Texas Instruments
Tech Day Atlanta 2009
Session Titles and Abstracts

Track & Course	Abstracts
Building A Higher-Performance Signal Chain	
Clocking to Maximize High-Speed Signal-Chain Performance	Selecting a clock driver for a high-performance sampling system involving high-speed data converters is a task whose difficulty is often underestimated. It is especially difficult when the system uses an ADC. A thorough understanding of ADC fundamentals makes identifying the required clock-driver performance easier. Such a clock driver can be a simple (non-PLL) clock-distribution circuit, a clock generator/synthesizer or a jitter cleaner. A clock driver can do the signal processing such as frequency integer or fractional multiplication and division, level translation, skew control, etc. The higher the input frequency of an ADC, the more important the sampling-clock jitter becomes. This jitter needs to be kept at the same levels as the ADC's internal aperture jitter to achieve the best possible SNR and SFDR. This session will address sampling-clock dependencies on the ADC's SNR and SFDR and will explain methods to calculate the required sampling-clock jitter. The session will also introduce TI's high-performance synthesizers/jitter cleaners and demonstrate how these cost-effective devices can achieve the best possible SNR and SFDR.
Exploit the ADC to Your Advantage	Sensors that measure real-world variables seldom have output signals that can be directly connected to a data converter in a system. Typically, analog signal processing such as amplifying, filtering, or shifting the offset of the signal is required. These functions are performed by various device families, each having unique strengths and application requirements. Join our experts in an informative exchange designed to help you better understand the basic characteristics of various data-converter architectures, the special considerations that must be made when conditioning input signals and how to best optimize the design of your signal chain.
Evaluating Analog-to-Digital Converters with ADCPro™	When you consider an ADC for a new design, you can rapidly assess the device with an evaluation module (EVM). If you intend to view collected time-domain, histogram, or fast-Fourier-transform (FFT) data, the new ADCPro software from TI will ease your evaluation. During this session we will identify the appropriate test equipment for your EVM and introduce basic ADC-evaluation test methods. We will also show how ADCPro will simplify the tasks of collecting and analyzing ADC data.
Optimize Your Multiplexed Delta-Sigma System with Low-Latency Strategies	Small-signal sensors often generate slow-moving DC signals. For these types of sensors, delta-sigma (ΔΣ) ADCs eliminate most of the analog-input circuitry by providing a complete, high-resolution, low-noise solution. Some systems have multiple sensors generating low-frequency signals. This situation may require a high-resolution, low-noise ADC with a multiplexer at its input. Even though the sensors at the input of the multiplexer in these systems present low-frequency (nearly DC) signals, switching from channel to channel creates the need for an ADC that is capable of a high-speed response. This session will focus on how to use to your advantage the latency issues with ΔΣ ADCs in multiplexed systems.
Op Amp SAR Converter Drive: Effects of the Wrong RC on the Op Amp	In this session we will review the key design points for driving SAR converters and then take a deeper dive into understanding the dynamics of the signal chain. In particular, we will investigate what happens when an RC combination is chosen without regard to its effects on op amp stability. Excessive overshoot, ringing, and AC gain peaking may be masked in 12-bit systems; but, as demands for systems with 16-bit and greater accuracy become the norm, marginal stability is no longer acceptable. In this session, we will use a definition-by-example approach by including real data to back up our theoretical analysis. We will give you appropriate, detailed techniques for designing CDAC-SAR op amp drive circuits. You will want to include this session in your day if you want to get the ultimate system performance from your SAR converter circuit.

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Optimizing Low-Power Communications

Implementing a Smart and Flexible Power-Line Modem for AMR/AMI and Industrial Applications on TMS320F28x 32-Bit Controllers	Power-line communications (PLC) is booming and becoming a popular solution to implementing remote control in smart electrical meters, automated meter infrastructures (AMIs), and applications ranging from industrial lighting and solar-power inverters to home automation systems. Whether for outdoors or indoors, PLC implementation is inexpensive because it uses the existing electrical grid. However, developers still need smart and flexible solutions to cope with various protocols, evolving standards, and regulations. In addition, the need for system cost optimization is leading to the convergence of the primary application and its remote control on a single device, requiring a product portfolio that offers scalability and performance. The TMS320F28x 32-bit microcontrollers from TI enable developers to implement flexible and smart PLC modems in software for narrowband solutions up to hundreds of kilobits per second. The F28x family also provides the ability to integrate the primary application on the same device if desired. This session will highlight examples of system implementation, share new developments that TI is pursuing in PLC, and show developers how to get started tod
Eliminating Wires Made Simple with SimpliciTI™	This session will address the use of the SimpliciTI network protocol as the heart of a truly robust and full-featured, low-power wireless network. We'll review the power-saving features of the TI low-power wireless radio and the MSP430 SoC microcontroller. This will be followed by a hands-on demonstration of the low-power capabilities of an access-point-based network that is based on the SimpliciTI™ network protocol stack.
RF Hardware System Design	This session will discuss how to deal with key challenges in RF hardware design: balun, decoupling, crystals, power, PCB layout, regulations and debug/test.
RF4CE and the RF-Based Remote-Control Market	This session will provide an overview of the emerging RF-based remote control for the consumer electronics market, specifically addressing the recently published RF4CE standard being driven by Sony, Samsung, Panasonic and Philips. In addition to discussing this vertical market, we will explore the hardware and software solutions available as well as the kits, demos, reference designs, application notes and additional collateral material that our customers can use to get into production in this market quickly and at minimum cost.
Designing RF Systems with Low-Power-Consumption Targets	This session will cover how to configure an RF system for low power consumption. We will explore the design of a low-power RF application from scratch, including periodic transmission, polling receiver and TDMA, power optimization, protocol considerations, design, debug and test. Specific low-power features of LPRF chips will be explored, such as wake on radio (WOR), fast startup from sleep, and low-power modes.

It's All About Power

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Lighting Class LEDs – Enabling the SSL Revolution *Presented by Cree*	LEDs have been used in indicator, automotive and mobile appliance applications for decades. Recent technical breakthroughs have made LEDs bright, efficient and economical enough to challenge traditional lighting sources in an increasing number of general illumination applications, but, as we have pushed into this new application space we have met many new challenges beyond the sheer number of lumens we can throw in a given direction. Quality and performance metrics like lifetime, color point, color point stability over time, binning, and color rendering index (CRI) all play into the "experience" and environmental design aspects of lighting, and this has caused a new class of LEDs to emerge in response: Lighting Class. Lighting Class LEDs leverage on the brightness and efficacy breakthroughs in LED technology, and confront these new quality and performance challenges with a suite of new technology and testing standards that enable them to deliver tangible energy savings, real maintenance dollars savings, and protect the environment in ways that traditional sources often can not. This paper will discuss the technical underpinnings that have enabled this new class of LED, showcase
Designing Power Drivers for Solid-State Lighting (LEDs)	For LED lighting applications, a single-stage power-factor-correction (PFC) converter is the lowest-cost and smallest-size approach to achieving a high power factor for 25- to 75-W applications when isolation is required. Using a UCC28810 transition-mode PFC-boost IC in a flyback converter yields a valley-switching design that can achieve 90% efficiency and a high power factor over a wide universal input range. There are a lot of design trade-offs and ancillary circuits needed to achieve different goals. These goals include fast start-up with low power loss in the start-up circuit, operation of a two-wire TRIAC wall dimmer, and wide universal operation. The magnetics design is integral to the power-stage design and cannot be "black-boxed" or outsourced to a magnetics vendor. A method of achieving a compromise between magnetics and power-stage design by using MathCAD will be discussed. This session is intended for those who have a basic knowledge of PFC converters and flyback-converter design.
Battery Fundamentals *Presented by Varta*	This session will define basic battery-performance parameters and present an overview of performance trade-offs for different chemical systems such as Li-Ion, NiMH, NiCd, $PbSO_4$ and disposable $ZnMnO_2$ alkaline cells. We will discuss how the physical construction of different battery systems affects which type can be used for a specific application. Safety, transport and disposal issues associated with batteries will be covered, along with charging methods for different battery systems. Also considered is the cycle-life impact resulting from various battery-management implementations and storage conditions.
Buck-Boost Converters for Portable Systems	This session presents several solutions to a typical problem encountered by many designers of portable power—how to produce 3.3 V from a single-cell. Solutions such as TI's fully integrated TPS63000 buck-boost converter will be discussed, including their efficiency, overall ease of use, and operation in "transition mode" — when the converter switches from buck to boost mode.
Understanding Digital Power Control	Digital power control promises to revolutionize the way power architectures are designed. In this session, we will review TI's latest product developments along with the theory of digital control. System-level benefits and application examples will also be covered, along with the details of configuring a device with an intuitive graphical user interface (GUI). A product demonstration using the Fusion Digital Power™ Designer tool and the UCD9240 evaluation board will be given.

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Becoming One with Embedded Processing

Tutorial on the New Code Composer Studio™ v4.0—Get Coding in Record Time	CCS v4.0 is a major new release of Code Composer Studio that is based on the Eclipse opensource software framework. Eclipse is becoming very popular in the embedded development community and is now becoming a standard in development environments. This session will provide an overview and explain advantages to using CCS v4.0 for your development.
Linux Development Tutorial on TI Processors	This session will explore the various Linux development options available for TI's embedded processors such as DaVinci™ and OMAP™. Both community and commercial offerings will be discussed, including the benefits of each.
The Ins and Outs of TI's Video Interfaces	TI has several embedded-processing solutions tailored for digital video applications. They consist of integrated processors, software, tools and support to aid in simplifying the design process and to accelerate innovation. In this session you will learn how to interface popular video displays to video ports on digital media devices.
Getting Started with Video- and Imaging-Application Development	From standard-definition to high-definition video, DaVinci technology offers integrated processors, software, tools and support that simplify the design process and accelerate innovation. In this session, we will review current and future offerings in TI's portfolio. This session will explain the processor cores, hardware accelerator engines and associated tools that are available to get started with video and imaging development today.
Implementing Digital Motor Control with High-Performance, Low-Cost MCUs	This session will provide an introduction to basic motor types, motor-drive inverters and motor-control methods but will also cover advanced digital motor control. Digital control was an option for only high-end motor drives and expensive equipment up until now. The introduction of TI's high-performance, low-cost, 32-bit MCU Piccolo™ family changes that. We will discuss how a low-cost Piccolo 32-bit MCU can be used in advanced motor control. We will also demonstrate how a single Piccolo MCU can be used to control multiple motors with advanced vector algorithms such as field-oriented control (FOC). In addition, we will show how the same Piccolo device can be used as the controller for front-end power-factor correction (PFC).

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Digging In with Hands-On Processor Workshops

Embedded Web Server-Enabled Design Made Easy with Stellaris® MCUs *(Parts 1 and 2)*	This presentation will demonstrate using the Stellaris LM3S6965 Ethernet Evaluation Kit with Code Red Technologies' Red Suite™ tools to set up embedded web solutions for a remote control application. The Stellaris LM3S6965 is an ARM Cortex-M3 microcontroller with integrated 10/100 Ethernet MAC+PHY. The Stellaris LM3S6965 Ethernet Evaluation Kit features several different implementations of embedded web servers. The fully-functional Red Suite evaluation tools also feature real-time code and interrupt trace capability with the Red Trace™ feature. The web server application will demonstrate how the provided royalty-free Stellaris libraries make it painless to have networking up and running in minutes, whether using an RTOS or not. The attendees will get a good understanding of how they can start building even the most advanced applications with Stellaris microcontrollers quickly and with low risk.
Hands-On OMAP™ L1x Boot Camp *(Parts 1, 2 and 3)*	The OMAP-L137 is a low-power applications processor based on an ARM926EJ-S™ and a TMS320C674x™ DSP core. The OMAP-L137 features robust operating-systems support, rich user interfaces, and excellent performance longevity due to the flexibility of a fully-integrated, mixed-processor solution. This hands-on workshop will provide a detailed technical overview of the device's architecture and will cover supporting hardware/software such as the Linux boot process and Codec Engine/DSPLink functionality.