



Technology Day Cleveland – May 17, 2011

Time	Session	Track 1 Signal Chain	Track 2 Power	Track 3 Wireless	Track 4 System/Board Level Solution	Track 5 Motor Solutions	Track 6 Embedded Processing
8:30 to 9 a.m.	Registration						
9 to 10 a.m.	1	Low-Power, High-Resolution Data Converter Techniques for Industrial Sensing and Metering	Wireless Power: Total Solution for Charging Using the Wireless Power Consortium Standard	Fundamentals of Antenna Design <i>by LSR</i>	Power Supply Layout Considerations	From Model to Motion <i>by D3</i>	MSP430™ MCU Value Line
10 to 10:15 a.m.	Break						
10:15 to 11:15 a.m.	2	Design Considerations for ±10-V Signal-Chain Applications.	Powering Modern Applications Processors and FPGAs	Texas Instruments Wireless Products and What Works Best for Your Design	Introduction to Touch Screen & Haptic Technologies	Control of BLDC Motors	Making USB Design Simple with MSP430™ MCUs
11:15 a.m. to 12:30 p.m.	Lunch						
12:30 to 1:30 p.m.	3	Instrumentation Amplifier Noise Analysis	What's New in TI Power Devices	Adding Wi-Fi and Bluetooth® to TI Embedded Processors (MCUs and MPUs)	DLP® Technology – Intelligent Light-Steering Solutions for the World	Science and Art of Your Bipolar Microstepper and DC Motor Driver	How to Select the ARM for Your Design
1:30 to 1:45 p.m.	Break						
1:45 to 2:45 p.m.	4	Digital Isolation Techniques and Implementations	Switching Power Supplies Made Easy with SwitcherPro™ Software and the New, Powerful TINA-TI™ Software v9	Bluetooth® Low Energy and ANT: Very Low Power Wireless Connectivity Solutions	PCB Power and Ground Plane Design For Reducing EMI and Circuit Noise	Analog Motor Drivers: Steppers, Microsteppers and DC Motors	Enabling and Accelerating Android on Sitara™, Integra™ and DaVinci™ Devices
2:45 to 3 p.m.	Break						
3 to 4 p.m.	5	System-Level Design of Data-Acquisition Systems Using Software Design Tools	Optimizing Your High-Input Voltage (Up to 60 V) DC/DC Converter for Size and Performance	Design Solutions for High-Fidelity Wireless Audio Using TI's PurePath™ Technology	Interface Standards Comparison for Industrial Networks	Designing Motor Controls <i>by D3</i>	The ABC's of BeagleBoard-xM

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Texas Instruments Cleveland Technology Day 2011 Session Titles and Abstracts

Track and Course	Abstracts
Track 1 – Signal Chain	
Low-Power, High-Resolution Data Converter Techniques for Industrial Sensing and Metering	TBD
Design Considerations for ± 10 -V Signal-Chain Applications.	In the industrial space, we are still dealing with ± 10 -V signal levels. Many available sensors generate these levels or you may need to measure these voltage levels (and greater) with minimal loading on the source. TI has recently introduced several new amplifiers that can operate on supplies up to ± 18 V, providing a range of high-input impedance options. In this session, we will discuss considerations in designing a suitable front-end interface, including voltage scaling, limiting and filtering in preparation for driving a lower input voltage ADC. We will also look at different error sources, including input loading, noise, and DC stability.
Instrumentation Amplifier Noise Analysis	This presentation covers the calculation, simulation and measurement of intrinsic noise in an instrumentation amplifier. Intrinsic noise is noise generated by resistors, op amps and other active devices in the circuit. The presentation does not cover extrinsic noise (RFI and EMI pickup). The presentation does cover specific real-world examples where peak-to-peak output noise is predicted, simulated and measured. In addition, using an instrumentation amplifier correctly to avoid internal node saturation will be discussed.
Digital Isolation Techniques and Implementations	Multiple options are now available to electronics designers to implement galvanic isolation. Apart from deciding whether to choose isolation technologies like capacitive, optical and inductive/magnetic, they must also contend with various isolation standards regarding voltage ratings and creepage/clearance distances. This discussion intends to simplify the decision-making associated with choosing the right isolation solution.
System-Level Design of Data-Acquisition Systems Using Software Design Tools	Learn how to use system requirements to choose a data converter and determine the signal conditioning circuitry required. Using FilterPro™ and TINA-TI™ software, along with other TI tools, see how to quickly design the required circuits and simulate and optimize them. Once the system is designed, you can use ADCPro to see your successful design perform.
Track 2 – Power	
Wireless Power: Total Solution for Charging Using the Wireless Power Consortium Standard	TI has launched its first wireless power solution for the mass market, called the bqTESLA100LP solution. This Qi-compatible kit includes both transmit and receive ICs, plus design, to take a Wireless Power Consortium-based solution to market today. We will discuss the basics of wireless power, the Wireless Power Consortium and the TI devices that make up our first-generation solution in this session.
Powering Modern Applications Processors and FPGAs	This presentation is centered about the power supply of FPGAs and modern application processors like TI's AM35xx, AML1xx and DM3xx, as well as processors from competitors like Freescale's iMX, Samsung's 3SC64xx, the SiRF Atlas IV and NVIDIA's Tegra series. We will present their power and sequencing requirements and how they can be implemented using TI catalog power management ICs. Learn circuit examples, reference designs and new power management ICs that make designing a power supply for FPGAs and processors easier.
What's New in TI Power Devices	This session will provide an overview of TI's latest power management products: new, high-performance power devices including DC/DC converters with integrated FETs, DC/DC controllers, high-efficiency FETs and TI's new integrated power solutions (IPS). We will also touch on the latest in offline switching controllers, battery chargers and integrated power management ICs.
Switching Power Supplies Made Easy with SwitcherPro™ Software and the New, Powerful TINA-TI™ Software v9	In this hands-on training session, you'll learn to generate custom power solutions in minutes with SwitcherPro™ software from Texas Instruments. SwitcherPro software allows you to select TI parts and real-world components; analyze designs for efficiency, stability, size and other design factors; modify designs to meet your needs with Design Options, What-If Analysis and User-Defined Parts; and review your designs in the Design Report, complete with a full bill of materials and notes for layout. Please bring a laptop if you wish to follow along.
Optimizing Your High-Input Voltage (Up to 60 V) DC/DC Converter for Size and Performance	A DC/DC converter switching at 1 or 2 MHz sounds like a great idea, but there is more to understand about the impact to power supply systems than size and efficiency. This case study compares size and performance of multiple designs running at different operating frequencies. Three designs will be compared where switching frequencies varied (from 100 kHz, 350 kHz and 750 kHz) and the impact that had on output filter design, efficiency, stability, etc.



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Track 3 – Wireless	
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.
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 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. Our discussion will touch on: 6LoWPan, <i>Bluetooth</i> ®, <i>Bluetooth</i> ® low energy, ZigBee, ANT, WiLAN, RF4CE, the SimpliciTI™ network protocol, RFID and proprietary solutions. We'll also discuss the available modules 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 MCUs (MSP430™, Stellaris®). 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 demonstrate how to establish a Wi-Fi and <i>Bluetooth</i> ® connection by showing a sample application running on an AM/DM37x EVM.
<i>Bluetooth</i> ® Low Energy and ANT: Very Low Power Wireless Connectivity Solutions	<i>Bluetooth</i> ® low energy (BLE) and ANT represent wireless standards operating in the 2.4-GHz arena, and are gaining lots of momentum due to their small size, reasonable cost and very low power requirements. They enable communication between self-powered devices in an extensible network environment. This session will present an overview of BLE and ANT standards before diving into the key priorities and challenges when designing with these two protocols. The session will then cover how to set up a quick BLE and ANT link.
Design Solutions for High-Fidelity Wireless Audio Using TI's Pure Path™ Technology	TI's new CC8520 wireless audio transceiver is capable of streaming uncompressed wireless audio at 44.1/48 kHz with 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 audio solution. Target applications for the CC8520 include wireless point-to-point audio streaming, wireless subwoofers, wireless speakers and wireless headphones.
Track 4 – System-/Board-Level Solutions	
Power Supply Layout Considerations	This topic will address methods for keeping circuit parasitic components from degrading the operation of your designs. Techniques to minimize the impact of parasitic inductance and capacitance of filter components and PWB traces will be discussed, together with a description of the impact that PWB trace resistance can have on power supply regulation and current capacity. A general overview of thermal design is also included, as well as sample temperature rise calculations in natural and forced-air environments. Finally, we'll review some practical examples of power stage and control IC layouts.
Introduction to Touch-Screen and Haptic Technologies	This session will discuss the fundamentals of operation and key design considerations when choosing between resistive and capacitive touch-screen technologies. No longer is multitouch a capacitive-only feature. Making multitouch affordable, we'll introduce the TI TSC2020 resistive multitouch controller. We'll also delve into the need for greater tactile response from touch-screens and the haptic options available to create a more immersive user experience.
DLP® Technology – Intelligent Light-Steering Solutions for the World	What is the common link between the following applications: high-end industrial lithography systems, high-accuracy 3-D machine vision systems, high-volume optical switching systems and subsurface multispectral medical imaging systems? The answer: All of these applications are rapidly adopting "intelligent light-steering" techniques to deliver disruptive and high-value solutions. DLP® technology powers more than just projectors – it enables very precise and very fast light-steering solutions, which sit at the heart of each of these and several other applications in a variety of industries. Come learn the basics of DLP light-steering technology, the many addressable markets and the available development tools. If light (photons) is an input or output signal in your system, then DLP light-steering technology can offer disruptive differentiation.
PCB Power and Ground Plane Design For Reducing EMI and Circuit Noise	This session focuses on common challenges for designing the power bus and ground on mixed-signal PCBs. Topics covered include current return paths; power and ground planes; split planes; decoupling; PCB stackup; and other considerations for providing power to analog, digital and mixed-signal circuits. The focus is on reducing circuit noise and electromagnetic interference (EMI).



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Interface Standards Comparison for Industrial Networks	A wide variety of solutions exist for communicating between equipment in industrial applications. This session discusses the various standards and compares the trade-offs between their different protocols and physical/electrical interfaces. The standards will include PROFIBUS, CAN, DeviceNet, ControlNet, ModBus, IO-Link and several flavors of industrial Ethernet.
Track 5 – Motor Solutions	
From Model to Motion by D3	As you move to more advanced controls and larger power stages, the need for modeling and simulating the system becomes more important. This session explores not only the concept of system modeling, but the capability to test that model in the hardware loop and deploy the tested model with automatic code generation.
Control of BLDC Motors	In this session, we'll explore the motivation behind using a brushless DC motor instead of a brushed DC motor. Topics include DC motor operation, BLDC operation, torque and speed control, sensorless techniques, and a simple explanation and application of advanced field-oriented control.
Science and Art of Your Bipolar Microstepper and DC Motor Driver	This session takes a careful view of all the steps needed to take a single-stepper motor step into multiple microsteps and how you can take advantage of full integration in a single device. We will explore what makes a stepper tick and how we can improve motion profiles to minimize dreadful resonance and vibration, followed by techniques on how to connect different stepper topologies and how to route PCB layout.
Analog Motor Drivers: Steppers, Microsteppers and DC Motors	This session will walk through TI solutions for motor drivers, which are all-inclusive to the DRV8xxx product family. Solutions will be provided for several stepper motor examples such as microstepping, driving two stepper motors from a single driver, a dual H-bridge driver with microstepping indexer and motor driver control through a serial interface. Many other features will be discussed, such as PWM current control, programmable decay modes and the protection features that a motor driver should have. Coming out of this session, you will fully understand what TI products fit your application best.
Designing Motor Controls by D3	This session explores the process of designing a low-voltage motor and motion control system, including analog motor drivers, microcontrollers, hardware reference designs, modular software libraries, debugging tips, and creating GUIs for interface and instrumentation.
Track 6 – Embedded Processing	
MSP430™ Value Line	The Value Line is the perfect gateway into the MSP430™ family of microcontrollers. No sacrifices were made on this new generation of devices. The Value Line provides a 16-bit architecture, high-performance analog integration, new features such as capacitive touch sense I/Os and still holds the title for ultra-low power. With volume pricing starting at \$0.25 and 100 new devices to choose from, learn more to see how the Value Line can help your project get up and running quickly without breaking the bank.
Making USB Design Simple with MSP430™ MCUs	Modern MSP430™ MCUs have integrated USB peripherals, allowing easy connection to a PC or mobile host. This session begins with an overview of the MSP430 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 creating customer-ready firmware update packages. Minimize the USB learning curve by basing your design on MSP430 MCUs.
How to Select the ARM for Your Design	You know you need a CPU in your system, and you're pretty sure you want to go with some form of an ARM core. But what form does that CPU take? Should it be a mainstream microprocessor, a DSP, an ASIC, an FPGA, a configurable core or something else? What are the advantages and disadvantages of each of the ARM options? What if you've already selected your OS? How does that affect the choice of CPU? How do you ensure that you're getting the maximum performance from your CPU? These are just some of the questions/issues that we'll tackle in this session. Choosing the best ARM processor for your design can be a difficult decision. In this session, developers will gain insight into the trade-offs between varying ARM-based processors, including TI's Stellaris® Cortex-M3-based microcontrollers and Sitara™ Cortex-A8- and ARM9-based microprocessors. The session will address key design considerations, including power, interface, software support and performance requirements. We will also offer processor selection tips and tricks through industrial automation and human interface application examples.
Enabling and Accelerating Android on Sitara™, Integra™ and DaVinci™ Devices	With the availability of Android for TI's Cortex-A8-based devices, developers are now able to use the unique power of the Android application framework to create new, compelling designs. Attend this session to learn about Android fundamentals, including key benefits, architecture review, how Android can benefit different end equipment and applications (including voice/video applications), and the TI/Android roadmap.
The ABCs of BeagleBoard-xM	What do do-it-yourself projects like a wearable computer or an eight-legged spider robot have in common? Both have been enabled by the open-source-friendly BeagleBoard. This session will provide an overview of the BeagleBoard-xM capabilities enabled by ARM-based Linux systems and open-source software like Qt. The BeagleBoard-xM is based on TI's DM3730 DaVinci™ digital media processor, which is drop-in-compatible with AM37x Sitara™ ARM microprocessors.

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