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DESIGN ARTICLES

Speeding embedded systems time to market using Node.js

	Node	Java	Android	Perl	Python	C	C++	PHP
Learning curve	Low	Medium	Medium	High	Medium	Low ^[*]	Medium	Low
Build speed	Fast	Slow	Slow	Fast	Fast	Medium	Medium	Fast
Execution speed	Fast	Fast	Fast	Slow	Slow	Very Fast	Very Fast	Slow
Development speed	Fast	Medium	Medium	Fast	Fast	Low	Medium	Fast
Package support	Very High	High	High	High	High	Low	Medium	Medium

[*] This is somewhat subjective, and a low learning curve is assumed due to prior knowledge by an embedded developer.
[*] Benchmarks typically rate javascript execution as "fastest" below java, but still above what would be considered "medium".



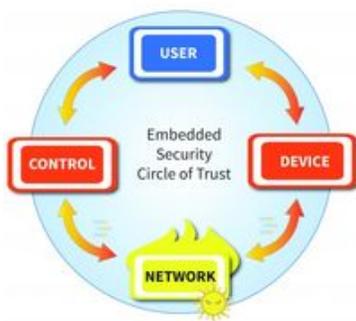
Michael Schmidt, Technologic Systems

Developing in a traditional embedded systems language such as C is hard, yielding long development times and slow time to market. Newer languages such as Java, Python, or PHP are easier, but do not provide a comprehensive end-to-end solution with a shallow learning curve and fast development cycle times. Instead, they require or encourage additional components such as a dedicated web server or database engine along with their additional administrative and maintenance requirements, which?

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Ensuring a safe medical design



Mary Sue Haydt, Green Hills Software

Until recently, developers and manufacturers of medical devices have not been required to consider security in their products. New guidance from the U.S. Food and Drug Administration (FDA) and expanded European Union requirements for personal data protection, now make security design in medical devices a necessity. While IT network attacks get most of the press, it is important to remember that physical attacks, such as accessing a maintenance serial port, can be just as?

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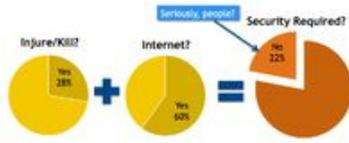
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Embedded systems engineers are dropping the ball when it comes to security!

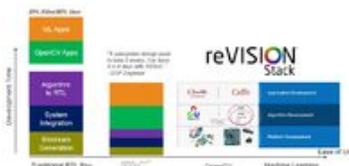


Curt Schwaderer Editorial Director

In an eye-opening embedded systems safety and security survey conducted by the Barr Group , 28 percent of respondents said the systems they work on could cause injury or fatalities and 60 percent of the respondents said their systems were connected to the Internet. Disturbingly, even when their systems could be dangerous and were on the Internet, 22 percent of engineers said security was not a design requirement on their project.

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Defining (artificial) intelligence at the edge for IoT systems



Brandon Lewis, Technology Editor

Merriam-Webster defines intelligence as "the ability to learn or understand or to deal with new or trying situations." By that definition, "intelligent systems" on the Internet of Things (IoT) require much more than just an Internet connection.

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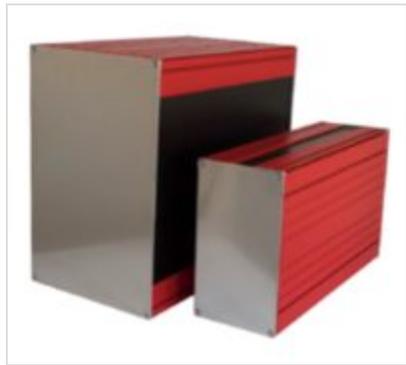
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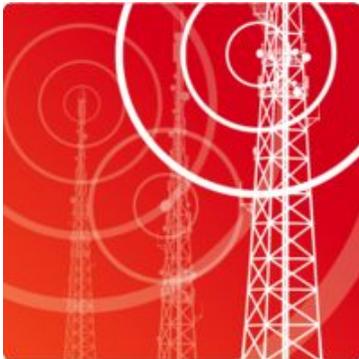
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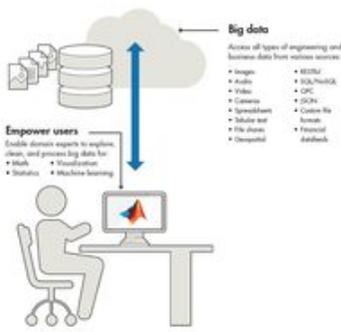
2017 embedded wireless landscape: LPWA standards seek Industrial IoT connections



Brandon Lewis, Technology Editor

Shortly after acquiring semiconductor IP vendor ARM last fall, Softbank CEO Masayoshi Son predicted a future with 1 trillion connected devices. Although it's unclear exactly how Son reached that number, what is undeniable is that, however many devices are eventually connected, the majority will belong to the Industrial IoT (IIoT).

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Big data for engineers and scientists, part 1: Introduction



Dave Oswill, MathWorks

Working with big data is fast becoming a key step in the process of scientific discovery and engineering. This is happening as technologies such as smart sensors and the Internet of Things (IoT) are enabling the collection of vast amounts of detailed data from scientific instruments, manufacturing systems, connected cars, and aircraft. There is significant [...]

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embedded world 2017: Embedded Insiders Show Recap



Rich Nass, Embedded Computing Brand Director *and* Brandon Lewis, Technology Editor



Wrapping up embedded world 2017 from their hotel bar, the Embedded Insiders, Rich Nass and Brandon Lewis of Embedded Computing Design, discuss some of the highlights they saw on Day 3 of the show. While safety and security remained a big theme, Nass also had the opportunity to discuss advances in GE's Predix platform with representatives from the company, which continues to position itself as a powerful tool for developers of Industrial Internet of Things?

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Thoughts from Embedded World



Michael Barr, Barr Group

I'm just getting back to work today after attending last week's Embedded World trade show in Nuremberg, Germany?and I still have a lot on my mind. This was my first visit to Embedded World and I have to say I was considerably impressed by the turnout and overall level of industry activity there. Of course, [...]

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Give me a human programmer over an automated compiler



Colin Walls Mentor Graphics Embedded Systems Division

Traditionally, embedded software was always written in assembly language. This is no longer the case and C and C++ are the dominant languages favored by most embedded developers. However, if code needs to be totally optimal, should assembly language still be used? The obvious and intuitive answer is yes. A skilled human programmer, with a [...]

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Access any IoT ?thing? anywhere with MQTT



David Brook, HCC Embedded

Analysts forecast that up to 50 billion devices could be part of the Internet of Things (IoT) by 2020. This presents a challenge for engineers developing the underlying technology to integrate these devices seamlessly into the IoT. The majority of devices are likely to be relatively small and simple, i.e. sensors and/or actuators built into [...]

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Testing is the only way to assure that code is correct



Jay Thomas, LDRA Technology

As systems in industrial, automotive, medical, and energy markets that involve human life and limb are connected to the IoT, the stakes get higher and the pressure for safety and reliability increases. While hardware can be physically isolated and protected, once the system is connected to the Internet, it becomes exposed through software, which forms [...]

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Possible 802.11p, LTE-V automotive wireless coexistence underscores test necessity for V2X and connected cars



Brandon Lewis, Technology Editor

The infrastructure required for vehicle-to-vehicle (V2V) and vehicle-to-everything (V2X) communications is slowly being tested and deployed by governments, automotive manufacturers, and technology companies, but different technologies and unique geographies are a challenge that must be overcome as the U.S., Europe, and Japan each pursue separate connected car strategies. An example of this is the [...]

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Zinn: The Finale; Wrapping Up a Year of Podcasts



Rich Nass, Embedded Computing Brand Director

Ray Zinn is famous in Silicon Valley, as the 37-year CEO of Micrel, and current author, speaker, and podcaster. After speaking with Embedded Computing Design every week for 52 weeks, we're putting a wrap on this series. In this finale, Ray and I discussed some of the highlights and some of the lowlights of the things we covered. No tears were shed, but the topics we covered were wide-ranging, and often brought cheers, gripes, complaints,?

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Low-power wide-area network standards, advantages, and use cases



Dave Kjendal, Senet

The Internet of Things (IoT) may represent more innovation and change than any other technological development in our lifetime. By instrumenting the world with low-cost sensors, consumers, businesses, cities and entire countries have the opportunity to change the way value is created by providing ground truth data to transform outcomes, markets, and economies.

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The OpenFog Reference Architecture: A baseline for interoperability in the IIoT cloud-to-things continuum



Brandon Lewis, Technology Editor

Fog computing concepts have been floating in the ether for some time now, but it seems that industry has been challenged to put the theoretical models behind the architecture to use in the real world. Recently, however, the OpenFog Consortium released the OpenFog Reference Architecture (RA), a foundational document that will enable interoperable semiconductors, systems, and software for Industrial Internet of Things (IIoT) stakeholders, industry-wide. In this roundtable interview, Dr. Maria Gorlatova, Associate Research?

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Security Comparisons: IT and Industrial Control Systems

IT systems	OT systems
<ul style="list-style-type: none"> • "Old" computer science grads, "digital geeks," younger generation • Data confidentiality and integrity • Automating business processes • Configuration management and manipulation 	<ul style="list-style-type: none"> • Engineers, technicians, production managers & staff who "moved" up through the ranks "from the bottom" • Safety and protection of the process • Response to human and other emergency situations • Controlling physical processes
<ul style="list-style-type: none"> • 3 to 5 years • Confidentiality, integrity, availability • Real-time data • High throughput demanded • High delay and jitter may be acceptable (e.g., video) • Complex data types • Multimedial analytics • Low data rate (10K messages/second) • Web browser • Keyboard • TCP/IP based • Typical IT networking practices • ITN processes are opportunistic. Software changes applied in a timely manner. Patching procedures often automated • Allow for diversified support styles and vendors • Components usually local • Easy-to-access • No controlled temperature environment 	<ul style="list-style-type: none"> • 10 to 20 years • Availability, integrity, confidentiality • Real-time • Response is time-critical • High delay and jitter is not acceptable • Single data type • Real-time analytics • High data rate (1M messages/second) • Human-Machine interface • Sensors • Color displays and touch screens • Serial-based (moving to TCP/IP) • ITN changes must be planned and scheduled in months to advance. Patching releases difficult & regularly impact productivity • Service support usually via a single vendor • Components can be isolated, remote • Requires extensive physical effort to gain access • No high/low temperatures, high humidity environments

Securing a factory's OT network and the role of trust



Stacy Cannady, Cisco and Trusted Computing Group

When leaders have advanced knowledge of how and where their cyber defenses will be attacked, they mobilize resources to reinforce the targeted area. This strategy applies to both war and to hacking attacks. For manufacturing companies, a common weak link in their enterprise network is their production network.

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STOP doing error checking! Part 2: Check for errors, instead.



Bill Gatliff, Freelance Developer

My last STOP error checking post alluded to "a few, ordinary laws of physics" that give us insight into how we might do true and useful error checking. I'll cover those in a moment, but first I'd like to briefly explore the notion of the error itself as it relates to our discussion.

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The Embedded Insiders Podcast: Survey Says!



Brandon Lewis, Technology Editor *and*



Rich Nass, Embedded

Computing Brand Director

In this episode of the newly rebranded Embedded Insiders podcast, Executive Vice President Rich Nass and Technology Editor Brandon Lewis review results from Embedded Computing Design's 2016 reader survey in which embedded and Internet of Things (IoT) engineers responded to a number of questions related to development practices and trends. After looking at the year-over-year responses, Nass identified a peculiar trends regarding the use (or expectations) of security technology by respondents working at the?

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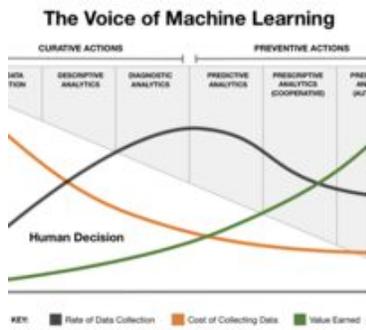
Real engineering requires a bucket!



Duncan Bennet, Bostin Technology

When you are working on proving the feasibility of a project, you sometimes need to think on your feet. The solution to the immediate problem doesn't need to be suitable for volume production, long lasting, or reliable. It just needs to work. The longer-term solution can follow later.

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The voice of machine learning starts and ends with humans



Mark Benson, Chief Technology Officer, Exosite

The Internet of Things (IoT) represents new opportunities for manufacturers to capitalize on the value of data for their business. One of those opportunities is through leveraging an approach called machine learning, which is a branch of artificial intelligence that enables machines (or virtual representations of machines in the cloud) to learn new behaviors based on their external environments, internal health, and changing inputs. However, in order for machine learning to work, humans must?

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