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kontron

COVER STORY

Standards & Services for ARM-based developments:

The faster way to application-ready ARM platforms

Special Features

- Industrial Computing
- Small Form Factor Boards
- Tools & Software

Aitech

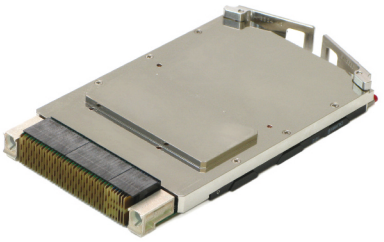
Powerful, Advanced GPGPU and Ethernet Switching

GPGPU

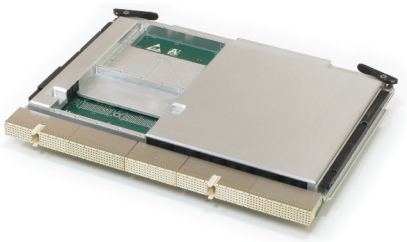
Today's parallel processing capabilities of multi-core Graphics Processing Units (GPUs) also makes them ideal for many computationally intensive non-graphics applications. Aitech's C530 GPGPU board enables incorporation of these capabilities in harsh environment computing systems. Available in two configurations NVIDIA GeForce GTX 560M or the AMD Radeon HD 6970M graphic processors.

Expandable Managed Gigabit Ethernet Switch

Aitech's C660 is a high-performance 6U Gigabit Ethernet Switch for embedded and harsh environment applications. The C660, with up to 40 GbE ports, is based on Marvell's Bobcat Gigabit Ethernet Switch Controller and MTS Management Suite. The simplified user web interface is an intuitive management tool, enabling convenient use of the switch's comprehensive feature set for a better-optimised network.



C530 - GPGPU



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Aitech

Dear Reader,

For a long time x86 processors was the dominant technology for embedded computing. But nowadays more and more ARM based microcontrollers are launched and become an useful alternative. The advantage of ARM based multicore MCUs is their high performance at extremely low power which allows using it in mobile applications. Our cover story starting at page 12 describes that small form factor boards and systems featuring ARM MCUs can be found already in the area of graphical user interfaces with touch-screen control, where upgrades from simple line displays to full graphic support are being carried out while using a minimum of power, or migration from x86 platforms to ARM is taking place. The extremely low energy consumption of the processors, which is around two to three watts, makes it possible to reduce the effort needed for a passive cooling solution to an absolute minimum, enabling developers to design very compact, flat/slim and above all portable devices, having a battery runtime which surpasses that of x86 systems to date. Application areas for mobile applications in harsh environments can be found, for example, in courier and parcel services, in machines maintained by service personnel, and equipment or in medical emergency services. All these applications profit from the advantages of a compact, power-saving technology as well as from the comfortable programmability of these processors on the basis of standard operating systems i.e. Linux, Android or Windows. So in effect they do not differ considerably from x86 technology. Therefore Kontron started building a new and growing ARM based product line to complement its traditional x86 products.

Another example of the success of ARM-CPUs is the article starting page 17 which introduces the new COMs by connector manufacturer Erni. With the WHITEspeed family, the connectiór provider extends its product range and is offering innovative COM solutions which provide powerful ARM CPUs, PCI Express and state-of-the-art, fast serial interfaces and particularly benefit from the performance and reliability of the MicroSpeed connectors used. The ruggedized solutions address applications in extremely harsh and demanding industrial environments such as transport, heavy industry or automation with high shock and vibration stresses.

And the ARM processors can already be found in industrial automation. The article starting page 20 describes the CX9020 embedded PC the first controller by Beckhoff equipped with an ARM Cortex A8 CPU, an architecture that is already used in the Apple iPhone. The 1GHz CPU has, in contrast to the older ARM9 architecture, a hardware-based floating point unit. This means that floating point operations (REAL, LREAL) can be processed significantly faster at the same clock frequency, and that motion control applications can now be implemented with this controller.

And I believe there are a lot more examples of the success of ARM CPUs to be found in the embedded computer industry

Yours sincerely

Wolfgang Patelay
Editor

boards & solutions

Cover Photo
Kontron

Cover Story:

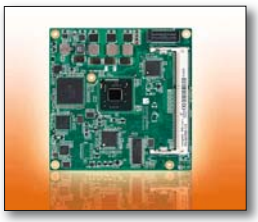
The faster way to an application-ready ARM platform PAGE 6

The highly successful embedded ecosystem of the x86 standard form factors can also be used for embedded ARM processors with a PC-like range of functions. By offering complementary hard- and software services, Kontron is heading developers in the fastest and long-term, most efficient direction to achieve an application-ready ARM platform.

Embedded safety: multicore programming with Ada 2012 PAGE 10

A new version of the Ada language, with nice additions in safety, flexibility, and efficiency has reached the software developers community. Many areas have been improved, but if I have to choose those I like the most, I would mention those directly related to program correctness and the better handling of Ada programs on multicore architectures.

Increased automation with low power dissipation PAGE 12



Dual-core systems are spreading to low-power applications, offering more performance at lower power dissipation and higher integration density, plus safe consolidation of device capabilities and reliable extension of traditional automation systems.

Computer-on-Modules for harsh industrial environment PAGE 16

This article introduces the WHITEspeed Computer-on-Module concept which provides future-proof, modular and scalable solutions based on defined form factors and interfaces. The solutions consist of an upgradeable part - the COMs with CPU, chip set, memory, etc. and the I/O baseboards, keeping all the application-specific functionality.

Graphics for demanding embedded applications: In the eye of the beholder PAGE 22

Humans basically rely on their visual orientation. Pictures are all around us. No wonder that in times of digital photography, flat screens and touch monitors we long for pictures in the industrial sector, too, and not only in the office but in areas where electronics used to be equipped rather sparsely.

TRUSTED SOFTWARE FOR INDUSTRIAL AUTOMATION AND CONTROL

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The faster way to an application-ready ARM platform

By Norbert Hauser, Kontron

The highly successful embedded ecosystem of the x86 standard form factors can also be used for embedded ARM processors with a PC-like range of functions. By offering complementary hard- and software services, Kontron is heading developers in the fastest and long-term, most efficient direction to achieve an application-ready ARM platform.

A year ago, Kontron announced its strategic entry into ARM technology. At the end of February, Pico-ITX, the first standard product with the Nvidia Tegra 2 dual-core processor came on the market. Shortly before the summer vacation, the Mini-ITX board with Nvidia Tegra 3 quad-core processor followed on. Two standard small form factors from the x86 sector thus became „ARMed". This series of new introductions continued with the Kontron ULP-COM-sAT30 with Nvidia Tegra 3 processor the highly scalable ULP-COM-sAMX6i with Freescale i. MX6 SoC series and the ULP-COM sA3874i based on Texas instruments Sitara AM3874. The Ultra-Low-Power Computer-on–Module standard ULP-COM was developed specifically for ultra-low-power applications and submitted to the SGET for manufacturer-independent certification.

So after just one year, not just three products have come into existence but three complete product lines with their own roadmaps plus a new standard. These serve as a stepping stone for further developments of the most varied kind. On the one hand module and board standard product lines at Kontron are the basis for integrated standard systems, on the other, they serve as a building block for customer-specific board and system designs. Furthermore, the existing new basic product lines will, of course, be extended too. For example, a new ULP-COM module will be launched end November incorporating Texas Instrument AM3874 with ARM Cortex-A8 Core followed by a SFF motherboard with the same processor in Q1/2013. What however are the target markets in the embedded industry for these new boards and Computer-on-Modules?

Target applications for these new ultra-low-power single and multi-core boards and systems can be found in the area of graphical user interfaces with touch-screen control where upgrades from simple line displays to full graphic support are being carried out while using a minimum of power, or migration from x86 platforms to ARM is taking place. The extremely low energy consumption of the processors, which is around two to three watts, makes it possible to reduce the effort needed for a passive cooling solution to an absolute minimum and, in doing so, enables developers to design very compact, flat/slim and - more than anything - portable devices, which have a battery runtime which surpasses that of x86 systems to date. Application areas for mobile applications in harsh environments can be found, for example, in courier and parcel services, in service personnel maintains machines and equipment or in medical emergency services. Furthermore, solar-driven outdoor devices are a target application too, as seen in car park ticketing machines, electricity filling stations for e-cars or digital advertising at bus stops or for vehicle applications for example for fleet management or digital signage or infotainment in public transport. Other interesting applications are in mobile test and measuring systems as well as in kiosks, cash and weighing systems. All these applications profit from the advantages of a compact, power-saving technology as well as from the comfortable programmability of these processors on the basis of standard operating systems i.e. Linux, Android or Windows. So in effect they do not differ considerably from x86 technology.

What though makes these new ARM processors so interesting? Let's, for instance, take a look at the cross platform benchmark „Geek Performance Benchmark". It analyses the processor integer performance, processor floating point performance, memory performance and memory bandwidth performance and produces a total score on the basis of all these criteria. Naturally, in areas which cover all different technologies, this benchmark can only deliver approximate values, as both the hardware - x86 PC system vs. ARM tablet PC – and the software differ substantially. In order though to give potentially interested customers a rough idea, this benchmark can be used for a first evaluation. A relatively small number of tests of the Nvidia Tegra 2 and 3 processors is compared with the scores of hundreds of tests gen-

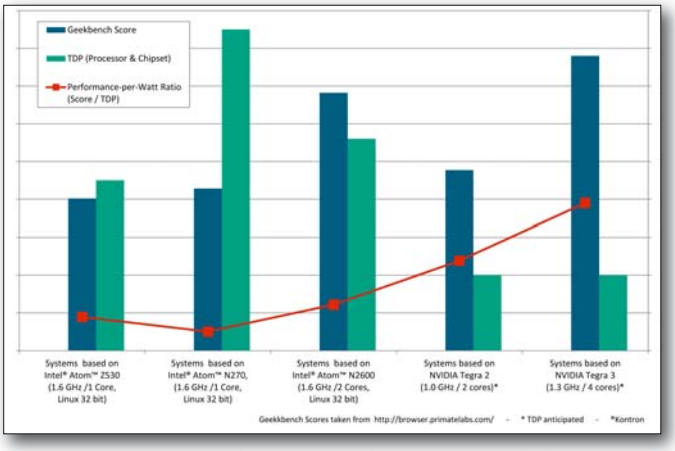


Figure 1. Comparison of processor performance with platform benchmark Geek Performance Benchmark

Figure 2. Pico-ITX KTT20/pITX with Nvidia Tegra 2 and the Mini-ITX KTT30/mITX with Nvidia Tegra 3

erated by the Intel Atom processor. The result is that tablet systems with Nvidia Tegra processors at an anticipated 2 watt TDP deliver a much higher performance per watt. There is, of course, a lot of room for interpretation, if – like common at Geekbench – apples are compared with oranges or other performance comparisons (i.e. graphic scores) are required. But on the basis of the fact that apples and oranges are both fruit..., then we can at least obtain a first indicator, why developers find this new class of processor so interesting. Without the overall trend in the consumer market to more powerful and graphic-heavy applications like smartphones and tablet PCs these would never have become so interesting for developers of robust and long-term available embedded devices. The reason being that only because of this mainstream development it is possible to offer such a powerful embedded roadmap.

What though do application developers need in order to be able to implement this new performance class as efficiently as possible in embedded systems? Well, for one thing, not really anything different from when implementing x86 processors: Form factor standards are an important issue, as they disencumber application developers of unnecessary development expenditure. They also offer a reliable roadmap with long-term availability, which ensures a re-usability of existing investments. And finally, form factor standards make developments manufacturer- independent. The sum of all these arguments makes it a logical step to also follow this successful path for the new ultra-low-power ARM and SoC processors.

The x86 small form factors Pico-ITX and Mini-ITX are highly interesting for standard implementations, as -thanks to their extensive ecosystem - they provide the fastest way to integrate innovative ARM technology off-the-shelf into embedded applications. Kontron therefore

Figure 3. The ULP-COM-sAT30 measures just 82 x 50mm and is equipped with Nvidia Tegra 3 quad-core processor with 800 MHz.

offers two motherboards fulfilling these standards in the form of the 2.5" Pico-ITX Kontron KTT20/pITX with Nvidia Tegra 2 and the Mini-ITX KTT30/mITX with Nvidia Tegra 3, both based on the ARM Cortex-A9 Core technology. They convince with their particularly energy-efficient performance and especially flat build and they are also designed for graphic-oriented embedded applications. Apart from the typical interfaces they also carry ARM-specific interfaces onboard, without deviating from the standard.

Computer-on-Module standards present a completely different picture, as they specify not only the physical form factor but also the pin-out. Due to the altered pin-out requirement of ARM and SoC processors in comparison to x86 technology and in order to facilitate especially flat designs, in which just the implemented interfaces of the carrier board would determine the minimum height of the application, a new standard became necessary.

For this reason, Kontron created a new module specification with the working title ULP-COM and submitted it for ratification to the newly founded manufacturer-independent Standardization Group for Embedded Technologies e.V. (SGET). The specially formed SGET work group plans to examine the draft at short notice and adopt it as an official SGET specification. And as it has been signaled that the essential parameters will be approved, and that the ratification is about to be announced and also that second-source modules are to be expected, Kontron already launched the first ULP-COM modules with ARM Cortex-A9 Core technology. The first module bears the name Kontron ULP-COM-sAT30. It measures just 82x50mm – according to the ULP-COM specification and is equipped with Nvidia Tegra 3 quad-core processor with 1.2 GHz. It offers superior high-end graphics with dedicated interfaces for two independent displays including hardware-accelerated HD video decoding for MPEG2 and HD video encoding as well as 2D and 3D acceleration. The ULP-COM-sAT30 further supports the connection of cameras via two dual-lane CSI-2 camera ports.

The second new module is the highly scalable Kontron ULP-COM-sAMX6i with single, dual or quad core ARM Cortex A9 technology. Based on Freescale i.MX6 Series processors, they cover an extremely wide performance range with a balanced processor and graphics performance. The ULP-COM-sAMX6i Computer-on-Modules exceed the traditional scale of longevity with their availability of at least ten years. Furthermore they support the extended temperature range from -40°C to +85°C by-design. Thus this new module family is ideal for market sectors demanding highest ruggedness and long-term availability, such as for example transportation, medical and military based on open standards software.

And a third module, the ULP-COM-sA3874i will be launched end of November. It will be based on the Texas Instruments Sitara AM3874 with ARM Cortex-A8 microprocessor (MPU) and will provide a wide range of choices for integration onto industrial applications. Those modules offer peripherals for high bandwidth connectivity such as SATA, Dual CAN, PCI Express (PCIe) and a Gigabit Ethernet switch.

Complying to the ULP-COM specification, all modules use the 314-pin MXM 3.0 connector which is just 4.3 mm in height, enabling robust and cost-efficient designs with an extremely low construction height. The standardized ULP-COM pin-out of the MXM 3.0 connector is optimized for ultra low-power applications. Specific I/Os, which are not available on x86 chipsets are, for example, CSI camera inputs, Serial Peripheral Interface, I²S, MediaLB and

CAN-Bus. And these are exactly the dedicated interfaces which make a new standard necessary. Evaluation of modules cannot take place without carrier boards, so for the ULP-COM modules a carrier board and a starter kit are already available. With this, customers can, just like with both the Pico-ITX and Mini-ITX Motherboards directly begin testing the embedded target platform.

Apart from these standard products, Kontron offers an extended range of services for these platforms which helps customers to accelerate their hard- and software integration. Kontron is a powerful, reliable business partner which operates globally and offers comprehensive support to OEM customers for designing and manufacturing individual carrier boards or even full-custom boards, integrated systems and application-ready platforms with middleware and approvals based on different processor and operating system platforms.

It goes without saying that each system configuration needs the corresponding software. This is also a part of the wide range of services which even includes developing an OS image for the customer appliance, integrating it into the series and shipping the complete package including software licenses. Beyond this, Kontron carries out adaption services for software integration of the applications into the hardware platform. Here, however, the range of services covers much more than just the odd API, BSP, boot loader or driver adaption. Kontron is in a position to offer its customers everything from one source: the standard hardware, the individual hardware design services and, in particular, also the hardware-related software services, which in the case of ARM designs bear much more significance than with x86 designs. ■

ADLINK and ELMA enter into partnership

ADLINK and ELMA Electronic have entered into a partnership. This collaboration will give ADLINK access to the integration expertise of the systems specialist. In exchange, ELMA Electronic is gaining a further strong partner for industrial computers and interface boards for their systems integrations. ELMA will become active as a further distribution partner for ADLINK in the market regions of Switzerland and Austria. On the German market, the collaboration is mainly focussed on systems integration. The customers benefit in addition from tailor-made solutions, specially designed for their individual requirements.

News ID 16090

Intel launches digital signage evaluation kit

Intel announced the next-generation Digital Signage Evaluation Kit-12 (DSEK-12) designed to streamline the digital signage evaluation process, reduce costs and enable faster deployment across a range of market segments including retail, healthcare and transportation. The DSEK-12 features technologies from Intel, Kontron and Microsoft in a pre-loaded and validated system. The kit includes an OPS-compliant Kontron media player KOPS800 based on 3rd generation Intel Core processors as well as a 180-day evaluation copy of Windows Embedded POSReady 7. In addition, demos of Content Creation and Content Management Software from Flypaper and Scala are included.

News ID 16103

InnoDisk releases CF-SATA with 50pin SATA interface

InnoDiske releases their Compact Flash Serial ATA (CF-SATA) module with high reliability and excellent data transfer speeds. An effective replace solution for CF cards, InnoDisk's CF-SATA, has the same mechanical design with Compact Flash card and complies with Serial ATA by extracting unusual pins from CF50 pin. Hence, Compact Flash card and CF-ATA can share with one CF50pin socket.

News ID 16118

Embedded safety: multicore programming with Ada 2012

By Dr. José F. Ruiz, Adacore

A new version of the Ada language, with nice additions in safety, flexibility, and efficiency has reached the software developers community. Many areas have been improved, but if I have to choose those I like the most, I would mention those directly related to program correctness and the better handling of Ada programs on multicore architectures.

```
type Ordered_Array is array (Integer range <>) of Integer with
Dynamic_Predicate =>
  (for all I in Ordered_Array'Range =>
     I = Ordered_Array'First or else
     Ordered_Array (I - 1) <= Ordered_Array (I));
--  Elements in type Ordered_Array places in increasing order

function Add
  (List    : Ordered_Array;
   Element : Integer)
  return Ordered_Array with
Post =>
  Add'Result'Length = List'Length + 1 and then
    (for all I in List'Range =>
       (List (I)  < Element and then List (I) = Add'Result (I)) or else
       (List (I) >= Element and then List (I) = Add'Result (I + 1)));
--  Insert Element within the List and return a new Ordered_Array.
--  Inserting an element in an Ordered_Array increases its length by 1.
--  Those elements whose value is lower than the new element will not
--  be moved, and the others will be moved one position to the end of
--  the array.
```

Figure 1: Subprogram contract

Ada has always been an attractive choice in application domains where reliability is paramount, and the new Ada 2012 version represents another major advance in the evolution of the language towards safety, namely with the addition of contract-based programming. Another aspect that became critical with the widespread of parallel hardware architectures was the control of task affinities to improve efficiency and analyzability.

Before explaining the advantages of contracts, let us move to a higher level of abstraction and talk about what they represent: requirements. Software requirements define what needs to be implemented and how. This is usually achieved using natural (informal) language, but with contracts the idea is to define the requirements by formally specifying the exact functionality to implement. This is the cornerstone of Design-by-Contract, which gives precise and verifiable semantics to specifications.

A contract is given by a precondition, which the caller must pay to be entitled to the service provided by the callee, and a postcondition, which is the service the callee must provide to the caller. Ada 2012 includes specific features for contract-based programming: preconditions, postconditions, type invariants, and subtype predicates. A precondition is a logical expression that must be true when a subprogram is called, and analogously a postcondition must be true when the subprogram returns. A type invariant is a postcondition that applies to every public subprogram for a type, and a subtype invariant is a logical expression that characterizes a subset of values for a type. Contracts, which are in effect low-level requirements, may be verified dynamically, and they may also be verified statically using appropriate tools.

Expressing properties in contracts is greatly facilitated by the use of several new Ada 2012 features: conditional expressions, case expressions, universal and existential quantified expressions, and expression functions (an expression function is a simple function whose body is defined by a single expression). Additionally, the expression in a postcondition can refer to the value returned by a function F as F'Result, and to the value in the pre-state (at the beginning of the call) of any variable or parameter V as V'Old. For example, we may want to define the specification (requirements) for an unbounded array whose elements are always ordered in increasing order, which can be modified by a function called Add that inserts an element in the corresponding location of the ordered array. The requirements can be specified using natural language, or better using formal logic formulas relating the input to the output state defining accurately and unambiguously the expected behavior (figure 1).

The Boolean expression representing the postcondition for the subprogram defines the expected effect of the function: we expect a list which has one more element than the one passed as parameter (the one we are inserting as parameter), and with items in the list moved one position to the end if they are greater or equal than the inserted value. Note that in this case, we have defined the properties of the type to ensure it is always ordered, so we do not need to ensure the ordering again in the postcondition. These Ada 2012 capabilities can be exploited by new static analysis and proof tools, which can significantly reduce the time and cost associated with traditional testing approaches, increasing at the same time the level of confidence, and helping detect problems early.

The complexity of both hardware and software quickly increases to cope with ever demanding applications, bringing increasing attention to high-level, abstract development methods. We have just discussed the interest of formal specification as a means to help requirements-based software development. There is another field requiring attention for engineering complex systems, which is software architecture. Writing correct programs efficiently exploiting parallel hardware is not trivial, and by providing the right level of abstraction, programmers are isolated from the need to understand low-level details. The Ada tasking model provides concurrency as a means of decoupling application activities, hence making software easier to design and test. At the same time, it gives different levels of control over the hardware where the application executes. Concurrency has been a first-class citizen in Ada since the beginning, and it has kept improving over time. Already in Ada 83 there were tasks as units of concurrent/parallel execution (same abstraction level as threads), and high-level constructions for message-based synchronizing and communicating them. Then, Ada 95 introduced the notion of synchronization and communication using data-oriented communication. The Ada 2005 standard added support for run-time profiles (for efficiency and simplicity), flexible task-dispatching policies, the

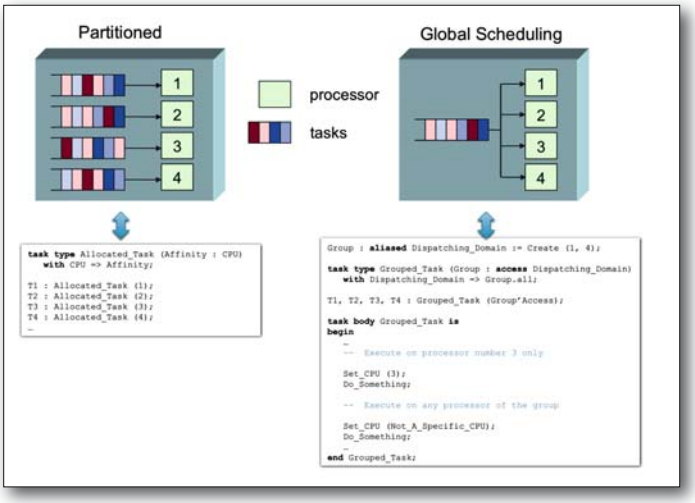


Figure 2: Some partitioning schemes

capability of monitoring and controlling execution time, and a unification of concurrency and object-oriented features. Finally, Ada 2012 improved largely the support for multiprocessor architectures. Ada has always taken into account parallel hardware architectures, supporting concurrent, parallel and interleaved execution, allowing for different partitioning schemes. However, until Ada 2012, there was not a standardized mechanism to control task allocation on processors.

In terms of relationship between tasks and processors, the spectrum goes from global scheduling, where any task can be executed on any processor at any time, to partitioned scheduling, where each task is allocated for its whole lifetime to concrete processors. The schedulability of neither approach is strictly better than the other (there are task systems that are feasible using a global partitioning that cannot be scheduled in a partitioned system and vice versa). Ada 2012 includes a flexible and general-purpose mechanism to handle task affinities in the form of dispatching domains, the abstraction representing groups of processors on which we allocate tasks.

Processors are grouped together into dispatching domains, and tasks may then be allocated to domains. Tasks allocated to a given dispatching domain will be executed on any of the processors of that domain. It is also possible to allocate a task to a concrete processor (either statically or dynamically) for any amount of time. Figure 2 depicts a couple of possible allocation strategies and how to exploit them. The notion of task affinity is supported by mainstream operating systems (such as Linux, Windows, Solaris, VxWorks, …). The Ada model is slightly more restricted than the generic mechanism provided by these operating systems: dispatching domains are non-overlapping, and they can only be created before calling the main subprogram. However, this more static model is flexible enough to support many different partitioning schemes, while at the same time providing for the definition of analyzable software architectures.

Reliable and very efficient execution on multiprocessors can be achieved using the Ravenscar tasking profile. This subset of Ada tasking features embodies a deterministic concurrency model inherently amenable to static analysis and implementable by a small, reliable, and extremely efficient run-time library. The profile has been defined to improve memory and execution time efficiency (removing high overhead or complex features), and to increase reliability and predictability (removing non-deterministic and non-analyzable features).When reliability, predictability, and analyzability are critical, Ada 2012 proposes a simple extension to the Ravenscar profile to support multiprocessor systems using a fully partitioned approach. The implementation of this scheme is simple, and it can be used to develop applications amenable to schedulability analysis. TheRavenscar profile implements fixed-priority pre-emptive scheduling, with tasks statically allocated to processors and no task migration among processors. Apart from the support for task affinities, there are other interesting capabilities allowing for predictability and efficiency on parallel architectures. Ada 2012 added a new effective parallel task synchronization mechanism with which a group of tasks can block and be released at once to work in parallel (mimicking the POSIX barrier mechanism). There is also the possibility to control the behavior of selected objects with respect to their order of loads and stores with multi-level caches. A typical problem when implementing synchronization on multiprocessors (such as wait-free and lock-free) is that of memory consistency, to ensure that the execution does not result in an unexpected order of execution. Ada 2012 allows you to mark variables as volatile so that all tasks of the program (on all processors) that read or update volatile variables see the same order of updates to the variables; it is the responsibility of the compiler to use memory barriers to flush the cache if needed. Ada 2012 takes advantage of decades of experience in using Ada on multiprocessors, and it has become a great language helping to exploit parallelism in an efficient and predictable manner. One of the challenges in software engineering is how to go from high-level specification and design to their actual implementation. Ada 2012 addresses this issue by providing a high level of abstraction exposing concepts that are relevant for the design. It addresses the specification with contracts, that define accurately the required functionality, and that are naturally verifiable by either formal proofs or testing. It targets the design with the Ada tasking model that permits control over aspects such as processor affinity, dispatching mechanism, and memory consistency. ■

Increased automation with low power dissipation

By Zeljko Loncaric, congatec

Dual-core systems are spreading to low-power applications, offering more performance at lower power dissipation and higher integration density, plus safe consolidation of device capabilities and reliable extension of traditional automation systems.

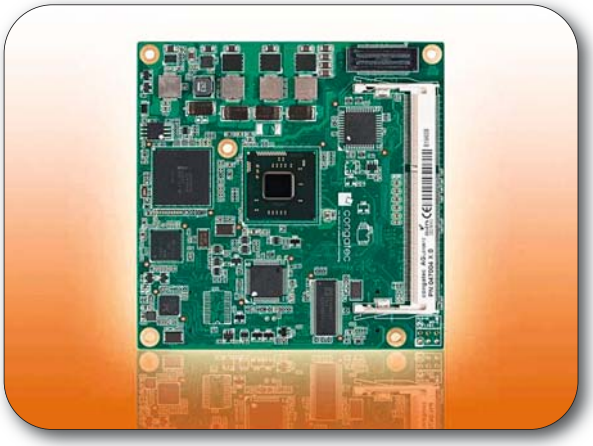


Figure 1. congatec conga-TCA module with dual-core Intel® Atom™ processor N2600

The Computer-on-Module (COM) standard COM Express is well established and provides a future-proof entry point for applications that require low power dissipation. The new Intel Atom dual-core processors with just 3.5W TDP are a perfect partner for the compact new pin-out Type 6 COM Express modules. They meet the increasingly complex entry requirements for automation systems which – in addition to enhanced graphical user interfaces and more computing power – include the continued need for passive system cooling.

The commercial success of new devices depends less on maximum performance and more on the availability of the right hardware platform with the right price/performance ratio for a particular application. For many automation systems the lower processing power of dual-threaded or dual-core applications is quite sufficient. The essential factor is the integration of the graphical interface between user and machine (HMI = human machine interface). Here, device integration on a single hardware platform via COMs can save a lot of time and money without compromising on security requirements.

Modern HMIs with graphical user interfaces and contextual menus that mirror models from the consumer market represent a challenge for developers. While keen to take advantage of modern technologies and graphics to distinguish their product from the competition, they often find it difficult to align this endeavour with classical requirements such as passive cooling, long-term availability and competitive pricing.

The logical or, better still, physical separation of the processor cores in a deterministic and highly reliable (real-time) system on the one hand, and a low-cost, general system for user and graphical interfaces like Windows or Linux on the other, is currently the most common reason for switching to a dual-core system. In this case, an automation application can continue to run uninterrupted even if, for example, a Windows graphics application displays the Blue Screen of Death and the Windows system on this processor core has to be rebooted. In multi-processing applications with separate processes hyper-threading enables the logical breakdown of the two physical processor cores into four threads. The safety-critical application can therefore run independently on a real-time operating system on a separate logical core while the graphical user interface runs, for instance, on a Windows operating system. As a result of miniaturization Intel Atom based CPU boards and modules can be very small, allowing easy integration into mobile applications. Numerous applications which previously had to be developed on the basis of microcontrollers can now be realized with this powerful and easily programmable computer technology. Applications which until yesterday could only be implemented in a desktop environment, because of size and power requirements, can now go mobile. COMs, fast and easy to integrate PC modules, can also benefit from the reduced dimensions of this technology.

The footprint of a mobile system is defined both by the module or chip-size and the power consumption. The application itself usually defines the battery life of the system. A mobile device, for instance a portable control panel, needs to be designed for at least a full day shift, i.e. eight hours of operation. The required battery life and the power consumption of the electronics therefore determine the battery di-

Figure 2.congatec Smart Battery Management Starter Kit for rapid evaluation

Figure 3. Computer-on-Module concept, compact baseboard and COM Express module

mensions. The battery size in turn determines the size and weight of the system. While battery technologies are being continuously enhanced, the weight to capacity ratio is only improving in small increments. Current lithium batteries achieve 100-150 Wh/kg. The lower the power consumption of the system the smaller and lighter is the possible system solution. A power reduction of 15W for a computer that is configured for an 8-hour shift can lead to a weight reduction of more than 1 kg. The relationship between the power consumption and weight/size of a system is almost linear. Additional weight, volume and cost savings can be achieved by reducing the dimensions of the power supply.

Compared to younger processors and chipsets for mobile applications with the same computing power, it is possible to save approximately 10 to 15W; when updating older systems the savings can be significantly greater. The power requirement of a complete Intel Atom processor based COM is about 5W, making it possible to develop systems with only one-third of the weight but the same battery life. The modular COM standards enable the easy exchange of modules, making it straightforward to move to newer processor generations. Usually this feature is called „upgradeability". But the opposite direction is also becoming increasingly important. „Downgrading" achieves a significant reduction in power consumption while maintaining, in some cases even increasing, computing performance. The battery life of existing systems can thereby be greatly improved. As a result of lower power dissipation, less heat is generated, which in turn leads to improved reliability and longer life spans, since the MTBF (mean time between failures) of electronic components depends to a considerable degree on the operating temperature.

Another advantage is the reduction in operating costs thanks to electricity savings. A saving of about 20W per computer in a machine which operates 24/7 adds up to around 200 kWh per year. At a current price of 30 cents/kWH, annual savings of more than €50 are possible. So it's not just the operators who benefit from Intel® Atom™ technology, but also our environment. In future, the performance per watt ratio of a project may constitute the most important cost component.

Depending on the performance requirements in the control and automation sector, COM Express modules are available for the power-saving Intel Atom Dual-Core/Quad-Thread N2600 processor with 1.6GHz and 3.5W TDP; and the Intel Atom N2800 with 1.86 GHz and 6.5W TDP. Compact pin-out Type 6 COM Express modules such as those from congatec provide up to 4GB of fast single-channel DDR3 memory (1066 MHz). The Intel NM10 chipset

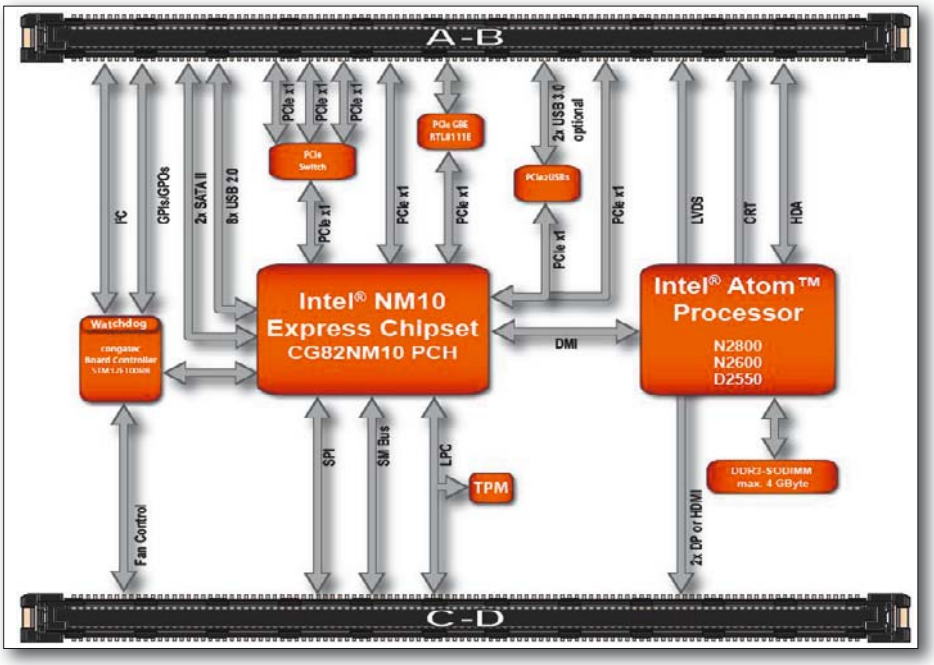


Figure 4. Block diagram of conga-TCA module

module features improvements in memory, graphics and display technology plus intelligent performance and greater energy efficiency. Due to the low power consumption and compact footprint (95 x 95mm), the new module is suitable for mobile and compact automation applications. Smart consumption and battery management prolong battery life, a key cost saving factor for portable devices.

The highlight of the COM Express module is the outstanding graphics performance of the integrated Intel GMA 3650 graphics chip with a clock rate of 640 MHz, making it twice as fast as the GPU of the previous Atom generation. In addition to VGA and LVDS, the module features two digital display interfaces, which can be executed for DisplayPort, HDMI or DVI, and which - unlike Type 2 modules - are no longer multiplexed. Five PCI Express x1 lanes, two SATA 2.0 ports, eight USB 2.0 ports, two optional USB 3.0 ports and a Gigabit Ethernet interface enable fast and flexible system extensions. Fan control, LPC bus for easy integration of legacy I/O interfaces and Intel High Definition Audio complete the feature set.

The conga-TCA module is equipped with the new UEFI embedded firmware solution, and the congatec board controller provides an extensive set of embedded PC features. Thanks to independence from the x86 processor, functions such as system monitoring or the I²C bus execute faster and more reliably, even when the system is in standby mode. An appropriate evaluation board, a small compact carrier board plus as a starter kit for COM Express Type 6 are also available. The new Type 6 pin-out builds on the successful Type 2 which it will supersede in due course. The AB connector series has remained widely unchanged; only some of the previously reserved pins have been assigned new signals for UART, Fan, Lid, Sleep and TPM. The signal assignments of the CD plug have changed fundamentally, with old parallel interfaces such as PCI bus and IDE having been replaced by several new interfaces: 3x DDI (Digital Display Interface), 2 additional PCIe 2.0 lanes and 4x USB 3.0 interfaces.

Although USB 3.0 was defined as early as 2008, its implementation is only just beginning. USB 3.0 requires additional signals to achieve increased bandwidths of 5 Gb/s. Two additional differential SuperSpeed TX and RX pairs are required per port. Instead of a maximum of 500mA, external USB 3.0 devices may draw up to 900mA current. In Type 6 four out of the eight USB ports can be implemented as USB 3.0. Additional ports can be realized on the carrier board with additional controllers. ■

Standard or proprietary embedded modules – a difficult decision

By Wolfgang Heinz-Fischer, TQ-Group

In this article the author describes and compares the pros and cons of so called standard module solutions and proprietary modules and gives possible estimations.

■ The introduction of the ARM Cortex-A9 processor brought with it movement into the ARM module market. The ARM Cortex-A9 core offers rewarding performance data that has prompted a number of chip manufacturers into action. Whilst the ARM Cortex-A8 processor was only interesting to a few chip manufacturers, now almost every well-known chip manufacturer provides a solution with an ARM Cortex-A9 core, both to industry and to consumers. There is a corresponding diversity of solutions on the ARM module market. The performance capability of the ARM Cortex-A9 processor and its many interfaces make it useful for a great variety of applications where an x86 processor has previously been used. More points in its favour are its low power consumption and small chip surface. Since the embedded world 2012, hardly a month goes by without another module provider introducing their ARM Cortex-A9 solution. Whilst the world of modules was previously divided into the two camps of x86 and ARM solutions, all providers compete on the playing field of ARM Cortex-A9 solutions. There are generally three different approaches: Q7 consortium, ULP COM (Ultra Low Power COM), and a variety of proprietary solutions. As usual, each provider makes good arguments for their solution, some of which also display clear positioning with respect to other providers. It is generally worthwhile to take a close look at the details in order to differentiate between

Product	Q7 Spec. 1.2		ULP-COM	Freescale i.MX6
Functiongroup	Function Minimum	Function Maximum	Function	Function
PCI Express Lanes	0 Lanes PCIe x1	4 Lanes PCIe x1	3 Lanes PCIe x1	1 Lanes PCIe x1
SATA	0x	2x	1x	1x
eMMC	0x	0x	1x	1x
Express Card	0x	2x	0x	0x
SD/MMC	0x	1x	1x	1x
USB 2.0	3x	8x	1x OTG, 2x Host	4x
Ethernet	0x	1x Gigabit	1x Gigabit	1x Gigabit, 1x 10/100
CAN	0x	1x	2x	2x
I²C Bus	1x	1x	4x	3x
SPI Bus	0x	1x	2x	1x
UART	0x	0x	4x (2x 2-Wire, 2x 4-Wire)	3x (2x 2-Wire, 1x 4-Wire)
GPIO	0x	0x	12x	30x
SPDIF	0x	0x	1x	1x
HDA / AC'97	0x	1x	0x	1x
I²S	0x	0x	1x	0x
LVDS	0x	Dual Channel 24 bit	Single Channel 24 bit	Dual Channel 24 bit
Display Port, TMDS, SDVO	0x	1x	0x	0x
HDMI	0x	0x	1x	1x
Direct LCD	0x	0x	1x 24-bit	2x 24-bit
Camera	0x	0x	1x	2x
LPC Bus	0x	1x	0x	0x
SM Bus	0x	1x	0x	0x
JTAG	internal	internal	internal	1x
System Control	3x	10x	16x	30x

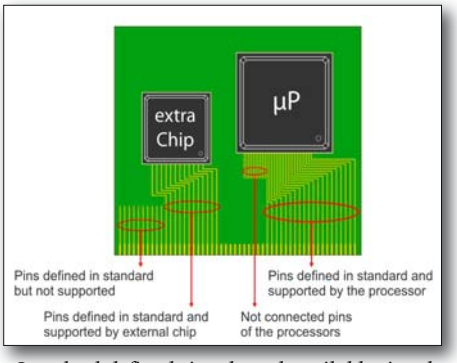
Comparison of IO signals of Q7, ULP COM modules and i.MX7 processor

pure marketing arguments and real facts. Finally, the decision on a module provider is a long-term decision, since every change of module provider is laborious and costly.

As is typical in the x86 market, some module manufacturers have also introduced standards for ARM Cortex-A9 modules. These include Q7 and ULP COM alongside manufacturer-specific standards. Every standard claims to be the true standard. In principle, a standard involves fixing both the board size and the pin configuration of the connector system. The systems should be compatible and interchangeable. Most pins/functions of the processor should be accessible through the connector system. However, in some circumstances, certain functions of the processor may not be defined in the standard, are not carried outwards, and are not available for use. Other functions of the standard may only be accessible through additional chips. Finally, the standard may establish functions that cannot be supported at all. An analysis of the successful standards in the x86 market such as COM Express shows that all processor functions are represented.

However, some defined functions may not be supported in the standard because the processor or chip set in question does not deliver the function. For example, the COM Express standard defines 8 USB 2.0 interfaces, which are however supported by only a handful of processor/chip set combinations. Usually there are between 4 and 6 USB 2.0 interfaces. Similarly, the 24 PCI Express Lines established in the COM Express standard pinout are usually not fully supported. The best standard is thus characterised by having all processor functions available through the connector system for use and by realising all other functions through additional chips. The fewer compromises have to be made regarding the functions offered and the functions stipulated in the standard, the more suitable the standard. If the functions delivered by the processor and external chips deviate strongly from the functions defined in the standard, it can be assumed that the cost/performance ratio is not optimal. This makes it easy to conclude that a Porsche engine in a Polo chassis cannot function optimally – and of course, the same is true vice versa.

A comparison of the systems offered that looks at the factors listed above quickly shows that a real standard with guaranteed compatibility and therefore interchangeableness in the ARM market is only possible to a limited extent. The Q7 system with its board size of 70x70mm uses a system connector with 230 pins to define a total of 177 signals; the remainder are supply pins. The comparison table shows which signals are supported in the example case of a Freescale i.MX6 processor in the Q7 standard Rev1.2 and which are not, as well as which pins the processor supplies but are not carried outwards over the system connector. Since the multitude of i.MX6 interfaces could be rewarding for the user, however, many Q7 module manufacturers offer additional connectors on the board to make these interfaces accessible. The Q7 specifications Rev1.2 provide for a space for additional connectors and functions, but in reality there is a general freedom of positioning. This quickly makes it clear that interchangeableness between providers will be quite limited. In addition, history shows that a connector on the module – as in the case of the SATA connector with ETX 3.0 – is not really the best technical solution and often severely restricts the freedom of positioning of the module on the application board. At the time, XTX was promoted as a solution, with all its functions over the system connector. In the early years, ETX modules were also offered with a compact flash connector on the module.



Standard defined signals and available signals don't fit in every case

It quickly became obvious, however, that the integration possibilities for a module were extremely limited if one wanted to exchange the CF card in practice – which is of course the actual point of such a card. These solutions disappeared at the latest with the introduction of the ETX heat-spreader for better thermal connection in a system. The same problem exists today with a MicroSD connector on the modules. Further standardisations within the Q7 group have been announced along with a smaller board in order to serve the market better. However, full compatibility as advertised by many Q7 board manufacturers does not exist in reality. A switch from a Q7 x86 solution, which offers among others an SM and LPC bus and an Express Card interface – which are not supported by ARM solutions – will only be possible with a change of the application board. Still, a switch can be interesting to users if they know the form factor and can recycle some parts of their circuitry. The ULP COM system offers a smaller form factor with a board size of 82x50mm as well as more pins on the connector (a total of 314, of which a maximum of 257 are signal pins) than a Q7 system with a standard connector. Here, too, the comparison table shows that some signals are not available on the connector from a Freescale i.MX6 processor and signals defined in the standard – such as two additional PCIex1 interfaces – are not supported by the i.MX6 processor.

If the comparison table were expanded to processors of other manufacturers, the deviations between individual standards would be even greater and the interchangeableness between modules with processors from different manufacturers even more limited. A big step has already been taken in the direction of standardisation for ARM modules, but the still very different characters of processors from individual chip providers make a real standard – as actually exists in the x86 module segment with COM Express – of only very limited use. One of the primary arguments for standards – interchangeableness – is only possible for ARM modules if a very limited number of signals are used. If the user wishes to use the full performance capability of the ARM Cortex-A9 processor on the module, he or she has to fall back on "special cuts" offered by module providers, with the restrictions described. This makes it actually a proprietary system, but chained to the standard by board size, storage system, system connector, etc.

A proprietary system has the freedom and advantage of being bespoke and developed perfectly for a processor or a family of processors. The board size can usually be notably smaller than standard boards. All or most interfaces are available on the system connector. From the point of view of long-lasting use of a processor platform, such a module offers the greatest possible freedom for the user. It is from this point of view that TQ modules were and are developed – the maximum performance with the best integration, provision of all signals, robust and reliable system connectors, and the smallest module size. As in the x86 market, however, different solutions are bound to exist side-by-side and find their respective users in the ARM module market. ■

Computer-on-Modules for harsh industrial environment

Bernd Eifer, Erni Electronics

This article introduces the WHITEspeed Computer-on-Module concept which provides future-proof, modular and scalable solutions based on defined form factors and interfaces. The solutions consist of an upgradeable part - the COMs with CPU, chip set, memory, etc. and the I/O baseboards, keeping all the application-specific functionality.

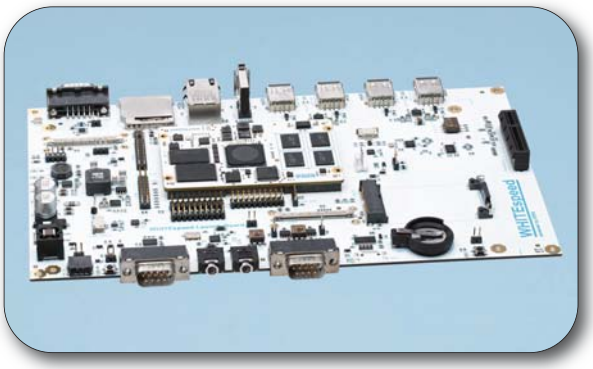


Figure 1. The WHITEspeed family provides COM solutions for harsh environments

■ The highly diversified Computer-on-Modules (COMs) market is characterized by a large number of standardised and proprietary solutions. The user has the choice of different form factors, processors, bus systems and interfaces for his embedded applications. With the WHITEspeed family, Erni Electronics is offering innovative COM solutions which provide powerful ARM CPUs, PCI Express and state-of-the-art, fast serial interfaces and particularly benefit from the performance and reliability of the MicroSpeed connectors used.

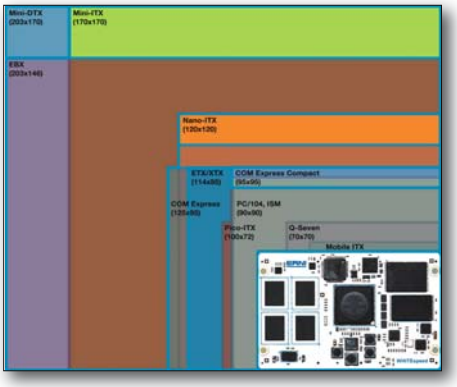


Figure 2: Different form factors for COMs

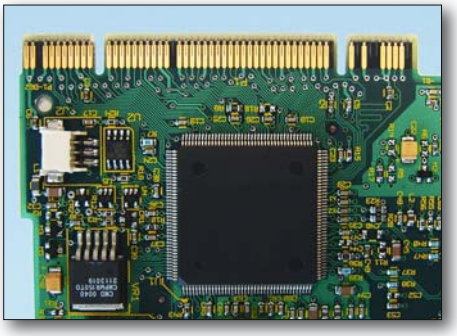


Figure 3: Card edge connectors have restrictions with regard to robustness and reliability

The ruggedized solutions address applications in extremely harsh and demanding industrial environments such as transport, heavy industry or automation with high shock and vibration stresses.

COMs are not just used on their own, but as a system with the respective baseboard. As well as the bus system (like PCI Express) and the other I/O interfaces, the connection between the modules and the baseboard plays an important part with regard to the performance and reliability of the overall system. Although often used in harsh industrial environments with interfering influences such as shock, vibration and EMC problems, many COMs are based on simple direct connectors (card-edge connectors) or low-cost plug-in connections such as the ones used in notebooks.

Card edge connectors are one-part connection systems that directly make contact to the PCB. These kinds of connectors cannot be used reliably in harsh environments with strong vibration and shock loads. In these cases fretting corrosion can occur - inadequately designed and manufactured contacts wear through under the effect of vibration. This is caused by insufficient gold plating, nickel edges or exposed glass fibres. On the other hand, contact reliability is limited with two-part connectors (male and female multi-pin connectors) that only feature single-leaf contacts (only one contact point). Loss of contact can occur due to misalignment, mechanical tolerances and vibration or shocks).

With Microspeed connectors extremely reliable, shielded connector systems that provide good contact overlap and secure mating and also withstand demanding requirements with high-quality contact surfaces are available for COMs for the first time. The modular, shielded connectors are available in a two-row version with 50 contacts for the extended temperature range of -55°C to +125°C. The signal contacts are built in SMT technology, whereby two options are available for the shielding terminals: SMT or Through Hole Reflow (THR) for extremely heavy plug-in boards or situations where there is a considerable amount of mechanical stress. The co-planarity of the SMT connections is 100% guaranteed, with a tolerance of less than 0.10mm for all contacts. The design with an open pin field of identical contacts and a longitudinal pitch of 1.0mm and a lateral pitch of 1.5mm allows a horizontal and vertical arrangement of the differential or single-ended signals

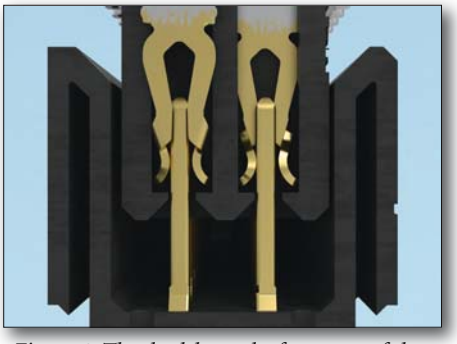


Figure 4. The dual-beam leaf contacts of the Microspeed family provide high reliability and secure mating

Figure 5. The WHITEspeed baseboard is also available with LCD

- depending on the application and the impedance requirement. MicroSpeed connectors make it possible to support data rates of 10Gbit/s, and significantly more with an appropriate design.

However, it is often not just the data speeds but the outstanding behaviour with regard to signal integrity and EMC that make MicroSpeed an ideal choice for demanding designs. The EMC characteristics of connectors are extremely important for the interference immunity and interference emission of electrical products. Coupling inductivity and shielding effectiveness are the decisive parameters here. In order to achieve controlled impedance behaviour, low digital crosstalk and good coupling for differential signal pairs, the MicroSpeed components have specific shielding structures. The modular, shielded MicroSpeed connector system consists of two rows of contacts and two shielding plates at the outside. The signal contacts are exclusively designed in SMT, since through-hole vias like the ones with press-fit connectors have a negative influence on noise and crosstalk behaviour.

Due to the card-edge connectors or connectors with a single contact point (single-leaf contact design) that are normally used, there have not been any uncompromising robust COM solutions on the market to date. On the other hand, the members of the new WHITEspeed family with their high degree of robustness to mechanical and EMC influences are particularly ideal for applications in harsh and demanding industrial environments such as in the transport, heavy industry or automation areas with high shock and vibration loads. The two-row, 50-pin MicroSpeed connectors establish a stable, reliable and shielded connection between the modules and the baseboard. With dual-beam leaf contacts, they do not just provide a high total reliability but also ensure best gathering and reliable mating.

The modules are also consistently extremely robust. They can be cooled using convection or conduction. All components are specified for at least an ambient temperature of -40 to +85°C. The new mezzanine boards provide a powerful i.MX537 CPU from Freescale with ARM Cortex-A8 core in credit card format (85x55mm). The ARM processor has extremely low power consumption and benefits from a comprehensive eco-system with operating systems, development environments, libraries, compilers, linkers etc. Besides a road map for further modules (such as a Cortex-A9 or a Cortex-A15, single-core and multi-core chips) with increased performance, Erni Electronics also provides a guarantee agreement for an extended product service life. The popular ARM technology provides a performance level that makes it attractive for demanding embedded computing applications. Comprehensive operating system and software support simplify software development for many applications. Furthermore, the ARM cores save a considerable amount of power.

The first WHITEspeed modules are based on a Freescale microcontroller with an ARM Cortex-A8 core. This proven core has already been delivered in high-volume of several million units, and is ideal for high-end applications. The core is scalable with frequencies of 600 MHz to 1 GHz. The Cortex-A8 processor can meet demands such as a high computing power (e.g. 2000 Dhrystone MIPS) and extremely low power consumption with less than 300 mW.

The WHITEspeed portfolio includes a family of pin-compatible ARM-based mezzanine modules that essentially differ in terms of CPU performance (clock frequency, number of cores, co-processors), I/Os and storage configuration. Furthermore, a comprehensively equipped adaptable baseboard is available. This board is the platform for the development of the application software and can simultaneously be used to create customer-specific boards. With four MicroSpeed signal connectors and a MicroSpeed power module, Erni is realising the new standardised interface (WHITEspeed 1.0) of the modules for the baseboard. The following are supported: PCIex1/x4, Ethernet 10MB/100MB/1GB, SATA, USB 2.0 High Speed, UART, CAN, I2C, SPI, LVDS LCD display (two display screens can be operated simultaneously), HDMI and SDVO (Serial Digital Video Out)), HDA (High Definition Audio), Watchdog, Debug Interface (JTAG) etc.

Initially Erni Electronics provides a Freescale i.MX537 (ARM Cortex-A8 up to 800 MHz at -40°C to 85°C) as the CPU option for the modules. The memory configuration includes DDR3-RAM (1 to 2 Gbytes), reliable NOR Flash memory (64 to 256 MBytes) for the boot code, NAND Flash (up to 4 Gbytes) and I2C-EEPROM with up to 128 kbytes for the configuration data. The CPUs also provide a comprehensive range of power management functions. The i.MX537 is optimised with regard to performance and low power loss. With an integrated display controller, 1080p/720p HD video functionality and extended graphics, the CPU is suited for applications such as industrial monitors or HMIs (Human Machine Interfaces). With the product launch, Linux support is provided by a Board Support Package (BSP). Real-time Linux, Windows (Windows CE, Windows Embedded) and additional operating systems will follow by request. The universal baseboard (241x147.5mm) can also be used as a development platform (with or without LCD display). The WHITEspeed solution is particularly predestined for intelligent operating terminals in automation, transport or medical engineering. One or two LC displays for touch, keyboard or mouse operation can be easily connected.

With the WHITEspeed concept Erni Electronics is providing economical solutions for industrial customers who require a fast time-to-market. Using the WHITEspeed approach customers can concentrate on the application and differentiate their products more clearly. Without expensive and complex CPU development, the design focus is placed on the application-specific carrier board and the software. Erni Electronics therefore makes system development at hardware level easier with the new WHITEspeed standard for ARM-based Computer-on-Modules, and provides maximum signal integrity due to the MicroSpeed connectors.

A long product service life is an important criterion to industrial customers. For this purpose, Erni commits itself to longer lifecycles for the COMs that are usual for the individual components on the modules. This makes lifecycle management easier for the customer, since he does not have to worry about procuring DRAMs, Flash memories and other components becoming obsolete. Erni also gives an upgrade guarantee, i.e. the next module generation (e.g. on Cortex-A9 derivates) will run on existing baseboards. ■

AMP: 8-Channel PC/104 Express frame grabber

Advanced Micro Peripherals has introduced its AVC8000X, an 8-Channel PC/104 Express Frame Gabber. Ideally suited to demanding real time Situational Awareness systems like remote video surveillance, traffic monitoring and control of vehicle based video capture in hostile environments, the AVC8000X delivers high performance 8-Channel video capture and overlay on a single PC/104 form factor card.

News ID 16344

MSC and F&S strengthen partnership for ARM-based COMs

MSC and F & S Elektronik Systeme have entered into an extensive cooperation to strengthen the nanoRISC embedded module family devised by MSC. Based on this agreement, F & S is entitled to use the nanoRISC brand when developing and marketing products based on this standard. This will satisfy the need for a second source for nanoRISC modules which many system developers have expressed. With F & S's strength in the support for Windows CE, MSC is gaining an experienced software partner with broad industrial know-how which will help to reinforce the use of nanoRISC modules in system projects and reduce design-in times.

News ID 16216

ADLINK: COM Express modules with quad/dual core i7/ i5 processor

ADLINK presents its latest COM Express offering, the Express-HR. The Express-HR is a high performance COM.0 R2.0 Type 6 module featuring an Intel Core i7/i5 processor with and supporting the latest digital graphics interfaces for future designs. With its high-level processing and graphics performance and long product life the Express-HR is ideal for medical, gaming and military applications. The Express-HR features the Intel Core i7/i5 processor supporting Intel Hyper-threading Technology (4 cores, 8 threads) and up to 16GB of DDR3 dual-channel memory at 1066/1333 MHz on dual stacked SODIMM sockets to provide excellent overall performance. Intel Flexible Display Interface and Direct Media Interface provide high speed connectivity to the Mobile Intel QM67 Express chipset. Intel HD Graphics is integrated on the CPU and a PCI Express x16 bus is available for discrete graphics expansion or general purpose PCIe (optionally configure as 2 x8 or 1 x8 + 2 x4).

News ID 16099

ARBOR: PC/104-Plus series CPU modules for harsh environments

ARBOR Technology has introduced Em104P-i2904 and Em104P-i2909, the PC/104-Plus form factor CPU boards, with fanless, low-power, versatile I/O interface and multiple expansions, plus the excellent price-performance ratio features make them ideal for space-limited applications. ARBOR Em104P-i2904 comes with onboard Intel Atom N455 processor and 1 GB DDR3 SDRAM, plus selectable one SATA and one CF card interface for storage.

News ID 16362

APLEX: Mini-ITX motherboard with Mobile Intel Sandy Bridge QM67 PCH

APLEX Technology announces its latest Mini-ITX motherboard - ASB-M8671. This newest APLEX PC-based industrial motherboard is equipped with 2nd generation Intel Core i7/i5/i3 processors. The ASB-M8671's key features include Intel Socket 988B and Intel QM67 PCH; 24bit LVDS support; 1 X DVI-I and HDMI output; 2 X SATA2 and 2 X SATA3 connector; APLEX designed 120 pins connector for PCIe and PCI raiser card expansion; wide range DC power input: 9~32V; wide operating temperature; optional CFast and SIM card slot. ASB-M8671 is ideal for a wide field of applications such as factory automations, gaming machines, military and networking.

News ID 16217

AAEON: fanless Pico-ITX board with Atom N2600 processor

AAEON released its latest small form factor Pico-ITX board, measuring only 100mm x 72mm, powered by the dual core 1.6GHz Intel Atom N2600 low power consumption processor and Intel NM10 express chipset. The PICO-CV01 offers high performance per watt in the compact form factor, to meet the demands of high-end industrial and various fanless embedded applications.

News ID 16125

Axiomtek: AMD G-series based low-power COM Express Type 2 module

Axiomtek released CEM100, a new low-power COM Express Type 2 module powered by either a single core AMD G-Series APU T40R at 1.0GHz or the dual core T56N at 1.65 GHz paired with the A55E FCH chipset. The platform comes with two DDR3 1066 MHz SO-DIMM slots for up to 8 GB of system memory and four SATA ports with RAID 0, 1, 10, 5. Integrated with Radeon HD 6250/6320 graphics controller with support for DirectX 11 and OpenGL 4.0, the CEM100 provides outstanding visual experience and features two DDI, 18/24-bit single/dual channel LVDS and VGA display interfaces.

News ID 16119

Powerful and resilient ARM processors for industrial automation

By Heiko Wilke, Beckhoff Automation

Beckhoff recently presented the second generation of its CX series DIN rail-mountable industrial PCs. Features such as multi-core processor technology and PCI Express as an extension bus in the new CX2000 series, or the high-performance ARM Cortex A8 CPU in the new CX9020 devices, open up new options for applications in automation.

Figure 1. The CX9020, equipped with a 1GHz ARM Cortex A8 processor, is part of the next generation of Beckhoff CX embedded PCs.

Beckhoff first introduced ARM-CPU-based embedded PCs as a control platform with the CX90xx series back in 2006. The ARM9 CPU, offered by Intel at the time, was mainly used in integrated systems such as routers, switches and other embedded systems without a user interface. The ARM architecture has become very popular, mainly driven by developments in the smartphone sector. The continuous optimization of the chips for lower power consumption, coupled with ever-increasing performance, makes this architecture ideally suited for mobile applications. In addition to the consumer sector, there is also increasing demand for these features in industrial applications, with a focus on the development of compact and fanless devices with high performance.

ARM is not only the name of the CPU architecture, but also the company that develops it (Advanced RISC Machines). It issues associated licenses to semiconductor manufacturers. The large number of licensees in the market means that there is a wide range of ARM CPUs for different applications. Over the years the CPU architecture has been continuously developed and optimized further, and the clock frequencies have reached the GHz range – similar to the x86 CPUs. The main difference is that all interfaces are fully integrated in the chip (System on a Chip, SoC). This simplifies the development and reduces component costs. With the CX9020 embedded PC Beckhoff is now introducing its first controller equipped with an ARM Cortex A8 CPU, an architecture that is already used in the Apple iPhone. The 1GHz CPU has, in contrast to the older ARM9 architecture, a hardware-based floating point unit. This means that floating point operations (REAL, LREAL) can be processed significantly faster at the same clock frequency, and that motion control applications can now be implemented with this controller.

The higher performance was also apparent in PLCopen benchmark tests. The PLCopen benchmark assesses practice-oriented program and data structures in terms of their processing speeds, and enables performance comparisons of different CPUs for processing IEC 61131 automation programs. In figure 3 the benchmark value achieved by a 266MHz ARM9 was set as reference value 1. The result shows that, with its 1 GHz ARM Cortex A8 CPU, the CX9020 takes the performance lead in ARM-based Beckhoff controllers. Total performance is comparable with a 500MHz x86 device such as the CX1010. However, compared with the x86 systems, the fundamental difference remains that the CX9020 is only available with Windows Embedded Compact 7, while all other x86-based controllers also support the larger operating systems such as Windows 7 or Windows Embedded Standard 7. Nevertheless, the CX9020 enables users to program complex visualizations on larger monitors, since this CPU offers an integrated graphics unit, which supports resolutions up to 1920x1080. The CPU has internal access to 1GByte DDR3 RAM, which is adequately dimensioned even for demanding applications. Industrial Micro SD cards based on single-level cell flash are used as storage media. They support wear leveling and are suitable for an extended temperature range. A 256 MByte microSD card containing the operating system is included as standard. A second microSD card slot is available for storing user data, if required. The second card can be swapped during operation, which can be handy for data logging or data exchange in applications without a network connection.

All CX9020 models have a DVI-D interface, four USB2.0 ports and two switched Ethernet ports. Headless devices, i.e. units without a connection option for a monitor and keyboard, will be discontinued. An internal slot, which is suitable as a versatile multi-option interface and can be preconfigured in the factory, is available as standard: fieldbus master and slave implementations are possible here, e.g. for EtherCAT (slave only), Profinet, Ethernet/IP, Profibus and CANopen, as well as serial interfaces (RS232/RS422/RS485). The multi-option interface is designed to be configured for one

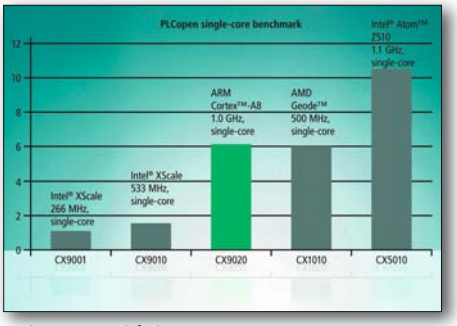


Figure 2. With its 1GHz ARM Cortex A8 CPU, the CX9020 takes the performance lead in ARM-based Beckhoff controllers. Total performance is comparable with a 500MHz x86 device.

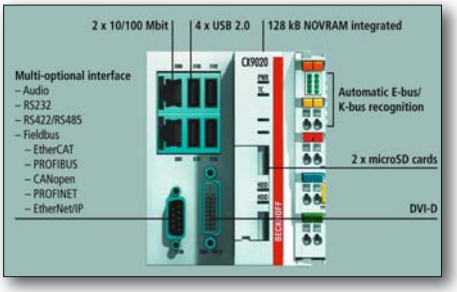


Figure 3. CX9020 with automatic K-bus/E-bus recognition and integrated 128kbyte NOVRAM for persistent data

of these options. What remains unchanged is the concept of DIN-rail-mountable hardware with direct connection to the Beckhoff Bus Terminal I/O system, alternatively K-bus or EtherCAT terminals. The housing concept has been completely revised, however, and now combines a durable metallic body with fronts made of special screening plastic. Thanks to its low power consumption, the CPU can be passively cooled and is nevertheless compact enough to fit into one housing width, plus one interface width. A new feature is the integrated automatic K-bus/E-bus recognition which recognizes which of the two I/O systems is used. In the past, different devices with different part numbers were required, depending on the bus system. Eliminating this differentiation reduces the complexity of the product range and inventory management efforts. At the same time it underlines continuity in the support of the K-bus technology on the part of Beckhoff.

In order to make migration from existing devices straightforward, the CX9020, like the previous generation, contains 128kbyte integrated NOVRAM, which enables data to be stored safely in the event of a power failure. The latest Microsoft Windows Embedded Compact 7 (previously CE) is used as the operating system, as already mentioned. The CX9020 and all other controllers can, as usual, be programmed with the Beckhoff TwinCAT software. CX9020 devices feature version 2.11 R3 of the TwinCAT automation software platform which offers, as usual, PLC functions and axis control with NC PTP. The CX9020 represents a consistent further development of PC-based control technology and ideally complements the performance range of Beckhoff controllers. The company offers the suited platform for all automation tasks, ranging from microcontroller-based small embedded PCs and different ARM CPUs to x86 Intel Quadcore CPUs.

Thanks to the new high-performance and fanless CPU with floating point unit, the CX9020 is predestined for automation and visualization tasks in small- and medium-sized machines as well as in buildings. Multi-axis applications with NC PTP are also straightforward to implement. The extended operating temperature range of -25…+60 °C makes the CX9020 suitable for outdoor applications. Typical fields of application are alternative energy systems such as a wind, solar or tidal power plants, which in some cases have to operate under extreme climatic conditions. ■

Product News

■ NORCO: ARM platform based Industrial PC

NORCO announces to enter into the ARM market of industrial PC this year, as well as X86 platform products. Currently, NORCO has released 2 ARM platform models based embedded PC designed for network security, digital signage, and industrial automation applications. The BIS-6370 is and embedded box PC based on Marvell ARMv5TE processor up to 1.2GHz; onboard 512MB DDRII RAM, 1Gb NAND Flash;6x 10/100/1000Mbps network interface, 5x LAN, 1x WAN. This embedded PC can be widely used in such applications as VPN, Flow Control, Network Firewall and other network platforms.

News ID 16140

■ Garz & Fricke: SANTARO HMI series with display sizes between 7 and 10.4“

Garz & Fricke introduces a new member of the HMI series. SANTARO, the name of the series, promises to cover the demand for high performance. The Freescale quad-core ARM module Cortex-A9 i.MX6Q and the Android operating system are particularly noteworthy. Single- and dual-core variants will also be available. In the area of operating systems, the customers can choose between Windows CE 7 and Linux but also the latest Android system will be offered, the Android 4.0.4 Ice Cream Sandwich.

News ID 16322

Graphics for demanding embedded applications: In the eye of the beholder

By Susanne Bornschlegl, MEN

Humans basically rely on their visual orientation. Pictures are all around us. No wonder that in times of digital photography, flat screens and touch monitors we long for pictures in the industrial sector, too, and not only in the office but in areas where electronics used to be equipped rather sparsely.

In the era of smartphones and tablets displays in underground trains or buses no longer leave passengers flabbergasted. The driver, however, might have a different opinion, since the latest generation of automotive electronics could offer him intelligent and intuitive operating possibilities owing to the display. Even doctors will surely go into rhapsodies over one or two medical devices. Modern graphics technology offers more convenience and at the same time improves medical care: endoscopy as a minimally invasive intervention, for example, substitutes more complex surgeries – thanks to steadily improving cameras and more detailed image data.

More and more embedded applications benefit from graphics functions like image acquisition, processing and output, including even those applications which used to be problematic considering their harsh environmental conditions. Simply think of the robot „Curiosity", which landed on Mars in August 2012 and which sent, after all, black-and-white pictures to earth shortly afterwards. And yet the Mars rover is an expensive single device and the mission was generously financed. Wherever such means are not available – like in commercial vehicles – rugged electronics off the shelf can be used, which are suitable for larger as well as for smaller series, as they are also flexibly adjustable. Those are the products and applications this article is particularly focused on. There are several criteria which play an important role for electronic components in demanding applications and which set the framework for a system. Space: Only very space-saving devices can be used in narrow driver cabins of cranes or agricultural machines. There is a bit more space in a train and the control room can even accommodate big monitors. Site of operation: Displays on free-standing ticket machines have to be protected against violent impacts and need to be weather-proof. Bike rental terminals have their own power supply with a solar cell. In vehicles there is no compromise to absolutely tight mounting of electronics due to unavoidable vibration. Performance: High-resolution graphics and a high data throughput are required for video surveillance or for aerial pictures. For other applications a camera with less megapixels or a monochrome display is sufficient. Less processing power means less power dissipation, which poses a threat to smooth operation in case of decentralized location without connection to the power supply system. This also applies to wherever fan cooling is not possible or not wanted, that is in all vehicles up to airplanes. Function: In most cases graphics functions are only one part of the system. A computer can acquire data and might be connected to a computer network, either via radio or wire. Everything from special serial I/O to audio output through to wireless communication might be required. Several technologies and platforms have established in the embedded sector addressing in particular the needs of industrial and mobile applications. The most important approaches particularly suitable for graphics functions shall be shortly presented in this article.

Computer on Modules (COMs) like COM Express, ESMexpress or Qseven can be integrated in any housing as a plug-on CPU with a matching carrier board. Therefore, they are suitable for very small or specific formats. Their computing performance is mostly optimized for low power dissipation and is rather in the medium range. Processor families like Intel Atom or Core 2 Duo also bring along – apart from their standard interfaces – multimedia functions like high-definition audio and LVDS-supported graphics output within the chipset. When using available standard COMs time-to-market is much shorter and development costs decrease. Commercial vehicles in mining applications, including their board computer, are subject to extreme conditions. The driver can intuitively configure his machine via a screen and can keep an eye on all events. The computer is conduction-cooled and embedded in an IP67-protected, explosion-proof housing. It controls vehicle functions and collects data during operation. For this purpose two ESMini COM modules in

Figure: 1. A box or panel PC in a bus can display the stops clearly and give up-to-date information on further connections

Figure 2. Four screens on one high-end graphics card in 3U CompactPCI format with an AMD Radeon E6760 GPU

95x55mm format with an Intel Atom E600 are embedded, sharing the tasks. Operating terminals in high-end agricultural machines are just as convenient nowadays. While a touch-sensitive 12.1" display is sufficient for graphics output and operation, a COM module also controls the remaining functions like positioning via GPS or fuel consumption measurement. In medical engineering more powerful COMs integrate well into special housings and portable devices. The computer can monitor vital data directly at the patient and display it in real time on its screen. Even high-resolution videos and complex 3D visualization are possible using adequate processors.

COMs are also predestined for the interior of modular standard box PCs. Systems like these have a very rugged housing and a compact format and are extremely versatile. Their design is rather plain and based on the demands mainly made by the mobile sector: insensitiveness to vibration and a good cooling concept, usually including cooling fins for passive heat dissipation. Furthermore, the system needs to be qualified accordingly, for example to the railway standard EN 50155, or it needs an e1 automotive certification. As single computer box PCs take on a variety of tasks. And image data gain ever more importance in carrying out these tasks. Offering medium to high graphics performance these computers are perfectly suitable as board computers or content servers. They can communicate with the control room via a wireless connection and send information to several displays. After all, DisplayPort supports HD resolutions of 1920x1080 pixels with a cable length of 15 meters. Therefore, many applications in buses and trains are implemented using this type of box computer. A single computer in a bus, for example, controls two monitors per DisplayPort. They keep the passengers informed on the course of the route and display the stops and stop requests. In the meantime info videos are shown. Whenever the train is in the depot, the data is updated via WLAN.

Flexibility in the design of box computer solutions can be decisive for a product. Wherever more performance is required, a scalable concept is of great benefit. AMD is way out in front of this concept at the moment. The Embedded G-Series combines each one- or multi-core CPU with a graphics processor of the Radeon range. These APUs (Accelerated Processing Units) make computing performance scalable thanks to their compatibility. A resolution of 2560x1600 pixels on several monitors is possible even on devices suitable for vehicles.

Whenever the display itself needs to be intelligent box PCs turn into panel PCs. They are in continuous operation in public places like railway stations or airports but also in vehicles and they need to be as maintenance-free as possible. Often interaction is required as well – nowadays mostly only via touch screen and without keys. This is why they are less vulnerable to destructive impacts like weather conditions and vandalism. In the driver cabin of modern trains there are often several panel PCs with screen sizes of about 10.4" to 17". A resolution of 1024x768 pixels is sufficient here. But the computer can take over train control tasks and is rugged enough to fulfill the high demands of the railway sector. The electronic parts are therefore coated against humidity and are prepared for operating temperatures of up to -40 to +85°C. They are compliant to EN 50155, the front panel is IP65-protected and the device can do without fan thanks to conduction cooling. For onboard passenger information bigger LCD/TFT screens of around 17" to 22" are used. New high-speed trains have onboard broadband internet access. 19" display computers with 1440x900 pixels are made available to passengers and are connected via Ethernet. Even in modern regional trains one might stumble upon similar solutions. In a current project there is one content server per train each supplying 2 to 6 intelligent displays with data. Every device acts as an Ethernet switch. Graphics is not an end in itself in the embedded sector. The computers applied in the mentioned applications are rock solid solutions fulfilling other functions as well. The latest „best" graphics card won't

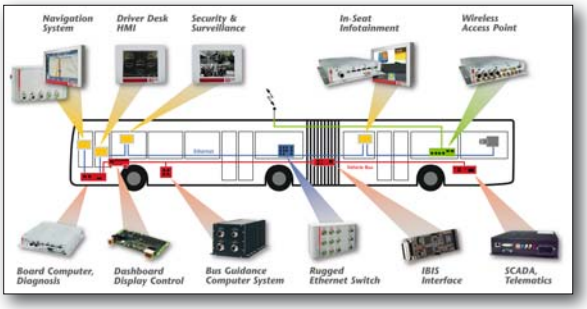


Figure 3. A whole lot of technology can be found in modern vehicles. Computer systems are networked and graphics output plays an important role for many functions

be used in this case, but a much more sustainable product instead. Processors like the Intel Atom all-time favorite and the more powerful Core 2 Duo, but above all the high-performance Embedded G-Series by AMD are a very good choice here. Wherever even higher performance and ruggedness at the same time is required, hardware needs to be designed differently. Big display panels in airports and train stations tend to be more and more digital and also control centers for traffic or in power stations have their equipment upgraded.

19“ systems have proven suitable here and with their 3U format they are even compact when space is limited. Operating systems like Windows used to have restricted functionality when it comes to output. Controlling four monitors at the same time used to be a tough job. Today under Windows 7 possibilities are much vaster. CompactPCI Serial is perfectly suited for equipping control stations. This technology is ideal for quick exchange of large amounts of data owing to its standardized serial backplane interfaces. In addition to a powerful CPUthere are seven high-end graphics cards as peripheral units in a system; these graphics cards can control 28 monitors in high resolution at the same time.A CPU card with an Intel Core i7 and QM57 chipset supports a resolution of 2560 x 1600.Graphics cards with AMD Radeon E6760 support DirectX 11, OpenGL 4.1 and OpenCL 1.1. OpenCL in particular delivers a high level of performance due to its parallel data processing.

As CompactPCI Serial feels comfortable even in rugged environments, a service provider for aerial pictures took it onboard. The camera inside the aircraft body takes pictures from a height of up to 5000 meters for mapping or track surveying on train routes. As many as 150 megapixels allow for the picture to be resolved to up to 2 centimeters. A flight like this is expensive, so the computer system has to work reliably and store the huge amount of data quickly. The flight team reviews the pictures on the monitor while still in the air. Its modular design makes it easy to upgrade the system or to change its set-up, as soon as a new generation of electronics is available, be it the CPU, the storage medium or the camera. Adequate software support is a basic feature of embedded computers nowadays. When it comes to graphics Windows and its embedded versions are at the forefront anyway. But also Linux cannot be neglected by hardware suppliers. QNX is an inherent part in the automotive and medical sector, just like VxWorks. Android is gaining ground in the industrial sector and Integrity or VxWorks are required for especially harsh embedded applications, like in avionics. All of them are as powerful as necessary for their certain niche. The different aspects, for example place and conditions of application or graphics performance and power dissipation, always fall into place making a coherent whole. For rugged electronics suitable for everyday use, however, it would be impossible to cover all applications with the expense of a specialized Mars rover. Modularity is what we need here. A series of innovative ideas and technologies, which make standard components combinable, allow for a more cost-effective design of rugged and even more qualified graphics solutions and for shorter time-to-market. Very compact devices usually don’t need graphical gadgets but a solid basis in accordance with the requirements. Computer-On-Modules make upgrading much easier. If high graphics performance or high data throughput and storage capacity is needed, a 19“ system like CompactPCI (Serial) is the better alternative, offering a maximum of modularity at the same time. And finally pictures reach areas where there used to be nothing more than a panel with control knobs or a tiny black-and-white monitor. ■

Trend to out-of-band-manageability and security features

Peter Hoser, Sales Director OEM, Fujitsu Technology Solutions

■ Technologies that are already established in the desktop sector, such as out-of-band-manageability via iAMT or DASH and security features like TPM, are now increasing their influence on the field of embedded systems. This is due to the increasing demand of the customers for remote manageability, i.e. for controlling and maintaining systems from outside their premises even when the operating system is switched off. Increasing security requirements for IP and IT are another reason for the growing influence of those features. From the perspective of embedded design, the technological changes presented year by year by platform producers Intel and AMD have to be considered critically. Growing complexity of new platforms requires a greater effort in development. Therefore, a higher degree of product maturity and a two-year innovation cycle should be aimed at for the field of industrial solutions. Intel and AMD also will offer new CPUs. Especially low power BGA-solutions as Intel ATOM or AMD G-Series will be less power-consuming and single-core solutions are increasingly being replaced by dual- and quad-core CPUs. With Industrial Ethernet replacing ever more proprietary bus systems, such as fieldbus solutions, there is a growing demand for GbE interfaces, either on board the mainboards or via expansion cards. ■

Embedded computing trends

Brian Carr and Nigel Forrester, Embedded Computing, Emerson Network Power

After supplying VME boards into applications such as railway signalling for many years, Emerson is starting to see a trend for these safety-critical applications to migrate towards VPX technology. VPX offers more flexibility with high speed fabric connectivity between boards, and is also easier to certify to the modern safety standards. The VPX standard was developed by embedded component, board and system vendors along with a number of military prime contractors, and so this trend to use VPX outside its core military market is quite significant.

ARM and Android are both consumer-led technologies that are likely to be adopted in embedded applications. Many embedded applications are risk-averse for good reasons, so ARM and Android technology has a way to go. Because of a legacy in consumer gadgets, ARM-based devices tend to have some different attributes: they are thought of as lower cost and able to provide improved power saving modes when compared to the more traditional Intel or Power Architecture CPUs that are used today. However, when offset by the need for high reliability, long lifecycles and pretty low volume production, the advantages between the architectures is not clear. ARM will no doubt become more commonplace in the embedded space but not necessarily at a lower price point. Android doesn't seem that big a

step, after all its only another Linux flavour and its elegant user interface would fit extremely will with some embedded board devices such as kiosks, aircraft-seat-based video displays, diagnostic test equipment and clinical medical devices. However, Android is not supported on many of the silicon platforms that embedded boards are based on and even then is very tightly coupled to the display. This will be less of an issue over the coming years because of the need to make embedded devices easier to use, and especially more touch-screen enabled. Having been one of the originators of the embedded board market with VMEbus more than 30 years ago, Emerson sees this as a very gradual transition that may take years.

The most exciting development in the ATCA arena is the recent release of PICMG 3.1 R2 which brings 40G ATCA into the mainstream. Emerson was one of the first vendors to release 40G-ready platforms, but now the ecosystem as a whole is bringing 40G technology to the market, and allowing customers wanting enhanced packet throughput for DPI applications such as session border controllers and network optimization equipment to adopt ATCA. The future trends are - as always - more performance and throughput per $ and per watt. This means close alignment with the major technology roadmaps such as Intel tick-tock Xeon developments, looking at latest Cavium announcements about OCTEON III, and enhanced switching from companies such as Broadcom and Mellanox. The next long-term development on everybody's lips is 100G, but for this we have to differentiate between 100G cable terminations onto a system, and 100G fabric in the ATCA backplane. The ability to terminate 100G cables will become mainstream over the next couple of years, but the technology advances required for 100G fabric are still in a research phase with a new PICMG standard unlikely to appear much before 2016. At the same time, we'll need to see continuing advances in cooling technology to be able to make use of all that extra bandwidth.

LynuxWorks: LynxSecure supports Curtiss-Wright's VPX3-1256 SBC

LynuxWorks announced LynxSecure support of the Curtiss-Wright Controls Defense Solutions' VPX3-1256 3U VPX Intel Core i7 Single Board Computer. Curtiss-Wright also plans, in the near future, to annouce support for LynxSecure on its Intel Core i7 3rd generation processor-based VPX3-1257 single-board computer. LynxSecure is a separation kernel and embedded hypervisor that provides a secure environment in which multiple guest operating systems and their applications can execute at the same time, in their own virtual partitions, without compromising security, reliability or data integrity.

News ID 16086

VIA: Mini-ITX embedded board features latest VIA VX11H MSP

VIA Technologies announced the VIA EPIA-M920 Mini-ITX board, the first VIA Mini-ITX board to feature the latest VIA VX11H media system processor enabling DirectX 11 and 3D stereoscopic display capabilities for immersive environments. Providing superior performance with the latest in connectivity technology in a low power envelope, the VIA EPIA-M920 Mini-ITX provides the ideal platform for a wide array of next-generation compact devices for applications in healthcare, gaming, digital signage, and other vertical market segments. With the choice of a 1.2GHz VIA QuadCore-E processor for high-end performance or a 1.0GHz VIA Eden X2 dual core processor for fanless system design, the VIA EPIA-M920 is a highly flexible platform for compact, low power systems with today's latest connectivity options including HDMI and USB 3.0.

News ID 16190

Wind River: Intelligent Network Platform provides fast packet acceleration and content inspection

Wind River has introduced Wind River Intelligent Network Platform, a software platform for the development of sophisticated network equipment that can accelerate and secure the flood of traffic for current and future networks. The explosion of network traffic, coupled with the need to deliver high quality of service with stronger network visibility and security, has created new pressures for network equipment providers.

News ID 16336

Liantec: Mini-ITX Intel QM77 Ivy bridge mobile motherboard

Liantec announce ITX-QM77 industrial Mini-ITX Intel QM77 Ivy Bridge Mobile motherboard solution. The ITX-QM77 is based on Mini-ITX form factor and Intel Ivy Bridge computing platform, supports Intel 3rd generation Ivy Bridge and 2nd generation Sandy Bridge Core i3 / i5 / i7 mobile processors, 16 GB of memory capacity, onboard dual Intel Gigabit Ethernet, HDMI, DVI, HD audio, SATA-III 6Gbit/s, and SuperSpeed USB 3.0 ports.

News ID 16292

DFI: Mini-ITX motherboard supports rich graphics and power-saving features

DFI brings the most cost-effective Mini-ITX motherboard, CR101-D, to its 3rd generation Intel Core processor-based product line. It is DFI's first Mini-ITX board supporting the new mobile Intel HM76 Express chipset. This low power board supports a range of mobile-based 3rd generation Intel CoreTM processors built on 22-nanometer process technology and boasts a 15% CPU performance increase over the previous generation.

News ID 16178

Artila: ARM SOM enables device control with remote desktop

Artila Electronics announces the support of remote desktop control for Linux and WinCE on its M-9G45A System on Module. M-9G45A is a credit card size system on module powered by Atmel 400MHz AT91SAM9G45 ARM9 Processor with memory management unit, and equipped with 128MB DDR2 RAM, 128MB NAND Flash, and 2MB DATAFlash. It is designed not only for devices that require Human Machine Interface but also an ideal solution for M2M device management.

News ID 16202

congatec partners with Ineltro to drive sales in Austria and Central Europe

congatec has announced its cooperation with Ineltro Halmer Electronics, headquartered in Vienna. Ineltro has a long and successful track record of distributing electronic components in the Austrian market. Effective immediately, the company will now offer the complete range of congatec products in Austria, Poland, the Czech Republic and Southern Europe.

News ID 16408

Green Hills: MULTI toolchain certified as functional safety support tool

Green Hills announces that its MULTI toolchain has been certified to meet the highest levels of tool qualification specified in the IEC 61508:2010 (Industrial), EN 50128:2011 (Railway) and ISO 26262:2011 (Automotive) functional safety standards. Green Hills has received certificates from both TÜV NORD and exida, making the Green Hills MULTI IDE the only commercially available toolchain certified to satisfy both SIL 4 and ASIL D tool qualification requirements.

News ID 16175

Hectronic: COM Express module based on Atom N2600/N2800/D2550

Hectronic has announced the H6816, a Computer-on-Module in the COM Express Compact form factor and based on the dual core Intel Atom processors N2600, N2800 and D2550. The Intel NM10 Express chipset is included in the platform. H6816 offers significantly improved power-consumption performance ratio compared to previous Intel Atom generations. The graphics capabilities include 24-bit dual channel LVDS accessible directly from the module, as well as VGA.

News ID 16093

ADLINK: COM Express type 6 module with three DDI ports

ADLINK presents its latest COM Express offering, the Express-HR. The Express-HR features the Intel Core i7/i5 processor supporting Intel Hyper-threading Technology and up to 16GB of DDR3 dual-channel memory at 1066/1333 MHz on dual stacked SODIMM sockets to provide excellent overall performance. Intel Flexible Display Interface and Direct Media Interface provide high speed connectivity to the Mobile Intel QM67 Express chipset

News ID 16294

MSI: multi-display output mini-ITX form factor board

MSI launch MS-9893 with the latest Intel ATOM platform. This multi-display output mini-ITX form factor board supports single Channel 18/24 bit LVDS, VGA, one HDMI. It has great graphics performance and support for up to 1080P high definition video.MSI MS-9893 is equipped with single-channel DDR3 1066 MHz memory up to a maximum of 4 GB in 1 x 204 SO-DIMM slots. MS-9893 supports D2550(10W) / N2800(6.5W) two SKU, with VGA, HDMI, Video Output: LVDS/ Single CH 24bit by D2550 (LVDS/ Single CH 18bit by N2800). Power Input support, one ATX for D2550, and another is DC-in 12V for D2550 / N2800.

News ID 16346

NEXCOM: ruggedized vehicle mount computer increases workplace safety

NEXCOM's 10.4" ruggedized vehicle mount computer VMC 3000 series is designed for use in heavy-duty vehicles and can increase productivity and safety within harsh environments. The VMC 3000 series features scalable computing power, 10.4" touch screen and various wireless communication technologies. Combining a robust design and IP65-compliant enclosure, the VMC 3000 series can gather, display, transmit and receive information to help optimize route planning, increase situational awareness, and monitor vehicle status.

News ID 16129

NEXCOM: bright wide-angle multimedia Panel PC enriches visual experience

NEXCOM's fanless multimedia panel PC MPPC 2120T, features a large, vivid 21.5" Vertical Alignment LCD touch screen with LED backlight to provide exceptional visual at wide viewing angles. The bright, distinct and responsive VA touch screen enhances information delivery and promotes user interaction, offering better customer service and experience for signage and kiosk applications.

News ID 16214

Advantech: green design concept for all panel products

Advantech announces that its PPC-L128 Panel PC has received a 'Product Carbon Footprint Certification Statement' from the China Environmental Certification Center, Ministry of Environmental Protection. PPC products will gradually adopt green design concepts throughout the product line.

News ID 16131

NEXCOM launches nine 12 to 19 inch Industrial touch panel PCs

NEXCOM has expanded its APPC series with nine fanless panel PCs powered by Intel Atom processor D2550. To accommodate individual's preference for display sizes, the APPC series is available in 12.1, 15, 17 and 19-inch touch screen formats with resolutions up to 1280x1024 SXGA. In addition, the 12.1 inch APPC product is available in both XGA and SVGA resolutions.

News ID 16132

Acromag: rugged COM Express carrier for Type 2 or Type 3 modules

The new ACEX4405 carrier card hosts Type 2 or Type 3 COM Express modules in a small footprint of only 95mm x 125mm. Designed for extreme applications, the ACEX4405 has an extra rigid PCB and extended temperature support. Features include dual ports for Gigabit Ethernet, RS232/422, and USB plus many other features. A mini PCIe slot adds further flexibility for expanded, high-speed I/O capabilities. Locking and latching connectors prevent shock or vibration from loosening cables.

News ID 16352

ADL: rugged 150W ATX power supply

ADL Embedded Solutions announced the ADLPS104-150 power supply board designed to meet the needs of high-powered Intel Core industrial and embedded motherboards by providing robust ATX voltages (5V, 5VS, 3.3V, 12V) in a stackable PCI/104-Express form factor designed for -40 to +85 °C operation and 150W. Its small 90x 96mm footprint allows it to fit in many space-limited applications.

News ID 16317

DSM: compact, robust DIN rail-mounted PC with 7.2 GB flash

DSM Computer has augmented its compact DIN rail-mounted PC family H1-A with a further model with integrated 7.2 GB flash memory. The large flash memory permits the installation of sophisticated operating systems, such as standard Windows and Linux, as well as the saving of comprehensive user data.

News ID 16414

Schroff: electronic packaging for industrial applications

In its new brochure, „Industrial Technology", Pentair Technical Products presents electronics packaging solutions from the Schroff, Hoffman, McLean, and Birtcher/Calmark brands designed specifically for industrial applications. In addition to wall-mounted enclosures and cabinets in mild steel for ordinary factory situations and stainless steel enclosures for use in the food and pharmaceuticals industries or in oil and gas, the brochure also contains enclosure solutions in plastic and composites for use in waste water and chemicals treatment.

News ID 16314

MicroSys: focus on system solutions for control and HMI at SPS/IPC/Drives

As partner from logi.cals, MicroSys exhibit on SPS/IPC/Drives 2012 with focus on system solutions for control and HMI applications. For example, the miriac HMI1022 HMI device. It carries Freescale QorIQ CPUs in combination with miriac MPX SoMs. In the current version, it is a P1022 CPU. The devices are highly integrated. They offer already in its standard configuration a set of I/O functions that fit right out of the box numerous typical HMI applications. Amongst others, the system holds a high resolution 15 inch 4 wire LED backlight touch display.

News ID 16413

GE: high performance graphics board for constrained environments

GE Intelligent Platforms announced the XMCGA7 High Performance Graphics Board. Designed for sophisticated, demanding graphics applications in harsh environments, the rugged XMCGA7 mezzanine features the latest E6460 graphics processing unit from AMD to deliver the highest possible performance from a restricted power envelope. Typical applications include command and control workstations, radar consoles and cockpit displays.

News ID 16306

MEN: Box PC based on latest AMD Embedded G-series APU

MEN Mikro Elektronik announces the release of the BC50M box computer based on the latest AMD Embedded G-Series Accelerated Processing Unit. The robust and maintenance-free BC50M (formerly called the BC1) is based on an innovative modular design that offers flexible display and I/O solutions with optimal performance for mobile applications such as use in trains, commercial vehicles, airplanes, and mobile machines. As a new option the BC50M can be equipped with the new AMD Embedded G-T16R APU with a power consumption of just 2.3 watts on average or 4.5 watts thermal design power. This new system complements the existing 1.4 GHz dual-core AMD Embedded G-T48N APU with AMD Radeon HD 6310 Graphics standard system as well as the high-end AMD Embedded G-T65N APU with AMD Radeon HD 6320 Graphics version.

News ID 16285

Portwell: stylish, interactive Panel PC with Cedarview and NM10 chipset

Portwell released the EUDA2 Panel PC, based on Intel Atom dual-core processor D2550 1.86 GHz and the Intel NM10 chipset. The EUDA2 comes standard with a true flat projected capacitive multi-touch display. With its ultra-slim and lightweight aluminum tooling, it is rugged yet stylish and resistant to vibrations up to 1G and shock up to 15G.. Its cable-less design, HDD tray, wide DC input and operating temperature ranges add to its flexibility and durability. The COM port and I/O board docking are selectable via BIOS.

News ID 16348

Portwell: fanless Panel PC with Intel Atom dual-core processor D2550

Portwell releases the FUDA Panel PC, featuring an Intel Atom dual-core processor D2550 1.86 GHz and an Intel NM10 chipset. The FUDA 5-wire resistive single touch screen and aluminum front bezel come standard. With its ultra-slim, lightweight, HDD tray, CF cover and cable-less design, the FUDA Panel PC series is stylish and fan-free. Its flexible I/O board docking and COM port are selectable by BIOS. In addition to operating in a wide temperature and DC input ranges, the FUDA panel PCs are tested to IP65 water and dust resistant standards. The FUDA also comes equipped with APIs and EtherCAT support. With all these great features, the FUDA Panel PCs are ideal for Industrial Automation and the Food & Beverage Industries.

News ID 16401

Curtiss-Wright: rugged COTS system supplies combat vehicles with networking backbone

Curtiss-Wright Controls Defense Solutions has announced an innovative new solution for quickly and cost-effectively adding a rugged VICTORY-compliant networking backbone to new and legacy military ground vehicles. The new Digital Beachhead system combines a 16-

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port Gigabit Ethernet Network Switch with a high performance, power efficient Vehicle Management Computer. Beachhead is a low-cost rugged COTS solution for modernizing ground vehicles to comply with the U.S. Army's new VICTORY initiative for interoperable digital network services.

News ID 16187

Vecow: GigE vision compliant quad-core Embedded system series

Vecow has expanded its GigE Vision support with ECS-5600 fanless embedded system family for applications demanding bandwidth and computing performance as well as simplicity of use and stability, such as industrial investigation and machine vision. GigE Vision brings abundant advantages to machine vision and quality inspection systems, including a data transfer up to 100 meters cable length, 100Mb/s bandwidth, real-time, precisely timed synchronization of multi-element, and unlimited number of cameras can be connected. ECS-5600 series supports GigE Vision intended for prior performance and accuracy of machine vision systems.

News ID 16139

DDC: rugged PDU provides 300 Amps of intelligent solid-state power control

Data Device Corporation introduces its first Power Distribution Units in the RP-20S1X family of stackable, configurable devices for 28 VDC systems. The High Power Solid-State Power Controllers provide four independent 75 Amp load channels (300 Amp total current capability) to distribute and control power to four independent subsystems.

News ID 16305

Aitech: CompactPCI Ethernet switch for data management in harsh environments

Aitech Defense Systems now offers the rugged C660, first in a new series of high-performance, single-slot Gigabit Ethernet switches. The new 6U CompactPCI PICMG 2.16 compatible switch serves as a robust communications backbone for moving massive amounts of data around tightly coupled processing or I/O data concentrators, typically found in embedded telecom, military, aerospace and spacecraft applications. Aitech's versatile new Gigabit Ethernet switch can be installed in rack-mounted equipment and backplanes or packaged in stand-alone rugged subsystems.

News ID 16339

X-ES: 6U CompactPCI SBC features 3rd gen Core i7 processor

Extreme Engineering Solutions introduces the XCalibur4402, a 6U CompactPCI Single Board Computer supporting the 3rd generation Intel Core i7 processor. Available in conduction- or air-cooled versions, the XCalibur4402 utilizes the processor's dual- or quad-core technology with Intel Hyper-Threading Technology, making it an excellent COTS solution for military, communications, and industrial applications.

News ID 16148

DATA MODUL: optical bonding – display solutions from a single source

With the development of an in-house optical bonding technology DATA MODUL is now capable of providing displays solutions with very high functional, optical and environmental performances. Optical bonding is the process of adhesive bonding of two or more transparent components using a high-quality optical grade adhesive. By such bonding the air gap between the transparent components is entirely eliminated.

News ID 16379

NI: all-hybrid PXI Express chassis features PCI Express 2.0 x8 links to every slot

National Instruments introduced an all-hybrid PXI Express chassis featuring PCI Express 2.0 x8 links to every slot for increased data throughput resulting in lower test times and reduced cost of test. The hybrid slot connectors deliver maximum flexibility in PXI and PXI Express module slot replacement, while the addition of hot-swappable fans and an easily replaceable power supply improves system availability in high-performance applications.

News ID 16383

N.A.T.: processor AMC based on Freescale multi-core QorIQ P3041

Based on Freescale multicore QorIQ P3041 the single-width mid- or full-size AdvancedMC processor board NAMC-QorIQ-P3041 is targeting combined control and dataplane processing applications with the demand for storage capability. Due to its performance and scalability the board also suits time critical data processing applications, i.e. for imaging and control. The NAMC-QorIQ-P3041 addresses the need of a more cost-efficient solution compared to the P40 and P50 family members. Dual SATA ports provide high-speed, low-cost storage options for statistics or large databases.

News ID 16111

MEN: certification package for SIL 4 certified 6U VMEbus or cPCI SBCs

For usage in railway applications MEN's A602 and D602 6U VMEbus and CompactPCI single board computers boasting extreme functional safety can now be accompanied by a certification package. In the package, MEN provides all relevant documents which make it easier to certify the complete system according to EN 50126 and EN 50129 with the responsible authority.

News ID 16107

COMMELL: 3rd and 2nd generation Intel Core i7 / i5 / i3 Mini-ITX motherboard

COMMELL announces the LV-67J designed for the 3rd and 2nd generation Intel Core i7/i5/i3 processors in the FCLGA1155 socket. The Mini-ITX mainboard based on Intel Q77 Express chipset, Q77 Express chipset is part of the desktop Intel 7 Series Chipset family, along with an Intel 3rd generation 22 nm Core i7/i5/i3, Flexible extend slots including PCI-Express X16, Mini-PCI & Mini-PCIe socket.

News ID 16203

Pico Computing: Altera Stratix V PCI-Express FPGA module

Pico Computing announces availability of the M-506 FPGA module, the most recent addition to Pico's scalable PCI-Express architecture, enabling users to start with a single module and grow their system by adding additional modules as their application needs increase. Along with the Stratix V GX FPGA (5SGXA3), the M-506 also features a 4GB DDR3 SODIMM capable of 12.8GB/s memory bandwidth.

News ID 16296

WinSystems: 150W industrial ATX power supply for PC/104, EPIC, and EBX SBCs

WinSystems has introduced the PS-ATX150-0, a 150W industrial power supply for ATX-compatible embedded SBCs. It supports ATX signals Power On/Off, Power Good, and Power Fail, allowing ATX-compatible SBCs to utilize sleep and suspend modes for energy savings during periods of processor or system inactivity.

News ID 16284

MSI: Cedar Trail products include system and motherboard

MSI IPC announcea new Platform: Cedar Trail, featuring the latest low-power platform. MSI Cedar Trail products include system and motherboard: MS-9A45/MS-9895/MS-9893, and are unique in low-power setting. MS-9A45 is low power solution with fan-less design and support display 1920x1080P. It provides memory up to 4GB, 2 x 204-pin SO-DIMMs and supports two independent displays.

News ID 16415

IEI: advanced auto data server with upgraded surveillance function

IEIMobile, the branded mobile solution provider established by IEI Technology, announced the launch of the AVL-3000, a highly integrated auto data server designed for advanced vehicle and asset management applications. The AVL-3000 includes various features such as the Intel Atom N2600 1.6GHz CPU, Windows 7 OS, Wi-Fi, Bluetooth, HSUPA/GPRS/GSM, GPS, and On-Board Diagnostics technologies.

News ID 16095

One Stop Systems: PCIe quad-port switch board for storage application

One Stop Systems introduces the first PCIe x8 Gen 3 quad-port cable adapter. The new quad-port adapter operates as a switch board in I/O expansion applications to fan out the PCIe signal up to four I/O devices like storage arrays and/or expansion systems. The new adapters are also field-programmable to allow the different ports to receive or transmit data. The quad-port switch board is ideal for building data storage farms.

News ID 16249

EKF: CompactPCI quad port eSATA & USB controller peripheral board

The CE3-GIG has been developed to satisfy the demand for additional SATA and USB ports in a CompactPCI environment. Three front panel eSATA/USB combo connectors are provided, for attachment of either USB 2.0 or eSATA external devices. A fourth F/P connector is available for USB devices only. The front panel combo connectors are 'Power over eSATA' compliant, with +12V power and ground pins. In addition, a docking connector is provided for mounting an on-board 2.5-inch SATA hard disk or solid state drive.

News ID 16309

Curtiss-Wright: 6U OpenVPX SBC features Intel's latest 3rd gen Core i7

Curtiss-Wright Controls Defense Solutions has announced the new VPX6-1957, a very high performance rugged Intel Architecture-based OpenVPX processing engine, that features the Intel 3rd Gen Core i7 Quad-Core processor, an unmatched range of high-speed I/O, and support for Intel AVX floating point libraries. Designed for optimal performance in harsh environments, the single board computer's latest generation Intel 22nm quad-core processor is supported with a 21 GB/s (peak) DDR3 memory subsystem connected directly to the processor that maximizes data throughput to its AVX floating point units.

News ID 16234

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