



TI Technology Day Milano 2011 - Abstracts



Session 1 **9:30 – 10:15**

Track 1

Motor topologies and an introduction to H bridges*

An introduction to the brushed DC motor, Stepper Motor and Brushless DC motor taking into consideration advantages, disadvantages and typical differences when it comes to speed, torque and voltage/current across said inductive loads. Also an introduction to the H Bridge, the most typical power stage used to drive the motors in question. Details include motor topology, H Bridge topology and blocks.

Track 2

Smart Grid Overview

This session will provide an introduction to the Smart Grid Infrastructure solutions from TI. The world-wide electric power infrastructure is a set of interconnected assets for power generation, transmission, conversion and distribution commonly referred to as "the Grid". As demand for energy accelerates, governments, power producers, distributors, equipment providers and other stakeholders are working together to modernize this outdated and taxed infrastructure to add intelligence, communications, and decentralized control.

TI provides solutions for the electrical substation and power-distribution system with the Smart Power and Energy platform combining sensing, signal processing (power monitoring and analytics) and communications for applications ranging from concentrators, substation automation, intelligent electronic devices (IEDs) and power-monitoring systems to active relays.

Track 3

Harvesting photons energy from uW to MW & wireless power*

Starting from harvesting ecosystem and the importance of photovoltaic, covering the different application of photovoltaic harvesting (from uW indoors to MW industrial power plants); we will review the different market segments, the technical challenges faced by our customers and the most suitable TI products to enable explosive growth in this high potential market.

Track 4

MSP430™ FRAM Technology Overview*

Welcome to the future of embedded memory! In this module we'll introduce a new memory technology aimed to enable faster and higher performance applications. FRAM from Texas Instruments provides unified memory with dynamic partitioning and memory access speeds 100 times faster than flash. FRAM is also capable of zero power state retention in all power modes, which means that writes are guaranteed, even in the event of a power loss. And with a write endurance of over 100 trillion cycles, EEPROM is no longer required.



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Track 5

High precision signal chain: design criteria

Signal chain building blocks analysis; identification of parameters impacting the system performance.

Session 2

10:15 – 11:00

Track 1

The H bridge and the DC motor*

A more detailed look at the full H Bridge and how it is used to control both speed and direction on brushed DC motors. Topics to discuss are: interface styles, protection modes, included blocks, current regulation, etc. We will study the behavior and operation of the DC motor from starting it up to braking it as well as different techniques on how to precisely control its speed parameter.

Track 2

Metering

This session provides an introduction to the Smart Metering. Smart Meters usually involve a real-time or near real-time sensors, power outage notification, and power quality monitoring. These additional features are more than simple automated meter reading (AMR). They are similar in many respects to Advanced Metering Infrastructure (AMI) meters. Smart meters are also believed to be a less costly alternative to traditional interval or time-of-use meters and are intended to be used on a wide scale with all customer classes, including residential customers and Industrial. One of the main concepts is that the communication is usually done in Wireless and the system is battery powered.

Track 3

Battery characteristics, charger, safety and cell balancing

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. We will discuss the characteristics and safety of rechargeable batteries and emerging battery chemistries such as LiFePO₄ and LiMn₂O₄. We will also present design considerations on connecting battery cells in parallel or in series in applications and review new trends toward designing safer battery solutions and achieving longer battery life, such as advanced cell-balancing technologies and cellbased thermal monitoring.



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Track 4

Concerto: Performance without compromise. Implementing real-time control and communications with a dual-subsystem microcontroller

TI's new Concerto microcontrollers utilize a dual subsystem architecture comprised of a TI C28x core and ARM® Cortex™-M3 core. This hybrid architecture combines the industry's best technologies for control and host communications functionality into a single controller that provides the performance, efficiency, and reliability required to maintain real-time control loops with the fast responsiveness required for low-latency communications.

TI developed the Concerto platform to eliminate the compromises engineers have to make when designing systems needing real-time control and communications capabilities.

In addition, Concerto enables safety certifications in your system via enhanced hardware and safety features. In the presentation we'll cover the processor architecture and the development tools.

Track 5

Steps from specification to synthesis of anti aliasing filters with Texas Instruments SW tools.

Specification and synthesis of amplification and anti aliasing signal chain blocks using FilterPro, Tina TI V.9 and calculation sheets from TI.

Session 3

11:30 – 12:15

Track 1

The stepper motor and microstepping*

Deep look at the stepper motor and the typical implementations around this motor. Training will go deep into the stepper basics such as full step commutation and then move on to the more complex technique of microstepping. We will discuss motor topologies, wiring techniques and H Bridge configurations.

Track 2

Home automation

The presentation will offer an introduction to the concept of Smart Grid Automation for homes and buildings. A home automation system integrates electrical devices in a house with each other. Devices may be connected through a wired network to allow control by a personal computer, and may allow remote access from the internet. The devices can also be connected in Wireless, with particular stacks and protocols like ZigBee®.



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Track 3

Understanding different fuel gauging approaches: voltage based, coulomb counting, Impedance Track

From the application point of view, significant progress has been made in Li-ion battery gas gauging to meet the demanding accuracy requirements of the portable-power industry. Battery state-of-charge (SOC) indication has evolved in recent years from being a simple warning to the user of impending power depletion to providing information to the system for more complex tasks such as soft shutdown to prevent data loss. This is a natural development that accompanies the spread of data-processing devices into the markets for handheld and portable products.

Track 4

ARM® solutions in TI: STELLARIS® Cortex™-M family*

TI's ARM® portfolio offers the most ARM®-based products supported by any single manufacturer. TI's portfolio offers the right combination of application-specific peripherals, packages and temperature ranges as well as the complete signal chain including analog, power and mixed signal. TI's ARM® solutions leverage and enhance the scalability, performance and efficiency of the ARM® Cortex™-M, ARM9™ and Cortex™-A8 cores to empower customers to innovate in a diverse mix of industries including applications such as industrial automation, test and measurement, medical instrumentation, HVAC, remote monitoring, motion control and point-of-sale, among many others. Now with over 160 compatible ARM® Cortex™-M -based Stellaris® microcontrollers and over 30 Stellaris® evaluation, development and reference design kits, Stellaris® fits the performance, integration, power and price-point requirements of nearly any industrial application. Stellaris® with Cortex™-M offers a direct path to the strongest ecosystem of development tools, software and knowledge in the industry. In the presentation we'll cover the latest updates on tools and product offerings.

Track 5

Comprehensive signal chain simulation.

Signal chain simulation using Tina TI: impact of in and out of band noise on signal chain performance.



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Session 4 12:15 – 13:00

Track 1

The brushless DC motor basics*

This training focuses on the H Bridge topology for the Brushless DC motor, how to achieve trapezoidal commutation, sensorless implementation, etc.

Track 2

Embedded Processing solutions for Smart Grid

TI offers a wide portfolio of Microcontrollers and Microprocessors as a perfect suite for the Smart Grid application spectrum, supporting every stage of the design process, from device selection and software development to tools and system solutions. MSP430™ is the right MCU choice for Metrology, due to ultra-low power consumption and high performance analog front end. Stellaris® Cortex™-M3 family of microcontrollers is a great solution for enhanced connectivity performances, including USB, Ethernet, and Wireless connectivity. TI's MPU and DSP Families of microprocessors are the perfect choice for main Application processors in smart grid applications, offering complex OS support, making them perfect fit for computation intensive Grid Infrastructure applications like power monitoring, relay protection, smart substation and concentrators.

Track 3

Why use NexFET™ MOSFET technology

This presentation will provide a detailed review and inspection of MOSFET parameters, how they effect circuit performance, and how to choose the right MOSFET, with a review of MOSFET configurations and applications highlighting key operating considerations in the buck and boost topologies.

Track 4

ARM® solutions in TI: SITARA™ ARM9™, Cortex™ A8 family + Integra & DaVinci™ overview

The Sitara™ MPU product family includes high-performance Cortex™-A8 and ARM9™-based embedded microprocessors with speeds ranging from 375 MHz to greater than 1 GHz .

Sitara™ shares common foundation software and tools with TI's popular OMAP™ processors to ensure portability and compatibility. These devices also leverage the power technology developed for OMAP devices making low power consumption a key product feature of the Sitara chips.

The new Integra DSP+ARM® processor generation boasts the highest performing floating- and fixed-point DSP processor on the market today. The processor integrates up to 1.5 GHz ARM®



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Cortex™-A8, high-bandwidth peripherals, 3D graphics and display engines. It is ideal for developing products requiring intensive signal processing, run applications on an advanced operating system, provide a rich, responsive GUI and drive multiple displays simultaneously. This product generation is ideal for applications such as machine vision, test and measurement, and tracking and control.

DaVinci video processors are signal processing-based solutions tailored for digital video applications that provide video equipment manufacturers with integrated processors, software, tools and support to simplify the design process and accelerate innovation. In the presentation we'll cover the latest updates on tools and product offerings.

Track 5

Verification of simulated signal chain models using the ADC development kits from Texas Instruments*

Comparing data from models and simulation tools with measurements from ADCs evaluation modules: the ADS1248 and ADS1298 EVM PDKs. Quick update on precision analog portfolio and evaluation tools.

Session 5

14:00 – 14:45

Track 1

Design and layout considerations*

This training focuses on different aspects crucial to a proper design when utilizing devices from the DRV8x family of power stages. Topics will include component selection, layout constraints, typical observed issues at customer sites, etc.

Track 2

Low Power Wireless

TI offers a very wide portfolio of Low Power Wireless devices, supported by Software and Stacks, and dedicated to the most important Application Segments. One of these segments is the Smart Grid. TI provides Sub Gigahertz transceivers dedicated to metering, like CC1120, and also transceivers and System on Chip dedicated to ZigBee® + Home Automation or Smart Energy profiles. All these chips are fully supported by software stacks, including ZigBee® (plus profiles like Home Automation, Lighting, Smart Energy) and Wireless MBus. TI also provides great support for HW development, providing a comprehensive portfolio of development tools, with Schematic, BoM and Gerber files for each EVM, provided for free.



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Track 3

Powering A/D converter and noise reduction technique

Utilizing DCDC converter for data converter and sensor applications often have low-level signals. A peaceful co-existence of the sensor signal, analog circuitry, and processor requires careful attention to power, layout and noise reduction techniques. In this session we will discuss how to deal with DCDC converter in noise sensitive circuitry and how to manage the noises and their sources.

Track 4

Android™ DevKit for TI platform (Aptasys)

Google® introduced Android™ as a mobile operating system in May 2009 (Android 1.5 deployable for Handsets). According to Gartner today Android™ is the world's third most popular smart phone operating system. The success of Android™ in the mobile space has made waves in other segments of industry where device makers across the industry are looking at deploying Android™ into their new and emerging "non-phone" products.

In this presentation we'll offer an overview on Android™, comparing the architecture, the tools and the licensing to the ones available for Linux. We will also present the Android™ DevKits offered by TI and a demo running on a low cost evaluation board based on DM3730.

Track 5

Analysis and test of high speed signal generation systems using Texas Instruments SW/HW tools

Direct Digital Synthesis (DDS) with high speed DACs: measurements with the TI TSW3100 waveform generator.

Session 6

14:45 – 15:30

Track 1 (14:45 – 16:15)

DRV8x offering*

A careful look at the available DRV8x devices and the roadmap for future offerings.



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Track 2

Power Line communications

This presentation discusses analog components used in Smart Grid applications. Specifically, we'll deeply discuss about Powerline Communications, which is one of the most recognized standard for smart network communication in home and building infrastructure. Electrical power is transmitted over high voltage transmission lines, distributed over medium voltage, and used inside buildings at lower voltages. Powerline communications can be applied at each stage. Most PLC technologies limit themselves to one set of wires (for example, premises wiring), but some can cross between two levels (for example, both the distribution network and premises wiring). We'll discuss deeply about TI analog offering and support for this technology.

Track 3

Powering processor and FPGA

What is the proper solution for high current applications like communications and embedded computing? How to address the power requirement of next generation processor?

Track 4 (14:45 – 16:15)

Software and HW tools overview, Wi-Fi™ and Bluetooth® solutions

In this presentation we'll offer an overview and the latest updates on the Software Development Kits and on the Evaluation platforms for TI's Processors. Operating Systems, Peripheral Drivers, Middleware/Frameworks and Software Development Environments will be included in the presentation. We'll then focus in particular on the Wi-Fi™ and Bluetooth® connectivity solutions both HW and SW for TI's processors, controllers. Texas Instruments is the world's leading supplier of Wi-Fi™ products for portable, battery-powered products leveraging nearly a decade of experience and eight generations of products. TI is also the market leader in combined wireless products such as the WL1271 (single-chip WLAN/Bluetooth® device) which further solve issues such as coexistence, antenna sharing in size constrained devices, cost and power consumption.

Track 5 (14:45 – 16:15)

Analysis and test of high speed signal acquisition systems using Texas Instruments SW/HW tools.

High speed acquisition system measurements through the TSW1200 acquisition tool and the TSW6011 (I-Q imbalance corrector). Quick update on high speed portfolio and evaluation tools.



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Session 7 **15:30 – 16:15**

Track 2

Real case study: Smart Grid implementation example (Sitek)

Sitek will discuss and present their solutions based on TI product for Smart Grid market, mainly for Home and Building Application case.

Track 3

Design Spark PCB (RS Components)

DesignSpark, an Authoritative online design resource for engineers
DesignSpark PCB, the worlds most powerful free of charge PCB design tool

** Will be held in English.*

Content & speakers are subject to change.