



Technology Day Toronto November 15, 2011

Time	Session	Wireless	National Semiconductor	Power Supply	Signal Chain	Digital Signal Processing	Microcontrollers
8 to 9 a.m.	Registration & Booths / Continental Breakfast						
9 to 10 a.m.	1	Texas Instruments Wireless Products and What Works Best for Your Design	WEBENCH Power Designer	There's More to Linear Regulators Than You Think	Introduction to Touch Screen & Haptic Technologies	Using Software to Enhance Your High-Performance Audio and Video Application	Concerto™ MCUs – Eliminate Compromises by Combining the ARM Cortex-M3 with C28x™ DSPs in a Single-Chip Solution
10 to 10:30 a.m.							
10:30 to 11:30 a.m.	2	Adding Wi-Fi and Bluetooth® to TI Embedded Processors (MCUs and MPUs)	WEBENCH LED Design Tools	DC/DC Converters 101: Power Supply Design for Digital Designers	High Performance Differential ADC Input Interface Design	Bringing DSP Closer to ARM Developers	Design and Implementation of Motor Control Systems with MATLAB Simulink and TI C2000™ Processors
11:30 a.m. to 1 p.m.	Lunch / Booths						
1 to 2 p.m.	3	Low-Power RF Development Tools for Testing and Debugging Your RF Products	Sensor Signal Conditioning: New Breakthrough Technology for Sensor Signal Conditioning and Conversion	Achieving Better Transient Response with Less Output Capacitance from Your DC/DC Power Designs	Clocking to Maximize High-Speed Signal Chain Performance	Introduction to Code Composer Studio™ Software v5	Ultra-Tiny Embedded Linux for Stellaris® MCUs with Unison
2 to 2:15 p.m.	Break / Booths						
2:15 to 3:15 p.m.	4	Energy Harvesting, Wireless Charging and Zero Power Devices by Cymbet	Designing Active Filters 101	Managing and Sequencing Many Power Rails in a System	TINA-TI™ Software v9: A New Simulation Solution for 2011	TI + National – A System Solution for Video	Passing Safety Certification with TI's Hercules ARM Cortex-R4F MCUs
3:15 to 3:30 p.m.	Break / Booths						
3:30 to 4 p.m.	5	Fundamentals of Antenna Design by LSR	High-Performance Signal Integrity Issues and Solutions	How TI NexFET™ Power Block and Power Stage Technology Enables the Highest Efficiency and Power Density in Low- to Medium-Input-Voltage Power Systems	TI's High-Reliability Solutions for Space, Extended Temperature, Harsh and Extreme Environments	Insight into a High-Performance SVC Implementation on TI's DM6467 with Ittiam	Making USB Design Simple with MSP430™ MCUs

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Texas Instruments
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Session Titles and Abstracts

Track and Course	Abstracts
Track 1 – Wireless	
Texas Instruments Wireless Products and What Works Best for Your Design	Ever wonder what wireless standard best fits into your embedded system? Texas Instruments supports a variety of wireless products from standards such as <i>Bluetooth</i> ® and ZigBee to proprietary radio hardware. How all of the standards fit in a typical design can be confusing. This session covers the TI wireless portfolio and compares the operation of these radios and standards with the trade-offs of each. The discussion will touch on 6LoWPan, <i>Bluetooth</i> ®, <i>Bluetooth</i> ® low energy, ZigBee, ANT, Wi-Fi, RF4CE, TI's SimpliciTI™ network protocol, RFID and proprietary solutions. We will also talk about will be what modules are available for evaluation and design support.
Adding Wi-Fi and <i>Bluetooth</i> ® to TI Embedded Processors (MCUs and MPUs)	Quickly and easily add Wi-Fi and/or <i>Bluetooth</i> ® technology to systems using TI MPUs (AM/DM37x, AM18x) and MSP430™ MCUs. In this session, we will start with an overview of the WL1271-TiWi 802.11b/g/n + <i>Bluetooth</i> ® transceiver and CC2560-PAN1325 <i>Bluetooth</i> ® transceiver, and then go into the details of the platform. The platform provides complete system integration of all components including WLAN and <i>Bluetooth</i> ® hardware, host hardware, Linux WLAN drivers, supplicant, TCP/IP integration, <i>Bluetooth</i> ® stack, profiles, example code for configuration, and sample source applications. We will walk through the sample applications and explain how you can get started developing Wi-Fi and <i>Bluetooth</i> ® applications.
Low-Power RF Development Tools for Testing and Debugging Your RF Products	This presentation will give a brief overview of the development kits and PC tools for the LPRF product family, focusing on how they can assist you during the development and test phases of a project. Secondly, we will do a deep dive into one of our most important tools – SmartRF™ Studio software. The deep dive will introduce you to some of the many capabilities of SmartRF Studio software and show how it can help you succeed with the development of your own RF product.
Energy Harvesting, Wireless Charging and Zero Power Devices By Cymbet	New techniques and technologies are now available to create self-powered devices by harvesting ambient energy. Actual energy harvesting (EH)-based designs will be reviewed that use photovoltaic, piezoelectric, thermoelectric and electromagnetic EH transducers. New technologies in the areas of ultra-low-power MSP430™ MCUs; the CC430 combination MCU/integrated radio; wireless charging and communications using the TI passive low-frequency interface device (PaLFI); energy processors; solid-state batteries; and solar energy harvesting for the TI MSP430 LaunchPad kit will all be detailed. The last portion of the session will include hands-on lab demos of various EH implementations.
Fundamentals of Antenna Design by LSR	Antenna design is one of the most intimidating and important parts of any RF design. It is critical to understand the key factors involved when choosing an antenna topology, as well as what tools are needed for design, simulation and characterization. Designs must account for the effects of the enclosure material, the available space, the required radiation patterns, and EMC compliance rules and regulations. This presentation discusses the fundamentals of antenna design for short-range devices, as well as the trade-offs between size, cost and performance. An antenna that is properly designed and optimized will enhance the overall performance of any radio.



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Track 2 – National Semiconductor	
WEBENCH Power Designer	WEBENCH Power Designer allows users to rapidly design and optimize power supplies. This presentation will introduce the basics of WEBENCH Power Designer, including regulator selection, BOM computation, electrical and thermal simulation, and prototype kit procurement. In addition, the use of Power Architect for designing power supply systems will be described.
WEBENCH LED Design Tools	This presentation will demonstrate how the LED Power Architect tool can aid in designing LED lighting systems. Topics will include selecting the right LED for your application and designing, optimizing and simulating a driver solution using the LED WEBENCH tool. Application examples will illustrate how WEBENCH allows users to select components, create BOMs, and perform electrical and thermal simulations.
Sensor Signal Conditioning: New Breakthrough Technology for Sensor Signal Conditioning and Conversion	This session will bring you a revolutionary new way to develop circuits quickly for sensor signal conditioning and digital conversion. We'll show you how to use the Sensor WEBENCH Designer tool, which allows you to quickly select the sensor and circuit you need, make initial performance adjustments and evaluations, then view the development platform (including hardware and software) for fast design validation and prototyping. With hundreds of sensors preloaded into the tool, you can quickly select the best one for you before developing your solution. If the sensor you're using isn't available, you can add a custom sensor by adding its characteristics. Please bring your laptop if possible. With access to our website, you can start designing right away.
Designing Active Filters 101	This course highlights the importance of filter types, terminology and various implementations. Real-life application examples will be included.
High-Performance Signal Integrity Issues and Solutions	Designers of systems that move high-speed information – whether networking, automotive or industrial – are running into issues where the data rates are reaching the limits of the standard materials used to fabricate printed circuit boards. In this session, we will examine the common problems with transmitting and receiving high-speed data and will provide signal-conditioning and timing solutions to these problems. We will also examine several common applications such as PCI Express, SATA, FPGA SERDES applications, 10 Gigabit Ethernet, and backplane and cable applications that employ high-speed data, as well as the associated circuit solutions to maintain signal integrity.



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Track 3 – Power Supply	
There's More to Linear Regulators Than You Think	There is a lot more to linear regulators than three pins and heat generation. This is an in-depth look at linear regulators, covering topics such as the basic building blocks of an LDO, how pass element transistor selection changes performance, the difference between an LDO and a standard linear regulator, stability, quiescent current trade-offs, what is PSRR, what is output noise, and thermal performance.
DC/DC Converters 101: Power Supply Design for Digital Designers	This presentation is an introduction to power supplies for non-power supply engineers. If you are an engineer that works on systems that require power but you don't design the actual power supply, this presentation is for you. We will define and explain some of the terminology surrounding power supplies and explain why you might use one topology over another; for example, efficiency considerations and how they relate to the differences between synchronous and nonsynchronous converters. We will also explain many terms you may have heard but not fully understood, such as split rail, PSRR, converter vs. controller, LDO vs. linear regulator, buck vs. boost, etc. This presentation will not show you how to design a power supply, but it will help you to understand what power-supply designers are talking about.
Achieving Better Transient Response with Less Output Capacitance from Your DC/DC Power Designs	The TPS54225, TPS54226, TPS54235 and TPS54326 are new product offerings in the switchers with integrated FETs (SWIFT™) power product line. They represent a significant addition to the product line with a totally different control mode from other SWIFT devices. They are very low cost and require a minimum number of external components to target cost-sensitive consumer or other applications. These devices use a proprietary DCAP2™ Mode control scheme that exhibits some very high performance characteristics not normally found in low-cost devices, while also eliminating bothersome external compensation. Transient response is extremely fast and the TPS54226 and TPS54326 feature a power saving auto-skip mode. This presentation fully explains the DCAP2 Mode control scheme, shows its advantages and high-performance features, and provides competitive analysis with both TI and competitor products.
Managing and Sequencing Many Power Rails in a System	Have you ever wondered how to manage 10 to 16 power rails in a system design? There can be many ways to do this with respect to discrete approaches or integrated designs. This session will show the TI portfolio of power supply rail sequencers and monitors, which can keep designers from having to design a complex hardware and/or software solution. In this discussion, you will learn that TI devices can manage up to 16 rails sequencing and monitoring. You'll also learn about the configurable GUI to ease setup and design with respect to these features: watchdog timers, voltage margining, internal temp sensors, nonvolatile fault logging, multiphase clock generators and more. This session will leave you with a "solutions-based" idea of which sequencers/monitors to choose for a specific design, and why.



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How TI NexFET™ Power Block and Power Stage Technology Enables the Highest Efficiency and Power Density in Low- to Medium-Input-Voltage Power Systems	Switching power supply FET technology is ever-advancing. TI's NexFET™ Power Block and Power Stage technology enable ~92 percent efficiency at output currents >100 A, and meet the ever-increasing power density and efficiency demands in line and portable power systems. You will come away with a complete understanding of the system approach TI NexFET technology facilitates in TI power-management solutions, and will understand TI's NexFET power MOSFET technology's competitive advantages in the marketplace.
Track 4 – Signal Chain	
Introduction to Touch-Screen and Haptic Technologies	This presentation will cover the basics behind touch-screen controller technologies – beginning with resistive and capacitive – before discussing specific products. We will show some of the differentiating features of TI's capacitive touch-screen controller technologies and provide an introduction to the field of haptics, including the need for (as well as the differences between) actuator technologies and the products that TI offers.
High-Performance Differential ADC Input Interface Design	High-performance ADCs used in high-speed data acquisition systems like test and measurement, wireless infrastructure, medical, and military applications require high-performance differential input drive circuits. Designing the drive circuit for optimum SFDR and SNR from the ADC is a challenge for design engineers. This presentation will provide an overview of how ADCs are characterized and show how SFDR and SNR can be combined with the amplifier drive circuit to estimate overall system performance. Different circuit architectures will be presented along with their strengths and weaknesses. To show achievable results, three example application circuits and performance will be shown: THS4521 interface to ADS1278 (24-bit, lower frequency, very high resolution, first Nyquist zone application), OPA695 interface to ADS5500 (14-bit, higher frequency, first Nyquist zone application), and THS4509 interface to ADS6148 (14-bit, narrowband IF second Nyquist zone undersampling).
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 hard task and often underestimated. Designers must first understand the fundamentals of the analog-to-digital converter to design a clock solution that does not degrade performance of the entire signal chain. Clocking solutions range from simple fanout buffers to sophisticated clock generators with the ability to control output frequencies, shape noise and control skew. As the input bandwidth of the ADC increases, the keystone of overall system performance can rely heavily on the jitter performance of the clock. This is particularly true for SNR and SRDR. This presentation will address sampling clock dependencies on ADC performance metrics (namely SNR and SFDR), explain methods to calculate required sampling clock jitter, introduce TI high-performance synthesizers/jitter cleaners, and show demonstrations of achieving the best possible SNR (and SFDR) with cost-effective yet high-performance clocking devices.
TINA-TI™ Software v9: A New Simulation Solution for 2011	TINA-TI™ software has been TI's free circuit simulator for five years. During that time, TI has released hundreds of macromodels and reference designs that can be simulated. This capability allows you to quickly evaluate parts, validate designs to ensure first-pass success, and, if necessary, debug problems. This session will provide an introduction to TINA-TI software, with an emphasis on new features in version 9. We will cover topics such as modifying EVM schematics to meet your needs, importing third-party models, running simulations, visualization/analysis of simulation output, and using parametric sweeping to improve your design.
TI's High-Reliability Solutions for Space, Extended Temperature, Harsh and Extreme Environments	TI has comprehensive signal-chain portfolio solutions for space, high temperature and Enhanced Products (EPs) where quality and reliability are critical. Our Space IC solutions consist of radiation-tolerant and QML-V qualified parts that are suited to survive harsh environments such as space, high-altitude aircraft and medical applications. We will cover radiation issues, quality considerations, radiation considerations as they apply to ICs, the techniques used to make our parts radiation-tolerant, and our space product portfolio. Our high-temperature (HT) parts are qualified to withstand operating temperatures of -55°C to 210°C for harsh environment and industrial electronics applications. Applications, extended temperature qualification requirements, and characterization techniques will be covered, along with a brief review of the HT portfolio. For EPs that are qualified for customers where quality and reliability are primary concerns, we will cover details about what EP are, the value propositions, the extended temperature qualification process, and a review of some of the 700+ EP parts released today.



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Track and Course	Abstracts
Track 5 – Digital Signal Processing	
Using Software to Enhance Your High-Performance Audio and Video Application	TI's KeyStone multicore processor platform features two, four and eight core devices and is supported by various software tools and development kits to enable a stable foundation for application development and deployment. This session explains how to overcome some of the challenges typically faced while designing, developing, debugging and deploying software on multicore architectures. Also covered are details of the multicore software development kit (MCSDK) and its usage with some application-specific examples for key application areas like video and audio. Key third-party offerings around HLOS and RTOS, as well as design tools like CriticalBlue PRISM, Polycore's Poly-Platform and The MathWorks MATLAB will be addressed.
Bringing DSP Closer to ARM Developers	For traditional ARM developers, the effort to understand DSP architectures and development environments seems like a difficult task. If the application doesn't have clear partitioning such that the application code can be split cleanly between the ARM and the DSP, it may seem easier to implement the entire application on the ARM processor. TI has been working on creating examples and techniques to allow such developers to leverage the DSP megahertz to extend the capabilities of their applications. This session will provide a detailed overview of C6EZRun tools. These tools and techniques not only remove the significant ramp-up needed to leverage DSP, but also present DSP as an extension to ARM. With the C6EZRun tool, we have a simple software migration strategy as customers move from ARM-only to ARM + DSP parts.
Introduction to Code Composer Studio™ Software v5	Learn about what's coming in Code Composer Studio™ IDE v5; get involved in the program early so that you can help guide its development. Code Composer Studio software v5 is based on the latest Eclipse release and includes a lot of changes and improvements over version 4. This session will cover the objectives of version 5, beta program information, and migration from previous versions. While version 5 just replaced version 4 in 3Q11, it is included in a number of SDKs and customers have already begun using it.
TI + National – A System Solution for Video	TI's DSP + ARM solutions are gaining momentum in the video infrastructure space for encoding, decoding and image processing. In this session, we will investigate the system considerations when combining TI's (formerly National) analog front-end solutions with the DaVinci™ family of DSPs. This includes an in-depth look at the SERDES-to-DSP architecture. A high-level overview of system power requirements for supporting this application will also be discussed.
Insight into a High-Performance SVC Implementation on TI's DM6467 with Ittiam	Scalable video coding (SVC) is an amendment to the ITU-T H.264 specification that has been recently ratified. The temporal, spatial and SNR scalability aspects offered by SVC are intended to achieve a highly efficient yet scalable representation that can be used to adapt to different channel and receiver capabilities. The requirement of the base layer to be compatible with H.264 base profiles (or high profiles) ensures backwards compatibility with existing H.264 (non-SVC) compliant terminals or media-aware network elements (MANEs). The power of SVC is highly relevant to the following applications: multipoint conferencing over heterogeneous networks and end points; content hosting sites catering to a multitude of end devices over the Internet; and video surveillance IP netcams involved with storage, local monitoring and remote monitoring. In this talk, we will present a high-level overview of the SVC extension to AVC, and the compression efficiency and complexity implications with SVC. While several x86 desktop solutions for SVC have been available in the market, we consider a comprehensive SVC decoder on a programmable platform with video acceleration such as the TI DM6467. This talk will highlight key design trade-offs and



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Track 6 – MCU	
Concerto™ MCUs – Eliminate Compromises by Combining the ARM Cortex-M3 with C28x™ DSPs in a Single-Chip Solution	Real-time control, connectivity and software simplicity come together in TI's Concerto™ MCU series. Building on the C2000™ DSP family's industry-leading C28x™ DSP core and control peripherals, Concerto MCUs add a host subsystem consisting of the ARM Cortex-M3 core and new communication peripherals such as USB OTG and Ethernet. Combined, the Concerto MCU's host and control subsystems make a cleanly partitioned, single-chip solution to eliminate compromises. Learn more about Concerto MCUs and how you can simplify hardware and software development in application areas including industrial control, renewable energy, digital power, electric vehicles and more.
Design and Implementation of Motor Control Systems with MATLAB Simulink and TI C2000™ Processors	This class from The MathWorks features a field-oriented controller for an AC motor using a C2000™ TMS320F28335 MCU from Texas Instruments to demonstrate the basic workflow for designing, generating and verifying C code for a control algorithm. Topics to be covered include design and test of functional requirements through simulation, generation of controller code and integration with application software, and functional verification of the compiled code and processor resource estimation using processor-in-the-loop (PIL) testing.
Ultra-Tiny Embedded Linux for Stellaris® MCUs with Unison	The Unison ultra-tiny, embedded Linux-compatible operating system offers complete communication, synchronization, thread management, file I/O and socket services on Stellaris® microcontrollers. Unison also adds extensive I/O modules including advanced networking, graphics and seamless integration into IAR, Eclipse and Code Composer Studio™ IDEs. Tools for bootloading, power-on self-test (POST) and operating object viewing are also available. This hands-on workshop provides an introduction to building ultra-tiny Linux-compatible systems with Stellaris processors, including wireless Wi-Fi or Bluetooth®, a tiny Web server, advanced networking, USB and fat/flash file systems.
Passing Safety Certification with TI's Hercules ARM Cortex-R4F MCUs	In this session, attendees will receive an overview of Hercules ARM Cortex-R4F MCUs and the integrated features that make the family well suited for safety-critical applications. The safety features that will be covered include dual lockstep CPUs, core compare module, error signaling module, CPU built-in self-test, RAM built-in self-test, memory protection units, and clock and voltage monitoring. In addition, we will discuss the performance aspects of the Cortex-R4F floating-point CPU and the MCU's peripheral interfaces, including FlexRay, CAN, LIN, SCI/UART, MibSPI and 12-bit ADC.
Making USB Design Simple with MSP430™ MCUs	Modern MSP430™ MCUs have integrated USB peripherals, allowing easy connection to a PC or mobile host. This course begins with an overview of the MSP430's USB module, followed by a discussion of the tools TI provides to make USB design simple. This includes a robust API for the most common device classes, a utility that instantly configures the API according to your needs, and a turnkey Visual Studio application for the creation of customer-ready firmware update packages. Minimize the USB learning curve by basing your design on MSP430™ microcontrollers.

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