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November 06/14

Cover Story

How to select the right embedded module and the right module provider

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SPECIAL ISSUE



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Dear Readers,



Despite the fact that the probably most important exhibition for the embedded community – Embedded World - is taking place in February in the Nuremberg fairgrounds, November is also an important month for the embedded industry. The reason are two exhibitions namely electronica, the international trade fair for electronic components, systems and applications, which will take place from November 11th to 14th at the fairgrounds of Messe München, and SPS IPC Drives, the showcase for electric automation – systems and components which are an important

application sector of embedded systems. First information about electronica 2014 was included in our last issue and this issue again contains a great deal of information about this exhibition.

Beside articles about new products and technologies you'll find the schedule of Embedded Forum starting at page 23. This four day event implies sessions with lectures about the latest trends in the embedded industry. These are first of all the Internet of Things (IoT). The Embedded Forum will provide the attendees with the basics, suited chips, tools & software, and will discuss security problems and its solution for IoT. ARM-based MCUs & SoCs, starter-kits & reference designs, motor control, and smart energy are additional semiconductor topics. The subjects of embedded computer technology are small form factor boards, embedded computing, and open standards for boards & modules. If you need more information about one of these topics, do not hesitate to attend at Embedded Forum.

Just two weeks after electronica 2014 SPS IPC Drives will take place in Nuremberg from 25th to 27th November. Over 1,600 exhibitors from Germany and abroad are expected to showcase their innovations, products and solutions from the field of electric automation. For the first time, the newly built hall 3A will expand the exhibition's events to 14 halls. The new hall will be dedicated to the topics of drive technology and sensors, thus creating a link between the existing halls 3 and 4A. As the exhibition has continued to expand, the themes covered by the various halls have altered. Industrial software has now been integrated into Hall 6 alongside mechanical infrastructure. Industrial communication is now accommodated in Hall 2, where topics such as industrial Ethernet and field bus systems are located. Hall 11 is occupied by the Siemens stand, which has relocated there this year.

The conference is running concurrent to the exhibition and always offers a first-class program. Keynote speeches on the topics of "Big data" and "Unconventional drives with smart materials" are just two of this year's conference highlights. Forty-eight presentations, two keynote speeches and the R&D talk, a podium discussion on the topic of "Opportunities and limitations of Industry 4.0", focus on practical and brand-independent dialog between development and application.

As you can see – hazy November is another month of substantial information for developers of embedded systems. Seize your chance!

Yours Sincerely

Wolfgang Patelay
 Editor



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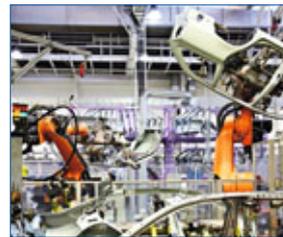
Viewpoint	3
Embedded Computing	
How to select the right embedded module and the right module provider	6
Industrial PCs in the maintenance cloud: focussing on MTBF and MTTR	10
Solid state drives are replacing hard disks in industrial applications	12
Internet-of-Things	
Unlocking the full potential of the Industrial Internet of Things	15
electronica Highlights	
Showcase of latest innovations of entire electronics industry	20
Embedded Forum	23
Microcontrollers	
Optimised MCUs enable a new spin on motor control	31
Low-power MCU design techniques for battery-powered devices	34
Wireless	
Five trends shaping 802.11 WLANs	38
Development Tools	
New software quality assurance methods keep everything under control	42
electronica Highlights	44
Product News	51

Cover Story: How to select the right embedded module and the right module provider 6



Once the decision has been taken to use an embedded module, the search for the best solution begins. Choosing a modular solution has wide-ranging consequences for the user, so it is therefore very important to make the right decision. But how do I find the best provider for me?

Featured Article: Unlocking the full potential of the Industrial Internet of Things 15



A leading automation solution for the Industrial IoT is device-WISE from ILS Technology, a Telit company, designed to connect production machines and processes with enterprise resource planning (ERP) and manufacturing resource planning (MRP) systems and SCADA applications without programming.

Showcase of latest innovations of entire electronics industry 20

Electronica, the leading trade fair for electronic components, systems, and applications is celebrating its 50th birthday in 2014. From November 11 to 14, 2014, the key topics at the fairgrounds of Messe München will be automotive, embedded systems, lighting and medical electronics, as well as the over-arching themes of security and energy efficiency. This year, about 2,700 exhibitors from all over the world are presenting their products and services.

Low-power MCU design techniques for battery-powered devices 34

This article highlights the advantages of using the low-power capabilities of 32-bit microcontrollers such as the RenesasRX100, and shows how system engineers can apply them to design battery-powered products within extremely tight power dissipation limits. It also shows how such devices can be used in real low power applications with improved system performance and reduced total system cost.

Five trends shaping 802.11 WLANs 38

This article describes in detail five specific trends which will likely shape the growth of WiFi technology in the future. Although these are the five biggest trends today, the progression of technology has a way of surprising everyone.

New software quality assurance methods keep everything under control 42



Software quality assurance in electronic control devices, according to the ISO 26262 standard, is often a fairly difficult task in practice. A new non-invasive method now allows for the first time determining the branch coverage even with optimized code.



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TQ



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25
YEARS

How to select the right embedded module and the right module provider

By Wolfgang Heinz-Fischer, TQ Group

Once the decision has been taken to use an embedded module, the search for the best solution begins. Choosing a modular solution has wide-ranging consequences for the user, so it is therefore very important to make the right decision. But how do I find the best provider for me?

A STRONG PARTNERSHIP



■ When making the decision you have to think about the right module and technology, as well as the provider. In any case the goal is to find a long-term, reliable solution, as the one-off investment to purchase a modular design should have long-term effects and not turn out to have boomerang effects later on. There are a lot of providers on the embedded market and the range of modules available can be confusing. The first questions are ones which are linked directly to the module or processor and answers to them can be found on the provider websites. How much experience does the provider have with the selected processor and with the chip provider? This is key for users because they rely on the experience of the provider and do not want to have to be part of a learning curve with the module provider.

What exactly is provided, i.e. how much support does the user have? This comprises on the one hand the Eval boards, starter kits or application boards supplied. This includes a range of application aids for the possible incorporation of interfaces. The more functions already shown here, the more the user can benefit from the experience of the module provider. What about the documentation of the modules and how are the application examples described? The second, very important part concerns the software support. What BSPs or other drivers are available, and does the provider have its

own software department so that it can react quickly in the event of an issue? And then there are sometimes hidden points which could play a key role. As already mentioned, software support is important too, while the hardware development support should also not be underestimated. What about the provider resources, or are they a one-man show? How widely can the hardware support be provided? Does the support only cover the module itself, or can the provider also offer assistance for the customer application board?

It is a lot of help to the user if the provider has experience in the customer application environment, and therefore doesn't have to deal directly with the module in the event of queries. Design support, e.g. a service like schematic review, can considerably speed up the modular design and make it safer. In some cases the provider may have already experienced errors in the activation of the module during the development of the starter kit, so that the customer does not have to repeat these errors. Support with the layout can also help to make a design safer. This know-how is relatively easy to see by taking a look at the Eval board or the starter kit. How much technology is there, as even the layout has already been successfully implemented? An option here is, of course, that the module provider implements the customer application board in the layout using its own

resources and know-how. Another important area is production. If the provider has its own production unit, it can usually react quicker and more flexibly to customer requests. In this case the production quality is the responsibility of the module provider. If an error occurs in a module the provider can normally determine quicker, using its own development and production units, where the error is and provide corresponding support. For some module providers it is of course beneficial to have a sub-contractor produce the modules. After all, it is not always easy to keep the own production lines up to date. When it comes to module providers who produce their own equipment, it is worth viewing their production line(s). Here you can quickly see what capacity the provider has and how well equipped it is for future technical challenges. If a production line malfunctions, what will happen to the supply reliability? The loss of some production lines after the tsunami in Japan clearly showed how important this issue is. It therefore generates a feeling of security and trust if you also visit the supplier on site.

Of course, the production quality also covers corresponding test procedures and the level of testing. How well is the module provider prepared for this? Does the user have special requirements on the module regarding certain test procedures that have to be

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Figure 1. HALT test chamber: the highly accelerated life test (HALT) allows assessing the product durability and robustness. The test results are directly incorporated into further development of the module.



Figure 2. SMD production line: thanks to the in-house production facilities, TQ-Systems is able to respond swiftly and flexibly to customer requirements.

proven, and can the module provider meet them? Once an error has occurred in a module, is it vital in the end in what way the module provider ultimately has access to the test data, or whether it can limit the error with a corresponding test procedure? In many licences, such as with medical technology (ISO 13485), aviation (EN 9100) or automotive (ISO 16949), corresponding proof is to be kept in the event of errors, about when, how and where the product was produced and tested. This traceability may require proof up to component level, in order to rule out consequential errors and damage. How well is the module provider prepared for this? Can it provide this data smoothly?

The user can get some security from the evidence of the module provider history with modules. With new providers on the market this is, of course, difficult and here it is particularly important to take a closer look. To ensure reliable delivery, is it important how long the module provider has supplied modules for, and how many have been discontinued and when? Is there a set procedure for reporting discontinuations to the user

in time? Procedures are, of course, also very important with discontinuations of key components, which in turn mean that the module can no longer be produced, as they ensure that that customer requirement can still be met. Normally the user is not just obliged to provide series delivery, but is also responsible for the later supply of spare parts. One way advertised by many providers is the use of standard modules. Here you can use the next generation of the module when the current module is discontinued. Unfortunately this only works to a limited degree, and hardly works at all with ARM-based processor modules.

To guarantee long-term reliable delivery the use and application of obsolescence procedures help. If obsolescence procedures are already applied during development, they provide a higher level of security that the module will also be able to be supplied for longer. After all here it is already checked which components can be supplied for how long - this applies to all the components of a module, not just for the processor. And components are only designed which are available for longer and securely, or possible alternatives are already intended. The aim

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Figure 3. TQ Minimodule TQMa28: based on the i.MX28 processor, the module offers a balanced ratio between computing and graphic performance. The basis for this is an ARM926 core with up to 450 MHz.

of obsolescence is always to ensure the safe and long-term availability of products and to make forecasts about the end of the product life cycle.

The delivery available of the modules is probably linked by most module providers to the forecasts of the processor manufacturer. But what about the other key components such as memories or power sequencing components? Nowadays the long-term reliable delivery is not as important with some applications as it was 20 years ago. But as users want to be able to use the module in other applications, the long-term availability once again plays a key role. And long-term doesn't mean here 5 to 8 years, but more likely 12 to 15.

Does the module provider have a history and can they provide evidence of individual modules? The whole environment of a module provider also includes a corresponding network. The bigger this network, the more probable and safe the long-term support for the module is. And in any case it is worth taking a closer look behind the scenes at the module provider, and not to be blinded by a good price. This can quickly hit you like a boomerang and end up costing much more than the money you saved in the first place.

As one of the leading electronics service providers, TQ offers a full range of services from development to production and after-sales services and even product life-cycle management. This applies in particular to the TQ modules. With its long-term experience in a wide range of sectors, TQ offers extensive development support, starting with the wiring diagram review, a complete layout of the application board, which is designed for manufacturing (DFM), and support with the assessment of the long-term availability of all components (obsolescence management), not just for the module. TQ modules are available for at least 10 years. TQ thereby offers even more security when choosing a modular design. ■

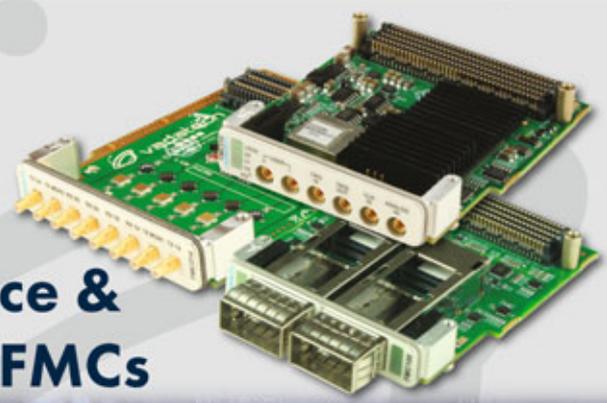
Product News

■ ADLINK: ETX COM as drop-in replacement for existing ETX systems

ADLINK announced a new ETX Computer-on-Module, which uses the latest Intel Atom Processor E3800 SOC Series with performance scalable from single core at 1.4GHz to a quad core at 1.9GHz, matched with a single SODIMM socket for up to 4 GB non-ECC 1333/1066 MHz DDR3L memory. The ETX-BT supports all legacy I/O of previous ETX modules on the market and will extend the service life of expiring ETX-based systems for another 7 years, bringing them to a new performance level and allowing them to access the latest cloud services.

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Industrial PCs in the maintenance cloud: focussing on MTBF and MTTR

By Norbert Hauser, Kontron

Panel and Box PCs, which are used for HMIs and control units, should be able to connect to maintenance clouds quickly and reliably. This article describes the demands that machine and plant manufacturers should place on such systems.



Salesforce data flow from the HMI and Box PC via the M2M platform to the Salesforce service cloud and can be accessed from any mobile device.

Machine and plant manufacturers as well as operators are looking for holistic integrated solutions for their service and maintenance activities. According to an asset management study by ARC Advisory Group, focus is placed primarily on improving availability and, therefore, the MTBF of the facilities. What's more, the longevity of the installations should be increased while lowering the maintenance costs. But that's not all: an improvement in quality and output, transparent management functions (visibility to manage), and improvements in relation to safety and risk management are also motives for making investments in this area.

An important lever here is the way in which field service management is organized. In order to increase efficiency, operators often want to map the messages from signal lamps and emergency stop switches from all over the factory, which are usually analog signals, on a central service cloud. Service employees can then control systems efficiently through the cloud using mobile devices such as smartphones and tablets. What's more, new findings for optimizing facilities long term can be obtained by analyzing the collected big data. To enable this, HMIs and controls need to support such cloud services, as they often represent the hub between I/Os in the field and the higher level management systems.

How can machine and plant manufacturers develop efficient maintenance solutions and integrate them into their box and panel PCs? The ability to use pre-assembled solutions would be the ideal option, especially when it comes to collecting and providing data, establishing a connection to the service cloud and the cloud application itself, and displaying information. With regard to the last point, Kontron has already introduced an exemplary platform, which is connected to its industrial PC within the scope of a proof-of-concept: salesforce.com. This cloud development environment can be used by OEMs to develop their own in-field service solution. The convenience of salesforce.com is that it provides a basic asset and field service management system. Many companies are already using the AppExchange platform for their field service solutions and one example is ClickWorkforce software, a workforce management system. A user is one of the most innovative and powerful market participants in the Gartner Magic Quadrant for in-field services. This proves the capabilities of this global leader in application platforms.

How does the information from the control unit or HMI in the field get to an application such as salesforce.com? Kontron views the IPC suppliers as strategic partners and has already developed appropriate solutions for OEMs. One development platform for con-

necting to the cloud is, for example, the M2M Smart Services Development Kit. This can work independently as a full cloud node or provide the technological basis for integrated 2in1 solutions, with which the cloud access is operated in parallel on the control or HMI hardware - ideally in virtualised form using a hypervisor. Developers only need to make



The IPC Kontron KBox C-101, designed for maintenance-free "wartungsfrei" operation, is the performance flagship of the new KBox family for industrial control cabinets.



The KBox A-101 has been designed for cost-intensive automation and industrial computing tasks and shows that cost efficiency and zero on-site maintenance are possible in one device.



The Kontron Micro Client 3/3W family has been designed for monitoring and controlling individual product lines. The HMIs are available with seamless, edge-free 16:9 glass touchscreens with PCAP or the traditional 4:3 format with resistive touchscreen.

their application data available in XML/SOAP and specify message data. After a few simple clicks, they can install a mature, cloud-based asset and in-field management system. What's more, with mobile communication interfaces it can also be installed in remote locations, where maintenance employees are not always on site.

The cloud application is now available and cloud access has been set up on site. What do users expect from a locally installed IPC system connecting to the cloud? It should work reliably and before anything fails, the OEM should be ready and waiting. This means this hardware should also be subject to preventative monitoring. For the IPC itself, uniform remote management functions need to be provided, and in order to ensure the best possible

re-use and uniformity, OEMs should focus on implementing standards. On the hardware side there is the Intel Advanced Management Technology (Intel AMT) for example, which is part of the Intel VPro Technology. On the software side it is worthwhile to utilize standardized application programming interfaces (APIs), such as the Kontron EAPI (Kontron Embedded API). This is the only way to ensure system functions can be accessed remotely in a uniform manner. For example, to monitor system parameters or for the active control of specific embedded features. If OEMs use such a uniform infrastructure, which supports multiple processors and operating systems, they will be able to implement a standardized remote access and management solution for a wide range of platforms.

What's the point of all of these functions if they are installed on systems that are relatively vulnerable? This means the symptoms were focussed on and not the causes. During the development of its cloud-capable solutions, Kontron also developed the feature set of its own systems and designed them for maintenance-free operation. As a result, the systems have components with long service lives in order to offer a high MTBF that exceeds the lifetime of the application, shock- and vibration-proof flash memory instead of rotating media, energy-efficient components in order to enable system designs that do not require fans, wear-free dual-layer capacitors instead of batteries, and extended power supply functions in order to avoid a system reset in the event of a short power failure. These points show that a lot needs consideration when determining the hardware, if you want to implement systems with zero onsite maintenance. Many of these design characteristics are not, however, listed in the data sheet. Systems that require no on-site maintenance are not always immediately identifiable as such. Developers need to obtain precise information about the system specs.

The first maintenance-free products that Kontron prepared for such maintenance solutions from OEMs and automation providers include the book-sized box PCs KBox A-101 and KBox C-101 as well as the panel PC Micro Client 3/3W. The boxes are fanless and equipped with flash memory and gold caps. With an MTBF of between 40,000 and 70,000 hours, (dependent on the system and configuration), they also offer a high level of reliability. During these operating periods no maintenance activities are required from a technical perspective. What's more, they stand out thanks to their industrial design and can be obtained from Kontron for at least five years from the initial launch date. This means customers will still be able to purchase systems with identical configurations years later. ■



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Driven by Safe Electronics



Solid state drives are replacing hard disks in industrial applications

By Robert Herth, MSC

The potential advantages of solid state over hard disk drives are now becoming apparent in the marketplace. This article discusses the technological background to this trend.



Robert Herth, BDM Memory & Storage, MSC Technologies

■ A few years ago, solid state drives (SSDs) still had some difficulties compared with hard drives. Today, SSDs celebrate considerable success and over the next few years, the market for SSDs will continue to grow very rapidly. The main reasons for this are improved technical characteristics, especially in terms of lifetime, performance and security, which determine the selection of SSDs today. Whereas the consumer market is dominated by price per gigabyte (GB), performance data and lifetime per GB are what count in the industrial market.

The market for industrial applications is divided into embedded customers – which use a flash card or SSD in their system, for example, industrial PC (IPC), data logger or measurement device – and enterprise customers in the field of networking and hosting. For customers with embedded applications, SSDs with smaller capacities such as, for example, 32 GB or 64 GB are sufficient in most cases. In the enterprise sector, there is a much greater need for storage, therefore large SSDs with 480 GB and 960 GB are used, and the demand for storage capacity is increasing rapidly. We can expect to be talking next year about 1.5 terabyte (TB) and 2 TB. Industrial customers are focusing more and more on data storage with NAND flash memory chips that are based on multi-level cell (MLC) instead of single-level

cell (SLC). In a MLC construction with common 19nm structures today, 2 bits of data per cell can be stored. With triple-level cell (TLC), 3 bits of data per cell can be stored, the highest cell density. However, the requirements in regard to the controller and handling of the SSD for ensuring performance and lifetime are more demanding. In assessing lifetime, the SSD must be considered as a whole system and not just the lifetime of an individual flash cell. Only approximately 3000 program-erase (P/E) cycles are allowed with the 0 or 1 programmed cells. However, by the implementation of diverse technologies that have evolved during recent years, the lifetime of the SSD can be extended considerably. Examples of this are: wear leveling, EDC/ECC, bad block management, write amplification, garbage collection, and over-provisioning.

Wear leveling is the intelligent distribution of data written in the SSD. The objective is to achieve even wear of the flash cells and thus increase lifetime of the SSD. With static wear leveling, wear of the flash cells over the entire capacity can be reduced through automatic transfer of data to less used flash blocks. Without wear leveling, individual sectors on the SSD would be hardly or heavily used to a varying extent. To maximize performance, the data buffering function catches data in a cache in order then to write this in a single opera-

tion. The error detection code/error correction code (EDC/ECC) algorithm for detecting and correcting errors at the bit level has an influence on the maximum number of read/write cycles. When a flash block approaches the end of its lifetime, the probability of a bit error increases. By checking the cell, if it is defective or not, the maximum number of cycles can be considerably increased.

Generally, in SSDs with MLC technology, approximately 7% of the flash memory chips are reserved as reserve blocks (spare blocks) for data storage. If a flash cell is worn out or defective, the bad block management feature will mark it with a flag and replace it with a cell from the reserve block. This increases the lifetime and reliability of the SSD. Write amplification is a criterion of how intelligent the manufacturer has written its firmware and how optimally the controller can manage the data. The garbage collection (GC) is responsible for efficient deletion of data in the flash blocks.

The data management requires that a SSD has enough storage space available for management and transfer of temporary data. In modern SSDs, over-provisioning (OP) is currently used in order to guarantee this, even as the drive is progressively filled with data. OP is a way to set aside a certain amount of storage

space, inaccessible to the user or the operating system. It is amazing how the performance and lifetime can be increased through this technology. For example, if only 100 GB of a 128 GB SSD are used – according to Samsung – a 3.5 times increase in possible write cycles is achieved. The total bytes written (TBW) increases three-fold. TBW is a value used in the industry, which is shown in the datasheet and provides information about the lifetime of the SSD. On the basis of the amount of data accumulated per year, the period of time that the SSD used can still reliably operate can be extrapolated from this value.

Further criteria that play a role in selection of the appropriate SSD are operating temperature and the behavior if power fails. Thanks to a range of advanced technologies to increase performance and lifetime, SSDs have also captured an important position in the industrial market. And the future promises even more: for example, Samsung has presented the first three-dimensional (3D) Vertical NAND (V-NAND) flash memory. ■

electronica News

Hall.Stand A6.319

■ Swissbit: X-60 series with capacities from 15GB to 480GB and different form factors

For the first time Swissbit presents its new X-60 series of the SATA III Generation at electronica. Due to the latest firmware and hardware technologies, they combine an impressive speed of up 490MByte per second with the utmost reliability. In order to meet the requirements of applications in the industrial, automotive and telecommunications markets, Swissbit develops and produces specific models for each segment with technically adapted features. Furthermore, the X-60 series is available with different capacities from 15GB to 480GB and form factors (including mSATA, slim-SATA, M.2 and Cfast). Samples of the mSATA version X-60m will be available from the end of Q1 2015, the other form factors will follow between Q2 and Q4 2015.

Another highlight is the Swissbit Security series PS-100u for highly integrated storage-based security. The new additions to the series, PS-100u PE and PS-100u DP, in the micro SD form factor, are available with and without a Smart Card. Graphic demos at the trade fair booth, such as Secure Voice, cloud authentication, data protection and contact-free security, show the capabilities of the security storage devices. The Swissbit portfolio includes industrial DRAM, flash and security storage solutions in all commonly used technologies and form factors. All Swissbit storage products meet the requirements of industrial and embedded applications in harsh environments: maximum reliability and robustness, long service life, extended temperature range.

[News ID 2075](#)

Hall.Stand A3.139/1

■ Zytronic: future touch technology at electronica

Zytronic will be showcasing applications at electronica that demonstrate what is possible at the limit of touch screen technology and give an insight into emerging trends for human-machine interfaces. The company, which is the leading developer of projected capacitive touch sensor technology for ultra large format displays, will focus, in particular, on curved screens. The centrepiece of the stand will be a proof-of-concept kiosk incorporating a concave 40-inch multi-touch screen. A waist height 19-inch 'Qwerty' touchscreen keyboard has also been included on the same 'zero bezel' printed glass interface, with the two touch sensors managed by a pair of Zytronic ZXY200 controllers managed by a single PC.

[News ID 2041](#)



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electronica News

Hall.Stand A5.260/A5.159

■ Rutronik: innovative products for tomorrow's solutions at electronica

Under the motto "Meet tomorrow now!" Rutronik will be exhibiting forward-looking components at electronica. For complete embedded systems RUTRONIK EMBEDDED offers embedded boards, IPCs, box and panel PCs, memory systems, displays and wireless modules, auto-ID components, and specific peripheral components. For devices within the Internet of Things RUTRONIK SMART unites complete solution approaches comprising selected sensors, wireless components, micro-controllers, power management, and security solutions.

The cloud-based pedometers containing the nRF51 from Nordic Semiconductor deliver an impressive demonstration of an IoT application. Rutronik will be giving away 1,000 pedometers at the trade fair. In addition, Rutronik will be exhibiting its sophisticated logistics systems and warehouse logistics systems with numerous add-on services such as traceability and Smart Consi. Under the heading "Global Networking", Rutronik will be demonstrating the possibilities of comprehensive global consulting services and delivery across the entire product range and beyond.

Rutronik24 will be exhibiting as a distributor for SMEs and large companies with medium component requirements. In addition, product specialists from Nordic Semiconductor, JAE, Telit, Samsung Electro-Mechanics, Toshiba, Osram Opto Semiconductors, ASJ, and Song Chuan, a new Rutronik partner for electromechanic relays, will be exhibiting the latest product innovations and on hand to answer any questions concerning the products and applications. Products from Infineon and STMicroelectronics as well as Kingstate, whose professional acoustics solutions were recently added to the Rutronik product portfolio, will also be on display.

[News ID 2056](#)

Hall.Stand A4.225

■ Arrow: web-based product life cycle services platform

Arrow Electronics is offering the first fully integrated online product life cycle services engine for electronics parts. Available in German, French, Italian, Spanish and English, users can meet their electronic component needs through an intelligent search of millions of parts from hundreds of suppliers by using comprehensive features, such as product selectors, cross referencing and Bill of Material capabilities. Arrow's web tool provides engineers with interac-

tive reference designs and advanced design applications for faster development cycles. Once users are finished designing using the interactive features, they can simply generate a Bill of Materials and purchase the parts, all without having to leave the site. Design engineers globally can collaborate on shared designs securely using messaging and live updates, as well as with Arrow's technical experts supporting all Europe, Middle East and Africa time zones.

[News ID 2179](#)

Hall.Stand A4.420

■ TI: innovations for industrial and automotive designs at electronica

At electronica 2014, Texas Instruments will showcase how analog and embedded processing semiconductors enable innovative technologies to meet today's industrial and automotive challenges. Visitors will have the opportunity to participate in hands-on demonstrations that reveal how the right products and solutions for complex systems can make development easy and shorten development times.

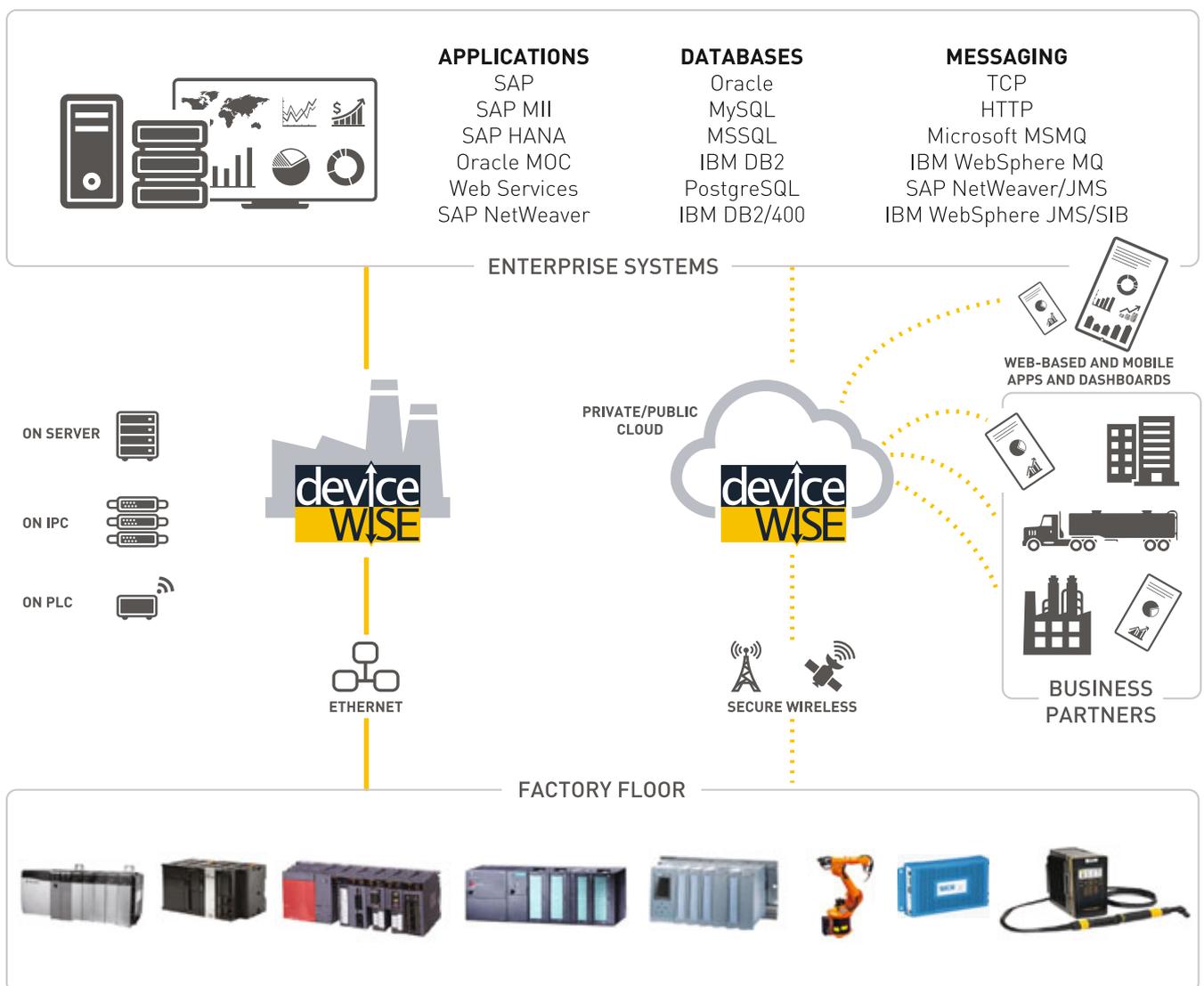
TI's industrial portfolio offers differentiated hardware and software solutions as well as tools and support to help customers develop innovative products. Key application areas include motor control, programmable logic controllers, sensor transmitters, industrial communication, smart grid, building access control and energy management. At electronica, TI will demonstrate a number of analog and embedded processing solutions, such as an industrial communication demo that shows the implementation of five industrial Ethernet protocols widely used in industrial automation: Profinet IRT, EtherNet/IP, EtherCAT, Powerlink and Sercos III. These protocols are implemented as slave configurations on TI's processors and can be dynamically loaded instantaneously.

From headlights to taillights and all systems in between, TI offers a wide range of innovative technologies for the state-of-the-art automobile. With solutions in infotainment, critical active and passive safety systems and advanced driver assistance, as well as emerging solutions for hybrid/electric power trains, including many connected by wireless connectivity technology, TI is changing the way the industry thinks of automotive innovation. Among other demonstrations, TI will showcase a DLP® head-up display that enables augmented reality with twice the field of view compared to existing solutions.

[News ID 2175](#)

Unlocking the full potential of the Industrial Internet of Things

A leading automation solution for the Industrial IoT is deviceWISE from ILS Technology, a Telit company, designed to connect production machines and processes with enterprise resource planning (ERP) and manufacturing resource planning (MRP) systems and SCADA applications without programming.





Factory automation: vehicle robots

■ Competing nowadays in global economy requires the ability to adapt quickly to changing consumer demands. Manufacturers need to stay lean and flexible while maximizing capability and capacity to take advantage of new business opportunities. They need real-time data to make informed decisions to improve efficiency, effectively manage the supply chain, and generate new revenue streams.

Real-time visibility into manufacturing operations requires integrating plant floor equipment with business systems and applications. Data from disparate devices and machines made by different suppliers, using different technical protocols, and connected via different private or public communications channels across campus, cities, or around the world adds a layer of complexity that means many manufacturing and IT departments are spending too much time and money on custom-programming and complex home-grown solutions.

To reduce complexity and save money, leading manufacturers rely on new technology platforms to connect and integrate all their on-site and remote production assets with their own business systems, as well as those of their suppliers and customers across their entire ecosystem. Innovations in this new connected industrial world – often referred to as the “Industrial Internet of Things” – are transforming the way businesses operate around the world.

A key component in unlocking the full potential of the industrial IoT is the application enablement platform (AEP). An AEP is a purpose-built software platform that can collect and process data from any device, anywhere. It provides seamless connectivity and integration of data – both directly to

existing enterprise IT systems and Cloud platforms and services for web-based and mobile applications. An AEP that is easy to deploy, requires no custom programming and can save time and money versus custom home-grown configurations.

One of the leading enterprise automation solutions for the Industrial IoT is the deviceWISE AEP from ILS Technology, a Telit company. The deviceWISE AEP is designed to easily connect production machines and processes with enterprise resource planning (ERP) and manufacturing resource planning (MRP) systems and SCADA applications without programming. It enables bi-directional data communication between factory floor machines and to enterprise IT systems and databases. This AEP supports all popular PLCs from Siemens, Mitsubishi, Rockwell, Omron and most widely used production equipment, and is compatible with virtually any database, message queuing and application server system available, including IBM, SAP, ORACLE and Microsoft.

As a key enabler of the Industrial Internet of Things, deviceWISE also provides seamless and secure integration with the Cloud for remote control and monitoring of business operations and equipment by company personnel or authorized third parties via web-based and mobile applications and dashboards. This optional Cloud integration lets companies improve operational efficiencies and create business innovation around collaboration, predictive maintenance and big data analytics with secure, role-based access to managed assets. For example, companies can react quickly to emerging supply-chain and market conditions to drive operational excellence and cost savings by: monitoring real-time demand and

inventories to improve production scheduling and logistics, resulting in sizeable operational efficiencies and profitability; integrating production with the enterprise via manufacturing execution systems that drive and track consistent workflows, materials consumption, and inventories; and taking advantage of new partnering opportunities by using collaboration tools across an extended IT framework (e.g., remote access, messaging, and file sharing). Additionally companies should leverage knowledge across the entire supply chain to address business challenges, collect performance data of field equipment ensuring maximum equipment uptime and reducing scheduled maintenance costs of mission-critical systems, and improve vendor documentation for regulatory compliance.

For manufacturers, an increase in emerging technologies and smarter devices on the factory floor means larger data sets from diverse PLCs. Each machine might use a different method of communicating to the ERP/MES systems, resulting in slower integration speeds and reduced data quality. The ideal solution is a single enterprise-grade industrial automation platform that can communicate with all the machines on the network and provide aggregated data to the ERP/MES servers. Benefits of deviceWISE include: improved resource utilization by eliminating the use of intermediate PC technology, resulting in enhanced security and reduced system integration cycles; more informed decision making with real-time communications between production equipment and enterprise servers; a scalable architecture that is configurable to any manufacturing environment in any industry by leveraging the vast library of built-in standardized drivers and connectors; easy on-site installation and maintenance; and Store-and-Forward functionality to ensure that no data is lost in the event that the connection with enterprise applications is interrupted. Data is automatically saved, and will be delivered when access has been reestablished.

Plant floor IT managers across Honda automotive facilities in North America were challenged with integrating disparate PLCs from Omron, Rockwell, Mitsubishi and others with proprietary (MES) applications and widely used DB2, MSSQL and ActivPlant. They were tasked with improving IT resource utilization with simple common tools, increasing commonality between tools and plants, and improving data quality. The team needed the ability to ramp up based on market demands while keeping their staff sizes the same. They needed to stay lean and flexible while maximizing capability and capacity. In addition, they were collecting more data using more advanced tools to get better quality results, which meant poten-



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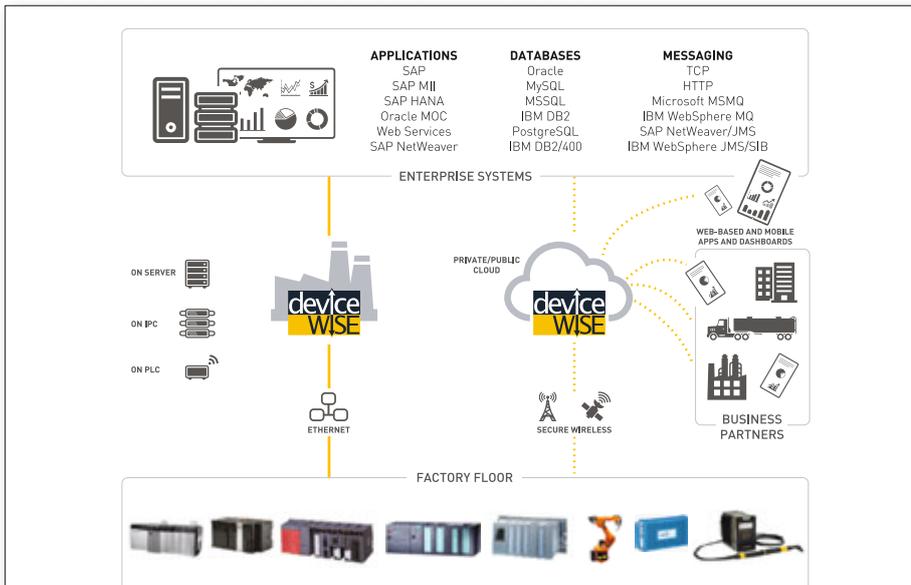
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Data transfer between production assets and enterprise systems

tially slower speeds. To improve product quality they would need to focus on integration speed and ease of collecting data. The original 2001 IT implementation included a large Java-based MES tracking application built on a UNIX platform. It was a custom-developed equipment interface written in house to meet business needs. The solution worked well but was difficult to maintain; additional customization was required each time a new device was introduced. An OPC-based solution was added but it fell short of delivering the desired improvements in resource utilization. The logic and application integration was still written by Honda, the response time was slow, there was data buildup in transit, and the team still had to deal with configuration issues. To reduce custom code and integration, Honda deployed the deviceWISE industrial automation plat-

form. Originally developed to operate within the four walls of the enterprise, it connects and integrates production machines and processes with existing enterprise resource planning (ERP) and manufacturing resource planning (MRP) systems and SCADA applications. DeviceWISE runs on multiple platforms (Windows, Linux, AIX, etc.), uses simple configuration logic and is fully-featured for advanced industrial automation. By adding deviceWISE, Honda was able to bring their blended system – the custom and the OPC package – into one common, simple interface.

The deviceWISE solution met the Honda requirement for a flexible and scalable system to suit the architecture of each plant. Plant floor IT managers needed to drive decision making by staying flexible within all lay-

ers of the application architecture, not from just inside their apps but from the factory floor side as well. Scalability meant supporting large factory implementations with large UNIX systems as well as small factory implementations with medium Linux systems. It also meant supporting special situations, e.g. satellite operations, with unique equipment or suppliers.

For large plants deviceWISE provided centralized control with options for satellite systems for localized logic and data reduction. Honda could run deviceWISE locally or communicate back up to the enterprise inside their data center and back to the factory floor. They could collect data downstream and have nested information or nested devices below that, thereby creating a small, common architecture and then feeding the data up to the enterprise into the large systems such as the ERP system or MES systems.

Finally, the deviceWISE platform met the requirement to improve data quality. The original plant tools couldn't handle the larger data sets sent from newer, more intelligent production devices with faster scan rate capability. For example, the history of a part serial number had to be retained in the PLCs. Adding more data to the PLCs slowed the overall scan times, which could lead to missing data. Implementing the deviceWISE solution enabled Honda to: simplify the plant device configuration, make the complex business logic that was buried in the application available to the plant device, remove complex ladder logic, and utilize a cheaper platform to write logic. It also meant using the enterprise to store and search the larger data set while not impacting the PLC scan rate and improving performance. ■

electronica News

Hall.Stand A5.507

■ Artesyn joins Wind River Titanium Cloud ecosystem

Artesyn Embedded Technologies has joined the Wind River Titanium Cloud ecosystem, a program dedicated to accelerating the development of solutions for network functions virtualization. By pre-integrating and validating hardware and software products with Wind River Titanium Server, the Titanium Cloud members shorten time-to-market for service providers and telecom equipment manufacturers deploying infrastructure based on NFV. Wind River Titanium Server is an application-ready software platform that enables NFV infrastructure to achieve the carrier grade reliability required for telecom networks.

[News ID 2173](#)

Hall.Stand A1.307

■ Rohde & Schwarz: mixed signal oscilloscope can be expanded to 100 MHz

R&S HMO1002 series mixed signal oscilloscopes developed by Rohde & Schwarz subsidiary HAMEG Instruments can be expanded at any time from 50 MHz to 70 MHz or even 100 MHz bandwidth by means of a simple upgrade option. HAMEG recently introduced this practical upgrade voucher for all of its instruments, and it is now also available for the R&S HMO1002. Moreover, the R&S HMO1002 includes mixed signal functionality. Measuring analog and digital signals simultaneously may not be anything unusual for an oscilloscope these days, but it is for a T&M instrument in the three figure price segment.

[News ID 2014](#)

Hall.Stand A5.476

■ Microchip: new 8-bit PIC devices featuring dual ADC peripheral

Microchip announces a new addition to its PIC12/16LF155X 8-bit microcontroller (MCU) family with the PIC16LF1554 and PIC16LF1559 (PIC16LF1554/9) devices. The PIC16LF1554/9 includes two independent 10-bit 100K samples per second Analogue-to-Digital Converters (ADC) with hardware Capacitive Voltage Divider (CVD) support for capacitive-touch sensing. This unique ADC configuration enables more efficient sensor acquisition and assists with advanced touch-sensing techniques for extremely noisy environments, low-power applications, matrix keypads and water-resistant designs.

[News ID 2054](#)

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Showcase of latest innovations of entire electronics industry

By Wolfgang Patelay, Editor

Electronica, the leading trade fair for electronic components, systems, and applications is celebrating its 50th birthday in 2014. From November 11 to 14, 2014, the key topics at the fairgrounds of Messe München will be automotive, embedded systems, lighting and medical electronics, as well as the over-arching themes of security and energy efficiency. This year, about 2,700 exhibitors from all over the world are presenting their products and services.



(images: Courtesy of Messe München International)

■ Nowadays everyone is talking about the Internet of Things (IoT). The industrial sector is hoping that greater networking will improve working processes. The semiconductor industry is playing a key role in the success of the Internet of Things. Its products and solutions are helping to ensure that the processes run as quickly, smoothly and reliably as possible. The CEO Roundtable on the morning of the first day of the trade fair will therefore feature a discussion entitled "Internet of Things: Possibilities, Challenges and the Question of Security". Carlo Bozotti from STMicroelectronics, Rick Clemmer from NXP, Gregg A. Lowe from Freescale and Dr. Reinhard Ploss, CEO of Infineon, will take part in the discussion.

Because many companies are concerned about the risks of using networked systems and are worried that they cannot judge what security measures are actually needed, experts will provide tips on the subject at the electronica Forum on Tuesday, November 11 from 14:00 until 15:30. The forum will start with a presentation entitled "An introduction to cyber security – what are the risks for companies?" In addition, two speakers will talk

about "How companies can prepare for hacking attacks with weakness analyses and security reviews" and how to put in place a suitable security concept in reality.

Basis for the IoT are more compact, more reliable, and more modular embedded systems. The global market for embedded systems is growing at a rate of up to eight percent. Market volume in Germany alone is currently more than 20 billion euros. To develop a successful electronic product, selecting the right embedded building blocks is not the only thing that matters. Interaction between the various components that is optimized for the respective application – i.e. the best hardware and software ecosystem – is also important. The embedded platforms conference is dedicated to these ecosystems. The conference, which is being held at the Messe München Press Center East on November 12 and 13, also deals with basic issues that pertain to component selection and system design. Presentations by processor manufacturers and OS/RTOS companies such as IAR, Infineon MicroConsult, Silica and Texas Instruments will inform participants about the optimum

selection of various tools, Open Source software, multicore migration and design challenges within ecosystems. Visitors will get additional insights into this specialty area at the embedded Forum in Hall A6. Presentations about "Smart Energy", "ARM-based Microcontrollers, FPGAs & SoCs", "Internet of Things" and a number of other topics will give them comprehensive information about components and practical applications.

Automotive electronics is one of the most important segments in the market for embedded electronic components. Automobiles already have on-board computers as well as infotainment and assistance systems with a constantly growing range of functions. Electromobility, or the increased networking of automobiles and the development of autonomous driving, could mean additional potential for the industry. The economic development agency Germany Trade and Invest expects that global market volume for automotive electronics last year will be worth some 190 billion US dollars. According to a forecast by the German Electrical and Electronic Manufacturers Association (ZVEI),

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HIGHLIGHTS

market volume is expected to increase to more than 430 billion euros by the year 2025. In the future, mobility will to a large extent be influenced by developments in automotive electronics. The latest buzzwords include energy efficiency, electromobility, connected car and autonomous driving. This year, some 1,500 exhibitors will demonstrate these and other topics at electronica. If the cars of the future are able to communicate not only with the driver but also with other cars and intelligent transportation systems or even operate autonomously, the automotive industry will need to address new security requirements.

The fair not only allows visitors to see the latest technologies: The automotive Forum and the lectures and panel discussions also offer the opportunity to gather information about the latest developments and trends. During the four days of the 2014 fair, the topics of power electronics and automotive software will be the focus of special attention. The electronica automotive conference is being held on November 10. The conference is where leading executives and experts from the automotive sector meet to exchange ideas and information about topics that play a key role in the transition affecting the entire industry. The lectures at this year's conference are divided into three subject areas, i.e. lighting, sensor fusion and connectivity.

LEDs, the successor to the traditional light bulb is taking over challenging tasks in the automobile industry, in Smartphones and in highly complex robots, and is ensuring optimum efficiency at the same time. According to a study by the German Energy Agency, the share of LED products in lighting technology is expected to continue growing. Now that the second phase of EU Regulation 1194/2012 on stricter guidelines for light bulbs and high-voltage and low-voltage halogen lamps went into effect on September 1, 2014, there will also be new regulations on energy-efficient lighting technologies in 2015. These requirements are not just coming from the officials: in the automotive sector in particular, manufacturers are searching for more productive lighting alternatives. That is why modern LED technologies will be one of the most important topics for the exhibitors at electronica 2014.

Lectures about trends in lighting technology will be held with Luger Research as part of the electronica Forum. It all revolves around the International Year of Light. Dr. Joseph Niemela from the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy, will hold a keynote on the topic on November 13. Immediately after the address, there will be a panel discussion with prominent international speakers. Experts will discuss strategies and technologies that can be used to further increase the ability of the European lighting industry to compete next year. The event that follows at 11:45 is about design. Technical directors and engineers will exchange ideas and information about the most important electronics trends in solid-state lighting. Besides the forum and the exhibitor stands, experts at the electronica automotive conference will take a special look at this topic.

Energy efficiency is increasingly becoming a key criterion for several industrial sectors. That is why this topic plays an important role in all exhibition sectors at electronica. While energy-efficient solutions still have to establish themselves more firmly in some fields, they have already done so in the display sector. During the past few years, TFT displays have achieved considerable energy savings in the industrial and consumer-goods sectors. However, new technologies show how much potential is still available. For example, displays with four-pixel colour systems (R/G/B + White) make it possible to reduce energy consumption by up to 30 percent. Furthermore, e-paper and memory displays only consume electricity when display content changes. Still, other factors besides energy efficiency also play an important role, especially in the industrial sector. They include readability, sturdiness, ease of use, cost-performance ratio and long service life. ■



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electronica News

Hall.Stand A5.115

**■ Toshiba: starter kit shortens
 development of BLE designs**

Toshiba Electronics Europe has introduced a starter kit that will help shorten development times when creating Bluetooth Low Energy subsystems. The kit features a Toshiba BLE IC and microcontroller, hosted on separate printed circuit boards, together with sensors and the associated software development tools necessary to simplify system creation. BLE is finding uses in an increasing range of applications including wearable and health-care-oriented smart devices, sensors and control systems. The growth of the Internet of Things is likely to accelerate its adoption.

[News ID 2100](#)

Hall.Stand A4.266

**■ Maxim to preview Wellness
 Platform at electronica**

Demonstrating its commitment to the wearables market, Maxim Integrated Products will preview its Wellness Platform at electronica 2014. The new Wellness Platform is a suite of design hardware and software, including the WASP/MAX32600 MCU, for wearable medical applications. Using this flexible and scalable platform, designers will be able to optimize wellness device performance and lower their R&D costs, all while meeting stringent time-to-market requirements.

At the heart of the Wellness Platform is MAX32600, a highly integrated ARM® Cortex®-M3 low-power microcontroller with high-precision analog performance. It integrated Trust Protection Unit provides the highest level of security with onboard public key authentication, data encryption, and tamper detection. This integrated security ensures that data cannot be compromised. Requiring minimal discreties, the onboard, highly configurable analog front-end (AFE) includes high current LED drivers and facilitates one or more wellness metric measurements, such as heart rate monitoring (HRM) and galvanic skin response (GSR). The MAX32600 is available in 192-ball, 12mm x 12mm CTBGA, 120-ball, 7 x 7mm CTBGA, and 108-ball WLP packages.

The Wellness Platform is architected with several body measurements in mind, all of which will be exhibited as demonstration platform examples at electronica 2014. A Product on Module (PoM) board and a separate application board with medical wellness sensors is being created using components from the Wellness Platform. This board will program the ARM microcontroller, config-

ure built-in analog peripherals, operate with built-in security, drive the RF links and sensors, and manage the system power. The PoM board will be an easy-to-use, high-quality turnkey solution for a wide range of customers. Communication, sensors, and human machine interface functions are integrated so the user has a complete system-level solution. To achieve scalability, the PoM will be compatible with multiple application boards through the expansion connector. An Android demo GUI application running on a smartphone or tablet will be available to chart the readings from the PoM.

[News ID 2109](#)

Hall.Stand A5.462

**■ Conrad combines innovation and
 entertainment at electronica 2014**

Conrad Business Supplies will be exhibiting at this year's electronica in Munich under the banner 'explore the future.' Their booth will feature daily live demos of the latest technologies offered by the company, exciting interactive activities, and opportunities for visitors to win prizes. Conrad's appearance at electronica will culminate in a stand party on the evening of Thursday 13th November.

Recent acquisition SOS electronic, who specialise in supporting customers in the Central European countries, will have a dedicated area on the Conrad booth, and UK based component distributor Rapid Electronic will also be available to meet visitors. Both companies have added to Conrad's knowledge, expertise and product portfolio in the component distribution market and bring significant local experience in supporting customers.

The new and innovative WunderBar Internet of things starter kit will feature prominently on Conrad's booth at electronica: live demonstrations will give visitors an insight into what can be achieved with the WunderBar and the huge potential for the IoT in general. Other live demos about the latest products and innovations from numerous A-brands will cover areas such as test & measurement, development kits and electronic components.

As another specialty at electronica, Conrad will feature a 3D scan activity that will give visitors the chance to experience getting their own personal '3D mini twin' scan and, the chance to enter and win a 3D mini print daily. A 'golden ticket' competition themed around Roald Dahl's famous Charlie & the Chocolate Factory story will also provide the opportunity to win a WunderBar starter kit on every day of the show.

[News ID 2108](#)



electronica 2014

Embedded Forum at electronica
in **Hall A6**

Programme Overview

Tuesday, November 11

- Session 1 - Internet of Things - Basics
- Session 2 - ARM-based MCUs & SoCs

Wednesday, November 12

- Session 3 - Starter-Kits and Reference Designs
- Session 4 - Small Form Factor Boards
- Session 5 - IoT - Chips, Tools & Software

Thursday, November 13

- Session 6 - Motor Control
- Session 7 - Security for the IoT
- Session 8 - Embedded Computing

Friday, November 14

- Session 9 - Open Standards for Boards & Modules
- Session 10 - Smart Energy



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Tuesday, November 11

Session 1 - Internet of Things: Challenges and Opportunities

13h00 - 13h30 Designing connected systems for the IoT

Avner Goren, Texas Instruments

The Internet of Things (IoT) is increasing the need for cloud connected nodes and gateways. However, there are several things that need to be considered when developing nodes and gateways including sensing technology, connectivity options, power management, security and selecting a cloud service provider. This presentation will discuss these considerations and how technology innovations are making it easier to develop applications for the IoT spanning industrial, automotive, home and building automation and more.

Session 2 - ARM-based Microcontrollers, FPGAs & SoCs

15h00 - 15h30 Intelligent system solutions with flexible microcontroller system

Harald Friedrich, EBV

The combination of Cortex-A9 Micro-Processors together with the scalable FPGA area in Altera's SoC devices enable the design of powerful and cost efficient system solutions.

15h30 - 16h00 Connectivity in the Industrial world

Arnon Friedmann, Texas Instruments

Factory automation is increasingly moving to Fieldbus protocols to enable more robust communication and control throughout modern manufacturing plants. These new networks allow increased functionality while providing higher reliability, safety, and ease-of-use. One challenge to this paradigm switch is the large number of different network protocols currently in use throughout the industry. In this talk we will discuss these challenges and show how Texas Instruments' embedded processors are ready to enable the connected factory.

Wednesday, November 12

Session 3 - Starter-Kits and Reference Designs

This Session is presented by Mouser Electronics

11h00 - 11h05 Introduction

Mark Burr-Lonnon, Mouser

11h05 - 11h30 MultiSIM Blue

Raymond Yin, Mouser

MultiSIM BLUE is a powerful circuit design platform from Mouser Electronics, in partnership with National Instruments, that integrates schematic capture, simulation, PCB layout, and innovative „BOM to cart“ features. This session will introduce attendees to MultiSIM BLUE as well as showing how it works together with other areas of the Mouser website to help reduce an engineer's time to market.

11h30 - 12h00 Architecting System Solutions to Solve Customer Problems - TI Designs

Ajinder Singh, Texas Instruments

In this talk I will present examples of TI Designs covering wide variety of areas within Industrial Segment that are helping our customers evaluate TI Products. TI Designs is a great tool and resource that combines differentiated TI products - from embedded processors to analog signal chain to power management to logic and connectivity and provides a subsystem solution which can help in the R&D efforts of our customers.



XMC – One microcontroller platform. Countless solutions.

Our portfolio of industrial, cross-market 32-bit XMC microcontrollers has the most mature, configurable and autonomous peripherals available today. XMC microcontrollers come with a special set of peripherals that can be programmed for specific applications and target markets. These include analog/mixed-signal and timer/PWM peripherals as well as communication interfaces. The XMC1000 family builds on ARM® Cortex™-M0 while the XMC4000 family is based on ARM® Cortex™-M4. Users benefit from scalability within a wide selection of derivatives as well as our free integrated development environment (IDE) DAVE™. Based on Eclipse with a GUI, DAVE™ offers users more than 170 of DAVE™ Apps - application-oriented software components with vast configurability, interconnectivity and automated C code generation. What's more, code developed in DAVE™ can also be used in other tools.

Our XMC microcontrollers are designed to boost energy efficiency and optimize system costs in building and factory automation, energy, transport, home appliance and power tool applications.

Highlights

- Application-specific features for lighting, motor control and power conversion
- Real-time performance with application-specific hardware acceleration
- High-quality, robust design for ambient temperatures up to 125°C

12h00 - 12h30 The Nucleo Eco-system
Alessandro Cremonesi, STMicroelectronics - Central Labs
STM32 Nucleo board as the hub of applications related expansion boards eco-system.

12h30 - 13h00 Introducing Intel's Edison board
Dr. Matthias Hahn, Intel
The Intel® Edison development platform is the first in a series of low-cost, product-ready, general purpose compute platforms that help lower the barrier to entry for entrepreneurs of all sizes-from pro-makers to consumer electronics and industrial companies working in the Internet of Things (IoT). This brief workshop aims to give attendees a high level overview of the hardware and introduce them to the software techniques and concepts for an x86 platform running Linux and interfacing I/O in a non-real-time system

Session 4 - Small Form Factor Boards

13h30 - 14h00 The ARM module market story
Wolfgang Heinz-Fischer, TQ
The ARM module market is very fragmented. Different standards are addressing the market. How can the developers find the right module and distinguish between marketing and technical arguments. A comparison of the different modules and an orientation guide.

14h00 - 14h30 Computer on Module - Carrier Board Design Challenges
Patrick Dietrich, Connect Tech
Planning a computer on module carrier board design? The engineering team at Connect Tech have completed dozens of carrier board designs for COM Express, Qseven and SMARC. We will share design tips regarding: COM Express Power Schemes, adding external graphics processing capabilities or I/O capabilities, USB 3.0 implementation with ruggedized interconnect and thermal heatplate/heatsink selection.

Session 5 - Internet of Things: Chips, Tools & Software for Device Development

15h00 - 15h30 IzoT - the Multi Protocol Industrial IoT Solution
Hans Happ, Avnet Memec
IzoT from Echelon is offering a multi protocol solution for the Internet of Things (IoT) running LonWorks, LonWorks IP, BACnet IP, BACnet MS/TP, IP via a single Chip. Except for BACnet MS/TP, where an additional RS485 transceiver is needed, all the protocols are supporting the worldwide well excepted 78 kbit free topology twisted pair FT/TP network. This offers the possibility to support IPv4 and IPv6 addressing via a low cost and reliable well known cabling system.

15h30 - 16h00 A Gigabyte's Guide to the IoT Galaxy
Amit Gattani, Micron Embedded Business
The massive economic value that the Internet of Things (IoT) is expected to create is predicated on connecting billions of devices to a cloud-based infrastructure for real-time decision making that will drive efficiency and productivity improvements in every aspect of our lives. Today, more than ever before, memory products and solutions play an increasingly critical role in the IoT data- and decision-making cycle of capturing, transmission, analysis, and storage. In this emerging landscape of IoT, embedded designers face a tough balancing act of power, performance, form factor, cost, security, and reliability requirements and trade-offs. It is critical for these designers to understand the memory solutions and tools available to them, as well as the vital role that choosing the right memory solution plays in successful build-out of the IoT infrastructure.

For more information visit
electronica-forum2014.embedded-know-how.com

16h00 - 16h30 Code coverage without instrumentation: New methods and tools to ensure software quality in electronically control units in accordance with ISO 26262

Heiko Riessland, PLS

The quality assurance of software in electronic control units according to standard ISO 26262 is quite difficult in practice. With conventional methods small pieces of inserted code establish measurement points in the application. But often it is not allowed to change memory size and execution time of the program. Then code and data trace recording can help to reconstruct the program execution but requires a lot of bandwidth and trace memory. A new method for determining the branch coverage needs only code trace records even with a program which is optimized by the compiler. This is based on additional debug information which is generated by the tool chain. It supports the full recovery of the real program flow and is combined with architecture-specific techniques of program execution trace directly on the control unit.

Thursday, November 13

Session 6 - Motor Control Solutions

11h00 - 11h30 System-on-Chip Motor Controller for cost and space efficient solutions for DC & BLDC motor drive automotive applications

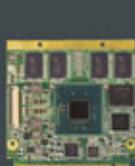
Daniel Mysliwicz, Infineon

Overview of the 3rd Generation of Infineon Embedded Power IC. In this presentation we show how the highly integrated automotive qualified devices enable cost and space efficient solutions for mechatronic DC & BLDC motor drive applications such as pumps and fans.

11h30 - 12h00 Accelerating Motor Control Algorithms with SoC FPGA's

Roger May/Harald Friedrich, Altera/EBV Elektronik

Purpose of presentation is to demonstrate how an advanced drive control system is implemented on an Altera System-on-Chip device, including complex control algorithms and interfacing to external devices and power electronics. The presentation will show how hardware calculations such as FFTs are accelerated in the FPGA, while keeping the main algorithm flow in C on soft or hard processors.



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12h00 - 12h30 Protecting your system from overvoltages, miswiring and power off conditions while maintaining precision performance.

Sean Brown, Analog Devices

This presentation will introduce overvoltage fault protection devices that make it easier to design robust systems that can handle continuous overvoltages ($\pm 55V$), miswiring and loss of power events while maintaining precision performance. Including protection within the switching component eases the design burden for circuit protection. Reducing the external protective impedance element allows the designer to target higher performance circuitry. The active protection enables digital feedback of the state of the switching component for enhanced circuit diagnostics.

12h30 - 13h00 Leveraging New Products and Innovative Design Tools to Accelerate Motor Drive Development Cycles

Mike Gilbert, Texas Instruments

In this presentation TI discusses the evolution of microcontrollers that do more than just motor drive loop control (both advanced in C2000 & ARM AM3/4/5). Moreover, additionally functionality includes independent processor cores for advanced communication, integrated delta-sigma filtering, encoder communications, high-resolution data conversion, and safety. Emerging functionality include predictive motor diagnostics. TI Designs are tools that help illustrate these powerful new functions and help design teams evaluate them quicker and easier.

Session 7 - Security for the Internet of Things: Challenges and Solutions

13h00 - 13h30 Security for the Internet of Things

Martin Klimke, Infineon

Internet of things (IoT) is the ability of creating networks of devices that can communicate with each other, thereby enabling exciting new application and services. To prevent misuse, this communication must be secured. In the speech it is shown, how dedicated security controller are beneficial to protect security and also ease the introduction of related security technologies.

13h30 - 14h00 The benefits of public key cryptography to embedded systems

Christophe Tremlet, Maxim

Embedded systems of tomorrow are expected to be more secure. They might be protected against cloning and reverse engineering, support secure communications so that unauthorized people cannot access confidential data, be able to protect users' privacy by securely storing their data. While these requirements are different, only strong cryptography can fulfill them with a high level of assurance. Implementing it might sound straight forward, however there are multiple difficulties to overcome. We explain in this presentation how public key cryptography supported by secure ICs can overcome these difficulties.

14h00 - 14h30 IoT security should be hard, by definition

Kerry Maletsky, Atmel

The Internet of Things is as much an idea as a reality today. And it will come to everyone's life in the form of integrated modules that include a mix of control, communications, sensors and security. Unless IoT nodes are secure, they and their data cannot be trusted. Without trust there will not be wide adoption of IoT. Therefore the most secure technology available must be implemented in IoT devices for them to become real things and not just an idea. This presentation will describe hardware-based key storage, why it is superior, what it does, and why the future of IoT depends on it.

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Session 8 - Embedded Computing

13h00 - 13h30 Selection Criteria for Embedded Modules and Boards

Peter Eckelmann, MSC

Embedded modules include COM-Express, Qseven, ETX and a few other standards. Embedded boards come in a huge variety of form factors including ATX, μ ATX, Mini-ITX, 3.5" and many others. For the application of all types of embedded modules and boards, there are some basic requirements such as long availability, high performance and low power – passive cooling should be possible except for the very highest performance boards. And there are further requirements such as fitness for a particular operating system, compact system realization and many others. MSC Technologies as a leading manufacturer of embedded hardware has dedicated answers to the requirements of the embedded market.

15h30 - 16h00 48 V is the new 12 V

Robert Gendron, Vicor

Increase system density and efficiency using 18V Direct to the load technologies including zero voltage switching and sine amplitude conversion are enabling designs to go directly from 48V source to processors, memory and ASICs, bypassing multiple intermediate power conversion stages. This design approach enables higher overall system densities efficiencies, with simple layout and implementation. This seminar will highlight industry trends, along with actual product performance and application implementations.

16h00 - 16h30 ARM Carrier Board and Industrial Panel PCs, designed and developed by Data Modul

Thomas Wolfmüller, Data Modul

Based on a modular concept Data Modul develops system solutions for a vast demanding applications. Particularly, long-term availability of products plays an increasing role in today's industrial environment. Learn more about a small ARM carrier board, scalable ARM touch panel PC and other Data Modul's solutions.

16h30 - 17h00 eMMC for Embedded Computing Applications

Victor Tsai and Cecilia Regolo, SMART Modular Technologies

Automotive, Industrial, Medical and Infrastructure applications have very rigid requirements of stability, noise immunity, temperature range, power loss protection, quality and reliability as well as security. Couple that with limited real estate, the need for design simplifications and component longevity, embedded system designers must choose their storage solutions carefully. SMART Modular's eMMC, with its powerful feature sets, is designed from the ground up to meet the rigid requirements of these applications. Its extensive device and package level testing, along with SMART's technical support and customization capabilities, help make SMART the supplier of choice.



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Friday, November 14

Session 9 - Open Standards for Embedded Computing Boards & Modules

11h00 - 13h00 SMARC, Qseven, eNUC - SGET standards for embedded applications

SGET Member Companies

In this session you will learn about the standardization activities and ideas within SGET, a Standardization Group for Embedded.

After a brief presentation about SGET their standardization activities and plans for the future, the open standards SMARC, Qseven and embedded NUC will be introduced and leading Embedded Computing companies will present their boards and modules based on these standards.

The SMARC („Smart Mobility ARChitecture“) is a versatile small form factor computer Module definition targeting applications that require low power, low costs, and high performance. The Modules will typically use ARM SOCs but alternative low power SOCs and CPUs, such as tablet oriented X86 devices and other RISC CPUs may be used as well.

The Qseven concept is an off-the-shelf, multi vendor, Computer-On-Module that integrates all the core components of a common PC and is mounted onto an application specific carrier board. Qseven modules have a standardized form factor of 70mm x 70mm or 40mm x 70mm and have specified pinouts based on the high speed MXM system connector that has a standardized pinout regardless of the vendor.

The eNUC activity targets to create a standard which makes Intel's NUC (Next Unit of Computing) concept suitable for embedded applications.

Session 10 - Smart Energy

13h00 - 13h30 Smart Grid beyond just Smart Utility Meters

Kripa Venkat, Texas Instruments

In the past few years, terminologies such Smart Grid, Grid Intelligence, Smart meters, Automatic Metering Infrastructure, Grid Communication etc. is being widely used, however, the purpose of all these is to increase the efficiency and robustness of energy generation, transmission and distribution. Due to increasing demand for energy there has been several ways to develop, optimize and combine renewal and non-renewable sources of energy to ensure a reliable source of power/energy. In this presentation we will talk about how Smart Grid has evolved from just Smart Utility meters to an array of intelligent devices.

electronica News

Hall.Stand A1.307

■ Rohde & Schwarz adds triggering and decoding option for RTO oscilloscopes

The R&S RTO-K60 option from Rohde & Schwarz supports developers involved in designing, verifying and debugging modules with USB interfaces. Equipped with this option, the R&S RTO oscilloscope triggers on USB 1.0, 1.1, 2.0 and HSIC-specific protocol data, decodes the acquired waveforms and displays the protocol content in an easy-to-read format. The hardware-supported trigger implementation of the R&S RTO provides high acquisition rates and minimal blind times.

[News ID 2123](#)

Hall.Stand A6.419

■ AAEON: Intel Atom D2550 based Panel PCs for industrial computing

AAEON launches the AHP-1123 and AHP-2173 panel PCs for a wide range of industrial applications. Powered by the Intel Atom D2550 processor, the AHP-1123 and AHP-2173 have a front bezel design and are rated at IP65 for their high level of resistance against water, dust and shock, making them ideal devices for system monitoring and human machine interface in places where extreme conditions are expected, such as outdoor laboratories and automated production lines.

[News ID 2120](#)

Hall.Stand A5.524

■ Mouser: congatec computing modules powered by 22nm Intel Atom

Mouser Electronics is now stocking the Conga-QA3 Qseven Modules from congatec. congatec is a member of the Intel Internet of Things Solutions Alliance. The congatec Conga-QA3 Qseven Modules, available from Mouser Electronics, are based on the Intel E3800 Atom Processors which utilize Intel's 22nm process technology with 3-D Tri-Gate transistors. This allows the Conga QA3 modules to deliver significant improvements in computational performance while also providing an energy-efficient systems for most applications.

[News ID 2047](#)

Optimised MCUs enable a new spin on motor control

By **Danny Basler**, Freescale

This article discusses the new Kinetis V series MCUs, the supporting Kinetis motor suite tool and the benefits they offer for leveraging modern motor technologies.



■ Motor control has an impact. Although not as fashionable as the current hot trends of IoT and smart mobile devices, it remains an expansive feature of the embedded control landscape and a huge area of opportunity for microcontroller (MCU) development. While the adoption of new motor technologies is increasing, many motors still achieve relatively low levels of efficiency – 50% in many cases. Multiply that by the billions of home appliances, HVAC units, elevators, generators, etc and it accounts for a staggering 45% of global electricity demand. That's worthy of considerable attention.

Thankfully, help is at hand in the form of sophisticated MCUs that can help improve motor efficiency up to around 80% and beyond. The environmental benefits are obvious, and improved torque, speed and position control (vs. the basic 'off/full speed' approach), can promote the motor to centre stage in the application. But while adopting an MCU is clearly an easy decision, using it to its full potential can present significant challenges to the less seasoned motor control system developer. New Freescale Kinetis V series MCUs based on ARM Cortex-M cores and the accompanying Kinetis motor suite tool provide a fresh-looking solution. Scalable MCU families that blend potent processing power, precision analog and cutting-edge timers, and

an intuitive, all-encompassing development tool that makes light work of algorithm tuning and trims weeks off development cycles.

The Kinetis V series is the latest product family in rich motor control legacy from Freescale that includes 8-, 16- and 32-bit MCUs, digital signal controllers and now ARM-based MCUs with mass market appeal. The V series benefits from several decades worth of motor control R&D innovation captured in state-of-the-art hardware building blocks that support all motor control use cases. Like other Kinetis series, these blocks are woven through multiple MCU families that offer scalable performance, memory and feature integration to support a broad spectrum of end product functionality and price requirements.

The Kinetis KV1x family is the entry point but developers should dismiss any notion of it being a low-end MCU – it's a very capable performer and can easily tackle BLDC and low-dynamic control PMSM applications. Processing power comes from a 75 MHz ARM Cortex-M0+ MCU core and a memory-mapped integer divide and square root co-processor (MMDIVSQ). ARM cores in the Cortex-M family implementing the ARMv6-M ISA do not include hardware support for integer divide or square root operations, two calculations commonly executed in

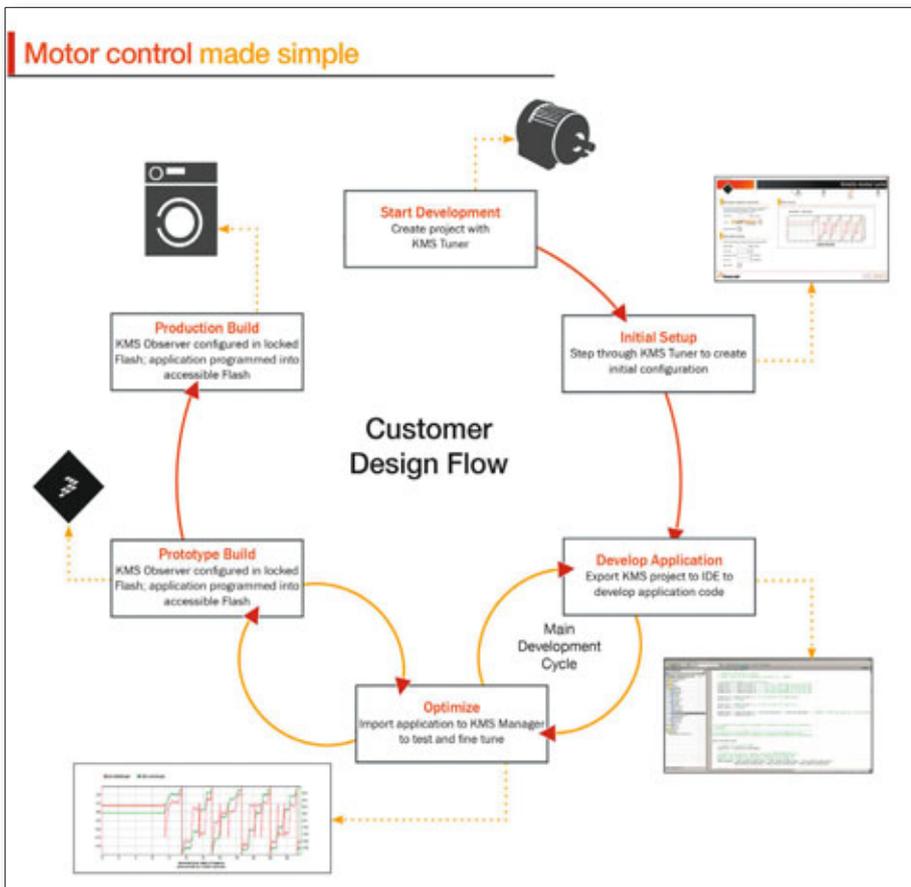
motor control algorithms. With software emulated divides typically requiring 100s of CPU cycles, this can amount to a significant drain on precious CPU bandwidth. Designers also benefit from a bit manipulation engine (BME) which improves cycle time and code size by an average of 40 percent when performing bit-oriented math operations on peripherals such as OR, AND, XOR, bit field insert and bit field extract. On processing power alone, similar MCUs will struggle to keep pace with the Kinetis KV1x family at managing the rigorous demands of modern control algorithms.

However, such horsepower is only useful if it can be harnessed appropriately and that calls for tightly coupled, high speed/resolution ADCs and PWMs to facilitate quick and accurate signal capture, processing and response. Dual 16-bit ADCs achieve 1.2 Msp/s (833 ns) when configured in 12-bit mode, adhering to the sub-1µs conversion time threshold that most modern motor technologies require. Single or continuous conversion, sample time and conversion speed are also user configurable.

The latest generation of Freescale motor control FlexTimers (FTMs) – refined over many years in response to customer feedback – generate multi-channel, high-resolution PWM waveforms and support dead-time insertion,



Kinetis Motor Tuner GUI



Kinetis Motor Suite design flow

complementary pairing, half-cycle reload and up to 4 fault inputs for global fault detection. Half-cycle reload increases control algorithm efficiency by pre-loading values prior to next edge of PWM, requiring fewer tasks to be performed on a PWM transition. Managing the FTM-ADC relationship is the programmable delay block that delays triggering from the FTMs to the ADCs and helps to define conversion sample points for precise rotor position detection in sensorless applications. Additional analog peripherals include dual

comparators that detect motor over-current/voltage fault conditions triggering PWM safe state shutdown, and a 12-bit DAC for configuring fault levels in software. With many low-end designs subject to strict price pressures (particularly consumer products), these features help minimize BOM costs through the elimination of external circuitry.

Kinetis KV1x MCUs offer 16 or 32 KB of flash memory with IIC, SPI and UART communication interfaces. A cyclic redundancy check

(CRC) module can be used in conjunction with the DMA to satisfy IEC 60730 hardware safety requirements such as periodic calculation of the CRC checksum in flash memory. For low-power applications, multiple low-power modes, watt-saving architectural techniques and autonomous, power-smart peripherals can also be leveraged. With this level of feature integration (not to mention the free enablement support), it is reasonable to expect the KV1x family to be priced beyond the reach of most entry-level design budgets where cost dominates performance and peripheral selection.

This is not the case as intelligent use of 90nm technology sets the KV16 MCU in a 32LQFP package at a starting price of \$0.99 (USD, 10,000-unit quantities), with additional 48LQFP and small footprint 5mm x 5mm 32QFN packages priced accordingly. Situated further up the Kinetis V series is the KV3x family that addresses mid-range BLDC and PMSM motor designs and features the ARM Cortex-M4 core with DSP instruction support and a floating point unit. Core frequencies range from 100-120 MHz and flash memory from 64-512 KB with an optional external bus interface for off-chip system expansion. A factory-installed, flash based bootloader enables quick and easy programming of the MCU during development, final product manufacturing or in the field.

The flagship of the Kinetis V series is the KV4x family which targets advanced PMSM and ACIM designs that require high dynamic control. Engineered for optimal performance, it also incorporates the ARM Cortex-M4 core but at an increased frequency of 150 MHz. Code is executed from up to 256 KB of flash memory via a 128-bit wide interface which helps minimize CPU wait states. With up to 30 timer channels – 12 provided by the highly flexible Enhanced FlexPWM (eFlexPWM) module – the KV4x family has no trouble supporting multiple three-phase motors concurrently. Motor speed/position detection comes from two cyclic 12-bit ADCs with sample rates of 1.9 or 4.1 Msps depending on the device selected. These can be triggered by any module connected to the internal peripheral crossbar of the MCU, including timers, analog comparators or GPIO.

The KV4x family's high degree of feature integration enables up to 30 PWM outputs, 38 ADC channel inputs, as well as CAN, UART and SPI interfaces to be housed in a 100-pin LQFP package. All Kinetis V series MCUs operate from 1.71 to 3.6V and from -40C to 105C. Production-qualified Kinetis KV1x and KV3x MCUs are available now; KV4x MCUs are currently sampling and are planned to enter production early in Q1 2015.



Kinetis V Series Tower development platform

The Kinetis motor suite is the newest addition to Freescale’s MCU enablement bundle which includes a broad range of IDEs, auto code generators, the Freescale MQX RTOS and application-specific software libraries. Designed for developers of all experience levels, Kinetis motor suite makes motor control development simpler, faster and more efficient.

A developer can identify (through simple parameter pre-loading), tune (using just one knob) and control (across variable speeds and loads) any type of 3-phase synchronous or asynchronous motor regardless of power level. The centrepiece is LineStream Technologies disturbance compensating algorithm, which helps to ensure high performance even in highly dynamic operating conditions and dramatically simplifies control loop tuning by replacing outmoded, trial and error based PID methods. Managed through a simple graphical user interface (GUI), this patented technology eliminates what is a barrier to entry for many – the need for in-depth motor control algorithm knowledge.

This enables more precise motor tuning, sharper system response and reduced system degradation over time. Kinetis motor suite three software components observe, tune, and manage motor control system operation: 1) Kinetis motor observer – advanced algorithms pre-programmed into the MCU that automate tuning of control loops and estimation blocks; 2) Kinetis motor tuner – an intuitive GUI for configuring motor observer algorithms based on self-identified motor parameters; 3) Kinetis motor manager – a real-time, non-intrusive display of system variables with extensive data tracing capabilities that optimizes motor system performance.

Two versions of the Kinetis motor suite will be offered based on application type and user knowledge. In the turnkey version developers will select their desired application – initially fans, compressors and pumps (further options will follow) – fine tune as needed, then deploy without ever having to write code. Alternatively, motor specific solutions for sensed and sensorless BLDC, PMSM and ACIM will allow the developer to transition between the KMS GUI and their IDE to write and debug their application code. MCUs pre-programmed with the Kinetis motor suite software are expected to be available to order in the first quarter of 2015.

Freescale also provides additional GUI-based configuration/debug tools and software libraries. FreeMASTER is a simple and highly-customizable, GUI-based, real-time debug monitor which supports the Motor Control Application Tuner (MCAT) plug-in leveraging Freescale reference design code. Developers using Matlab/Simulink model-based design are also supported by the Motor Control Toolbox. Complimentary software libraries for motor control, math, filter and other general functions, as well as a core self-test library for IEC 60730 certification are also provided. The TWR-KV10Z32, TWR-KV31F120M and TWR-KV46F150M Freescale Tower System MCU modules along with the TWR-MC-LV3PH motor driver module provide the hardware for MCU evaluation and development. These include precompiled examples for BLDC trapezoidal and PMSM FOC algorithms that can be evaluated within CodeWarrior and Kinetis Design Studio IDEs, as well third party IDEs including the IAR Embedded Workbench and ARM Keil Microcontroller Development Kit. ■

MDK-ARM™ Version 5

MDK supports the complete ARM® Cortex®-M series and introduces component-based software development.

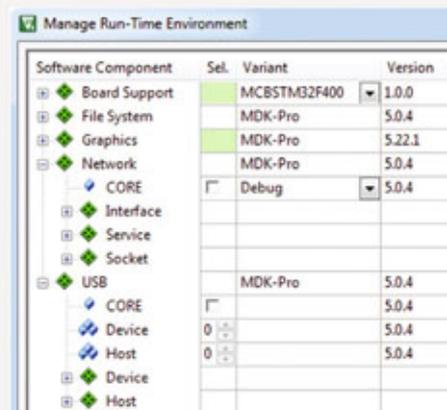
MDK Core

- µVision IDE with Editor
- ARM C/C++ Compiler
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Low-power MCU design techniques for battery-powered devices

By Graeme Clark, Renesas

This article highlights the advantages of using the low-power capabilities of 32-bit microcontrollers such as the RenesasRX100, and shows how system engineers can apply them to design battery-powered products within extremely tight power dissipation limits. It also shows how such devices can be used in real low power applications with improved system performance and reduced total system cost.



■ In today's competitive market place, designers are being asked to provide ever more function for less: less cost, less power, less size. This is especially true with the market drive towards more energy-efficient and green products. Next generation microcontrollers, like Renesas RX100, are designed to save energy, delivering strong levels of CPU performance with advanced peripheral and memory integration, while consuming next to no power during operation. These innovative devices can wake up quickly from sleep mode, consume far less current when running than existing solutions, and achieve outstanding overall levels of performance. These are advantages that system engineers can use to create products offering a wide range of new capabilities to meet the needs of the market today and tomorrow.

The RX100 microcontrollers are the first 32-bit MCUs in the industry to combine breakthrough power-control technology with innovative features such as fast wake-up times, zero-wait-state flash, multiple safety functions, integrated USB 2.0 host/device and on-the-go support, all at a very competitive price point. These microcontrollers are the best choices for low-end 32-bit applications like mobile healthcare devices, smart meters, and security systems, as well as sensors, detectors and other elements of industrial control

systems and building automation equipment. The major low-power characteristics of these devices include: exceptional RUN-mode power efficiency; 100µA/MHz; ultra-fast wake-up time, 4.8µs or less; superior architecture; 3.08 Coremarks/MHz performance; six operating modes, plus numerous other design options for saving power, and standard and advanced on-chip peripherals, ADC, LVD, RTC, USB, and more.

Multiple power-optimised run modes (high speed, middle speed, and low speed) minimise power consumption when different CPU speeds are needed for various application tasks. Additionally, three low-power modes (sleep, deep sleep and software standby), in combination with the short wake-up times from these modes, let system engineers fine-tune both system performance and the power supply to meet specific application requirements. There are many other power-saving techniques that should be noted: the use of zero-wait-state flash memory technology decreases power consumption because the CPU doesn't have to remain idle while waiting for data fetched from non-volatile storage. Every on-chip peripheral module can be powered off individually, so that those not being used don't waste power. An advanced clock system allows the speed of the clocks driving the peripherals to be reduced while the CPU

operates at up to its maximum frequency. Moreover, a choice of oscillators (HOCO or LOCO) for waking up the CPU, and extra power reductions can be obtained in some situations by utilising those clocks to replace the phase-lock loop (PLL) main clock.

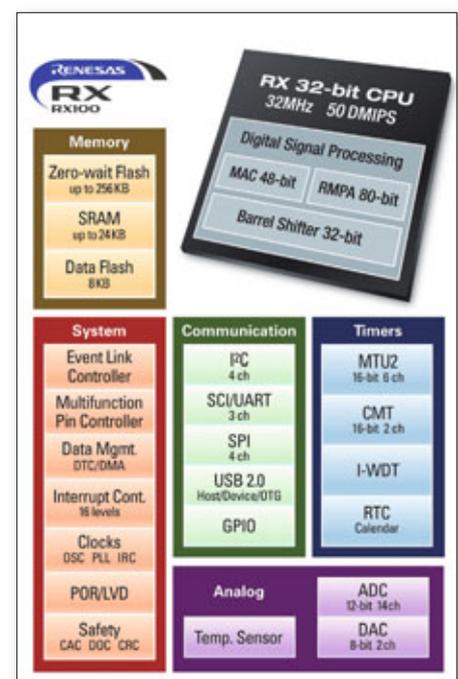


Figure 1. RX111 block diagram

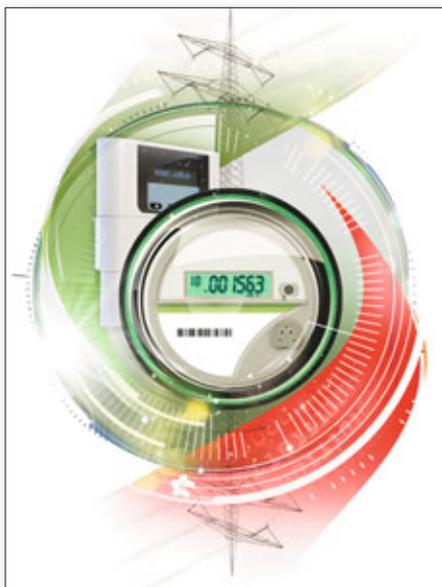


Figure 2. Flow meter example

The CPU architecture of the RX family is extremely compute-efficient, achieving the highest possible number of instructions per mW. Interrupt latency is only 5 cycles and processing performance is rated at 1.54 DMIPS/MHz and 3.08 Coremarks/MHz. The large number of parallel buses in its architecture makes possible simultaneous movements of data between the CPU core, flash, SRAM and peripherals. This design feature ensures that no bottlenecks are present when the CPU wakes up from a power-down mode. By maintaining direct control of all the elements of MCU development and manufacture, the semiconductor technology experts of the company enable the production of high-quality, optimised system design solutions that customers can apply to implement ultra-low-power products and systems.

As already mentioned, the CPU has three power-controlled run modes: high speed, middle speed and low speed. Each of these modes makes available a different set of on-chip peripheral modules. However, some restrictions apply. The availability of some oscillators, the PLL, flash memory programming and certain peripheral clock frequencies depends on

the run mode selected. By contrast, the MCU supply voltage requirements aren't affected by the power-controller run modes. Operation is always allowed over the full 1.8V to 3.6V range of the device. However, the clock frequencies usable in the high, middle, and low speed modes do depend on the supply voltage (table 1).

Besides the three power-controlled operating modes, RX100 MCUs also offer the mentioned low-power operating modes: sleep, deep sleep and software standby. In each of them, different MCU functions are stopped and/or powered down, saving various amounts of current. Here are the details: in sleep mode the CPU is stopped with data retained. This reduces the CPU dynamic current consumption, which is a significant contributor to the overall operating current of the MCU. The CPU wakes up from sleep mode into the run mode in only 0.21µs at 32MHz. In deep sleep mode the CPU, RAM and flash memory are stopped with data retained. At 32MHz with multiple peripherals active, the typical operating current is only 4.6mA. It takes just 2.24µs for the CPU to wake up from deep sleep mode and enter run mode. In software standby mode the PLL and all the oscillators, except the sub-clock and IWDTC, are stopped. Almost all of the RX100 modules – CPU, SRAM, flash, DTC and peripheral blocks – are stopped, with data retained. The power-on-reset (POR) circuit remains operational though, and if necessary, the iWDT, RTC, and LVD modules can be operated. Current consumption in this mode is from 350nA to 790nA, depending on whether or not the LVD and RTC functions are used. When waking up in the 4MHz run mode, CPU operation begins after a 4.8µs delay. When waking up in the fast 32MHz run mode, the wait time extends to 40µs.

Although the sleep, deep sleep and software standby modes of RX100 MCUs are very helpful for decreasing the current the chips consume, system engineers can use other techniques to achieve further power reductions. For instance, they can set various clock-signal frequency-division ratios individually. This capability applies to the system

Operating Mode	Voltage Range	Operating Frequency Range			
		ICLK	FCLK	PCLK	PCLKB
High Speed	2.7 - 3.6v	Up to 32 MHz	Up to 32 MHz	Up to 32 MHz	Up to 32 MHz
	2.4 - 2.7v	Up to 16 MHz	Up to 16 MHz	Up to 16 MHz	Up to 16 MHz
	1.8 - 2.4v	Up to 8 MHz	Up to 8 MHz	Up to 8 MHz	Up to 8 MHz
Middle Speed	1.8 - 3.6v	Up to 8 MHz	Up to 8 MHz	Up to 8 MHz	Up to 8 MHz
Low Speed	1.8 - 3.6v	32 kHz	32 kHz	32 kHz	32 kHz

Table 1. Operating modes

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Function	Operating Characteristics		
	Active Peripherals	Estimated Iterations / min	Estimated Processing Time
Flow Monitor	RTC, LVD, ADC	60 (1s interval)	15µs
Battery Monitor	RTC, LVD,	1 (1 min. interval)	30µs
Send Update	RTC, LVD, SCI	0.1 (10 min. interval)	1000µs
Receive Update	RTC, LVD, SCI	0.1 (10 min. interval)	2000µs

Table 2. Functional characteristics of the flow meter

clock, peripheral module clock, ADC clock and flash clock. It's a valuable design option when application requirements differ between function blocks. Each peripheral module also has a separate stop control bit. This feature allows software to exercise individual control of the MCU on-chip functions to further reduce dynamic current.

The remainder of this article discusses the use of a 32-bit low power microcontroller like the RX100 in a real life application, in this case a flow meter. This application is useful for exploring and explaining various ultra-low power system-design techniques. This application highlights appropriate low-power design techniques and/or options, and explains how to best apply key features of RX100 MCUs. Performance data is used to calculate the average current usage of this example design and show the resulting battery lifetime.

Modern flow meters are evolving from simple, manually read mechanical units to microcontroller based electronic versions with wireless connectivity. More advanced designs offer flexible monitoring and data communications, allowing control by the central control system of the utility company. Such advanced features must be implemented despite the fact that the meter is always on. Therefore, the electronics must consume only miniscule amounts of power on average. Battery operation is the norm, since AC power is seldom available to run the meter. Typical design specifications mandate a battery lifetime of over 20 years. The primary low-power requirements of an electronic flow meter can be grouped according to the major functions the unit performs. Most of the time, the micro-controller operates in the lowest power modes, with just the real-time clock (RTC) and low voltage detector (LVD) running. Also, it's generally recommended that the SRAM be kept active so that it can store intermediate processing results, eliminating the need to continually write data to the flash memory. Periodically, the meter wakes up and makes a flow measurement. Key parameters (used for billing) are saved in non-volatile memory so they won't be lost if power is interrupted. Communications with the central

control system are implemented via the serial transceiver whenever data has to be collected or updates implemented. Additionally, the voltage levels of the battery are checked regularly to manage the MCU operating modes.

The following discussion of a typical flow meter design looks in detail at key aspects of its operation to obtain information essential for estimating battery lifetime. For this example, data is derived from an implementation based on an RX111 chip (figure 2). The RX111 processor, memory and peripherals integrate most of the flow meter functions. The main peripherals used are the analog-to-digital converter (ADC) that measures the output of the flow sensor, an SPI port that connects to the central controller that collects data from a variety of meters, and another SPI port that drives the LCD that shows flow-usage data and system status. Additionally, the RTC of the MCU keeps accurate track of the time each measurement is made, and the low-voltage detector (LVD) continuously monitors the voltage of the meter battery.

In order to estimate the power use and battery lifetime of the flow meter, it's necessary to identify key facts: the main functions that the meter MCU has to execute, what modules are utilised in performing the tasks, how often the functions are performed, how long it takes to execute those functions, and the current the MCU uses in handling those tasks. Some of the on-chip peripherals of the MCU, like the RTC and LVD, operate continuously, while others, like the ADC or SPI ports, are needed for only short periods of time.

The function battery monitor checks the voltage level of the battery, producing information that's included in the operational status data sent periodically to the central control system. The battery monitor can also perform a tamper-detection task to determine whether or not the meter has been subjected to an attack. The measured battery voltage (and its variation over time) is used to adjust the frequency of operation of various meter functions, because by extending the time between operations as the battery level drops, battery life-

time can be extended. When battery voltage gets too low, the monitor can initiate a going-off-air signal that causes vital flow-usage and system data to be stored in flash memory for later retrieval and diagnostics. This operation is seldom needed, so it isn't included in the battery lifetime calculation. System engineers are urged to set the low-level warning trip-point of the battery monitor high enough to ensure that sufficient power remains for the MCU to execute any last-gasp data collection, security and safety tasks.

In the Flow Monitor function the MCU ADC reads the output of the sensor to accurately measure the flow rate. The data it provides subsequently must be processed to determine actual billable metrics. The requisite computations are well within the processing capability of the RX111 MCU. The function Send Update communicates key data (flow rate, battery level, quality of service, etc) to the central control system. The time between send and receive transmissions can be extended as the battery runs down in order to conserve battery power. The Flow Meter Receive function is activated on an as-needed basis by the central controller. When the meter receives update data, its MCU has to be able to quickly perform important housekeeping functions before executing the update. A basic function table, like the one shown in table 2, is a convenient way to organise these basic operating functions. It shows the active peripherals associated with each meter function, how often the task is performed, and how long it takes the MCU to execute each function. The data in table 2 comprise estimated values for the MCU processing time required for each function instead of measured values, because the functions weren't actually implemented. Still, they are best conservative guesses based on similar functions designed in other applications and are valid for these power-use calculations.

Several implementation options typically exist when designing a low-power MCU-based system. One common software option is to place the system in a power-down mode, and then turn it on after a specified time interval has elapsed. This option is called a periodic wake-up. Applying this approach to the flow meter design example, the following operational schedule was specified. Software wakes up the CPU every second. The MCU has to execute the Send Update function at each 10-minute interval, perform the Battery Monitor task at each 1-minute interval and activate the Flow Monitor function at each 1-second interval. However, the Receive Update function is different. It's an exception to the operational schedule because it executes asynchronously to the MCU timebase whenever the central control system requests it. For

Function	Battery Life Estimate (RX111 typical)						
	MCU Mode	Execution period	Execution Time (µs)	% Cycle Active	Peripherals Active	Current Drain (mA)	Average Current (µA)
Wait	Software Standby	1 second	N/A	100 %	RTC, LVD	0.00079	0.79
Flow Monitor	Run @ 32 MHz	1 second	3	0.0003 %	RTC, LVD, ADC	11.3	0.0339
			55	0.0055%	RTC, LVD	10.6	0.5830
Battery Monitor	Run @ 1 MHz	1 Minute	40	0.00007%	RTC, LVD	1.2	0.0008
Send Update	Run @ 32 MHz	10 minutes	1000	0.000167%	RTC, LVD, SCI	10.6	0.0177
Receive Update	Run @ 32 MHz	10 minutes	2000	0.000333%	RTC, LVD, SCI	10.6	0.0353
Total							1.4607

Table 3. Power consumption estimates for the flow meter

the purposes of this application example, the worst case is that the Receive Update function is performed about once every 10 minutes. Thus, for the meter current-consumption calculations, Receive Update is considered to be a regular function with a 10-minute interval.

Here are more details about the main tasks the meter microcontroller performs. Generating periodic wake-ups: because the real-time clock operates continuously in this meter design, it provides a convenient, power-efficient method for generating the 1-second periodic wake-up signal. The 128Hz clock that drives the RTC is derived from the sub-clock (XCIN) 32.768 kHz input. Counters in the RTC produce accurate time signals (year, month, week, day, hour, minute and second) for up to 99 years, making automatic leap-year corrections. The MCU Alarm mode (ALM) can generate an interrupt on the year, month, date, day-of-week, hour, minute or second. Another interrupt source, the periodic interrupt (PRD), is convenient for initiating shorter time periods because it can generate an interrupt every 2 seconds, 1 second, 1/2 second, 1/4 second, 1/8 second, 1/16 second, 1/32 second 1/64 second or 1/256 second. The example flow meter design utilises the 1-second PRD interrupt for operational timing.

Monitoring flow: once every second, the MCU ADC converts the output of the external Flow Sensor to produce digital flow data. The ADC converter is turned on via software prior to each measurement. This keeps power dissipation low, since the converter adds 0.66mA to the current consumption when the MCU is running at 32 MHz. At that clock speed, the ADC has to be enabled for 3µs to make a measurement: 1µs to enable the A/D, 1µs to perform conversion, and a 1µs delay before the converter is subsequently disabled. At 32 MHz, the RX111 wake-up time into the run

mode is 40µs. This time must be added to the 15µs it takes the CPU to process the flow data from the ADC. Measuring battery level: the low voltage detector in RX100 MCUs has two separate voltage detection circuits. The LVD1 circuit measures the battery voltage (VCC). It can compare this voltage to ten different voltage steps, ranging from 1.86V to 3.1V. By contrast, the LVD2 circuit can compare an external voltage source to four different voltage steps, ranging from 1.8V to 2.9V. In this flow meter design, VCC is checked every minute to monitor its condition using the LVD1 module to get the most accurate measurement. It generates an interrupt if the level begins to approach the specified lower voltage limit of 2.7V for 32 MHz operation of the RX111.

The MCU stores the measured battery voltage and, if necessary, sends an alert to the utility central control system during the next Send Update operation. The battery measurement function can run at 1MHz, so its associated wake-up time is only 4.8µs. Its processing time (at 1MHz) is estimated to be approximately 35µs. Thus, the total active time for this function is about 40µs. Every 10 minutes, the Send Update command uses the SPI peripheral to transmit data to the central control system. To calculate the energy used by the meter design, an engineering assumption is made that it requires 1000µs to process and transfer the data. Every 10 minutes, the Receive Update command uses the SPI peripheral to receive data from the central control system. It is assumed that 2000µs is needed to wake, receive and process the data.

Table 3 shows the execution time and current drain of each of the flow meter functions. The 0.6mA current consumption number (high-speed run mode; table 2) is used here because the RX111 MCU CPU is active and some of the built-in peripheral functions of the chip

may also be active. When the ADC is active, it adds 0.66mA to the current consumption. To determine the meter battery lifetime, the individual average current for each function is calculated by multiplying the current drain by the percent cycle active. Results are shown in the right-hand column in table 3. The sum of these contributions is the total average MCU current (ICC): 1.46µA. Of the major contributors to the average current consumption of the meter, the software standby mode current, 0.79µA, accounts for about 54% of the 1.46µA total, while the Flow Monitor function consumes 0.62µA, or approximately 42% of the total. In applications like this that have relatively long periods of inactivity, the current consumed in the software standby and run modes generally accounts for most of the average MCU current. Thus, it's important that the MCU used in the design has excellent low-power characteristics in both of these modes.

For this example application, the meter battery pack is assumed to have a capacity of 300 mAh and provides approximately 3V for most of its life. Given that information, the battery lifetime is computed by dividing the average MCU current into the battery capacity, as indicated here: 300,000µAh/1.46µA = 206,243 hours, or 23.5 years. The calculation reveals that the battery lifetime of the RX111-based flow meter exceeds the specified 20-year requirement. This result clearly demonstrates the system design advantages gained by applying the exceptional low-power characteristics of an RX100 MCU. The mentioned battery lifetime computations focus on the current contributed by the microcontroller. For clarity, the current drain of external components and the self-discharge characteristics of the battery are not considered in this example. Various design techniques are helpful for applications in which external devices must be considered; however, they are beyond the scope of this article.

The advanced low-power characteristics of RX100 MCUs make them excellent solutions for flow meters and similar applications that require battery operation. Among the device features most helpful in such uses are the following: the power-efficient run mode, very low software standby current, the fast wake-up time from software standby mode, low power dissipation for the RTC and LVD peripherals, and power-efficient processing at slower clock frequencies. The lower-frequency run modes of RX100 MCUs allow longer battery lifetimes if the primary application routines have a fixed execution time, i.e. one that's not determined solely by CPU performance. ■

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Five trends shaping 802.11 WLANs

By Amal Ekbal, National Instruments

This article describes in detail five specific trends which will likely shape the growth of WiFi technology in the future. Although these are the five biggest trends today, the progression of technology has a way of surprising everyone.



■ Wireless local area networks (WLANs) based on WiFi technology have become a standard part of life for many, whether integrated within a home television or a radio-controlled drone helicopter. The latest commercially available version of WiFi, based on the Institute of Electrical and Electronics Engineers (IEEE) 802.11ac standard, provides significant connectivity improvements. In addition, it is driving upgrades in consumer and enterprise markets from earlier versions, such as IEEE 802.11n. As the use of WLANs has grown, so have feature requests, helping to drive the evolution of WiFi more rapidly than ever. The WiFi brand name popularized by the WiFi Alliance refers to products based on the IEEE 802.11 family of WLAN standards. The IEEE 802.11 standard was first approved in 1997. Subsequent amendments added innovations such as orthogonal frequency division multiplexing (OFDM; from IEEE 802.11a) and multiple-input, multiple-output (MIMO) antenna systems (from IEEE 802.11n) to keep up with market requirements.

As table 1 shows, the theoretical peak physical layer (PHY) data rate supported by the standard has increased by more than 100× over the past decade: from 54 Mb/s in IEEE 802.11g to 6.9 Gb/s in IEEE 802.11ac. Although these PHY rates do not directly translate to data throughput due to channel

access and protocol overheads, improvements in the IEEE 802.11 medium access control (MAC) layer (such as packet aggregation and block acknowledgments) enable present-day IEEE 802.11 devices to achieve 70% to 80% efficiency. Improvements in data rate are not the only trend in WiFi evolution. What follows is a review of five important trends expected to shape the WiFi ecosystem over the next decade.

The first trend involves the market rollout of products based on the IEEE 802.11ac wireless standard. The current wave of IEEE 802.11ac products is part of release 1, which added support for wider 80-MHz bandwidth with as many as three MIMO spatial streams, per-frame dynamic bandwidth selection, and higher-order modulation operation, in the form of 256-point quadrature amplitude modulation (256 QAM). In addition, IEEE 802.11ac simplifies and improves a number of features present in IEEE 802.11n, such as transmit beam forming. Based on a 3×3 MIMO configuration with 80-MHz bandwidth, the present-day typical release 1 IEEE 802.11ac access point supports a peak PHY data rate of 1.3 Gb/s. Release 2 devices for IEEE 802.11ac are anticipated to support even wider bandwidth (160 MHz) operation and four MIMO spatial streams. Release 2 is also likely to support downlink (DL) multi-user (MU) MIMO

(DL MU-MIMO). As illustrated in figure 1, today a WiFi access point can only support one client at a time using single-user MIMO (SU-MIMO) operation. Since devices such as laptop computers and smartphones usually support only one or two antennas and most IEEE 802.11ac access points support three or four antennas, this leads to a waste of MIMO resources and lower throughput. MU-MIMO, also shown in figure 1, allows the access point to use spatial separation to send data to multiple clients at the same time and fully utilize its MIMO capabilities. MU-MIMO in IEEE 802.11ac is limited to the downlink direction - i.e. for data packets sent from the access point. MU-MIMO has the potential to increase network capacity since it minimizes packet collisions, reduces network usage, and reduces interference to neighboring networks. Note, however, that performance improvements due to MU-MIMO can vary drastically depending upon the spatial distribution of devices and data traffic patterns.

The second trend in WiFi is the development of high-efficiency WLANs. WiFi has become so ubiquitous that it is being deployed in dense, high-interference environments, such as airports and office buildings. Use in such environments usually results in lower-than-expected data rates and sluggish performance. For example, WiFi users may

Year	Standard	Peak PHY rate (Mb/s) Including optional modes	Typical access point	Key technology
1997	802.11	2	2	Spread spectrum
1999	802.11b	11	11	CCK, spread spectrum
1999	802.11a	54	54	OFDM
2003	802.11g	54	54	OFDM
2009	802.11n	600	300-450	MIMO OFDM, wide bandwidth (40 MHz)
2013	802.11ac	6933	1300-3466	DL MU-MIMO, wide bandwidth (80 and 160 MHz)

Table 1. WLAN physical layer evolution.



Figure 1. A MU-MIMO can better utilize the MIMO capabilities of a WiFi network.

Traditional IEEE 802.11	HEW SG
Low-density deployments (e.g., single-family home)	High-density deployments (e.g., enterprise/carrier deployed WiFi)
Focus on peak data rate of a point-to-point link	Focus on average data rate per user and per unit area
Limited inter-access point interference management	Manage interference to improve spectral re-use and robustness
Focus on indoor performance	Considers indoor and outdoor performance

Table 2. Traditional IEEE 802.11 versus HEW SG goals.

experience a WiFi network crash at a trade-show or other where the presence of a large number of WiFi devices leads to high interference. This is because, traditionally, IEEE 802.11 standards have focused on point-to-point link data rate improvements in an indoor network consisting of a single access point and a few clients working under light external interference. This objective needs to

be amended to consider total system throughput and fairness, given the market reality of denser indoor and outdoor deployments. To address this, the IEEE formed a new IEEE 802.11 study group (SG) called High-Efficiency WLAN (HEW) in July 2013. The efforts of this study group are expected to lead to the next major evolution of the IEEE 802.11 standard after IEEE 802.11ac. Table 2 compares

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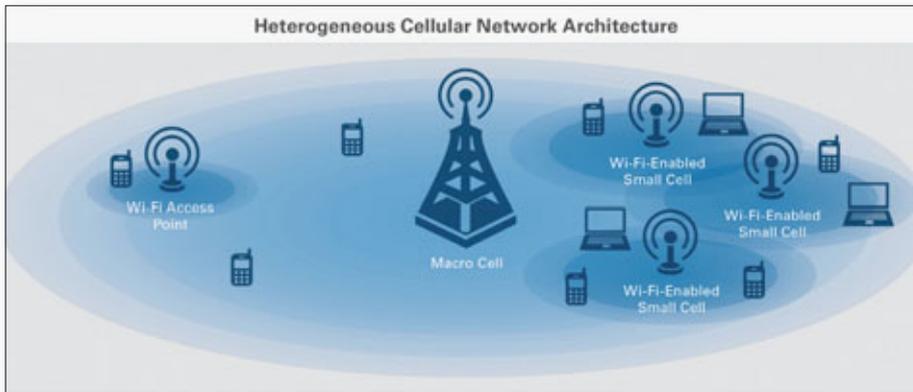


Figure 2. This is a simplified example of a next-generation heterogeneous cellular network with integrated WiFi.

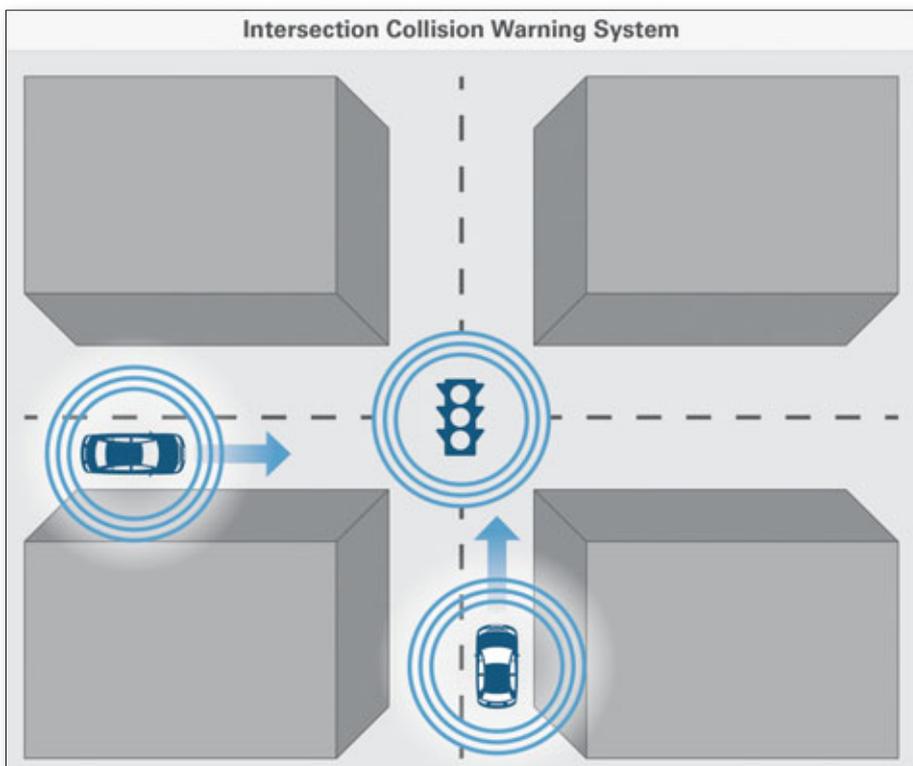


Figure 3. This example shows how IEEE 802.11p enabled automobiles and traffic infrastructure (e.g. a traffic light) to cooperate to avoid any potential collisions in the intersection.

the key differences in objective between the HEW SG and past IEEE 802.11 efforts. The HEW SG will consider both PHY innovations (such as orthogonal frequency division multiple access, OFDMA, modulation) and uplink MU-MIMO and MAC innovations (such as interference management and dynamic sensitivity control). The initial target of the HEW SG is to improve average throughput per station by at least 4x in dense deployments.

Update: since this article was written, HEW SG has completed its feasibility study. The IEEE standard board moved the effort to the next stage and officially created task group IEEE 802.11ax. This task group will discuss technical solutions needed to meet HEW requirements and reach consensus on updates to the IEEE

802.11 standard. The cellular ecosystem is preparing for increases of as much as 1000x over present demand in cellular data traffic in future Long-Term-Evolution (LTE) and Fifth-Generation (5G) cellular networks. Given this expected volume, offloading some user traffic to a WiFi network represents an attractive solution to meet this data demand. As a result, cellular carriers around the world are deploying or partnering with WiFi networks.

Figure 2 shows a simplified example of a next-generation heterogeneous cellular network with integrated WiFi. In addition to the traditional wide-area macrocell tower, the network includes a dense network of indoor and outdoor small cells with varying range servicing areas of high handset density (hotspots)

such as downtown neighborhoods. Most of the small cells will have integrated cellular and WiFi access-point capabilities, but some may be WiFi- or cellular-only cells. The network will cooperatively make decisions (e.g. when to offload a user from cellular to WiFi) to meet data traffic demand. In hotspots, it is beneficial to have a very dense deployment. However, carriers have found that efficient scaling of a network based on current WiFi technology is challenging in dense scenarios and, hence, the interest in HEW SG. There are other pieces to the carrier-grade WiFi puzzle, such as RF coexistence testing, integration with cellular network infrastructure, and optimizing handoffs between WiFi and cellular networks. The WiFi Alliance is working on a first version of carrier-grade WiFi certification based on existing WiFi technologies and some incremental changes. But, if HEW SG is successful, it has the potential to revolutionize the performance of carrier-deployed WiFi and beyond.

The third trend influencing the future of WiFi is the exponential growth expected in the Internet of Things (IoT) and machine-to-machine (M2M) communications. Wireless connectivity is seen as an important enhancement for the sensors and meters used in markets such as smart grid, healthcare, fitness, consumer wearable devices, and industrial monitoring. IEEE 802.11ah defines a lower-power version of WLAN to better address these use cases. To reduce power requirements, IEEE 802.11ah adds support for lower bandwidths (1 and 2 MHz are mandatory modes), uses lower data rates (typically less than 2 Mb/s), and uses unlicensed spectrum in the 900 MHz range. MAC layer enhancements in IEEE 802.11ah improve power-save modes and network scalability. As a result, access points can support a huge number of very low rate sensors efficiently. An example use case is in smart grids, where IEEE 802.11ah access points attached to electric utility poles connect wirelessly to sensors/meters in nearby homes to collect information on energy usage. The instantaneous information provided can be used for customer billing purposes and to improve power grid performance.

The fourth trend impacting WiFi is the use of intelligent transport systems and the growing application of IEEE 802.11p. The IEEE 802.11p amendment supports vehicle-to-vehicle and vehicle-to-infrastructure communications for intelligent transport system applications. Regulators in the European Union (EU) and in the US have designated spectrum near 5.9 GHz for this application. In the US, this spectrum is typically referred to as dedicated short-range communications (DSRC) spectrum. Figure 3 shows an example use case, where the IEEE 802.11p enabled automobiles and traffic infra-

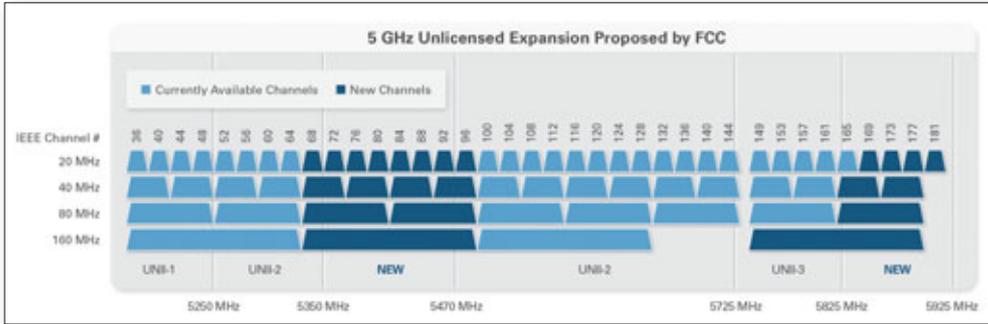


Figure 4. The FCC released a proposal in 2013 to add almost 200 MHz to the available bandwidth for use in the 5-GHz band.

structure (e.g. a traffic light) cooperate to avoid any potential collisions in the intersection. Other vehicular safety use cases include such functions as forward collision warning, blind spot warning, etc. A model deployment of the collision-avoidance system was launched in Ann Arbor, MI by the US Department of Transportation in the fall of 2012 using a pool of 3000 cars. Based on the positive results of this trial, the Department of Transportation announced in February 2014 that it is working on regulations to require this technology in light vehicles such as personal automobiles. In the future, additional pieces of intelligent transport systems could be enabled, such as connected real-time traffic rerouting, dynamic lane management, etc. Considering the recent research interest in driverless cars, the potential of intelligent transport systems and IEEE 802.11p appears even more promising.

A final trend is the exploration of new unlicensed spectrum. Today, WiFi devices utilize unlicensed spectrum in the 2.4 and 5 GHz bands, which offer bandwidths of approximately 100 and 500 MHz in the US, respectively. However, many WiFi devices, especially in the consumer market, use only the 2.4 GHz band due to cost and complex regulations in the 5 GHz band. The latest WLAN standard, IEEE 802.11ac, is limited to the 5 GHz unlicensed spectrum to avoid the congestion at 2.4 GHz. Although IEEE 802.11ac provides several performance improvements, additional unlicensed spectrum is required to truly take advantage of the wider bandwidth modes and the correspond-

ing high data rates. Today, spectrum regulators around the world are investigating ways to provide additional unlicensed spectrum in the 5 GHz band. In the US, the Federal Communications Commission (FCC) released a proposal in 2013 to add almost 200 MHz to this band (figure 4) and to simplify existing rules. Other regulators around the world are also expected to move in a similar direction. Several GHz of spectrum is available in the 60 GHz millimeter waveband for unlicensed use such as 57 to 64 GHz in the US and 57 to 66 GHz in the EU. Although using this spectrum for consumer devices would have been unthinkable a decade ago, advances in circuit technologies such as introduction of relatively inexpensive millimeter wave CMOS manufacturing have changed that.

Due to the different nature of the 60 GHz band, IEEE 802.11ad defined a unique PHY/MAC stack for this band. For example, the significant propagation loss at 60 GHz is mitigated by key enabling technologies such as adaptive beamforming. In this case, antenna arrays create highly directional beams that are rapidly adapted to the changing channel between the communicating devices. Target use cases for this technology includes short-range communications such as high-speed wireless cable replacement (e.g. wireless HDMI, wireless docking) and wireless interactive displays. The market rollout of this technology is expected to accelerate in 2015. Although WiFi technology and equipment have been available for more than a decade, the innovation in this market space is only accelerating. ■

Product News

ARM unveils a new 32-bit Cortex-M processor achieving 5 CoreMark/MHz

ARM has unveiled a new 32-bit Cortex-M processor that delivers double the compute and DSP capability of today's most powerful ARM-based MCUs. The ARM Cortex-M7 is targeted at high-end embedded applications used in next generation vehicles, connected devices, and smart homes and factories. Early licensees of the Cortex-M7 processor include Atmel, Freescale and ST Microelectronics. The Cortex-M7 achieves an impressive 5 CoreMark/MHz. This performance allows

the Cortex-M7 to deliver a combination of high performance and digital signal control functionality that will enable MCU silicon manufacturers to target highly demanding embedded applications while keeping development costs low. Expected uses of Cortex-M7 include smart control systems employed in a range of applications such as motor control, industrial automation, advanced audio, image processing, a variety of connected vehicle applications and other Internet of Things (IoT) uses.

[News ID 2072](#)

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New software quality assurance methods keep everything under control

By Dr. Stefan Weisse and Andreas Gajda, PLS

Software quality assurance in electronic control devices, according to the ISO 26262 standard, is often a fairly difficult task in practice. A new non-invasive method now allows for the first time determining the branch coverage even with optimized code.



■ With the complexity of control software in safety-relevant systems, which has virtually exploded in recent years, developers are now more dependent than ever on reliable methods for verifying and assessing the functional reliability of manually created source code. The focus is currently primarily on control-flow-oriented testing methods. Their great advantage is the largely automatable application with specially generated artificial stimuli or parallel to functional tests. Thus, these test methods are very often recommended or required (IEC 61508, ISO 26262) as part of standardized processes for quality assurance of products with software-based control systems.

Control-flow-oriented methods typically ensure that in the control processes described, on the basis of high-level languages all possible branches in the control-flow-generated stimuli using special or using functional tests within the operational environment of the system are achieved. The different levels of abstraction of control-flow-oriented test methods in terms of coverage of the control flow fall broadly into the following categories: coverage at function level, coverage at source text lines level, coverage at statement/command level, coverage of the branches – edge

coverage, coverage of the paths of a module, and coverage of the individual conditions and decision terms. For the exact definition of each category, there are similar but not completely identical definitions from several authors. Classification according to the DO-178B standard is the basis for the following information.

When classifying these categories, measurement of the coverage at source text level is always assumed. For this, typical methods use test instrumentation code additionally built-into the test code, by means of which the corresponding measurement data are determined. The measurement itself can then, based on a static code simulation or by translation of the generated overall code from test and instrumentation codes, be carried out in machine code and then test-run to determine the measured values. However, this method has several serious disadvantages. Due to the instrumentation, in particular the installation of measurement probes, the run-time behavior of the system will change. The additional code necessary for the instrumentation obviously also increases the overall size of the application to be tested in the test case. Instrumentation is only sensibly applicable in non-optimized code. For real-time-critical

control systems, the use of this method is therefore very limited, because adherence to the time behavior as well as maintaining the memory layout are absolutely necessary for parallel execution of coverage and function tests. For the test on such real-time-critical systems, methods by which the data required for coverage measurement are determined non-invasively seem much better suited. Since in this case, the installation of additional code is excluded, other methods must be used here for obtaining the required measurement data.

The following describes how the control-flow-information, for example as part of the debug-information, can be additionally provided by the compiler. As a result, this information must not be embedded as additional instrumentation code in the program structure, but rather only used in the evaluation of trace information to determine the coverage.

The code optimization can change the structure of the machine code in such a way that subsequently a clear mapping of the basic blocks of the source code level on basic blocks of the machine code level is no longer possible. Thus, during optimization, for example, basic blocks are duplicated, combined or elimi-

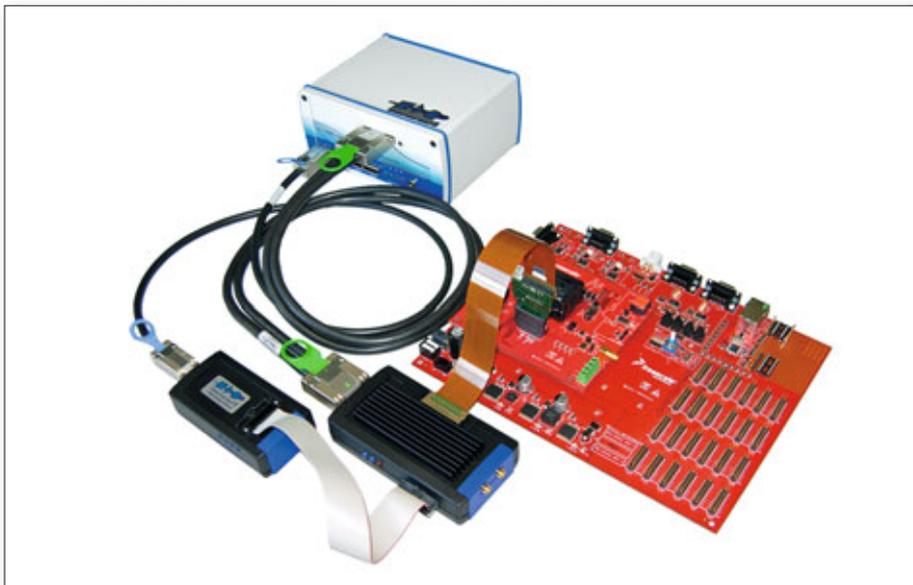


Figure 1. The Universal Access Device 3+ (UAD 3+) with Aurora trace pod and 4 GB trace memory enables a high data throughput and at the same time reliable coupling of the target system.

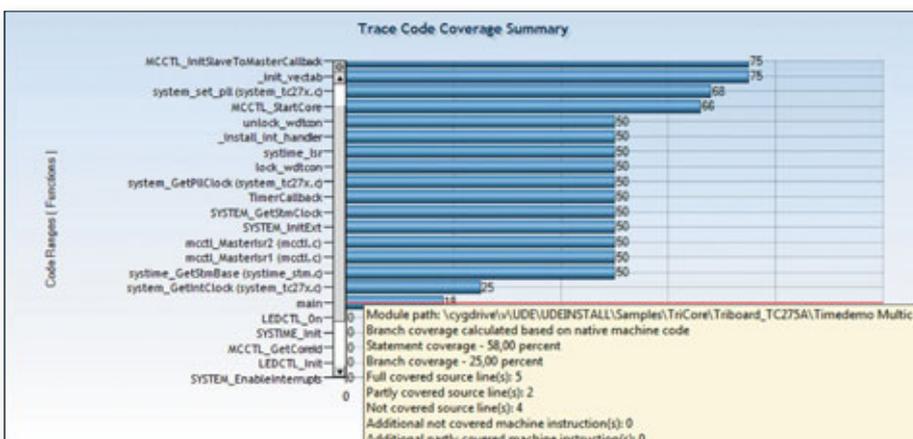


Figure 2. Overview diagram of the measured total coverage per module

nated. Such program transformations occur, among other things, during optimizations, such as for example, loop transformations, loop splitting, loop fusions or loop expansions, if-then-else transformations, such as for example, the elimination of a statement branch as well as conversions of basic blocks to table accesses. The program structure (in other words, the basic blocks), whose program address and size as well as their relations to other, can be determined statically and dynamically. The debug information from the program file can also be used, which exists, for example, in DWARF format and, among other

things, contains the mapping of line numbers to program addresses and the program addresses of the basic blocks. However the size of the basic blocks and their relations to other are not contained in the DWARF format. The latter can be determined by disassembling the machine code statements and subsequent interpretation, emulation or simulation. However, this static code analysis is very complex and is therefore rarely performed. The most dynamic trace information contains the addresses of the statements actually executed and the sequence of execution. From this information, a view can be generated of possi-

ble basic blocks and their view. However, only the basic blocks actually executed are recognizable. Accordingly, since in this way it is not possible to determine which basic blocks are not executed, a reliable coverage analysis can therefore not be carried out.

The debugging information in the program is usually sufficient in order to determine the coverage of the source code lines (C0 coverage). However, in order to additionally determine the decision coverage (C1 coverage) from trace data, the relations between the basic blocks are necessary. But, as already described, this information is not available in the DWARF information. From the statement trace can be derived which program branch was taken. In the case of direct jumps, it can also be determined, with some effort, which branches were not taken. At the latest, in the case of indirect jumps with almost any number of jump targets, it can de facto however no longer be determined how many branches actually exist and where they lead.

In order to avoid the equally extensive and error-prone static code analysis usual in such cases, it is appropriate to use the basic block information, which is available to the compiler after all program transformations. These include, among other things, basic blocks according to the function, identification number, address, size, the successor of a basic block and the number of basic blocks. This information is sufficient in order to determine a graph of basic blocks and to filter out decision coverage from the relation between basic blocks and statement trace. This debug information is stored in the linker output file and evaluated by the debug tool for coverage determination. The additional tool for coverage has no effect on code generation, memory usage or run-time behavior.

With help of the control-flow-information that is available via the enhanced debug information and the trace data of recorded program executions, it is possible to non-invasively carry out coverage measurements. Typically, a test arrangement with the storage of trace data in an external trace memory with a memory capacity in the gigabyte range is sensible for this purpose. The trace interface of choice for this purpose is a high-speed serial interface based on the Aurora

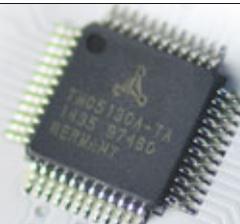


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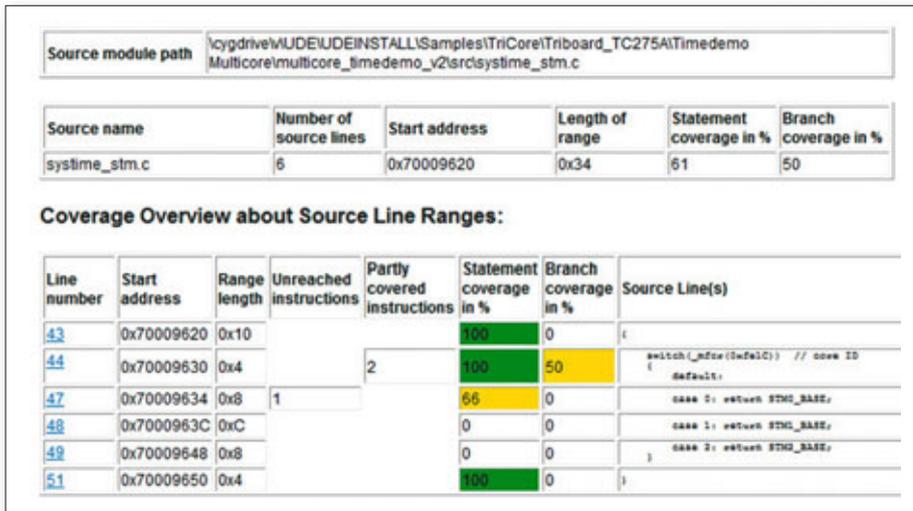


Figure 3. Extract from the HTML report of the coverage measurement of a module

interface, which enables a high throughput and at the same time reliable coupling of the target system. Figure 1 shows a corresponding configuration based on the Universal Access Device 3+ (UAD 3+) from PLS with Aurora trace pod and 4 GB of external trace memory.

An important part of a complete tool environment for proof of the program coverage is effective visualization of the measurement results (figure 2). In order to comply with the requirements for proof of the coverage measurements performed within the overall process for software quality assurance, complete reports including all details must also be generated (figure 3). These reports could be relevant for future traceability of the measurements performed and their interpretation. ■

electronica News

Hall.Stand A4.225

■ Arrow features lifecycle services platform at electronica

At electronica 2014, Arrow is showcasing its online design, specification and purchasing platform, parts.arrow.com. The extraordinary part is the presence of a customised track racing car and its truly inspirational driver, Sam Schmidt. As visitors would expect from one of the world's largest global sources of electronic components and services, there will also be a wealth of expertise and information from Arrow's own technical experts and those of its broad community of suppliers.

The Arrow stand will feature a Corvette C7 Stingray racing car that was created as part of the SAM (semi-autonomous motorcar) Project. It has been specially adapted to be controlled solely by movement of the driver's head; this allowed former racer, Schmidt, who is paralysed from the shoulders down, to take part in this year's Indy 500 festival and steer the car around the track unaided. Schmidt and a team of Arrow engineers will be on the stand to discuss the car's ground-breaking technology and show it to visitors.

Elsewhere on the stand, Arrow will be joining its suppliers demonstrating expertise in areas including machine-to-machine and Internet of Things solutions, power, LED lighting and embedded solutions. There will be a particular focus on parts.arrow.com, the first fully integrated online product lifecycle services engine for electronic components. Parts.arrow.com enables engineers and buyers to research and compare components, virtually deploy them with interactive reference designs, manage the resulting bill of materials and much more.

[News ID 2148](#)

Hall.Stand A5.562

■ ROHM: most recent product developments on show at electronica

At electronica, ROHM Semiconductor will present its most recent developments from the company's R&D centers as well as co-developments with partners which have been manufactured in its fully integrated production sites. The new devices feature future-oriented properties reflecting latest material research, proprietary process and packaging technologies. ROHM's innovative multi-channel, constant current LED driver series BD1837x is optimized for Automotive clusters, combining high efficiency and functionality with optimized diagnostic options.

Flexibility is provided via global PWM dimming, additionally, each channel can be fine-tuned by calibration setting and individual on/off switching. The line adds up to ROHM's wide range of Automotive drivers covering applications like indicators for clusters, display backlighting, blinkers, rear and head lamps. ROHM's new AEC-Q100 qualified synchronous buck converter family of low Iq DC/DC converter Ics integrates low-resistance MOSFETs and sophisticated SLLMTM (Simple Light Load Mode) control that ensure high energy efficiency and best performance, both at low and high load while maintaining a regulated output voltage. ROHM's wide range of low power devices includes Lapis MCUs, wireless products, market leading accelerometers from Kionix and ROHM's wide sensor lineup including proximity and UV sensors. Advanced MEMS design and innovative materials such as amorphous metal as well as thin film piezoelectric elements offer breakthrough energy-savings and compact packaging.

[News ID 2085](#)

Hall.Stand A1.307

■ R&S: fast analysis of MIPI RFFE interfaces with triggering and decoding option

To control the RF frontend, state-of-the-art smartphones use the serial RFFE bus standardized by the MIPI Alliance. The new R&S RTO-K40 option for the R&S RTO high-performance oscilloscopes from Rohde & Schwarz addresses the need for fast analysis and testing of MIPI RFFE interfaces. The option also offers automatic glitch rejection, which is quite unique.

The R&S RTO-K40 MIPI RFFE serial triggering and decoding option from Rohde & Schwarz is a powerful solution that enables developers of RF frontends and modules with RF frontend control interface to verify and debug designs and put these components into operation.

[News ID 2090](#)

Hall.Stand A4.266

■ Maxim: online GUI simplifies designs for precision signal chain applications

FPGA engineers can quickly evaluate and validate their FPGA-based control systems and get to market faster, using the high-speed MAXREFDES74# 18-bit data acquisition system reference design from Maxim Integrated Products. Achieving high-precision, high-speed digital control loops is a challenge for designers. But now the MAXREFDES74# DAS provides an 18-bit acquisition analog input and output front end for applications demanding high precision and high-speed data conversion based on FPGA digital processing. The MAXREFDES74# plugs directly into a standard FPGA I/O expansion (FMC) and is fully equipped with complete hardware, firmware for Zynq FPGAs, Maxim's easy-to-use PC-GUI, and Gerber files.

[News ID 1993](#)

Hall.Stand A6.510

■ MSC: Qseven rev. 2.0 starter kit for Atom E3800 based modules

MSC Technologies introduces a Qseven Rev. 2.0 starter kit for its Qseven modules with Intel Atom processor E3800. The starter kit is a complete, ready-to-run environment for modules designed to the new Revision 2.0 of the Qseven standard, and particularly for MSC Technologies' new Q7-BT modules which are now entering wide availability. The starter kit for E3800 based modules features the company's new Qseven Rev. 2.0 application carrier board MSC Q7-MB-EP6 which gives access to most of the module's key features such as USB 3.0, USB 2.0, HDMI, DisplayPort, SATA and UART interfaces. Furthermore the board adds a second GbE LAN interface to the one provided by the Qseven module, and also features SD, mSATA and miniPCIexpress card slots as well as TFT backlight control.

[News ID 2107](#)

Hall.Stand A5.476

■ Avnet Memec showcases latest technology in four focus zones

Avnet Memec will be showcasing the latest technologies from their portfolio in four focus zones at the forthcoming electronica show. Technologies for the Internet of Things will feature alongside Analogue & Sensors, Data processing & Communications and FPGA & MCU zones.

Electronica visitors to Avnet Memec's IoT zone will be able to view a wide variety of low power hardware and software demonstrations to address the growing market for the Internet of Things. The demonstrations will include sensor nodes, smoke detectors, alarm panels and other devices talking to new low power wide area IoT networks based on the LoRa technology and Sigfox. In addition to new low power components, the demonstrations will incorporate Web and Cloud services including Software/Apps for visualizing the data.

The Analogue and Sensors section will feature advanced power supply and signal chain technologies from suppliers including Intersil, Maxim, Microchip, MPS, Semtech and Silicon Labs. Cutting edge capacitive and resistive touch sensor solutions, sensors for lighting, UV-Index, proximity, haptic, temperature and relative humidity are being showcased.

Also on the Avnet Memec stand will be Data processing & Communications and FPGA & MCU areas. Technologies including multi-core ARM based SoCs from Marvell and fibre optic transceivers, modules and active optical cables from Finisar will feature alongside complementary solutions from Applied Micro, Microchip, Microsemi, Renesas, Silicon Labs. Various powerful solutions for Industrial Ethernet are building another main focus in that zone.

[News ID 2176](#)

Hall.Stand B1.274

■ Elma presents MicroTCA carrier hub with fibre-optic technology

MicroTCA-specialist Elma Electronic presents his new MicroTCA carrier hub with extremely fast signal transmission. The card equipped with fibre-optic technology enables connection to PCs at a distance of up to 150 meters. This enables relocation of computing power and the related heat development. The new MCH was officially launched at the specialist conference TWEPP-2014 in Aix-en-Provence, France. The CPU of a MicroTCA.4-crate may only be of 4 TE width what often causes problems especially with cooling. The Elma-MCH with four tongues now solves this problem by transferring data from the MicroTCA.4-crate via fibre-optic connection to a conventional PC. Further computing performance and cooling can be realized much easier. The card also offers precise FPGA-based synchronization clock networks as well as synchronization protocols such as WhiteRabbit or IEEE 1588 for data transmission.

[News ID 2149](#)

Hall.Stand A6.306

■ congatec: COM Express mini module with ECC support

congatec now offers designers the safety and security of error correction code, often referred to as ECC memory, on a COM Express Mini Type 10 module. The new conga-MA3E, a follow on from the congaMA3, is based on the Intel Atom E3800 series of processors. Unlike standard RAM modules, ECC modules feature additional functions to check the data flow and adjust it as necessary in order to correct errors. The correction mode of this memory type can detect and correct both single and double bit errors. It therefore differs significantly from the so-called „parity bit“, where errors can be detected but not corrected. Both the conga-MA3 and the conga-MA3E feature the latest Intel Atom single chip design, an L2 cache able to be shared by multiple cores, and a much faster Intel HD graphics engine than the previous generation.

[News ID 2178](#)

Hall.Stand A5.476

■ Microsemi: SmartFusion2 and IGLOO2
FPGA with new security features

Microsemi announced the availability of its new ultra secure SmartFusion2 SoC FPGAs and IGLOO2 FPGAs that have more advanced security features at the device, design and system levels than any other leading FPGA manufacturer. The new data security features are now part of Microsemi's mainstream SmartFusion2 SoC FPGAs and IGLOO2 FPGAs and allow developers to leverage the device's lowest power consumption in its class, high reliability capabilities and best-in-class security technology to build highly differentiated products that help gain a significant time to market advantage.

[News ID 2159](#)



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Stand B1-274

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Hall.Stand A3.207**■ F&S introduces new form factor efus**

F&S is now a Proven Partner in Freescale's Connect Partner Program; your essential source for embedded designs based on Freescale solutions. The F&S profile on the Freescale Website offers a detailed overview of how we contribute to the partner ecosystem.

F&S Elektronik Systeme now offers the new COM formfactor "efus". The new standard „EasyLayout“ guarantees a low cost carrier board. EasyLayout describes the concept of no crossing lines or avoidable through holes. The chosen plug connector frees up valuable space on the bottom side of the module. The schematic data for developing a base board under EAGLE is available.

[News ID 2172](#)

Hall.Stand A1.668**■ Tektronix: 6-in-1 oscilloscope at electronica**

Tektronix will be showcasing a wide range of test and measurement products at electronica. The Tektronix stand will feature four workstations: Power, Automotive and Embedded Design, Education, Research. Visitors to the Tektronix stand will be able to get hands-on demonstrations and technical advice from our experts to help them with their test and measurement challenges.

Highlights on the Tektronix stand will include the MDO3000 Series, the ultimate integrated oscilloscope, that includes a spectrum analyzer, logic analyzer, protocol analyzer, arbitrary function generator and digital voltmeter. The MDO3000 clears the design bench of costly, specialized equipment and provides the tools needed to test and debug virtually any embedded design. In addition, Tektronix has developed the MDO3000 to be completely customizable enabling customers to select the functionality and performance needed now - and later.

The TBS1000B-EDU series are the first oscilloscopes in the industry with an integrated courseware system designed to help students learn more efficiently and effectively while minimizing the time instructors need to spend preparing and conducting lab sessions. With integrated courseware, instructors can make their lab exercise content viewable on the oscilloscope and students can conveniently capture lab results straight from the instrument.

Also on show is the Keithley Parametric Curve Tracer Configurations on the 2600- / 4200-PCT Series, recently enhanced with the new High Power Interface Panel Model 8020, deliver reliable and quick results on comprehensive high power semiconductor I-V and

C-V testing. The 8020 now expands actual I-V and C-V characterization solutions by high power I-V and high voltage C-V at wafer-level. [News ID 2181](#)

Hall.Stand A5.260**■ Telit introduces cloud-ready modules**

Telit Wireless Solutions debuted its first m2mAIR Cloud-ready wireless modules, designed to simplify the development and deployment of comprehensive M2M and Internet of Things applications using the m2mAIR Cloud service – an important step toward realizing the company's vision of the Internet of Things made Plug & Play.

[News ID 1994](#)

Hall.Stand A5.476**■ Silicon Labs: beta program for Thread software**

Silicon Labs introduced the creation of a Thread beta program for selected customers and ecosystem partners, enabling them to accelerate their product development plans for IP-based mesh networking. As a founding member of the Thread Group, Silicon Labs has been a major contributor to the definition and development of the new IP-based mesh networking software stack for the Connected Home.

[News ID 2105](#)

Hall.Stand B1.243**■ Pentair: Interscale platform, MTCA and ATCA systems at electronica**

At this year's electronica, Pentair will present new and enhanced products from ist Schroff brand. On centre stage is the Interscale case platform, as well as MicroTCA and AdvancedTCA systems, subracks and electronics cabinets. Pentair's innovative Interscale case platform brings flexibility to engineers working with non-standardised or small form factor designs. With three levels of case options available – standard, modified and fully-customised – the Interscale case platform satisfies a wide spectrum of customer requirements.

During the show, Pentair will demonstrate ist new online Interscale M configurator that helps ease design of individual cases – for both prototyping and production quantities. By following a step by step approach, users of the configurator can customise the case with the desired accessories and requirements – from quantity, delivery date, size, colour, cutouts and printing – with a free, detailed quotation provided within 48 hours.

Pentair's AdvancedTCA system has also undergone further development with the inclusion of smaller systems with front-to-back cooling to ist ATCA 450/40 family. A new 48 V DC version of the 2-slot

AdvancedTCA system will be unveiled during the show, which features front-to-back cooling to achieve up to 450 W cooling per slot, as with the current 14-slot systems. Pentair is also working on enhanced front-to-back cooling for ist 6-slot AdvancedTCA system.

Pentair will also present ist Schroff Varistar and Schroff Novastar 19" cabinet platforms. Using the three-level service concept – standard, modified and fully-customised – individual cabinets can be configured to satisfy the requirements of a wide variety of applications.

For the first time, the Schroff Park2Power charging system will also be on display. This system offers everything that a public, commercial or private user demands of a charging station for electric vehicles. With ist variable configuration options and three product versions, the Park2Power charging system has the flexibility to meet a wide range of requirements both in terms of cost and performance. The charging, authorization, payment, communication and control modules can be expanded, changed or updated at any time.

[News ID 2132](#)

Hall.Stand A6.175**■ Apacer expands market presence in embedded and industrial applications**

During electronica, Apacer will further expand into the European market by taking into account the requirements of industrial and embedded applications. Apacer will comprehensively display ist whole series of industrial SSDs as well as ist memory modules with latest specifications, demonstrating ist market-leading position and innovation strength.

In 2013, Apacer was again ranked Top 1 industrial SSD manufacturer by Gartner Research. This year, Apacer has developed more cutting-edge products by breaking through the traditional thoughts and utilizing the innovative value-added technology. The industry-leading products to be presented in the exhibition include: high-speed industrial SSD featuring only 5mm thickness and ultra-large capacity of 256GB; the seamless waterproof nano coating SSD that runs even when immersed in water; Core Security SSD with the boot protection function; CorePower Technology and the first Combo SDIMM which integrates DRAM and SSD in one module. Further, Apacer will also introduce several SSDs with SATA 3.0 and PCIe interface and top-level DDR4 memory modules. With more than 10 years of experience in the SSD market, Apacer is well-known for ist ever-increasing shipment volume, excellent customization capability, stringent manufacturing quality and timely technical support.

[News ID 2146](#)

Hall.Stand A6.243

■ Renesas: RL78/G1G MCUs reduce system costs

Renesas Electronics Europe is expanding its safety and efficiency support for home appliances and tools with the innovative new RL78/G1G Group of microcontrollers. In complement to its current brushless DC motor control MCU offerings, Renesas delivers power-efficient performance with shorter development time and up to 40 percent lower system costs, in a small but powerful single-chip solution for appliances like advanced electric fans, electric tools, and food processors, and many other applications that require fine motor control.

[News ID 2078](#)

Hall.Stand A5.115

■ Toshiba: online design tool simplifies power part selection and system design

Toshiba Electronics Europe has announced an online design tool that helps engineers to analyse the performance of components for the power stages of embedded designs and improve overall system effectiveness and efficiency. The Toshiba Semiconductor Web Simulator enables users to simulate MOSFET performance under various voltage and temperature conditions, and to analyse their switching waveforms in AC/DC and DC/DC converter applications using different topologies such as full-bridge, flyback and synchronous buck converters.

[News ID 2080](#)

Hall.Stand A5.115

■ Sierra Wireless: InMotion solution deployed for automatic vehicle location

Sierra Wireless announced that the Regional Transportation District in Denver, Colorado has deployed InMotion Solutions to support mobile broadband access for automatic vehicle location and smart card fare payments aboard more than 1,100 buses in its fixed route fleet. Denver's Regional Transportation District (RTD) is one of the top 20 public transit agencies in the United States, providing services to residents across an eight county metro area

[News ID 2177](#)

■ DFI: microATX industrial motherboard supports 10 COM

DFI presents the HD332-H81, a new micro-ATX industrial motherboard in its cost-effective Intel H81 product line. The new microATX embedded board with LGA 1150 socket is powered by the 4th generation Intel Coreprocessor family delivering a 5~15% CPU performance increase over previous generations. The enhancements in CPU performance, media and graphics capabilities, security and power efficiency make this embedded board well suited for a variety of market segments, such as medical, retail, kiosk and industrial manufacturing.

[News ID 2106](#)

Hall.Stand A6.510

■ MSC: 17" industrial display from Innolux, ideal for outdoor applications

MSC Technologies is now selling the recently-launched series of Innolux G170J1-LE1 displays with WUXGA (1920x1200) resolution. This display stands out due to its suitability for industrial applications, which is an unusual characteristic for display monitors of this size. The new G170J1-LE1 is ideal for use with medical devices, outdoor vending machines and industrial controls in harsh environments.

[News ID 2062](#)

Hall.Stand A6.520

■ IBASE: outdoor digital signage player for harsh environment application

IBASE releases the SI-32-N outdoor digital signage player integrating an R-452L APUs to deliver high processing performance coupled with discrete-class Radeon HD 7600 graphics performance. Designed for outdoor and automotive digital signage applications, the rugged and compact SI-32-N is built to withstand vibration and silently operate with a wide voltage input range of 12V~24V.

[News ID 2017](#)

Hall.Stand A6.228

■ Elmos signs distribution agreement with Silica

Silica has signed a distribution agreement with mixed-signal specialist Elmos Semiconductor, authorising SILICA to sell and support their full range of Interface, Sensor, Power and Motor Control products across Europe. The addition of Elmos to Silica's linecard brings with it a host of extremely attractive products. In particular these include Smoke Detectors, BLDC Motor Driver and KNX. Silica's approach to market is characterised by the provision of expert technical support and the Elmos line is no exception.

[News ID9 2013](#)

Hall.Stand A6.107

■ Freescale drives IoT innovation with gateway based on QorIQ LS1 processor

Freescale Semiconductor introduced an exceptionally versatile and reliable Internet of Things gateway reference design supporting a broad array of IoT applications including building/home management, smart cities, networked industrial services and other applications where performance and reliability are critical. The production-ready reference design, named the LS1021A IoT gateway, is engineered to shorten design cycles and speed time to market for OEMs. Additionally, the offering's remarkable versatility allows IoT service providers to replace multiple boxes with a single, low-cost unified appliance.

[News ID 2130](#)



I P C

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MS-9A78 Haswell/BayTrail Platform

- Swappable Mini-ITX motherboard
- Intel® 4th Gen Haswell or BayTrail platform
- High performance up to TDP 45W
- Operation temperature: -10 ~ 50°C (35W Haswell and BayTrail)


MS-9A65 BayTrail Fanless Platform

- Ultra-slim fanless design (TDP 10W)
- Intel® BayTrail platform
- Easy maintenance w/ removable bottom cover
- Smart power button to avoid mistaken action


MS-98F6 3.5" BayTrail D/M SBC

- Intel® Bay Trail-D/M Processor
- DDR3L 1333MHz SO-DIMM up to 8GB
- HDMI, VGA, and LVDS displays
- Dual GbE LAN, USB 3.0 and 6 COM
- Dual Mini-PCIe, SATA, and mSATA



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ipc-sales@msi.com

Hall.Stand A5.524
■ Mouser: free design integration tool MultiSIM BLUE

Mouser Electronics announced the launch of a PCB design integration tool MultiSIM BLUE, designed in collaboration with National Instruments. The tool is available free globally, and is offered in English and German as well as Simplified Chinese. This all-new PCB design integration tool utilizes the Berkeley SPICE engine and includes a preloaded component library of over 100,000 frequently used components from multiple Mouser databases.

[News ID 2124](#)

Hall.Stand A6.520
■ IBASE: fan-less network appliance with 4 GbE ports

IBASE has launched the FWA6604 compact network appliance that is a device with four Gigabit Ethernet ports based on Intel I211-AT Gigabit Ethernet controllers. The model comes in two flavors - a fanless version powered by an Intel Atom E3815, 1.46GHz processor and another one built around an Intel Celeron J1900, 2.0GHz processor.

[News ID 2144](#)

Hall.Stand A5.476
■ Microchip: 3-phase BLDC motor gate drivers integrate power module and LIN transceiver

Microchip announces two new 3-phase Brushless DC motor gate drivers with integrated power module, LIN transceiver and Sleep mode: the MCP8025 and MCP8026 (MCP8025/6). These devices can power a broad range of Microchip's dsPIC Digital Signal Controllers and PIC microcontrollers, complementing their control algorithms by driving MOSFETs, sensing current, preventing short circuits, outputting zero crosses, controlling dead time and blanking time, and monitoring for fault conditions such as over/under-voltage, over-temperature and other thermal warnings. This combination enables Microchip to provide a complete motor control and drive solution for a broad range of automotive and industrial applications.

[News ID 2104](#)

Hall.Stand A6.510
■ MSC : Linux development kit for E3800 and i.MX6 based modules

MSC offers a Linux Development Kit with board support package for its Qseven and COM Express modules with Intel Atom processor E3800 platform, and for the Qseven and nanoRISC modules with Freescale's i.MX6 processor. Using this LDK, Linux developments for these processors can be shortened greatly, and its scalability feature allows generating embedded systems with minimum memory footprint.

[News ID 2040](#)

Hall.Stand A4.159
■ ADI: high speed, high-temperature 16-bit A/D converter

Analog Devices introduced the high speed, high-temperature 16-bit, A/D converter, which is more than twice as fast as currently available converters and provides error-free operation at temperatures of up to 175 °C. With sample rates up to 600-kSPS, the AD7981 PulSAR A/D converter is ideally suited for applications including wide bandwidth sonic and vibration measurement as well as low power, lower-bandwidth pressure and temperature sensing.

[News ID 2150](#)

Hall.Stand A6.549
■ DFI: solutions for POS systems

The POS systems use customized hardware and software to fit different requirements in various industries. A typical POS system includes two monitors: one for the clerk and another for the customer, a cash drawer, a credit card reader, a receipt printer, and a barcode scanner. Thus, it requires a computer system that supports flexible I/O ports and responsive computing ability. DFI's Mini-ITX motherboard, HM101-QM87, is powered by the 4th generation Intel® Core™ processor family offering higher processing performance and superior graphics display support.

[News ID 2129](#)

Hall.Stand A5.115
■ Toshiba: motor drivers deliver quiet, cool operation to home appliances

Toshiba Electronics Europe announces the availability of several new motor driver ICs that reflect the demand for compact design and quiet operation in applications such as home appliances and office automation equipment. The TB67S269FTG is a bipolar stepping motor driver that offers a high voltage of 50V and current of 2A. High speed, high capability motor drives are required in printers, office automation equipment, ATMs, amusement machines and home appliances.

[News ID 2139](#)

Hall.Stand A4.122
■ Creative Chips at electronica 2014

The fabless mixed-signal ASIC / ASSP supplier CREATIVE CHIPS GmbH is exhibiting again this year at the electronica in Munich. Visitors will be informed about new ASIC technologies as well as enhanced application-specific standard products. The semiconductor company moved into the newly constructed own building in Bingen last fall. During the ASIC symposium held on the occasion of the 15th anniversary customers, partners and invited guests could get an idea of the efficiency and capacity of the new production and test facilities.

[News ID 2008](#)

Hall.Stand A1.568
■ Altium broadens Cortex-M device support to its TASKING C compiler for ARM

Altium announces a new release of its TASKING compiler suite for ARM, delivering support for many additional Cortex-M based microcontrollers including STMicroelectronics, Freescale, Atmel, Texas Instruments and many others. The enhanced version brings pin assignment functionality to the toolset, which is another step forward in helping engineers to speed up application development.

[News ID 2116](#)

Hall.Stand A4.225
■ Arrow: evaluation board for Altera's non-volatile Max 10 FPGAs

Coinciding with the release of the Altera MAX10 field-programmable gate array family, Arrow Electronics has released the BeMicro Max 10 FPGA evaluation board. Developed in collaboration with Altera and Analog Devices, the BeMicro Max 10 is ideally suited for testing the features and functionality of MAX 10 FPGAs. MAX 10 FPGAs revolutionize non-volatile FPGAs by integrating within a small-form factor device dual-configuration flash, analogue blocks, memory, DSP and embedded processing capabilities.

[News ID 2115](#)

Hall.Stand A4.159
■ Analog Devices and EBV Elektronik sign distribution franchise agreement

EBV Elektronik and Analog Devices have signed a distribution franchise agreement for the EMEA region, except Russia, Ukraine and Israel, effective November 3, 2014.

Both companies are renowned for their solutions and applications orientation. EBV Elektronik will represent ADI's complete product portfolio, including data converters, amplifiers, DSPs, MEMs, power management ICs, and an extended linear and RF/microwave portfolio.

[News ID 2055](#)

Hall.Stand A5.507
■ Artesyn: COTS fail-safe system designed to be certified to SIL4

At the Innotrans exhibition, Artesyn Embedded Technologies announced the ControlSafe Platform, one of the first embedded computing systems to use COTS components to create a fail-safe computing platform designed to be SIL4 certified for a wide range of train control and rail signaling applications. The ControlSafe Platform enables rail application developers and system integrators to substantially accelerate time-to-market without being deterred by the potentially high costs and risks associated with the stringent SIL4 system development and certification process.

[News ID 2065](#)

Hall.Stand A3.207

■ Avalue announces Haswell refresh platform products

Avalue is introducing the 3.5" board ECM-QM87R, EPIC board EPI-QM87R and System-on-module ESM-QM87R which are based on the 4th generation Intel Core Haswell-Refresh i5/i3 Processors and the mobile Intel QM87 Express chipset. Compared with the 4th generation Intel Core processor family, the Haswell-Refresh i5/i3 Processors shows improvements in performance and clock speed.

[News ID 2010](#)

Hall.Stand A4.420

■ TI: digital power hardware and software tools

Texas Instruments enhanced a third-party ecosystem of digital power hardware and software tools as well as development services. This ecosystem allows digital power design engineers who use TI's broad portfolio of C2000 microcontrollers to develop their systems quickly and easily. The members of the ecosystem include Altair, MathWorks and Powersim. Each company has demonstrated its digital power offerings on one or more of TI's C2000 MCU solutions, enabling applications such as inverter control, power factor correction and power conversion.

[News ID 2005](#)

Hall.Stand A5.476

■ Microsemi: SmartFusion2 150K LE Advanced Development Kit

Microsemi announced the availability of the company's new largest density, lowest power SmartFusion2 150K LE System-on-Chip FPGA Advanced Development Kit. Board-level designers and system architects can quickly develop system-level designs by using the two FPGA Mezzanine Card expansion headers to connect a wide range of new functions with off-the-shelf daughter cards, which significantly reduces design time and cost when creating new applications for communications, industrial, defense and aerospace markets.

[News ID 2094](#)

Hall.Stand A6.243

■ Renesas: 32-bit RX family with larger memory capacities up to 512 KB

Renesas announced the addition of new product versions with larger memory capacity to the RX111 Group of 32-bit microcontrollers ideal for applications such as healthcare devices, industrial equipment, and building automation systems. Renesas' existing RX111 Group product lineup offer package pin counts of 36 to 64 pins, flash memory capacity of 16 KB to 128 KB, and RAM capacity of 8 KB to 16 KB.

[News ID 2093](#)

Hall.Stand A1.115

■ Pico Technology: new range of mixed-signal oscilloscope

The new PicoScope 3000D Series Mixed-Signal Oscilloscopes are ideal for engineers working on a diverse range of embedded systems. These compact USB-connected devices form a complete portable test system, with two or four analog channels and sixteen digital channels as well as a built-in arbitrary waveform generator.

[News ID 2077](#)

Hall.Stand A6.107

■ Freescale plans for Kinetis MCUs with ARM Cortex-M7 Core

Freescale Semiconductor announced its support for the ARM Cortex-M7 core, which Freescale plans to leverage for new levels of performance and power efficiency in forthcoming embedded SoCs. With the industry's broadest range of compatible and scalable MCUs based on ARM Cortex-M cores, Freescale maintains software and hardware compatibility across six unique Kinetis series, while offering the choice of general purpose or application specific features.

[News ID 2073](#)

Hall.Stand A5.276

■ Innodisk: certified storage solutions for in-vehicle computing

Innodisk announces a new line of SSDs and DRAM designed specifically for in-vehicle computing. These storage solutions stand up to the challenges posed by the extreme environments found in cars, buses, trains, ships, fleet vehicles, and military vehicles.

Innodisk's In-Vehicle SSDs are certified products that cause no electromagnetic interference. System reliability is ensured at the end application.

[News ID 2058](#)

Hall.Stand A4.266

■ Maxim: Micro PLC platform implements Industry 4.0

Using the Micro PLC platform from Maxim Integrated Products, designers now have the tools to implement Industry 4.0 with less power, parts, and total costs. The platform consists of five reference designs which can operate as stand-alone subsystems and be configured and tested with a laptop's USB port.

[News ID 2117](#)

Hall.Stand A5.524

■ Mouser: start connecting with Microchip Bluetooth starter kit

Mouser Electronics is now stocking the DM320018 PIC32 Bluetooth Starter Kit from Microchip Technology. The DM320018 is a low cost Bluetooth development platform based on the 32-bit Microchip PIC-

32MX270F256D microcontroller. This easy to use starter kit features a Bluetooth HCI module, single-chip 3 axis accelerometer and temperature sensor, high output multi-color LED, and two USB connectors.

[News ID 2103](#)

Hall.Stand A6.419

■ AAEON: 3.5-inch subcompact board in fanless design

AAEON unites both traditional and state-of-the-art new technology with the release of the GENE-A55E, 3.5" subcompact board. Specifically designed for users of the previous model of AAEON's AMD LX800 3.5" subcompact board, this new entry provides almost identical configurations, such as rear I/O arrangements and design, ensuring users of the former board need minimum effort to upgrade their hardware.

[News ID 2174](#)

Hall.Stand A6.169

■ Exar completes merger with Integrated Memory Logic

Exar has completed its merger with Integrated Memory Logic, provider of power management and color calibration solutions for large and medium-sized flat panel displays used in televisions and tablets. The transaction was completed through a second-step merger to acquire all of the remaining outstanding shares of iML. As of September 15, 2014, Exar owns 100% of the outstanding stock of iML and iML stock is no longer publicly trading.

[News ID 2034](#)

Hall.Stand A5.476

■ Silicon Labs: easy-to-use web-based utility simplifies clock tree design

Silicon Labs launched an online timing utility that eases the complexity of designing clock trees for a wide range of Internet infrastructure applications including high-speed networking, telecommunications and data center equipment.

[News ID 2033](#)

Hall.Stand A1.630/A5.202

■ Teledyne LeCroy: three-phase motor drive power analyzer software

Teledyne LeCroy announces three-phase Motor Drive Power Analyzer software for its HDO8000 oscilloscopes. The HDO8000 mixed-signal oscilloscopes, with 8 input channels, 12-bit resolution, and up to 1 GHz bandwidth, are the perfect solution for motor drive embedded control and power section debug. With the addition of three-phase power analyzer capability and motor speed and torque integration, the complete drive system can be more quickly and easily validated and debugged, and extensive drive and motor power and efficiency measurements may be performed.

[News ID 2076](#)

Hall.Stand B5.373**■ demmel: intelligent touch displays enhance iLCD product line**

demmel products has added the new intelligent touch displays DPP-T43, DPP-T57 and DPP-T70 to its iLCD product line. The 4.3", 5.7" and 7" iLCD models now feature the fast DPC3090 processor and 128 MByte flash memory on board. Each of the six iLCDs between 3.5" and 10.2" provides the same feature set, which represents a new standard for intelligent displays. Despite the significantly improved performance, prices for the DPP-T43 and DPP-T57 remain unchanged, and the DPP-T70 now costs considerably less than previous 7" models. The new touch displays are fully compatible with preceding models and all iLCDs across the entire product line. Hence, their operation, frame size and pin assignment are identical.

[News ID 2167](#)

Hall.Stand A5.476**■ Microchip: capacitive touchscreen line driver for advanced touch performance**

Microchip announces a new addition to its Human Interface Input Sensing Solutions portfolio with a standalone integrated high-voltage line driver to increase Signal-to-Noise Ratio for advanced projected-capacitive touch performance: the MTCH65X. The MTCH652 features an integrated boost converter and can interface to any touch controller via SPI to drive up to 19 Transmit channels at selectable voltages up to 18V to increase the SNR in projected-capacitive touch systems.

[News ID 2151](#)

Hall.Stand A5.507**■ Lantiq introduces G.fast residential gateway reference design**

Lantiq announced the EASY330 G.fast reference board, the industry's first residential gateway reference design built around G.fast. The EASY330 uses the Lantiq AnyWAN concept based on Lantiq's GRX330 multicore networking processing unit with Gigabit routing performance to provide maximum flexibility in CPE design and deployment. It also includes an embedded 11n offloading engine, maximized 802.11ac Wi-Fi throughput, Gigabit Ethernet switch and PHYs, carrier grade VoIP and built-in G.fast chipsets from Sckipio Technologies, the leader in G.fast modems.

[News ID 2136](#)

Hall.Stand A5.507**■ Artesyn: successful testing of 100G ATCA technology**

Artesyn Embedded Technologies announced the successful testing of the industry's first 100G ATCA technology. This breakthrough will for the first time enable bandwidth-hungry next-generation applications in software defined networking and network functions

virtualization deployments to achieve up to 4 Tb/s aggregate throughput in a single open standards-based bladed server system. Working with connector manufacturer, ERNI, Artesyn has developed the critical technology components – the connector and backplane – that enable 100 Gb/s Ethernet connectivity in an ATCA shelf.

[News ID 2135](#)

Hall.Stand A1.307**■ Rohde & Schwarz: HMO oscilloscopes bundle as special promotion**

HMO Complete is the name of the current special promotion from Rohde & Schwarz. It applies to all two-channel and four-channel HMO oscilloscopes from its subsidiary HAMEG Instruments. The Complete2 bundle includes the two-channel 500 MHz HMO3052, and Complete4 contains the comparable four-channel HMO3054. At no extra charge, the Munich-based electronics specialist adds two HO3516 eight-channel digital probes with a sampling rate of 1 Gsample/s for analyzing up to 16 logic channels.

[News ID 2126](#)

Hall.Stand A5.207**■ ST: ARM Cortex-M7 Core-based STM32 F7 series MCUs**

STMicroelectronics announced the extension of its STM32 family of more than 500 pin- and software-compatible microcontrollers. The new STM32 F7 microcontroller series leverages the ARM Cortex-M7 core, just announced as ARM's newest and most powerful Cortex-M processor. ST's STM32 F7 series leapfrogs the industry's previous high-performance 32-bit Cortex-M champ — ST's own STM32 F4 — in delivering up to twice as much processing and DSP performance that is accessible via a seamless upgrade path.

[News ID 2070](#)

Hall.Stand A5.338**■ iC-Haus: interface IC for sine/cosine encoders with safety functions**

For the fast and safe position acquisition with sine/cosine encoders and linear systems iC-MR provides the complete position sensor and encoder interface in a "system-on-chip" solution. The intrinsically safe differential sine/cosine transmission of the position information can take place now at signal frequencies of up to 500 kHz from the transmitter to the receiver. The circuitry contains serial and parallel MCU interfaces and the complete analog front end for signal conditioning, a 13-bit sample & hold SAR tangent converter with a latency of only 2 µs, diagnostic functions for monitoring the sine/cosine signals in real time, as well as a 1V output driver for a differential sin/cos output at 100 Ω.

[News ID 2038](#)

Hall.Stand A4.420**■ TI: 25- to 160-MSPS ADC family saves energy in industrial designs**

Texas Instruments expanded its data converter portfolio with a new family of small, pin-compatible ADCs that provide a best-in-class power-to-performance ratio. The ADC3k family includes 12- and 14-bit options in speed grades of up to 160 MSPS with 2 or 4 channels and with LVDS or JESD204B interfaces. The devices support the industrial ambient temperature range of -40C to 85C for use in industrial applications, such as motor control, medical imaging, and portable test and measurement, as well as defense and communications applications, such as software defined radio and MIMO communications.

[News ID 2046](#)

Hall.Stand B5.136**■ mycable: unlock the power of the GPU for embedded**

mycable is making available the NVIDIA Jetson TK1 development kit for custom specific designs in the industrial market. Jetson TK1 helps developers unlock the power of the GPU for embedded applications. It's built around the revolutionary NVIDIA Tegra K1 mobile processor and uses the same NVIDIA Kepler GPU architecture designed into supercomputers around the world. This gives developers a fully functional NVIDIA CUDA parallel computing platform that will let them quickly develop and deploy compute-intensive systems for computer vision, robotics, medicine, and more.

[News ID 1996](#)

Hall.Stand A4.420**■ TI: 450-V linear controller simplifies offline LED lighting design**

Texas Instruments has introduced a 450-V linear controller that simplifies current regulation of high-voltage LED strings. The TPS92410 controller integrates a multiplier and tunable phase dimmer detection, as well as analog dimming inputs and drive circuit protection functions to ease design of downlights, fixtures and lamps powered from an offline AC or conventional DC power source.

[News ID 2127](#)

Hall.Stand A4.159**■ ADI: power efficient drivers for 12-, 14- and 16-bit A/D converters**

Analog Devices introduced a family of low-power rail-to-rail amplifiers for high-speed data acquisition systems that require exceptional accuracy, precision and power efficiency. For system designers who are looking to achieve full datasheet specifications from high resolution A/D converters, the ADA4805-1 (single) and ADA4805-2 (dual) amplifiers provide the only solution with quiescent current as low as 495µA.

[News ID 2063](#)

■ **IST: touchpanel PC solves complex visualization tasks**

IST Group introduces its new HMI solution ECS-S7, intended for visualization applications with S7 PLCs. The license-free and open system is especially suited for applications which are cost critical, e.g. because of volume production requirements, or complex to implement. The product is based on IST's proven ECS6 family of touchpanel PCs, making available 7" and 10" solutions, with resistive or capacitive touches, in standard or high-bright (sunlight-readable) versions

[News ID 2157](#)

■ **Wind River introduces Security Profile for VxWorks RTOS**

Wind River has introduced a security profile for the next generation version of its VxWorks real-time operating system. The profile adds advanced security capabilities to VxWorks 7 to protect Internet of Things devices, data, and intellectual property.

[News ID 2141](#)

■ **Vector offers integration with Jama software**

Vector Software announced integration with Jama. This collaboration helps engineering and QA professionals boost software quality by using the VectorCAST test tool and Jama Test Management to link test cases to requirements, run test plans, and log related defects to ensure complete test coverage. Jama Software's test management solution is tightly integrated with its requirements management and collaboration capabilities for seamless workflows between product planning and quality assurance professionals.

[News ID 2180](#)

■ **Express Logic: ThreadX RTOS supports ADSP-BF70x processor family**

Express Logic announced that its ThreadX RTOS now supports Analog Devices' ADSP-BF70x Blackfin Digital Signal Processor product family. Deployed in over 2 billion electronic products in consumer, medical, and industrial applications worldwide, Express Logic's small-footprint, high-performance ThreadX RTOS is well matched to the new Analog Devices ADSP-BF70x processor family as well as to ADI's other 32-bit microprocessors. To maximize developer efficiency, ThreadX is configured for ADI's CrossCore Embedded Studio IDE and is available in full source code.

[News ID 2170](#)

■ **LDRA partners with Microchip for functional safety platform**

LDRA has become a partner to Microchip Technology. The partnership offers seamless integration of the LDRA tool suite with Microchip's MPLAB X Integrated Develop-

ment Environment and MPLAB XC compilers. The LDRA tools focus on compliance while leveraging the MPLAB tools for comprehensive support of Microchip's line of more than 1000 8-bit, 16-bit and 32-bit microcontrollers and DSCs.

[News ID 2134](#)

■ **HCC: Encryption Manager improves data security and reliability in the IoT**

HCC Embedded has released a new Embedded Encryption Manager that allows developers to secure IoT systems using multiple encryption or hash algorithms through a uniform interface. Using a well-defined interface shortens development time as developers can now simply drop-in the Manager and encrypt data stored on flash or transmitted across a network. Such security is necessary to block potential hackers looking for a backdoor into the microcontroller-based system.

[News ID 2110](#)

■ **Wind River: Embedded Linux to enable faster project starts**

Wind River introduced the latest version of Wind River Linux. For maximum flexibility and speedier development, customers can now access Wind River Linux as binary code, in addition to source code format. The new version is also updated with the current Linux kernel, toolchain, and user space based on the upcoming Yocto Project release.

[News ID 2162](#)

■ **ICOP Technology opens European headquarters in Frankfurt**

ICOP Technology celebrates the recent grand opening of its European headquarters in Frankfurt – Germany with greatly discounted evaluation boards. ICOP Technology starts a product fireworks and offers exclusively for its German, Austrian and Swiss industrial customers* a fifty/fifty deal: 50% discount on 50 pieces of each selected evaluation board. The offer runs for one month from October 15th through November 12th, 2014.

[News ID 2155](#)

■ **Green Hills announces support for ARM Cortex-M7 core**

Green Hills Software has announced early access availability of its complete development tool suite and μ -velOSity real-time operating system for the new ARM Cortex-M7 processor, ARM's latest and highest performance Cortex-M processor. The Green Hills Software development solution for the Cortex-M7 core includes the Green Hills ARM C/C++ compilers, which generate the fastest and smallest code in the industry; the Green Hills Probe and SuperTrace Probe, and the MULTI integrated software development environment.

[News ID 2184](#)

■ **ADLINK: alliance with Intel for integrated networking and communications**

ADLINK announced the opening of demo room developed in collaboration with Intel at ADLINK's Shanghai Operations Center as the kick-off event for a newly-signed collaborative technology strategy. Combining Intel's latest development technologies with ADLINK's established design capabilities, this new era of cooperation promises to deliver advanced, cutting-edge switching, transcoding, and deep packet inspection solutions for the next iteration of the intelligent edge cloud computing platform.

[News ID 2158](#)

■ **SEGGER announces support for ARM Cortex-M7**

SEGGER announce their support for the new ARM Cortex-M7 architecture. SEGGER's industry standard J-Link debug probes and middleware products, including embOS and the new emSecure Digital Signature Library are Cortex-M7 ready, ensuring innovators and early adopters the quickest way to successful product development.

[News ID 2071](#)

■ **MathWorks: major new release of MATLAB**

MathWorks announced a major new release of MATLAB as part of its Release 2014b that includes a new graphics system, big data capabilities and improved collaboration features for packaging and sharing code, and for source control integration. With these new capabilities, engineers and scientists in all major industries can more easily analyze and visualize their data. The updated default colors, fonts, and styles in the new graphics system in MATLAB make it easier to interpret and gain insight from your data. New syntax for changing properties of graphics objects makes it simpler to customize visualizations. Additional new features include rotatable tick labels, support for multilingual text and symbols, and automatic updating of date and time tick labels.

[News ID 2147](#)

■ **powerBridge presents new MicroTCA catalogue**

The new comprehensive powerBridge Computer AdvancedMC and MicroTCA brochure presents a wide range of AMC modules, MTCA and MTCA.4 systems and gives a detailed introduction into this technology. A product portfolio from many manufacturers provides a unique reference for project developers, purchasers and even beginners in MicroTCA technology. It enables engineers to create own solutions in automation, communication, defence technology, image processing and traffic engineering applications.

[News ID 2171](#)

■ SEGGER brings Internet services to USB devices

SEGGER announced the release of a complete USB to Internet solution. This solution uses the RNDIS USB class. It enables developers to transform low-end stand-alone products into connected devices with the same functionality as other devices on a local network. With an appropriate application server in the firmware of a USB-connected device, any internet service on the host computer can access it. Examples include Web, Telnet, FTP or other application specific services.

[News ID 2153](#)

■ Axiomtek: fanless Embedded box system with 8 GB DDR3L and rich I/O

Axiomtek announced the arrival of the eBOX620-841-FL, its new fanless embedded box system designed to support the latest Intel Atom SoC solution. Through the use of new 22nm quad core Intel Atom E3845 processor, the eBOX620-841-FL offers both high computing performance and energy efficient operation. In addition, this extreme low power embedded platform is equipped with 8 GB DDR3L, dual displays and rich connection capabilities, making it an ideal solution for many applications including digital signage, transportation, POS, kiosk, industrial control automation and medical equipment.

[News ID 2039](#)

■ SYSGO and Kontron show safe railway platform at InnoTrans

At the Berlin railway technology fair InnoTrans, SYSGO and Kontron present a joint platform for safe rail systems. SYSGO's hypervisor PikeOS is certified to the highest level SIL 4 of railway safety standard EN 50128 and runs on the Kontron VX3035 3U Single Board Computer with Intel Multi-Core i7 processor. At the booth of Kontron visitors can learn about the safety-tested platform.

[News ID 2061](#)

■ MSI: industrial system with powerful 4th gen scheme

MSI released a new industrial system, KingBOX MS-9A66. KingBOX MS-9A66 is a powerful yet fanless system featuring scalability, ruggedness, and versatile expansion capability. With powerful, scalable Intel 4th Gen scheme, KingBOX MS-9A66 meets demanding performance requirement while keeps the system cool with its superior heat radiation design that allows it to work fanlessly and reliably.

[News ID 2087](#)

■ DAVE: new development kit for DIVA SOM based on TI AM335x

DAVE Embedded Systems released the latest DIVA Embedded Linux Kit version 2.0.0 for the DIVA SOM based on Texas Instruments AM335x. Diva Embedded Linux Kit provides all the necessary components required to set up the developing environment to build the bootloader, build and run Linux operating system on Diva-based systems, build Linux applications that will run on the target.

[News ID 2160](#)

■ Amplicon: USB to serial conversion made easy

In the industrial sector laptop computers are used as a tool for accessing devices but these are no longer supplied with an RS-232 interface. As there are still a large number of serial devices being used in the industrial sector this can cause problems when trying to connect to legacy devices. The Moxa UPort 1250 and 1250I from Amplicon are the perfect solution.

[News ID 2156](#)

■ Express Logic: pre-ported platforms simplify ARM-based IoT development

Express Logic has launched X-Ware Platform, target-specific, integrated development software that delivers all X-Ware components (ThreadX, NetX, USBX, FileX, GUIX, and TraceX) pre-ported and fully integrated for use on specific development boards. Express Logic has tailored its initial X-Ware Platform offerings to the ARM developer community. By integrating its high-quality, widely respected ThreadX RTOS and middleware components for use on specific targets, Express Logic's X-Ware Platform simplifies and accelerates IoT development for products aimed at markets such as home automation, smart metering, industrial control, medical devices, and more.

[News ID 2111](#)

■ Phaedrus: end-to-end solution for IoT device design

Micrium introduced Micrium Spectrum a pre-integrated end-to-end portfolio of embedded software, protocol stacks, cloud services to facilitate development of Internet of Things devices. A first in the industry, Micrium Spectrum is also silicon vendor agnostic, which allows designers to develop proprietary and differentiated solutions. Micrium Spectrum is available in the UK from safety-critical and high-integrity tools specialist, Phaedrus Systems.

[News ID 2099](#)

■ VadaTech: 72-core Tiler processor powers MicroTCA systems

VadaTech has announced a new Tiler GX-72 processor in the Advanced Mezzanine Card form factor. The processor features 72 tiles (cores) in the double module, full-size. The AMC740 Tiler processor offers 4 x 10 GbE ports, dual RJ-45, and a USB port via the front panel. Four banks of DDR3 64-bit memory with ECC and a bank of Flash memory are provided. PCIe or XAUI signals can run across the fat pipe or extended fat pipe region for x4 or x8 ports.

[News ID 2031](#)

■ Axiomtek: IoT gateway solution with anti-vibration design

Axiomtek introduces ICO300, an industrial gateway for IoT solution. With din-rail, fanless and rugged design, this ideal embedded system utilizes low power new 22nm Intel Atom processor E3815 (1.46 GHz) and supports DDR3L system memory maximum up to 4GB, delivering high performance at competitive price. This intelligent Intel Atom-based IoT gateway solution supports complete expandability and features, including wireless support, four RS-232/422/485 ports, two isolated Gigabit Ethernet ports, two high-speed USB 2.0 ports, RTC battery function, and wide range 12-24VDC power input with terminal block.

[News ID 2154](#)

■ Vector announces integration with Esterel SCADE suite

Vector Software is offering integration between the VectorCAST test solution and the Esterel SCADE Suite LifeCycle Qualified Testing Environment. Engineers using the tool chain can integrate model-based application development with the SCADE Suite, and automatically generate the target test environment and supporting test cases using VectorCAST — providing an on-target testing capability which validates that the software execution behaves as expected.

[News ID 2118](#)

■ CES: FPGA based PMC multi-function serial module

Creative Electronic Systems announced the RSL-5222, a VITA 20 PMC serial communications module available in extended temperature and conduction cooled versions. The FPGA based RSL-5222 supports up to 8 serial channels programmable as synchronous or asynchronous protocols.

[News ID 2128](#)

More information about each news is available on www.Embedded-Control-Europe.com/magazine
You just have to type in the "News ID". —

■ **NEXCOM: fan-less computer bridges business decisions and factory operations with Industrial IoT**

NEXCOM has released the fan-less computer NISE 3720 series to build industrial IoT for data-driven decision making. Featuring 4th generation Intel Core i7-4650U processor, the NISE 3720 series supports communication across automation protocols, data-intensive analysis, and effective information delivery. Targeted at big SCADA applications, the NISE 3720 series also provides high integration capability to connect multiple factories.

[News ID 2024](#)

■ **MEN: SIL 4 Certified SBC with safe software**

As a SIL 4 certifiable railway computer, the 3U CompactPCI F75P incorporates a safe QNX BSP and will serve as the heart of the MEN Train Control System, currently under development. In addition, safe firmware now available from infoteam Software perfectly complements the dual-redundant safe hardware from MEN. The F75P is a safe CompactPCI PlusIO SBC featuring onboard dual redundancy as well as a safe BSP for QNX, with PikeOS on request. The SBC forms the basis for the MEN Train Control System – an application-ready system platform in half 19" that can manage single functions in a train as well as the control of the complete train.

[News ID 2023](#)

■ **Lauterbach: µTrace supports new ARM Cortex-M7 processor**

Lauterbach announces its support for the ARM Cortex-M7 processor, the latest embedded processor in the ARM Cortex-M family. It not only inherits the characteristics from Cortex-M processor series, such as energy efficiency, high performance, ease of use and smaller code, but also is designed with more configurations for automotive and safety applications as well as more powerful debug and trace capabilities.

[News ID 2121](#)

■ **PEAK-System: fast CAN FD for USB interface**

CAN FD, the evolution of the proven CAN bus, can now be connected to PCs with two USB interfaces from PEAK-System. While PCAN-USB FD offers a single CAN FD channel, PCAN-USB Pro FD has two CAN FD and two LIN channels, distributed on two D-Sub connectors. The CAN FD channels are each galvanically isolated up to 500 V. The interfaces can reach transfer rates of up to 12 Mbit/s for the maximum 64 data bytes of a CAN FD frame. Both products make use of the USB 2.0 standard, ensuring a lower latency than on USB 1.1. Device drivers are available for Windows 8.1, 7, Vista, as well as Linux.

[News ID 2059](#)

■ **SYSGO ports PikeOS on IC OpenVPX Core i7 platforms**

SYSGO with PikeOS and Interface Concept with its Core i7 Intel VPX 3U and 6U platforms collaborate to offer processing solutions for the embedded defense and aerospace market. These solutions benefit from the most recent technologies available in the design of OpenVPX COTS Single Board Computers while offering high performance real-time processing capabilities.

[News ID 2183](#)

■ **MEN: safe communication for train control system**

A safe QNX BSP ensures comprehensive safe communication between the control unit and the I/O in the new MEN Train Control System. Available in a SIL 4-pre-certified configuration, MTCS is based on the F75P SBC to provide safe control of single functions as well as for complete train control. MTCS is an application-ready system platform in half 19" that allows safe control of all rail relevant actors and sensors, including doors, brakes, speed measurement data and complete vehicle control.

[News ID 2067](#)

■ **Mentor: commercial Embedded Linux Platform**

Mentor Graphics announced the availability of the Mentor Embedded Linux software for the AMD Embedded G-Series SoC, CPU and 2nd Generation R-Series APU devices. Developers who began evaluation, prototyping, and development by downloading the previously announced and freely available Mentor Embedded Lite and Sourcery CodeBench Lite products can now easily migrate to these new commercially-supported versions. Developers can make use of the Mentor Embedded Linux and the Sourcery CodeBench integrated development environment products to create dynamic applications targeting markets such as digital gaming, point-of-sale, and electronic signage/displays.

[News ID 2053](#)

■ **MEN: wireless access point meets requirements of modern railway applications**

As a member of MEN's robust box PC family, the rugged, maintenance-free NM50 provides the same flexible and scalable architecture that enables fast cost-effective time to market. The new NM50 is a wireless access point especially designed for demanding rail and automotive applications, and operates over an extended operating temperature range from -40 to +85°C. The electronics, based on a low-power QorIQ processor, are housed in a fan-less, conduction-cooled enclosure with IP40 protection.

[News ID 2089](#)



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■ **Curtiss-Wright: certifiable COTS modules speed development**

Curtiss-Wright announced that its Defense Solutions division has launched a new family of DO-254 DAL C and DO-178C DAL C safety certifiable standard commercial-off-the-shelf (COTS) processing modules designed for use in military and civil aerospace applications. An alternative to more costly custom designs, Curtiss-Wright's Safety Certifiable COTS Modules provide the reduced cost and development risk benefits of COTS electronics to designers of safety-certifiable systems.

[News ID 2015](#)

■ **Vector: AUTOSAR basic software is basis for reference integration**

For a reference integration of the BMW "BAC4 Release 2" AUTOSAR Core, Vector provides the BMW Group the AUTOSAR basic software MICROSAR. It contains already the new functions released in AUTOSAR Release 4.2.1 in autumn 2014. The focus is on internal vehicle communications over CAN, FlexRay and Ethernet and related new concepts. BMW and its ECU suppliers benefit from shortened development times due to reduced integration and testing needs.

[News ID 2051](#)

■ **IAR: Embedded Workbench supports ARM Cortex-M7 core**

IAR Systems launches version 7.30 of IAR Embedded Workbench for ARM with full support for the new ARM Cortex-M7 processor core. The processor brings high performance and efficient processing to support devices featuring embedded intelligence across the industrial, infrastructure and domestic sectors. Using IAR Embedded Workbench to develop applications based on the new processor enables unique possibilities in performance and energy efficiency.

[News ID 2069](#)

■ **Cadence and ARM expand SoC design collaboration**

Cadence Design Systems and ARM today announced the signing of a multi-year Technology Access Agreement. Expanding upon the successful EDA Technology Access Agreement signed in May 2014, this new agreement gives Cadence rights to access to existing and future ARM Cortex processors, ARM

Mali GPUs, ARM CoreLink System IP, ARM Artisan physical IP, and ARM POP IP. This partnership enables ARM and Cadence to continue providing customers with advanced low-power and high-performance system-on-chip design solutions for markets including next-generation mobile, consumer, networking, storage, automotive and IoT.

[News ID 2095](#)

■ **Amplicon: Ethernet extension support speeds of up to 50Mbps at 300 meters**

The ED3101 is a rugged low cost Ethernet extender that offers long distance communication over copper wires and can support speeds of up to 50Mbps at 300 meters and 1Mbps at 1900 meters. Ethernet extension doesn't need to be expensive or difficult, the ED3101 is an easy to use, cost effective Ethernet extender that features plug-and-play installation using existing copper twisted-pair infrastructure to connect Ethernet devices and networks at high speeds over long distances.

[News ID 2021](#)

■ **Adeneo Embedded: software support and services for Altera ARM-based SoC FPGAs**

Adeneo Embedded is now providing software support and services for the Altera product line of programmable SoCs with embedded ARM processors, beginning with the Altera Cyclone® V SoC. This collaboration brings together Adeneo Embedded's strong expertise in embedded software and Altera's world-class ARM-based SoC FPGA solutions. In addition, the companies will work with Arrow Electronics to help provide Altera SoC solutions to customers throughout US and EU markets.

[News ID 2025](#)

■ **Softing: mobile PROFIBUS diagnostics and cable testing in one device**

Softing announces the release of its new mobile PROFIBUS Tester which provides extended functionalities. The PROFIBUS Tester BC-700-PB is a powerful diagnostic and troubleshooting tool for comprehensive testing of PROFIBUS segments during operation and can now also be used for cable testing. The device is battery powered which guarantees maintenance- and commissioning engineers the highest level of mobility in the field.

[News ID 2044](#)

COMPANY	PAGE
AAEON	56
ADLINK	7
Apacer	41
ARM	33
ARTILA	14
Avalue	22
congatec	27
Connect Tech	8
DATA MODUL AG	13
Digi-Key	2
Elma Electronic	45
Express Logic	17
Green Hills	5
Infineon	25
MEN Mikro Elektronik	11
Messe München	55
MSC	4
MSI	47
PEAK-System-Technik	35
Renesas	19
RUTRONIK	21
TQ Group	29
Trinamic	43
VadaTech	9
WIZnet	39

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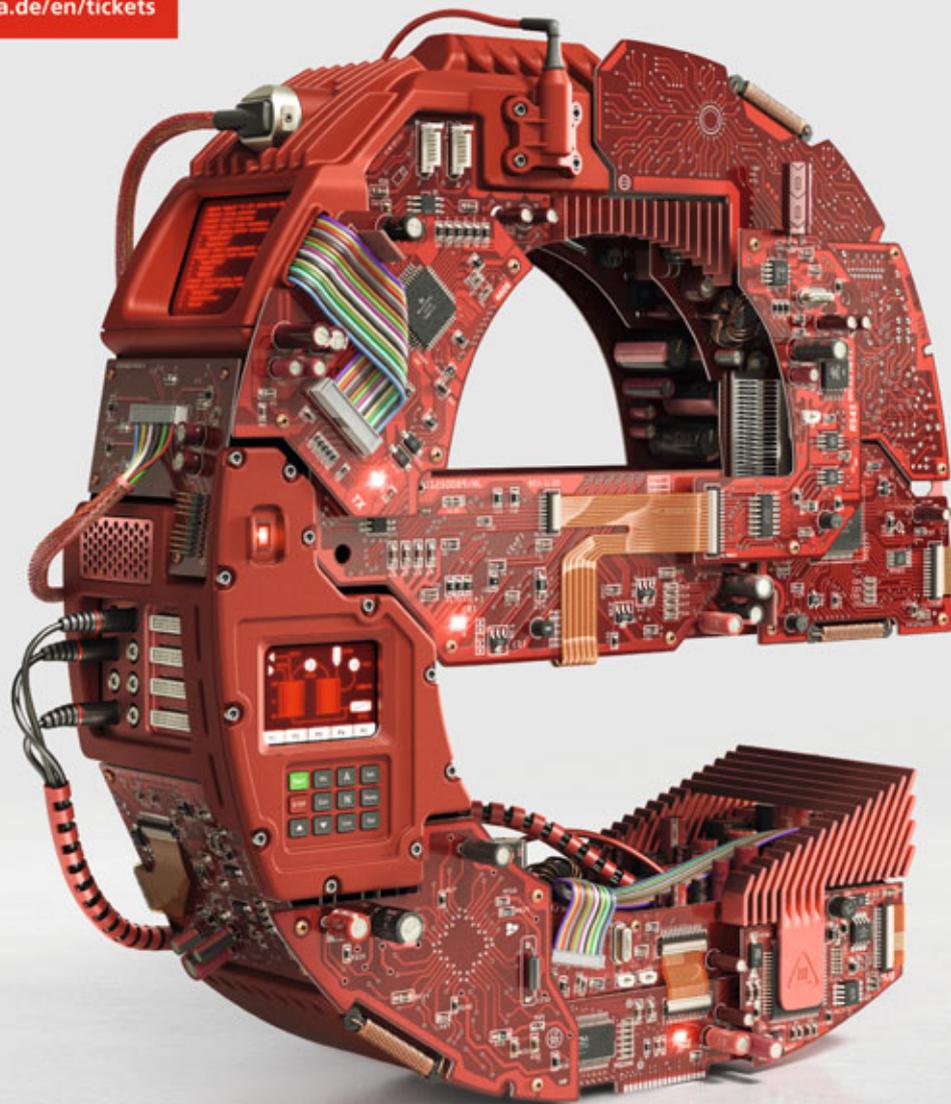
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