



Texas Instruments

Tech Day San Diego 2010

Session Titles and Abstracts

Track & Course

Abstracts

Track 1

POWERful Solutions

TI Metering Solutions: ZigBee Smart Energy for the HAN

This presentation provides an in-depth discussion of how the ZigBee Smart Energy application profile is used by devices in the home area network (HAN) for smart-grid deployments. An example ecosystem of an energy service portal (ESP), an in-premise display that displays price and consumption information to users, load control, and simple meter devices (such as a gas meter) are discussed to explain the secure communication model of such a network, as well as commissioning aspects related to ZigBee Smart Energy security. Available TI system solutions for ZigBee HAN devices are also covered.

Sensors and the Analog Interface

In this presentation, we will discuss how to monitor many different physical phenomena, such as temperature, air flow, humidity and power. We will discuss numerous sensor characteristics and the various styles of sensor signal conditioning that you can implement in your systems. Throughout this presentation, the output of every sensor circuit will be suitable for conversion to a digital signal. You will leave this session fully armed to tackle your on-board or remote sensor challenges.

Implementing Smart and Flexible Power-Line Modems for AMR/AMI and Industrial Applications on TMS320F28x 32-Bit Controllers

Power-line communication (PLC) is on the rise for applications like metering, intelligent lighting, energy-source management and HEVs. This presentation will give a short overview on PLC history, standards and requirements. With the introduction of Piccolo™ MCUs/Concerto MCUs and dedicated analog front-ends, TI delivers a solution for these PLC applications. The PLC EVM enables customers to enhance time to market for their designs. Promoting flexible microcontroller versus chipset solutions is one key element; but as power, interfaces and drivers are in every PLC modem, we will focus on all key devices.

Empowering Solar

The renewable energy market is poised for exponential growth in the next decade, and TI's Power Management group has recognized the need for simpler and more innovative solutions in this arena. Of particular interest is the area of solar-energy harvesting, which is currently employed everywhere from LED streetlamps to home power systems. The key challenge in solar applications is low efficiency. System efficiency can be significantly improved by using algorithms to maximize panel outputs combined with smart management of batteries that store the harvested energy. TI's solar controller IC, the bq44100, is an integrated analog front-end and preprogrammed microcontroller that addresses many such applications. It offers maximum solar-energy conversion using state-of-the-art MPPT algorithms, safe and secure battery charging, and intelligent management of the overall power system. In this presentation, we will demonstrate how the bq44100 can empower you to easily design sophisticated solar-energy systems at a fraction of the development time and component cost of current high-end systems.

Energy Harvesting
Presented by Cymbet

This session provides an overview of how to design autonomous wireless sensors using various energy-harvesting transducers, energy-conversion circuits, and energy storage with permanent thin-film battery technology, sensors, and the TI MSP430™ microcontroller, CC2500 and CC430. Various configurations of autonomous self-power sensors based on energy harvesting will be described. 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.



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Track 2

Low-Power Wireless and RF Design

Low-Power RF Software System Design

Need to know how to write low-power RF software? This presentation explores how to design an RF protocol from scratch, with the main focus on small point-to-point or point-to-multipoint networks. We'll discuss the different aspects of protocol design, defining system details, network topology, network access, device pairing, power budget and savings, and interference. A brief overview of development tools and other available resources will be mentioned, as well as some of TI's LPRF-specific low-power features, like wake-on-radio, fast startup from sleep and low-power modes.

An Introduction to Antennas and the Theories Behind Them

The antenna can be one of the most daunting components of low-power RF designs. Most information available relates to larger antennas for HAM or cellular applications. This session covers the basics that most designers would need to know to start the antenna requirements and selection process for their next design. At the end of this session, attendees should be able to decipher the data sheet information and decide what the appropriate antenna for the application should be.

Bluetooth® Low Energy and the Low-Power Wireless Ecosystem

With a growing number of proprietary and standard low-power short-range wireless technologies, most recently noting the soon-to-be-released *Bluetooth*® Low Energy standard, it is often difficult to determine which protocol best serves your product's or application's needs. In this session, we will discuss the more popular and readily available standards and proprietary low-power wireless technologies and provide some guidance for your existing or future project needs.

Leveraging TI's New WiFi and *Bluetooth*® Offering for the OMAP35x Evaluation Module (EVM)

This year, TI added WiFi and *Bluetooth*® connectivity features 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, roadmap for additional connectivity support, and 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 for customers 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.

Wireless Audio Design Featuring the CC8520

TI has introduced the CC8520 wireless audio transceiver, which is capable of streaming uncompressed wireless audio at 44.1/48 kHz and 16 bits of 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 TI's PurePath Wireless™ RF solution. Target applications for the CC8520 include wireless point-to-point audio streaming, wireless subwoofers, wireless speakers and wireless headphones.



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Track 3

Innovations in Analog

Op-Amp Stone Soup: A "Cookbook"
Collection of Single-Supply Op-Amp
Circuits

This presentation offers a "stone soup" collection of useful op-amp circuits to solve linear application problems on a daily basis. Each op-amp circuit (prebuilt in the included TINA-TI™ technology-based SPICE schematic) is presented as a definition-by-example, with a brief overview of its functionality, applicable transfer function, and/or waveforms and key equations for rescaling the function to your exact application. A sampling of the ingredients includes the following circuits: voltage-to-current conversion, drive circuits (bridge-tied-load, parallel op-amps, high-current cascade reference buffers), translation circuits (single-ended to differential, differential to single-ended, differential in to differential out), conditioning circuits (full-wave rectifier, supply splitter, integrator amp in feedback, isolation amplifier, $G=1/G=-1$ amp), and comparator circuits (AC-coupled, comparator with hysteresis).

High-Speed Amp to High-Speed ADC
Design Tool

Selecting the right ADC is driven by a few key specs, like clocking speed, SNR, SFDR, power dissipation and interface technology. But the key to winning a high-speed ADC design socket is often based on your ability to propose a system solution with amp, anti-alias filter and ADC. Picking an amplifier and/or interface circuit can be challenging given the large number of device parameters and circuit architectures to consider. This session presents the most recent work done by the High-Speed Amplifier and ADC groups on interfacing high-speed amplifiers to high-speed ADCs. We will discuss the basic methodology used but will focus on the result: a family of EVMs and applications material that will greatly enhance your ability to offer solutions, and a tool to offer customers so that they can tweak their designs easily.

Reference Power Supply Designs for
Audio Applications

One of the key contributors to audio quality is the power supply driving the system. In this presentation, we will review several reference power-supply designs your customers can use to ensure that they achieve the high levels of audio performance that TI quotes in data sheets. Emphasis will be on what power-supply parameters negatively impact audio performance, so you can help your customers avoid problems when they get their prototypes back.

Advancements in Audio Codecs and
Development Tool GUIs

PurePath Studio™ software for TI's family of portable audio codecs with miniDSP enables rapid application development using a powerful graphical programming environment. PurePath Studio software does not require in-depth knowledge of the miniDSP assembly language, which allows users to develop complex signal-processing applications without a difficult learning curve. The development environment comes with a rich set of signal-processing components, which are placed using drag-and-drop and wired together interactively. This presentation shows how to use PurePath Studio software, using the TLV320AIC3254 as an example.

DLP® Products – Introduction and
Overview of New Applications

DLP® Products has become a well-known brand, used in projection systems such as DLP digital cinema and conference-room projectors. At the core of DLP technology are the millions of tiny mirrors that modulate light at high speed, high accuracy and high resolution. This unique ability to modulate light in the UV, visible and IR spectrums is spurring hundreds of new applications in every sector of our lives. This presentation provides an overview of how the DLP mirrors work and describes some of the exciting new applications where DLP products are being used.



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Track 4

Portable Power Design

Battery-Charging System Design Considerations

The Lithium-ion (Li-ion) battery has gained great popularity in recent years as the market for battery-powered portable devices grows rapidly. It has superior characteristics, including high gravimetric and volumetric energy density, low self-discharge and no memory effect. On the other hand, a Li-ion battery pack requires mandatory safety features because of the battery's sensitivity to overcharge and high temperature. This topic aims to discuss the characteristics and safety of rechargeable batteries and emerging battery chemistries such as LiFePO₄ and LiMn₂O₄. It will also present design considerations on connecting battery cells in parallel or in series in applications. New trends toward designing safer battery solutions and lengthening battery life, such as advanced cell-balancing technologies and cell-based thermal monitoring, will also be discussed.

To Clock Synchronize or Not, What's the Trade-Off? Eco-Mode™ Impacts

With all converters, the performance of the IC is only as good as the external components around it. The external components, including the inductors and capacitors, have a large influence on performance. If using the recommended components from the data sheet, you can expect promised performance. However, designers often need to deviate from these recommendations for various reasons, such as preferred BOM parts, size constraints and performance optimization. This topic 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 paper provides measured data to show the effects of changing external components in the power supply.

Introduction to DC/DC Converter Topologies for Portable Applications

The wide variety of power-management solutions available to designers keeps growing, particularly in integrated devices. The simplicity of the integrated converter may raise questions about how to properly test your solution; all of these questions are addressed in this session. After a thorough review of the buck converter, we will explore other power-conversion topologies, including inductive boost, switched capacitor, SEPIC and buck/boost.

Inductive Charging Solutions

This presentation provides an overview of contactless charging principles based on e-coupled technology targeted at low-power (<5 W) applications. The 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.

Driving WLED as a Backlight for Small- and Medium-Sized LCD Displays

White-light emitted diodes (WLEDs) have long been the choice for backlighting small LCD displays, such as those used in mobile phones. With continuing performance improvements and cost reductions, LEDs have quickly moved into larger media form factor (MFF) displays, replacing cold-cathode fluorescent lamps (CCFLs) for LCD back (edge or side) lighting. MFF displays up to 19 inches may require as many as 100 LEDs for proper backlighting. Determining whether these LEDs should be configured in series or parallel requires collaboration between both the panel maker and the LED backlight driver manufacturer. In addition, how to implement dimming is a critical design decision, where power efficiency, display quality and cost all need to be analyzed and compromised. This article provides guidance on how to choose the best WLED backlight solution, from LED configurations to dimming methods.



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Track 5

Embedded Processing Solutions

TI's Community Linux Strategy and Partners for DaVinci™, OMAP™, Stellaris™ and ARM9 Products

Initially TI offered only a single commercial Linux offering – MontaVista Linux – to customers requiring Linux on TI devices. Beginning with the OMAP3530, TI is now releasing community Linux kernels for its devices, along with the associated SDKs and DVSDKs. These community Linux kernels give customers full access to "free Linux" and have enabled multiple commercial Linux companies to support TI devices. This presentation will begin by describing the community Linux distributions TI is releasing, when they will be available, how to obtain them and the support model. It will conclude by overviewing TI's commercial Linux product and consulting partners and the additional value they offer beyond pure community Linux.

Stellaris™ ARM-based MCUs: Communications Introduction

In this session, attendees will receive an overview of Stellaris™ MCUs and the integrated communications available on chip. Communication interfaces that will be covered include: full-speed USB 2.0 On-the-Go (host and device), 10/100 Ethernet MAC and PHY, IEEE 1588 precision time protocol (PTP), CAN networking and the Inter-Integrated Circuit Sound (I2S) interface. In addition, we will discuss the license-free and royalty-free StellarisWare software.

Essential Concepts in SoC System Design

Learn how to successfully develop with TI's ARM, 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.

Video Codecs – What, How and Which

Our investigation of video codecs begins with examining how they work. Next, we'll see how these codecs are implemented on TI's OMAP™ and DaVinci™ processors. Finally, we will compare and contrast many of the popular codec standards and help guide you to the right processor for your application.

Considerations for Choosing the Right TI ARM-Based Microprocessor

TI has introduced many new processors based on Cortex-A8 and ARM9 architectures. This session compares ARM-based MPU options and guides you through the decision-making process. Learn the technical components that are included as part of these cores. In addition, learn about the scalability of the different architectures.

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