Embedded COMPUTING DESIGN
December E-Letter

DESIGN ARTICLES

IoT interop across the OSI model


Brandon Lewis, Technology Editor

The Open Systems Interconnection (OSI) model is the foundation of Internet communications, including for devices connected to the Internet of Things (IoT). However, the wide variety of existing communications technologies and protocols that plug into this framework has resulted in significant interoperability issues that often force IoT device manufacturers and end users to adopt one method of connectivity or another at various layers of the OSI model, leaving industry at a crossroads of consolidating around a few ubiquitous technologies or accepting fragmentation that could exist on a vertical-by-vertical or application-by-application basis.

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How the IoT is changing business models

Tiffany Rowe, Seek Visibility

Of all of the influences on how we live and work, the one that? s having the greatest effect is undoubtedly the Internet of Things (IoT). From controlling our home appliances with a smartphone, to tools that make simple tasks more efficient in the workplace, the IoT is revolutionizing just about every aspect of our lives. [...]

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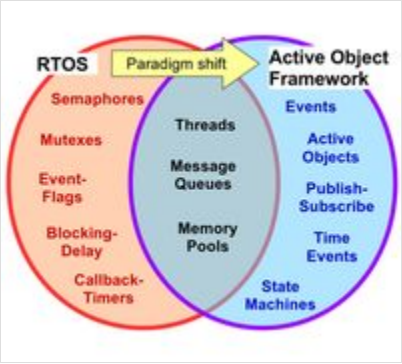

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Five Minutes With?Richard Catizone, CTO, Morey

Rich Nass, Embedded Computing Brand Director

Morey competes with the big boys, the super big boys, in the manufacturing space. I wondered how difficult it was to compete with vendors that seemingly have R&D budgets that are easily 2X your budget and many more people assigned to any given task. As Richard Catizone, Morey?s CTO explained, it?s difficult but far from impossible.

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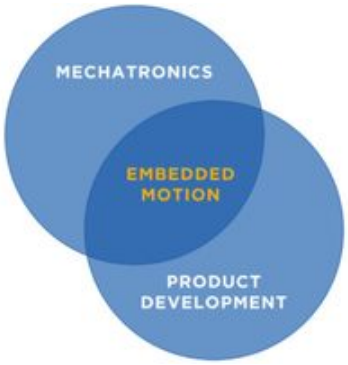

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Mechatronics aids in embedded system design

Doug Harriman, Simplexity Product Development

By looking at embedded systems from a different perspective, a mechatronics perspective, systems can be improved while saving cost.

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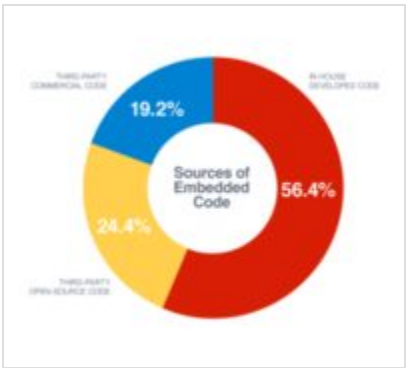

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How wearables and patient-generated data can improve healthcare

Christine Young, Maxim

Heidi Dohse grew up as an athlete?swimming competitively, playing soccer, running track. At some point, though, she noticed that she couldn?t take her pulse manually. When she went in for knee surgery at 19, she learned during a pre-operation EKG that she had a rare heart arrhythmia. ?I went from a being a competitive, healthy [...]

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Building better benchmarks for IoT systems


Brandon Lewis, Technology Editor

Benchmark testing is a favorite of electronic engineers, as it provides a quick reference on performance, power consumption, latency, or other component metrics that can have a significant impact on an overall system. Component benchmarks are widely available from organizations like the Embedded Microprocessor Benchmark Consortium (EEMBC) , and measure everything from the energy efficiency of microcontrollers (MCUs) and their peripherals to the performance of multicore and heterogeneous computing architectures to the latency and throughput of data center servers . The scores provided by these standardized tests offer a comparative snapshot of how devices function in a controlled setting, and can help engineering decision makers sift?

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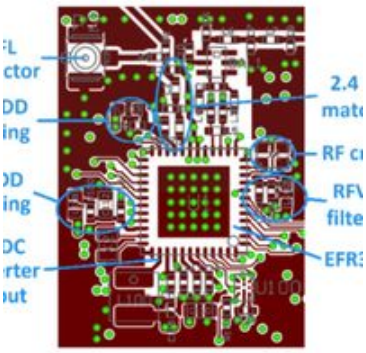

DESIGN ARTICLES

Best practices for RF layout in wireless SoC designs


Kriszti?n Kov?cs, Silicon Labs

The system-on-chip (SoC) integration of wireless connectivity with microcontrollers (MCUs) is an enabling technology for connected device applications throughout the Internet of Things (IoT). The latest wireless SoC devices accelerate the development of high-performance networks and enable compact, low-power, and cost-effective system designs to be delivered to market in ever-shorter timeframes. Whether it is a Bluetooth connection between a wearable device and a smartphone, or a smart home application using ZigBee or Thread as the communication protocol, the underlying technology relies on radio frequency (RF) signals being transmitted and received at frequencies up to 2.4 GHz. Maximizing the performance of any wireless connection means paying close attention to the RF circuit design?

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Intel reorganizes to fortify IoT and Autonomous Driving Groups


Rich Nass, Embedded Computing Brand Director

Two of the topics that come up in just about every meeting I hold, either with design engineers or suppliers, are IoT and automotive technologies. Apparently, it?s not just me. Intel is either sitting in on my meetings or they?re having the same thoughts (I assume it?s the latter). To that end, the company just [...]

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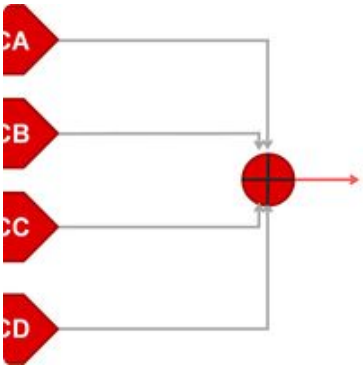

DESIGN ARTICLES

Using a 16-bit DAC to generate a cost-efficient 18-bit DAC transfer function

Rahul Prakash, Texas Instruments, Jonathan T. Key Texas Instruments, *and* Kunal Gandhi, Texas Instruments

High-resolution precision digital-to-analog converters (DACs) are becoming increasingly popular in modern day industrial test and measurement equipment. In order to reduce total system cost, designers often must sacrifice resolution. The following proposes a method for building an 18-bit DAC using a 16-bit DAC and two operational amplifiers (op amps). Two different circuit topologies are analyzed that can be used to achieve the desired 18-bit output: one using a single-channel 16-bit DAC, and the other using a quad-channel 16-bit DAC. Finally, the general operating theory of both topologies is discussed, and a calibration algorithm presented. By leveraging a microcontroller with an integrated analog-to-digital converter (ADC), the algorithm achieves low differential nonlinearity (DNL) and guarantees monotonicity?

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Smart home as a service: The next frontier for the smart home market


Cees Links, Qorvo

The smart home will probably introduce the next technology revolution, but has not yet met its potential, as choosing devices with the right functionality and communication protocols to create an individualized smart home ecosystem is often too complicated for the casual consumer. Some companies are moving their focus from individual devices to packaged solutions, giving rise to the smart home as a service (SHaaS).

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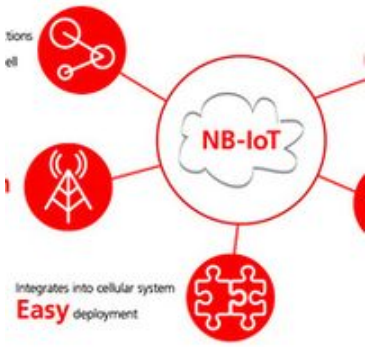

How narrowband IoT will connect our cities


Simon Glassman, u-blox

Cities across the world are increasingly blanketed with public Wi-Fi networks, providing free or extremely low-cost citywide access to the Internet, as well as public services and information. The ultimate hope of many of these initiatives is to move towards a smarter, connected city where people can easily access the information they need at their [...]

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Growing the Internet of Things, part 1: Cost


Skip Ashton, Silicon Labs

In my ongoing discussions with customers and the market in general about the growth of the Internet of Things (IoT), I?m often asked what?s needed to increase the market and expand the IoT across more devices. Recent articles and blogs question all the hype surrounding the IoT and whether the market is actually going to [...]

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Security and the Cortex-M MPU, part 2: MPU multitasking


Ralph Moore, Micro Digital

As noted in my previous blog, Security and the Cortex-M MPU, embedded systems are being drawn more into the Internet of Things (IoT), and consequently, security in the form of protection of critical system resources is becoming increasingly important. Furthermore, effective protection can only be achieved via hardware means. The Cortex-M Memory Protection Unit (MPU) [...]

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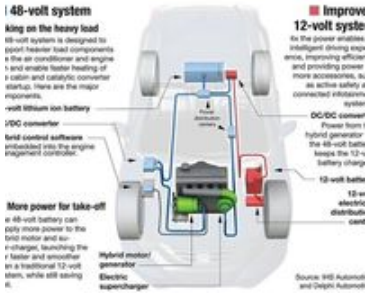

The rise of 48V mild-hybrid vehicles


Majeed Ahmed, Automotive Contributor

Electric and hybrid vehicles are mostly industry initiatives with modest consumer interest and are largely aimed at driving new business models. So how will carmakers meet the stringent CO 2 emissions targets being implemented by 2020? The mild hybridization of conventional cars with 48V battery has emerged as the most viable answer to this challenge in the near term.

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RTOS in the IoT: Where we are and where we?re headed


Brandon Lewis, Technology Editor

The Internet of Things (IoT) has brought software developers from all walks of technology into the field of embedded system design, and with them various predispositions concerning the type of operating system (OS) best-suited for device development. General-purpose operating systems (GPOS), bare metal design, and the ?free one? all have their place based on the [...]

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RISC-V: Reigniting innovation in semiconductors?


Brandon Lewis, Technology Editor

Do you remember when one advantage of the ARM architecture was its limited number of instructions? After all, the ?R? in ?ARM? stands for reduced instruction set computing (RISC), and the benefit of this smaller instruction set architecture (ISA) was that it was simpler to program than complex instruction set computing (CISC) ISAs such as the x86-64 instruction set (which currently includes more than 2,000 instructions [1]). The more intuitive approach to programming and the fact that instruction sets for all ARM CPUs up to version 2 were available in the public domain helped the architecture gain popularity, and eventually aided in the mass adoption of ARM-based processors seen in the market today.

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Top tech to watch at CES 2017: Building blocks for autonomous drive


Brandon Lewis, Technology Editor

It?s hard to believe, but once again it?s time for the most exciting (and exhausting) show of the year ? the Consumer Electronics Show (CES). CES 2017 will be my third, and while each of the last two has showcased innovative advances in the segments of wearables, drones, and augmented/virtual reality (AR/VR), CES is as [...]

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WHITE PAPER

White Paper: Faster Development of Safe, Smart Railway Solutions with SIL Level COTS Components

Staff, MEN Micro Elektronik GmbH

Smart railways require smart control and management systems that must often meet the highest safety requirements up to SIL 4. With SIL pre-certified modular commercial off-the-shelf platforms (COTS) such systems can be developed faster and more cost-effectively than ever. menTCS, the train control system (TCS) from MEN Micro, Inc., is the world's first modular development kit to meet rail safety specifications.

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