Texas Instruments
Technology Day Orlando – November 11
Session Titles and Abstracts

Track and Course	Abstracts
Track 1 – Wireless Connectivity	
Design Solutions for High-Fidelity Wireless Audio Using TI's PurePath™ Technology	TI is introducing the CC8520 wireless audio transceiver, which is capable of streaming uncompressed wireless audio at 44.1/48 kHz and 16-bit resolution. This presentation will give a brief introduction to the CC8520 and demonstrate the development tools used to build a wireless audio application. A live demonstration and measurement results from coexistence and range testing will be presented to illustrate the robustness of the PurePath™ Wireless solution. Target applications for the CC8520 include wireless point-to-point audio streaming, wireless subwoofer, wireless speakers and wireless headphones.
6LoWPAN: How to Connect LPRF Solutions to the Internet	We have all heard the industry buzz about connecting sensors to become "the Internet of things." This course will present an overview of 6LoWPAN technology and how it can be configured with LPRF products to connect a wireless industrial sensor network to the Internet (IPV6 portal). Typical real-world applications will be discussed as well as solutions from our LPRF developer network in use today.
Simple Point-to-Point Communication Using the CC11xx/CC25xx Radio	In applications where maximum data rate, minimum latency or small code size is required, using the hardware of the CC25xx/CC11xx radio can accomplish quite a bit. This session goes into the registers of these radios and covers how they can be used to set up a robust and versatile point-to-point wireless network.
eZ430 Chronos Teardown	The eZ430 Chronos is a revolutionary development tool that puts a complete open-source development system in a consumer-quality RF-enabled sports watch. The eZ430-Chronos is enabled by the CC430 microcontroller, the MSP430™ microcontroller's first integrated RF solution on one chip. This session will provide a better understanding for the capabilities of the eZ430 Chronos tool and the endless possibilities to get started quickly across several reference platforms.
First Steps in Developing Your *Bluetooth*® Low Energy Application	This presentation review the *Bluetooth*® BR/EDR and will go through the major steps (checklist) that need to be taken when developing *Bluetooth*® low energy (BLE). The technical presentation will go into the specifics of BLE and how to choose the right set of parameters to achieve your application needs.
Track 2 – Analog/Power	
SEPIC Design Made Easy Using the TPS61165 and TPS61175	Designers often have problems generating a regulated output voltage when the input voltage goes above and below the required output voltage. A common example is generating a regulated 12-V rail from an 8- to 16-V rail. The solution is easily accomplished by converting the TPS61165 or TPS61175 boost converters into SEPIC converters. This presentation shows the benefits and limitations of using these ICs as SEPIC converters, outlines the design procedure including component selection, covers the challenges of compensating the RHPZ, and addresses board space and layout concerns
Contactless Charging	This presentation provides an overview of contactless charging principles based on e-coupled technology targeted at low power (<5-W) applications. Success of this emerging technology depends on a universal standard that enables interoperability between various transmitters and receiver solutions. This session will also provide an overview of the Wireless Power Consortium (WPC) and its efforts to create such a standard focused on delivering interoperable solutions.
Utilizing DC/DC Converters with HS Data Converters	Engineers continually demand lower power consumption from our high-speed ADCs. However, the power efficiency in their system typically is not very good, as the standard, proven method is to power the ADC from an LDO. In the past this was necessary to ensure best performance, even if the configuration comes at the cost of lots of wasted power. Advances in ADC design and process technology, along with improved DC/DC converter design, allow designers to eliminate the LDO and power the HS ADC directly from a switching regulator without having to sacrifice performance. This lecture will compare traditional LDO power supplies against new DC/DC versions for our ADS548x, ADS61xx and ADS41xx converters.
Class-D PCB Layout	This presentation demonstrates the three key areas needed to successfully layout a PCB for Class-D amplifiers: audio quality, electromagnetic compatibility (EMC) and thermal performance.
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 (to name a few) require high-performance differential input drive circuits. Designing the drive circuit for optimum SFDR and SNR from the ADC is the 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 are presented along with their strengths and weaknesses. To show achievable results, four example application circuits and performance are shown: a THS4521 interface to ADS1278: 24-bit, lower frequency, very high resolution, first Nyquist zone application; an OPA695 interface to ADS5500: 14-bit, higher frequency, first Nyquist zone application; a THS4509 interface to ADS6148: 14-bit, narrow-band IF second Nyquist zone undersampling; and a THS770006 interface to ADS5493: 16-bit, narrow-band IF second Nyquist zone undersampling.

Texas Instruments
Technology Day Orlando – November 11
Session Titles and Abstracts

Track and Course	Abstracts
Track 3 – Power Supply Seminar SEM1900	
Incorporating Active-Clamp Technology to Maximize Efficiency in Flyback and Forward Designs **and** Under the Hood of Flyback SMPS Designs	For telecom and PoE applications up to 25 W, single-ended forward and flyback topologies offer the lowest potential cost; however, utilizing active-clamp technology can increase the efficiency of both, particularly when synchronous rectification is appropriate for the outputs. Subjects to be addressed in this topic include obtaining zero-voltage switching; selection and driving of synchronous rectifier FETs; optimizing transformer design; and a side-by-side comparison of equivalent forward and flyback solutions, emphasizing the performance benefits of each topology that can be achieved as a trade-off against circuit complexity and cost. A basic review of the flyback switching topology as applied to low-voltage DC/DC converters will be presented in the second part of the session, with an emphasis on not-so-obvious design issues, including the effects of parasitics, fault protection and EMI mitigation. Modeling and analysis will be demonstrated and compared with physical hardware measurements. A major subtopic will be the understanding and characterization of the flyback transformer, considering leakage inductance, cross regulation, parasitic capacitance and other performance-defi
Designing an LLC Resonant Half-Bridge Power Converter	Although half-bridge power stages have commonly been used for isolated, medium-power applications, efficiency requirements with high-voltage inputs encourage the use of resonant switching, an improvement that comes with added design complexity. However, the LLC half-bridge converter topology offers several performance benefits. This session provides detailed design information on its implementation, eased with a unique analysis tool for frequency modulation control, that of first harmonic approximation (FHA). This FHA method is used to define circuit parameters and predict performance, which is then verified through comprehensive laboratory measurements.
Power Factor Correction Using the Buck Topology: Efficiency Benefits **and** Practical Design Considerations and New Product Offerings from Texas Instruments	Although active power factor correction is typically accomplished with a boost power topology, this topic will show that there are significant efficiency advantages offered by a buck power stage, particularly when universal line operation is required. Specific design and performance issues such as bus voltage choice, achievable total harmonic distortion and power factor, control algorithms, and design practicalities will be discussed. Design choices and their implications will be illustrated with a practical buck PFC design example based on a 90-W high-density notebook power adapter demonstrating a PF >0.9 over a 20- to 90-W load range and >96 percent full load efficiency over a 100-230 Vac line. In the second part of this session, information on significant new power control products will be solicited from TI business managers, with the criteria for selection that a data sheet and samples will be available by September 2010.
Designing Magnetic Components for Optimum Performance in Low-Cost, AC/DC Converter Applications	With the assumption that the attendee is familiar with basic magnetic design theory, this session provides design guidance to achieve high efficiency, low EMI and ease of manufacturing for the magnetic components found in typical offline power converters. Magnetic component designs for a 90-W notebook adapter and a 300-W “silver-box” power supply are used as examples. Applications to be considered include the input EMI filter, PFC inductor, high-voltage level-shifting gate drives, and single- and multiple-output forward-mode transformers in both wound and planar formats. The techniques are also applied to flyback transformers and will enable lower profile designs with lower intrinsic common-mode noise generation.
A New Dual Half-Bridge DC/DC Converter with Wide-Range ZVS and Zero Circulating Current **and** Designing a Solar-Cell-Driven LED Outdoor Lighting System: A Comparison of Digital and Analog Power Control Solutions	A new digitally controlled high-power converter topology combines two half-bridge inverters to operate as a full-bridge power stage using phase-shifting control, but with zero circulating current. Each power switch operates with a nominal 50 percent duty cycle to achieve zero-voltage switching over a widely varying load, but can also function in PWM mode for increased voltage range. A 1-kW, 400-V/48-V converter designed to validate the concept will be shown achieving a 96+ percent efficiency and a high power density. The second part of this session will use a medium-power solution to illustrate the many considerations of designing a complete solar-powered LED light, homing in on the unique demands of both the solar array and LED lamps and integrating them with a storage battery, charger and control circuitry. Both analog and digital solutions will be proposed and compared on the basis of functionality, complexity and cost.

Texas Instruments
Technology Day Orlando – November 11
Session Titles and Abstracts

Track and Course	Abstracts
Track 4 – Lab Track	
Stellaris® Human Machine Interface (HMI) Hands-On Workshop (Part 1 of 2)	During this interactive, hands-on session we will take a close look at the Stellaris® RDK-IDM and the RDK-IDM-L35. Both of these reference design kits include serial connectivity options for easy implementation as a human machine interface (HMI) touch display panel in an embedded control device. This session will include an in-depth look at the Stellaris graphics library and utilizing the LM3S811 evaluation kit as a debugging interface.
Stellaris® Human Machine Interface (HMI) Hands-On Workshop (Part 2 of 2)	During this interactive, hands-on session we will take a close look at the Stellaris® RDK-IDM and the RDK-IDM-L35. Both of these reference design kits include serial connectivity options for easy implementation as a human machine interface (HMI) touch display panel in an embedded control device. This session will include an in-depth look at the Stellaris graphics library and utilizing the LM3S811 evaluation kit as a debugging interface..
Introduction to Linux for ARM Cortex-A8 Hands-On Workshop (Part 1 of 3)	This is a combined lecture and hands-on lab session. The discussion starts with an overview of TI's devices and software development kits (SDKs). The heart of the presentation examines TI's Linux options, from an overview of Linux itself to where you can get versions of Linux for TI platforms (including Arago, TI's open embedded Linux distro) and finally examining how to build within the Linux environment. The session's discussion ends with a brief, practical examination into using Linux on embedded platforms. After booting the system with an SD/MMC card, the lab gets you working with the Linux graphical user environment just as if you were working on a desktop computer. If you have time after exploring the GUI environment, there are further, optional exercises to explore Linux's networking applications, boot environment and mounting various file systems.
Introduction to Linux for ARM Cortex-A8 Hands-On Workshop (Part 2 of 3)	This is a combined lecture and hands-on lab session. The discussion starts with an overview of TI's devices and software development kits (SDKs). The heart of the presentation examines TI's Linux options, from an overview of Linux itself to where you can get versions of Linux for TI platforms (including Arago, TI's open embedded Linux distro) and finally examining how to build within the Linux environment. The session's discussion ends with a brief, practical examination into using Linux on embedded platforms. After booting the system with an SD/MMC card, the lab gets you working with the Linux graphical user environment just as if you were working on a desktop computer. If you have time after exploring the GUI environment, there are further, optional exercises to explore Linux's networking applications, boot environment and mounting various file systems.
Introduction to Linux for ARM Cortex-A8 Hands-On Workshop (Part 3 of 3)	This is a combined lecture and hands-on lab session. The discussion starts with an overview of TI's devices and software development kits (SDKs). The heart of the presentation examines TI's Linux options, from an overview of Linux itself to where you can get versions of Linux for TI platforms (including Arago, TI's open embedded Linux distro) and finally examining how to build within the Linux environment. The session's discussion ends with a brief, practical examination into using Linux on embedded platforms. After booting the system with an SD/MMC card, the lab gets you working with the Linux graphical user environment just as if you were working on a desktop computer. If you have time after exploring the GUI environment, there are further, optional exercises to explore Linux's networking applications, boot environment and mounting various file systems.

Texas Instruments
Technology Day Orlando – November 11
Session Titles and Abstracts

Track and Course	Abstracts
Track 5 – Embedded Processing	
Advanced Digital Lighting Control with C2000™ MCUs	Many lighting applications are now adopting LED technology due to demand for greater energy efficiency and lower power consumption. For example, LED streetlights are not only more efficient than standard high-pressure sodium streetlights but offer a longer lifespan and provide better light as well. Using digital control can further improve functionality by enabling features such as intelligent dimming, adaptive behavior and communication capabilities. This session will highlight the benefits of using digital control in lighting applications, discuss system architecture and partitioning, review TI's C2000™ MCU product family, and showcase the tools and software available to help you get started today.
Energy Harvesting by Cymbet	This session provides an overview of how to design autonomous wireless sensors using various energy-harvesting transducers; energy conversion circuits; energy storage with permanent thin-film battery technology; sensors; and TI's MSP430™ MCU, CC2500 and CC430. Various configurations of autonomous self-power sensors based on energy harvesting will be detailed. Low-power EH RF system architectures will be discussed and design examples will be shown. An example of a zero-power wireless sensor will be demonstrated using the eZ430-RF2500-SEH demo kit and the new DigiKey self-powered CC430 weather station reference design.
FRAM: Opening New Horizons for Embedded Developers	Ferroelectric random access memory (FRAM) is the next-generation non-volatile memory technology for ultra-low-power embedded microcontrollers. Its fast write capability (like DRAM), practically unlimited write endurance (>1,014 cycles) and ultra-low-power consumption benefits developers and end users alike. The presentation will describe FRAM's ability to function as universal memory, helping ease the life of developers and reducing development time (faster time to market) and costs. In addition, FRAM enables several new, exciting ultra-low-power applications such as batteryless intelligent sensors. The presentation will include a look at the power consumption advantages of FRAM in one such application. FRAM also offers significant advantages over incumbent technologies in several other applications, such as energy harvesting, sensoring, datalogging and motor control.
TI Introduces the New SOC Architecture for Multicore DSPs	This session will review TI's new system-on-chip architecture based on multicore DSPs that integrate fixed-and floating-point capabilities in the industry's highest performing CPU. Running up to 1.2 GHz and providing up to 256+ GMACS and 128+ GFLOPS, this SoC delivers 5x the performance of existing solutions in the market. The product family will include a range of devices for medical imaging, military, and test and automation, as well as wireless infrastructure, media gateway and networking applications.
Introducing New Low-Power DSPs for Your Application	There are a wide range of low-power processors available from Texas Instruments. It can get challenging to determine which processor is the right processor for your customer's low-power application. There are many factors that influence processor selection: use case of the application, performance requirements, battery type, battery life and many others. This presentation gives an overview of various low-power processors from TI, including MSP430™ MCUs, C5000™ and C6000™ DSPs, and OMAPL1/OMAP3 processors. Both static and active power consumption of the processors will be compared with performance. The use cases of several power-sensitive applications will be analyzed in detail and the processor selection process explained.
Track 6 – Software and Support	
Essential Concepts in SoC System Design	Learn how to successfully develop with TI's ARM MPU, OMAP™ and DaVinci™ devices. This session will provide a hardware overview as well as a dissection of software architecture. Attendees will gain an understanding of TI-delivered software components (OSs, LSP, codecs), use cases, collateral and support paths, and system integration. Program management best practices will also be covered.
Developing Rich User Interface-Based Products on Sitara™ and DaVinci™ Processors	This session will focus on how to quickly build a Qt-based rich user interface application and how to take advantage of the powerful Cortex-A8 core in the Sitara™ AM3517 processor to play video. We will assemble a custom Linux platform with selected APIs that include Qt, mplayer and GStreamer. We will develop a custom GUI-based application with an Eclipse-based IDE for the medical market. We will integrate and then deploy the complete product on the reference development kit. In addition, we will talk about designing applications that leverage 3-D hardware acceleration. At the end of this session, all attendees will have a full understanding of Linux capabilities for the AM3517 platform and what is also available for other TI chips. Everyone who attends this session will walk away with a free evaluation version of Timesys tools.
Design Considerations When Selecting an Operating System for Your ARM Design	Selecting an OS for applications running on ARM-based microprocessors requires the consideration of desired features, technical requirements and cost parameters. Although many OSs support the ARM architecture, guidelines can be used to help design teams quickly narrow the list. In this session, we will go over key considerations when selecting an OS and talk about the various OS options supported on TI microprocessors. In addition, you will learn about the software development kits and evaluation boards currently available to aid in your design.
Code Composer Studio™ IDE v4.0 Hands-On Workshop (Part 1 of 2)	Code Composer Studio™ IDE v4.0 is a major new release of Code Composer Studio software that is based on the Eclipse open-source software framework. Eclipse is becoming very popular in the embedded development community and is now becoming a standard in development environments. Join this hands-on session to help you get started today.
Code Composer Studio™ IDE v4.0 Hands-On Workshop (Part 2 of 2)	Code Composer Studio™ IDE v4.0 is a major new release of Code Composer Studio software that is based on the Eclipse open-source software framework. Eclipse is becoming very popular in the embedded development community and is now becoming a standard in development environments. Join this hands-on session to help you get started today.