Texas Instruments
Technology Day — Chicago 2010
Session Titles and Abstracts

Track and Course	Abstracts
Track 1 **Power**	
Designing an Offline Multistring LED Driver Solution Utilizing TI's Simp*LED* rive™ Technology	This session will cover the operational theory of an offline, three-stage isolated LED driver suitable for driving multiple strings of LEDs from a universal input line with efficiencies up to 90 percent. The topologies used are transition-mode boost follower PFC, transition mode buck and a resonant current converter. The design example's theory of operation will be based around the UCC28810 EVM003. Using an Excel spreadsheet to modify this design to accommodate other LED loads will also be presented.
The Design Issues of Using TRIACs for LED Lighting/Dimming	Traditional wall dimmers are based on triodes for altermating currents (TRIACs). TRIACs have been used extensively in residential lighting applications with incandescent lamps. Because LED lighting consumes much less power for the same amount of light compared with incandescent sources, the current through the TRIAC wall dimmer is much less. This training will discuss the basic circuits and operation of a TRIAC and present the pros and cons of several LED lighting TRIAC interface solutions. Solutions will include TI's TPS92001, TPS92010 and TPS92210 LED lighting driver controllers.
Amplitude and PWM Dimming Techniques for LED Lighting Solutions	The two principle methods for dimming LED lights are PWM and analog. This training describes the typical implementation, advantages and disadvantages, and impact on performance of each method. The discussion will include color rendering, dimming range and implementation. To dim the light level in an LED, the preferred way is to turn the LED on and off at a certain duty cycle determined by the required dim level. Commonly used methods include pulse-width modulating the LED current with a series power FET or pulse-width modulating the entire controller. The first approach results in increased power dissipation, while the second approach limits the slew rate of the LED current due to the inherent soft-start cycle. The TI solution dims the LED current by overriding the output of the error amplifier. This technique uses low-power, low-cost components and allows the LED current to be turned on and off relatively fast.
Optimizing High-Frequency Synchronous-Switching Buck Converter Performance	With all converters, the performance of the IC is only as good as the external components around it. External components, including the inductors and capacitors, have a large influence on performance. If the recommended components from the data sheet are used, promised performance can be expected. However, designers often need to deviate from these recommendations for various reasons, including preferred BOM parts, size constraints and performance optimization. This session covers the key design points for external component selection and helps designers understand the trade-offs associated with changing the external components in their high-frequency, integrated power supplies. This understanding is especially critical when working with high-frequency power supplies. The session also provides measured data to show the effects of changing external components in the power supply.
Buck-Boost Converters for Portable Systems	This topic presents several solutions to a typical problem encountered by many designers of portable power: how to produce 3.3 V from a single-cell Li-ion battery. The advantages and disadvantages of each solution will be provided, along with measured data on overall battery runtime. This data helps designers select the best overall solution for specific system requirements. This topic also provides a detailed comparison of TI's fully integrated TPS63000 buck-plus-boost converter and other buck-boost solutions. The efficiency, overall ease of use and operation in transition mode when the converter switches from buck to boost mode will be discussed.

Texas Instruments

Technology Day — Chicago 2010

Session Titles and Abstracts

Track and Course	Abstracts
Track 2 **Labs: Stellaris® MCUs and SimpliciTI™**	
Embedded Web Server-Enabled Design Made Easy with Stellaris® MCUs *(Two hours)*	This presentation will demonstrate 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 an integrated 10/100 Ethernet MAC plus 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. Attendees will get a good understanding of how they can start building even the most advanced applications with Stellaris microcontrollers quickly.
Everything You Wanted to Know About the SimpliciTI™ Network Protocol *(Three hours)*	The SimpliciTI™ network protocol is an easy-to-use, robust, fully functional network stack ideal for star and point-to-point networks where low power and security are primary concerns. This hands-on session discusses the main components of the SimpliciTI network protocol, interaction with the network, and the SimpliciTI v1.1.1 stack, and how it can be used to develop simple but very robust wireless networks. Starting from a simple point-to-point communication and building to a data-hub topology utilizing frequency agility, this training covers most design concerns for designers new to the SimpliciTI network protocol. Upon completion of this workshop, attendees should expect to gain the knowledge to design simple-to-intermediate SimpliciTI networks. This is a three-class session. Laptops will be provided and hands-on sessions will use eZ430-RF2500 development boards.

Texas Instruments
Technology Day — Chicago 2010
Session Titles and Abstracts

Track and Course	Abstracts
Track 3 **Low-Power Wireless and Microcontrollers**	
RF Basics, Tools and Getting Started	Have you been told by your manager to remove the wires from your design? Not sure where to start? This presentation serves as an overview of the parameters and considerations a designer would use to select a low-power wireless solution. It also highlights devices and tools from TI and how they fit into a typical low-power RF design.
Design Considerations for Connecting Consumer Products to Internet Web Applications and Browsers *Presented by Arrayent Inc.*	The rapid adoption of smart phones (smart phones exceeded laptop shipments in 2008) is driving many companies to explore ways to connect their products to smart phones and Web applications. By attending this seminar, you will better understand that choosing a wireless LAN protocol is just the first step in enabling Internet connectivity to your product. Three components are required to connect a product to Web applications on the Internet: RF wireless, gateway and a server back end. Other Tech Day tracks will discuss RF wireless design trade-offs, so this session will focus on gateway and server design considerations. Using a design example, we will cover a simple setup; NAT firewall traversal; asymmetric protocols for low-power consumption; Web servers in the product endpoint vs. gateway vs. cloud; network-state storage in the gateway or server; caching vs. SQL queries; and number of open TCP sessions.
C2000™ ControlSuite™ Technology – A New Look at MCU Software	ControlSuite™ software is the C2000™ DSP's effort to take a new look at MCU software. ControlSuite software is not just about content, it's also about content management. On the content side, ControlSuite software introduces a four-level hardware abstraction layer that allows users to choose the level of complexity and control as they program the device. An application focus provides not just examples of systems but includes dedicated application libraries and an incremental build schema for development kits that makes C2000 application kits easier to learn, easier to debug, and easier to modify. All application kits include open-source software and hardware. ControlSuite software includes these application libraries as a part of the library repository, which also includes optimized libraries for math and DSP. For content management, ControlSuite software is packaged in a single installer that shows all software that C2000 DSPs have to offer. As users select the software they want, the installer recognizes and selects dependencies as well. Finally, the installer includes an update notification function that tells users when we update the software.
Lighting Solutions from Microcontrollers to Analog	Microcontrollers have many benefits in lighting applications, including the ability to dynamically adjust operating conditions for optimal efficiency, color mixing, intelligent lighting, ambient light sensing and adjustment. This session gives an overview of MCU solutions for lighting applications, including digital-powered lighting and lighting control and communications. TI has a broad portfolio of products suitable for the lighting market, from light bulb replacements to LCD backlights, from digitally powered streetlights to advanced intelligent lighting controls such as power-line communications or wireless 6loWPAN and ZigBee. TI can address a wide swath of both new and existing markets. This session will also include an overview of digital power as it relates to lighting, reference designs, and products and development kits that will be released within the next six to 12 months.
MSP430F5xx: Bigger, Faster, Lower Power – the Next-Generation MSP430™ MCU	The next generation in MSP430™ MCU technology is here, delivering enhanced performance and deeper integration. This session provides an overview of the feature set and modules of the new MSP430F5xx device family. These devices feature a clocking system with new clock sources and fail-safe features; deliver increased 16-bit performance; enable new on-chip power supervision; and provide enhanced features for simpler code and lower power. The 5xx family will also enable integration of powerful new peripheral modules.

Texas Instruments
Technology Day — Chicago 2010
Session Titles and Abstracts

Track and Course	Abstracts
Track 4 **Embedded Processing**	
Uncover New Opportunities with TI's WiFi and *Bluetooth*® Connectivity Solutions on the OMAP35x EVM	This session will discuss WiFi and Bluetooth connectivity features added to the OMAP35x EVM, making TI's connectivity solutions available to new markets. Come learn about TI's WL1271 combination WiFi and BT device. In this session we will discuss the solution features, support structure and roadmap for additional connectivity support, as well as how to get started and successfully engage with customers. The WL1271-based module is shipping today with the OMAP35x EVM. It is a compact solution that opens the door to innovate a wide range of applications requiring WiFi and/or Bluetooth connectivity. A live demonstration of the WiFi and Bluetooth sample applications included in the platform software will also be shown during the session.
Software Development for OMAP35x High-Performance Application Processors	OMAP35x processors feature an ARM Cortex-A8 core, 3-D graphics, a display subsystem and video accelerators to provide laptop-like performance at handheld power levels. The complete platform allows for differentiation and rapid development of applications. Join this session to learn more about developing software for OMAP35x processors.
Introducing the Graphics Capabilities of TI SoCs	This session will take a look at the graphics hardware capabilities across TI's OMAP™ and DaVinci™ device families and explain what software is provided to enable developers to easily write applications that can leverage these hardware features. This session will then demonstrate how the various hardware capabilities can be utilized within a higher level graphics framework such as Qt/embedded from Nokia. Such a framework can drastically reduce the time and learning curve required for the creation of complex mixed 2-D/3-D user interfaces on TI SoCs.
Achieving High Levels of Integration Using TI's Sitara™ Processors	OMAP-L1x system-on-chip devices integrate an ARM9 core and a high-performance floating-point C674x DSP core. This dual-core architecture allows customers to partition real-time processing-intensive tasks on the DSP while leaving non-real-time tasks to the ARM. Additionally, a rich set of peripherals such as USB On-the-Go, serial ATA and Ethernet MAC – all included on-chip – allow for high levels of integration. Pin-for-pin compatible AM17xx/18xx ARM-only devices give customers the ability to easily scale from an ARM-only design to an ARM-plus-DSP design based on their product requirements. This presentation will examine several applications in which OMAP-L1x devices have allowed customers to integrate MCU and DSP designs into a single chip. These applications include power-protection systems, networked audio, portable data terminals and telecom gateways. An overview of the OMAP-L17xx/18xx family of devices will also be presented.
Code Composer Studio™ IDE 4.0 Advanced Tricks and Tips	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 even becoming a standard in development environments. This session will provide an overview and explain the advantages of using v4.0 of the Code Composer Studio IDE for your development.

Texas Instruments
Technology Day — Chicago 2010
Session Titles and Abstracts

Track and Course	Abstracts
Track 5 **Motor Control**	
Digitizing Your Motor Control Design	Today's motor control systems almost invariably use a microprocessor or microcontroller to close the control loop digitally. The economical advantages of this approach are obvious, but the impact to system performance is much more subtle. How does quantization affect system performance? How can you analyze the stability of your composite analog/digital signal path? How do you know if your sampling frequency is high enough? What processor features are really important for optimized performance? Are there software tools and techniques you can use to ease the development effort? This session discusses some of the analytical methodologies you can use to answer these questions (including several motor control simulation examples), which take the guesswork out of designing your digital motor control system.
Types of Motors and Control Techniques	Building on the previous session, we take a look at some of the different types of motors and digital control techniques being employed in various applications and examine the critical system areas that can affect performance.
High-Performance Analog for Motor Control Applications	In motor control applications where current monitoring and positioning information are critical to the design, system performance is dependent on the accuracy of the analog components found within the control loop. Many modern digital processors have embedded analog components that help ease control system designs, but the performance of these embedded analog components may not meet system specifications. This presentation will highlight simple methods to improve the accuracy of motor control systems with external voltage references by using high-performance operational amplifiers for level shifting and signal conditioning, or by adding high-speed, simultaneous-sampling analog-to-digital converters.
Digital Motor Control MCUs	This session explores the overall methodology, features and example systems available for motor control using TI microcontrollers.
Design and Implementation of Motor Control Systems with MATLAB Simulink and TI C2000™ Processors	In this session, engineers from The MathWorks will demonstrate the concepts of using Simulink as an algorithm tool for motor control applications. Then we will demonstrate code development and code generation to rapidly and efficiently deploy your algorithm to a TI C2000 MCU.