IEEE instrumentation & measurement society

The Long Island Chapter of the IEEE Instrumentation & Measurement Society presents:

NI Technical Conference

Tuesday, November 10th 2009 from 8:00 AM – 4:20 PM

These seminars are free (except for optional CEU accreditation). Lunch and refreshments are included.

Join **National Instruments** for the NI **Technology Conference**. This complimentary, full-day event is designed to both strengthen your engineering skills and introduce you to local engineering resources. It is a chance to network with your peers and learn more about the latest test, measurement, and control technologies – all in a local environment. The day includes in-depth, technical presentations highlighting the latest technology innovations and featuring the latest developments for automation, manufacturing, design, and test. These sessions offer high-value content for all experience levels. With an agenda format including keynote presentations from NI experts as well as a variety of technical and hands-on sessions, the conference offers information on emerging industry trends within a valuable networking forum and product exhibition.

Agenda:

	Track 1: Test	Track 2: Hands-On/Embedded
8:00 - 8:30 a.m.	*Registration*	
8:30 - 9:15 a.m.	*Welcome – Robert Berger, District Sales Manager* *Keynote*	
9:20 - 10:15 a.m.	T1 - Object Oriented Programming in a Graphical Environ.	E1 - Hands-on Tutorial to LabVIEW
10:20 - 11:15 a.m.	T2 - High Performance Computing using FPGAs	
11:20 - 12:15 p.m.	T3 - New Development and Productivity Features for LabVIEW 2009	E2 - Hands-On Tutorial To Circuit Design And Simulation With MultiSim
12:20 - 1:10 p.m.	*Lunch / Visit Exhibits*	
1:10 -2:05 p.m.	T4 - Incorporating FPGAs in Test Applications	E3 - Developing and Customizing Embedded Technologies with LV
2:10 -3:05 p.m.	T5 - Computer-Based Data Acquisition Technologies and Considerations	E4 - RT Hypervisor: Run Windows and Real-Time OS in Parallel on One Computer
3:10 -4:05 p.m.	T6 - Architecting High-Speed Data Steaming Systems	E5 - Introduction to Wireless Sensor Networks
4:05 -4:20 p.m.	*Wrap-up/Prizes/Exhibits*	
	Presentation Style	Hands-On Session

Speaker Biography:
Various speakers from National Instruments, Bloomy Controls, and ALE System Integration will be presenting the material.

Registration:
Registration is required, and is available online only. Please visit the registration link and fill out the form at:
http://sine.ni.com/nievents/app/offering/p/offeringId/519217/site/nic/country/us/lang/en

Lunch will be co-sponsored by IEEE Long Island Section, Bloomy Controls, and ALE System Integration.
Please invite any colleagues that you feel would benefit from these presentations. The lectures and lunch are **free**.

Location:
This conference will be held at Four Points by Sheraton, 333 South Service Rd, Plainview, NY 11803. Registration will start at 8:00 AM, and the keynote will begin promptly at 8:30 AM. (Please try to join us early and enjoy networking with your colleagues.) The lectures are scheduled to last until around 4:20 PM. Directions and maps are provided at the on-line registration page.

Seminar Coordinator (please contact with any questions):
Robert Berger, Vice-Chair of the IEEE Instrumentation & Measurement Society, LI Section, 516-507-7001, robertberger@ieee.org

CEU Credit:
Up to **0.6 CEU Credits** can be obtained by attending the full day of seminars in the agenda above. For CEU credit, individuals should bring a check for $20 per Track/per individual **(Check only please**), Payable to "**IEEE Consultants Network of Long Island**". (ie: If attending sessions from both Tracks, then the check should be for $40.)

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Track 1 Abstracts:

Object Oriented Programming In A Graphical Environment, Speaker: Shaun Hayward
Object Oriented Programming is a powerful software development methodology that has become an accepted standard in many programming languages, such as C++ and Java, and has recently become available within the LabVIEW programming environment. In this session Bloomy Controls will introduce basics concepts of Object Oriented software development and the LabVIEW Object Oriented Programming (LVOOP) model. Real-world examples will be given to demonstrate how and when LVOOP can be used, and the advantages it can bring to your LabVIEW applications.

High Performance Computing with FPGAs, Speaker: Terry Stratoudakis
High Performance Computing (HPC) is used in Finance, Telecommunications, Big Physics, and Bio-tech among many other industries. Existing High Performance Computing solutions include technologies such a cloud computers, GPUs, and FPGAs. FPGAs are traditionally programmed with HDL, however, with new software capabilities and tools available now, LabVIEW programmed FPGAs can be used to solve problems that in the past were too complex to solve using HDL programming. This presentation will discuss several development approaches including HDL and LabVIEW as well as Black Scholes as a Financial application and Tomography as a Big Physics application.

New Development Techniques In Graphical Programming, Speaker: Robert Berger
In addition to providing increased performance for parallel programming with multicore processors and field-programmable gate arrays (FPGAs), LabVIEW 2009 provides access to the latest wireless technologies and simplifies real-time math by streamlining mathematical algorithm design and deployment to deterministic hardware. Examine how these tools can increase graphical programming productivity among engineers. See Next-Generation Technologies including: VI Snippets Tool (Drag and drop graphical code as images to create working block diagrams), 3D Math Plots (Take advantage of 11 new 3D graphs for visualizing data), Partial Diagram Cleanup (Automatically arrange portions of code with improved block diagram cleanup tool), VI Recursion (Develop using native recursion), Parallel For Loops (Improve performance through automatic multithreading of for loops), Enhanced Icon Editor (Develop layered VI icons with integrated templates, glyphs, and text editing), Probe Watch Window (Simplify debugging by managing all probes in one global window), MathScript RT Module (Deploy your custom .m files to real-time hardware).

Incorporating FPGAs In Test Applications, Speaker: Terry Stratoudakis
From cell phone base station emulation to protocol-aware semiconductor test, user-programmable FPGAs are becoming increasingly common in test systems. This session will explore how engineers can use FPGAs to increase versatility and speed in their test application. It will cover everything from test-specific FPGA programming to designing custom adapter modules. Benefits of Using FPGAs include: *High Reliability* – If your application or OS crashes, the hardware will continue to operate, or even if a virus scanner preempts your application, you can still maintain determinism. *Low Latency* – without a bus between the logic and the measurement, decision making can occur as soon as a sample has been acquired. FPGA, with their inherent parallelism, can often implement algorithms with lower latency than microprocessors. *Reconfigurable* – FPGAs aren't only programmable, they are also reprogrammable. You can compile multiple personalities for different applications and measurements. *High Performance* – FPGAs are fast and parallel. Things that could not be done with microprocessors are now possible with FPGAs. *True Parallelism* – A single FPGA can often implement the same algorithm several times, completely in parallel. This is optimal for measurement front-ends with multiple channels.

Computer-Based Data Acquisition Technologies and Considerations, Speaker: Steven Hoenig
Learn the step-by-step fundamentals of Computer Based Data Acquisition, examining both hardware and software considerations. For hardware, understand ADC bits of resolution, the role of signal conditioning, aliasing, range, and other considerations. For software, look at the concepts of initialization, configuration, analog and digital reading and writing, and returning resources to the pc. See the next generation of Data Acquisition devices that include technologies such as integration with PCI Express and PXI Express for the new X Series and the newest DAQ chassis triggering capabilities. X Series uses new enhancements for counters, advanced timing, and parallel software execution can rapidly increase the productivity of engineers streaming information to disk. Also highlighted will be the new DAQ triggering capabilities of modular DAQ systems and more.

Architecting High-Speed Data Streaming Systems, Speaker: Sujit Basu
Various modern day test and measurement applications are generating huge amounts of data from multiple sources. There is a growing need to store this data and retrieve it later for post-processing or analysis. Since hard-drives are getting faster, bigger and cheaper, RAID solutions are also becoming inexpensive and gaining popularity. There are also newer interfaces, such as PCI Express, USB, 1394, eSATA, that are now available to implement RAID solutions. Initial RAID solutions were limited to slow data rates of IDE (Integrated Drive Electronics with highest data throughput of 133 MB/s). With the advent of PCI Express, data streaming rates greater than 600 MB/s are easily possible. Learn how to architect and build high-speed data streaming applications such as RF record and playback, IF/baseband streaming, and digital video and audio test based on new high-throughput PXI Express instruments, chassis, and controllers. Discuss system-level considerations and module specific characteristics.

Track 2 Abstracts:

Hands-on Tutorial to LabVIEW, Speaker: Jeff Steele
LabVIEW is an open, industry-leading software tool for designing test, measurement, and control systems. Since its introduction in 1986, engineers and scientists worldwide who have relied on the LabVIEW graphical development for projects throughout the product design cycle have gained improved quality, shorter time to market, and greater engineering and manufacturing efficiency. By using the integrated LabVIEW environment to interface with real-world signals, analyze data for meaningful information, and share results, engineers can boost productivity throughout their organization. Because LabVIEW has the flexibility of a programming language combined with built-in tools designed specifically for test, measurement, and control, engineers can create applications that range from simple temperature monitoring to sophisticated simulation and control systems. Attend this seminar to learn how to build measurement and control applications using NI LabVIEW graphical programming. Throughout the course you will be familiarized with the NI LabVIEW graphical programming environment, measure in minutes using the latest USB data acquisition devices, understand how to design LabVIEW control applications, use data acquisition boards to take measurements, control output signals, and drive digital I/O lines, observe tools to communicate with benchtop instruments using LabVIEW instrument drivers, choose the best LabVIEW structures for adding decision making into your applications, and add analysis to your LabVIEW application.

Hands-On Tutorial To Circuit Design And Simulation With MultiSim, Speaker: Patrick Noonan
Learn how to extend analysis capabilities to circuit design through the automated acquisition of SPICE simulation measurements. Through new integration to the Multisim design environment, you will be able to explore ways to improve prototype validation through the acquisition, analysis and visualization of both real and simulated measurements. You will learn how engineers are leveraging this integration to improve device modeling, correlate prototype performance to simulated specifications, and create virtual test-benches to speed design validation. This exciting new technology can help you to make the most of your resources, speeding you through the design flow, improving your productivity, and reducing costs through effective practices. During this seminar you will also see brand new resources to speed your custom designs. For example, connector symbols and land patterns for NI DAQ, NI Single-Board RIO and NI CompactRIO are now available for Multisim for your custom signal conditioning, breakout boards and daughter cards. Take this opportunity to view complete demonstrations and application use cases.

Developing And Customizing Embedded Technologies With LV, Speaker: Christian Hahn
There are a variety of NI provided and off-platform hardware devices such as FPGAs and microprocessors available for embedded design. When using certain targets, users can take advantage of the tight hardware and software integration tools, built-in I/O, and rugged/deployable devices that run on the same platform that they have become accustomed to in their lab. Most targets are also capable of user defined customization, either though FPGA programmability, or by augmenting hardware with custom design. NI CompactRIO and Single-Board RIO are one example that takes advantage of an ecosystem of third-party C series modules, and end-users or resellers can build their own C Series. Also, the I/O connectors on Single-Board RIO make it a good candidate for custom daughter cards, capable of analog signal conditioning or other functionality so that an open standard is provided for all users and programmers. The FlexRIO devices utilize adaptor modules either from NI, third parties, or custom.

RT Hypervisor: Run Windows And Real-Time OS In Parallel On One Computer, Speaker: Christian Hahn
The Real-Time Hypervisor is a piece of software recently released that allows you to run both a Real-Time OS and Windows XP simultaneously on the same multicore controller. The word "hypervisor" is an industry-standard term for a piece of software that runs multiple operating systems at the same time. In this session, we will discuss this Real-Time Hypervisor software, explore how it uses virtualization technology to work, and gain experience working with hypervisor systems (example: running LabVIEW Real-Time and Windows XP in parallel). We will also look at the performance impact of running the Real-Time Hypervisor, including some benchmarks. Learn how you can use the new Real-Time Hypervisor to incorporate real-time processing and a GUI on the same controller, and take advantage of Windows services in conjunction with LabVIEW Real-Time test and control applications. Also discover ways to partition devices between operating systems and communicate via virtual Ethernet.

Introduction To Wireless Sensor Networks, Speaker: Robert Berger
Wireless is everywhere. Freedom from complex cabled infrastructure and restrictive wiring schemes has left no industry untouched or uninterested, including PC-based measurement and automation. Convenience, flexibility and cost reduction are some of the many potential benefits that make this technology an attractive option for data acquisition. In addition, new challenges, such as aging national highway infrastructure and ailing environment health, are compelling scientists and engineers to take measurements out of the lab and into the field. Wireless has the potential to bring measurements to areas where they have previously been impossible or impractical. Learn how engineers can utilize, configure, and extend wireless sensor network capabilities to conserve power and interface with custom sensors.