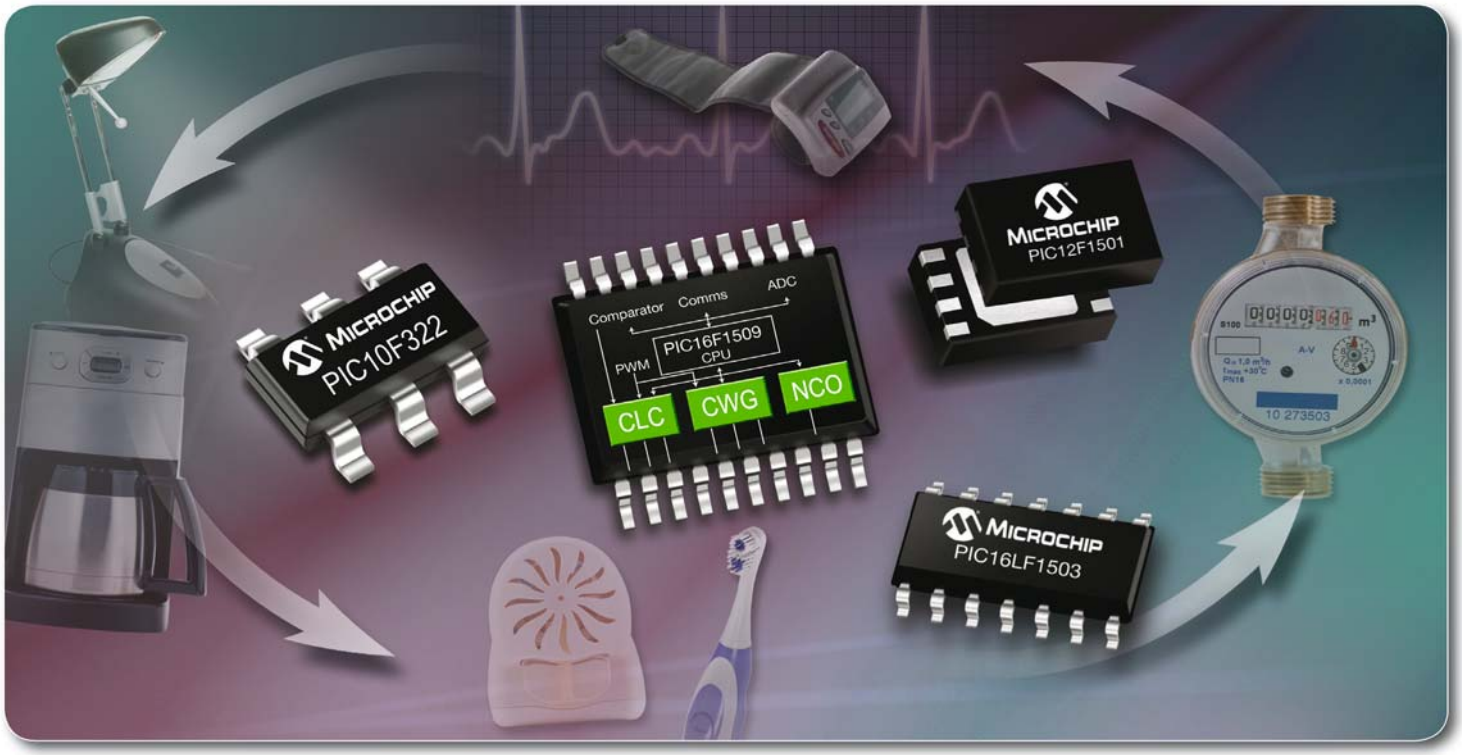
The trend towards replacing 8-bit with 32-bit microcontrollers is clear. According to market observers almost half of developers in German industry are planning this switch. The price level has been the limiting factor, but Infineon now caters for this situation with its new XMC1000 family, using the standard Cortex-M0 processor core.

The new MCU products will be produced with an internal feature size of 65nm and on 300mm wafers. Customers who use a broad spectrum of microcontrollers also benefit from the fact that the XMC1000 is a genuine complement to the XMC4000 microcontroller family introduced in early 2012. Numerous peripheral units such as timers, A/D converters and serial communication interfaces are identical to those of the XMC4000 Cortex M4 products. This opens up numerous and diverse possibilities for scaling. For efficient software development, the development environment DAVE is available free of charge. In addition to a number of the peripheral functions already known from the XMC4000 family, the XMC1000 derivatives offer features which, to date, have not been found in 8-bit microcontrollers. A unique feature for this market segment is, for example, the range of flash memory variants, which extend from 8 Kbyte up to 200 Kbyte. In particular, special peripheral functions permit the professional and at the same time simple implementation of LED lighting applications and energy-efficient motor controls. With a solution concept for the IP protection of embedded software, Infineon is also addressing an ever-more important trend within the microcontroller market. With its feature set, the XMC1000 family addresses the broad field of previous 8-bit applications. These include such applications as motor controls, LED lighting, digital power conversion, smart sensors, capacitive control elements, and LED displays in addition to numerous other possible uses. To this end, the new XMC1000 derivatives offer, besides the 32-bit Cortex-M0 with 32 MHz, numerous new features such as up to 200 Kbyte flash memory, powerful mixed-signal peripherals, modules for touch control and LED displays (LEDTS), a peripheral unit patented by Infineon for the dimming and colour control of LEDs (brightness and colour control unit, BCCU), a flash loader with 128-bit AES encryption for software IP protection and a Math coprocessor with 64 MHz for efficient motor controls.

What is more, with such features as hardware error correction (ECC) and corresponding memory tests, the new microcontrollers satisfy the requirements defined by the IEC60730 class B standard, as prescribed for the safety of household appliances sold in Europe. Using the flexible USIC interface module, it is possible to implement various serial communication protocols such as ASC, SSC, I2C and I2S. A USIC module offers two independent communication channels. A dedicated FIFO permits buffering for slower applications. The A/D converter module consists of a kernel that operates according to the principle of successive approximation (SAR). The resolution can be programmed with 8, 10 or 12 bits. What is more, the amplification can be set individually for each channel. A FIFO memory prevents data loss when working with very fast sampling rates. The XMC1200/1300 series also integrate two sample-and-hold stages and high-speed analog comparators. Measurements with the A/D converters can be triggered by the CCU4/CCU8 timers. Other helpful peripheral functions include a pseudo-random number generator, a real-time clock (RTC) and a window watchdog timer (WDT).

With three product series including 23 products, each member of the XMC1000 family caters for different applications. By way of example, the XMC1100 Entry Series offers a basic range of functions to facilitate entry into the XMC world. Nonetheless, the features are state-of-the-art, with 12-bit A/D converters and 16-bit timers which allow various PWM

New 8-bit Microcontrollers with integrated configurable logic in 6- to 20-pin packages



Microchip's new PIC10F/LF32X and PIC12/16F/LF150X 8-bit microcontrollers (MCUs) let you add functionality, reduce size, and cut the cost and power consumption in your designs for low-cost or disposable products, with on-board Configurable Logic Cells (CLCs), Complementary Waveform Generator (CWG) and Numerically Controlled Oscillator (NCO).

The Configurable Logic Cells (CLCs) give you software control of combinational and sequential logic, to let you add functionality, cut your external component count and save code space. Then the Complementary Waveform Generator (CWG) helps you to improve switching efficiencies across multiple peripherals; whilst the Numerically Controlled Oscillator (NCO) provides linear frequency control and higher resolution for applications like tone generators and ballast control.

PIC10F/LF32X and PIC12/16F/LF150X MCUs combine low current consumption, with an on-board 16 MHz internal oscillator, ADC, temperature-indicator module, and up to four PWM peripherals. All packed into compact 6- to 20-pin packages.

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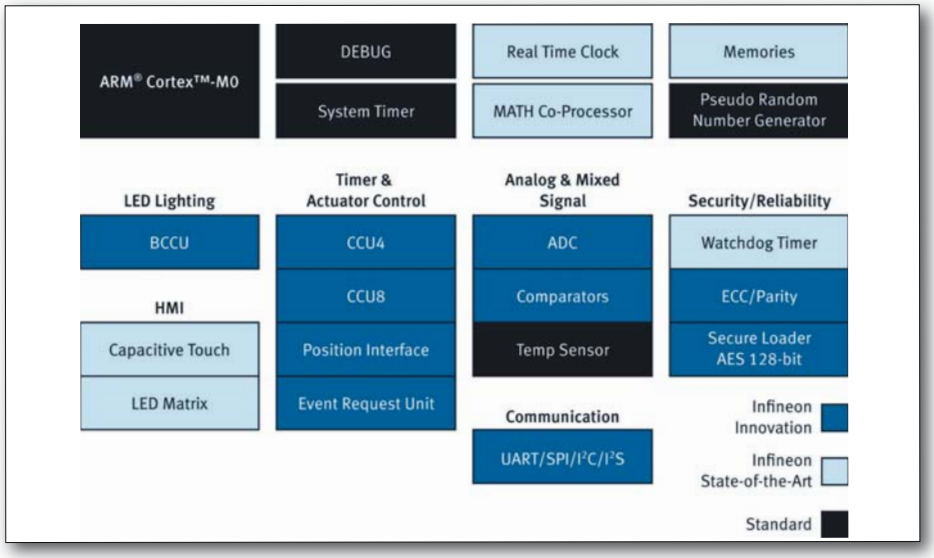


Figure 1. The new XMC1000 microcontrollers with ARM Cortex-M0 processor core offer 32-bit performance with innovative features at 8-bit prices.

		XMC1100	XMC1200	XMC1300
System Performance	Core	ARM® Cortex™-M0		
	CPU Frequency	32MHz		
	Co-Processor			MATH[1]
	Flash Size	8–64kB	16–200kB	8–200kB
	RAM Size	16kB	16kB	16kB
Timers	POSIF			1x
	CCU4 (4ch)	1x	1x	1x
	CCU8 (4ch)			1x
Signal Processing	ADC 12-bit	1x	1x (2x S&H)	1x (2x S&H)
	Comparator		Up to 3x	3x
Communication	Serial Channels (UART, SPI, I²C, I²S)	2 Channels	2 Channels	2 Channels
Application Specific	Touch Control/LED Display Matrix		✓[2]	
	LED Dimming & Color Control		✓[3]	✓[1]

1) Not valid for all variants of this product series
2) Only for XMC1201 sub-series
3) Only for XMC1202 sub-series

Figure 2. Three series (XMC1100, XMC1200 and XMC1300) – optimised for various applications

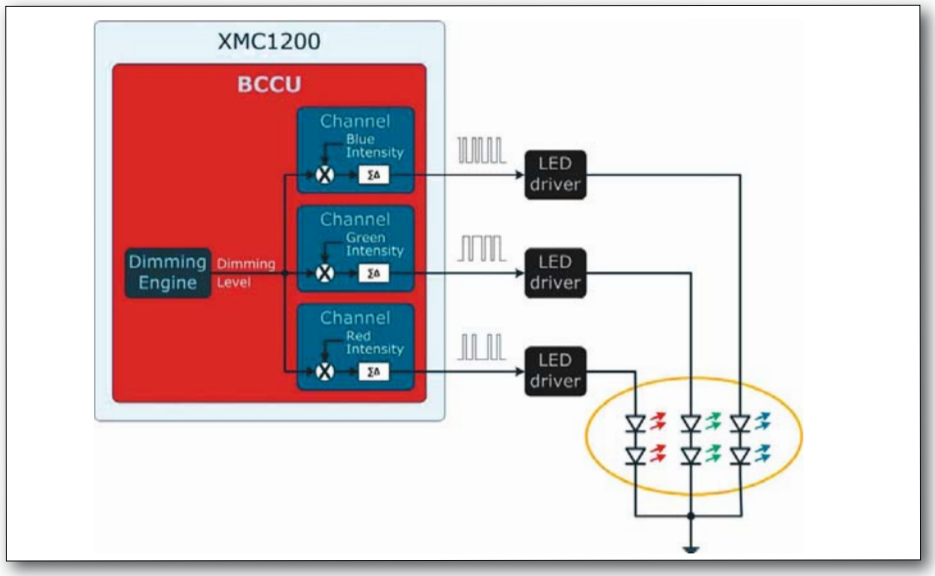


Figure 3. LED lighting control with the BCCU unit

patterns to be generated. The XMC1200 Feature Series comprises additional application-specific features, such as the above-mentioned BCCU and LEDTS units. Furthermore, versions are available for the extended temperature range of -40°C up to 105°C. Last but not least, the XMC1300 Control Series is specially geared to applications in the area of motor control and digital power conversion. To this end, besides the exceptionally powerful Capture/Compare Unit 8 (CCU8), it also features, for example, a position interface (POSIF) for the precise detection of the motor position as well as a Math coprocessor, which permits efficient sensorless FOC (field-oriented control) solutions for electric motors – the latter being unique for Cortex-M0-based products. The XMC1300 family also offers variants for the temperature range up to 105 °C.

The basic function of the BCCU (XMC1200 and XMC 1300 series) consists in automatically making dimming signals available at the port connections for external LED drivers. The BCCU is designed for automatically controlling the dimming and the colours of multi-channel LED lamps. A key feature is the automatic high-frequency intensity modulation (PDM with 12-bit resolution). This permits a flicker-free display. The exponential dimming and linear adjustment of the intensity allow the dimming steps and colour changes to appear totally natural for the human eye. A wide range of drivers and high-performance LEDs is supported.

Using the two LEDTS modules of the XMC1200 family, it is possible to drive LEDs and touch panels in HMI applications. At the same time, the LEDTS can measure the capacitance of up to eight touch pads each with the aid of an RO (relaxation oscillator) topology. Up to 64 (8x8) LEDs can be controlled in one LED matrix. The modules can be synchronised with each other for optimised results. Touch pads and LEDs can share pins, which in turn minimises the number of pins required.

The CCU4/CCU8 timer units and POSIF position interface provide a simple means for sensing the position and speed of a motor for efficient motor controls. In addition, the Math coprocessor can perform vector rotation (PARK transformation) with 24-bit resolution, which in turn allows powerful algorithms to be implemented for field-oriented motor control. The CCU4 is primarily designed for switched-mode power supply applications. It can be used, for example, for pulse generation or, with the aid of the dither function, for stabilising slow control loops. In conjunction with the programmable POSIF block, it is also possible to evaluate an incremental encoder. For various applications, using the POSIF allows the

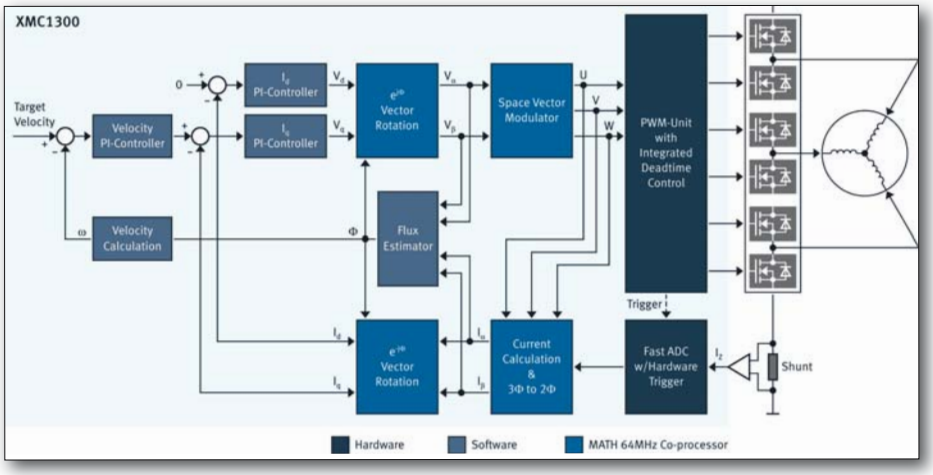


Figure 4. Sensorless, field-oriented control with the XMC1300 microcontrollers

accuracy to be improved and the software simplified, since the corresponding data can be acquired at the same time. A low-pass filter suppresses the noise and interfering impulses from the Hall sensor and rotary transducer, which can lead to incorrect position and/or speed readings.

Using the CCU8 and the additional compare canal, it is possible to define different delays for rising and falling edges and to generate asymmetric PWM signals. Typical applications that benefit from this include 3-phase inverters for drives, 3-level inverters for solar modules and half-bridge converters. The 64-MHz Math coprocessor consists of a 32-bit scaler and a 24-bit CORDIC for trigonometric calculations. Both the scaler and the CORDIC unit can operate in parallel with the Cortex-M0 CPU. The Math unit increases the processing power significantly for real-time applications.

In introducing the XMC1000 family Infineon has addressed the ever-more important aspect of IP security. Essentially, it is about ensuring that software can only run on specific microcontrollers and that only certain persons have access to the software code throughout the production process. The Infineon concept involves providing the IP owner with a tool that encrypts the embedded software, with a key that is only known to defined XMC1000 microcontrollers and, accordingly, which only permits programming on just these MCUs. At the same time, the MCUs each carry customer and/or project-specific keys and execute a routine (secure loader mode, which is supported by the loader tool) that works on the basis of the 128-bit AES method and only encrypts the code during the loading process, which it saves to the flash memory, before finally providing it with a lock protection facility. For efficient software development, in common with the XMC4000 series, the development environment DAVE is available, which can be downloaded free of charge from the Infineon website. The tool package comprises an automatic code generator on the basis of DAVE Apps, a free GNU compiler and debugger, including flash loader. DAVE supports automatic code generation based on predefined and tested software components – otherwise known as DAVE Apps. In contrast to the conventional approach with libraries and sample programs, the DAVE Apps are more abstract and permit the simple graphic combination of multiple DAVE Apps. This allows the hardware resources to be mapped automatically and accurately on the chip. A simple evaluation facility for the new XMC1000 products is offered by what are known as boot kits, which are available for each of the three product series. In conjunction with DAVE, a debugger and a number of sample apps, they provide a complete package for the development of simpler application software. For an application-oriented approach, Infineon provides dedicated application kits. For XMC1000, a kit will initially be available for the development of LED lighting solutions and, from May 2013, also a kit for standard and highly efficient motor controls.

Infineon is presenting the new XMC1000 microcontrollers at its stand (Hall 4A, Stand 222) at the Embedded World 2013 exhibition in Nuremberg. Initial samples of the new family and the boot kits will be available from March 2013. Package options are 16-, 28- and 38-pin TSSOPs. XMC1000 products will be offered for large order volumes from as little as € 0.25 and up to around € 1.25 for the full range of functions. ■

www.infineon.com/xmc1000

Choosing the right embedded flash disk for various applications

By Axel Mehnert, Hyperstone

This article describes how flash controllers can be used to directly embed flash drives onto PCBs and into systems. Hidden bill-of-material including firmware versions or additional costs can be avoided and control over component lifetimes maximized. Drives can be configured according to the application-specific requirements.

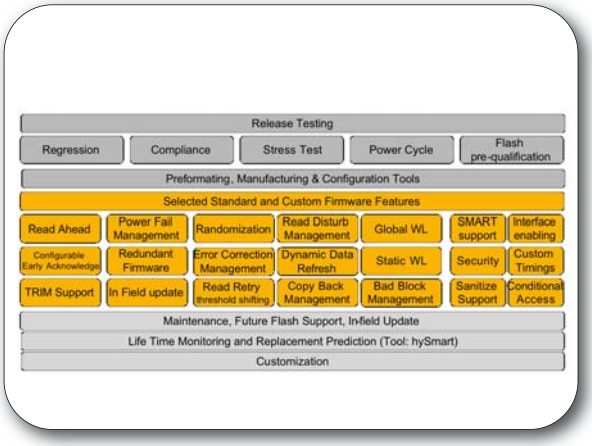


Figure 1. Hyperstone hyReliability Firmware architecture - selected modules

■ At the Embedded World 2013, Hyperstone is presenting their updated product line-up of NAND flash controllers including SATA and SD 3.0 controllers. Together with hyReliability firmware, embedded designers can easily realize embedded flash directly on-board. Designers are facing an increasing number of options when designing an application that requires mass storage. Depending on requirements, the trade-offs in terms of cost per bit, quality, life cycle cost, and maintenance are significant. HDDs still offer the best cost per bit. However, for an increasing number of applications, local storage is flash-based since NAND flash offers several advantages. Many different NAND-based standard products are available from solid state disks (SSD) to flash memory cards (e.g. SD cards, CompactFlash cards and USB flash disks) to embedded flash multichip packages (MCP) such as eMMC. Significant differences in terms of cost, capacity, performance, quality, reliability, and power consumption relate to flash process, controller, and firmware technology.

NAND memory technologies today include single level cells (SLC), multi-level cells (MLC) and three level cells (TLC). These technologies differ in how many bits of information (levels) are attributed to different numbers of electrons pushed into a floating gate. More levels mean fewer electrons associated to a bit of information. Fewer electrons mean more errors and less data retention. Also, physical stress to each memory cell is increased the more electrons need to be pushed in and out of the floating gate as it is being programmed or erased. Hence, the specified lifetime in program-erase cycles (PE cycles) is much smaller for TLC than for SLC, for example. Finally, the likelihood of disturbances resulting from operations to neighbouring cells or as an exposure to heat increases. All those effects get worse and more significant as manufacturing process technology shrinks. All these effects result in faster cell wear-out, less data retention, longer program times, and higher power consumption.

Of course, higher information density per chip area is cheaper. Since most NAND flash providers have to fight for cost leadership per mm2 chip area and the main volume is in consumer markets, cost optimization is focusing on MLC and TLC. Hence MLC product life cycles are shorter and usually MLCs available are already in smaller geometries compared to the comparable SLC available at the same time. For instance, today you might consider 1x MLC or 2x SLC. At the same time, today you can still buy 4x and 3x SLC, but 2x MLCs are already difficult to procure. TLC reliability parameters are not suited for embedded designs, which can be derived from table 1. Consumer products have been offering sufficient quality and endurance for many applications with increased reliability requirements in the past. In the future, they are likely to fail since they have been designed to satisfy other requirements. Beyond being a bridge between two interface protocols, the firmware is responsible for managing the flash media including error handling, power fail recovery, countermeasures against wear-out, and optimal usage of all flash cells, to name a few examples. The firmware has to continuously make arbitrary decisions regarding performance, wear-out, robustness and data retention. As an example, one physical effect that has become more significant recently is the so-called read disturb. This refers to the phenomenon of when a specific sector of one page is read and another sector of another page that is neighbouring on the flash physical topology is impacted. After a certain number of reads, this other sector might deliver significant bit errors, eventually exceeding the controller ECC strength. This has an impact on the stored firmware itself, parts of the OS or files system, or possibly application data that is read repeatedly. The firmware can address this phenomenon by refreshing certain areas based on read counts of other areas. To do so, the phenomenon has to be assessed for each flash. Afterwards, a refresh procedure has to be implemented trying to minimize performance penalty or additional programming overhead which

	SLC	MLC	TLC
Cost per Gbit	Higher	Lower	Lowest
Program /erase cycles	50K to 200K	2K to 10K	<<1K
Power fail impact on Flash	Current page might not finish	Data that has been already written into a page can be destroyed	Data that has been already written into a page can be destroyed
Product life cycle	Longer	Shorter	Shortest
Target application	Industrial/OEM/Enterprise	Consumer/OEM/Enterprise	Consumer/Commodity
Prone to read disturbs	Later (e.g. after 100K reads)	Sooner	Earliest
Program disturbs	Later	Sooner	Earliest
Raw bit error rates	Lower	Higher	Highest
Performance	Faster	Slower	Slowest
Power consumption	Lower	Higher	Highest
Data retention	Higher	Lower	Lowest

Table 1. High-level comparison of SLC, MLC and TLC NAND memory technologies

again would add to wear-out. Also, this might lead to busy times not expected by the hosts. Another significant and often discussed feature is wear levelling. The principle is to use all pages/blocks of a flash evenly. A so-called logical to physical mapping is required and managed by the firmware. This mapping, if you look at it in detail, is quite complex. Depending on the administrative architecture being based on blocks or pages, the mapping tables differ in size to an extent that either requires hundreds of MB external DRAM

	A1 (new)	A2 (new)	S6	S8 (new) *
Flash Interface	Asynchronous SDR, Open NAND Flash Interface (ONFI) 1.1 compliant	Asynchronous SDR, Open NAND Flash Interface (ONFI) 1.1 compliant	Asynchronous SDR, Open NAND Flash Interface (ONFI) 1.1 compliant	Asynchronous SDR, Toggle DDR, ONFI 2.3 compliant, compatible to ONFI 3.0 and Toggle DDR 2
# of Chip Enables	Up to 16 (up to 64 with external decoding)	Up to 32 (up to 128 with external decoding)	Up to 4	Up to 8
Flash Voltages supported	3.3V	1.8V, 3.3V	1.8V, 3.3V	1.8V, 3.3V
Error Correction	6/8 per 512, 24 bit per 1K byte BCH	6/8 per 512, 24 bit per 1K byte BCH	4-byte RS per 512 byte sector	Flexible ECC Engine
Supported Flash Generations	Any SLC MLC up to 2x	Any SLC MLC up to 2x	SLC up to 2X	Any Flash up to 1x
Flash Page Size Support	up to 8K	up to 16K	up to 4K	up to 16K
Performance	max. 60 MB/s read/write	max. 140 MB/s read max. 120 MB/s write	max. 25 MB/s (SD) read/write	max. 90 MB/s read/write
Interface to Host	CF 4.1 compliant, CF 5.0 compatible, up to UDMA 6	SATA II, CFAST 1.0	SD 2.1, MMC4.2	SD3.0, SD2.0, eSD2.1, MMC 4.2, eMMC 4.4
ATA Security Command Support	Yes	Yes	No	No
SMART function	Yes (ATA)	Yes (ATA)	Yes (proprietary)	Yes (proprietary)
Other Interfaces	ISO 7816	ISO 7816	ISO 7816, UART, GPIOs	ISO 7816, SDIO 3.0, 8-Bit parallel data I/O, SPI, I2C
Pins for external Power Fail Circuitry	Yes	Yes	No	No
Hardware Encryption	No	No	No	AES 128, 256
Security Features	proprietary Features	proprietary Features	CPRM and ASSD 2.0 supported	CPRM and ASSD 2.0 supported
Power Fail Tested	Yes	Yes	Yes	Yes
Wear Leveling	Static & Global	Static & Global	Static	Static & Global
Read Retry /Voltage shift	Yes	Yes	No	Yes
Read Disturb Management	Yes	Yes	No	Yes
Dynamic Data refresh	Yes	Yes	Partially	Yes
Redundant Firmware	Yes	Yes	Partially	Yes
In Field Firmware update	Yes, w/o data loss	Yes, w/o data loss	Yes	Yes, w/o data loss
Temperature Range	-40°C to 85°C	-40°C to 85°C	-25°C to 85°C	-40°C to 85°C
Packages	TQFP, Bare Die	BGA, Bare Die	LGA, Bare Die	LGA, BGA, Bare Die

* *Samples available in Q3 of 2013*

Table 2. Hyperstone product overview (SD, eMMC, PATA and SATA) suited for embedded flash disk on board

	Embedded Flash Multi Chip Package (MCP)	Discrete 2 Chips Embedded Flash Disk on board (DoB)
Interface Options	eMMC, eSD, SATA	eMMC, SATA, PATA, SD/eSD, USB
Main Target Applications	Consumer/Mobile	Industrial/Multi-Segment/OEM
Based on Flash Technology	MLC & TLC	SLC & MLC
Industrial Temp available	No	Yes
Firmware Configurability	No	Yes
Product Availability	2-3 Years Depending on consumer life cycles	5 to 10 years, long term availability of all components
Endurance Trend	Towards lower endurance	Stable
Scalability	Limited to supplier line-up	Fully Scalable in terms of cost, capacity and quality requirements

Table 3. Comparison of embedded flash as MCP or discrete disk on board (DoB)

(page-based) or sufficient to be using internal SRAM (block-based). Each approach has certain trade-offs in terms of power-fail robustness or performance. It might be beneficial to use a "local" wear levelling approach that manages only a single flash in order to make use of certain performance features of the flash such as copy back. While this increases system performance, it results in one flash chip deteriorating faster than others within the system. The global wear levelling approach uses all chips but cannot utilize the copy back feature.

Another example of a non-trivial decision is the consideration and interpretation of bit errors. The firmware can define several bit error thresholds after how many bit errors a page or block could be refreshed, copied, retired and mapped out assuming it has reached the end of its useful life. Many flash systems show performance degradation over their lifetime. The reason is not only the increased ECC activity due to deteriorated flashes but also the fact that an increased amount of housekeeping and maintenance operations are being executed in the background.

These are just a few examples of many features that are not transparent in their implementation but can have a significant impact for an application over their operating life time. The impact of flash generation changes or any firmware change can be significant, making it challenging to qualify a flash system for an application. This tremendous firmware effort is one reason why connecting raw NAND or even NAND with added ECC hardware is not efficient for many applications. When qualifying and managing product changes of a managed NAND option such as an eMMC, you might want to monitor flash, controller and firmware versions as part of a bill of materials that might be partially hidden and not easily transparent.

Integrating modules or cards such as CompactFlash cards, SD cards, USB flash disks, or solid state disks, is certainly the most flexible option. Most standard interfaces are available in some standard form factor. The module or card manufacturer is part of the value chain and takes care of flash and controller procurement, system and PCB design, manufacturing including firmware preformatting as well as life cycle management and warranty. With respect to flash systems, these are very valuable services. Independent of the mainboard life cycle, modules or cards are removable. Updates can be quite easily accommodated. With one qualification cycle you can roll out new revisions over several applications or platforms.

However, for cost optimization of a stable application with certain volumes or for space considerations, it might make sense to integrate and embed a flash-based mass storage sub-system directly as an MCP on board. Such modules are available mostly in BGA packages and are

more or less standardized, e.g. with eMMC or SATA interfaces. However, since most are developed for consumer markets, cost might be attractive but suitability for other applications and extended requirements might be questionable. Another alternative is integrating flash controller and flash as two discrete components. This has certain benefits especially for industrial embedded applications.

Based on Hyperstone products, it is easy to implement an embedded flash disk onto a PCB and into systems. Chip hardware, fully qualified to industrial requirements, is available together with the most reliable firmware. Reference design schematics, configuration tools as well as local support will help you to optimize firmware for your specific requirements. Controlled or even fixed BOM is fully under control. Once a setup has been qualified, the requalification effort can be minimal. The impact of reacting to any flash EOL is smaller since controller and firmware might not need to be changed. Hyperstone currently offers flash controllers supporting any type of flash technology and interfacing to SATA, PATA and SD or MMC hosts. Another advantage is long term availability. Certain Hyperstone controllers have been available for more than 10 years, and support for new flash memories continues to be added today.

When qualifying a storage system that includes NAND flash, controller, and firmware, the firmware version is also an important factor for qualification. Hyperstone can support designing an application with an embedded flash storage sub-system integrating controller and NAND flash in parallel. Customization and application specific tuning is possible. In any case, SLC is the flash of choice for reliability and endurance. eMMCs are currently designed and optimized for consumer mobile phones. Since eMMC or embedded flash MCPs are often exposed to cost pressure from consumer markets, changes to flash, controller, and firmware are much faster and usually not announced via product change notes. Long-term availability of qualified industrial products is questionable.

Given these constraints, predominantly MLC-based MCPs require a great level of attention to whether the controller, firmware and choice of flash are optimally suited for your application over the whole life cycle. Using a separate controller, NAND flash, and an optimally configured firmware will help applications to be more rugged and the storage sub-system to be better tuned for the target application. Also, life-cycle cost is minimized due to long-term availability of Hyperstone products. The need for frequent changes to products is reduced thus resulting in lower cost for requalification. ■

Embedded industry trends: a silent MCU revolution

■ Today, there is a silent revolution on the embedded market. Most new microcontrollers and application processors that are introduced are based on the ARM architecture. In 2012 we also saw the launch of several new ARM processors. At the low end of the spectrum, the Cortex-M0+ processor has been introduced for applications which were previously dominated by 8-bit microcontrollers. The new 64-bit Cortex-A50 series processors address the high-end market such as servers. Gartner is forecasting 50 billion devices connected to the Internet-of-Things (IoT) by the year 2020, and ARM processors span already the whole application range from sensors to servers. Here I can just mention a few innovative products that have been introduced lately, it is not possible to cover a complete list of all new ARM devices.

ARM Cortex-M0+ processor-based microcontrollers are already available from Freescale and NXP. These modern 32-bit devices beat most 8-bit microcontrollers on price, performance, and even power consumption. They are easy-to-use, have powerful debug and trace capabilities, are offered in very tiny packages and to me there is today no reason for using 8- or 16-bit microcontrollers. New Cortex-M4 processor-based devices have been launched by Atmel, EnergyMicro, Infineon, Freescale, and STMicroelectronics. These devices provide capable peripherals combined with enough processing power for demanding floating-point and DSP algorithms. There is also a trend towards multi-processor devices which combine two Cortex-M cores (NXP LPC4000) or a Cortex-M4 processor-based MCU with a Cortex-A5 application processor (Freescale Vybrid). Such devices are designed for example for feature-rich graphical user interfaces that integrate deterministic control software.

With the availability of ever more capable microcontrollers, software development for these devices has become more complex over the years. Use of real-time operating systems is rapidly becoming an industry best practice, and usage of commercial middleware as well

Reinhard Keil, Director of MCU Tools, ARM Germany

as reuse of custom libraries is gaining importance for cost-efficient software engineering. Successfully combining these building blocks of a modern embedded application often poses a problem for developers. To solve this, ARM is introducing a new approach to component-based software development. A structured description format for arbitrary components like device support files, operating systems or communication stacks allows automatic dependency resolution, reliable version management and consistent configuration. With MDK Version 5, we will demonstrate a reference implementation of a component-based software development system for ARM Cortex-M processor based systems at Embedded World 2013.

Computer-On-Modules (COM) is another strong industry trend and frequently, the boards are powered by ARM Cortex-A series application processors available from Broadcom, Freescale, NVIDIA, Marvel, Qualcomm, Samsung, or Texas Instruments. COM boards are available from several hardware manufacturers in various form factors and have enough processing power to replace traditional PC-based industrial computers while consuming less energy. Most COM boards run a Linux or Android operating system and therefore offer cost benefits on hardware and software. For optimizing the application code towards performance or energy efficiency, the tool industry offers analyzers such as the ARM DS-5 Development Studio with Streamline system and performance trace capabilities. ■

Increasing advances for microcontrollers today

■ Over the years, microcontrollers (MCUs) have significantly evolved. The demand for MCUs, known for their lower power levels, has also increased. Requests from MCU customers include smarter, more integrated devices so their product systems can be controlled with fewer components while offering consumers greater capabilities. Although 8-bit MCUs may be utilized in specific, dedicated functions (e.g. system monitoring or power-up sequencing), it seems that MCUs in general are trending towards increased intelligence while keeping a smaller package footprint. Specifically, we're seeing a rise in four key functionalities in MCUs – low power, real-time control, safety and connected MCUs.

Low power: Consumers are seeking to add more capabilities to their lives with smarter gadgets. However, these "smarter" gadgets must also offer low power levels so that we conserve energy and never have to change batteries. Some examples of these types of applications include blood glucose meters used in a preventive measure to help wirelessly monitor blood glucose levels, food intake, along with other vital signs and transmit them wirelessly in regular intervals to the consumer or doctor. Then everyday items, such as smoke detectors are getting makeovers so that they never need battery changes – no beeping – and they also get additional functionality such as glass break detection, temperature monitoring and more. Real-time control: Appliances and systems are becoming smarter every day. Products such as washing machines can now adjust for various loads, cycles, water levels while reducing energy

Sang Chon, Director, Central Marketing, Microcontrollers, TI

consumption. MCUs are becoming smarter with on-chip digital signal processing capabilities and advanced analog that can assess and calculate special real-time control techniques for adjusting motor and power operations. Other products that require real-time control include renewable energy, industrial motors and lighting.

Safety: Safety-critical systems are everywhere today. Customers need components and systems to be safety-certified ready to meet IEC and ISO safety standards. Take the auto industry for example, previously safety MCUs were only used in items such as electric power steering and anti-lock brakes. Over the years, we've seen new hardware and software technology in MCUs to enable airbags and advanced driver assistance systems that prevent things like lane intrusion. And safety affects many other industries – transportation, industrial, medical and renewable energy. Connected MCUs: End products are becoming increasingly small and more connected. So, MCUs need to offer additional connectivity options without increasing the footprint. The evolution of silicon technologies and on-chip integration innovations make it possible to do this. These connected, integrated capabilities are especially important for applications such as high-performance data converters, sensors, human interface technologies (e.g. touch and proximity detection) and wireless communication protocols (e.g. NFC and WiFi) in consumer, industrial and automotive applications.

These MCU functionalities, combined with a world full of inventors – in the "maker" space or commercial space, lead customers to look beyond basic MCU silicon to differentiate their products. Now time is spent on software and system integration. To meet these customer needs, MCUs should be offered with software, development tools and application-specific software libraries and tools to make development and differentiation key.

TI products offer a broad spectrum of microcontroller products for ultra-low power, real-time control, safety, computing and connectivity applications. These are easy to use by customers with a strong eco-system of software, tools, documentation and application notes. They provide a path to our customers to provide strong differentiation in their applications, bill-of-materials cost reduction by integrating needed analog for particular applications, as well as application-specific tools and software for ultra-low power uses, motor control applications, smart grid solutions, functional safety designs and more. The sky is the limit with product development using the ever-evolving MCU market. ■

Chips & Tools News

Hall-Stand 1-318

Rutronik presents complete solutions for vertical markets at embedded world

Rutronik will be presenting itself at embedded world as a provider of complete application-specific solutions for the lighting, medical, energy, automotive, industrial and home appliance focal markets. With a full portfolio that covers all electronic components, Rutronik is able to present complete solutions in full detail and is therefore able to tune them to precise technical and commercial needs. Innovative, functional example applications for each focal market will be among the highlights on the fair stand. These include an electric car from Tesla and an LED "Arquicity" street lamp with automatic brightness adjustment, developed by Rutronik in collaboration with Osram Opto Semiconductors and the solid state lighting specialists Arquiled. As an example for the industrial field, Rutronik will be demonstrating the intelligent energy controlling system from econ solutions, in which the distributor also contributed to the development. It provides industrial companies with transparency about every point of energy consumption, thereby providing a basis for a comprehensive system of energy management. Product and application engineers from the six vertical market teams and from all of the product divisions stand ready to provide fair visitors with expert advice.

News ID 14887

Microcontroller trends: comprehensive eco-systems and standard cores

Embedded systems are fundamental to modern electronic applications, ranging from industrial control to home appliances and consumer devices to office automation. Trends that support rapid, successful development include application-specific devices, comprehensive eco-systems, and standard cores.

One trend helping to make selection easier is the growth in the number of application-specific microcontrollers. These devices provide single-chip solutions to complex design challenges by integrating the key functional blocks, peripherals and interfaces demanded by the design. An example of this trend can be found in the motion control arena with the emergence of a new generation of devices offering intelligent motor drive solutions for variable speed brushless DC motors. Some of these MCUs even implement in firmware the complex algorithms required for effective vector/field oriented control (FOC). Developers can combine these functions with their own proprietary motor control IP or use the firmware to handle all FOC functions. In either case accurate and efficient motor control is achieved without lengthy and complex software development. Other dedicated on-board functions may include those relating to functional safety – for instance oscillation frequency detection (OFD) for compliance with IEC60730 standards. A similar trend can be seen with smart metering. Microcontrollers with functionality and performance optimised for residential and

Roland Gehrmann, Consumer and Industrial IC Marketing Manager, Toshiba Electronics Europe

commercial meters allow designers to replace traditional two-chip analog front end (AFE) and processor implementations with a single chip. These devices integrate functions such as high-accuracy active power measurement, analog-to-digital conversion, display drivers, gateway communication features and anti-tampering detection. More recently we have seen devices dedicated to healthcare in areas such as glucose and blood pressure monitoring. As well as demanding the functional specification, this market also puts significant price pressure on MCU manufacturers thanks to the often disposable nature of the target application. Even with dedicated hardware, embedded implementations can present significant challenges, and the quality of tools and support will impact ease of implementation. That is why we are seeing a growing trend for semiconductor vendors to deliver comprehensive support eco-systems, including reference designs and starter kits for evaluation, prototyping and testing, and software to speed programming and visualisation. Take, for example, Toshiba's support for its motor control micro family. As well as a range of starter kits for 'out-of-the-box' development, the eco-system for these devices includes PC-based software providing an intuitive GUI to simplify configuration of key FOC motor control parameters. These include proportional-integral (PI) control settings, deadtime and PWM frequency. Embedded World also sees the launch of the latest addition to this eco-system – the SigmaBoard. Depending on application requirements the SigmaBoard – which combines a pre-programmed microcontroller with all the necessary components and interfaces for immediate use - can be a starter kit, a reference system, or a stand-alone BLDC motor control solution.

Finally we can expect to see more devices built around 'de-facto' standard processors such as the ARM Cortex range of cores. Standardization trends are fuelled by benefits that include re-use of IP and tools across projects and reduction of learning curves for developers. Fortunately standardization doesn't mean compromising on performance, functionality or efficiency. The latest ARM Cortex™-M4 processor core, for example, integrates powerful digital signal processing capabilities while retaining the low-power operation and small code footprint designers expect from the Cortex family. ■

Chips & Tools News

Hall-Stand 4-226

SEGGER: embedded software suite supports Energy Micro's Cortex-M3 Gecko MCUs

SEGGER Microcontroller and Energy Micro announce that SEGGER's embedded middleware suite now supports Energy Micro's range of ultra low energy ARM Cortex-M3 based EFM32 Gecko microcontrollers. The comprehensive feature-rich software suite from SEGGER delivers an easy-to-use environment for embedded systems development, offering exceptionally low memory requirements, which minimizes Bill-of-Materials costs and enables significantly reduced power consumption overall.

News ID 14834

Hall-Stand 5-320

Express Logic: ThreadX RTOS adds support for Xilinx Zynq-7000 EPP

Express Logic announced that its ThreadX RTOS now supports Xilinx's Zynq-7000 Extensible Processing Platform. ThreadX is a small-footprint, high-performance, royalty-free RTOS with efficient real-time responsiveness. With sub-microsecond context switching, and service times of 100-200 cycles, ThreadX easily supports the demands of embedded system devices. ThreadX also offers a rich ecosystem of complementary development tools, including the Xilinx ISE Design Suite for the Zynq-7000 EPP.

News ID 14841

Hall-Stand 1-205

Xilinx ships Zynq-7000 FPGAs with ARM dual-core Cortex-A9

Xilinx announced its first Zynq-7000 Extensible Processing Platform shipments to customers. For systems that need to support applications which require high, real-time performance, the Zynq-7000 EPP delivers levels of performance that go beyond what traditional processing solutions can implement. Emulation platforms, hardware development tools, Open Source Linux support and the recently announced Extensible Virtual Platform developed jointly with Cadence Design Systems, Inc. all help to make developing and implementing Zynq-7000 EPP systems possible.

News ID 14843

Cost-sensitive applications benefit from leading-edge microcontrollers

■ 5.6 billion US dollars in 2013 is the revenue number for 4/8-bit microcontrollers. That prediction by market researchers at IHS means that the low-end segment accounts for 31% of the worldwide microcontroller market. Most of the devices in this segment are based on quite old processor core architectures, peripherals and also manufacturing technologies. There are many commonly accepted reasons for this. 1) If computing performance requirements are low, there is not a huge pressure to upgrade to a higher performance processor. 2) If flash sizes of microcontrollers are small, technology shrinks do not make a lot of sense. 3) If hardware developers don't see the need for powerful digital signal processing peripherals, you can keep them simple. You can probably state a few more reasons. And there also is a sort of myth in the semiconductor industry: business economics dictate that low-end microcontrollers are best produced in an old, depreciated technology. We think it's time to revisit this myth. To understand why, let's first have a look at some of the important applications of low-end microcontrollers.

Start with low-end electric motors, which are used in huge quantities in washing machines, dishwashers, fans, heating pumps etc. Microcontrollers control the power circuitry, and system designers historically strive to use the lowest possible cost solution for the job. With increased pressure to save electric energy, despite the cost pressure this segment gets more and more important because the saving potential is typically above 50%. In addition to the energy saving topics the requirements for better user experience, like less noise and improved human machine interfaces, are increasing. Yet another accelerating trend is regulatory pressure to improve safety, which requires redundancy on the microcontroller but also the software running on the microcontroller. To address those challenges microcontrollers with more processing power, better peripherals and also more flash memory are needed.

In LED lighting, which is an emerging application segment for low-end microcontrollers, there are two market drivers that must be addressed. First, new peripherals are needed to control the LED drivers and to assure flicker-free dimming and brightness control. As this

Dr. Stephan Zizala, Senior Director, Industrial and Multimarket Microcontrollers, Infineon

is directly linked to the end user experience, it is important for the wide acceptance of LED lighting. Additionally, microcontrollers for LED lighting open the possibility to connect multiple LED fixtures via a network protocol like DALI, DMX or KNX. This requires microcontrollers capable in terms of processing performance and memory range to support enhanced connectivity.

Those trends are just two examples that illustrate how energy efficiency, user experience, legal requirements and new technologies make the traditional concept of a low-end microcontroller obsolete. But still, the price target for these types of systems mean that BOM cost remains a key factor. And there also remains the need for simple microcontrollers which just evaluate some analog signals to enable simple control or communication.

Even in the simplest applications there is a new trend. While one would wish that almost every engineer leaving college should be able to program the microcontroller, nowadays the number of engineers who are interested in 8-bit microcontroller programming is very limited. The goal then is to develop the software in a high-level approach, but still be able to run the software on a low-cost microcontroller. In other words, the optimum low-end microcontroller family now must offer both innovation and cost efficiency.

The XMC1000 of Infineon is the first low-end microcontroller family manufactured using a 65nm embedded flash manufacturing process on 300mm wafers. Besides the use of the 32-bit ARM Cortex-M0 processor, adopting a leading-edge production approach allowed to integrate peripherals used in the higher-end XMC4000 microcontroller family; e.g. PWM units enabling asymmetrical PWM wave forms, automatic dead-time insertion and much more, and ADC features (12-bit resolution, 2 sample and hold stages, 1.88 mega samples/second etc.). XMC1000 offers peripherals for cost-sensitive electric motor control systems which are also used to control industrial servo-drives. In certain family members there are also innovative peripherals for autonomous LED lighting control, touch sensing, and LED matrix control. Most importantly, this microcontroller family is fully integrated in Infineon DAVE integrated development platform. This is a free, unlimited, Eclipse-based development environment which introduces component-based programming to the low-end microcontroller world. In a graphical IDE one can configure and combine software components, known as "DAVE Apps". DAVE assigns these components to the microcontroller hardware resources and automatically generates code that can be compiled and debugged in the integrated free tool-chain.

In talking about software we see a new trend related to protecting software IP and enabling new business models. The idea is simple: link the software to a limited number of chips. XMC1000 is the first low-end microcontroller to enable this by integrating 128-bit AES as a security mechanism. Protecting software IP will become more and more important, since as hardware component cost continues to decrease the value of the software running on the "cheap" hardware increases. Protecting software IP also is of special interest for software design houses. If the software can be linked to a certain number of chips, copying software does not make so much sense anymore and royalty-based business models become much more attractive for them.

We are convinced that a transition from 8-bit MCUs to inexpensive, innovative, 32-bit microcontrollers is needed to address the rising demands for energy efficiency, safety, security, connectivity and usability in so-called low-end applications. This requires leading edge hardware and software technology. With XMC1000 and DAVE Infineon takes a large step in this direction. ■

Hall-Stand 2-206

Atlantik Elektronik at embedded world 2013

Atlantik Elektronik takes off into for the 35th anniversary with its presence at the embedded world 2013 with its motto: We love technology! Atlantik presents a revolutionary concept of LED modules, making it finally possible to realise tailored lighting solutions for the first time. That concept enables freely configurable sizes and design of light sources. In addition, visitors can immerse into the world of wireless communications with the Embedded RANGER development kit. This development kit provides an ideal base for developments with GSM/GPRS, WLAN, ZigBee and Bluetooth. Qualified and pre-certified radio modules allow an efficient design and thus shorten the development time significantly.

At Atlantik Elektronik, the car is now becoming a rolling Wi-Fi hotspot - thanks to CSR's wireless technology with Wi-Fi access point, Wi-Fi direct and Wi-Fi client as well as Bluetooth 3.0+HS for high-performance wireless solutions! Another exhibition highlight is the live demonstration of how the mobile phone can be turned into the key to a house.

In addition, Atlantik Elektronik strengthens its efforts with the development of apps for specific applications. Visitors can gather knowledge about the world of apps on a new industrial i.MX53 1GHz -based module with Android. Using the example of an Atlantik app on the iPhone 4S and the Motorola RAZR a robot control via Bluetooth Low Energy is presented to the visitors. Atlantik Elektronik also already presents the 3rd generation of intelligent Home Automation Solution, which is now equipped with an integrated remote management and cloud services. Thus, a remote access into any device is possible. According to the slogan „Innovation by Expertise" Atlantik informs visitors about the latest TFT displays with different touch technologies and the passive display technology for automotive applications under extreme lighting conditions. Furthermore, the latest black matrix TN (BTN) LCD displays with higher contrast and enhanced viewing angles (-80° to +80°) are presented.

The topic „Strong ARM with industry-leading specifications," continues to enjoy the highest popularity. Atlantik Elektronik presents the most comprehensive 32-bit microcontroller family „NuMicro" with more than 60 derivates now, equipped with a Cortex-M0 kernel from ARM. As a solution provider Atlantik Elektronik is capable of offering complete solutions to the customers on the basis of the above mentioned products, and advise them with the development of new applications.

News ID 15019

Hall-Stand 4-408

Visure: field-proven requirements engineering solution

Visure Solutions has released the IRQA Systems Engineering Template, an IRQA extension designed to address the challenges of increasingly complex embedded software systems. As a field-proven requirements engineering tool, IRQA improves the quality and tracking of embedded system requirements through automated requirements specification and change management.

Applied to the Embedded Software Requirements Lifecycle, IRQA becomes the process backbone. The requirements process metamodel, including all the requirement-related artifacts, their relationships, and their interactions with the users, are graphically represented, showing compliance through all stages of software development. IRQA helps standardize and enforce the requirements definition across the organization, formalize a common requirements specification structure, and handle changes throughout the lifecycle. With IRQA, project collaboration—whether between various software groups or with hardware or mechanical contributors—becomes easier as specific information can be communicated and shared both inside and outside the company.

News ID 15008

Hall-Stand 4-617

JTAG: boundary-scan software and hardware products at Embedded World

JTAG Technologies will showcase its latest hard- and software solutions at Embedded World Show in Nuremberg. AutoBuzz, the latest tool from JTAGLive family, effectively learns a connectivity signature of all boundary-scan parts within a design from only the BSDL models of those parts. By expanding on the seek and discover mode of BuzzPlus, AutoBuzz automatically gathers the circuit data of a known good board and then performs a full connectivity compare against the faulty circuit. AutoBuzz supports just two simple operating modes: Learn and Compare. With AutoBuzz in Learn mode a 'known good' sample PCB is initially scanned to establish a reference connectivity map. Suspected faulty boards can then be scanned by AutoBuzz in Compare mode, and a comparison is automatically made of their connectivity maps. Differences between the two maps are highlighted to indicate possible faults such as interconnect short-circuits, open-circuits or 'stuck-at' faults. Since the user requires no boundary-scan technical knowledge and with only a basic scan chain input needed, AutoBuzz is the perfect tool for repair and rework technicians, especially when design data is missing or incomplete.

News ID 14877

Hall-Stand 2-219

MSC: RL78/G14 MCUs with enhanced real-time control functions

MSC offers the RL78/G14 Group of microcontrollers from Renesas Electronics. The new 16-bit MCUs with enhanced real-time control functions incorporate proven on-chip peripheral functions of Renesas' R8C MCU family and feature a current consumption of only 70 µA/MHz at 32 MHz. The new MCUs , which MSC will present at embedded world 2012, are equipped with three proven timer modules, which are compatible with timers that already exist in the R8C MCU family. Timer RD comprises two universal 16-bit timers capable of operating at up to 64 MHz, which thanks to their three-phase complementary pulse width modulation (PWM) function are ideal for motor control applications. Timer RG is additionally equipped with an encoder input with which direction of rotation and rotation speed can be measured. Timer RJ is also a 16-bit timer module than can generate pulses or measure pulse widths.

News ID 14945

Hall-Stand 4-342

TI: signal conditioners drive high-speed interface standards

Texas Instruments introduced 10 signal conditioners designed to drive high-speed interface standards such as 10G/40G/100G Ethernet, 10G-KR (802.3ap), InfiniBand, Fibre Channel and CPRI. The new integrated circuits join a comprehensive family of repeaters and retimers that combat signal impairments caused by insertion loss, jitter, reflections and crosstalk in high-speed enterprise servers, routers and switches. Manufactured using TI's BiCMOS SiGe process technology, these new signal conditioners deliver highest signal reach performance at less than 6-mW per gigabit.

News ID 15033

Hall-Stand 4-208

Agilent: add-in extensions for compliance application software

Agilent Technologies announced a product enhancement designed to help engineers extend the capabilities of compliance applications on the company's Infiniium real-time oscilloscopes. The enhancement to Agilent's N5467A user-defined application software gives engineers the ability to develop extensions that they can plug into existing compliance applications for USB, PCIe, DDR, SATA, HDMI, MIPI, Ethernet and other technologies. This add-in capability allows engineers to rapidly automate custom measurements on Infiniium oscilloscopes, which saves time and effort.

News ID 15030

Hall-Stand 4-234

Analo Devices: innovative signal processing solutions for embedded applications

Analog Devices will showcase innovative signal processing solutions for embedded applications designed for industrial, automotive, healthcare and other markets at Embedded World 2013.
The demonstrations at the ADI booth will include:
Interfacing FPGAs to Analog Devices: Using Avnet Xilinx Spartan-6 FPGA LX9 MicroBoard and Digilent Pmods, and the Arrow Altera Cyclone IV BeMicro SDK, ADI will showcase several designs that feature a variety of MEMS sensors and data conversion devices connected to and controlled by these FPGA development systems.
Interface & Isolation: An industrial communications demonstration will illustrate the touch screen control of a robotic arm over an isolated CAN communication bus. The robot arm controller board contains the ADM3053 signal and power isolated CAN transceiver and is used with the ADuC7128 microcontroller to receive CAN messages from the Blackfin BF548-EZ-Kit.
Microcontroller/RF: The ADF7023 RF transceiver with MAC and packet handler and the fully integrated ADuCRF101 with RF transceiver and integrated Cortex M3 Micro will represent the highly integrated ISM band transceiver ICs in order to provide a more complete system solution.
Process Control: The AD5755 Quad-Channel, 4 to 20 mA 16-Bit DAC, reduces power loss and self-heating with its innovative dynamic power control architecture, enabling increased channel count per system. Additionally, its small package reduces space requirements, and the AD5755-1 version enables simple coupling of HART signals.
Design Resources and Support: Available at the kiosk will be featured Circuits from the Lab reference circuits, which are multi-purpose application circuits that have been built and tested by ADI's experienced engineers. Schematics, gerbers, and other design files make these circuits easy to integrate, while evaluation hardware aids in quick testing and prototype. In addition, the European Customer Interaction Centre staff members will be available on site at the ADI booth to provide live technical support.

News ID 14991

Hall-Stand 4A-211

SiLabs to showcase USB, ultra-low power and wireless MCUs

Silicon Laboratories will showcase its next-generation mixed-signal microcontrollers and development tools at Embedded World 2013. Silicon Labs will demonstrate high-performance USB MCUs for a variety of embedded applications; ultra-low-power MCUs and wireless MCUs targeting green energy, home automation and security systems; automotive MCUs for body electronics; and the company's latest development platforms and integrated development environments designed to simplify and accelerate the design process. Silicon Labs' demonstrations will include not only a host of new mixed-signal solutions but also easy-to-use development tools that will significantly enhance embedded design productivity:
Discover the next generation of mixed-signal MCUs designed to reduce power, cost and complexity for embedded applications such as motor control, industrial monitoring, portable medical, consumer devices and home automation. These new highly integrated, high-performance MCU products contain an array of user-configurable precision-analog peripherals such as 12-bit ADCs, DACs, integrated voltage reference, 5 V high-drive IOs and USB connectivity.
Simplify your embedded development effort with Silicon Labs' new unified development platform featuring interchangeable MCU and radio components and other subsystems to match your application needs. The innovative UDP includes a single motherboard, modular boards, and ample real estate for prototyping, expansion and system integration. It also supports MCU code and firmware development, RF design and optimization, and an array of network and protocol stacks.
Silicon Labs' GUI-based application builder software enables you to create custom software programs graphically without writing a line of code. The app builder tool is the centerpiece of Silicon Labs' advanced IDE, which provides a "one-stop shop" source for all the information you need including example projects, data sheets, errata, schematics, PCB footprints, app notes, active version tracking, automatic updates and more.
Meet the stringent system power budgets of your battery-operated and green energy designs with the energy-efficient C8051F96x family, which is an excellent fit for smart metering, in-home utility monitoring, wireless security, home and building automation, portable medical and asset tracking products.
Connect with the Si102x/3x wireless MCUs combining the power-saving features of the F96x MCUs with the company's EZRadioPRO sub-GHz transceiver into a single-chip solution that's perfect for battery-operated embedded systems requiring both energy efficiency and industry-leading RF performance.
Test drive Silicon Labs' comprehensive automotive motor control reference design based on the company's automotive-grade MCUs qualified and tested to the AEC-Q100 specification with high-temperature operation up to 125°C. These automotive MCUs feature LIN 2.1 and CAN 2.0B interfaces.

News ID 14951

Hall-Stand 4-534

Toshiba: development tools for industrial and home appliances on show

Visitors to the Toshiba Electronics Europe booth at this year's Embedded World will have the opportunity to see the latest hardware and software development tools for speeding the design, prototyping and testing of embedded systems for industrial, home appliance and retail applications.

Among the technologies to be unveiled at the event will be the BMSKTOPASM369 – a new Starter Kit for the first family of ARM-Cortex microcontrollers to combine Ethernet, CAN and USB Host and Device connectivity in a single IC. Software tools that speed and optimize embedded designs for motor control applications will also be announced and supported by live demonstrations.

The BMSKTOPASM369 Starter Kit is a highly integrated evaluation board that combines a Toshiba TMPM369Fxxx microcontroller with a comprehensive set of connectivity options and peripherals. The board features an integrated power supply and offers rapid 'out-of-box' prototyping and testing for applications ranging from industrial control systems and barcode readers to motion control, home appliances and solar inverters. Using the board in conjunction with software from Toshiba's partners, developers can quickly and easily develop fully functioning prototypes - including embedded systems that integrate a web server on the microcontroller.

Interfaces provided by the BMSKTOPASM369 hardware comprise 10/100 Ethernet; USB (host and device) and USB (UART); CAN; microSD; and a dedicated motor control interface that supports direct connection to a motor power board. A light sensor, eight indication LEDs and a joystick interface are also provided, while a 'J-Link' JTAG interface supports connection of hardware probes for debugging and trace functionality. Toshiba partners can provide a comprehensive range of free and low-cost development tools and embedded software – such as Atollic's TrueSTUDIO IDE and Segger's RTOS, web server software and TCP/IP and HTTP stacks - to support application development.

Based around a 32-bit ARM Cortex-M3 core running at 80MHz - and with up to 512Kbyte of Flash memory and up to 128Kbyte of RAM - the four microcontrollers in the TMPM369Fxxx series integrate single-channel CAN2.0B, a full-speed USB Host controller, a full-speed USB device controller and a 10/100BASE single-channel Ethernet MAC. Two independent analogue-to-digital converters (ADCs) with conversion times of 1µs – or 0.5 µs in interleaved mode - meet the requirements of barcode readers and other applications requiring ultra-fast conversion.

News ID 14943

Hall-Stand 1-636

port and Heyfra join forces ot serve industrial communication customers

Heyfra and port announce their collaboration. Both companies will extend their scope of service. Heyfra now provides engineering services in the field of Industrial Communication. There is specific demand on hardware and software solutions to enable products for industrial networking. Focus is on PROFINET, EtherNet/IP, EtherCAT, POWERLINK and CANopen.

Port has focused on Communication Technologies like Protocol Stacks, Drivers for Fieldbusses and reliable Tools as standard products.

News ID 15029

Hall-Stand 4-325

Green Hills launches end-to-end security solutions

Green Hills Software announces its new end-to-end ISS Security Solutions consisting of Suite B-Compliant Security Protocol Toolkits and Device Lifecycle Management system, delivered by its INTEGRITY Security Services business unit. INTEGRITY operating systems with an ISS Security Protocol Toolkit will add an additional level of reliability and authenticated security that ensures all embedded devices powered by ISS Solutions are secure.

News ID 15034

Hall-Stand 4-108

Logic Technology: latest version of Datalight's flash memory manager

Datalight has announced the release of FlashFX Tera 2.1, the latest version of its flash memory manager, which includes extensive updates for a range of hardware and software platforms. The product now supports both standard and enhanced ClearNAND, the newest versions of the Windows Compact 7 and VxWorks operating systems, and Freescale's i.MX51 processor.

News ID 15024

Hall-Stand 4-310

pls: multicore workbench simplifies control and debugging at system level

pls Programmierbare Logik & Systeme presents its Universal Debug Engine 3.2 for the first time at embedded world 2013. The UDE 3.2 features new functions for a particularly efficient multicore control, unique visualization capabilities at system level and the dedicated support for a wide range of the latest 32-bit SoCs from different manufacturers. The UDE 3.2, which is enhanced to a universal multicore workbench for the Development Device of Infineon's new TriCore multicore architecture as well as devices from the STMicroelectronics/Freescale Joint Development Program, includes a multicore program loader that controls loading of the application to multiple cores as well as a multicore run control manager for synchronous runtime control. Therefore, the data recorded by the on-chip trace like Infineon's Multi-Core Debug Solution or externally can be visualized and used for analysis functions at the system level such as code coverage or profiling. The graphical code coverage analysis enables simple recognition of non-executed code at function, source line or machine code level. Profiling functions help with performance optimization of applications.
Other microcontrollers supported by the UDE 3.2 include Infineon's new AUDO MAX TC1791, TC1793 and TC1798 devices, which are based on the TriCore version 1.6. The emulation devices of this high-end MCU family, which are specifically designed for troubleshooting and calibration, offer the user significantly advanced diagnostic capabilities in combination with the further improved Universal Emulation Configurator of the UDE. The latest version of the UDE also promises dedicated support for the Power Architecture based SPC56x devices from STMicroelectronics and the Qorivva MPC56xx family from Freescale. With the UDE 3.2, for example, both cores of dual e200 core derivatives can be debugged within one user interface - both in the safety-relevant lock step (LS) mode and the decoupled parallel mode.
In addition, the support for various Cortex M derivatives such as the Cortex-M3 based STM32F2 family from STMicroelectronics, the LPC178x family from NXP and the Cortex-M4 based Kinetis series from Freescale was expanded. Furthermore, all CoreSight technologies such as Serial Wire Debug, Serial Wire Viewer, Instrumentation Trace Macrocell and Enhanced Trace Macrocell can be fully and effectively used by the debugger. Moreover, Hilscher's netX 50/100/500 network controllers and the rcX real-time operating system, which is specifically optimized for the netX controllers, are also supported for the first time by the UDE.

News ID 14924

Hall-Stand 1-616

PEAK-System: CAN for PCI Express Mini

For especially compact computers with PCI Express Mini slots, like notebooks or small-scale industrial PCs, PEAK-System introduces the suitable CAN interface PCAN-miniPCIe at embedded world 2013 in Nuremberg. The small-sized card of about three by five centimeters contains one or two High-speed CAN channels (ISO 11898-2) each galvanically isolated against the PC electronics. The 9-pin D-Sub plugs for CAN are connected to the card by space-saving cables. Like all CAN interfaces of the PCAN series, the PCAN-miniPCIe comes with the CAN monitor PCAN-View for Windows and the programming interface PCAN-Basic. Device drivers are available for Windows 7/Vista/XP and Linux, each in 32-bit and 64-bit editions.

News ID 14939

Hall-Stand 2-206

Atlantik presents Holtek s new enhanced Flash MCUs

Atlantik Elektronik presents the HT68F60 and HT66F60 MCUs, Holtek s new 12K word program memory devices. They expand further the HT68Fxx and HT66Fxx enhanced flash MCU device range. The complete series meets with the industrial specification requirements of -40 ~ +85°C operating temperature and high noise immunity. By integrating Holtek s in-circuit programming technology solution, users can conveniently upgrade their application programs. The devices also include an EEPROM which can be used to store related production process or product parameter and data. This can improve production efficiency and product flexibility.

News ID 15041

Hall-Stand 5-445

Altium collaborates with Altera on component resources and software support

Altium announces new devices and updates to the board-level components from Altera's Stratix IV FPGA and MAX V CPLD device families available in its online content delivery ecosystem. Developed in collaboration with Altera, the updated collection of FPGA and CPLD components add to the extensive range of Altera design content already available through AltiumLive. The new components are available through the AltiumLive portal from within Altium Designer, providing designers with access to current, high quality board-level components during the design process.

News ID 15036

Hall-Stand 4-204

CMX: Embedded suite for Infineon XMC4000 family

CMX Systems now offers its CMX-RTX RTOS, two TCP/IP stacks and five Flash File Systems for the Infineon XMC4000 family of microcontrollers based on the ARM Cortex-M4 processor. Support is provided for compiler tool chains including IAR and Keil. CMX also plans to announce USB support in the near future.

News ID 15016

Hall-Stand 4-310

pls: debug tools for new XMC4000 microcontroller family of Infineon

Synchronized with the market launch of the new XMC4000 MCU family of Infineon Technologies which is based on ARM Cortex-M4 processor, PLS Programmierbare Logik & Systeme presents its Universal Debug Engine 3.2.1, optimized test and debug tools for the high performance and also energy efficient SoC devices. Both the UDE 3.2.1 and PLS' Universal Access Device 2 fully support the debug resources and peripherals of the new XMC4000 MCU family. The integrated FLASH/OTP programming function of the UDE guarantees maximum speeds in the entire erase-download-program-verify cycle.

News ID 15012

Hall-Stand 4-212

IAR supports Infineon XMC4500 microcontrollers

IAR Systems announced that its embedded software development toolchain IAR Embedded Workbench now provides support for the new XMC4500 microcontrollers from Infineon Technologies, including examples for the modular Hexagon Development Kit.
The XMC4500 series of microcontrollers is dedicated to enable highly energy-efficient products with industrial interconnection capabilities. It features a configurable peripheral set, which allows setting up the controller according to the specific use cases in the various parts of an application.

News ID 15009

Hall-Stand 4-342

TI: MCUs offer enhanced LCD advanced metrology software support

Offering developers more flexibility in electricity metering and energy monitoring applications, Texas Instruments has announced the MSP430F673x/F672x family of ultra-low-power 16-bit microcontrollers. TI's new devices guarantee no interruption of operation through a backup capable microcontroller supporting real-time clock operation and power management from the main power supply and up to two separate auxiliary supplies.

News ID 15004

Hall-Stand 5-220

element14: PIC32 Multimedia Developers Kit

Targeted at 10/100 Ethernet applications, the new PIC32 Multimedia Developers Kit from element14 and Microchip, offers comprehensive design software support for rapid evaluation and engineering development projects. Available to element14 customers from 23 January, the new development kit is offered at an exclusive price for a two month period. Optimised for multimedia applications such as audio, graphics and touch screen development, the kit features a PIC32 Ethernet Starter Kit and Multimedia Expansion Board.

News ID 15002

Hall-Stand 4-204

Hitex supports new XMC4000 family from Infineon

Hitex Development Tools announces comprehensive support for the newly introduced XMC4000 family from Infineon Technologies. With the MCU's availability, Hitex provides a complete offering of development support. This comprises evaluation boards, consulting and training as well as compilers, debuggers, and software. This also ensures that Hitex's customers benefit from the long-lasting cooperation with Keil/ARM, since the corresponding Keil tools are also distributed by Hitex.

News ID 14992

Hall-Stand 1-524

Swissbit presents storage solutions for Industrial applications

At embedded world, Swissbit will present its industrial DRAM memory modules in COB and SMT, available in DRAM, SDRAM, DDR, DDR2 und DDR3 technology. The Flash industrial products include CompactFlash, CFast Serial Flash, MultiMedia Cards, Secure Digital Cards, Solid State Drives and USB products. Customized for the industrial market, the Swissbit memory solutions combine a long life time, high reliability, excellent vibration and shock tolerance, extended temperature range and long life cycle with a controlled Bill of Material.

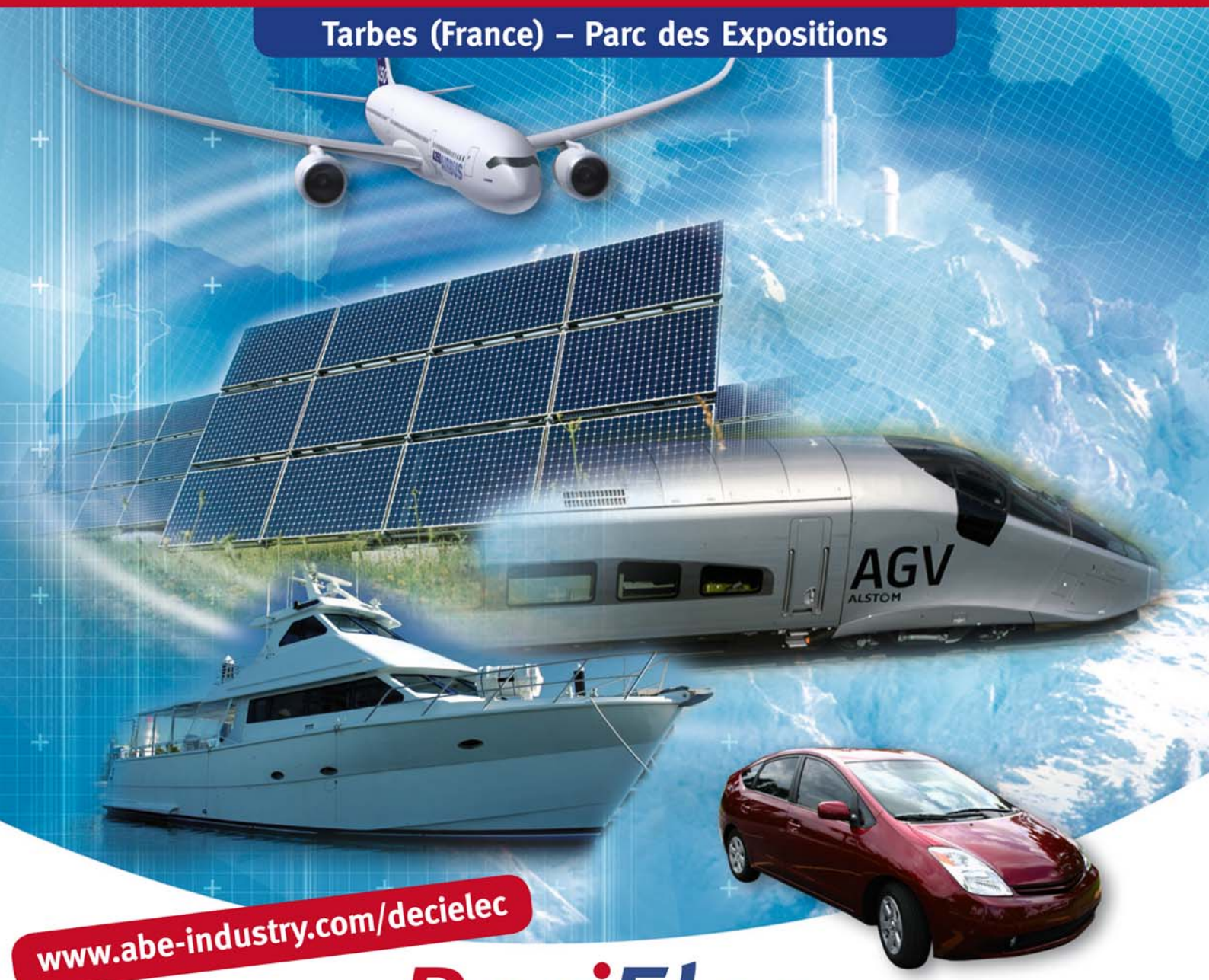
Swissbit presents its new products, the C 400 series CompactFlash card and F-200 series CFast card (or SATA CompactFlash). These products offer maximum available reliability for non-volatile memories thanks to read disturb management and impressive random accesses of up to 600 4k random write IOPS (input/output operations per second). The S.M.A.R.T. values permit complete transparency and, in conjunction with other monitoring methods (e.g. life time monitoring), help to keep field problems to an absolute minimum. The C-400 CompactFlash and the F-200 CFast cards are available in bit densities of up to 64GB with cutting-edge SLC technology.

As a co-exhibitor at the Swissbit stand, the microprocessor and microcontroller developer Hyperstone presents its SSD and Flash memory controllers, processors and microcontrollers, which are based on a proprietary RISC/DSP architecture. The Hyperstone boast outstanding RISC/DSP performance, maximum reliability and robustness plus minimal power consumption.

News ID 14913

→ B to B Meetings - 12th edition - April 17 & 18, 2013
→ International Congress - April 17 & 18, 2013

Tarbes (France) – Parc des Expositions



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Hall-Stand 5-241

SYSGO: Samsung SDS selects PikeOS for SIL4 railway project

SYSGO's flagship product PikeOS has been chosen for the next generation Communications-Based Train Control railway system by a South Korean consortium led by Samsung. The complete system complies with safety standard EN 50128 SIL4 and PikeOS is the certified RTOS platform for both ground and on-board components.

News ID 14962

Hall-Stand 4A-222

Infineon: 32-bit XMC4000 MCUs with ARM Cortex-M4 processor

Infineon Technologies has introduced its new XMC4000 32-bit microcontroller family, which uses the Cortex-M4 processor from ARM. The XMC4000 family supports three main trends in industrial applications: It helps to improve energy efficiency, supports a large number of communication standards and reduces software complexity during development. XMC stands for "Cross-Market Microcontroller" and means that, due to its configurability, the XMC4000 family is suitable for a wide range of industrial applications. Infineon is using this product to close the performance gap between the 16-bit XE166 family and the 32-bit TriCore family. The XMC4000 family is designed to enable scalable, compatible solutions with a high degree of software reusability. The XMC4000 portfolio consists of five series: XMC4100, XMC4200, XMC4400, XMC4500 and XMC4700.

News ID 14988

Hall-Stand 4-342

TI: ultra-low power MCU with integrated LCD controller

Texas Instruments introduced its lowest cost microcontroller with an integrated LCD controller. Based on TI's MSP430 ultra-low power MCU core, the AFE4110 delivers 16-bit processing power, built-in LCD driver, low power and low cost, while operating on a single 1.5-V battery. Along with cost-effectiveness and ultra-low power, the AFE4110 features 16-kB ROM, 512-B RAM, a 4- x 12-segment LCD driver with charge pump, a high-accuracy oscillator, and additional features designed for digital thermometers, pedometers, thermostats and portable single alkaline battery devices.

News ID 14931

Hall-Stand 5-334

Wind River: Android capabilities for accelerated device development

Wind River has introduced Wind River Solution Accelerators for Android, a series of software modules to help developers jumpstart their Android development and rapidly integrate compelling features and functionalities to their devices. Wind River Solution Accelerators for Android are currently available in three software modules: User Experience, Connectivity and Medical.

News ID 14916

Hall-Stand 4-204

CMX: extensive USB support for Embedded processors

CMX Systems offers comprehensive USB Host, Device and OTG support with its CMX-USB product offering. CMX-USB software is available for most processors with integrated USB Host, Device and OTG controllers and for processors that require external USB controllers. CMX-USB is ported as a working project for a variety of tool chains including IAR, Keil, GNU, Atollic, Rowley, Renesas and many more.

News ID 14906

Hall-Stand 1-336

Renesas: 32-bit microcontroller with built-in resolver sensor interface

Renesas Electronics announced that it has developed a new 32-bit microcontroller, the V850E2/PJ4-E, which incorporates an on-chip resolver sensor interface. The new MCU realizes both higher performance and lower system cost for automotive control systems including motor control for HEV/EV and other automotive applications. With the combination of P Series' dual core lockstep and on-chip resolver sensor interface, the V850E2/PJ4-E MCU is compliant with the ISO 26262 safety standard and easily realizes lower system costs.

News ID 14972

Hall-Stand 4-342

TI: new Piccolo MCU digital AC LED lighting kit

Texas Instruments has announced its new 32-bit TMS320C2000 Piccolo microcontroller AC LED Lighting and Communications Developer's Kit. Leveraging the performance of low-cost Piccolo MCUs, the LED Lighting and Communications Developer's Kit is a complete mains-powered LED lighting solution with software that allows designers to create lighting products featuring full dimming, remote connectivity and efficient power stage design perfect for street, outdoor, commercial, industrial, and entertainment lighting applications.

News ID 14966

Hall-Stand 4-516

Rigol: digital oscilloscope features up to 500 MHz bandwidth

Rigol introduces the DS4000 series digital oscilloscope, featuring up to 500 MHz bandwidth, 1.5GHz bandwidth differential and single-ended active probes. Designed to reduce test time in research, development and failure analysis applications, Rigol's DS4000 series digital oscilloscopes make detecting signal and device characteristics easier with advanced waveform search, visualization and replay.

News ID 14985

Hall-Stand 4-212

IAR: complete starter kit for TI's Hercules safety device

IAR Systems announces that the IAR KickStart Kit for Texas Instruments Hercules RM48 MCU is released and available for order. The Hercules safety microcontroller platform from TI has built-in hardware safety features, making it suitable for development of systems with high requirements on functional safety, for example within medical, industrial, and transportation applications areas.

News ID 14965

Hall-Stand 4-328

MicroSys: new SBC family based on Freescales QorIQ

MicroSys announces a versatile family of Freescale QorIQ based Single Board Computers. The systems are available as development kits including adapted operating systems for rapid prototyping and are applicable for production use as well. Based on the miriac „MPX System on Module"-concept, custom designs offering flexible feature/performance configurations can be turned into production rapidly. With the P2020, P1022, P1013 and P1011 CPUs, a variety of performance levels, from dual to single core functionality and graphics support are available.

News ID 14959

Hall-Stand 4-544f

AdaCore and SofCheck merge

AdaCore announces a merger with SofCheck, an automated software quality company. AdaCore has acquired SofCheck's products, including static error detection tools, the AdaMagic compiler front end technology, and also ParaSail, a new Parallel Specification and Implementation Language intended for high-reliability applications on multicore target platforms. AdaCore and SofCheck personnel share a long and direct involvement in the design of the Ada programming language, and the two companies have specialized in software development tools that nicely complement each other.

News ID 14938

Hall-Stand 1-432 /2-206

Digi supports development of wireless, cloud-connected medical devices

Digi International has released the iDigi Telehealth Application Kit – a development kit that allows customers to create cloud-connected medical devices. The kit includes the Freescale Semiconductor Home Health Hub (HHH) reference circuit board which enables wired and wireless connectivity to medical devices like blood pressure monitors, blood glucometers, pulse oximeters and scales. It also features the iDigi Device Cloud, allowing medical devices to easily and securely integrate patient data into new, existing and custom healthcare applications.

News ID 14935

Hall-Stand 4-325

Green Hills: major new release of INTEGRITY real-time operating system

Green Hills Software has announced a major new release of its flagship INTEGRITY real-time operating system. INTEGRITY 11 provides a new, highly optimized communications mechanism called GIPC (Green Hills IPC). GIPC is five times faster than Linux AF_LOCAL sockets. Native INTEGRITY, as well as Linux processes, executing in virtual machines, can take advantage of the super fast GIPC.

News ID 14926

Hall-Stand 1-520

Microchip: PIC24F MCUs feature 150 µA/MHz active current

Microchip announces the expansion of its eXtreme Low Power microcontrollers with the PIC24F 'GA3' family. The 'GA3' devices feature 150 microamperes/MHz active current, as well as six DMA channels, which allow a routine to be executed with less power consumption and increased throughput. The family demonstrates the continual advancement of Microchip's XLP technology and adds a new low-power sleep mode with RAM retention down to 330 nA.

News ID 14917

Hall-Stand 4-122

Vector: model-based E/E development from concept to production readiness

Vector Informatik and aquintos have extended PREEvision to an integrated development platform for the entire E/E product development process. To further increase efficiency in automotive E/E development, the current Version 5.0 implements such aspects as requirements management, hazard and risk analysis (ISO 26262), AUTOSAR support, Simulink integration, life cycle management and file management.

News ID 14912

Hall-Stand 4-212

IAR: Express Logic's ThreadX RTOS integrates with Embedded Workbench

Express Logic and IAR Systems announced that IAR Systems will sell and support Express Logic's ThreadX RTOS, integrated with IAR Embedded Workbench, for development of real-time embedded systems. By becoming a single-source, total solution provider for ThreadX and IAR Embedded Workbench, IAR Systems answers developers' needs for tightly integrated, easy-to-use tools that make embedded development faster, easier, and more productive. Developers of 32-bit embedded systems generally use an RTOS to manage the real-time scheduling of multithreaded applications and an integrated development environment to build applications from source code into firmware. The more integrated the combined tools, the easier the development solution. IAR Systems and Express Logic have, therefore, combined IAR Embedded Workbench and ThreadX to provide a much more powerful, affordable, fully integrated tool, which developers can purchase from IAR Systems.

News ID 14819

embeddedworld Preview

Boards & Modules

Rocking and rolling: functional safety on 3U CompactPCI

By Susanne Bornschlegl, MEN Mikro Elektronik

Innovative products are rather rare in common CompactPCI. New CPU boards usually sport the latest Intel processor generation and make an upgrade in interface speeds or memory components. A different, new approach in 3U format shows where true challenges lie hidden – not only for rolling stock applications.

Figure 1. Safe 3U CompactPCIcomputer F75P

Errors or failures in transportation can result in loss of life or cause major damage to the environment and also to property. With an ongoing shift from analog technology to computer-driven functions, functional safety is more and more important in the design of electronic systems. Each market, from railways to buses and ships up to airplanes, has its own safety criteria, backed by standards. Computer hardware and software inside a vehicle must work reliably. They have to be safe and at the same time extremely robust. This can cause a dilemma for manufacturers and providers: to remain competitive, they must keep their rolling stock up-to-date, with all the high-tech functions that passengers expect. However, if technology makes their costs soar, they have no way of remaining competitive, because passengers also expect inexpensive tickets, especially in mass transit. This is why you can find 19-inch CompactPCI technology in many places in railway transportation. The modularity and acceptably low footprint of 3U commercial-off-the-shelf (COTS) boards help keep the costs within reason. At the same time, systems are both robust and comfortably based on mature industry standards.

Another reason why CompactPCI is so convenient is the requirement of redundancy in safety-critical systems. This feature can have many divergent types of implementation with different goals and behavior on a varied scale of safety levels. In most cases, though, the critical components of a system use redundancy to fulfil safety requirements. Exchangeable COTS boards are reasonably priced and easy to maintain. In a 3U CompactPCI system you can build up a redundant system from two or three identical plug-in CPU cards, which are connected using network cables. Up to a certain level of application demands, this can be a perfect solution. The multiplied volume, weight and power may still be acceptable. What could go awry with three or more tuples is the networking, which is susceptible to faults and maintenance. The effort involved in correct cabling and the cables themselves are expensive. Yet, a reliable network connection is an absolute must for the system to meet its demands in functional safety.

In a new 3U design, MEN Mikro Elektronik tries to take the CompactPCI COTS approach away from bad compromise and towards a new level of functionally safe electronics. Rugged and reliable, compact, modular and inexpensive – these classic attributes get another dimension through onboard redundancy. MEN F75P design integrates three processors: two redundant control processors and one I/O processor. Internal Ethernet connections save a lot of wiring, and the extensive rear I/O capabilities of the board support standardized CompactPCI PlusIO interfacing for fast backplane connections. The front I/O provides a solid base of networking, USB and graphics, but on the whole its exterior doesn't easily give away the card's true values: the entire design is optimized to flexibly implement functional safety.

A typical way to use the two control processors would be to run the same application logic on each of the processors. Both CPUs calculate their outputs and compare their results with the other channel to detect discrepancies. But the board is not restricted to any special compare strategy. The system integrator has complete freedom in implementation. It is true that this partly means more work, for example when setting up a voter mechanism. Being flexible still saves costs: You can realize different functions using the same, known assembly. You can implement a less complex function with less effort for a lower SIL level (Safety Integrity Level) or take a complex approach for an extremely critical SIL 4 application.

This goes for software, too: You can use an existing software architecture originally implemented on individual boards, and you can execute identical or diverse software on the control processors. They support VxWorks and PikeOS – real-time operating systems common in critical environments –, but they

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also support Linux. The I/O processor connects to control elements like sensors. In addition to its core function, it can take over other, non-safety-critical tasks, such as control of a fieldbus or graphical output of operation data. This CPU also supports Windows for a comfortable user environment and the usual graphics capabilities.

Adding to the obvious triple-CPU benefit, the new 3U design has a set of other fine features to achieve functional safety. To start with, it can shut off completely. This is crucial if in case of an error the system must be fail-safe or even fail-silent, i.e. go to a safe state, and this safe state means that all CPUs are powered off. Many CPU cards just go into reset and restart. The F75P is capable of doing both, whichever is configured by hardware. Apart from that its circuitry features independent supervisor components separated from the CPU. They make sure that parameters like voltage, temperature and frequencies all run as specified, but they also register internal errors of each processor. Each supervisor, and also the software of each control processor, can put the board into the safe state. For easier error detection and handling, the board gives the administrator an event log in a non-volatile FRAM. Its entries are basically hardware events, but the application software can generate events, too, making the protocol more specific and detailed. With common plug-in boards system error logging involves supplementary hardware, and some events can only be logged by application software, which may crash.

Knowing a lot about one's system is essential with any mission-critical function, because everything in it must be predictable. Engineers need to consider worst-case scenarios in detail at an early stage of their design. Their goal is to detect errors before they can harm the entire system. Consequently, a COTS board claiming to be safe must also be deterministic. For the F75P this was a challenge: it uses Intel Atom E6xx processors to support existing X86 applications with a solid base and higher performance. For the demanded calculable execution times, hyper threading and speed step

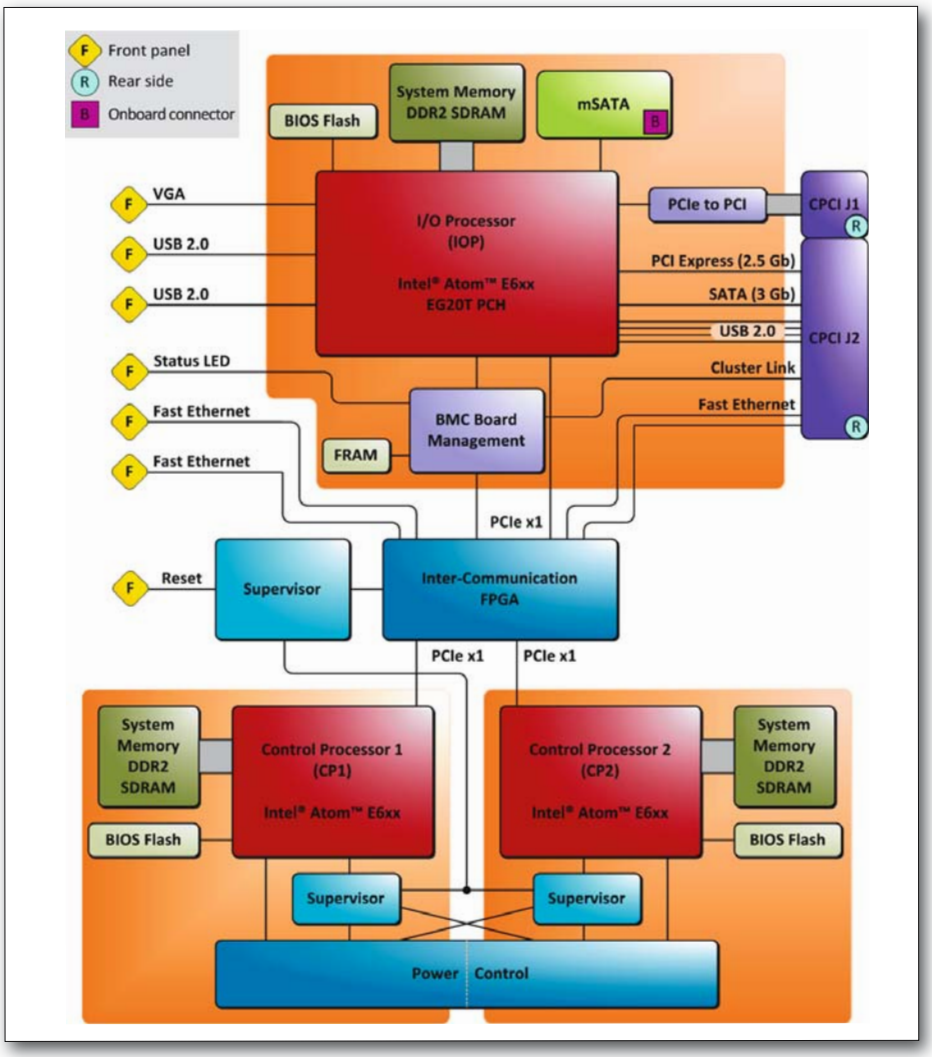

Figure 2. Block diagram of 3U CompactPCI CPU F75P with two redundant control processors and one I/O processor

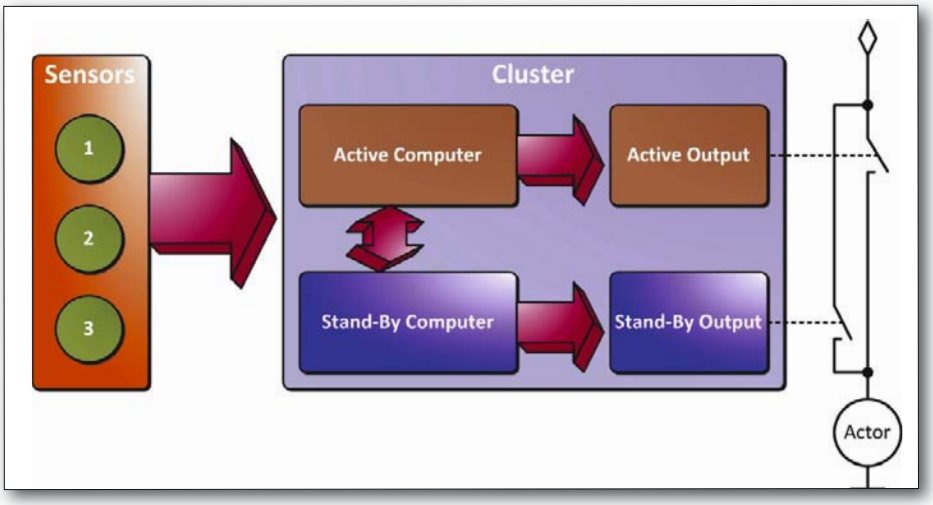

Figure 3. Back-up system through a computer cluster

technology are disabled. They would allow the hardware to handle several processes in parallel and the processor to change its clock rate. BIOS interrupts are off limits, too. As already mentioned, the board uses real-time operating systems like VxWorks or PikeOS to assure deterministic behaviour. Among others, these have optimized their memory and task management for minimum latency, so that the system remains predictable.

While the measures described increase safe operation, the redundancy scheme used does not increase availability. But this can be a requirement, too, where a function is not supposed to be completely shut off in case of a failure. For instance, the lighting inside the train should continue working even if the train stops inside a tunnel. To give critical functions higher availability, you can create a cluster configuration by multiplying the existing system and making it available as a safe back-up unit. One system is active, while the other runs in stand-by mode. If the active channel fails, the system automatically switches to the second channel.

To save the system integrator additional effort, the F75P already includes the logics necessary to define and manage the roles of two units. Two cards can be connected directly via the CompactPCI backplane, without any cabling. They use a dedicated RS422 UART interface for communication between their Board Management Controllers (BMC), which can switchover from the active to the inactive channel.

When implementing safety functions, system integrators don't have to reinvent the wheel in every respect. The opposite is true. Many requirements are defined in standards specific to each market. Generally, you could say: the more safety-critical an application is, the more stringent and complex the standards. In the rail area, electronics need to be certified to the Safety Integrity Level defined for the specific function, with SIL 4 being the highest level with the lowest probability of failure according to EN 50129. The respective value is just one piece of data that the system integrator needs for certification. The whole procedure involves many details. Railway integrators who build the F75P card into a complete system get help here. The component comes with a package that includes all the necessary documents for the board, including a SIL 4 certificate from the German TÜV SÜD and the required Safety Case. The design complies with IEC 61508, EN 50129 and EN 50128, and fulfils rail electronics standard EN 50155. For the integrator this translates into lower cost and faster time-to-market on a high level of quality – a unique benefit compared to common COTS boards.

MEN has a background of activities in the railway area and has grown with its challenges. Being certified to IRIS (International Railway Industry Standard) the company has consistently improved its processes and continues to do so. But especially its many years of experience with CompactPCI have given its product managers new impetus. The F75P CompactPCI plug-in board in 3U format is the best proof of this. Its clear-sighted design and extensive documentation makes the innovative computer ready for use on board rolling stock. Paired with the vendor know-how and optimum support in certification, the compact set-up of the computer and free implementation of its redundant CPUs are already giving integrators new ideas on how to better realize their design. The board integrates well into existing 19-inch CompactPCI systems that are past their prime, but also into new designs. This also goes for areas other than railways, where functional safety is more and more becoming an issue, such as automation or medical engineering. But most importantly: it helps lower costs in safety-critical applications. ■

SMARC – new Computer-on-Module standard for ARM/SoC designs

By Gerhard Szczuka, Kontron

With Smart Mobility ARChitecture (SMARC), SGET has ratified the first manufacturer-independent Computer-on-Module standard for purebred ARM/SoC designs. The specification was developed specially for Smart Mobility, but many stationary applications also profit from these highly efficient SFF modules. Several modules, evaluation platforms and starter kits are already on the market.

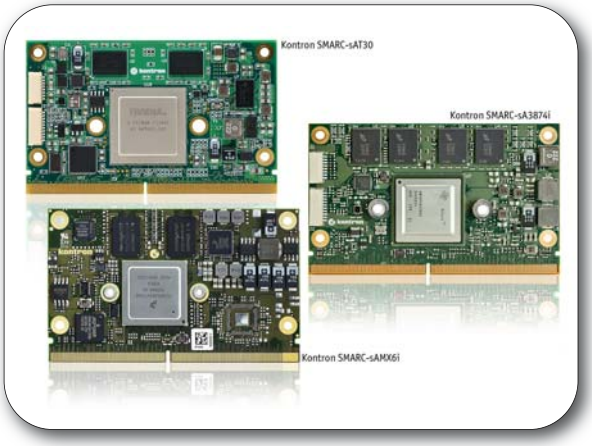

Figure 1. Kontron already has three different SMARC modules on offer: the SMARC-sAT30 with graphics-heavy NVIDIA Tegra 3, the especially widely scalable SMARC-siMX6 with Freescales i.MX6 single, dual and quad-core processors and the ultra low-power SMAR- sA3874 with Ti Sitara AM3874.

The new high-capacity ARM processors, as developed for modern smartphones and tablets, for example, impress developers with their high performance and low energy requirements. Thanks to these characteristics, manufacturers of long-term available, rugged industrial devices, machines and systems can implement solutions with these processors that they were not able to offer either with less complex ARM designs or with more capable x86 designs. Consequently, a very attractive gap in the market has been bridged by making a comparatively large graphics and computing performance available in the lower single-digit watt range. Thanks to the low energy consumption, fanless, rugged and extremely compact system designs are now possible. Heat removal is often just a question of connection to the enclosure, but as a rule an optimized SFF design like this requires a highly integrated individual design. An approach is needed that allows manufacturers and mechanical engineers to integrate this new class of processors in their applications with the least possible design outlay.

For this, OEMs require finished building blocks that allow them a high level of design freedom and the compactness of a full custom design while still effectively minimizing development expenditures and risks. Computer-on-Modules (COMs) take exactly this approach. They integrate the core components of a computer system such as the processor, relevant controllers, NAND memory and main memory on a highly integrated and consequently compact COTS component. The individual solution is designed via carrier boards to be developed in an application-specific fashion. They implement the signal lines from the module to the system interfaces and integrate additional application-specific components such as sensors or controllers. Carrier boards offer developers a particularly high degree of design freedom for their size and shape: only the minimum footprint is defined via the module size. Due to the very sophisticated design and layout of Computer-on-Modules, a carrier board is also noticeably easier and quicker to develop than a completely customized board.

With this modular approach, the module manufacturer alone shoulders the integration outlay for the processor. That makes Computer-on-Modules an ideal choice for efficient development of individual designs. Studies by IMS and VDC indicate an average annual growth rate of 25 percent for ARM-based COMs by 2016, showing how big the need for such ARM building blocks is. This enormous growth will catapult the portion of ARM-COMs traded to only just under 60 percent of the total COM market. In an environment as dynamic as this, it is important for developers to bet on the right horse. They should therefore give preference to COM solutions with manufacturer-independent standardization. Ultimately, they clearly offer more design reliability than manufacturer-specific modules. For long-term success, these standards should have especially broad support among the manufacturers. And it's not just the small and medium-sized ones, but more than anything the big manufacturers.

One standard for all technologies however, is on the other hand not recommendable. Manufacturer-independent standards have to be designed in a consistent and focused fashion. However, too many options that are not compatible with one another dilute the enforcement of a standard. Special forms, interim solutions and hybrid functions should be avoided, wherever possible. But is there such a Computer-on-Module standard that focuses on ARM/SoC designs?

In the past, developers of ARM-based solutions had no support under these conditions. Until recently, there was no Computer-on-Module standard adopted by an independent body that took the specific requirements of ARM/SoC processors into account. The existing module standards such as ETX and COM Express, which are the most significant COM standards worldwide, were developed for x86 architectures and are less suitable for ARM or SoC processor modules. The reason is that,

due to the very different requirements for the power supply of the components and the sometimes very different requirements in terms of interfaces, it makes little sense diluting these standards.

Last but not least, ARM-SoCs also provide other interfaces than x86 platforms for similar tasks. MIPI interfaces are a good example for an energy-efficient display connection, and also the serial peripheral interface (SPI) which is used for general peripheral connection, in contrast to Intel x86 where the SPI interface is only used for connection of a boot device. ARM-based processors also provide other specific interfaces such as I²S or – very important – various camera ports. So far they are not available in the x86 standard feature set. If you take all this into account, it becomes apparent that all known COM concepts that were originally developed for x86 processors and I/Os are not ideally suitable for ARM designs.

Subsequently, a purebred ARM/SoC-centered module form factor is required for ARM-SoC-based building blocks. The feature set should correspond exactly to these new processor generations and in addition should have an especially small footprint suitable for SFF applications. This means that developers do not have to compromise or take x86 conventions into account that are not relevant on ARM/SoC designs. Kontron has taken on this task and submitted a suitable module draft to the Standardization Group for Embedded Technologies (SGET). This draft has now been officially ratified.

With ratification of the SMARC form factor specification, a dedicated standard for ARM-based building blocks now exists. SMARC stands for Smart Mobility ARChitecture. This architecture for ARM/SoC is characterized by extremely flat Computer-on-Modules and was almost immediately adopted by SGET. That underlines both the great need for a new manufacturer-independent form factor standard and also the impact of the new group. This new standard means that customers profit from a reliable roadmap with a high level of long-term availability which also ensures the reusability of their investments. This high reuse factor makes it possible for OEMs to lower their costs and ensure quick market launch times. And they are also manufacturer-independent. Basically, users get exactly what made COM Express in the x86 world the most-used module specification: a standard exactly tailored to the specific requirements. It provides them with an extensive ecosystem of scalable products and services with which they can implement new SFF applications quickly and reliably and obtain a reliable migration path.

The SMARC specification describes extremely flat ARM/SoC-based, ultra low-power computer-on-modules. They define two module sizes: short with 82 mm x 50 mm for extremely compact low-power designs and a larger one with 82 mm x 80 mm for possible future higher-capacity SoCs with an increased space and cooling requirement. The proven and inexpensive MXM 3.0 plug connector was chosen as connector. With its installation height of only 4.3 millimetres, specially flat designs such as tablets or wearable computers can be developed with an overall installation height that is less that one centimetre. On the electrical side, SMARC modules have a total of 314 pins. SMARC effectively provides 281 I/O signal lines. That is already 50 more than the old MXM 2.0 connector has altogether, for example. Consequently, clearly more dedicated interfaces can be specified as interoperable here. SMARC can thus support an extremely broad range of dedicated ARM and SoC processors, which also accommodates the heterogeneity of ARM processors.

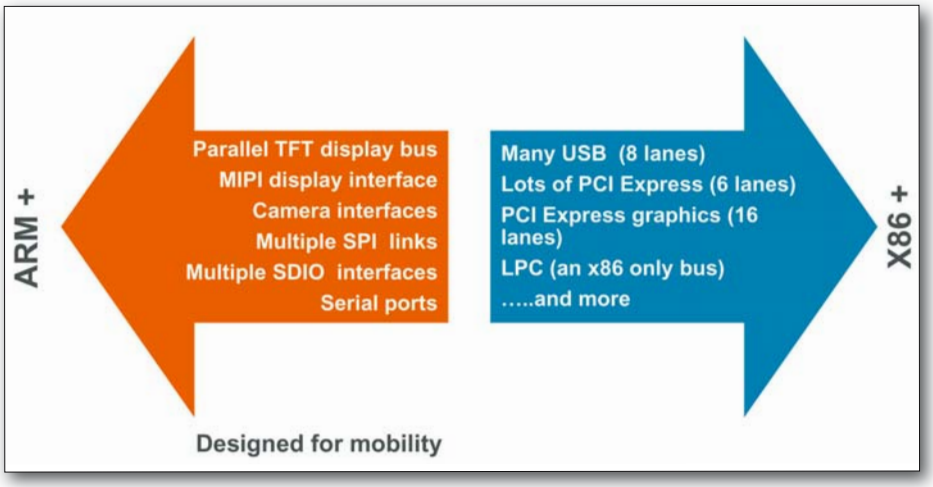

Figure 2. With their interfaces optimized to low-power designs, ARM-SoC-based modules also require a specification optimized especially for ARM/SoC.

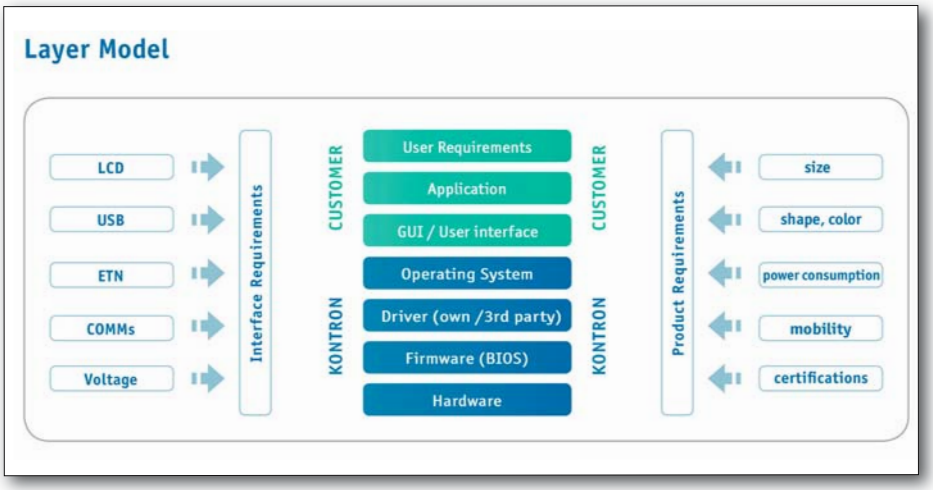

Figure 3. Software services on the part of the hardware manufacturers are clearly gaining in significance so as to make entry into the ARM world as easy as possible for customers.

And since this concept impressed not only the initiator from the very beginning, the first product lines already became available at the same time as the ratification of the new SMARC standard. OEMs can directly resort to a broad range of Computer-on-Modules and evaluation boards. Currently there is a choice of SMARC module families with ARM Cortex A8 or ARM Cortex A9 designs. The range extends from modules with the graphics-heavy NVIDIA Tegra 3 processor and the especially broadly scalable i.MX6 family from Freescale with single-, dual- and quad-core processors, all the way to the ultra low-power Texas Instruments Sitara AM3874. By taking a closer look at the feature set of these new modules, the bandwidth which it can cover becomes apparent.

SMARC modules on the basis of the NVIDIA Tegra 3 quad-core processor with 1.2 GHz and ARM Cortex A9 architecture are oriented to image-centric applications for markets such as POS/POI, infotainment, digital signage, security and monitoring as well as medical and military technology. The integrated NVIDIA-GeForce GPU makes these processor modules especially interesting. In conjunction with ARM it currently delivers the highest graphics performance for up to two independent displays. Among its outstanding performance features are HD video decoding, including MPEG2 and HD video encoding. In addition, they provide camera support via two dual-lane CSI-2 camera ports. Although they are based on the same processor technology as the highest-performance tablets and smartphones which are currently available in the consumer segment, they have the typical embedded long-term availability of seven years.

Attractive graphics are also possible with the Freescale i.MX6 modules. But the versatility is - thanks to the high level of scalability - even more impressive. Their 800 MHz ARM Cortex A9 performance ranges from single and dual to quad-core. This scalability offers the option of developing entire product lines that facilitate a differentiation from the entry model to the high-end solution just by means of the module used. They are oriented to intelligent devices that require balanced processor and graphics performance. Depending on the SoC design, they integrate one or two independent graphics engines with up to four 3-D shaders for life-like visualizations. A video decoder and encoder that can process videos up to full HD (1080 p) with 60 Hz is also integrated. Among the other advantages there is the above-average long-term availability of at least 10 years. In addition, the SMARC COMs equipped with this processor are developed by Kontron to work in the extended temperature range of -40 °C to +85 °C.

The new modules based on the Texas Instruments Sitara AM3874 processor specially target cost-sensitive applications with the slimmer ARM Cortex A8 single-core design. Their extremely low power consumption makes them attractive and, thanks to the extended temperature range of -40 °C to +85 °C, they effortlessly brave the effects of wind and weather and are thus ideally suited for outdoor installations. Ti-Sitara modules support 3-D graphics acceleration and HD video processing. Two independent displays can be connected via 18/24-bit parallel LCD or 18/24-bit single-channel LVDS and HDMI. In addition, a parallel camera interface is integrated. At other interfaces, for example, 2 x SPI, 4 x I²S, 4 x multifunctional I²C and a dual CAN bus are supported.

Carrier boards for evaluation are also available for all these new SMARC modules. In accordance with the requirements of different ARM-based solutions for dedicated interfaces, they support various interfaces and various solid-state memories. But such a standard evaluation board could hardly meet the requirements of the individual SFF applications. As a rule, an individual carrier board is required for the specific application. OEMs themselves can develop a fitting board design. But alternatively, most suppliers also offer the development of application-specific carrier boards; for example, selected sales partners of Kontron are in a position to offer this service. In addition, when larger quantities are required it makes sense to merge the module with the carrier into a full custom design. Most module manufacturers or their value-added resellers offer this too. However, the precondition for this is a suitable development team which also has the potential to implement the individual interfaces both on the hardware side as well as on the software side.

A standard-based hardware offer is only one building block within the complex structure of a low-power SFF application. The second important question is: what about the software support? Due to the dedicated design of the ARM processors and the accompanying closer

linkage of hardware and software, application developers likewise require dedicated software support. This is especially the case due to the fact that the new processors also represent completely new processor architecture for some of the new applications. So what are the main considerations? The operating system support first counts for software-side application development: which OSs can be used and is the specific hardware configuration-supported?

Each manufacturer can only answer individually for its modules. Nonetheless, general requirement profiles can be established. In accordance with the purpose of the new SFF applications, primarily slim operating systems that can be compiled as needed with a small storage footprint are in demand. Above all Linux, the Linux-based Android and Windows Embedded Compact 7 are interesting. VxWorks including Hypervisor, QNX and Greenhills are suitable for hard real-time applications. According to all expectations, subsequent Windows versions are also becoming interesting. In contrast to x86 platforms however, an approach such as was taken with x86 operating systems is not possible on ARM-SoCs: first run the operating system and identify missing drivers so as to then successively integrate them. With ARM technology, the precondition has to be created already in the boot loader through integration and adaptation of the drivers to support the dedicated processor platform and the required peripherals. This results in a noticeably greater significance and implementation outlay for board support packages than is the case with x86 designs. If OEMs integrate additional components via the carrier board that are not part of the standard equipment for these processors, then of course their drivers also have to be integrated in the boot loader.

Therefore, a comprehensive board support package is an absolute must for ARM-based modules. If the service of the hardware manufacturer would actually include driver porting of the individual components used on the carrier board, that would be a bonus. A software department has to be available for this. Then it can also offer direct support when adapting the boot loader. Where x86 technology relies on the BIOS, with ARM processors loading the firmware of the individual components is done via a boot loader. That indeed speeds up the booting process, but may be unfamiliar terrain for many OEMs. If dedicated components are added to the carrier board, they likewise have to be integrated in the boot loader. And just as application-specific BIOS configurations are required, they also have to be created for the boot loader. Here, too, the question is open as to who can help if boot loader expertise is needed. Ideally, this range of tasks should also be covered by the hardware module manufacturer, since this is where the most in-depth knowledge of the system is.

Software services on the part of the hardware manufacturers are clearly gaining in significance so as to make entry into the ARM world as easy as possible for customers. Customers should therefore make sure that the software department of the embedded hardware manufacturer is effective enough to also be able to implement these services. Many embedded manufacturers outsource these services. But from the customer perspective it is clearly more efficient if the customer receives this service from a single source, directly from the module manufacturer. Companies such as Kontron offer software support in-house for the most part. The company has more than 1,000 development engineers worldwide. More than two thirds of them work in software development. ■

Introducing OEM computing solutions in EMEA

2012 saw the emergence of a new EMEA business in Arrow Electronics. Following the successful transition of embedded solutions sales and support in the United States to its OEM computing solutions (OCS) division, Arrow formed OCS EMEA by merging the EMEA OCS group with its embedded solutions team. As many will know, the distributor has long been an established leader in displays, boards, software and storage devices.

This is not simply a reshuffling of the deck that we're seeing play out. The company has made a significant number of acquisitions in recent years, adding a variety of services and solutions offerings to its portfolio. The OCS business is a prime example of an organically grown business unit established to meet the ever-changing needs of OEM customers in EMEA and beyond.

So what's new about Arrow? The part that makes the OCS business interesting is that it goes beyond the traditional distribution business. The OCS business allows to address not only the embedded components needs of its customer base, but also the requirement for kitting, sub-assembly, appliance and system build, through to complete turnkey solutions. The company then brings its supply chain and logistics expertise into play, enabling the shipping and distribution of products to customer destination of choice around the globe.

Our EMEA capabilities for OEMs include integration facilities in both Hungary and Israel, both of which have been in operation for several years. A further 5 sites – Phoenix, Sao Paolo, Nogales, Bangalore and Shenzhen – extend the ability to integrate where it makes logistical and financial sense for the customer. Furthermore, each of the integration facilities carries a wide range of certifications, providing customers from a wide range of industry sectors the comfort of knowing that they are in safe, professional hands. A key concern of companies that are considering outsourcing their product integration is that of quality and regional experience. A first article and gold sample may be perfect, but production quality must be maintained from beginning to end. The OCS team tackles this issue head-on and uses its CopyXact processes to guarantee product quality. Jennifer Johnson, Global Programs and Technical Services Director comments, "Integration is a detail business and we take our responsibilities seriously. Regardless of which Arrow site is used to NPI (New Product Introduction) a product or solution, we guarantee the quality and customer experience in each and every one of our integration facilities across the world, regardless of language or time zone. We listen to our customers and we drive our business to where they need us to be, adding capabilities and solutions for our worldwide strategy".

Andrew Sayers, Marketing Director, Arrow OCS EMEA

This is backed up by substantial regional field and support operations covering Central and Eastern Europe, Israel, Nordics, UK and Ireland, Netherlands, France, Belgium, Italy and Iberia.

Amir Mobayen, VP and General Manager for the OCS team in EMEA says, "We have responded to customer needs and requirements and invested heavily in providing industry-leading capabilities. We will continue to distribute products for our select range of suppliers, however it is moving to a customer-focused and market-driven model offering value-added services and solutions. We've increased our focus on local customer touch points. As a global organization, Arrow delivers worldwide reach not only to our OEM customers, but to their customers also, and truly accelerates globalization, supported by local execution".

The OCS business provides extensive technical knowledge, combined with best-in-class suppliers to deliver repeatable solutions. Whether a customer is looking for a ruggedized server, bonded display solutions or help with design and prototyping, Arrow is the logical choice for intelligent systems, customized for your needs around the globe.

As Amir Mobayen puts it, "We are listening to the needs of our OEM customers and are helping improve their time to market, thereby increasing competitiveness". Of course, this type of business metamorphosis does not simply happen overnight. "We have invested in putting our employees through intensive training to ensure that we deliver the best technical solutions and customer service in the market place. We are already seeing our approach bear fruit and we are extremely excited for 2013 and beyond".

As more and more OEM customers are faced with a make-or-buy decision, Arrow helps to make this decision as painless as possible. With the ability and willingness to supply embedded parts only through to full turnkey solutions, the company focuses on the embedded computing requirements of its customers. In fact, it often makes sense to provide the sub-assembly to a CEM for final device manufacture. In this way, the OEM customer is offered a genuine choice and also gains the added benefit of a simplified supply chain.

As summarized by Amir Mobayen, "Arrow enables OEM customers to focus on core competencies, allowing them to deploy their resources on areas such as R&D. By partnering with us, everything from product selection and lifecycle management through to worldwide distribution is taken care of. We're helping customers to enhance their bottom line". ■

Embedded computing meets high performance computing

■ In the commercial computing world, the pressure is to accommodate the rapidly accelerating rise in the number of connected devices and the requirement to process significantly more data. There is a parallel in the embedded world – especially in military computing – which is seeing a substantial increase in the amount of data that is being captured by sensors and needing to be processed in close to real time, in order to turn that data into actionable information. The commercial world has responded with high performance computing (HPC): acres of racking and megawatts of power driving huge numbers of processors operating in parallel. High performance embedded computing (HPEC) takes the processor parallelism that is becoming increasingly available and applies it to embedded computing applications. Where HPC occupies huge, air-conditioned data centers, HPEC takes those same principles and deploys them in a 6U – or even 3U – rack. However: where HPC typically relies on the output of thousands of Intel x86 processors, HPEC has turned to GPU – graphics processing unit – technology.

Michael Stern, Product Manager, GE Intelligent Platforms

The virtue of GPU technology is its inherently parallel architecture: graphics applications are particularly well suited to processing large amounts of data concurrently. NVIDIA Kepler GPU architecture, for example, features no fewer than 384 cores. In sensor-driven applications, such as radar, that extraordinary degree of parallelism can be readily exploited to deliver results far faster than is possible with a general purpose CPU. Small, lightweight solutions capable of delivering thousands of GFLOPS can be created by leveraging this capability. For example: an embedded computing subsystem capable of delivering close to 600 GFLOPS of compute performance would, until not long ago, have occupied four cubic feet of space; weighed 105 pounds; and consumed 2,000 watts of power. Today, using the parallelism inherent in GPU technology, that same level of performance can be achieved from an enclosure occupying just 0.8 cubic feet, weighing only 10 pounds and consuming a mere 200 watts of power. In response to the rapid rise in interest in HPEC and acknowledging the complexity of the applications that are being developed, GE Intelligent Platforms has opened a HPEC Center of Excellence and announced the first in a series of HPEC starter systems; the combination is designed to accelerate time to solution and time to deployment.

One of the keys to success for HPEC is that it responds to the unrelenting demand for solutions that conform to open standards and take advantage of technologies that are widely deployed in commercial HPC applications, benefiting from the ecosystem of skills and expertise as well as hardware and software products. A standard to which it is becoming increasingly important that such solutions conform is MOSA (Modular Open Systems Architecture). Conformance to such standards is shown not only to reduce development time and cost, but also to ensure that long term viability and supportability are maximized – an issue which has historically limited the value of solutions based on proprietary architectures and technologies. HPEC and GPU technology are rapidly becoming mainstream in embedded computing. What is important for integrators and end users alike is to make the right technology choices. ■

On the way to becoming a global leader in embedded computing

Advantech vision aims to become a global leader in embedded computing. In order to achieve this we provide innovative embedded platforms, extending from x86 to RISC architecture, plus industrial cloud service to lead our marketing position. We are strongly committed to bringing the best product/technology and service to customers.

■ Advantech provides innovative technologies from cloud computing (industrial server, video server) and edge computing (fanless, slim and portable devices) to high performance embedded systems (blade computing, network processor platforms, DSP processing). The company transforms embedded systems into intelligent systems with smart, secure, energy saving features, built with industrial cloud services and professional system design-to-order services (system DTOS). Our systems are designed to target vertical markets in transportation, industry (machine automation, equipment/machine building), digital signage, and video applications (video infrastructure and video surveillance).

The report and survey from IDC regarding the future of embedded markets said that in 2010 there were 1.8 billion embedded systems, some of which were intelligent systems. This will grow to 4 billion in 2015, with a compound annual growth rate of 23%, and the market will continue to grow to 25 billion in 2020. Our mission is to support this expansion with

Ween Niu, Head of Embedded and NCG Sales Sector, Advantech USA and Europe

the latest technology trends in embedded cores. We also expect that more and more ecosystem partners and leaders will work together to drive the same vision and direction. This is why we work closely with Intel and Microsoft. Let me explain what the main element of an intelligent system is. For instance, every client device should have its own identification, like personal ID, and reliable management and remote access, and also secure connection device to device, machine to machine.

A client device should have its own protection and recovery solution for future intelligent systems, and we recommend this architecture for industrial cloud services. Let me further present the scenario for our industrial cloud services. Here we establish a web server, and put most of the software into it (ex, BIOS update, OS image, device driver…). Our customers only need to connect their embedded devices to our cloud server (via internet or intranet). The system will auto-detect the device brand name and model, and list the necessary software for the customer' s selection. The customer just needs to make one click, and our cloud server will follow up with auto-download, auto-installation, and auto-execution. This is a plug and play user scenario and on-demand software service.

Let me further explain what SusiAccess stands for. We propose it for our customers to use to have well-managed, always-connected embedded devices from the internet. With SusiAccess, our customers can perform remote device monitoring to check device status in real time, and remote configuration like wall-mount digital signage display, backlight control, surveillance/ IP camera. Emergency system backup and recovery is supported. SusiAccess will preload in all our embedded boards and systems.

This we are sure can offer big differentiation from competitors. We understand what customers really need, and we give support from product planning, design, validation, and integration to final mass production. In every phase, we provide module integration service, chassis design, thermal simulation, and also intensive embedded software service. All these factors combine to offer customers a one-stop embedded design-in service. ■

Hall-Stand 1-624

GE: with rugged COM Express at Embedded World

GE Intelligent Platforms presents at Embedded World the latest product program of innovative and very robust hardware solutions for demanding application areas. Thus the complete rugged COM Express product range can be seen which is designed for extreme conditions with its soldered components. The product range is completely designed and produced in Bavaria, Germany. As a novelty you can see the latest migration options for VME and cPCI applications. Existing bus standards of products can be adapted to the modular advantages of the COM Express technology. In this context are the fast and modular built industry PC and controller solutions that enable users to start into the industrial internet world. GE Intelligent Platforms creates today the high performance automation solutions for the connected world of tomorrow. In addition to the hardware solutions for the commercial embedded and automation market, Intelligent Platforms presents High Performance Embedded Computing models for powerful computing operations. Along the unique open VPX products of GE you can also find the outstanding new ARINC boards for the Aviation market. GE Intelligent Platforms is ahead of time with the concept of combining the embedded and automation hardware market and one of few suppliers with longtime experience in both markets. The R&D center in Augsburg has a strong know how in the design of rugged COM Express based solutions and is glad to support with customized developments.

News ID 16787

Hall-Stand 2-220

MEN: ESMexpress COM with PowerPC QorIQ

MEN's latest computer-on-module complying with ANSI-VITA 59 (standard in preparation) excels by its extremely high performance in addition to the usual ruggedness and flexibility of the ESMexpress standard. The XM51 is equipped with processors of the Freescale PowerPC QorIQ family, with up to 8 processor cores featuring up to 1.5 GHz being accommodated on the space-saving form factor. Based on the QorIQ P4080, P4040 or P3041 at clock frequencies between 1.2 and 1.5 GHz, the XM51 takes the performance and speed of common computer-on-modules to a new level. Paired with the robust and space-saving design of ESMexpress modules from MEN, this powerful CPU is the perfect basis for safety-critical and demanding applications, especially in avionics, railways and medical engineering.
All three processor types of the QorIQ family used come with multi-core architecture and advanced computing functions. Depending on your requirements, you can select the processor that fits best: Do you need a strong, number-crunching P4080 with eight cores or a cost-efficient and energy-saving P3041? The computer-on-module supports four USB 2.0 interfaces with host function and one USB client port, two Gigabit Ethernet channels, two 3-Gigabit SATA and two PCI Express x1 links with 5 Gbits/s each (PCIe 2.x), which can be made accessible on any ESMexpress carrier.

News ID 14885

Hall-Stand 1-211

Concurrent: fabric interconnect networking software

Concurrent Technologies releases their Fabric Interconnect Networking Software (FIN-S, pronounced 'finesse') to complement their range of Single Board Computers and Fabric Switch products employing high speed serial backplane interconnect fabrics i.e. VPX, VXS, AMC product ranges. FIN-S provides a high performance, low latency, communications mechanism for multiple host boards to intercommunicate across high speed serial fabrics i.e. PCIe, SRIO and 10GigE.

News ID 14954

Hall-Stand 1-650

VIA: Mini-ITX Embedded platform for POS and kiosks

VIA Technologies announces the VIA VB7009 embedded Mini-ITX board. Measuring only 17 x 17cm, the VIA VB7009 Mini-ITX is an extremely flexible embedded board with top class functionality and performance for POS and kiosks. The VB7009 is a cost effective solution offering a broad range of power efficient VIA CPU choices, including the dual core VIA NanoTM X2 processor, providing superior flexibility to match customers' embedded computing needs. Paired with the VIA VX900 unified all-in-one media system processor, the VIA VB7009 Mini-ITX embedded board delivers a highly optimized platform that boasts stunning HD video performance of the most demanding video formats at resolutions of up to 1080p.

News ID 14897

Hall-Stand 1-507/4-240

Apacer: industrial-grade MicroSDHC memory card with up to 16GB

Apacer launches the first industrial-grade MicroSDHC memory card featuring the capacity of up to 16GB. One of the highlights is its firmware and major components that can be fixed right after customer's recognition and validation. This reduces the risk of out-of-stock and compatibility issues by providing customers stable supply and high reliability. Apacer's industrial-grade MicroSDHC memory card is compliant with SD 3.0 Specification and supports Class 10 high-speed transmission. Available in 4GB, 8GB and 16GB, with sequential read/write speed reaching up to 20/14 MB/sec, it fulfills requirements for high-capacity and high-speed data storage.

News ID 14922

Hall-Stand 1-222

Vecow: extended-temp fanless Embedded system for in-vehicle security

Vecow presents the EC-5500-3R and EC-5500-5R fanless Embedded controller, integrating 2nd Gen Intel Quad Core i7, i5, i3, and Celeron Sandy Bridge mobile series processors. With built-in Intel vPro technology, 2nd Gen Intel Core processors empower virtual management and smart security of PCs. Intel vPro technology allows management remote access to the PC, it is easy to secure sensitive data in protected flash memory regardless of the system's power or OS. The new 2nd Gen Intel Core processors offer embedded designers a number of important upgrades including up to Quad CPU cores, an integrated graphics processor, an extended instruction set, Intel® Turbo Boost Technology, and remote management support.

News ID 14969

Hall-Stand 4-136

F&S: ARM SBC in PicoITX form factor

armStoneA8 is a small, powerful and cost-effective SBC, offered by F&S. Its PicoITX form factor with CortexA8-1GHz is suited for developing small but high-performance applications. It comes with 512 Mbyte RAM and 128 Mbyte NAND Flash, which is sufficient to boot WCE or Linux directly from Flash. A micro SD-Card can be added optionally. The board offers interfaces such as USB Host/ Device, 2x LAN, RS232, CAN, SPI, I2C, and Audio (IN/ OUT). Furthermore, a LVDS interface (max. resolution up to XGA/WXGA), a HDMI/ DVI interface up to 1920 x 1080 and a touch panel interface are available, so it is possible to control two displays/ screens independently.

News ID 14997

Hall-Stand 1-119/2-420

Lanner: fanless Industrial system with Intel Core i5/i7

Lanner Electronics is releasing a fanless Intel Core i5/i7 based industrial computer. The LEC-7920 is designed with a Mini-PCIe slot with a SIM card reader for 3G connectivity, Intel GMA HD graphics for full high-definition output and a dust proof design for longevity. The LEC-7920 incorporates a Mini-PCIe slot with an attached SIM card reader. When equipped with a module this appliance can be connected through GPS or 3G networks, allowing for GPS tracking or content updates via 3G.

News ID 14968

Hall-Stand 4-228/5-340

Arrow: engineering and embedded computing integration services

Arrow Electronics will showcase its engineering and embedded computing integration services at the Embedded World trade show. Arrow will feature engineering offerings that support developers throughout all design process steps, from the identification of new applications to the concept phase and through the development of the solution. Arrow offers numerous engineering programmes, tools and solutions to developers during each phase, including Testdrive, a reference board evaluation programme, online design tools and industry-specific technology solutions. In particular, Arrow's engineering booth will emphasize areas such as the functional safety in industrial automation, motion control, LED lighting and memory solutions. Several manufacturers will present their newest technologies, and boards that Arrow has designed in collaboration with manufacturers and development partners, such as BeMicro Real Time Ethernet and a new version of the web server, CUBE, will be exhibited. Demonstrating its commitment of "bringing it all together," Arrow

will also showcase its embedded computing integration services for original equipment manufacturers. Those services include end-to-end solutions, design engineering, supply-chain management, global logistics and post-manufacturing solutions. Arrow provides numerous system-integration options, and its product range for OEMs includes displays, industrial computing platforms, storage and software solutions with comprehensive server solutions, standard and custom board designs and system solutions, among others. Arrow maintains seven integration and fulfillment facilities for OEM solutions worldwide.

News ID 15005

Hall-Stand 2-419

ADLINK commits to ARM development by joining new COM initiative

ADLINK announces it will support the new Computer-on-Module standard from Kontron for ultra low-power embedded architecture platforms with a whole new line of products. Building on our design experience with ARM/RISC in OEM and Intelligent Display projects, this marks ADLINK's first endeavor outside x86 boundaries for a standard form factor product offering.

News ID 14864

Hall-Stand 4-334

ERNI: ARM-based mezzanine modules

ERNI Electronics announces its entry into the growth market of computer-on-modules. At Embedded World, the company is presenting the first products of the new WHITEspeed family. The implementation of the new WHITEspeed interface standard benefits from the high speed and reliability of the MicroSpeed connectors. With this, the company is in particular addressing applications in harsh and demanding industrial environments such as in the field of transport, heavy engineering and automation exposed to high shock and vibration loads. The portfolio comprises a family of pin-compatible ARM-based mezzanine modules, which differentiate in terms of the CPU performance (clock rate, number of cores, coprocessors) and I/Os and memory capacity. In addition, a fully equipped, adaptable baseboard is available, which can be supplied also with an optional display.
This carrier board is the development platform for the application software and, at the same time, the basis for customer-specific boards. Using four MicroSpeed signal connectors and one MicroSpeed power module, ERNI realises the new standardised interface (WHITEspeed 1.0) of the modules to the baseboard, which supports the following: Ethernet 10MB/100MB/1GB, SATA, PCIe x1/x4, Express Card, UART, USB 2.0 High Speed, CAN, I2C, SMB (system management bus), SPI, LVDS LCD display, SDVO (serial digital video out), HDA (high definition audio), SecureDigital memory card interface, GPIOs, RESET, Watchdog, PWM and optionally a camera interface.

News ID 15031

Hall-Stand 1-318

Fujitsu: new versions of Mini-ITX D3003-S3 mainboard series

Fujitsu add another product version to their series of Mini-ITX mainboards for industrial use. D3003-S3 is equipped with an AMD A55E Controller Hub chip set, an AMD T56N Dual-Core processor, and an internal 24-bit Dual-Channel LVDS. This allows for operating displays larger than 12" at the highest resolution in HD quality, something which is not possible with conventional 18-bit Single-Channel LVDS. The product will be shown first at Embedded World. The Mini-ITX mainboards are designed for challenging applications in an extended temperature range from 0 to 60 °C found in the fields of automation, medical engineering, kiosks, and digital signage. With the D3003-S3, applications with onboard displays now also profit from the performance of a Dual-Core processor.The extended-lifetime Mini-ITX boards are equipped with an AMD A55E Controller Hub chip set. Model 3003-S1 supports AMD's low-energy processor FT1 Single-Core T44R (9W), while models D3003-S2 and D3003-S3 support AMD FT1 Dual-Core T56N (18W). The CPU comes with an integrated high-performance ATI graphics controller supporting VGA, DVI, HDMI, and 24-bit Dual Channel LVDS.
The second onboard LAN connection supports a wide range of functions with the best possible alignment of components, even for small Mini-ITX mainboards with a small number of extension slots. The mSATA solution offers tremendous advantages over conventional CF cards in terms of data transfer rates.

News ID 14971

Hall-Stand 1-442/1-306

AAEON: slim, compact fanless controller with Atom D525

AAEON has released a new fanless controller with the Intel Atom D525 processor: AEC-6612 Rev.B. This embedded controller has a storage temperature of -20~70°C and an operating temperature of -20~60°C for the ability to thrive in diverse environments. The AEC-6612 Rev.B encompasses the Intel ICH8M chipset and features up to six USB 2.0 ports, six COM ports, one power switch, one SYS LED, one HDD LED and one CompactFlash slot for copious connectivity options.

News ID 14946

Hall-Stand 2-419

ADLINK product highlights at Embedded World 2013

ADLINK will present amongst other products the following new highlights at the Embedded World Show:

Adlink will showcase the cPCI-3970 Series, the first 3U CompactPCI PlusIO compatible processor blade in its product lineup that supports high-speed serial point-to-point connections. The ADLINK cPCI-3970 Series is equipped with the latest quad and dual core 2nd Generation Intel Core i7/i5 processor with ECC memory support, and the Intel QM67 Platform Controller Hub. It is a high performance solution for applications in industrial control and automation, transportation, and medical segments that require enhanced graphics capabilities, ECC memory and high speed I/O interconnects. The cPCI-3970 Series includes two blade types based on the same electrical and mechanical design: the cPCI-3970 which is equipped with HM connectors, and the fully PICMG 2.30 compliant cPCI-3971 which features an Ultra Hard Metric J2 connector with a data transfer speed of 5 Gb/s. Both products are compatible with the CompactPCI PlusIO pin assignment and support PCI Express Gen2 x4, three SATA ports, three USB 2.0 ports and two Gigabit Ethernet ports at the J2 connector.

At show is also the new Smart Panel series of products designed to provide a new "all-in-one" concept to panel computing applications, such as factory automation equipment, transportation systems, multimedia navigation devices, advertising systems, interactive kiosks, and medical care systems. The Smart Panel series of products provide users an embedded human-machine where cloud computing is used for the Things of the Internet in both public and private cloud services to enable access to information and services from any location as needed. Smart Panel products comprise highly-integrated, ultra-thin, and flexible designs ready for development. Benefits of this series of products include a quicker time-to-market of your end products, reduced development risks and costs, and simplified material management. This is the first series of products on the marketplace to integrate the CPU, networking capability, and a display into a single panel device. The 8" model Smart Panel offers a screen brightness of up to 800 cd/m2 (compared to 250 – 300 cd/m2 in commonly found in the LCD panels available in the marketplace) to ensure a clear image both indoor and even outside under direct sunlight. The high-resolution full-color interface makes it much easier for users to use the device to gather data and display images, reports, and text for viewing through simple operations.

As recently announced Adlink will also support the new COM standard from Kontron for ultra low-power embedded architecture platforms with a whole new line of products. The new COM standard provides a very slim and low profile solution for ARM/RISC and SOC based ultra low-power processors. The standard specifically targets new fast growing markets such as handheld devices and industrial tablets, and in the near future is also expected to move into more traditional applications such as industrial control and data communications.

News ID 14886

Hall-Stand 1-460

Kontron: 10-core out-of-the-box DPI AMC module with Cavium OCTEON II

Kontron announces that the second generation of the Kontron AMC Packet Processor module AM4211 for MicroTCA platforms is now available with the Cavium 10-core OCTEON II cn6645 series. For telecom equipment manufacturers, this AMC module represents a 40 percent increase in performance for any new designs of security and Deep Packet Inspection, network applications for SNOW 3G and KASUMI, TCP/IP packet processing acceleration and QoS that are integrated into eNodeB base stations and other types of network security and test and measurement applications for LTE networks.

News ID 14941

Hall-Stand 1-211

Concurrent: high performance 6U CompactPCI SBC

Concurrent Technologies announces their latest high performance 6U CompactPCI Single Board Computer. The PP 81x/x9x is a single slot air-cooled Single Board Computer utilizing the 2nd generation Intel Core microarchitecture, based on 32nm process technology with the new Intel memory/graphics controller architecture integrated into the processor. The PP 81x/x9x supports the Intel Core i7-2715QE processor and the enhanced features of the Intel Series 6 Express chipset, along with up to 8 Gbytes of DDR3-1333 ECC SDRAM.

News ID 14957

Hall-Stand 4A-304

ELMA: CompactPCI serial system for test laboratory

ELMA has now presented a CompactPCI PlusIO test system at PICMG CPCI-2.30 standard. This "little brother" of the two already existing 19-inch versions is equipped with eight slots in total; one system slot for the CPU, four for peripheral cards and the remaining three for CompactPCI legacy cards. CompactPCI Serial is seen as successor technology to the meanwhile outdated CompactPCI standard.

News ID 14882

boards & solutions & ECE

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Hall-Stand 2-422/2-305

IEI: 3.5" embedded SBC with Atom N2600 and D2700

IEI Technology announces the launch of the WAFER-CV-N2600x/D2700x. This 3.5" embedded computer board is based on new options for the Intel Atom processor N2600 and D2700 series. The WAFER-CV-N26001/D27001 supports resolutions up to 2560 x 1600 with the Chrontel CH7511 DP to LVDS converter. It has an operating temperature range of -20 ~ 70 . IEI's WAFER-CV-N26001/D27001 embedded computer board includes an Intel Atom processor N2600 or D2700 with the Intel NM10 Express chipset. It features low power consumption, UEFI speedy boot-up, SO-DIMM DDR3 support, high resolution via VGA & DP, 12 V only power supply and mSATA SSD storage.

News ID 14894

Hall-Stand 5-340

Beckhoff: compact fanless PC control for a wider range of applications

The new fanless CX9020 Embedded PC is equipped with a 1 GHz ARM Cortex A8 processor and is suitable for a wide range of PLC and Motion Control applications in small- and medium-sized machines, systems or buildings. A multi-interface can be configured ex factory, if required, offering scope for numerous optional extensions, from an audio interface up to the connection of fieldbus masters or slaves. The CX9020 is a DIN rail-mountable controller with state-of-the-art components: ARM Cortex A8 CPU and microSD card with large storage capacity and very compact design.

News ID 14984

Hall-Stand 4-448

Hectronic: Qseven module based on AMD Fusion G-series APUs

Hectronic has announced H6059, a Qseven module based on the new AMD T40E and T40R ultra low power dual core and single core APU and the A55E embedded chipset. H6059 is a Qseven standard revision 1.2 compliant module measuring only 70 x 70 mm. The H6059 module is a perfect fit for embedded applications that require powerful CPU and graphics performance in combination with low power consumption and extremely compact size. The Radeon 6250 GPU is integrated with the CPU to offer for instance increased 2D/3D and motion video acceleration performance and can be used for general purpose GPU computing by taking advantage of AMD's Open CL support. An on-die GPU such as this has advantages over discrete GPUs by avoiding the memory bus bottleneck.

News ID 14942

Hall-Stand 2-219

MSC presents further ARM based Qseven module family

With the compact MSC Q7-TI8168 module the MSC Vertriebs GmbH expands its offering of ARM based embedded boards in compliance with the Qseven standard 1.20. The powerful platform integrates the Integra C6A8168 processor from Texas Instruments with an ARM Cortex-A8 core with up to 3000 DMIPS and a digital signal processor. The 10 GMACS / 7,2 GFLPOS DSP @1.25 GHz C674x supports 32/64-bit single/double precision floating point. The MSC Q7-TI8168 Qseven module is special designed for demanding image processing functions e.g. in industrial automation, medicine, transportation and security systems.

News ID 15006

Hall-Stand 4A-304

Elma: OpenVPX Mini ATR provides flexibility in a small footprint

Elma Electronic now offers the 3U VPX Mini ATR in a rugged OpenVPX platform designed for use in harsh environments where SWaP is critical. Measuring only 133 x 180 x 250 mm, the compact unit is ideal for space constrained environments. The new Mini ATR ships configured with a 3-slot, 3U OpenVPX backplane, designed to VITA 65, and can be configured with solid state storage and a 250 W power supply. The unit can be modified to accommodate a plug-in version of the power supply module, providing up to 350 W VDC.

News ID 14963

Hall-Stand 1-542

Advanced Digital Logic changes name to ADL Embedded Solutions

Today Advanced Digital Logic are changing company name to ADL Embedded Solutions. This name change is due to a significant expansion in the product lines, System Design and Integration Service capabilities, including enclosures, cabling and thermal solution design and our value-added services to our embedded customers. ADL Embedded Solutions will continue to operate in its current structure, contact email addresses and the website will remain the same. The name change will also be extended to the German Subsidiary, which will be named ADL Embedded Solutions.

News ID 14932

Hall-Stand 2-219

MSC: cost and power-efficient COM Express modules with Celeron

The MSC has expanded its CXB-6S COM Express module family based on second generation Intel Core processors with two cost-efficient Intel Celeron CPU variants. The new boards almost reach the pricing level of Intel Atom and ARM based solutions. The new embedded modules integrate the Intel HM65 PCH chipset and the Intel Celeron processor 827E with one core (1.4GHz) or the dual-core Intel Celeron processor 847E with 1.1GHz clock frequency. Both processors are manufactured in a 32 nm technology and use a 2 MB L3 cache.

News ID 14923

Hall-Stand 2-419

ADLINK: i7 -based 6U CompactPCI blade with remote management

ADLINK introduces the PICMG 2.0 compliant cPCI-6210 Series, a 6U CompactPCI processor blade based on the latest quad- and dual-core 2nd Generation Intel Core i7 and Intel Core i5 processors and up to 16 GB DDR3-1600 memory support. The cPCI-6210 is a performance computing solution with enhanced management features such as PICMG 2.9 compliant IPMI, remote management based on Intel vPro technology and optional Trusted Platform Module for security management, and is suitable for applications in Military, Communication and Industrial Control segments.

News ID 14950

Hall-Stand 1-150

DFI: fanless embedded computer features dual independent 1080p HD display support

DFI launches a new compact design system, DS910-CD, offering low power consumption and fanless cooling for digital signage applications. This embedded system is powered by the 1.60GHz dual-core Intel Atom processor N2600 and Intel NM10 I/O Express chipset with 5W system TDP. The low-profile chassis is constructed of heavy duty steel with an extruded aluminum top cover providing silent passive cooling. A single 12VDC power input reduces power supply cost and complexity for both stationary AC powered applications and mobile battery powered applications.

News ID 14907

Advertisers Index

Hall-Stand 1-435

Axiomtek: Core i7 Mini ITX motherboard with multiple display interfaces

Axiomtek introduces MANO860, an industrial-grade Mini ITX motherboard based on the Intel QM67 Express chipset and designed for the 2nd generation Intel Core i7/i5/i3 processors in Socket G2. The high performing MANO860 comes with two DDR3 1066/1333 MHz SO-DIMM slots with up to 16GB memory and five SATA ports with RAID 0, 1, 10, 5. The Intel HD Graphics 2000/3000 graphics engine is built into the chipset to provide fast graphics performance, high visual quality, and flexible display options without the need for a separate graphics card.

News ID 14902

Hall-Stand 2-308

IBASE: compact fanless system supports wide-range temperature

IBASE Technology announces its RSB200-884T ruggedized fanless solution designed for thermally constrained environments in outdoors, automation and industrial sectors. The compact rugged embedded computer comes with a 3.5-inch SBC supporting the low-power Intel Atom Z520PT 1.33GHz processor with an extended temperature range of -30 to +70°C for use in extreme operating environments.

News ID 14895

Hall-Stand 5-141

Eurotech: Parvus awarded AS9100 Rev C quality certification

Eurotech Subsidiary Parvus announced its successful certification to AS9100 Rev C. Encompassing all ISO 9001:2008 quality management requirements, AS9100 Rev C specifies additional requirements for aviation, space, and defense organizations. Parvus first earned its AS9100 Rev B Certification in December 2010 and elected to upgrade to Rev C to meet the industry's newest and highest standards of quality. The new Accredited ISO registrar Eagle Registrations Inc. assessed Parvus and found it in full compliance with this globally recognized quality standard.

News ID 14888

Hall-Stand 1-460

Kontron: three new embedded motherboards with 2nd gen Intel Core i3/i5/i7 processors

Kontron announced the launch of three additional embedded motherboards in the ATX and Flex-ATX form factors with the 2nd generation Intel Core i3/i5/i7 desktop and mobile processors. All three embedded motherboards are equipped with a highly flexible and configurable feature connector. This means the adaptation of the Kontron ATX and Flex-ATX embedded motherboards to individual I/O requirements can be carried out extremely simply and efficiently via the onboard embedded microcontroller.

News ID 14889

Hall-Stand 1-119/2-420

Lanner: customizable IPC has onboard Mini-PCIe slot with a SIM card reader

Lanner released the LEC-2110, a fanless Intel Atom D525 Industrial PC with dual video outs and multiple expansion options. Every LEC-2110 will have an onboard Mini-PCIe slot with a SIM card reader. This SIM card reader allows customers to use wireless communications applications such as 3G or GPS. The other expansion slot can be used for either a PCIe or PCI expansion. Common uses of this expansion slot include CAN bus modules, motion control modules or a number of separate I/O ports.

News ID 14875

Hall-Stand 1-650

VIA announces Android support for embedded x86 boards

VIA Technologies announces Android support for VIA x86 embedded platforms, starting with support for the VIA EITX-3002 Em-ITX board. Running Android on an x86 platform offers increased flexibility, great multimedia support and cost saving advantages for embedded applications such as in-vehicle entertainment and interactive kiosks. Key advantages for Android on x86 include leverage of Android development resources and existing apps, rich I/O flexibility, greater CPU performance as well as higher display resolutions of up to 1920 x 1080.

News ID 14873

Hall-Stand 2-110

Advantech to present industrial grade digital signage solutions

Advantech delivers industrial-grade reliability which is ideal for mission-critical digital signage deployment where 24x7x365 availability is the key. The standard life-cycle of Advantech's industrial grade digital signage systems is five years hence offering predictability and ease for managing network operations. Advantech is also flexible in terms of product configurations, pre-installing images and operating systems support such as Linux and Windows Embedded.

News ID 14872

Building Your Embedded Solution Right Here

PICO-CV01

PICO-ITX Fanless Board With HDMI and Intel® Atom™ N2600 Processor

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- Mini HDMI Support
- 18-bit Single Channel LVDS LCDs
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- mSATA/ Mini Card (Half size) x 1, SATA 2 x 1
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