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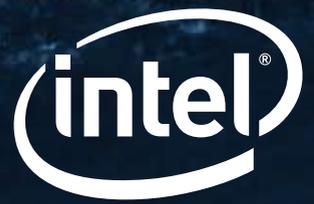
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Factory automation requirements for applications such as mechanical assembly are demanding more axes on robotic arm equipment as well as intelligent fault management. Read more on memory solutions for data storage and retrieval in multiple axis robotic control systems on page 24. Cover photo and robotic arm image on page 24 courtesy of ABB (www.abb.com).

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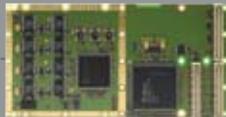
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foreword >> thinking

By Don Dingee



Control freaks

If you'd sell your soul for total control – in industrial applications, that is – these are good times. Control freaks are everywhere, and it's a good thing in this industry. Whether you're looking to control a device, machine, or entire building, new tools and ideas are showing up constantly. These are just some of the examples brought to our attention in the last few months.

Device level

Steve Marsh, manager of strategic marketing for the Digital Signal Controller (DSC) division of Microchip, described some of the key points of device control using the latest in DSCs to combine a fast 10-bit A/D with DSP-like features. "Many processes aren't oversampled enough,"

Marsh said. "In smart sensor applications, using oversampling with the latest DSCs driving calculations can help determine a partial occlusion, compensate for variability between sensors, or adjust for time degradation of a particular sensor."

Performance is directly related to input quality. Being able to sample faster can not only offload central processors but also provide adaptive functions previously only possible with full-blown DSP devices. Marsh cited one example using

FFTs running on a DSC to analyze and eliminate wobble from a turbine flow sensor. Figure 1 shows a block diagram of Microchip's DSC.

Marsh explained how Microchip is working on field-oriented motor control, relying on the multiply-accumulate capability in the DSC. Field-oriented control can provide better torque control, noise reduction, and power efficiency in motors used for applications such as large appliances. Microchip is offering software and development kits to help engineers get their DSCs running out of the box.

Machine level

Brian McCleery, product marketing manager with National Instruments, described how graphical system design using LabVIEW is helping design complex machines. "We're using SolidWorks to help build models, and we're getting close to providing cosimulation capability

"Being able to sample faster can not only offload central processors but also provide adaptive functions previously only possible with full-blown DSP devices."

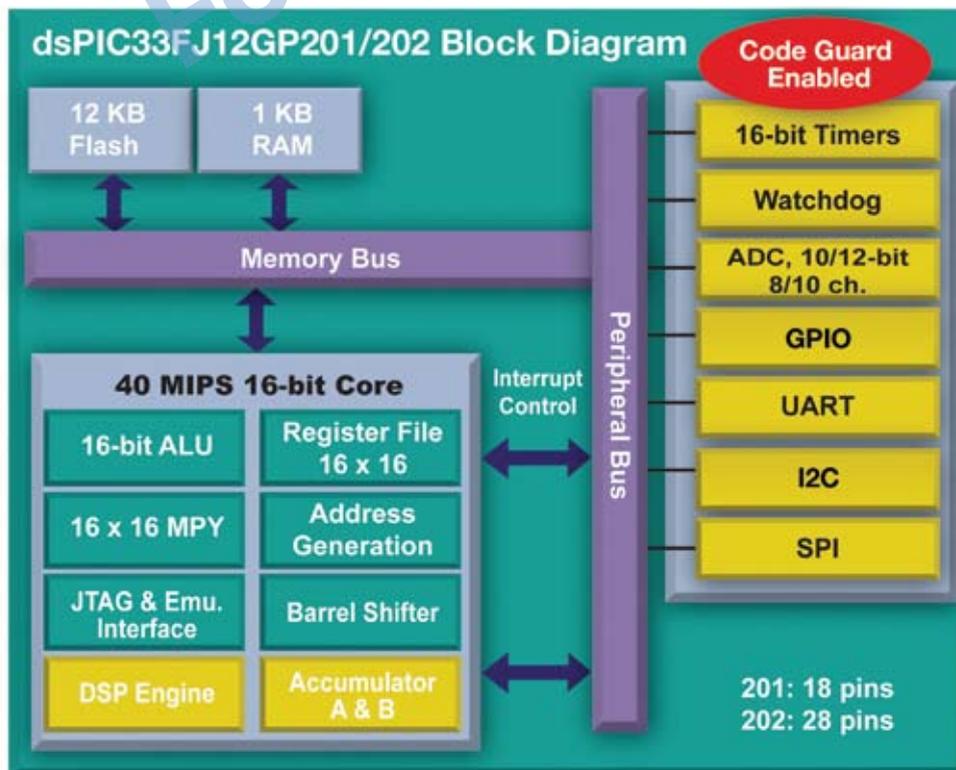


Figure 1

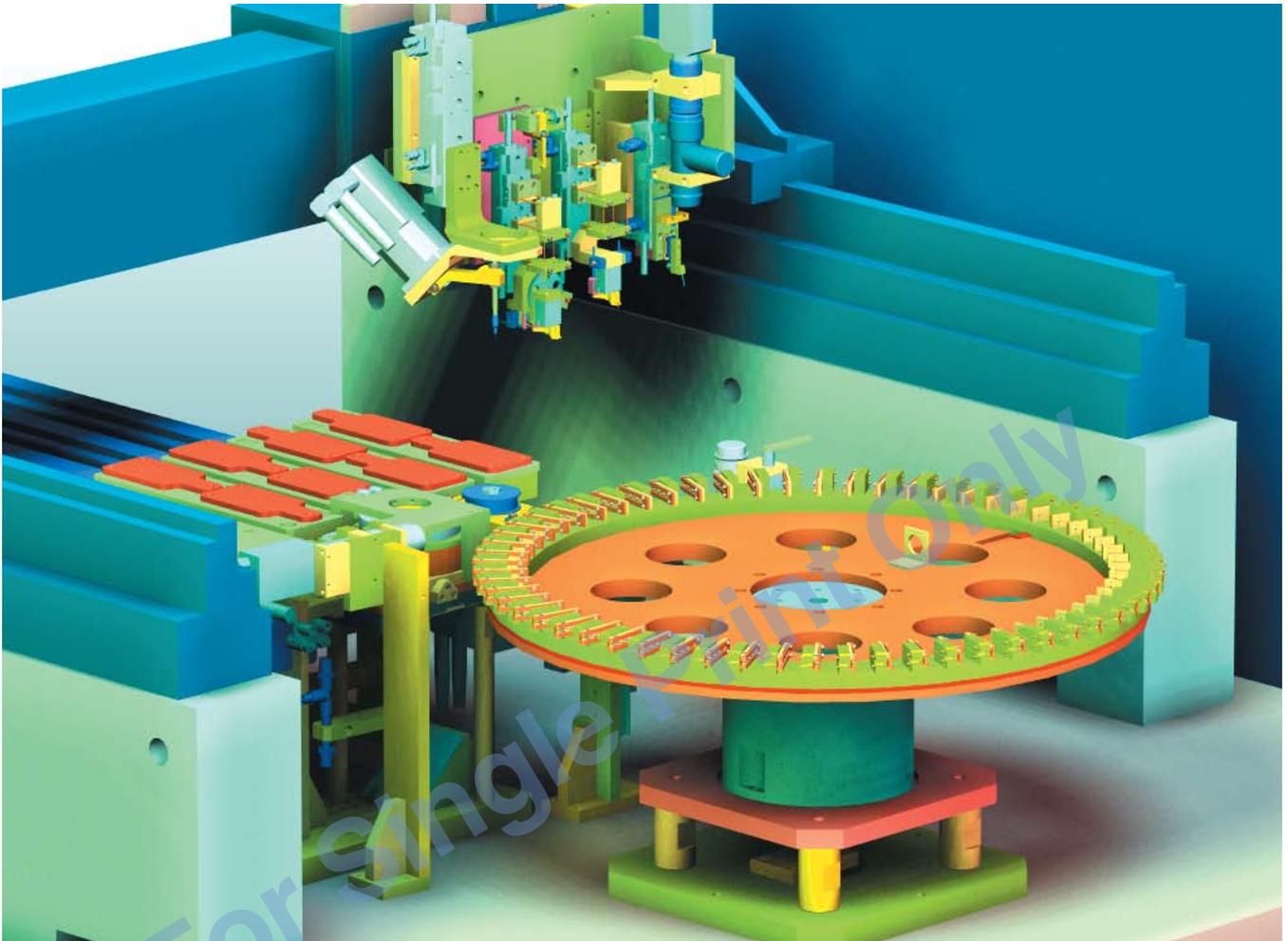


Figure 2

in LabVIEW,” McCleery said. The latest LabVIEW 8.5 has new model-predictive control capability, improved filtering, and runtime tunable parameters. At NIWeek, McCleery demonstrated loop closure improvements in a tool that positioned parts on a rotating carousel for engraving operations. An example of a SolidWorks 3D model is shown in Figure 2.

Part of McCleery’s demonstration was the latest NI Vision Development Module, a library of image processing and machine vision functions adding better edge-detection algorithms and new 2D code recognition. Edge detection using the new code now reliably finds edges with 1/25 or better pixel accuracy and better performance in noisy images. 2D bar codes, which NI says is the most common application for machine vision in industrial applications, benefit from improved recognition. The 2D bar code support includes quick response codes and Pharmacode.

Building level

As bigger wireless sensor networks are constructed to tackle problems such as building automation and distributed process control, Daintree Networks is supplying software to analyze and commission these networks. Jason Choong and Zachary Smith of Daintree contributed an article for this issue, describing the problems encountered in setting up large ZigBee or 802.15.4 networks and approaches to addressing those problems. Their Sensor Net Analyzer is an advanced tool that assists with those deployments. Don’t miss their article starting on page 10.

Gathering in Texas

I’m expecting to see more newsworthy items designed and used by industrial control freaks (again, meant as a compliment) at this year’s ISA Expo in Houston, and we’ll have our wrap-up on that event in our December Industrial E-letter. Just a reminder, you can keep up on the latest news using the RSS newswire on our website at www.industrial-embedded.com, as well as search for the latest products and read more articles on the topic of control.

And keep an eye on our 2008 coverage, where we’ll have E-letters and our fourth annual Resource Guide with articles on topics such as data logging, SoCs and microcontrollers, system software, MEMS sensors, Design for Energy Efficiency, RFID, and industrial networking. If you haven’t subscribed to the E-letter yet, please take a moment to do so at www.opensystems-publishing.com/subscriptions.

Thoughts and ideas about trends, products, or our coverage of industrial topics are always welcome to my attention at ddingee@opensystems-publishing.com.

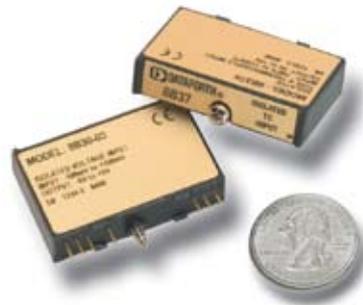
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Commissioning a wireless sensor and control system

By Jason Choong and Zachary Smith

ZigBee sensors are quite easy to install individually, but correctly designing and installing a large network is another matter. Jason and Zachary outline three of the most significant challenges in a big sensor network and describe a variety of solutions that can help overcome them.

Embedded wireless sensor and control systems such as ZigBee provide developers with the infrastructure to create wireless versions of existing sensor and control applications. These technologies can reduce or eliminate much of the cost of wiring, provide greater flexibility with device placement, and enable more scalable systems with meshed networking.

However, these benefits come with additional challenges in commissioning and deploying. The following discussion introduces three of these significant challenges and presents a variety of solutions to address them effectively.

Deployment and commissioning challenges

One such challenge is the *identification* problem. Where sensors or devices are wired to other devices, they can be physically traced to each other. However, this is not possible with wireless. In many scenarios, multiple devices of the same type may be turned on at roughly the same time, so how can one identify a particular device?

In a building with 100 identical sensors (such as temperature sensors), a tool can detect all 100 devices, but how does the installer identify which of the 100 devices is the one in room 16A, given that all devices are functionally identical? How does one identify and select that sensor, place it on a particular wireless network, and make it affect the behavior of the controller in section 16 of the building?

In its general form, this challenge is about mapping logical devices to physical devices, as shown in Figure 1.

Another challenge is the *network design* problem. How does one design a network that can minimize interference from other wireless technologies? Which channel should be used?

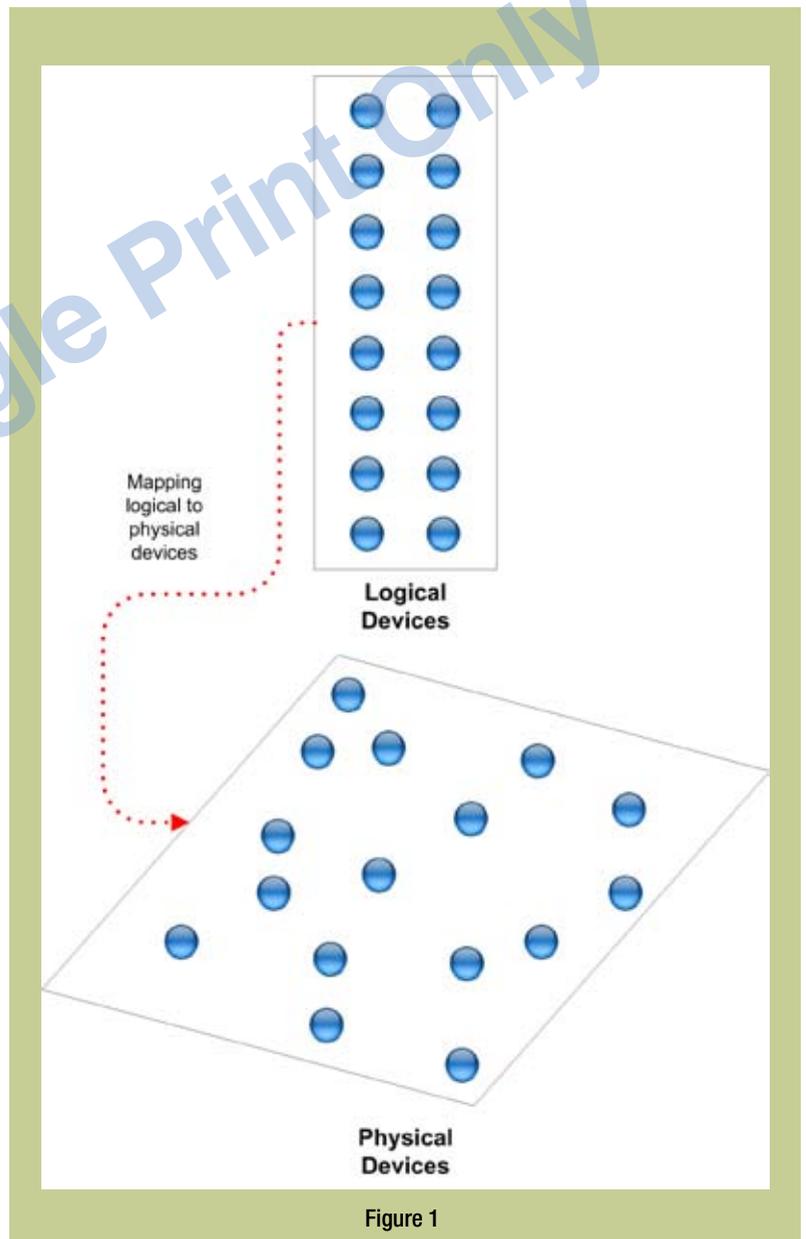


Figure 1

Should devices be placed on the same wireless network or segmented into different networks? This problem also encompasses considerations such as the number of wireless routers to use, the ratio of routers to end devices, and device placement.

motion being sensed on specific sensors? Bindings provide connections between devices. These connections replace the physical wiring by setting up logical control paths between devices. An example of binding relationships within a network is shown in Figure 3.

Solutions for these problems must consider certain practical realities. These include the installer's skills and the availability of tools (or otherwise). In most environments, the end user or installer has no knowledge or understanding of wireless technologies. In others, the installer may have little or no access to tools. Solutions must fit these constraints.

Solving the identification problem

A variety of solutions can solve the identification problem. The main task of these solutions is to provide a means to map logical to physical devices. The need to define a mapping largely results from having identical devices on a network in the absence of distinguishing features.

Sequential activation or commissioning

The simplest solution is to avoid having a collection of logical devices that requires mapping to physical devices in the first place. If the installer has the means to turn on individual devices one at a time, and then take appropriate action on each device, he or she has effectively identified each device. Another way of doing this is to have a button on each device

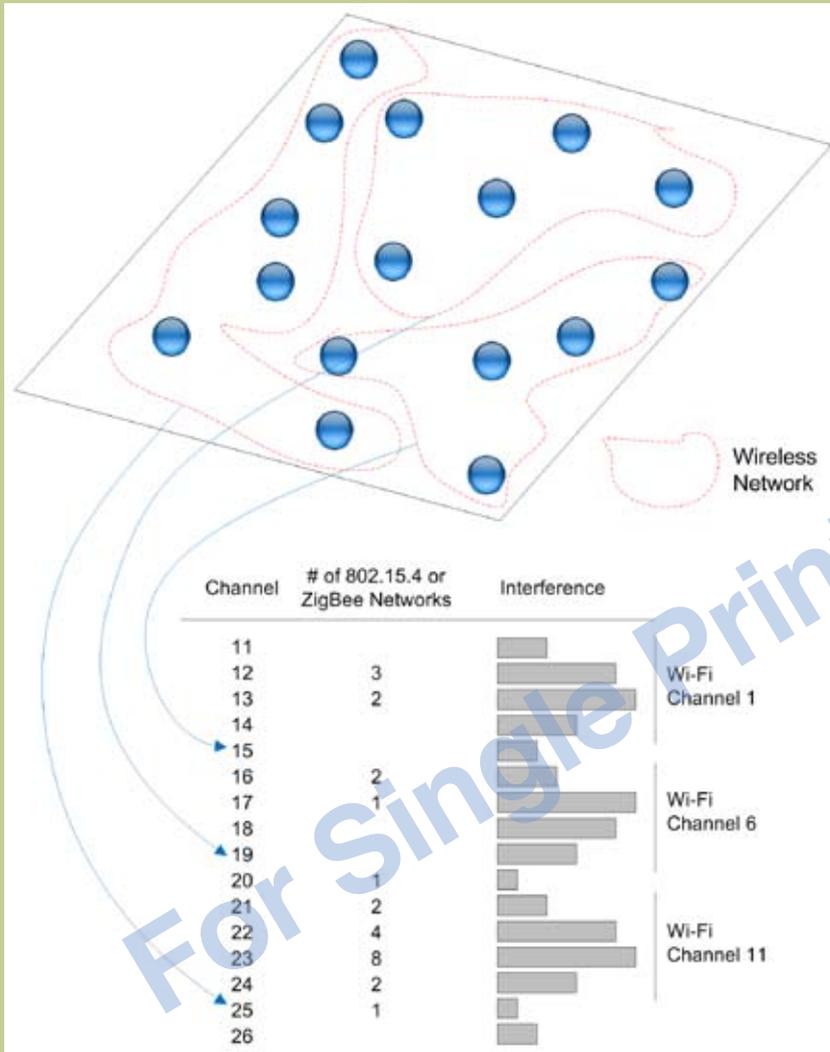


Figure 2

An example is provided in Figure 2. Multiple networks are to be deployed in an environment with existing interfering sources (such as Wi-Fi routers) or other ZigBee networks. The challenge is to establish which channels and networks to set up and then place devices in effective locations.

The third challenge is the *binding* problem. Devices on the same network may communicate to any other device, but which devices should actually be communicating to each other? For instance, as part of solving the network design problem, 12 motion sensors might be assigned to the same network, but which lights should each of these 12 motion sensors be bound to in order for the lights to be automatically turned on as a result of

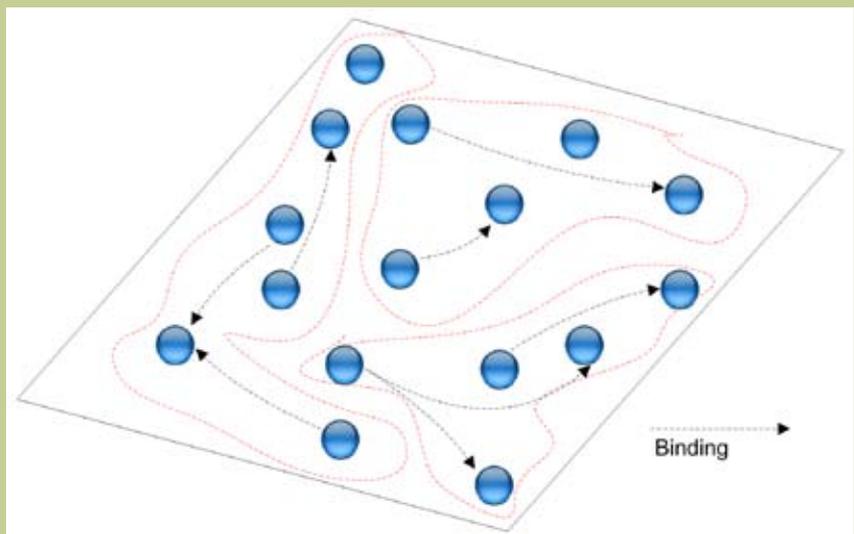


Figure 3

Networking: ZigBee

and, through the commissioning process, require that this button be pressed to effect commissioning only on this device.

Identify thyself

In scenarios where physical access to individual devices is not possible or sequential commissioning is too slow, alternative methods are required. ZigBee provides an Identify Command the device could use to provide an audible or visual feedback. Devices are turned on, and a tool could show a list of detected devices. The installer then selects a device on the

tool to generate an Identify Command. This stimulates an audible or visual feedback, thereby identifying the device. The installer can then decide to take action on that specific device if it is the correct one. This method only works when some physical feedback mechanism is available and accessible to the installer.

Automatic locationing

Another solution is to find some way of automatically locating devices on a plan. Using automatic locationing methods (GPS, ZigBee-based, or some other

method), devices could be automatically placed on a blueprint or floor plan. The installer can then take action on devices based on where they appear on the plan. The effectiveness of this method is dependent on the accuracy of the locating algorithm relative to device density.

Out-of-band methods

A wide range of methods falls into this category. Fundamentally, they involve some means of associating a device identifier to a physical location on a plan or some physical identifier (such as a room or floor number). While similar to automatic locationing, this method differs in that automatic locationing may be somewhat less accurate but is more convenient, as it requires minimal or no additional work to identify the device.

Out-of-band methods involve some custom or special methods to tag devices outside (out-of-band) of the usual ZigBee or wireless communications.

An example is provided in Figure 4. Devices can be manufactured with a barcode, which is associated with a device ID (such as an IEEE address for ZigBee). The barcode is then scanned, and the installer associates that barcode with a position on a (paper or electronic) plan or perhaps a room identifier. These then allow for later identification when an action needs to be taken on a specific device by using the physical location or a room identifier.

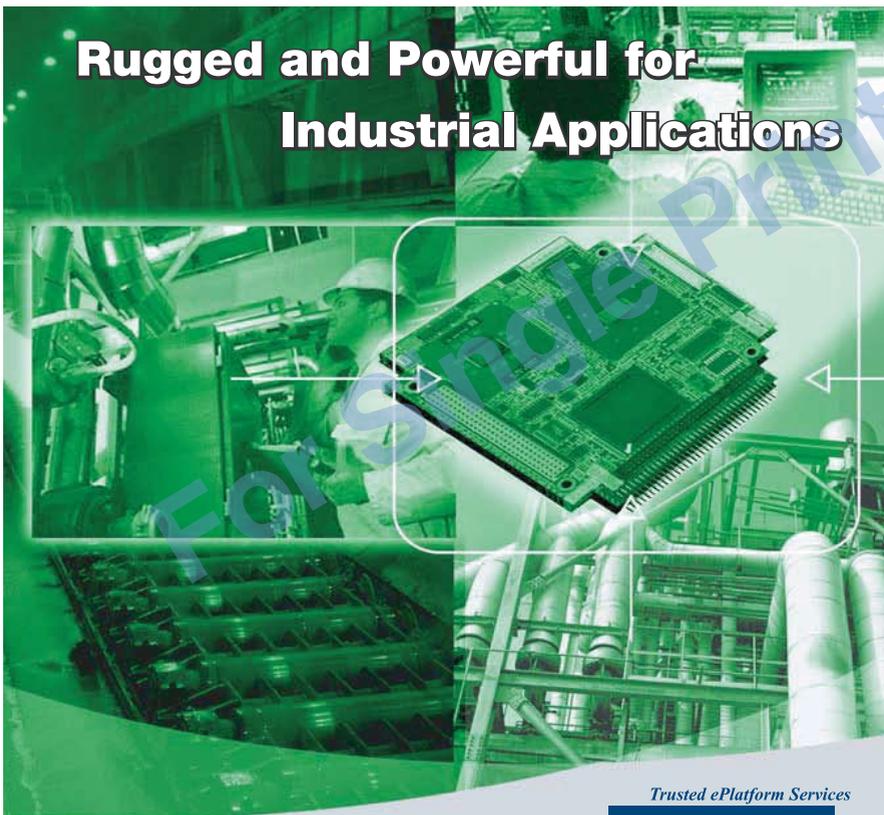
Solving the network design problem

Network design is affected by the operating environment and the requirements of the application. Environmental factors include other radio networks, radio propagation, and available locations to place devices and routers. Application characteristics that impact network design include device density, how often devices communicate or sleep, and sensitivity to performance.

Channel selection

Channel selection is mostly influenced by the environment. In particular, avoidance of interference from Wi-Fi and other 2.4 GHz-based technologies may impact the channel choice.

ZigBee has two methods for optimizing channel selection. It can be set up to automatically select the channel with the lowest energy (or interference) when the



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coordinator is first started up. It also has a mechanism to change the network's channel when interference is believed to be causing significant problems.

Additional steps can be made to improve channel selection. These may include taking energy scans across the entire building or operating environment (the coordinator itself may not detect interference in a remote part of a building) or proactively initiating channel changes prior to problems occurring.

Network planning

Network planning encompasses a wide range of issues. For instance, how many wireless routers are required, or more aptly, what is the ideal ratio of routers to end devices for a specific application? Where should routers be placed?

The key metric for determining this is connectivity. Wireless mesh networking works best when every device has more than one path to reach the rest of the network. This provides resilience against temporary signal loss from radio fading or more permanent signal loss from a newly introduced obstruction or interfering radio source. It allows devices to find alternative routes to reach other devices.

Pre-release testing will provide some indicators on router-to-end-device ratios. In actual deployments, installers can deploy devices to these ratios and, using reports on connectivity, add additional routers or place them in alternative locations to improve connectivity.

An example is provided in Figure 5. With the exception of router 287b, the routers

How far could you go?

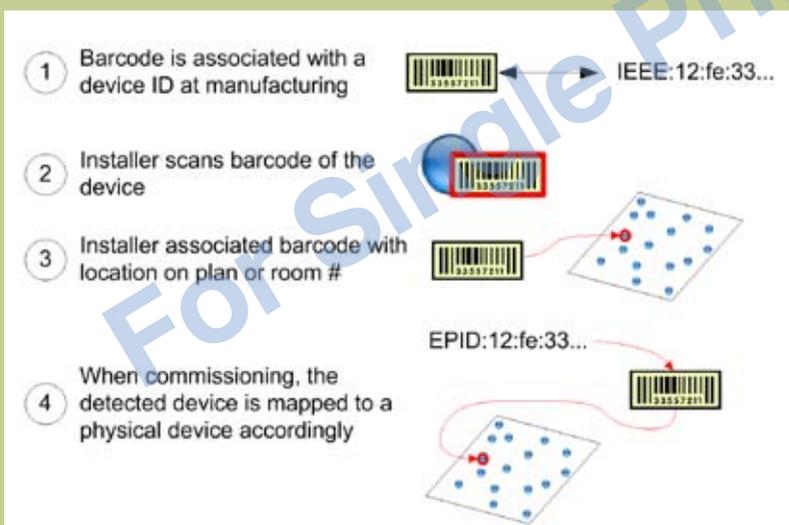


Figure 4

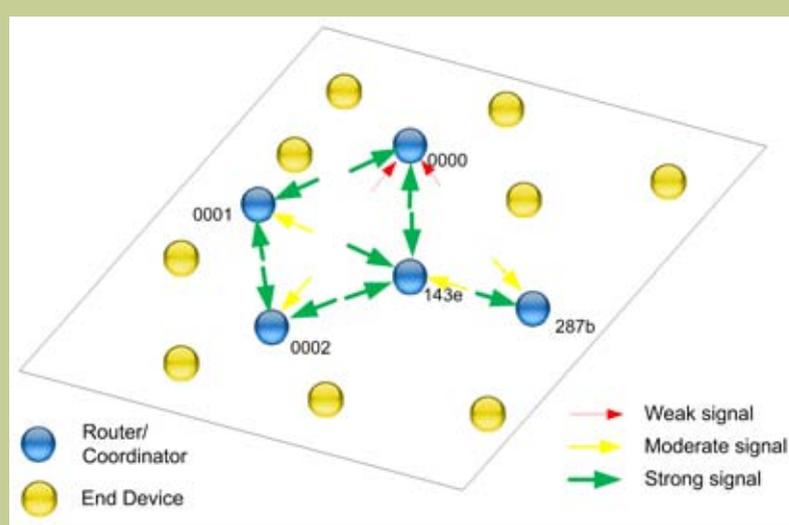


Figure 5



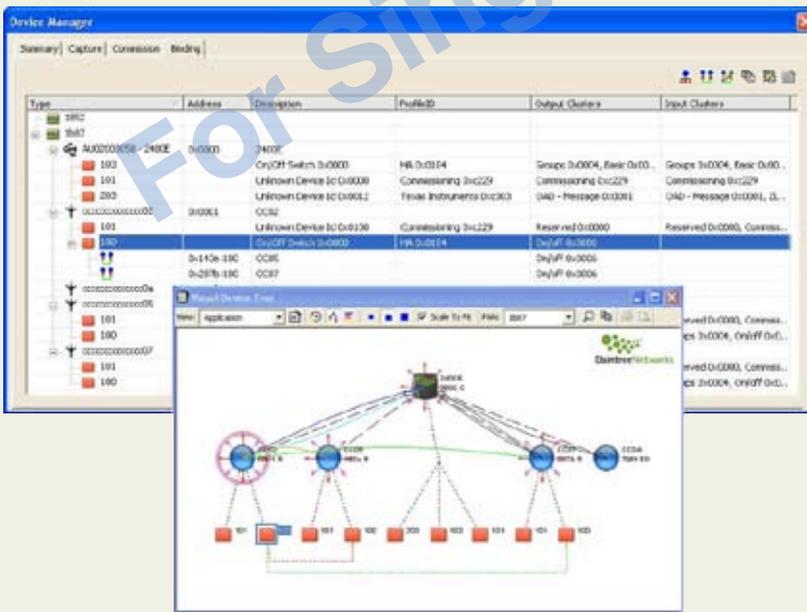


Exactly what the devices-to-network ratio is and how those networks should be spread across different channels is highly dependent on the application, radio channel utilization, and device density.



Powerful testing and analysis in one solution

Daintree's *Sensor Network Analyzer (SNA)* provides one of the industry's most comprehensive solutions for ZigBee and 802.15.4 testing, analysis, and commissioning. The SNA simplifies the configuration and commissioning of 802.15.4/ZigBee systems during development, field trials, deployment, and maintenance with easy-to-use GUI and standards-based, over-the-air commands to ensure interoperability.



Network visualization, locationing, and API features provide the tools required to design and verify device identification solutions. Network design parameters can be obtained using network analysis, channel scans, performance analysis, and over-the-air startup commissioning. Through binding and group commissioning features, control paths and bindings can be set up quickly and verified.

The SNA combines powerful testing and analysis tools (ideal for field trials) with an intuitive user interface and unique visualization capabilities (ideal for installers). Incorporating the latest industry standards, this is a beneficial solution for any ZigBee deployment.

have good connectivity to at least two other routers (as shown by colored arrows). Should the only good connection available to 287b fail (through 143e), 287b may be isolated from the rest of the network.

Another consideration is the way the ZigBee network should be segmented. Should a single ZigBee network be used to provide the infrastructure for all applications in a building or factory? Should several networks be constructed to provide independence for different applications and systems – one network for lighting and security and a different one for machinery? Alternatively, the networks could be partitioned by location – even floors for one network, odd for the other to reduce device density.

Using a single network reduces the need for duplicate infrastructure. Only one set of wireless routers and a single wireless security system are needed. Conversely, a single network may also result in performance degradation since more devices use the same channel and routing infrastructure.

Exactly what the devices-to-network ratio is and how those networks should be spread across different channels is highly dependent on the application, radio channel utilization, and device density.

Devices also could be on different wireless networks but still be on the same “network.” This can minimize interference due to high device density or allow remote wireless networks to be on the same network. By using ZigBee bridges, devices can communicate to any other device across wireless networks on different channels and in more remote locations, as shown in Figure 6.

In this example, devices in building #1 are segmented into two different wireless networks on different channels to minimize interference, while TCP/IP infrastructure is used to bridge these networks together with a third wireless network in a more remote building #2, creating a single ZigBee network for all devices.

Solving the binding problem

By this stage, the means to identify devices has been determined. Devices are now on the networks they need to be on. The next challenge is to determine the control path

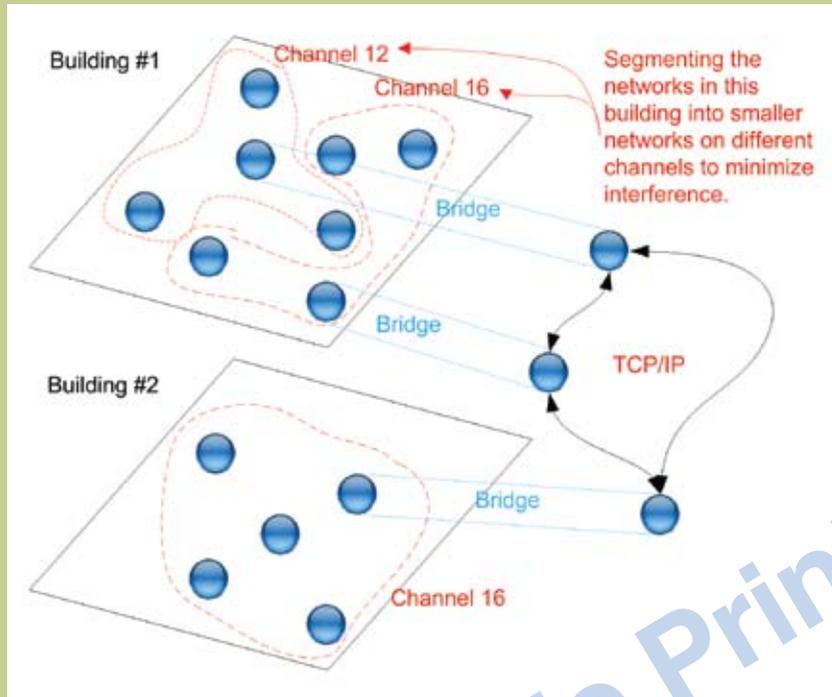


Figure 6

between devices – that is, how devices should be bound to each other.

Binding is application specific. A light switch and a light fixture should be bound together, but the light fixture should not be bound to a thermostat. However, the switch could be bound to an air conditioning unit to turn it on or off.

The specifics of how devices are bound may be application dependent, but the binding procedure can be generalized into a few common methods.

Binding through stimulus on devices

In applications with simpler binding relationships, such as between a single light switch and fixture or between an air conditioning unit and thermostat, binding decisions are relatively simple. Buttons or Dual In-line Package (DIP) switches could be provided on devices to allow the installer to make binding decisions directly. These often take the form of buttons with timers (“if two devices have their binding buttons pressed within x seconds of each other, they are bound to each other”) or switch settings (“two devices that need to be bound to each other should have their DIP switches set to the same value”).

Automatic bindings

The ideal binding method is to have bindings set up automatically. This is viable in certain applications. For example, in an application comprising a large number of sensors and a single gateway that collects all this information, no special binding is required. All sensors send their information to that single gateway.

More complicated applications also may be automated. For instance, if through the identification stage room numbers are used to identify device location and devices in each room are always bound to each other, devices found to be in the same room could be automatically bound to each other.

Manual or machine-based binding

In more complex applications and installations, other methods are required. For instance, if the behavior of a variable air-volume controller may be determined by multiple temperature sensors, thermostats, and motion sensors, manual or machine-based control systems are required.

This final class of requirements deals with more complex scenarios that cannot be adequately handled by simpler “buttons on devices” or be completely automated with simple algorithms. Here, tools

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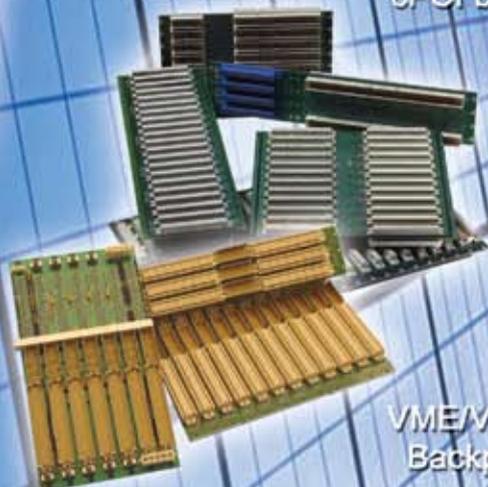
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	0001		
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	143e		
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Figure 7

or control systems are required to set up more complex binding relationships.

Work orders and the user interface Solutions for identification, network design, and bindings may involve complicated algorithms or complex protocol interactions. However, work orders and the user interface for tools used by the installer should be simple. It is expected that most, if not all, installers will have no knowledge of the underlying communication technology, or even wireless for that matter. What is presented to the installer must be a lot simpler.

Consider, for instance, the complexity shown previously in Figure 5. To interpret the measurements shown in this diagram, an understanding of radio communication is required. The algorithms used to determine sufficient connectivity between routers should be hidden from the installer. Summary information should be provided instead, as shown in Figure 7. Green status symbolizes sufficient connectivity, while yellow or red status alerts the installer to insufficient connectivity and is perhaps accompanied by simple recommended actions to resolve the problem.

Choices available to installers

This article describes three key commissioning challenges – identification, network design, and binding – and offers a variety of solutions. The choice of solutions, work orders, and user interface to the installer is highly dependent on the nature and requirements of the application, the installer's skills, and the tools at the installer's disposal. **IES**



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The ten-cent solution

By John Beans

RFID, or perhaps more accurately, RF solutions carry some mystical properties with them. Sometimes, the magic just doesn't seem to work right. Instead of looking for more technology magic, a little common sense can yield a better solution.

As companies are beginning to deploy RFID tags in large production operations, customers are discovering a number of reliability and scalability issues. Sometimes the solutions to these problems are very creative, with a few even resulting in the creation of new technologies, products, and services. And sometimes the creative solutions are both simple and effective, such as the following example from an actual RFID project.

Vendor-managed inventory could be the ticket

A multibillion-dollar distributor wanted to radically change the way it did business with its customers. In fact, it wanted to change the entire business model. The conventional business model for its product distribution was well understood: the customer orders more products when they are needed. The customer is responsible for monitoring stock levels and disposing products that have expired (the products in this case have a strictly enforced shelf life). The distributor has plenty of competition, which means that customers can play one distributor off another, and consequently, margins are tight. This model seems to limit the investment the distributor can make in upgrading its business processes.



This particular distributor envisioned a different sort of business model, one with dramatically higher margins. If feasible, this alternative business model could quickly pay back the required investment.

The new service would work as follows. The distributor would install at no charge to the customer a new storage unit at the customer's site. The distributor offered a new business arrangement stipulating that it would own the inventory and the customer would not be billed until the product was taken from the cabinet. The distributor would assume responsibility for ensuring that stock levels never dipped below preset amounts and would handle expired items.

This model would potentially provide customers a huge benefit. The inventory-

carrying cost and overhead of managing the stock levels of these items would

shift to the distributor, and the expense of expired items, which could cost as much as \$100,000 each year, would disappear. In addition, the dramatic reduction in out-of-stock situations would improve the customer's business operations and client satisfaction.

Not as easy as it looks on paper

The storage units in this example were equipped with hidden RFID readers and antennas. To keep deployment costs low, the company wanted to use the least expensive RFID tags that would work on each unit.

The products within the cabinet numbered in the hundreds and would very likely end up jumbled and piled up at some customer locations. For the service to be practical, it could not require any special treatment or actions on the part



Figure 1

of its users. The rules had to be simple. If the product was in the cabinet, it would appear in the distributor's system as present. If someone took it out, that should be apparent as well. The customer couldn't be expected to stack the products a certain way or to maintain neatness. It just needed to work.

The cheapest RFID tags come in the form of passive (no battery) paper labels. Passive RFID has its limitations, and this situation stretched them severely. Read range wasn't really an issue; the cabinet was not overly large, and Ultra-High Frequency (UHF) tags have ranges of more than 10 feet. What presented a problem was the sheer number of items and the possibility that those items would be stacked. In some cases, tags would be pressed right up against neighboring tags, and many items blocked RF waves from passing through them.

First attempts were close, but ...

Cabinet prototyping was the first step. A Motorola UHF RFID reader and a Blue Vector Edge Manager (shown in Figure 1) handling business rules, data translation, and integration were installed in each cabinet.

Three hundred tagged products were loaded into the cabinet. The readers were fired up, and the results were a bit unexpected.

The system reported 294 items most of the time. Stacking and jumbling the items varied the result very little, a testament to the robustness of Gen 2 RFID technology. But 100 percent read reliability – in this case, finding and reporting 300 items –

seemed unachievable no matter how the antennas and system settings were adjusted.

After a great deal of fiddling with antennas, angles, powers, and configurations, RF experts assessed that the spatial relationship between the antennas and the large number of randomly oriented tags created complicated interactions and certain unavoidable dead zones.

The right angle

Then someone suggested a rather simple solution: adding a second, redundant RFID tag to each item. The original tag was on the back of each box; the second tag was added to one side at a right angle to the first. The Edge Manager in the cabinet was configured to recognize and report the presence of each item by either tag.

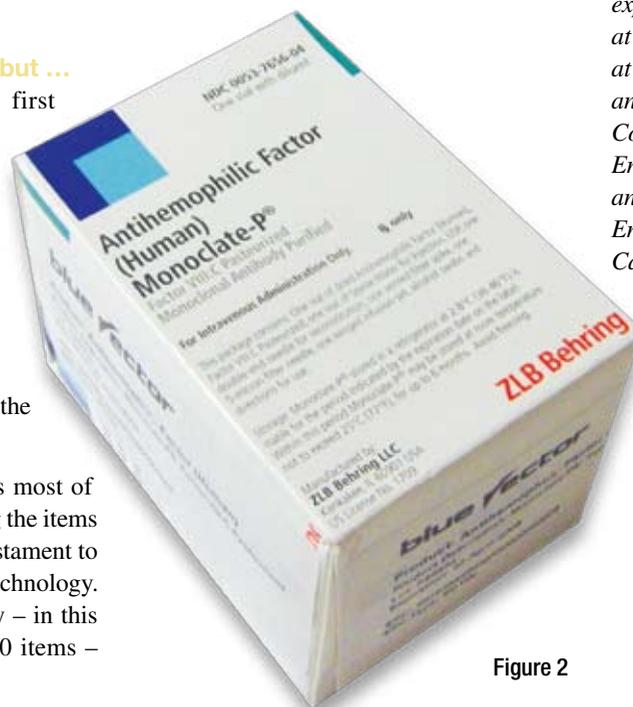


Figure 2

The result was startling. It became nearly impossible not to read 300 items in the cabinet and appeared that the odds of not being able to read at least one of the two tags on each item (similar to the box shown in Figure 2, courtesy ZLB Behring) were exceedingly low. Suddenly, the exact orientation and configuration of the antenna and reader mattered less. Per the original requirements, it just worked.

Simple solution, big results

Sometimes the solutions to RFID problems can be expensive and require extra equipment and even operational process changes. But the solution in this example only cost a dime (the current cost of a UHF tag) per item, which was acceptable in this distributor's industry, and did not require any change to how the end customer uses the service.

The cost of adding a second RFID tag to each item: 10 cents.

Confidently keeping accurate inventory counts in customer locations: priceless. **ES**



John Beans is the VP of marketing for Palo Alto, California-based Blue Vector Systems, which has developed an automation platform that integrates a

variety of RFID, barcode, temperature, and other industrial sensors with back-end enterprise applications. John's experience spans manufacturing systems at Datasweep and Camstar, networking at SBC Communications (now AT&T), and strategy consulting at Bain & Company. He has a BS in Mechanical Engineering from Clemson University and an MS in Control Systems Engineering from the University of California at Berkeley.

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Extended memory RFID tags provide immediate access to data anywhere, anytime

By Sam Liu

While “license plate”-style or limited memory RFID is achieving real business benefits across industries, there’s a whole gamut of high-value applications that can only be realized with extended memory RFID tags. Extended memory enables these tags to operate as portable databases to deliver real-time, actionable information without the need for network connectivity.

Standard RFID tags offer only a limited amount of memory (96 bits). That’s just enough to store an electronic product code number, which consists of a universal product code plus a serial number. RFID systems based on these tags use the same “license plate” approach as the bar code-based systems widely deployed today.

The limitation of a license plate architecture is that these RFID systems must link to local or remote databases to obtain additional information about a specific tagged item. This requires a robust network infrastructure that guarantees secure, reliable, and speedy access to a central database where additional item data resides.

Portable databases eliminate network dependencies

RFID tags with more onboard memory enable organizations to overcome license

plate RFID architecture limitations. Extended memory RFID tags serve as individual, portable databases containing additional information about the tagged item, eliminating the need for robust network connectivity between the RFID reader and a remote database server.

A portable database architecture using extended memory RFID tags delivers extensive benefits for applications such as asset management, product life-cycle tracking, yard management, shipping container tracking (above the case and pallet levels), and applications involving sensor-based inputs. For instance, the on-tag memory enables decisions to be made at the *point of use* and insulates the application from network connectivity issues or delays that could hamper operational efficiency or result in mishandling the tagged item.

When extended memory RFID is the answer

Thanks to extended memory tags, a variety of business challenges and constraints can now be addressed using RFID technology.

Network connectivity availability

In some environments, network connectivity is unavailable or is not 100 percent reliable either in terms of coverage

or response time. In field service applications, the technician may have wireless access via a cellular service provider but is not guaranteed 100 percent coverage. In manufacturing and warehousing environments, the quality of service may be compromised by available bandwidth or response time. This is particularly true where RFID traffic might be competing for limited network bandwidth with other enterprise applications or in situations where choke points exist within and between network nodes.

Supporting item documentation

Shipments and assets that move between locations and trading partners require bills of lading and chain of custody documentation to move with them. Even when an advanced shipping notice is transmitted electronically between trading partners via Electronic Data Interchange (EDI)- and XML-based transactions, the materials often arrive ahead of the paperwork. In many cases, the data contained in these typically paper documents could be encoded into the RFID tag’s extended memory.

Actionable information at the point of use

The portable database approach becomes very important when mission-critical operations are dependant upon verifying some aspect of an asset’s history.

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support preventive and predictive maintenance applications.

Illustrating portable database architecture use

While the full breadth of extended memory RFID tag applications is too vast to list, the following examples provide some insight into the capabilities and benefits extended memory RFID offers.

Container tracking

Portable database tags provide immediate visibility into the contents of cargo containers, reusable totes, and parts bins by storing electronic manifests, parts lists, and bill of material information directly on the RFID tag. Armed with real-time information as to the availability, location, and condition of both full and empty cargo containers, freight carriers can more efficiently load and unload cargo, minimize lost and misplaced containers, and reduce the tendency to over-procure containers to meet anticipated peak requirements.

Electronic manifests

RFID readers capable of reading both license plate and portable database tags read license plate tags on individual shipments as they are loaded into air freight cargo containers. Upon sealing the container, the same reader can write the individual shipment information (that is, the contents of the container) to the portable database tag on the container. The electronic manifest stored on the portable database tag can be read at the receiving location, thus enabling container content verification without breaking the seal.

Nested visibility

In over-the-road transportation and logistics operations, truck trailers can be tagged with portable database tags. As trailers are loaded, the pallet- and case-level tags are read and written to the trailer-level tag as an electronic manifest. When the trailer enters the yard at the receiving location, the electronic manifest can be read automatically from distances of 50 meters (150-plus feet). This enables the receiving location to immediately compare the manifest to the master schedule and determine whether to route the trailer to a specific receiving dock for unloading or to a staging area in the yard. By more effectively staging lower-priority trailers in the yard, the facility increases throughput and warehouse capacity while reducing the number of times merchandise is handled.

For instance, extended memory can capture an asset's maintenance, repair, and usage history and/or future scheduled service. Storing this information directly on the tag provides instant visibility to the part's service history (for example, what repair activities have been performed, when, where, and by whom). In a multi-step repair process, the data on the tag provides information on steps already performed and those that are still pending, such as waiting for a missing part to complete a repair.

Data logging sensor-based inputs

When combined with sensor-based input, the portable database tag can serve as a data logger. In cold-chain applications, the tag memory can log time-stamped temperature readings on items as they are transported via refrigerated truck or rail car. As items are unloaded, decisions can be made about the condition and fitness for use at the point of unloading. In the utilities industry, fixed assets in remote locations can be tagged with extended memory tags to log flow rates, temperatures, pressures, and other salient information to

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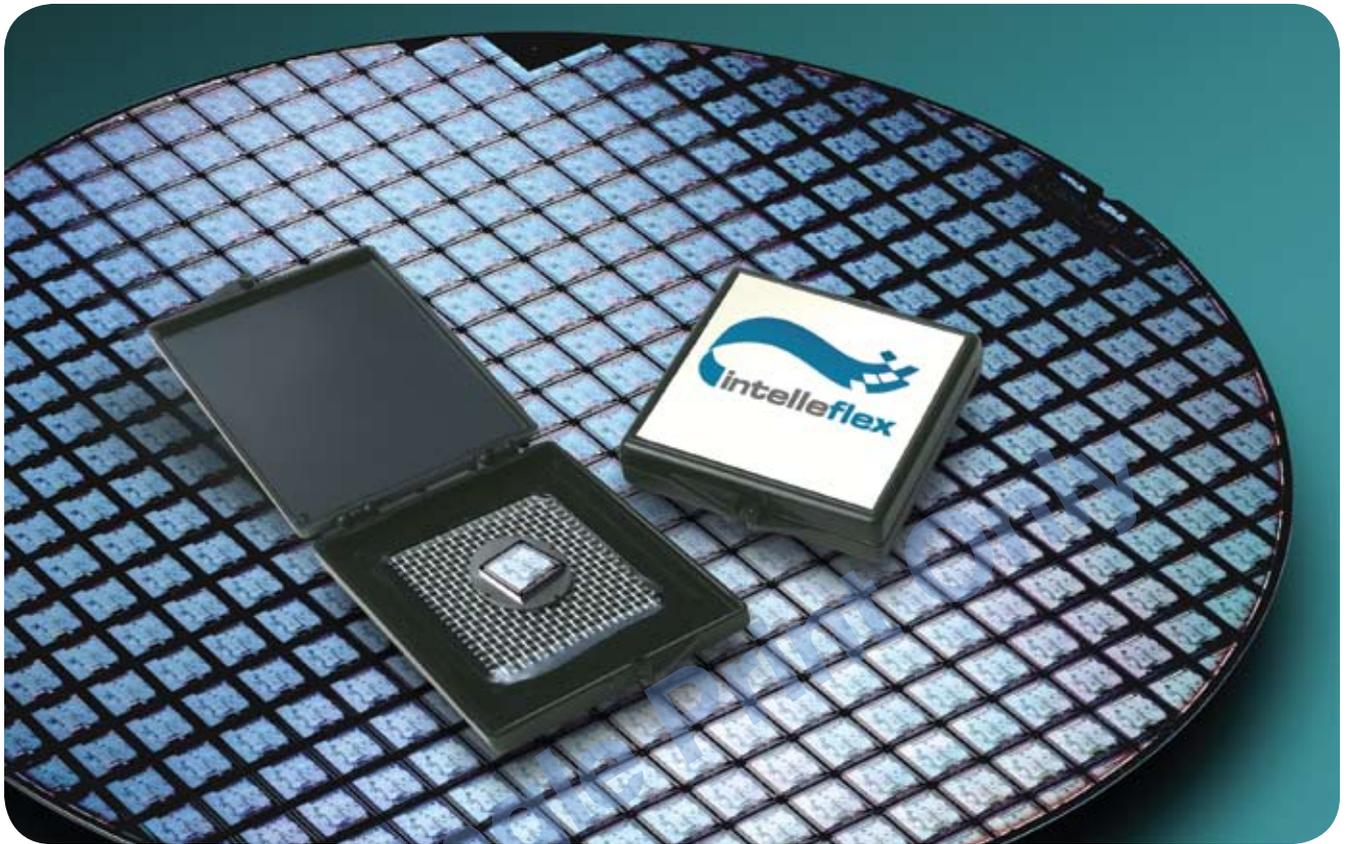


Figure 1

Boeing leverages extended memory for improved part tracking

Boeing will soon begin using RFID tags to track thousands of maintenance-significant parts, high dollar value items, line replaceable units, and limited life parts that must be frequently inspected, repaired, and replaced. RFID will be used to track a part's birth record (items like country of origin, birth date, manufacturer, and serial number) and life record (data such as flight time and inspection/repair history) throughout its life cycle.

Boeing has selected a 64 Kb chip (Figure 1) from Intellex that can permanently lock birth record information about a part while providing read/write capabilities so that mechanics in various repair facilities can update the part's life record. The combined life-cycle record can be read by service centers around the world wherever and whenever inspection and repair activities need to be performed.

To enable this, the RFID tag features commands that provide individual control of 1 Kb memory blocks, read and write locking and permalocking for each memory block, and password management for reading and writing locked memory. Each memory block has three associated

bits to control different locking combinations: read-locked, write-locked, and permalocked.

With the extended memory RFID system, logging a part's flight hours, maintenance, and repair histories directly on the RFID tag will reduce the costs of tracking and maintaining service history on parts. It also will reduce the cycle time to solve in-service problems by providing the part's repair history in real time without relying on network connectivity to dozens of databases spread across several maintenance, repair, and overhaul facilities around the world. Furthermore, electronic maintenance records stored directly on the RFID tags will reduce airlines' reliance on paper records and ease future compliance with FAA documentation requirements.

Immediate answers to time-critical questions

Is the aircraft part cleared for flight? Is the produce fresh? What's inside this container? These are all questions that can be answered immediately by interrogating portable database tags without requiring access to remote databases.

The ability to store large amounts of information directly in tag memory is the key

to enabling portable database-powered applications, including uses in aerospace parts maintenance, manufacturing work-in-process control, advanced asset management, and intelligent supply-chain optimization. When immediate access to actionable information regarding the status, condition, or contents of high-value parts, assets, or shipping containers is required and network connectivity to remote databases is not assured, the portable database RFID tag can provide the data needed to make informed decisions in a timely manner at the point of use. **IES**



Sam Liu is director of marketing at Intellex in Santa Clara, California. He has six years of RFID and security market experience as well as more

than 18 years of enterprise and Internet experience in marketing. Sam has a BS in Computer Science from San Francisco State University and an MBA from Golden Gate University.

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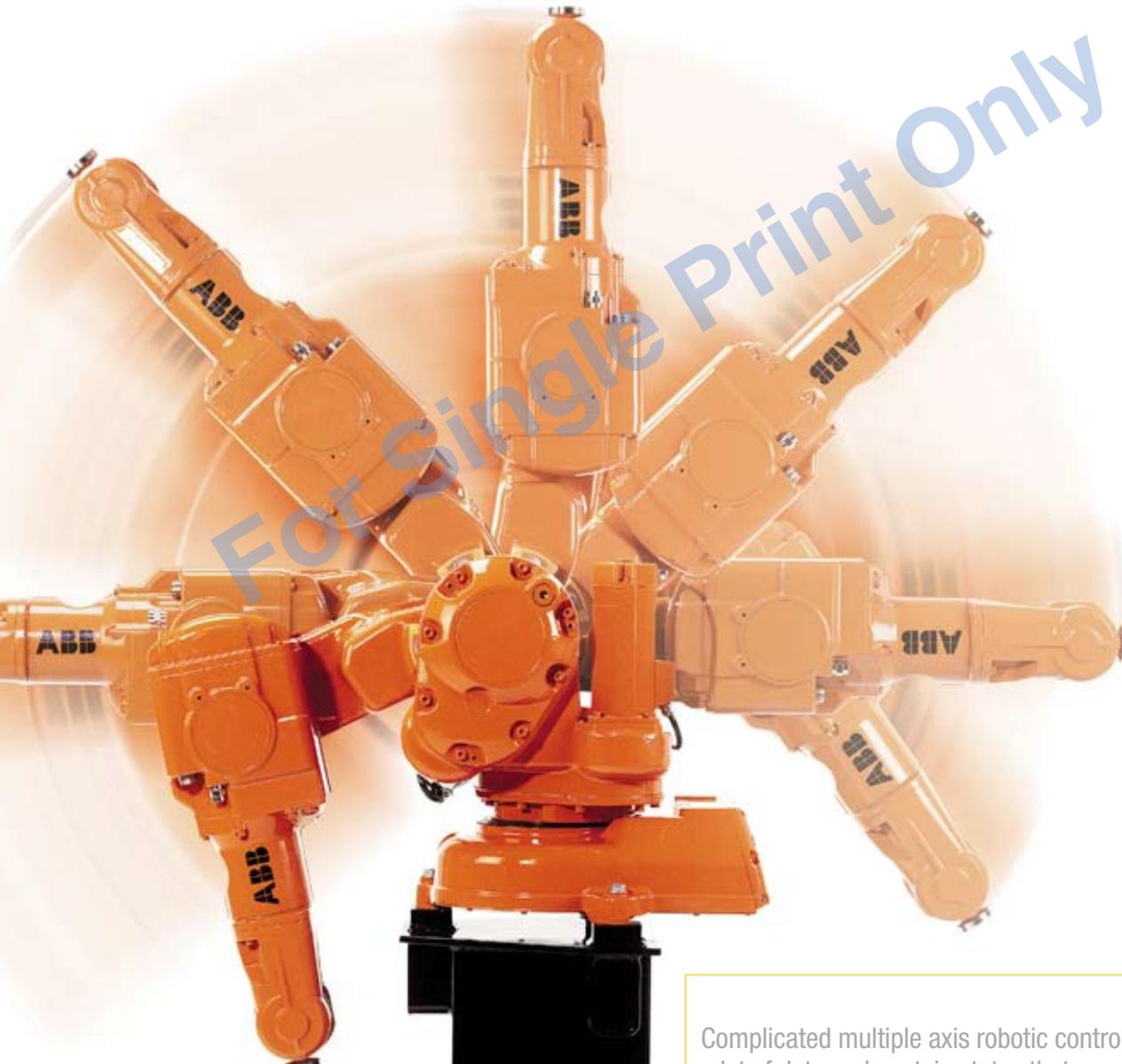
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nvSRAM improves rapid recall in multiple axis robotics

By Rich Paulson and Rich Hooper, PhD



Complicated multiple axis robotic controls generate a lot of data and contain states that must be restored quickly in the case of partial or complete power failure. While technologies like flash and battery-backed Static Random Access Memory (SRAM) have been used, another solution based on nonvolatile SRAM (nvSRAM) offers significant advantages.

As the number of modern manufacturing facilities increases worldwide, the use of robotic machinery is now more the rule than the exception. Typical applications include mechanical assembly, material handling, dispensing, routing, electrical assembly, packaging, test, and inspection. Six axis robots, conveyor control, and other feed mechanisms require substantial coordination. Multiple robots also may work together on the same project simultaneously. (See Figure 1, courtesy of RobotWorx, Inc.)

With each passing day, factory automation requirements are demanding a greater number of axes on robotic arm equipment, as well as tighter tolerances on their movement and performance at the point of application. This coordinated subsystem interaction demands intelligent fault management and continuous improvement of distributed control programs. It becomes essential that data is captured in fault situations, including power spikes, brownouts, high noise, and power grid failures. This article examines different semiconductor memory solutions for data storage and retrieval after a power-failure event has ended and system power has been restored.

Faster control for a growing data mountain

Combine the constant flow of closed-loop positioning information fed back from the

robotic sensors with the data logging of detailed arm movement history for quality control purposes and the result is ever-increasing sizes of constantly written cache SRAM. Other memory technologies such as Electrically Erasable Programmable Read-Only Memory (EEPROM) and flash physically wear out with repeated use and exhibit extremely slow write speeds[1]. Keeping position and velocity data properly recorded at a blistering rate of five million updates per second is essential for higher-quality contour profiling. Flash memory write delays are 2,500 times slower than SRAM, limiting the closed-loop control rate to 2 KHz. Position, velocity, and acceleration can all change continuously during motion profiles.

The high update rate of Proportional Integral/Differential (PID) motion control makes real-time tracking of all positions next to impossible for the upstream control. Eliminating the nonvolatile real-time updating of the robot's state risks system operation restart errors. It is crucial for a robot to properly record its last-known state under the most adverse conditions, or else the overall system's operational costs could increase as a failure of some kind would inevitably occur.

Using low-power SRAMs and a large battery source for backup, some manufacturers have attempted to address system recovery after a power failure by making



Figure 1

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all of the semiconductor memory space nonvolatile[2]. Because SRAM is of the low-power variety, it is also slower and more expensive when used in large banks.

Research in the area of persistent storage systems, known as *Solid-State Drives (SSDs)*, reveals that data corruption is a significant risk[3]. First, electrical or electromagnetic noise can still upset memory contents because of the slow response of the battery switchover circuits. System faults frequently increase in industrial environments where large motors, electrical

contactors, and electromechanical valves all can create radiated and conducted emissions[4]. Second, software programs can have bugs, bad pointers, stack overflows, or arrays addressed out of bounds that can cause unintended write operations to what is supposed to be secure data. Data stored on a flash drive or a hard disk drive is not a part of the computer's address space. Therefore, other techniques in battery-backed main memories must be employed to truly secure valuable and fast-changing parameters from power loss or other risks.

Persistent memory requires protection beyond a battery

Persistent memory's key essential feature is a memory write-protection interlock system. Many microprocessors have protected memory spaces whereby a program is stopped when it attempts to write into another program's data or program area. While this is typically found in PC-class processors (such as Pentium, Power Architecture, and 68000), most DSP processors used in real-time motion control do not have this capability. A simple write-protection scheme involves using an I/O port pin to control write protection in the memory access controller. Non-volatile memory updates then require the write-protect interlock to enable access. This protects the nonvolatile data from inadvertent write operations.

Another issue is battery switchover and power-off write protection. Typically, very fast power spikes can disrupt operations before the analog comparator circuits can act, so it is important to ensure that the proper memory protection is in place.

Many robotic systems exist as a part of a larger coordinated system, and the complexity is growing each year. In this environment, an unrecoverable fault can have ripple effects throughout the operation. Power grids are becoming more and more overloaded as energy use grows, thus placing an increasing strain on the power-transmission infrastructure. Fast, nonvolatile memory throughout the system is advised so that the entire operation can be restored completely and as fast as possible with minimal scrap, rework, line downtime, and most importantly, the safety of operators and other manufacturing personnel.

The magic bullet: transaction logging into fast nvSRAM

Successful, coordinated control structure can be enhanced through transaction logging. Transaction logging is a two-step process. First, record the robotic event that needs to be completed into the log. Second, when the event is completed, reconcile the log. This is much like reconciling a checkbook, which ensures that the bank's records and the customer's records are *in sync*. This concept also applies to a multitude of robotic coordinated tasks.

For example, in a contour profile, which is a description of the robotic arm's movement, a piecewise linear path is

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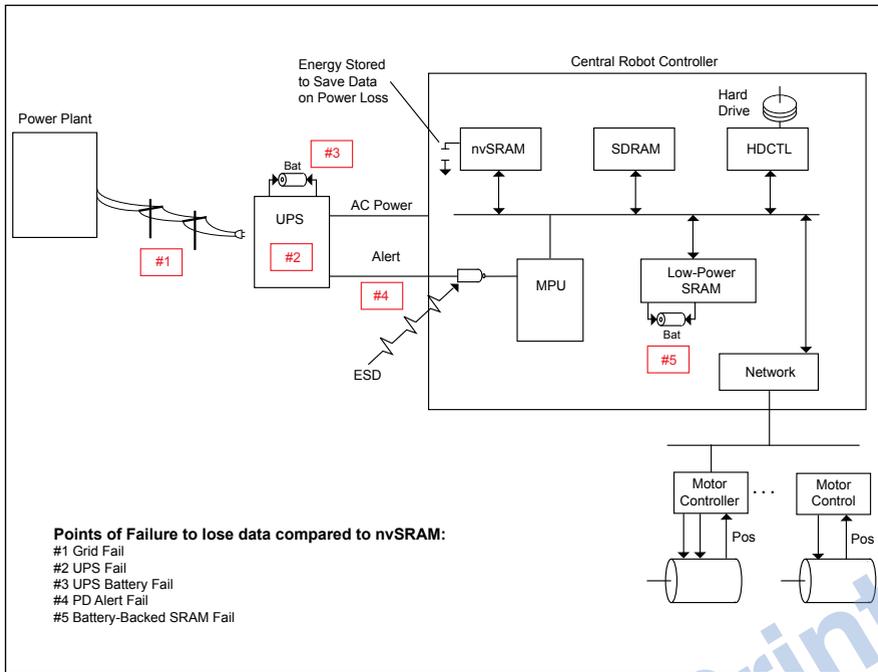


Figure 2

constructed of the arm's tool point. Inverse kinematics translates the tool path into angle and velocity changes for each axis for coordinated motion. A smaller contour interval results in a better approximation of the exact curve. At the end of the profile interval, each axis should be at the desired location. However, coordinated control requires a position check to assure that each axis has completed the operation and is close enough to the ending coordinate to be within acceptable limits. The end result is a faster control loop that provides smooth curve fit quality and highest throughput. Having a transaction logging process capable of high-speed operation is therefore imperative.

The preceding illustration is a simple example of coordinated axes control with robust transaction logging. However, far more complex processes involving conveyors, multiple robots, handlers, and upstream-feed information require the global transaction logging processes to ensure proper coordination simultaneously at many levels. The key requirement of a transaction log is to ensure that actions or events have actually occurred in the right order or in the logical arrangements the application requires. This coordination method requires nonvolatile storage of the rapidly changing parameters. Central logging over a network is not viable because of the risk of overloading the network's bandwidth and possibly losing valuable data.

Uninterruptible power supplies not enough

The Uninterruptible Power Supply (UPS) is intended to keep the system active to handle grid failures and allow enough time to shut down cleanly. A power-failure alert from the UPS commands the Main Processing Unit (MPU) to save its data to a disk drive or flash memory so it can resume properly when power is restored. However, grid power outages are only one of many potential failure modes. The components that could interrupt the transaction logging include any faults that might disrupt MPU system operation, such as:

- > UPS failure (battery degradation)
- > Software bug or glitch (because it is not a protected memory space)
- > Disk drive or flash drive failure
- > USB or network interface failure
- > MPU or controller power supply failure
- > Electrostatic Discharge (ESD) events that can disable a controller chip

Consider the list just mentioned with the hundreds of components involved (see Figure 2), and it is obvious that a UPS cannot protect vital operational information in many cases. Too many other failures can result in data loss. A single nvSRAM write operation is always the highest-reliability solution requiring the lowest number of components[5].

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Because of the energy storage on the nvSRAM's off-chip capacitor, automatic data saving to the nvSRAM's on-chip EEPROM is ensured even when the MPU power supply or disk drive fails. An ESD event could disrupt the alert signal as well. With nvSRAM, the MPU does not intervene upon power loss. nvSRAM is the smallest self-contained local memory subsystem possible that logs the state of the system.

The nvSRAM requires only two highly reliable components and has the highest

Mean Time Between Failures (MTBF). Compare this to the much lower MTBFs of the MPU power supply, disk drive, and controller. nvSRAM is clearly a robust, highly reliable, easy-to-implement, and less costly solution than a UPS or battery backup of the entire memory space.

Using transaction logs after a power or system fault

The list of transactions is scanned to detect any defective subsystems or incomplete operations. First, any transactions that can be cleared are checked to ensure they

are completed. For example, say that axis controller #3 is supposed to move from 29 degrees to 34 degrees at a velocity of 1 degree/second. The axis controller is queried to report its current position, and this positioning data is also saved in nonvolatile high-speed memory. If it is in range, its operation is cleared (reconciled). Otherwise, it remains an open item for analysis. Is axis controller #3 responding? Is the network card functioning? Can other devices respond over the network?

This diagnostic process continues by following a predetermined troubleshooting tree. The results are then reported to the operation, along with the test queries and evidence of the failure in the log. The network might be down, axis controller #3 may have lost power to the motor or the controller, and so on. The decision tree can be simple or complex, and as logged faults are encountered, continuous improvement is obtained. Transaction logging is used in reservation systems and other high-reliability applications to deal specifically with power loss. It is a time-proven technique.

Enabling the power of transaction logging

Nonvolatile memory such as flash physically wears out with repeated write operations and is typically too slow to update. Disk drives must seek sectors, which takes from 5-10 ms and always operates by transferring data blocks, when only 4 bytes might actually need to be changed. Also, sending data to the drive does not mean it is actually being safely stored on the disk's platter. It may temporarily be stored in the write cache on the drive, waiting to be written to the hard disk drive when the fault occurs.

Data items are rarely written onto the disk drive's platters in sequential order. Instead, the drive optimizes the data write operations based upon what is physically nearest to the disk drive's current position of the read/write head, not on a first-come, first-serve basis. This limits the number of non-volatile write operations to about 100 per second. Most control loops are many times faster than this to meet today's demanding performance requirements. The highest speed nvSRAM can write 40 million, 32-bit words per second, which is at least 1,000 times faster than the fastest control loop time requirements[6].

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Flash drives work like disk drives and transfer whole sectors of 512 bytes each, even if only 4 bytes need to be written. It takes roughly 500 μ s to perform the write operation, which results in an acceptable maximum control loop time of 2,000 loops per second. However, most applications will wear out the memory after 10,000 writes, and many control applications will reach this level in 5 seconds. This is obviously unacceptable.

Battery-backed SRAM not the best choice

Reliability is the primary reason battery-backed SRAM is not the best option. The cost of a robust robotic solution can easily be \$10K or more per node. This high cost makes battery solutions penny wise and pound foolish. Battery backup is unreliable because of a number of contributing factors:

- 1. Contacts:** Batteries have mechanical contacts that can corrode and fail. The MTBF of mechanical contacts is orders of magnitude shorter than a state-of-the-art integrated nvSRAM IC solution. In addition, vibration can degrade contacts, further reducing reliability.
- 2. Liquid electrolytes:** Batteries work by ionic reaction, which means ions exist in liquid solutions. At high temperatures, gas can be produced, resulting in electrolyte leakage failure and corrosion of the surrounding environment.
- 3. Seals:** Lithium batteries have nonconduction seals between the cell's positive and negative cases. These seals degrade with time and temperature and can fail many times before the battery's lifetime-charge capacity is exhausted.
- 4. Vents:** Rechargeable batteries have vents to handle outgassing caused by overcharging, which can fail. Otherwise, the pressure can build up and blow out the seals.
- 5. Rechargeable wear out:** Charge cycling will wear out the battery's cells.
- 6. Periodic maintenance:** The MTBF of any human activity is much shorter than any nonhuman solution. To deal with these issues, periodic battery replacement is required, but the possibility of human error results in a significantly lower MTBF for this activity, even with the best controls and practices in place.

Because of battery backup limitations, using a battery to keep the whole SRAM memory space is not the best solution. While it has the advantage of not limiting an application by the amount of parameters that can be stored, nvSRAM memories do not depend on stable power being delivered. Once data is stored into a highly reliable Silicon Oxide Nitride Oxide Silicon (SONOS) EEPROM cell, it will be secure for up to 100 years at 125 °C[7]. Designed with the proper write-protection schemes, nvSRAM stores data as a charge on an insulator behind an oxide.

This means it is immune from noise once the data is stored. This SONOS technology can withstand the highest levels of radiation, which further demonstrates its robustness. A low-power SRAM, on the other hand, is always susceptible to noise and conducted or radiated emissions.

Studies also have identified weaknesses in dealing with such *persistent memory* (SSD) architectures, where a very large-density, low-power SRAM is kept active, replacing the need for a hard disk drive. While this solves the problem of the disk

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drive's limit of 100 random I/O operations per second, the challenge is how to protect the memory space from program bugs and other brownout and noise-related problems.

Brownouts and spikes often worse than total power loss

The reason that brownouts and spikes can do more damage than a total power loss is subtle. Latent system power should always be fully discharged to create a stable initial system state for proper system power up. Power dips and brownouts can activate an unstable system reset. Voltage drops that just barely reach the reset threshold can and often do misfire, creating poor-quality logic signals, which do not always properly configure the system's power-up logic state[8].

Complex ASICs, FPGAs, Complex Programmable Logic Devices (CPLDs), and MPUs can power up inconsistently if a proper reset signal is not provided to them. Many of these types of ICs depend upon their own internal reset circuits and do not use the system-wide reset signal. These programmable logic chips are internally configured on power up, and many FPGAs actually read a small EEPROM containing data that programs the specific logic function of the chip. Power disruptions can upset this process.

Using a single-reset trip point is usually not an acceptable engineering practice. Reset operations must indicate that the starting logic can function properly and start the configuration process successfully by setting the starting state of all the internal logic on the chip. This works well when power has been off for a lengthy period of time and the system voltage is indeed zero volts.

Unfortunately, brownouts and power dips do not always exhibit this characteristic. They can drop in voltage to virtually any level. Proper reset logic depends on moving through the threshold; a voltage that is arbitrarily close to the threshold amplifies noise and creates a poor chip reset.

According to the *Data Conversion Handbook* by Walter Allan Kester, "The error mechanism is the occasional inability of a comparator to resolve small differential input into a valid logic level." The brownout pulse can be of small duration and mid-level voltage, which can result in inconsistent operation. The end

result is a soft failure in a subsystem, often referred to as a *glitch*.

Transaction logging can identify this kind of situation as subsystems power up in an unstable way and cause a system malfunction. The ideal solution is to respond to brownout conditions with a system-wide discharge of all power to zero volts. In this case, transaction logging detects and captures these unstable situations and leads to a safe and graceful recovery. The secondary result of transaction logs is hard data for post-mortem analysis, followed by effective continuous improvement.

nvSRAM enhances the solution

While several different technologies are available from a nonvolatile memory perspective, nvSRAM can offer a highly reliable and robust solution. Fast, on-chip SRAM, combined with auto STORE and RECALL to and from on-chip nonvolatile memory, can keep track of last known position, current known position, sensor data logs, surrounding axis information, and other enhanced functions. In addition, nvSRAM's superior ability to deal with sudden and unexpected power outages makes it a choice that should be considered for mission-critical robotic control applications. **IES**



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- 512 MB memory preinstalled
- 802.11b/g wireless antenna inside
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UML tools help expand ASI-safe portfolio

By Christiane Kapteina



Model-driven design using the Unified Modeling Language (UML) isn't just an academic concept. UML and structured software design methods are being used more and more often in the real world to simplify the design of safe products in industrial environments. This application article shows such an example of UML tools helping design an Actuator-Sensor-Interface (AS-I) product line.

Model-driven design using UML continues to take hold in many markets, and industrial automation is no exception. The requirements for safety-critical systems raise the bar for tools to analyze requirements and specify, design, and develop software.

Siemens Automation and Drives Group (Siemens A&D) has established itself as an innovation driver and trendsetter in control automation products, systems, and complete solutions for the manufacturing and process industries. As such, Siemens A&D was one of the dozen or so initiating companies instrumental in AS-I development and standardization.

AS-I basics

In the control hierarchy of industrial communications, AS-I is a low-cost, low-level fieldbus tailored to the needs of devices such as sensors and actuators. For these devices, low connection cost per node is critical, and simplicity is paramount.

At its simplest, AS-I is a digital replacement for traditional cable architectures. It provides a low-cost electromechanical connection system designed to operate over a distinctive yellow two-wire cable, carrying data and power over a distance of up to 100 m. Longer distances can be accommodated if repeaters and other devices are used.

AS-I should not be confused with higher-level fieldbuses providing sophisticated performance at much higher cost; in fact, it complements those technologies. Since its introduction in 1994, tens of millions of AS-I nodes have been installed worldwide, and it has been standardized according to EN 50295 and internationally to IEC 62026-2.

Now established as a fundamentally important part of most control automation strategies, AS-I can handle plenty more. For example, the AS-Interface Safety at Work (ASI-safe) Profile has been created for functional safety applications, enabling safety devices such as emergency stop

buttons, light barriers, and interlocks to run on the same cable as a standard AS-I system.

Offering major savings in terms of design, engineering, commissioning, and maintenance, ASI-safe devices operate within the same cyclic pattern as standard AS-I devices but take no part in normal monitoring and control. A special safety monitor resides on the bus to listen only to the safety devices. It recognizes when a safety-related event occurs, such as when a stop button is pressed, and initiates a shutdown. Typical applications range from conveyor-based assembly lines to advanced robotics and airport carousels.

UML meets safety-critical parameters

In further developing and enhancing its ASI-safe product portfolio, Siemens A&D chose an integrated suite of collaborative UML/Systems Modeling Language (SysML) modeling tools from ARTiSAN Software Tools for software requirements analysis, specification, design, and development. These tools helped create the safety-critical embedded software needed for fail-safe product operation. Figure 1 shows a SysML profile screenshot.

Siemens A&D specifically selected ARTiSAN Studio for the embedded software development of a series of recently announced ASI-safe products, including:

- > A DP/AS-I F-Link that seamlessly integrates ASI-safe slave devices into PROFIBUS or PROFINET safety (PROFIsafe) environments to create a safety-related gateway between the AS-I and the higher-level PROFIBUS
- > A new ASI-safe compact module that offers twice as many safe inputs to the module it replaces, thereby reducing costs and space in the plant
- > A new generation of ASI-safe position switches (the 3SE5 Series) that integrates all the ASI-safe electronics and the previously external power supply into the position switch housing

According to Siemens A&D, the ability to seamlessly and easily meet the safety-critical parameters mandated for its solutions by the ASI-safe specification and external safety bodies was fundamental in its selection of a UML tool.

Peter Weichhold, a senior software engineer at Siemens A&D, explained, "We were drawn to ARTiSAN Studio by its depth of support of UML 2.0 and its reputation in safety-critical markets. All of our product development follows IEC 61508, the European standard for safety-critical systems. Maintaining Safety Integrity Level 3 is crucial to us. In the recent ASI-safe project, for example, there was a requirement to integrate several safety-critical bus systems including ASI-safe and

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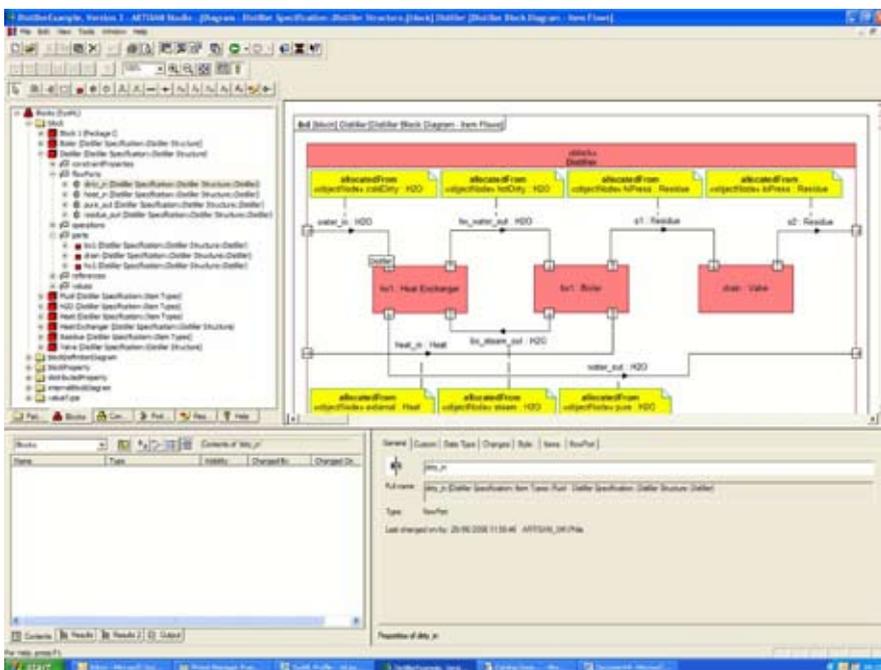


Figure 1

Software: AS-Interface and UML

PROFIsafe with a PLC based on SIMATIC S7 using the SIMATIC IDE and Siemens Safety Integrated. Using ARTiSAN Studio, we are able to meet and even exceed our safety-critical requirements, all within the timescales demanded for the project.” An example of these ASI-safe products is shown in Figure 2.

Distributed development teams

Since the ASI-safe project relied on software development teams spread over multiple sites, the ability to support them effectively and without compromise was also an important issue to address in the software development tools. Using a powerful object-based repository designed specifically for multi-user access provided a truly collaborative environment, enabling the physically disparate development teams to “grow” shared models quickly, accurately, and with confidence. “The ability to share and exchange modeling information in ARTiSAN Studio helped them cooperate in a highly efficient way,” Weichhold stated.

Following the process

Almost all large projects and, certainly, all safety- or mission-critical systems require that an auditable process be followed. To achieve the mandated approvals for products, not only do companies have to say what they do and do what they say, they have to prove it with quality records and project artifacts. This process is

difficult enough with an individual, tightly knit development team, but with multiple teams spread over multiple sites, the process can become even more challenging to manage.

This was another important factor in Siemens A&D’s choice of tools for the project. “The multi-user change-tracking capability in ARTiSAN Studio and the adaptability of its document-generation features were fundamental to the certification process, enabling the automatic generation of the right documents from the UML models,” Weichhold remarked. “This enhanced the communication between our developers and the TÜV certification offices.” **IES**



Christiane Kapteina heads ARTiSAN Software Tools’ operation in Germany, which is responsible for ARTiSAN Studio sales in the Central European

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Figure 2



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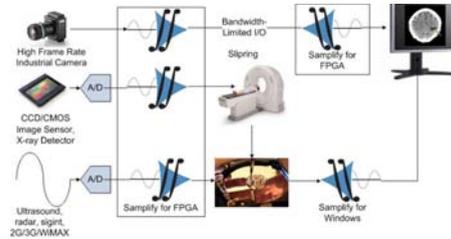
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Rugged Handheld Terminal

The MARS-1030 is equipped with an Intel® XScale® PXA255 400 MHz processor and Windows® CE 4.2 Operating System for the highest performance and trusted reliability in retail, warehousing, logistics, and ordering service applications. The optional 1-D/2-D barcode scanner allows users to collect information and communicate with back-end host data servers seamlessly through 802.11b and Bluetooth. Wireless connectivity with peripheral devices such as portable printers is supported. For harsh environments, the MARS-1030 is rated IP54 water and dust resistant. It is also designed for ruggedness and can withstand a 1.5 meter (5 foot) drop onto concrete. The MARS-1030 is an OS-ready platform with WinCE 4.2 pre-installed.



FEATURES

- › Intel® XScale® Bulverde processor (PXA255 400 MHz)
- › Windows® CE 4.2 Operating System pre-installed
- › Optional 1-D/2-D barcode scanner
- › Optional WLAN 802.11b and Bluetooth function for wireless data communications
- › Long battery life, up to eight hours of operation
- › Slim, palm-sized, and lightweight

For more information, contact: ECGinfo@advantech.com

RSC# 33699 @ www.industrial-embedded.com/rsc

Industrial systems

Advantech Corporation

38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com/applied

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Trusted ePlatform Services

ADVANTECH**Vehicle Mounted PC**

The TREK-776 is a vehicle mounted platform designed to withstand the harshest environments. It offers a rich variety of optional wireless and Wide Area Network modules for real-time communication and data capture in warehouses, freezers, docks, or container yards. The rugged die-cast aluminum enclosure replaces the fan as it helps dissipate heat. The TREK-776 is specially designed without ventilation holes, allowing the front bezel, back cover, and sides to be IP65 compliant for protection against dust and water. Exposed I/O ports are positioned on the bottom of the unit to further protect the system against vertically falling water (can be sealed with optional cover). With wide temperature tolerance components and a heater for low temperature operation, the TREK-776 can even operate in freezing environments.

**FEATURES**

- > 12.1" TFT LCD with touchscreen and function keys for 5% to 100% brightness control
- > Onboard Ultra Low Voltage Intel® Celeron® M 600 MHz or Low Voltage Intel® Pentium® M 1.1 GHz CPU
- > Rugged aluminum enclosure with fanless design and VESA standard for flexible mounting kits
- > Compatible with Windows® 2000/XP, Windows® CE 5.0, and Windows® XP Embedded
- > Flexible expansion capability for IEEE 802.11a/b/g, GPS, GSM/GPRS
- > Extreme temperature operating capability

For more information, contact: ECGinfo@advantech.com

RSC# 33790 @ www.industrial-embedded.com/rsc

Embedded Solutions for ARM[®] Cores

Single Board Computers

Development Tools

Evaluation Boards

Educational Kits

ODM & OEM Service

Embest offers **compact, cost-effective, reliable** single board computers based on different **ARM7/ARM9/XScale** processors from **Samsung, Atmel, NXP, STMicroelectronics** and **Marvell**.

Embest also provides **ODM/OEM** customer design services to help customer save time and money, quicken your development pace.



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Visit: www.armkits.com



Altera Corporation

101 Innovation Drive • San Jose, CA 95134
408-544-7000
www.altera.com

**Nios II Development Kit, Cyclone II Edition**

Altera® Cyclone® II FPGAs are optimized for low cost, extending the reach of FPGAs further into cost-sensitive, high-volume applications and continuing the success of the first-generation Cyclone device family. Cyclone II FPGAs offer a customer-defined feature set, industry-leading performance, and low power consumption. They also offer greatly increased density and more features, all at significantly lower cost. Featuring up to 150 embedded 18 x 18 multipliers, Cyclone II FPGAs can be used alone or as digital signal processing (DSP) coprocessors to improve price-to-performance ratios for DSP applications, including video and image processing, communications systems, and common DSP functions.

The Nios® II Development Kit, Cyclone II Edition, offers a variety of intellectual property (IP) cores to speed development, including three Nios II 32-bit RISC processors. The Nios II processors – fast, standard, and economy – are each optimized for a specific price and performance range, allowing designers to choose a system configuration that is an exact fit for their embedded needs. With these processors, you can upgrade system performance at any stage of the product life cycle without having to redesign the board or develop hand-optimized software. All three processors use the same instruction set architecture and are 100 percent binary code compatible. Nios II processors can be added to a designer's system using the SOPC Builder system development tool in the Quartus® II development software. The Nios II C-to-Hardware Acceleration (C2H) Compiler boosts performance of time-critical C subroutines, converting them to powerful hardware accelerators with a simple "right-click to accelerate" interface. This kit includes 12 months of upgrades so you can keep your system up-to-date with the latest enhancements to the Nios II processor, peripherals, and system design tools. This development kit is now RoHS-compliant.

Visit www.altera.com/nios for more information.

**FEATURES**

- › Complete embedded FPGA development environment featuring the versatile Nios II embedded processor and the low-cost Cyclone II family
- › Embedded software development tools:
 - Nios II integrated development environment (IDE) and debugger, and the Nios II instruction set simulator (ISS)
 - GNU tool chain, MicroC/OS-II real-time operating system, and NicheStack TCP/IP network stack
- › Hardware design tools, including the Quartus II design software with the SOPC Builder system development tool
- › Library of standard embedded IP cores and suite of pre-built hardware and software reference designs, including:
 - Three Nios II 32-bit RISC CPU cores (fast, standard, economy)
 - DDR, SRAM, timer, UART, SPI, JTAG UART, GPIO, DMA, 10/100/1000 Ethernet, interface-to-user logic, custom instruction, and more
- › Complete embedded development board with Triple-Speed Ethernet PHY daughtercard featuring:
 - Cyclone II EP2C35 FPGA and 10/100 Ethernet PHY/MAC
 - 1-Mbyte SSRAM, 16-Mbyte DDR SDRAM, 16-Mbyte flash, JTAG connectors for FPGA and CPLD, Mictor trace/debug connector, 32-bit PMC headers
- › No license or royalty fees when developing with the Nios II processor in Altera FPGAs and HardCopy® series structured ASICs

Industrial systems

Altera Corporation

101 Innovation Drive • San Jose, CA 95134
408-544-7000
www.altera.com

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**Nios II Development Kit, Stratix II Edition**

Altera® 90-nm Stratix® II devices are the industry's biggest and fastest FPGAs with an innovative logic structure packing more functionality into less area to dramatically reduce device costs. With internal clock frequency rates up to 500 MHz and typical performance > 250 MHz, these devices deliver on average 50 percent faster performance and more than 2x the logic capacity than first-generation Stratix FPGAs. Stratix II FPGAs deliver 50x higher multiplier bandwidth than single-chip, standalone digital signal processors. The DSP blocks have the flexibility and performance to implement fast, arithmetic-intensive applications such as image processing, wireless communications, military, broadcast, and medical. Each DSP block has dedicated multiwidth multipliers to implement DSP algorithms and functions, including filtering, video and image processing, correlation, transforms, encryption, and error correction.

The Nios® II Development Kit, Stratix II Edition, offers intellectual property (IP) cores to speed development, including three Nios II 32-bit RISC processors. The Nios II processors – fast, standard, and economy – are each optimized for a specific price and performance range, allowing designers to choose a system configuration that is an exact fit for their embedded needs. You can upgrade system performance at any stage of the product life cycle without having to redesign the board or develop hand-optimized software. All three processors use the same instruction set architecture and are 100 percent binary code compatible. Nios II processors can be added to a designer's system using the SOPC Builder system development tool in the Quartus® II development software. The Nios II C-to-Hardware Acceleration (C2H) Compiler boosts performance of time-critical C subroutines, converting them to powerful hardware accelerators with a simple "right-click to accelerate" interface. This kit includes 12 months of upgrades so you can keep your system up-to-date with the latest enhancements to the Nios II processor, peripherals, and system design tools. This development kit is now RoHS-compliant.

See www.altera.com/nios for more information.

**FEATURES**

- › Complete embedded development environment featuring the Nios II embedded processor and high-density, high-performance Stratix II FPGAs
- › Embedded software development tools included:
 - Nios II integrated development environment (IDE) and debugger, and the Nios II instruction set simulator (ISS)
 - GNU tool chain, MicroC/OS-II real-time operating system, and NicheStack TCP/IP network stack
- › Hardware design tools, including the Quartus II design software with the SOPC Builder system development tool
- › Library of standard embedded IP cores and suite of pre-built hardware and software reference designs, including:
 - Three Nios II 32-bit RISC CPU cores (fast, standard, economy)
 - DDR, SRAM, timer, UART, SPI, JTAG UART, GPIO, DMA, 10/100/1000 Ethernet, interface-to-user logic, custom instruction, and more
- › Complete embedded development board with Triple-Speed Ethernet PHY daughtercard featuring:
 - Stratix II EP2S60 FPGA and 10/100 Ethernet PHY/MAC
 - 1-Mbyte SSRAM, 16-Mbyte DDR SDRAM, 16-Mbyte flash, JTAG connectors for FPGA and CPLD, Mictor trace/debug connector, 32-bit PMC headers
- › No license or royalty fees when developing with the Nios II processor in Altera FPGAs and HardCopy® series structured ASICs

For more information, contact: nios_info@altera.com

RSC# 33544 @ www.industrial-embedded.com/rsc

Altera Corporation

101 Innovation Drive • San Jose, CA 95134
408-544-7000
www.altera.com

**Nios II Embedded Evaluation Kit, Cyclone III Edition**

The Nios® II Embedded Evaluation Kit, Cyclone® III Edition is a full-featured evaluation platform for the Nios II processor. This kit offers hardware components that support a wide range of applications, including networking, audio, and image processing. It provides a full evaluation of Altera's software development tools with several design examples.

This kit offers a variety of intellectual property (IP) cores to speed development, including three Nios II 32-bit processors supported by an integrated development environment (IDE). The Nios II processors – fast, standard, and economy – are each optimized for a specific price and performance range, allowing you to choose a system configuration that is an exact fit for your embedded needs. With these processors, you can upgrade system performance at any stage of the product life cycle without having to redesign the board or develop hand-optimized software. All three processors use the same instruction set architecture and are 100% binary code compatible. The Nios II C-to-Hardware Acceleration (C2H) Compiler boosts performance of time-critical C subroutines, converting them to powerful hardware accelerators with a simple "right-click to accelerate" interface.

The low-cost Cyclone III FPGA family is the third generation in the Altera® Cyclone series. With its unprecedented combination of low power, high functionality, and low cost, Cyclone III FPGAs broaden the number of high-volume, cost-sensitive applications that can benefit from FPGAs. Built on 65-nm low-power process technology, Cyclone III devices offer the lowest power consumption of any 65-nm FPGA and an optimal set of features to drive high-bandwidth parallel processing and many other cost- and power-sensitive applications. Cyclone III devices range from 5 K to 120 K logic elements, and offer up to 535 user I/O pins, up to 4-Mbit of embedded memory, 288 embedded 18x18 multipliers, dedicated external memory interface circuitry, phase-locked loops (PLLs), and high-speed differential I/O capabilities.

Visit www.altera.com/nios for more information.

**FEATURES**

- › Embedded software development tools:
 - Nios II Embedded Design Suite with Nios II IDE, compiler, debugger, C2H Compiler*, MicroC/OS-II RTOS*, and NicheStack TCP/IP Stack* (* licensed separately)
 - Software applications and tutorials inc. remote system update, picture viewer, hardware acceleration, and application selector utility
- › Hardware design tools, including the Quartus® II design software with the SOPC Builder system development tool
- › Library of standard embedded IP cores and suite of pre-built hardware and software reference designs, including:
 - Three Nios II 32-bit CPU cores (fast, standard, economy)
 - DDR, SRAM, timer, UART, SPI, JTAG UART, GPIO, DMA, 10/100 Ethernet, LCD controller, SD card interface, custom instruction, and more
- › Complete embedded development board with color touch panel LCD featuring:
 - Cyclone III EP3C25 FPGA and 10/100 Ethernet PHY, 32-Mbyte DDR SDRAM, 1-Mbyte SRAM, 16-Mbyte flash, 128-Mbyte SD card and connector
 - Audio in, audio out, composite video input, VGA output, push buttons, LEDs, PS2, and embedded USB-Blaster™ for FPGA configuration
- › No license or royalty fees when developing with the Nios II processor in Altera FPGAs and HardCopy® series structured ASICs

For more information, contact: nios_info@altera.com

RSC# 33953 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Industrial systems

American Portwell Technology, Inc.

44200 Christy Street • Fremont, CA 94538
510-403-3399
www.portwell.com

PCS-8220

Portwell's PCS-8220 is a single-DIN in-vehicle embedded Car PC infotainment system. Based on the Intel ECX (Embedded Compact Extended) form factor, the PCS-8220 supports multiple infotainment interfaces – including integrated DVB-T/FM tuner, Bluetooth, WiFi, and GPS – to meet the requirements of applications such as audio and video media, navigation, Internet access, and email. The unit also supports dual-display for CRT, LVDS, or TV-out. The PCS-8220 is designed as a fan-less system and to dissipate heat efficiently. The modular rear I/O architecture is easily customized to provide greater flexibility and speed OEMs time to market.

For more information, contact: info@portwell.com

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**FEATURES**

- › Occupies single-DIN space, easy for installation
- › Intel 915GM chipset and Celeron M processor to achieve the best performance per watt and per cubic meter
- › Integrated with DVB-T/FM tuner, Bluetooth, WiFi, and GPS
- › Dual independent display of CRT, LVDS, or TV-out
- › Multimedia functions for audio and video
- › Customization is available for OEM

RSC# 33915 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Industrial systems

American Portwell Technology, Inc.

44200 Christy Street • Fremont, CA 94538
510-403-3399
www.portwell.com

WADE-1120 System

Portwell's WADE-1120 is a compact and fan-less computer system with a unique tool-free design that allows the integrator or field service engineer to release the top cover quickly and easily. It integrates seamlessly with Portwell's cost-effective WADE-8141, Intel ULV Celeron M-based (852GM chipset), or WADE-8144, Intel Pentium M-based (915GM chipset) Mini-ITX board. With its multiple LAN and USB ports and video port, the WADE-1120 system is the ideal solution for applications in digital signage video control, automated test equipment, medical equipment, kiosks, and network appliances.

For more information, contact: info@portwell.com

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**FEATURES**

- › Compact size 190 mm x 170 mm x 50 mm/7.48" x 6.69" x 1.97"
- › Fan-less configuration, low heat, and no noise
- › VGA, 2 LAN with WADE-8141, 3 LAN with WADE-8144, 3 COM, and 4 USB ports
- › 40-watt internal power supply
- › Unique tool-free design: the top cover can be released easily and quickly when field service is needed
- › Rugged design for harsh environment

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Industrial systems

Carlo Gavazzi Computing Solutions

10 Mupac Drive • Brockton, MA 02301
508-588-6110
www.cg-cs.com



535 Series

The 535 Series is a CompactPCI 2.16 Compliant Switch Fabric Platform that contains redundant IPMI System Management cards, along with dual AC or DC input 600 or 400 watt PICMG 2.11 power supplies. This platform provides system integrators the flexibility to design a system using both legacy bus based fabric base boards.

At the heart of the system are two PICMG 2.9 Compliant System Managers in an over/under slot configuration. The IPMI System fully manages the cooling unit, system temperature, power supplies, fabric switches, and boards.

The 535 Series has been designed to meet: NEBS Level 3, FCC-B, CE, and UL, as well as being fully RoHS compliant.



FEATURES

- › 9U High x 12" deep enclosure redundant IPMI system manager
- › cPCI 2.16 fabric backplane with two fabric switch slots and 64-bit/33 MHz Bus
- › RoHS and NEBS Level 3 Compliant
- › Hot swap 400 or 600 watt power supply
- › Front replaceable speed-controlled and monitored fan tray
- › 19-inch or 23-inch rack mountable

For more information, contact: pr@cg-cs.com

RSC# 33950 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Industrial Embedded Systems Resource Guide 2007

Industrial systems

Carlo Gavazzi Computing Solutions

10 Mupac Drive • Brockton, MA 02301
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www.cg-cs.com



650 Series

Carlo Gavazzi Computing Solutions 650 Series of 2U MicroTCA systems provide the features required to deploy up to 12 AMCs in an economical, low profile 2U 19" rack mount chassis.

The 650 Series features a 6HP MicroTCA Carrier Hub (MCH) and a 12-port backplane with base fabric connectivity that supports the AMC.2 1000 BASE-BX fabric as well as SATA Backplane connectivity.

The chassis comes in two standard configurations:
a) One MCH and 9 full-height, single-width AMCs or
b) One MCH, 6 full-height, single-width and 6 half-height width AMCs. A range of other customizable configurations are available.

The 650 Series systems are designed to meet: RoHS, FCC Class A/B, UL 60950, and CE requirements and are ideal for VoIP, hubs, Wi-Fi, and Wi-Max applications.



FEATURES

- › Multiple configurations support half and full height, single and double width AMCs
- › Up to 12 AMCs can be configured into a 2U rack space
- › Push pull controlled and monitored thermal management system for 40 watts per AMC
- › MCH and 12-port backplane with base fabric connectivity support AMC.2 1000BASE-BX fabric and SATA connectivity
- › 600 watt universal input AC power supply

For more information, contact: pr@cg-cs.com

RSC# 33949 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Industrial systems

DataMetrics Corporation

1717 Diplomacy Row • Orlando, FL 32809
407-251-4577
www.datametrics.com

7004 4U Mini-Tower

The Model 7004, a vertical 4U COTS Mini-Tower chassis, has several unique features that distinguish itself from the competition. This tabletop chassis has a unique "push-pull" front air inlet feature that allows access to the upper and lower fan trays for sub-2 minute field replacement. This model also provides front access to all 5ea 6U backplane slots and up to 5ea 6U rear transition modules. The chassis accommodates 3U and 6U x 160 mm or 220 mm plug-in boards and 6U x 80 mm rear transition modules. Backplane architectures such as VME, VME 64X, VITA, cPCI, and customer-specific architectures are available.

Further component protection can be provided with the EnviroStat 2.0 System Monitor which monitors and controls fan speed, temperature, and system voltages.

For more information, contact: info@datametrics.com

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**FEATURES**

- › 5-slot VXS/VME64x backplane standard. Up to a 7-slot backplane available
- › Unique front air inlet for optimal cooling and fan access to upper and lower tray
- › Two powerful 150-CFM fans cool critical components
- › Optional chassis environmental monitor/controller
- › Perfect for testing and system development
- › Powerful 600 W power supply standard

RSC# 33951 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Industrial systems

Dolphin Interconnect Solutions

225 Cedar Hill Street • Marlborough, MA 01752
508-786-9950
www.Dolphinics.com

DXH510 / DXE410

The Dolphin Express expansion solution is a high performance PCI Express expansion platform that includes a host bus adapter, cabling, and a 4U, 8 slot, rackmount chassis. This platform is used to add additional high bandwidth PCI Express slots to servers or workstations for adding or testing, high performance PCIe cards.

Eight PCIe slots are provided, capable of being configured as eight – x4 PCIe slots, four – x8 PCIe slots, or any combination. The platform utilizes either copper or fiber optic cabling for host connections. These connections can be up to 10 meters via copper cables or 300 meters with fiber-optic cables. Each host adapter includes two x4 PCIe connections, which can connect to two expansion chassis or a single chassis as an x8 connection.

For more information, contact: info@dolphinics.com

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**FEATURES**

- › Eight slot PCI Express expansion chassis with high speed x8 PCI Express and x4 PCI Express support
- › Cable distance support for up to 10 meters via copper cabling or 300 meters with fiber optic cables
- › PCI Express slots configurable as 8 – x4 PCI Express slots or 4 – x8 PCI Express slots
- › Two x4 PCIe connections to host, configurable as a single x8 PCIe connection
- › Automatic slot configuration for x4 or x8 slots provides flexibility for performance applications
- › Automatic chassis power-on from host over fiber or copper cabling provides ease of installation and setup

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Industrial systems

IEI Technology USA Corporation

168 University Parkway • Pomona, CA 91768
909-595-2819
www.ieiworld.com



IEI Technology Corp.

PCIE-9650

IEI announces the latest PICMG 1.3 SHB CPU card, the PCIE-9650, with the following specifications:

- **CPU:** LGA 775 Core 2 Quad, Core 2 Duo, Pentium® D/4, Celeron® D with 533/800/1066 MHz FSB
- **Chipset:** Intel Q965 + ICH8DO
- **Memory:** 4 x 240 pin dual channel DDRII 533/667/800 MHz up to 8 GB
- **Ethernet:** Dual Intel PC82573 PCIe GbE controller
- **I/O Interface:** 2 x RS-232/10 x USB 2.0/6 x SATA II with RAID/1 x IDE/1 x KB/MS/1 x IrDA by pin header
- **Display:** Integrated in Intel Q965
- **Audio:** 7.1 channel HD Audio Kit
- **Watchdog Timer:** Software programmable supports 1 ~255 sec.
- **Temperature: operation:** 0 °C ~ 60 °C (32 °F ~ 140 °F)
- **Humidity: operation:** 5% ~ 95%



FEATURES

- › PICMG 1.3 and RoHS compliant
- › Intel Core 2 Quad processor (LGA775 socket) support 1066/800/533 MHz FSB
- › Dual channel DDR II 800/667/533 MHz supports up to 8 GB
- › Intel Q965 chipset provides high performance
- › High performance PCI Express Gigabit Ethernet
- › 6 x SATA II with Intel Matrix Storage Manager support

For more information, contact: emarketing@usa.ieiworld.com

RSC# 33908 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Industrial Embedded Systems Resource Guide 2007

Industrial systems

Meilhaus Electronic GmbH

Fischerstrasse 2 • 82178 Puchheim, Germany
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www.meilhaus.com



ME-Synapse/Neuron

Distributed DAQ: ME-Synapse & ME-Neuron.

Many bus platforms – one solution: The ME-Synapse is a converter for 3U CompactPCI to Ethernet/LAN, or USB. With this “docking station,” all current CompactPCI boards from the Meilhaus Electronic ME series can be used in an Ethernet/LAN or at the USB. The ME-Synapse has a robust metal housing that makes use of the rugged and standardized CompactPCI mechanics. As an option, the complete device can also be assembled in 19" systems. The ME-Neuron is a complete DAQ PC system that uses the same stackable form factor and can be combined with the ME-Synapse. It can work as a stand alone DAQ PC as well as a remote PC with ME DAQ boards at the Ethernet.



FEATURES

- › ME-Synapse converts Meilhaus Electronic's 3U CompactPCI boards to Ethernet or USB. 19" mountable
- › Supported by driver system ME-iDS for Windows or Linux, C++, VEE Pro, LabVIEW, and others
- › Programmer will see no difference between PCI, PXI/CompactPCI, or remote Ethernet/LAN and USB
- › Power supply range of LAN-Version 9 - 30 V. Ideal solution for system integration, cross-platform projects
- › ME-Neuron is a complete, 3U CompactPCI-based DAQ PC system with the same form factor as ME-Synapse
- › Stackable with ME-Synapse and robust metal connector blocks

For more information, contact: sales@meilhaus.com

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Intel Corporation
intel.com/design/intarch



Intel® Core™ 2 Duo Processors: Enabling the Connected Factory

Manufacturing must be connected, economical and efficient, from floor management to inventory control. Intel® Core™ 2 Duo processors based on Intel® Core™ microarchitecture deliver breakthrough energy-efficient performance, allowing customers to precisely integrate control, manufacturing, and communications functions over a protected network.

65nm process technology makes it possible to integrate two complete execution cores in one physical package, providing advancements in simultaneous computing for multi-threaded applications and multi-tasking environments. With core speeds ranging from 1.06 GHz to 2.20 GHz, and thermal design power from 65 watts to 10 watts, these dual-core processors offer a wide range of performance-intensive, low-power, value-sensitive solutions for smaller form factors.

Intel Core 2 Duo processor-based platforms provide an integrated 32-bit 3D graphics engine along with excellent storage speed, reliability, and remote asset management capabilities. Intel® Advanced Platform Technologies reduce system management costs while increasing flexibility and security, enabling innovative capabilities throughout the connected factory.

To enhance scalability and flexibility, Intel Core 2 Duo processors are validated with a variety of Intel® chipsets:

- Intel® Q965 Express chipset: Optimized memory engine delivers enhanced graphics, sound, and manageability. Intel® Quiet System Technology helps regulate system and processor fan speeds.
- Mobile Intel® 945GME Express chipset: Superb graphics and I/O bandwidth; up to 4 GB of 400/533/667 MHz DDR2 SODIMM system memory.
- Mobile Intel® GME965 Express chipset: Excellent storage speed, reliability, and remote asset management capabilities.
- Intel® E7520 chipset: Supports high-performance, low-power platforms.
- Intel® 3100 chipset: Integrated chipset for thermally sensitive, performance-intensive applications.

**For complete details on this product and the Intel® technologies included, go to intel.com/design/intarch/core2duo/index.htm*

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FEATURES

- › Embedded lifecycle support of five to seven years or more protects system investment
- › Intel® Wide Dynamic Execution performs four instructions per clock cycle to improve execution speed and efficiency
- › Intel® Advanced Smart Cache improves system performance by significantly reducing memory latency to frequently used data
- › Intel® Smart Memory Access optimizes use of available data bandwidth from the memory subsystem to accelerate out-of-order execution
- › Intel® Advanced Digital Media Boost accelerates execution of SSE/2/3 instructions to significantly improve multimedia performance
- › Intel® Intelligent Power Capability turns on computing functions only when needed to manage runtime power consumption of execution cores
- › Intel® Virtualization Technology⁺ lets one hardware platform function as multiple virtual platforms to improve manageability
- › Intel® 64 Architecture⁺ supports 64-bit instructions, providing flexibility for 64-bit and 32-bit applications and operating systems
- › Execute Disable Bit allows memory to be marked as executable or non-executable when combined with a supporting operating system
- › Digital Thermal Sensor (DTS) measures maximum temperature on the die at any given time
- › Intel® Communications Alliance (intel.com/go/ica) provides a strong ecosystem of hardware and software vendors

For more information, contact: intel.com/design/intarch

RSC# 33212 @ www.industrial-embedded.com/rsc

IXXAT

120 Bedford Center Road • Bedford, NH 03110
603-471-0800
www.ixxat.com

**Industrial Ethernet Module**

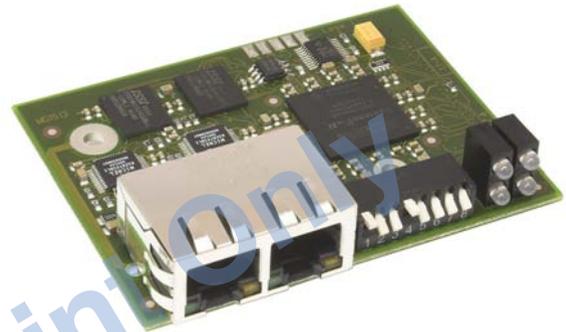
IXXAT's industrial Ethernet module (IEM) supports various industrial Ethernet protocol standards for I/O devices such as actuators and sensors used in manufacturing, medical, test and measurement, electric power generation, and other industrial equipment. Based on Altera's Cyclone® II EP2C8 FPGA and Nios® II embedded processor, the IEM serves as a co-communication solution for existing I/O device processors that may not have Ethernet communication capabilities. It can also be used in time-deterministic applications requiring fast cycle times below 1 ms.

The IEM offers maximum flexibility to apply "open" industrial Ethernet communication protocol standards. One hardware platform supports multiple standards: PROFINET IO, EtherNet/IP, Modbus/TCP, Powerlink, EtherCAT, and SERCOS III. A host application program interface (API) from IXXAT allows application programmers to easily link their existing application CPUs to an industrial Ethernet communication protocol without having detailed knowledge of which protocol is currently running on the IEM.

The IEM is delivered as a reference design for integration into an existing CPU platform that does not have Ethernet connectivity. A serial interface or a shared memory interface is available. The memory required for the data exchange is pre-engineered on the IEM, so that the interface of the application CPU only has to be connected to the module.

IXXAT's IEM includes an Altera® Cyclone II FPGA, optimized for low cost, and ideal for cost-sensitive, high-volume applications. Cyclone II FPGAs offer a customer-defined feature set, industry-leading performance, low power consumption, greatly increased density, and more features, all at significantly lower cost. Altera's 32-bit Nios II processors are each optimized for a specific price and performance range, allowing designers to choose a system configuration that is an exact fit for their embedded needs.

For more information about the IEM, contact IXXAT (www.ixxat.com). For more information about Cyclone II FPGAs and the Nios II processor, contact Altera (www.altera.com).

**FEATURES**

- › Cyclone II FPGA-based single hardware solution for all "open" industrial Ethernet I/O device protocol standards
- › Industrial Ethernet protocol software runs entirely on the IEM, which improves performance via co-communication on Cyclone II FPGAs
- › Host API provided by IXXAT
- › Hardware and software designs are pre-engineered and tested
- › Reference design provided for Cyclone II FPGAs with Ethernet controller and Nios II processor
- › I/O cycle time from <1 ms to 10 ms
- › Host connection via serial peripheral interface (SPI) or shared memory interface
- › Low-cost, low-power Cyclone II FPGAs offer up to 150 embedded 18 x 18 multipliers and can be used alone or DSP coprocessors
- › Three Nios II 32-bit embedded processors – available in fast, standard, and economy – are optimized for a specific price/performance range
 - Upgrade system performance at any stage of the product life cycle without having to redesign the board or develop hand-optimized software
 - All three processors use the same instruction set architecture and are 100% binary code compatible
 - No license or royalty fees when developing with the Nios II processor in Altera FPGAs and HardCopy® series structured ASICs

Industrial systems

Moxa Technologies, Inc.

3001 Enterprise Street, Suite 210 • Brea, CA 92821
714-528-6777
www.moxa.com

ThinkCore W341

The ThinkCore W341 embedded computer features 4 software-selectable RS-232/422/485 serial ports, 802.11a/b/g for WLAN communication, 1 Ethernet port, 2 USB 2.0 hosts, 1 relay output, and an SD socket for external storage expansion. The MOXA ART 32-bit ARM9 processor and the built-in Linux OS provide a powerful and reliable platform for any harsh, industrial environment, promising an ideal solution for industrial M2M applications such as data acquisition, protocol conversion, and remote device control and monitoring.

Hardware Specifications - System:

CPU: MOXA ART ARM9 32-bit 192 MHz

Memory: DRAM 64 MB, Flash 16 MB

Storage Expansion: SD socket x 1

USB: USB 2.0 Host x 2

Console Port: RS-232 x 1 (Tx/D, Rx/D, GND)

Button: Reset button x 1

Other: RTC, buzzer, Watchdog Timer

OS: Embedded Linux with MMU support

Environmental Specifications:

Operating Temperature: -10 to 60°C (14 to 140°F),
5 to 95% RH

Storage Temperature: -20 to 80°C (-4 to 176°F),
5 to 95% RH

Anti-Shock: 50G @ IEC-68-2-27, half sine wave, 30 ms

Anti-Vibration: 5G @ IEC-68-2-6, sine wave, 5-500 Hz,
1 Oct./min, 1 hr/axis

Regulatory Approvals:

EMC: FCC Part 15, CISPR 22 Class A

CE Class A: EN55022 Class A, EN61000-3-2 Class A,
EN61000-3-3, EN55024

Safety: TÜV: IEC/EN60950

UL/cUL: UL60950, CAN/CSA-C22.2 No. 60950-00

Other: RoHS, CRoHS, WEEE

Warranty: 5 years

Industrial Embedded Systems Resource Guide 2007

MOXA®

**FEATURES**

- › MOXA ART ARM9 32-bit 192 MHz processor
- › On-board 64 MB RAM, 16 MB Flash disk
- › 802.11a/b/g wireless LAN
- › WEP, WPA, and WPA2 encryption
- › Robust, fanless design
- › WLAN Repeater function supported
- › 4 software-selectable RS-232/422/485 serial ports
- › Ready-to-run Linux 2.6 platform
- › Relay Output for external alarm connection
- › DIN-rail or wall-mount installation
- › SD socket for storage expansion supported

Industrial Embedded Systems Resource Guide 2007

Industrial systems

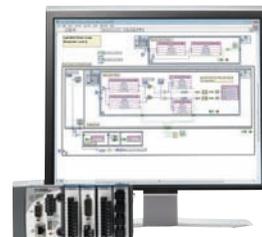
National Instruments

11500 North Mopac • Austin, TX 78759
512-683-0100
www.ni.com



NI CompactRIO

The National Instruments CompactRIO programmable automation controller (PAC) combines real-time and FPGA technologies to deliver high-performance in a small, rugged industrial control and acquisition platform. This low-cost architecture combines a reconfigurable I/O FPGA core to provide the reliability of dedicated hardware circuitry and the performance of true parallel execution in silicon; a real-time embedded processor for stand-alone and distributed deterministic operation with a built-in web-based human-machine interface; and industrial hot-swappable analog and digital I/O modules for direct connection to industrial sensors and actuators. Decrease development time by programming the entire NI CompactRIO embedded system with NI LabVIEW software.



FEATURES

- › Small, rugged embedded control and data acquisition system
- › Powered by National Instruments LabVIEW graphical programming tools for rapid development
- › Features embedded real-time processor for reliable stand-alone or distributed operation
- › Integrates an embedded FPGA chip that provides the flexibility, performance, and reliability of custom hardware
- › Includes hot-swappable industrial I/O modules with built-in signal conditioning
- › Features extreme industrial certifications and ratings for temperature, isolation, and vibration

For more information, contact: info@ni.com

RSC# 33911 @ www.industrial-embedded.com/rsc

Industrial Embedded Systems Resource Guide 2007

Industrial systems

DIGITAL-LOGIC AG

Nordstrasse 11/F • CH-4542 Luterbach/Switzerland
++41-(0)32-681-58-00
www.digitallogic.com



MPC20/21

The MICROSPACE® MPC20/21 boots from CompactFlash, LAN, USB, internally mounted USB flash disk (uDOC) or from the optionally integrated 2.5 hard disk. The MPC20 is 27 mm in height and the smallest computer of its kind. In addition to the MPC20 functions, the MPC21 (46 mm in height) has 2 COMs, LPT, and a PCI-104-slot.



FEATURES

- › MICROSPACE® MPC20/21 with fanless AMD Geode™ LX800, 500 MHz, DDR-RAM 256 MB (max. 1 GB)
- › VGA output/Video input, 3x USB (2.0), 1x internal USB, COM1 (RS-232C), COM2 internal, 2x LAN 10/100BASE-T
- › MiniPCI-socket, PCI-104-slot, CompactFlash disk with Linux/DOS
- › Optional: 40 GB-HD, Optional: WLAN
- › Passive cooling concept
- › Weight: 500 g, Size (W x L x H in mm): 165 x 110 x 27/46
- › Operating temperature (without hard disk) -25 °C to +70 °C

The MiniPCI base makes it possible to integrate WLAN or field buses. The MiniPCI-socket allows integrating of a WLAN-module. Power is supplied directly with 12/24 V or with a 110/220 V power supply unit.

The MPC20/21 is the perfect solution for cost-effective information terminals (LAN, VGA) or measuring instruments (integrated PCI-104 measurement card), and more.

For more information, contact: brigitte.kocher@digitallogic.com

RSC# 33801 @ www.industrial-embedded.com/rsc

Industrial systems

Saelig, Inc.

1160-D2 Pittsford-Victor Road • Pittsford, NY 14450
585-385-1750
www.saelig.com

Unique Components

Unique, time-saving products from Saelig Company that you won't find anywhere else – with free, unlimited technical support. Check out www.saelig.com for Test & Measurement, USB, CANbus, Motion Control, OLED and LCD kits, ZigBee, and other wireless network products, embedded controllers, PC scopes, and data-loggers.

Components: ZigBee, mesh-network, and EasyRadio modules make wireless networking easy. USB-serial ICs make it quick to add USB storage and serial links to your product. RFID reader ICs read five competing protocols. Ethernet adapters and TCP/IP stack ICs make networking your product a 5-minute task. Quantum touch-sensing ICs are the world's best at creating touch-input systems. Our I2C-Ethernet and I2C-USB modules are designed for simple installation. We have frequency-hopping oscillators that can make your system meet EMI limits after your design fails in test. We offer custom-made rotary switches, polystyrene capacitors, SM adapters, and RS-232/422/485 adapters. We have OLED, LCD, and touch-panel kits so you can add displays from 2" to 10" quickly to your product; Ethernet and serial motor control boards, servo, and stepper controllers for your motion control needs; video motion detection boards.

Test Equipment: color LCD bench-scopes under \$400; mixed-signal 14-bit PC scope adapters sample analog and digital signal simultaneously at 100 MS/s; rugged handheld 20 MHz service scopes for less than \$600; RF test chambers that can fit on your bench, or room-sized EMI tents that fold up into a suitcase. We have 7 GHz EMC test-meters at under \$1,000. Our USB and UWB bus analyzers are vital for equipment designers and test departments. Logic analyzers at under \$300. LINbus and CANbus adapters for PCs. Mains line testers for automatic compliance measurements to 40th harmonic. GPS loggers can track equipment movement history. We have a wide range of temperature, humidity, and voltage dataloggers with PC or wireless connection.

Software: front panel design, CAD, and graphics; smart GUI creation across processor platforms, to give a common "feel" to your product range.

For more information, contact: info@saelig.com

Industrial Embedded Systems Resource Guide 2007



Bringing you the best in unique electronics.

FEATURES

- **Wireless Modules:** TinyOne ZigBee, EasyRadio, Emxys Bluetooth transceivers remove the headaches of wireless design for your project
- **ICs:** USB-serial, TCP/IP stack, USB-on-the-Go, RFID, motion control, touch-sensing and level-sensing. Starter kits ease startup hassles
- **Modules:** ready-made modules for USB-serial, Ethernet-serial, Ethernet-I2C, Ethernet-IO, USB-I2C, tilt-sensing, motion control, serial-LCD
- **Displays:** kits for LCD from 2" to 10"; brilliant 2" OLEDs; LCD meters; blue/white serial-driven 4 x 20 backlight LCDs; touch-panels, and more
- **Motion Control:** stepper motor and servo control boards, stepper motors, Ethernet motion control modules
- **Components:** LCDs, polystyrene capacitors, custom rotary and LED switches, SM adapter boards, crystals and oscillators, power supplies
- **LCD Scopes:** battery-powered 20 MHz color LCD 2-ch bench scope with probes, USB connection. \$399; line-powered \$329; 60 MHz version \$599
- **Rugged Scopes:** 20 MHz LCD 2-channel handheld scope in carrying case, USB connection, 3.8" color LCD – \$529; 60 MHz version \$749
- **PC-scope adapters:** from \$299 to \$3,360, we have a wide range of adapters to turn your PC into a sophisticated USB-connected scope
- **Mixed-signal Scopes:** combined 100 MHz scope and logic analyzer enables you to trigger on hard-to-find glitches. Optional sweep generator
- **USB and UWB Bus Analyzers:** high performance, economical USB1/2.0/USB analyzers – essential for driver design, debugging wireless Wimedia
- **Software:** create cross-platform GUI for your embedded device automatically by arranging icons and widgets to form functional control panel

RSC# 33920 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Sealevel Systems, Incorporated

2779 Greenville Highway • Liberty, SC 29657
864-843-4343

www.sealevel.com

SEALEVEL**Relio™ Industrial Computers**

Designed for I/O intensive applications where ruggedness is a must, the Relio™ product family combines the reliability of a PLC with the configurability of an industrial computer. Relio systems are completely fanless. Embedded software can run from CompactFlash, eliminating hard drives and resulting in true solid-state operation. Relio's unmatched expansion capabilities can be readily adapted to a wide variety of OEM and industrial applications.

R1000 systems provide all core processing functions in a rugged metal enclosure small enough to mount in virtually any application. Available with ULV Intel® Celeron® M processors and AMD Geode™ processors, the system offers excellent computing power, low power consumption, and a wide operating temperature range. Standard I/O includes 10/100BaseT Ethernet, dual serial ports, USB, and analog video. Local or remote I/O expansion is available using Sealevel Seal/O modules.

R2000 systems are available with up to a 1.4 GHz Intel Pentium® M processor. Fanless operation is possible up to +50 °C, and using the Windows XP Embedded operating system you can operate from CompactFlash, achieving the ultimate in reliability for harsh environments – no moving parts. The R2000 is designed and maintained for long-term availability so you can avoid the obsolescence problems inherent with motherboard-based industrial computers.

R3000 systems are designed for installation in 19" EIA racks and offer a wealth of standard I/O including dual 10/100BaseT Ethernet, four RS-232/422/485 serial ports, four USB ports, and analog video. For I/O intensive applications, you can interface to a wide variety of real-world devices using Sealevel's robust PC/104 kits or Seal/O modules.

The Relio™ product family offers bullet-proof reliability with solid-state operation and versatile I/O selection. With our dependable design consistency and long-term availability, Sealevel provides an industrial computing solution perfectly matched to your needs.

**FEATURES**

- › Fanless operation
- › Choose from Intel and AMD Processors
- › Up to 1 GB RAM
- › 10/100BaseT Ethernet
- › USB ports
- › Serial ports
- › CompactFlash socket
- › Wide temperature operation - 0 °C to +50 °C
- › Analog video
- › R1000 - Compact size - 7.5" (L) x 5.1" (W) x 1.8" (H)
- › R2000 - 11.4" (L) x 8.0" (W) x 4.4" (H)
- › R3000 - 17.0" (L) x 11.0" (W) x 3.5" (H)

For more information, contact: sales@sealevel.com

RSC# 33952 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Industrial systems

Vector Electronics & Technology, Inc.

11115 Vanowen Street • North Hollywood, CA 91605
818-985-8208
www.vectorelect.com

Industrial Embedded Systems Resource Guide 2007

**Series 2370/400/790**

VME and VME64x cPCI or PXI chassis available in many configurations from 1U to 12U, 2 to 21 slots. Many power options up to 1200 watts. Dual hot-swap available in AC or DC versions. We have in-house design, manufacturing capabilities and in-process controls. All Vector chassis and backplanes are manufactured in the USA and are available with custom modifications and the shortest lead-times in the industry.

Series 2370 chassis offer the lowest profile per slot. Cards are inserted horizontally from the front and 80MM rear I/O backplane slot configuration is available. Available in 1U, 2 slots up to 7U, 12 slots for VME, CompactPCI, or PXI. All chassis 1101.10/11 compliant. Hot-swap, plug-in AC or DC power options.

Our series 400 enclosures feature side filtered air intake and rear exhaust, for up to 21 vertical cards. Options include hot-swap, plug-in AC or DC power and system voltage/temperature monitor. Embedded power supplies available up to 1200 watts.

Series 790 is MIL STD 461D and E compliant and certified, economical and lighter weight than most available today. It is available in 3U, 4U and 5U models up to 7 horizontal slots.

All Vector chassis are available for custom modification in the shortest timeframe. Many factory paint colors are available and can be specified with Federal Standard or RAL numbers.

For more detailed product information go to www.vectorelect.com or call 1-800-423-5659 and discuss your application with a Vector representative.

**FEATURES**

- › COTS or Ruggedized EMI/RFI models
- › Vertical or horizontal card insertion
- › Card sizes up to 9U X 400mm
- › System monitoring option (CMM)
- › AC or DC Power Input
- › Power options up to 1200 watts

VersaLogic Corp.

3888 Stewart Road • Eugene, OR 97402
 541-485-8575
www.VersaLogic.com



VERSALOGIC
 CORPORATION

GECKO (EPIC-2)

The Gecko is available in both standard and extended temperature versions and features a highly reliable fan-less design, very low power dissipation (5 Watts), and on-board I/O options. System expansion is supported by a PC/104-Plus interface that allows users to easily add a wide range of additional I/O options to the platform.

The Gecko is a mid-sized board designed on the EPIC-2 standard (4.5" x 6.5") that boasts a 500 MHz-equivalent processor combined with on-board video, networking, and I/O. It features support for up to 512 MB DDR RAM, and removable Compact Flash storage. Gecko uses standard x86 architecture and MMX and 3DNow! chipsets to support familiar OS environments and software applications. The EPIC standard was designed to accommodate PC-style I/O connectors to eliminate I/O transition cables and simplify cabling in many applications. A number of design elements also help reduce radiated EMI in the Gecko including three ground planes within the PCB, minimized trace lengths for I/O, USB filters, and a single on-board clock source.

The Gecko board is available in OEM quantities. VersaLogic supports the Gecko and all its CPU products with a minimum 5-year product lifespan guarantee. For more information about the Gecko or VersaLogic's other embedded computer products for industrial applications, visit www.VersaLogic.com.

**FEATURES**

- › AMD GX500 Processor
- › High Speed DDR RAM
- › 10/100 Ethernet
- › Flat panel support
- › Analog inputs
- › TVS protection
- › Extended temperature version
- › Mid-level pricing
- › Real-world connectors
- › Multiple I/O zones
- › Stackable
- › Supports PC/104 I/O expansion

Operating systems

Ardence, a Citrix Company

266 2nd Avenue • Waltham, MA 02451
781-693-6333
www.ardence.com

Phar Lap ETS

The Phar Lap ETS Real-Time Operating System (RTOS) provides system designers with the most reliable, highest performing, and easy-to-deploy hard real-time development environment. Based on x86 architectures, ETS offers a comprehensive suite of tools that smoothly integrates into the well-known Microsoft Visual Studio IDE – minimizing development and debugging time.

With support for all standard BIOS implementations and the industry's smallest operational footprint, the Win32 API-compliant Phar Lap ETS RTOS enables developers to install, configure, and start developing within two to four hours. ETS has proven itself in thousands of demanding environments, such as multimedia streaming solutions, ocean vessel location systems, submicron scanning systems, and RFID products.

For more information, contact: info@ardence.com

Industrial Embedded Systems Resource Guide 2007

Ardence

a Citrix Company

**FEATURES**

- › Real-time file system: High-speed media access with FAT16 and FAT32 support
- › Fully Win32 compliant: No need to use code wrappers for API mapping
- › Complete IA32 x86 support: 386, 486, Pentium I, II, III, 4, Multicore, M, Xenon, as well as AMD CPUs
- › Smallest operational footprint: < 500 KB with I/O graphics and TCP/IP
- › Support for all standard BIOS implementations: Support includes ACPI-compliant PIC and uniprocessor APIC
- › Integrated WinSock-compliant real-time TCP/IP stack: Fully Windows independent

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Operating systems

Ardence, a Citrix Company

266 2nd Avenue • Waltham, MA 02451
781-693-6333
www.ardence.com

ReadyOn

The enhanced end-user experience of instant-on/off functionality and secure, corruption-proof reliability in devices using Windows OS provides OEMs with clear advantages. ReadyOn-enabled devices bypass driver loads, OS boot, network configuration, and application loading time by accessing a pre-configured "environment" – bringing the device to full operability in seconds. Because the pre-configured environment is hardened, viruses cannot permanently install into a ReadyOn-enabled system. Any problem is fixed by simply powering off the device and turning it back on. ReadyOn has been deployed in 2,000,000 systems, with manufacturers such as NEC and Fujitsu, and is ideally suited for consumer electronics, medical devices, automation, portable systems, and testing.

For more information, contact: info@ardence.com

Industrial Embedded Systems Resource Guide 2007

Ardence

a Citrix Company

**FEATURES**

- › Protects key partitions while leaving writeable partitions for saving data, including use with removable storage
- › Robust, high-performance Windows instant-on and off: boot time is virtually eliminated
- › Microsoft Windows Support: Windows XP Pro, XP Embedded, Server 2003, including all current service packs
- › Integrated appliance environment: OEM can implement multipurpose functionality on a single system
- › Support for "Ghosting": Simplifies manufacturing and speeds time to market
- › Comprehensive GUI-based configuration and management: Intuitive interface results in reduced time to configure

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Operating systems

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781-693-6333
www.ardence.com

Ardence

a Citrix Company

RTX

Ardence RTX is a real-time extension for Windows-based devices. Military and aerospace OEMs that demand uncompromising performance and reliability on standards-based platforms rely on RTX to deliver full control – pre-empting Windows and providing precise control of IRQs, I/O, and memory. RTX’s deterministic performance ensures that specified tasks execute with proper priority and 100 percent reliability – including the ability to survive Windows crashes (blue screens).

As a true extension to Windows, not an RTOS ported to Windows, developers can benefit from the familiar standards-based Windows development environment and tools. On multi-core architectures, RTX can be configured to run in “dedicated” mode, where it can leverage the processing power of an entire core.



FEATURES

- › Robust, High-performance Windows RTOS Extension in Ring 0: sustained interrupt rates of 30 KHz
- › Support for all standard Microsoft HALs: including ACPI compliant PIC, uni-processor and multi-processor APIC
- › Comprehensive Microsoft Windows OS support: Windows Vista, XP Pro, XP Embedded, 2000, Server 2000, and 2003
- › Complete x86 CPU support: including multi-processor and multi-core in either shared or dedicated mode
- › Visual Studio 6.0, .NET 2002, 2003 and 2005: develop, compile, and debug in well-known development environment
- › WinSock-compliant TCP/IP stack: independent of Windows; support for IPv4 and IPv6

For more information, contact: info@ardence.com

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Operating systems

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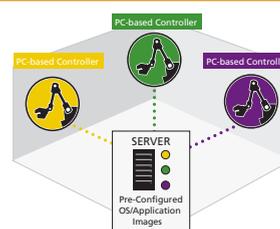
Ardence

a Citrix Company

Software Streaming

The Device Edition of the Ardence Software-Streaming Platform revolutionizes the traditional software deployment and management model, which assumes that the OS/application image is loaded onto each embedded device. Uniquely, Ardence virtualizes the OS/application image and streams the selected image to a diskless device from the network. By eliminating the need to pre-install or maintain any software (OS or apps) on the device, military and aerospace OEMs benefit from unparalleled reliability, flexibility, security, and productivity.

Because the OS/applications are processed on the devices locally, optimal system performance is maintained (including real-time applications), while centralized management enables simplified upgrades, maintenance, and scalability.



FEATURES

- › Enables devices to change functionality in the time it takes to reboot
- › Target devices process applications locally, yet require no hard disk
- › Eliminates the need to make hands-on visits to devices for maintenance and upgrade
- › Devices do not rely on the network for control of peripherals
- › Works with existing hardware, applications and network
- › Allows additional devices to plug into the network and start streaming immediately

For more information, contact: info@ardence.com

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Small form factor modules

Advanced Knowledge Associates

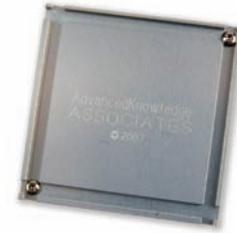
3350 Scott Blvd., Suite 40 • Santa Clara, CA 95054
408-986-1807
www.a-k-a.net

LM150 PRISM

The LM150 is a high-performance Prepackaged Reconfigurable Integrated System-on-Module (PRISM) that enables advanced embedded system design. The LM150 combines a standard CPU subsystem including memories, boot devices, and standard interfaces with an FPGA fabric all into one miniaturized package with a single rail voltage supply. The LM150 boasts a high level of hardware and software integration and flexibility, employing cutting edge ARM-9 technology tightly coupled with latest generation, high-density, FPGA technology. The LM150 includes numerous digital and analog peripherals commonly used in communications, military, and medical applications and its modular architecture allows for easy integration of custom user logic and peripheral bridging functions.

For more information, contact: info@a-k-a.net

Industrial Embedded Systems Resource Guide 2007

**FEATURES**

- › Designed with a high-density 30K LE FPGA and a built-in 32-bit high-performance and low-power ARM-based MCU
- › Capacity to store multiple logic-images for the implementation of diagnostics and fault-tolerant applications
- › Supports multiple power and performance profiles using the built-in programmable clock circuitry
- › Supports Linux or other MMU-capable OSs and full featured software applications in the large on-board NVRAM
- › Features a small footprint of 2" x 2" in a 462 Pin PGA with 100 high-speed GPIOs and a single 3.3 V source
- › Dual 1553RT, ARINC 429, dual CAN, dual RS-232, USB and dual 10/100 Ethernet

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Small form factor modules

Advantech Corporation

38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com/applied

COM Express CPU Module

The SOM-5782 is an embedded COM Express Type 2 CPU Module that supports the Intel® Core™ 2 Duo processors by Intel® 945GM/ICH7-M chipset. In a basic form factor of 95 mm by 125 mm (roughly 3.7 inches by 4.9 inches), SOM-5782 is a scalable, high-performance, and easy-to-integrate solution for various applications. The SOM-5782 offers advanced I/O capacity and incorporates serial differential signaling technologies such as PCI Express, Serial ATA, USB 2.0, LVDS, HD Audio, and Serial DVO interfaces. It also complies with the "Green Function" standard and supports Doze, Standby, and Suspend modes. Two high capacity connectors allow the COM Express module to be easily and securely mounted onto a customized solution board or Advantech's standard SOM-DB5700 development board.

For more information, contact: ECGinfo@advantech.com

Industrial Embedded Systems Resource Guide 2007

Trusted ePlatform Services

ADVANTECH

**FEATURES**

- › Embedded Intel® Core™ 2 Duo processors
- › Intel® Graphics Media Accelerator (GMA 950) and external PCI Express x16 graphics interface
- › Supports the upcoming primary data path PCI Express
- › Supports eight host USB 2.0 ports
- › Supports two SATA ports, with data transfer rates up to 1.5 Gbps (150 MBps)
- › Supports dual channel LVDS panels

RSC# 33797 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Industrial Embedded Systems Resource Guide 2007

Small form factor modules

Advantech Corporation

38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com/applied

Trusted ePlatform Services

ADVANTECH

EPIC CPU Module

The PCM-4390 is a stackable EPIC Single Board Computer (SBC) with high-performance computing based on Intel® Core™ Duo processors. Industrial-grade components and special vibration-proof connectors make the PCM-4390 a solid, reliable embedded platform suitable for high vibration and wide temperature range applications, such as those in transportation and military fields. Power efficient mobile Intel® 945GM chipset with integrated Intel® Graphics Media Accelerator (GMA 950) enables exceptional 3D graphics and DirectX 9 and HDTV support. GMA 950 supports dual independent displays in multiple combinations, making it particularly suitable to the gaming, medical, and self-service kiosk markets.



FEATURES

- › Embedded Intel® Core™ Duo processor onboard and support for PCI-104 bus
- › SODIMM socket supports up to 1 GB DDR2 SDRAM
- › Supports display combinations CRT + LVDS and LVDS + LVDS
- › Supports four COM ports, eight USB 2.0 ports and two SATAII ports
- › Dual 10/100/1000 Mbps PCI Ethernet interface
- › Supports USB-DOM Solid State Disk (SSD), for quicker boot-up and read/write performance

For more information, contact: ECGinfo@advantech.com

RSC# 33795 @ www.industrial-embedded.com/rsc

Industrial Embedded Systems Resource Guide 2007

Small form factor modules

Advantech Corporation

38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com/applied

Trusted ePlatform Services

ADVANTECH

ETX CPU Module

The SOM-4481 is an Intel® 855GME/ICH4 ETX System On Module (SOM) with audio controller, 4X AGP SVGA controller, and PCI 10/100Base-T Ethernet interface. Onboard features include two serial ports, one multi-mode parallel (ECP/EPP/SPP) port, four USB ports, a floppy drive controller, and a keyboard/PS/2 mouse interface. The SOM-4481 features power management to minimize power consumption. It complies with the "Green Function" standard and supports Doze, Standby, and Suspend modes. The SOM-4481 is a highly integrated, multimedia SOM that combines audio, video, and network functions. Major onboard devices adopt PCI technology to achieve outstanding computing performance at a mere 10 W of power consumption when used with Intel® Celeron® M processors.



FEATURES

- › Embedded Intel® Pentium® M/Celeron® M processor
- › Supports ECC Double Data Rate (DDR) memory
- › Vcore two phase design for a more stable system
- › Supports four USB 2.0 ports
- › Supports dual channel LVDS panels
- › ETX form factor with PCI/ISA interface

For more information, contact: ECGinfo@advantech.com

RSC# 33798 @ www.industrial-embedded.com/rsc

Small form factor modules

Advantech Corporation

38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com/applied

PC/104 CPU Module

The PCM-4141 is a PC/104 CPU board that is vibration/shock resistive and also has the capability to operate in extreme temperatures. It has passed Advantech's Extended Temperature Testing (ETT) specifications for guaranteed thermal reliability. The board was tested continuously over a 36-hour period to ensure proper operation and boot-up in temperatures ranging from -40 °C to +85 °C. For increased ruggedness, the CPU and memory are soldered onto the board. For easy integration, WinCE 5.0 can be installed onboard. PCM-4141 uses a low power fanless STPC Atlas processor rated at 120 MHz and supports SDRAM memory, up to 64 MB. Extensive I/O features include onboard 128 MB Flash, 10/100Base-T Ethernet, Enhanced IDE interface, one parallel port, four serial ports (RS-232), and a PC/104 expansion interface for scalability.

For more information, contact: ECGinfo@advantech.com

Industrial Embedded Systems Resource Guide 2007

Trusted ePlatform Services

ADVANTECH

**FEATURES**

- › -40 °C ~ +80 °C operating temperature, Phoebus design onboard CPU, memory, Flash for vibration and shock resistance
- › Low power and fanless STPC® Atlas CPU module
- › Onboard 64 SDRAM
- › 18-bit TFT LCD support
- › Supports two USB 1.1 ports and up to four COM ports
- › Onboard Flash (128 MB), supports up to 1 GB

RSC# 33796 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Small form factor modules

congatec AG

2033 Bruceala Court • Cardiff by the Sea, CA 92007
760-635-2602
www.congatec.us

conga-B945

Dual Core COM Express module with dual channel memory support up to 4 GB DRAM. The conga-B945 features many processor variants up to the latest Intel® Core™ 2 Duo 2x 2.16 GHz with 4 MB shared L2 cache and measures only 95 x 125 mm², as defined by the PICMG COM Express specification. Two serial ATA® ports provide the ability to configure drives as high performance RAID 0 or RAID 1. In order to support economical and robust CompactFlash cards, parallel ATA is also available.

The conga-B945 supports 5x x1 PCI Express lanes, 1x x16 PCI Express Graphic port (PEG), Gigabit Ethernet, 8x USB 2.0, 2x SATA, PCI, fast mode I²C, LPC and can utilize several high definition audio (HDA) codecs in order to provide the highest sound quality and numerous channels.

For more information, contact: congatec@rfm-corp.com

Industrial Embedded Systems Resource Guide 2007



congatec

the rhythm of embedded computing

**FEATURES**

- › Dual channel memory
- › Up to Intel® Core™ 2 Duo 2x 2.16 GHz with 4 MB cache processors
- › 5x x1 PCI Express lanes, 1x x16 PCI Express Graphic port, Gigabit Ethernet
- › 8x USB 2.0, 2x SATA, PCI, Fast Mode I²C, LPC
- › ACPI Power Management, ACPI Battery Support, Multistage Watchdog, Flat Panel Auto Detection
- › LVDS flat panel interface, analog VGA interface, SDVO
- › Latest 3D and 2D video capabilities, TV-Out is also possible

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Small form factor modules

congatec AG

2033 Bruceala Court • Cardiff by the Sea, CA 92007
760-635-2602
www.congatec.us

**conga-E855**

ETX[®] embedded CPU module with Intel[®] Pentium[®] M/Celeron[®] M and ISA support. The conga-E855 features Intel[®] Pentium[®] M processors up to 1.6 GHz. High memory bandwidth is provided by supporting up to 1 GB memory (DDR333). The complete conga-E855 design is geared around low power consumption. The Ultra Low Voltage Intel[®] Celeron[®] M 600 MHz and Intel[®] Celeron[®] M 1 GHz variants are very well suited for mobile solutions. The congatec Embedded BIOS offers ACPI 2.0 support. Enhanced Intel[®] SpeedStep[®] Technology is supported for Pentium[®] M versions. The conga-E855 features all ETX[®] interfaces including the ISA bus. Although the Intel ICH4 has no direct ISA support, the ISA bus is generated by an additional PCI to ISA bridge device.

**FEATURES**

- › Integrated Intel[®] Extreme Graphics controller with two independent pipelines featuring the latest 3D video capabilities
- › Automatic flat panel detection
- › LVDS flat panel interface, analog VGA interface, DVO
- › 4x USB 2.0, 2x COM, LPT, FDC, PCI, ISA, I²C, LAN, 2x EIDE
- › congatec Embedded BIOS with ACPI 2.0 support
- › Enhanced Intel[®] SpeedStep[®] Technology support for Pentium[®] M processors

For more information, contact: congatec@rfm-corp.com

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Small form factor modules

congatec AG

2033 Bruceala Court • Cardiff by the Sea, CA 92007
760-635-2602
www.congatec.us

**conga-X945**

Dual Core XTX[™] embedded CPU module with four PCI Express lanes and SATA. The conga-X945 features the latest Intel[®] Core[™] 2 Duo processors up to 2x 1.5 GHz with 4 MB shared L2 cache. It offers all XTX features including 4x x1 PCI Express lanes. The conga-X945 offers the highest computing performance available on an ETX[®] module size. It's completely ETX[®] compatible and offers PCI Express, SATA, and much more state of the art features by using the ETX[®] ISA pins. Thanks to the four PCI Express, six USB 2.0, 2x SATA[®], two COM ports, PCI, I²C, and LPC the conga-X945 offers more connectivity than most other computer modules.

**FEATURES**

- › Up to Intel[®] Core[™] 2 Duo processors up to 2x 1.5 GHz with 4 MB shared L2 cache
- › LVDS interface with automatic flat panel detection, analog VGA interface, SDVO
- › ETX[®] compatible and offers PCI Express, SATA and more state of the art features by using the ETX[®] ISA pins
- › Six USB 2.0, two COM ports, PCI, Fast Mode I²C, and LPC
- › congatec Embedded BIOS
- › ACPI Power Management, ACPI Battery Support, BIOS flashing via serial port

For more information, contact: congatec@rfm-corp.com

RSC# 32043 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Small form factor modules

Connect Tech, Inc.

42 Arrow Road • Guelph, ON N1K 1S6 Canada
519-836-1291
www.connecttech.com

FPGA Digital I/O

Connect Tech's FreeForm/104 offers two PC/104 solutions in one. Designed with a reconfigurable FPGA using Xilinx's Spartan 3E, FreeForm/104 is fully customizable and field programmable. When used with its standard core, FreeForm/104 is also a Digital I/O and Counter/Timer solution.

Use FreeForm/104 when time to market is of the essence, field-reprogrammability is a must, and when speed and accuracy are critical.

CTI's standard core offers 96 digital I/O-8255, 6 counter/timers-8254, and Opto-22 compatibility.

Off-the-shelf flexibility and a high speed processing core within a rugged design make the FreeForm/104 ideal for real-time applications including: DSP, software-defined radio, aerospace, defense systems, and industrial process monitor and control.

For more information, contact: sales@connecttech.com

Industrial Embedded Systems Resource Guide 2007



Connect Tech Inc.
Industrial Strength Communications

**FEATURES**

- › Provides external 5 V power, should a stand-alone, single board solution be required
- › On-board Flash memory for run-time design changes
- › LEDs, Rotary Switch, and Reset Button ease the VHDL development process
- › Free ISE Webpack for front-to-back FPGA design
- › Reconfigurable in the field or through CTI Engineering Services
- › Lifetime warranty and free technical support

RSC# 32921 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Small form factor modules

Connect Tech, Inc.

42 Arrow Road • Guelph, ON N1K 1S6 Canada
519-836-1291
www.connecttech.com

PC/104 Serial Expansion

Connect Tech offers the Xtreme/104 and the Xtreme/104-Plus for your most demanding PC/104 and embedded needs. Choose from 2, 4, 8, or 12 high performance asynchronous RS-232/422/485 serial ports for PC/104 or choose 2, 4, or 8 ports for PC/104-Plus that offer RS-423 or RS-232/422/485 switchable or TTL.

Xtreme/104 and Xtreme/104-Plus products offer data speeds from 50 bps to 1.8432 Mbps, depending on the model. Exceptional data protection is provided via optical or electrical isolation options. Industrial temperature ranges are also available to further protect your data in harsh environments.

Ask about our two-channel, multi-protocol ComSync that offers synchronous serial communications.

Products include lifetime warranty and free technical support.

For more information, contact: sales@connecttech.com

Industrial Embedded Systems Resource Guide 2007



Connect Tech Inc.
Industrial Strength Communications

**FEATURES**

- › 2, 4, 8, or 12 asynchronous serial ports
- › Supports RS-232/422/485/423 serial interfaces and TTL
- › Data transfer rates up to 1.8432 Mbps on Xtreme/104-Plus and 460.8 kbps on Xtreme/104
- › Extended temperature options and optical and electrical isolation available
- › 64 bytes of transmit and receive FIFO buffers
- › Lifetime warranty and free technical support; RoHS compliant

RSC# 32924 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

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Small form factor modules

General Standards Corporation

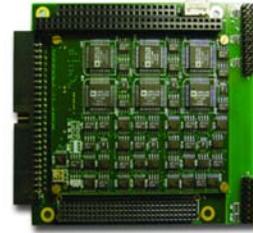
8302A Whitesburg Drive S.W. • Huntsville, AL 35802
 800-653-9970
www.generalstandards.com

General Standards Corporation
High Performance Bus Interface Solutions

PC104P-24DSI12

Low noise, 24-bit resolution, low phase distortion, and multi-board synchronization make the PC104P-24DSI12 board ideal for state-of-the-art sonar and noise monitoring applications. The 12-channel PC104P-24DSI12 analog input board provides high-density 24-bit analog input resources on a standard PC104P expansion board. Optimized for flexibility and performance, the board is ideal for a wide variety of applications, ranging from simple precision voltage measurements, to the analysis of complex audio signals and waveforms. Each of the 12 delta-sigma analog input channels can be controlled by any one of two independent sample clocks, and multiple channels can be harmonically locked together.

Contact our sales department for a customized application to your system at 800-653-9970.



FEATURES

- › Input bandwidth is from DC to 80 KHz
- › Sample rates are adjustable from 2 KSPS to 200 KSPS
- › Input range is software selectable as ± 2.5 V, ± 5 V, or ± 10 V
- › Internal auto calibration networks permit periodic calibration to be performed without removing the board
- › A/D conversions on multiple boards can be synchronized and phase-locked
- › Also available on PMC, PCI, and CompactPCI form factors
- › Contact our sales department for a customized application to your system solutions@generalstandards.com or 800-653-9970

For more information, contact: solutions@generalstandards.com

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Coming in the
 December E-letter:



ISA Expo wrap-up
 A look ahead to 2008

INDUSTRIAL
 EMBEDDED SYSTEMS

Small form factor modules

Mesa Electronics

4175 Lakeside Drive, Suite 100 • Richmond, CA 94806
510-223-9272
www.mesanet.com

4C81 PC104-PCI CPU

Designed for networked applications, the 4C81 has two 10/100 BASE-T Ethernet interfaces and a slot for a Wi-Fi card or other Mini-PCI device. The 166 MHz CPU card consumes less than 2 watts total from a single 5 V supply. The Ethernet interfaces generate hardware TCP checksums allowing close to wire speed routing through the 4C81. An optional on card 200K or 400K gate Spartan3 FPGA with 32-bit local bus connection provides 36-bits of flexible user I/O or a custom processing accelerator. Versions without the FPGA option supply 36-bits of general purpose digital I/O via a CPLD. PC/104-PCI expansion allows addition of high performance peripheral cards. Three bus master PCI devices can be used (including the MiniPCI). The 4C81 supports both Linux and NetBSD.

For more information, contact: sales@mesanet.com

Industrial Embedded Systems Resource Guide 2007

MESA

**FEATURES**

- › Low power ARM CPU – 2X 100 BASE-T Ethernet
- › Type 3 MiniPCI for Wireless/modem
- › Optional Spartan 3 FPGA for custom I/O
- › 64M RAM, 64M Flash, Linux, or NetBSD
- › Price in 100's at \$169
- › Made in U.S.A. - Local Support RoHS available – 2 Year Warranty

RSC# 33922 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Small form factor modules

WinSystems, Inc.

715 Stadium Drive • Arlington, TX 76011
817-274-7553
www.winsystems.com

I/O-Intensive EPIC

The EPX-GX500 is an AMD Geode 500 @1.0 W SBC. The processor has extremely low power dissipation that allows fanless operation in rugged, industrial applications. The board features a 10/100 Ethernet controller, video with CRT and flat panel interfaces, 2 USB ports, 4 COM channels, 24 digital I/O lines, 6 channel AC97 audio, CompactFlash memory, and standard AT peripheral feature set. A MiniPCI socket is onboard for 802.11 wireless networking plus an optional 12-bit A/D converter is available.

The board measures 4.5x6.5-inches and is compliant with the EPIC standard. It supports PC/104 and PC/104-Plus module expansion for more I/O options. The EPX-GX500's x86 PC software compatibility assures a wide range of tools to aid in your program development.

For more information, contact: info@winsystems.com

Industrial Embedded Systems Resource Guide 2007

The WinSystems logo features a stylized red 'W' with five blue stars above it, followed by the text 'WinSystems®' in a black serif font.

**FEATURES**

- › AMD GX500@1W processor
- › Video with CRT or flat panel support
- › Ethernet, two USB, four COM and 24 DIO channels
- › Optional, wireless 802.11, GPS, and 12-bit A/D
- › -40 °C to +85 °C operating temperature
- › Small, rugged, EPIC-compliant board

RSC# 33635 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

WinSystems, Inc.

715 Stadium Drive • Arlington, TX 76011
817-274-7553

www.winsystems.com

**Embedded Connectivity**

Selected by Electronic Products Magazine's editors as a 2006 Product of the Year, WinSystems' LBC-GX500 achieves significant advancement in the application of wired and wireless connectivity technology applied to single board computers. The LBC-GX500 connectivity options include 802.11 wireless Ethernet, GSM/GPRS/CDMA cellular modem, ZigBee wireless RF module, 10/100 wired Ethernet, global-compliant dial-up (POTS) modem, six USB ports, and six COM channels. It provides an open and powerful industrial platform for management of geographically distributed machinery and sensors with a operational temperature of -40°C to +85°C.

In addition to its networking capability, the LBC-GX500 is a full-featured SBC with a variety of on-board peripherals which eliminate the need for other I/O cards. Features include 48 parallel digital I/O lines, CRT and digital flat panel video controller, keyboard controller, PS/2 mouse support, LPT port, and AC97 audio plus an optional 12-bit A/D converter.

Its Pentium-class CPU with a x86-native instruction set and 32KB of integrated L1 cache efficiently runs Windows® CE, Windows® XP embedded, Linux and other x86-compatible operating systems such as VxWorks and QNX. It is a low power device that supports Advanced Power Management (APM and ACPI) for even less power during standby and suspend modes.

The LBC-GX500 draws typically 1.6A at +5V (≈8W) during normal operation and it does not require a fan. The LBC-GX500 also has software developer kits that provide the necessary hardware, software, and cables to help designers with their program development. WinSystems offers a 30-day product evaluation program. Their products are designed and manufactured in the United States, and are backed by outstanding customer and technical support.

**FEATURES**

- › AMD Geode GX500@1W processor
- › Supports CompactFlash as solid state memory storage
- › Video controller supports CRT or LCD panels
- › 10/100 Mbps Ethernet controller and wireless 802.11
- › Supports POTS modem, GPRS/CDMA cellular modem, and ZigBee
- › Optional Trimble GPS receiver module supported
- › Six serial ports and six USB ports
- › 48 bi-directional digital I/O lines
- › IDE, FDC, keyboard, and PS/2 mouse interface
- › EBX-size board, 5.75" x 8.00" (146 mm x 203 mm)
- › -40 °C to +85 °C Fanless operational temperature range
- › Outstanding technical support

For more information, contact: info@winsystems.com

RSC# 33634 @ www.industrial-embedded.com/rsc

Small form factor modules

WinSystems, Inc.

715 Stadium Drive • Arlington, TX 76011
817-274-7553
www.winsystems.com

Industrial Embedded Systems Resource Guide 2007

**Fanless 1GHz SBC**

The EBC-855-G-1G-0 is a highly integrated, low cost (\$595), single board computer designed for rugged, performance-driven applications. It operates over a temperature range of -40°C to +70°C without a fan and is designed for applications including industrial automation, security, medical/diagnostic equipment, MIL/COTS, test and measurement, and transportation. WinSystems uses chipsets from Intel's long life embedded road map to ensure longevity of the core technology.

The EBC-855-G includes support for both wired and wireless Ethernet (with remote boot capability), simultaneous support of both SVGA and LVDS flat panel video, four USB 2.0 ports, four serial COM ports, AC97 audio, PS/2 keyboard, LPT, and 48-lines of digital I/O. It supports a maximum of 1GB of industry-standard PC2700 SDRAM, up to 8GB of CompactFlash, plus support for hard and floppy disk drives. PC/104 and PC/104-Plus expansion is on board for additional special I/O requirements.

It includes advanced features such as custom splash screen, APM 1.2 and ACPI 1.0b power management modes, PXE boot, and multi-language support. The BIOS also supports legacy operation of a USB keyboard and mouse, as well as booting from a USB floppy disk, USB keys, and other USB-connected mass storage devices.

The board runs Windows® XP embedded, Linux, and other x86-compatible RTOS. The EBC-855-G requires only +5V and typically draws 2.1A with 1GB of DDR SDRAM installed.

For even higher performance, a 1.8GHz Pentium® M version is also available. It will operate from -40°C to +70°C with a fan.

**FEATURES**

- › Intel® 1GHz CPU (fanless), or higher-performance 1.8GHz Pentium® M is available
- › Intel® Extreme Graphics 2 technology supports CRT and LVDS flat panels simultaneously
- › Custom splash screen on start up
- › 10/100 Mbps Intel Ethernet controller
- › 802.11a/b/g wireless supported
- › Four serial COM ports and four USB 2.0 ports
- › 48 bi-directional TTL digital I/O lines
- › Bi-directional LPT port, AT keyboard and FDC controller
- › PC/104 and PC/104-Plus expansion
- › 5.75" x 8.0" (146mm x 203mm) EBX-compliant SBC
- › Long-term product availability
- › Quick Start kits for software development

For more information, contact: info@winsystems.com

RSC# 33929 @ www.industrial-embedded.com/rsc

Industrial Embedded Systems Resource Guide 2007

Small form factor modules

WinSystems, Inc.

715 Stadium Drive • Arlington, TX 76011
817-274-7553
www.winsystems.com



I/O-Intensive SBC

WinSystems' PPM-GX500 is a highly integrated, PC/104-Plus SBC designed for deeply embedded, space-limited, low power applications. It is a full-featured SBC that includes an AMD GX500 x86-compatible CPU, CRT and flat panel video controller, 10/100 Ethernet, USB, and four COM channels.



It also includes the standard PC controllers for floppy disk, IDE hard disk, CompactFlash, mouse, keyboard, AC97 audio, and LPT. Its x86 PC software compatibility assures a wide range of tools to aid in your application's program development and checkout.

The PPM-GX500's extremely low power dissipation permits fanless, extended -40°C to +85°C temperature operation. Its small size and rich feature set make it ideal for harsh industrial environments.

FEATURES

- › AMD GX500@1W processor
- › Video with CRT or flat panel support
- › Ethernet, two USB ports, and four COM ports
- › -40°C to +85°C operating temperature
- › Small, rugged PC/104 board
- › Windows® and Linux supported

For more information, contact: info@winsystems.com

RSC# 33928 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

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Small form factor modules

DIGITAL-LOGIC AG

Nordstrasse 11/F • CH-4542 Luterbach/Switzerland
++41-(0)32-681-58-00
www.digitallogic.com



SM800PC/X

The SM800PC/X smartModule is based on the AMD LX800 and performs at 500 MHz. All interfaces, the 16-Bit ISA bus and the PCI bus, are contactable via the 480 pin smartBus. The SM800PC/X smartModule is one of the smallest Computers On Module (COMs) and enables integration of the personal computer in very small devices and environments. The product is characterized by very low power consumption (8 W), a broad temperature range, and an excellent price/performance ratio. The SM800PC/X is the perfect solution for information terminals, control of interactive devices, play systems with music output, measuring instruments, and telecommunication device applications.



FEATURES

- › smartModule 800PC/X with AMD Geode™ LX800 and up to 1 GB DDR-RAM
- › 1x P-ATA, FD, HD, LAN, CF, COM1/2 (TTL)
- › VGA Video and FP-Interface 24-Bit, VGA Video and FP-Interface 24-Bit, Audio AC97-Stereo
- › LCD interface (24-Bit, 240x320 to 1600x1200)
- › CRT, Watchdog, 10/100BASE-T LAN
- › Operating temperature -25 °C to +70 °C (Optional: -40 °C to +85 °C)

For more information, contact: brigitte.kocher@digitallogic.com

RSC# 33800 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

System-on-Chip

AMCC

215 Moffett Park Drive • Sunnyvale, CA 94089
800-935-2622
www.amcc.com

Industrial Embedded Systems Resource Guide 2007


PPC405EX Processor

The AMCC PowerPC® 405EX is based on Power Architecture™ technology and is optimized for the demanding requirements of 802.11n (Wi-Fi) and WiMAX™-based wireless access points and similar embedded processing or network control applications. The PPC405EX combines the performance of the PPC405 processor with a high performance suite of peripheral and memory interfaces, including 2 x1-Lane PCI Express, USB2.0 On-the-Go, DDR 2/1, and two Gigabit Ethernet ports. The PPC405EX also incorporates an advanced security engine, featuring header/trailer processing capability and support for the broadest range of security protocols, including IPSec, SSL, and DTLS. With speeds up to 667 MHz, a flexible off-chip memory architecture, and a diverse communications package, the PPC405EX provides a system-on-a-chip (SOC) solution not only for wireless LAN applications but a wide range of high performance, cost-constrained embedded applications, including security appliances, internet appliances, line cards, and intelligent USB peripherals. It is an easily programmable general purpose, 32-bit RISC controller that offers an upgrade path for applications in need of performance and connectivity improvements. For more information on this device, please go to www.amcc.com.

Development Tools Support

The AMCC 405EX evaluation kit provides users with a comprehensive set of resources to evaluate the 405EX processor as well as to start system development. The evaluation board, incorporating the industry-standard Linux operating system and U-Boot firmware, is an optimized, low-cost platform designed specifically for evaluation purposes. Schematics and layout files for the board are provided so that customers can start their designs from a proven baseline. Likewise, the Linux code and U-Boot firmware source are available to accelerate customers' software development. The kit includes advanced software development tools from multiple suppliers, to assist customers in selecting the most appropriate development and run-time environments.

For more information about our development tools and partners, please go to www.amcc.com/embedded.

**FEATURES**

- › AMCC PowerPC® 405 32-bit RISC processor core operating from 333 MHz to 667 MHz including 16 KB I- and D-caches with parity checking
- › 32-bit DDR1/2 SDRAM controller with ECC, supports both x16 or x32, up to 2 GB memory bank
- › Two PCI Express 1-Lane Interfaces, each with separate controller and SERDES, up to 2.5 Gbps per lane
- › Two 10/100/1G Ethernet MACs
- › USB 2.0 On-the-Go port, both host and device mode supported
- › Optional Turbo Security Engine features True Random Number Generator and Public Key Accelerator, supports IP-SEC, AES, DES, 3DES, 802.1af
- › 90nm CMOS, 388 pin, 27 mm x 27 mm EPGBA package. 1 mm ball pitch
- › 1.2 V core, 2.5/3.3 V I/O depending on interface
- › 1.7 W estimated typical power for SoC (assuming 400 MHz CPU, 200 MHz PLB4 and 400 MHz DDR2 1.8 V memory)
- › DMA (4-channel) support for all on-chip slaves and external bus, UARTs, and devices on the EBC
- › Programmable universal interrupt controller (UIC)
- › System power management, low power dissipation and small form factor

For more information, contact: support@amcc.com

RSC# 33598 @ www.industrial-embedded.com/rsc

AMCC

215 Moffett Park Drive • Sunnyvale, CA 94089
800-935-2622
www.amcc.com

AMCC**PPC405EZ PROCESSOR**

PPC405EZ EMBEDDED PROCESSOR – has speeds of up to 416 MHz, a flexible on-chip and off-chip memory architecture, a unique combination of ADC, DAC, IEEE1588 Precision Timing Protocol (PTP) controller, configurable Chameleon Timer®/PWM, and a diverse connectivity package. Its Power Architecture provides a low power and small footprint system-on-a-chip solution for a wide range of high performance, cost-constrained EMBEDDED APPLICATIONS such as industrial control, high-precision AC, DC, and servo drive control, instrumentation, data acquisition, industrial automation, building and enclosure management, commercial and retail systems, Internet appliances, and intelligent USB peripherals. It is an easily programmable general purpose 32-bit RISC embedded processor that offers an ideal upgrade path for applications currently using 8-bit, 16-bit, RISC, or DSP MCUs needing performance and connectivity improvements.

Implemented in the scalable Power Architecture, the PPC405EZ processor delivers up to 632 DMIPS while maintaining code compatibility with other Power Architecture processors for ease in migration and fast time-to-market. Unique features include an external bus optimized for high performance, low power CellularRAMs, the Chameleon Timer®/PWM, and an IEEE1588 PTP controller that is tightly coupled to the Ethernet port, analog functions, and other on-chip functions to optimize performance and eliminate CPU involvement in capturing, triggering, and timestamping real-time events in devices deployed across entire networks.

Development Tools Support

To accelerate customers' system development time, AMCC's "Acadia" 405EZ kit provides users with a comprehensive set of resources including a custom-designed evaluation board, industry-standard software development tools, sample applications, system-level benchmarks, and hardware design files.

The Acadia evaluation board, incorporating the industry-standard Linux operating system and U-Boot firmware, is an optimized, low-cost platform designed specifically for evaluation purposes.

For more information, please visit www.amcc.com/embedded.

**FEATURES**

- › PPC405EZ EMBEDDED PROCESSOR has speeds of up to 416 MHz, 32 KBytes of cache, and 32 KBytes of on-chip high speed SRAM
- › A flexible memory and external bus architecture supporting NOR, NAND, SRAM, low power PSRAM & CellularRAM, and external bus masters
- › ADC: 8-input, 10-bit 300 K samples/sec DAC: 10-bit 30 M samples/sec
- › Hard realtime timing control via IEEE1588 precision timing protocol controller Chameleon Timer®/PWM
- › Flexible connectivity providing 1 Ethernet port, 3 USB ports, and 2 CAN ports simultaneously
- › Supports full application-code compatibility with all other PowerPC® processors for seamless migration
- › Uses award winning 64-bit IBM CoreConnect™ high-performance on-chip bus
- › Case temperature range: -40 °C to +105 °C
- › 54 GPIOs (each with programmable interrupts and pull-up/down resistors)
- › Technology
 - 130 nm CMOS
- › Power Supply
 - 1.5 V (internal logic), 3.3 V (I/O), 3.3 V (external bus)
- › Packaging
 - 324-pin PBGA 23 mm 23 mm (with 1 mm ball pitch)
- › For more information, Contact Kim: keller@amcc.com or visit www.amcc.com.

For more information, contact: support@amcc.com

RSC# 33957 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

System-on-Chip

AMCC

215 Moffett Park Drive • Sunnyvale, CA 94089
800-935-2622
www.amcc.com

Industrial Embedded Systems Resource Guide 2007

PPC460EX Processor

With speeds of up to 1.2 GHz, The **AMCC PowerPC® 460EX** supports floating-point operations, USB 2.0, PCI-Express, SATA, Gigabit Ethernet, security, NAND Flash interfaces, and low power dissipation. The PowerPC 460EX embedded processor is ideally suited to a wide range of high-performance applications, including imaging such as multi-function printers, industrial control and networking.

The PowerPC 440 Core

To enhance overall throughput, the PowerPC 440 superscalar core incorporates a 7-stage pipeline and executes up to two instructions per cycle. Its large 32-KB data cache and 32-KB instruction cache are 64-way set associative.

High Performance FPU

In addition to its powerful 440 core, the PowerPC 460EX includes a high-performance FPU. This superscalar FPU supports both single and double precision operations, and offers single cycle throughput on most instructions. The result is exceptional performance in imaging and other calculation intensive applications.

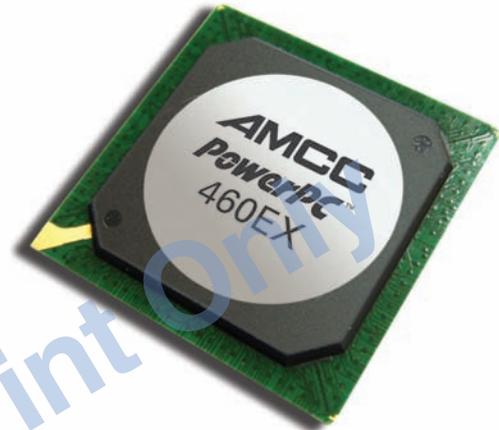
Turbo Security (Optional)

The PPC460EX delivers advanced security capabilities with the optional Turbo Security Engine. This security engine attaches directly to the PLB4 bus for the fastest possible throughput between the PPC460 processor, memory, and the security engine itself. The Turbo Security engines supports DES, 3DES, AES, ARC-4 encryption, MD-5, SHA-1, and SHA-256 hashing.

Development Tools Support

The AMCC 460EX evaluation kit provides users with a comprehensive set of resources to evaluate the 460EX processor as well as to start system development. The evaluation board, incorporating the industry-standard Linux operating system and U-Boot firmware, is an optimized, low-cost platform designed specifically for evaluation purposes. Schematics and layout files for the board are provided so that customers can start their designs from a proven baseline. Likewise, the Linux code and U-Boot firmware source are available to accelerate customers' software development.

For more information about our development tools and partners, please go to www.amcc.com/embedded.

**FEATURES**

- › Two 10/100/1G Ethernet MACs with SGMII
- › 256 KB L2 cache 64 KB of on chip memory (OCM)
- › 4-channel DMA controller
- › PCI-Express ports – one “x4” lane and one “x1” lane
- › Turbo Security Engine: Optional on-chip IPSec/SSL security acceleration engine
- › SATA single port (mux'd w/ 2nd PCI-e port)
- › USB 2.0 OTG and Host with ULPI Interfaces
- › Interrupt Controller with 10 external interrupts
- › On-chip peripherals including: Four serial ports1 SPI2 IIC with boot strap controller
- › 32/64-bit DDR1/2 up to 400 MB/s w/ ECC (up to 16 MB)
- › On chip Peripheral Bus (OPB) - 32-bit 100 MHz
- › FPU (2Mflops/MHz Single and Double Precision)

Industrial Embedded Systems Resource Guide 2007

Capture devices

Active Silicon

17 Wilson Street • Chelmsford, MA 01824
978-244-0490

www.activesilicon.com

**ETX-LFG**

Active Silicon has broadened the market for rugged and embedded vision systems with the launch of a new product based on the ETX form factor from Kontron.

The ETX system comprises a processing module (provided by Kontron) and a carrier card. One of the benefits is that as processor power increases and cost reduces, the plug-on module can simply be replaced without affecting anything else in the system.

Targeted for volume embedded applications, the Active Silicon custom designed carrier card has two simultaneous (PAL/NTSC/CCIR/RS-170) video inputs, 10 serial ports, VGA/flat panel output, CompactFlash, Ethernet ports, USB2, 8 channel ADC, and I/O lines. Other boards in the ETX range support PCI Express and offer high speed Camera Link and GigE interfaces.

FEATURES

- › Extremely rugged and embedded vision platform
- › High Speed PCI Express interface
- › Multiple Gigabit network interfaces with support for GigE Vision cameras
- › Simultaneous PAL/NTSC/CCIR/RS-170 video inputs
- › VGA/flat panel video output
- › Software support for Windows XP, XPE, Linux, and QNX

For more information, contact: info@activesilicon.com

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Industrial Embedded Systems Resource Guide 2007

Display devices

American Portwell Technology, Inc.

44200 Christy Street • Fremont, CA 94538
510-403-3399

www.portwell.com

**WADE-2231 System**

Portwell's WADE-2231 is a compact and rugged Mini-ITX computer system. Like other Portwell Mini-ITX systems, the WADE-2231 is designed with a unique tool-free mechanism to allow the integrator or field service engineer to release the top cover quickly and easily. It integrates seamlessly with Portwell's WADE-8056 or WADE-8656, Intel Core 2 Duo-based Mini-ITX board. Built with Intel's latest multi-core technologies, the WADE-2231 offers greater computing power with lower energy consumption. Portwell's WADE-2231 is the powerful solution for applications in digital signage, automated test equipment, medical equipment, kiosks, and network appliances.

**FEATURES**

- › Built with Intel's latest multi-core technologies
- › Ports of VGA/LAN/USB/COM
- › Tool-free design for easy and quick release of top cover
- › PCI or PCIe slot for expansion
- › Dimensions: 223 mm x 212 mm x 86.2 mm/8.78" x 8.35" x 3.4"
- › Compact, rugged, and stylish design

For more information, contact: info@portwell.com

RSC# 33919 @ www.industrial-embedded.com/rsc

Display devices

IEI Technology USA Corporation

168 University Parkway • Pomona, CA 91768
909-595-2819
www.ieiworld.com

SRM-121/150GS

The IEI SRM-150GS is a high brightness monitor ideal for outdoor applications. It features more 800 NIT brightness and 600:1 contrast ratio. Typical high brightness monitors usually have more than six CCFLs, but the IEI SRM monitors have super high brightness with only four CCFLs. IEI SRM panels are still readable in bright sunlight with fewer backlights and thereby not increasing power consumption or producing extra heat. The IEI SRM series monitor functions in a wide working temperature range of -10 °C to +60 °C in order to accommodate diverse industrial applications such as outdoor kiosks in winter and summer. The SRM series has a special AR (anti-reflection) surface treatment to prevent reflection, ensuring excellent visibility in daylight conditions.

For more information, contact: emarketing@usa.ieiworld.com

Industrial Embedded Systems Resource Guide 2007**FEATURES**

- › 800 and 1000nits super high brightness – ensures outdoor application content's visibility
- › Anti-reflection technology
- › IP 65 compliant – dust and water resistant
- › Auto-dimming function
- › Wide operating temperature: -10 °C ~ +60 °C
- › Both VGA and DVI input, optional touch screen version available, optional 9~36 V version available

RSC# 33907 @ www.industrial-embedded.com/rsc

Display devices

Kaparel, a Rittal Company

97 Randall Drive • Waterloo, ON N2V 1C5 Canada
817-447-9420
www.kaparel.com

AdvancedTCA Enclosures

ADVANCEDTCA ENCLOSURE FAMILY

Rittal Electronic Systems – the complete know-how.

What really counts is reliability. Rittal Shelf Management Concepts incorporates innovative components to produce reliable systems available up to Level 5 for AdvancedTCA and MicroTCA. Everything is fully assembled, ready to run, and individually configured. The same naturally applies equally for CompactPCI, VME, and VME64x. One supplier, one manufacturer, one quality standard. As the leading system supplier, Rittal is your one-stop partner for electronic know-how and a reliable promise of all-inclusive competence – worldwide.

Case solutions in 5U, 12U, 13U, or cube design. Climate control concepts up to 200 W/board and more. High speed backplanes up to 10 Gbps.

For more information, contact: kdubois@kaparel.com

Industrial Embedded Systems Resource Guide 2007**FEATURES**

- › Rittal Electronic Systems – the complete know-how. What really counts is reliability
- › Case solutions in 5U, 12U, 13U, or custom; climate control concepts up to 200 W/board and more
- › High speed backplanes up to 10 Gbps – Variable Shelf Management Concepts – Rittal incorporates innovative components to produce reliable systems available up to Level 5 for AdvancedTCA and MicroTCA
- › Fully assembled, ready to run, and individually configured for AdvancedTCA, MicroTCA, and PicoTCA
- › One supplier, one manufacturer, one quality standard: Kaparel is a Rittal Company, your one-stop partner for electronic know-how

RSC# 3 4485 @ www.industrial-embedded.com/rsc

National Instruments

11500 North Mopac • Austin, TX 78759
512-683-0100
www.ni.com

**NI LabVIEW**

National Instruments LabVIEW is an award-winning development environment optimized for engineers and scientists creating test, measurement, and control applications. With NI LabVIEW, users can quickly and easily acquire real-world signals, perform analysis to ascertain meaningful data, and communicate or store results through a variety of means.

With National Instruments LabVIEW software, you can quickly create industrial measurement and control systems and build high-performance embedded machines.

**FEATURES**

- › Easy-to-use graphical development environment
- › Add high-performance I/O
- › Rapidly prototype embedded systems
- › Integrate your existing industrial PLCs and PACs
- › Incorporate signal processing and analysis
- › Tight integration with a wide range of measurement hardware

For more information, contact: info@ni.com

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Zero Downtime 2007

Advanced Technology for Protecting Mission-Critical Electronic Equipment

Zero Downtime is the only conference focused on the latest advancements in protecting electronic equipment for data centers, communication and control networks, 24X7 industrial and facility systems, infrastructure and emergency service operations and other mission-critical electronic systems.

Topics discussed will include new developments in power protection and reliability including UPS, surge and circuit protection; thermal protection including controls, sensors, heating, cooling; condition monitoring and control, preventative maintenance; EMI shielding; and electronics packaging solutions.

Co-located with the Remote Monitoring and Networking/Onsite Power 2007 Conference!

www.EquipmentProtectionMagazine.com

November 5-7, 2007 – Scottsdale, AZ Radisson Ft. McDowell Resort & Casino

Wired

Connect Tech Inc.

42 Arrow Road • Guelph, ON N1K 1S6 Canada
519-836-1291

www.connecttech.com

BlueHeat

Network-enable serial devices with Blue Heat/Net. With 2, 4, 8, or 16 ports of RS-232/422/485 connectivity, you can locate COM ports exactly where you want them without the need for a physical PC connection. Remotely control serial peripherals from any terminal connected to the Ethernet LAN or Internet.

Fully customizable, each port can be individually configured and controlled via serial interface, remote Telnet, or HTTP. Achieve data speeds of 460.8 kbps/port with autosensing 10BASE-T and 100BASE-TX LAN.

Based on the uClinux embedded operating system, Blue Heat/Net offers programmers a familiar Linux API. Open source development tools are also available via our Software Development Kit. Create customized protocols and download to onboard flash memory.

For more information, contact: sales@connecttech.com

Industrial Embedded Systems Resource Guide 2007



Connect Tech Inc.
Industrial Strength Communications

**FEATURES**

- › Created around a ColdFire CPU featuring 16 MB SDRAM, 2 MB or 4 MB flash, quad UARTs, and a Linux core
- › Numerous application modes and protocols available, including Point-to-Point Protocol (PPP) and Raw TCP
- › Built on the uClinux embedded operating system, enabling the development of customized software
- › Configuration over a serial interface or using Telnet with subsystem administration capabilities with HTTP
- › Independent configuration for 2, 4, 8, or 16 RS-232 or software-selectable RS-232/422/485 ports
- › Real data transfer speeds of up to 460.8 kbps per port

RSC# 22722 @ www.industrial-embedded.com/rsc

Wired

Grid Connect, Inc.

1630 West Diehl Road • Naperville, IL 60563
630-245-1445

www.gridconnect.com

Ethernet/IP Modbus

The popular Xport and Matchport components are now available with Modbus or Ethernet/IP. These simple components can be added to existing boards and all standard Modbus commands and messages are automatically converted.

The Xport-MBTCP converts your existing Modbus RTU/ASCII serial TTL port to a Modbus TCP Ethernet port while the Xport-EIP component converts an existing Modbus RTU/ASCII serial TTL port to an Ethernet/IP port.

Using Ethernet, every node has the ability to read/write data to each other, thus eliminating the limitations of a serial network. Ethernet/IP or Modbus capabilities are also available with the MatchPort Wireless 802.11b/g Device Server component: Matchport-MBTCP or Matchport-EIP.

For more information, contact: sales@gridconnect.com

Industrial Embedded Systems Resource Guide 2007

**FEATURES**

- › Integrated into intelligent RJ-45 connector
- › Ethernet 10/100 Mbps
- › Serial TTL interface to applications
- › Serial interface protocol is Modbus
- › Simple configuration, temperature range -40 °C to +85 °C
- › Customized versions available

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Industrial Embedded Systems Resource Guide 2007

Wired

Meilhaus Electronic GmbH

Fischerstrasse 2 • 82178 Puchheim, Germany
+49-89-890166-0
www.meilhaus.com

**ME-90 PC/104**

The embedded PC/104 datacom board ME-90 has 8 serial ports. These ports can either be RS-232, or RS-422/485, or mixed. RS-422 or RS-485 can be selected with jumpers and can use RTS/DTR half-duplex or auto-redirect. Termination can be set with jumpers. The data transmission rates are up to 1 Mbaud. With its extended temperature range, ESD protection, and an additional external user IRQ line, the board is the ideal solution for PC/104-based point-of-sale, retail, or industrial embedded datacom applications. A flat ribbon cable with 9-pin D-sub connectors is included. The board can be used in Windows, Linux, and other environments as standard COM ports. The board's base address can be set in a wide range with jumpers.

**FEATURES**

- › 8 ports. High-speed transmission rates up to 1 Mbaud.
- › RS-232 or RS-422/485 ports or mixed versions (half of the ports are RS-232; the other half are RS-422/485).
- › RS-422/485 termination can be set with jumpers. All handshake lines wired to the connector. 5 V pin per port.
- › Extended temperature range of -40 °C to +85 °C. ESD protection.
- › Embedded board for the ISA-based PC/104 bus. Wide range for base address. Additional external user IRQ line.
- › Runs as standard COM ports with Windows, Linux, and others. No drivers required.

For more information, contact: sales@meilhaus.com

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Wired

N-TRON

820 South University Blvd., Suite 4E • Mobile, AL 36609
251-342-2164
www.n-tron.com

**IP67 Ethernet**

Ideal for mission critical data acquisition, control, and Ethernet I/O applications with environmental challenges, N-TRON's 105M12 and 108M12 unmanaged Ethernet Switches are IP67 rated for protection against dust, low and high pressure water jets, and temporary immersion in water. These units come with standard M12 D-coded connectors for either five or eight 10/100BaseTX copper ports and carry extended operating temperatures, specifications, and a high MTBF for unbeatable reliability. The 105M12 and 108M12 are UL listed, TUV certified, and can be used in Class I, Division 2 Hazardous Locations.

**FEATURES**

- › Five or Eight 10/100BaseTX Copper Ports with M12 D-coded female 4 pin connectors
- › IP67 rated enclosure for protection against dust, low/high water jets, and temporary immersion in water
- › -40 °C to 80 °C Operating Temperature for 105M12 and -40 °C to 70 °C Operating Temperature for 108M12
- › Full/half duplex operation, auto sensing speed and flow control
- › ESD protection diodes on all ports. Surge protection diodes on power inputs
- › Redundant Power Inputs 10-30 VDC

For more information, contact: sales@n-tron.com

RSC# 33947 @ www.industrial-embedded.com/rsc

Control

Daintree Networks

111 North Market Street, Suite 648 • San Jose, CA 95113
408-351-3645
www.daintree.net

Daintree SNA

The Sensor Network Analyzer (SNA) from Daintree Networks provides the industry's most comprehensive solution for ZigBee and IEEE 802.15.4 testing, analysis, commissioning, and management.

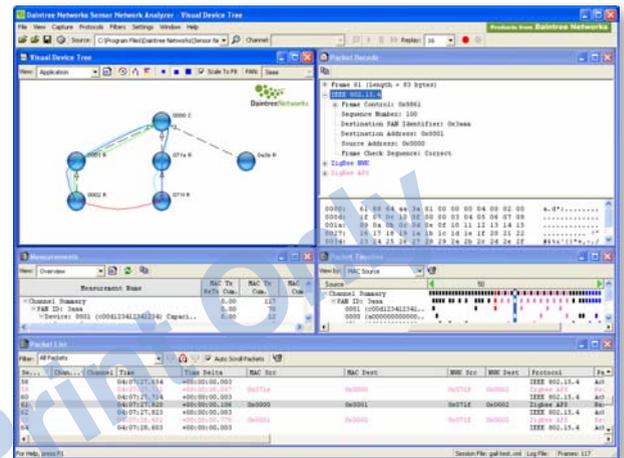
The SNA is both intuitive and powerful: suitable for those new to the technology right through to seasoned professionals. It extends traditional protocol analysis with powerful visual network analysis including visualization of network topologies, routing and application bindings, link quality, and device states. In addition, the SNA provides multi-node capture for analysis of large and physically distributed networks, over-the-air configuration and upgrades for commissioning and maintenance, and measurements for analysis of system performance.

To accelerate troubleshooting tasks, the SNA provides ease-of-use features such as filters based on visual objects, user-definable ZigBee profile definitions using XML, comprehensive playback controls and breakpoints, and an API.

Because the SNA is standards-based, it supports an extensive range of ZigBee and 802.15.4 chipset evaluation boards as both capture and commissioning devices, allowing you to get started quickly using available hardware.

Recognized as the industry standard, the SNA plays an essential role in ZigBee Interoperability events, where it is used as the primary platform-independent means of visualizing, recording, and verifying conformance to ZigBee specifications and test plans.

The SNA is available in three different editions – Professional, Standard, and Basic – so you can pay for the functionality you need today and upgrade in the future as your needs increase.

Industrial Embedded Systems Resource Guide 2007**FEATURES**

- Understand and troubleshoot networks and devices with visual analysis of devices joining, routing behavior, and application binding
- Visualize endpoints and bindings to rapidly determine application behavior. Observe all transactions and identify correct bindings
- Select any visual object such as a device, route, or binding, and show all packets associated with that object
- Obtain complete information about your network: drill down to access every field of every packet from every device
- Use filters to narrow your search and quickly find packets of interest from among thousands or millions
- Save and replay your network at original (or faster) speeds, pause, step, or fast forward. Insert breakpoints at events of interest
- Obtain performance measurements for every device, route, and application binding in the network
- Determine performance with critical metrics such as packet counts and losses and min/avg/max end-to-end latencies
- Commission key startup parameters such as Extended PAN ID, channel, and security using standards-based over-the-air commands
- Use binding and group commissioning to establish control paths between devices. Store binding and group details in devices or tables
- Scan live networks to discover their overall structure. Discover ambient energy levels and active services on endpoints of any device
- Run the SNA on a laptop for a truly portable commissioning, monitoring, and analysis solution that you can take wherever you need it

For more information, contact: sales@daintree.net

RSC# 33906 @ www.industrial-embedded.com/rsc

Industrial Embedded Systems Resource Guide 2007

Control

D-TACQ Solutions Ltd

James Watt Building, Scottish Enterprise Technology Park
East Kilbride G75 0QD Scotland, United Kingdom
44 1355 272511
www.d-tacq.com

**ACQ196CPCI**

The ACQ196CPCI is an Ethernet networked data acquisition device, with high level standards compliant interfaces such as the Web Service interface, which makes it trivial to interface to any networked computer. The board meets the requirement for high channel density simultaneous data acquisition in cost-sensitive applications. The board samples 96 input channels simultaneously with 16-bit resolution at sample rates up to 500kSPS (kilo-samples per second) per channel, while still offering a robust buffered differential front end input stage with good AC and DC performance. On board, realtime signal enhancement is available. Applications: transient recorder, data streaming over Ethernet and backplane interface used for low latency control loops and automated test.

**FEATURES**

- › 16-bit ADC per channel for true simultaneous analog input
- › High throughput, available in two speed grades: 250kSPS/channel and 500kSPS/channel
- › Maximum channel density – 96 channels in one slot, replaces a rack full of 16 channel data acquisition boards
- › Uses latest silicon for highest performance at lowest cost/channel: Deployed in applications down to 1kHz
- › True differential input to each channel. Input features high common mode range and input overvoltage withstand
- › Plant cable interface to front panel – 3 x SCSI 68 connectors on front panel

For more information, contact: info@d-tacq.co.uk

RSC# 33909 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Industrial Embedded Systems Resource Guide 2007

Control

Embest Info & Tech Co., Ltd.

Rm 509, Luohu Science & Technology Bldg., #85 Taining Road
Shenzhen, Guangdong, China 518020
+86-755-25635656
www.armkits.com

**EM104V1 PC/104 SBC**

The EM104V1 is a standard PC/104-compliant industrial controller board based on Samsung's S3C2410A processor. It takes the full features of the ARM9 processor and implements the most functions including ADC, PWM, LCD/TSP, UART, IIS, SPI, Watchdog, IIC, USB, SD/MMC, and JTAG through its CPU board which can be also used as a component directly in OEM products. Its carrier board offers more in addition to those provided by the CPU board, including Ethernet, Keyboard, CAN bus, and more. The board also contains PC/104 and PC/104-Plus expansion connectors that make it available to connect with a wide range of standard peripheral cards. Compared to the traditional x86 PC/104 controller board, the EM104V1 board has more peripherals but with much lower power consumption and higher reliability.

**FEATURES**

- › 203 MHz Samsung S3C2410A ARM920T CPU
- › 64 MB SDRAM, 64 MB Nand Flash, 2 MB Nor Flash, 128 KB SRAM
- › LCD display controller (TFT/STN)
- › Ethernet, CAN, USB, Serial ports, SPI, SD/MMC, IIC, IIS, PWM, ADC, Keyboard
- › PC/104 expansion, CPLD, GPIO
- › Linux 2.6 development environment

For more information, contact: market@embedinfo.com

RSC# 33954 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Control

National Instruments

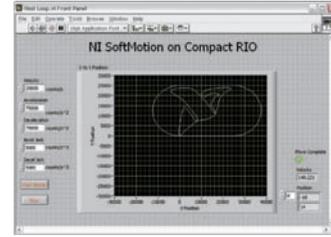
11500 North Mopac • Austin, TX 78758
512-683-0100
www.ni.com

Industrial Embedded Systems Resource Guide 2007

**NI Motion Control**

NI motion control software and hardware – including high-performance motion controllers, drives, and motors – simplify the development of all your motion control applications and deliver easy integration with NI data acquisition and vision products. From automating test equipment and research labs to controlling biomedical, packaging, and manufacturing machines, engineers and scientists use NI motion to solve a diverse set of application challenges, faster and at a lower cost.

The NI SoftMotion Development Module for LabVIEW is for machine builders and OEMs creating custom motion controllers for better machine performance, and for researchers implementing advanced motion control design algorithms using NI CompactRIO, DAQ modules, or Compact FieldPoint.

**FEATURES**

- › NI SoftMotion enables custom motion control system development in software
- › Works with NI CompactRIO, Compact FieldPoint, and plug-in R Series and M Series DAQ devices
- › Is ideal for machine builders, OEMs, and researchers
- › Centralized (Plug-In) Controllers, Distributed Controllers, Custom Controllers, Servo Drives, Stepper drives

For more information, contact: info@ni.com

RSC# 33912 @ [www .industrial-embedded.com/rsc](http://www.industrial-embedded.com/rsc)

Hardware

Connect Tech Inc.

42 Arrow Road • Guelph, ON N1K 1S6 Canada
519-836-1291
www.connecttech.com

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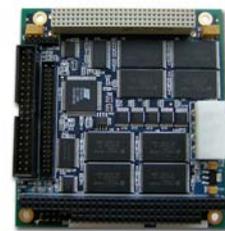
Connect Tech Inc.
Industrial Strength Communications

PC/104 Flash Drive

FlashDrive/104 is an ideal storage solution for rugged applications. This flash based storage module uses the latest NAND technology and fits any PC/104 or PC/104-Plus stack. Easily access flash using industry standard ATA or IDE interface.

Engineered with harsh conditions in mind, FlashDrive/104 is a solid state drive with no moving parts. The result is a high performance, reliable storage module with endurance for any environment.

FlashDrive/104's high-density flash memory offers huge storage capacities and consequently reduces latency for rapid data transfer. Programs/files are stored without disruption; including extreme temperatures, shock, or vibration. Protect your data from damage/corruption that can occur on traditional hard drives with FlashDrive/104.

**FEATURES**

- › Flash based solid state storage, using the latest NAND technology (No mechanical failures!)
- › Industry standard ATA/IDE interface
- › Withstands extreme temperatures, shock, and vibration
- › Read/write performance, up to 10 MB/second
- › Standard and 2.5" hard drive connectors
- › 4, 8, 16 or 32 GB storage for commercial and industrial temperatures

For more information, contact: sales@connecttech.com

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Editor's Choice Products

Supersized rack-mount monitor

Bigger monitors are the trend, and this one is *really* big. The CPPM-8U23 from Chassis Plans is an 8U 23" TFT LCD display with native WUXGA 1920 x 1200 resolution at 60 Hz – 75 percent more pixels than a 1280 x 1024 19" display. Viewability is great with 400 nit brightness, 700:1 contrast, 178 degree viewing angle, and fast 12 mS response time.



But here's the twist: it mounts to the front of a standard 19" rack with an articulating arm, allowing the monitor to be rotated to almost any position.

Chassis Plans

www.chassisplans.com
RSC# 34006



Get surveillance video faster

Video over IP is all the rage, but handling MPEG-4 streams requires special processing power. Intellvisions and Cradle Technologies have partnered to create a new solution for streaming video in surveillance networks.



Trinetra provides four-channel video surveillance capability with selectable MPEG-4 streaming and hard disk recording and playback of stored video streams. Using the Cradle MultiCore DSP architecture, Trinetra enables streaming full 640 x 480 resolution at up to 30 frames per second (NTSC) or 25 frames per second (PAL), and delivers outstanding picture quality across a standard network interface.

Intellvisions Software Ltd.

www.intellvisions.com
RSC# 34047

Equalize pressure without contamination

Sealed enclosures are subject to strong pressure differentials as temperatures vary widely. But letting air in and out opens the enclosure to possible dust, moisture, or worse contamination.



The Polyvent/M12 high-airflow GORE Protective Vent from W. L. Gore and Associates comes in plastic or metal versions, providing water protection to meet IP66 for water jets, IP67 for 30 minutes of water submersion, and IP69K for high-pressure spray. Metal versions are explosion rated and temperature rated from -40 °C to +125 °C.

The trick is a unique expanded polytetrafluoroethylene membrane with a microporous structure that allows air in while preventing water and most environmental contaminants from entering.

W. L. Gore and Associates, Inc.

www.gore.com
RSC# 34046

Cube PAC now 8x faster

Programmable Automation Controllers (PACs) continue to improve. United Electronic Industries' UEIPAC runs Linux with two Ethernet ports, a serial port, an SD card interface, and an inter-PAC sync interface. It provides either three or six slots for I/O boards, including analog input, analog output, digital I/O, serial I/O, counter/timer, quadrature encoder, CAN bus, and ARINC 429 interfaces.

The latest UEIPAC upgrade now allows analog input sample rates up to 576 KSps and up to eight simultaneous Proportional-Integral-Derivative (PID) loops at greater than 20 KHz. No changes to existing code are required to take advantage of the 8x performance improvement, and existing UEIPACs are field-upgradeable at no charge.

United Electronic Industries

www.ueipac.com
RSC# 34045



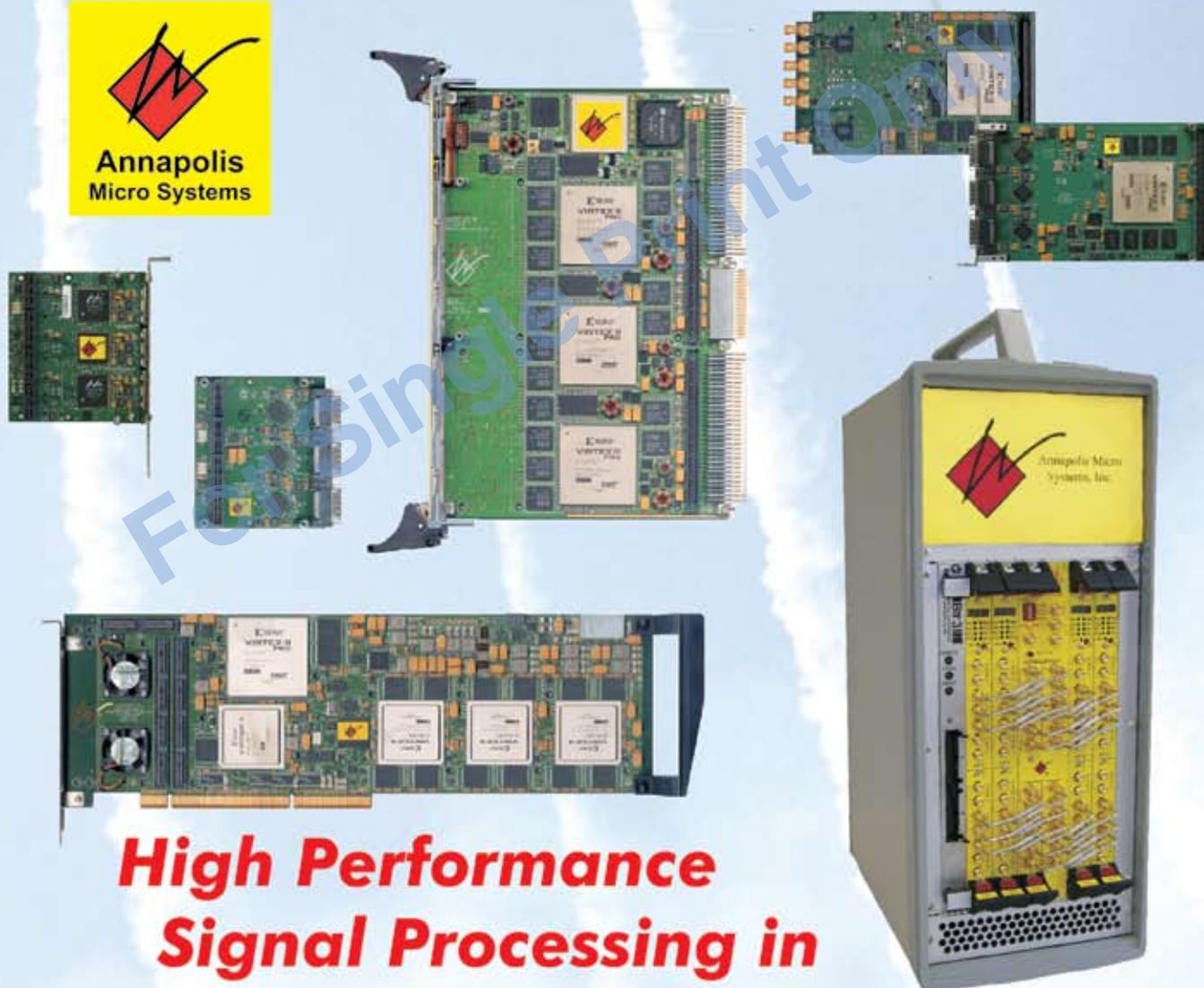
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Photo courtesy of USN

Industrial SBC Supports Wired and Wireless Communications

WinSystems' LBC-GX500 is a highly integrated, single board computer (SBC) designed for machine-to-machine connectivity with a wide variety of wired and wireless options. It provides an open and powerful platform for management of geographically distributed machinery.

- AMD GX500@1W processor
- PC-compatible: supports Linux and Windows® XP embedded and other popular RTOS
- Operates from -40° to +85°C with no fan
- 10/100 Mbps Intel Ethernet controller
- 10 COM ports and 6 USB ports
- Socket support for 56kbps POTS modem, GPRS/CDMA cellular modem, ZigBee and 802.11a/b/g wireless modules
- 48 bi-directional TTL digital I/O lines
- Flat panel and CRT supported
- Onboard AT keyboard, PS/2 mouse, LPT, FDC, and UDMA disk controllers
- Type I and II CompactFlash cards supported
- PC/104 and PC/104-Plus expansion
- Optional 12-bit A/D converter, 8 SE/4 DI
- Optional Trimble GPS receiver
- EBX-size: 5.75" x 8.00" (146mm x 203mm)
- Long-term product availability
- Quick Start kits for software development

Off-the-shelf delivery, knowledgeable technical support, long-term availability and the right price makes WinSystems' LBC-GX500 the SBC of choice for your application.



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