

# NIWeek

WORLDWIDE GRAPHICAL SYSTEM DESIGN

## CONFERENCE

AUGUST 6–9, 2012





# Table of Contents

## CONFERENCE HIGHLIGHTS

Welcome Letter From Dr. James Truchard	3
Keynote Presentations	4
Conference Information	6
Social Media @NIWeek	7
Networking and Evening Activities	8

## SPECIAL EVENTS

Academic Forum	10
The Future of System Design Symposium	16
Graphical System Design Achievement Awards	18
Build Your Own Embedded System	20
Nurturing Innovation in Emerging Countries: Reducing Social Disparity Through Technology	20
Training and Certification	21

## SUMMITS

Aerospace and Defense Summit	24
Big Physics and Science Summit	26
Energy Technology Summit	30
RF and Wireless Test Summit	36
Robotics and Autonomous Vehicles Summit	40
Vision Summit	44

## TECHNICAL SESSIONS

Embedded Monitoring and Control Track	50
Software Development Techniques Track	58
Test and Data Acquisition Track	66

## EXHIBITION AND SPONSORS

Exhibitor Quick Reference Guide	74
Exhibition Hall Floor Map	75
Product Showcase	76
Connect @NIWeek Lounge	77
Technology Theater	78
Pavilions	81
Exhibitors	87
Sponsors	94







Dear Colleague,

Welcome to the 18th annual NIWeek—National Instruments' global event that showcases best practices and tools for the world's top engineers and scientists.

For the next few days, you will join a community of more than 3,000 fellow researchers, engineers, innovators, and educators who are using NI LabVIEW system design software and NI modular hardware to revolutionize the way the world works.

This year, NIWeek offers more than 250 interactive technical sessions and hands-on workshops as well as keynote presentations from some of today's brightest minds. With continuing education courses, certification exams, a massive exhibition floor, and demonstrations of the latest products, we invite you to explore the NI ecosystem and further sharpen your knowledge of it.

While in Austin, be sure to enjoy the sights and sounds of the "Live Music Capital of the World." Remember to also visit [ni.com/niweekcommunity](http://ni.com/niweekcommunity) to stay updated during the conference and to remain connected, inspired, and innovative in your work throughout the year.

We thank the sponsors, exhibitors, and you for being part of this world-class event.

Sincerely,

A handwritten signature in black ink, reading "James Truchard". The signature is fluid and cursive, with the first name "James" being larger and more prominent than the last name "Truchard".

James Truchard  
President, CEO, and Cofounder  
National Instruments





# Keynote Presentations

- The NIWeek keynote presentations give attendees a first glimpse at new, cutting-edge innovations from National Instruments as well as an opportunity to learn about customers and real-world solutions using tools from NI. Start each morning of the conference by exploring new products through demonstrations and customer presentations from NI leadership and engineers, and learn how LabVIEW can help you launch your applications and your career.

## TUESDAY, AUGUST 7

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**Dr. James Truchard**, President, CEO, and Cofounder, NI

Kick off your NIWeek experience with Dr. James Truchard, who has served as CEO of National Instruments for over 35 years and who coinvented the award-winning LabVIEW graphical programming software. Learn about the latest innovations that will equip engineers and scientists with tools that accelerate productivity and discovery.



**Eric Starkloff**, Vice President of Product Marketing for Test and Embedded Systems, NI

Watch Eric Starkloff and NI engineers unveil the latest products, technologies, and customer applications demonstrating graphical system design in cutting-edge measurement and control systems.





# Keynote Presentations

## WEDNESDAY, AUGUST 8

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**Jeff Kodosky**, Cofounder, Business and Technology Fellow, NI

Hear from Jeff Kodosky, the coinventor and “father” of LabVIEW, as he shares fundamental programming concepts vital to meeting the most demanding application challenges during the next 25 years of graphical system design.



**Shelley Gretlein**, Director of Software Marketing, NI

Join Shelley Gretlein as she explores visionary approaches to solving some of the most challenging engineering applications around the globe and glimpse the future through the eyes of engineers. Examine an exciting variety of technologies and products, applications, prototypes, and research from mobile measurements to cloud integration to high-speed silicon streaming to advanced control like you’ve never seen.

## THURSDAY, AUGUST 9

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**Ray Almgren**, Vice President of Product Marketing for Core Platforms, NI

Ray Almgren leads the company’s efforts to enhance science and engineering education and inspire students to pursue technical careers. Join him and students of all ages as they demonstrate how technology and hands-on learning are changing the world around us.



**Dr. Thomas R. Kurfess**, Assistant Director for Advanced Manufacturing for the White House Office of Science and Technology Policy, Professor and BMW Endowed Chair of Manufacturing at Clemson University

Learn about Dr. Thomas Kurfess’ work with scientists and policymakers in various executive branch agencies that support advanced manufacturing, such as the Commerce Department’s National Institute of Standards and Technology and the Department of Defense.



All keynote presentations are held from 8:30 to 10:00 a.m. in Exhibit Hall 4.



# Conference Information

## ON-SITE CHECK-IN HOURS

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Sunday, August 5	7:30 a.m.–5:00 p.m.
Monday, August 6	7:00 a.m.–7:00 p.m.
Tuesday, August 7	7:30 a.m.–7:00 p.m.
Wednesday, August 8	7:30 a.m.–6:00 p.m.
Thursday, August 9	7:30 a.m.–1:00 p.m.

## DAILY CONTINENTAL BREAKFAST

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8:00–10:00 a.m.	1st Floor Foyer
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## DAILY LUNCH

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11:30 a.m.–1:00 p.m.	Exhibition Hall 2 and 3
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Lunch is provided for full-conference attendees and Expo Plus Pass holders. Conference name badges are required for admission.

## EXHIBITION HALL HOURS

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Monday, August 6	5:30–7:00 p.m.
Tuesday, August 7	10:00 a.m.–7:00 p.m.
Wednesday, August 8	10:00 a.m.–6:00 p.m.
Thursday, August 9	10:00 a.m.–1:00 p.m.

## NIWeek ONLINE AND MOBILE APPLICATION

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Get the most out of NIWeek with our online and mobile application tool. Create a personal schedule, review session abstracts and speakers, learn about the exhibitors, and get conference updates.

### 3 Ways to Access the NIWeek App

- On your PC/laptop, go to **[portal.niw2012.alliancetech.com](http://portal.niw2012.alliancetech.com)**. Click on the “First time user? Click here to create your account.” link and enter your login ID and confirmation number.
- On an iPhone, download the app from the iTunes Store (search for NIWeek 2012).
- On a smartphone, go to **[mobile.niw2012.alliancetech.com](http://mobile.niw2012.alliancetech.com)**.

Login ID: Last name

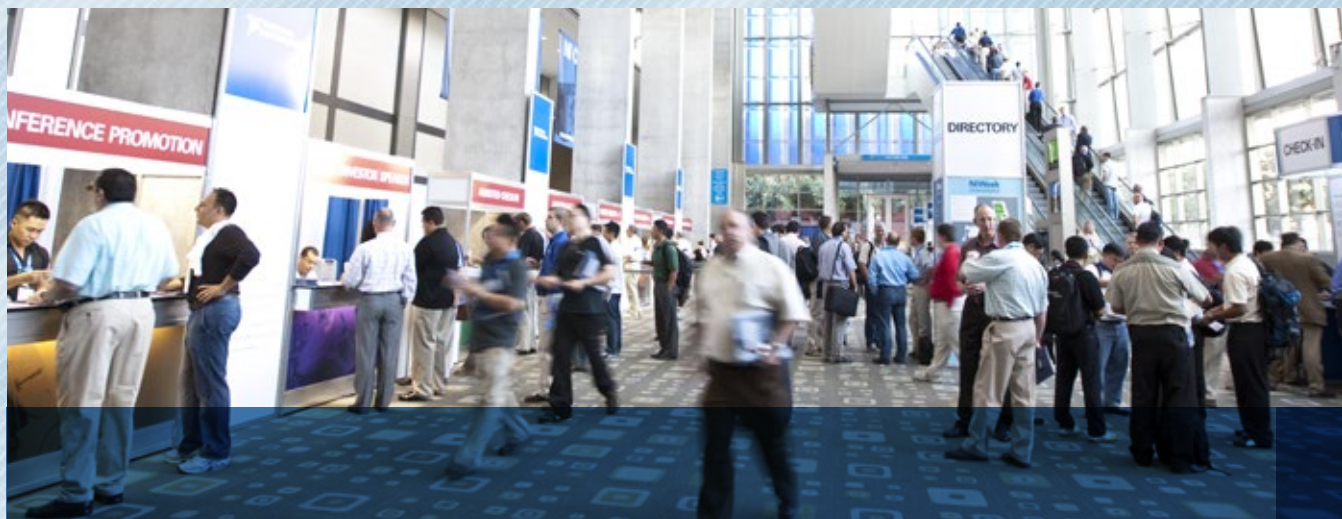
Password: 5-digit number on your badge

## VISIT THE NI STORE

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Open during Exhibition Hall hours.

Visit the NI Store, located in the Connect @NIWeek Lounge at the back of the exhibit hall, to purchase NI-branded merchandise including stylish polos and other apparel. The store accepts American Express, MasterCard, and VISA.





# Social Media @NIWeek



## JOIN THE COMMUNITY

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Whether you're looking for session presentations after NIWeek, code and videos of key demos, conference updates on our blog, or networking opportunities, the NIWeek online community has it all. Bookmark [ni.com/niweekcommunity](http://ni.com/niweekcommunity) and see for yourself.

Joining the NI Developer Community has perks outside NIWeek, too. Visit [ni.com/community](http://ni.com/community) to connect with thousands of technical experts all over the world:

- *Share and vote on LabVIEW feature ideas*
- *Download example code to get your project up and running*
- *Learn about cutting-edge technologies*
- *Join a group and connect with other like-minded individuals*
- *Participate in existing discussions or start one of your own*

## STAY CONNECTED

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### Follow @NIWeek—[twitter.com/#!/niweek](https://twitter.com/#!/niweek)

Broadcast brief messages to colleagues and other attendees from your laptop or mobile phone and receive real-time updates and valuable conference information from NI staff. Remember to type #niweek in your tweet to send updates to the entire NIWeek community on Twitter. You can also follow @NIGlobal or @LabVIEW on Twitter.



### "Like" NIWeek—[Facebook.com/NIWeek](https://facebook.com/NIWeek)

Want to be friends? Stay up to date on conference news, participate in polls, and connect with other NIWeek attendees by "liking" NIWeek on Facebook. You can also connect with fellow developers on our LabVIEW page or get company news and resources from our National Instruments page.



### [youtube.com/niglobal](http://youtube.com/niglobal)

View videos contributed by NI staff and other NIWeek attendees of cool product demonstrations from the NIWeek exhibition as well as interviews with NI leadership and industry experts.



### <http://linkd.in/ljfwyB>

Making a lot of new contacts at NIWeek? Build your network of connections on LinkedIn and exchange information, ideas, and professional opportunities. Attend and follow the NIWeek Event page on LinkedIn to subscribe to pre- and post-conference updates and virtually connect with your fellow attendees.



# Networking and Evening Activities

## **TEXAS DAY AT NIWeek**

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Tuesday, August 7 → 8:00 a.m.–7:00 p.m. → Austin Convention Center

Luncheon is from 11:30 a.m. to 1:00 p.m. in Ballroom A.

Texas Day gives engineering professionals around the state the opportunity to network with more than 3,000 engineers and scientists. Learn from today's leading innovators through a variety of interactive technical sessions, panel discussions, and hands-on and case study presentations for beginners and advanced developers. Join fellow Texans at a special keynote and luncheon featuring John Fitzpatrick, executive director of Educate Texas. Meet your local NI field engineers and NI Alliance Partners, and discover how you can use NI products to advance your application and retain your competitive advantage. Open only to Texas Day registrants.

## **NIWeek KICKOFF HAPPY HOUR**

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Monday, August 6 → 5:30–7:00 p.m. → Exhibition Hall

Kick off your NIWeek experience with an evening of drinks and music while networking with NI sales engineers, National Instruments Alliance Partners, the NI R&D team, LabVIEW Champions, exhibitors, and other NIWeek attendees.

## **NI COMMUNITY BLOCK DIAGRAM PARTY**

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Tuesday, August 7 → 5:00–7:00 p.m. → Exhibition Hall

Enjoy food, drinks, and music as you meet fellow conference attendees from around the world. Watch the Challenge the Champions contest in the Technology Theater, attend the knighting ceremony of new Knights of NI, or make history and join the world's largest user group gathering.

## **ANNUAL NIWeek CONFERENCE PARTY**

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Wednesday, August 8 → 7:00–10:30 p.m. → Austin City Limits – The Moody Theater

Don't miss out on an opportunity to attend a real Austin party at this Austin landmark venue! Enjoy good food and cold drinks as you relax and hang out with new friends. Dance the night away to great live music or kick back and network with your peers at this popular conference event. *Transportation provided.*





# Special Events

- In addition to a variety of technical sessions, NIWeek gives you several opportunities to meet industry and academic leaders, learn about engineers in the NI Community, and enhance your product knowledge and expertise during the following special events:

## **ACADEMIC FORUM**

10

Experience NIWeek with fellow educators and students to learn more about what's new in NI hardware and software for academia.

## **THE FUTURE OF SYSTEM DESIGN SYMPOSIUM**

16

Learn about the latest system design technologies and research including processors and FPGA convergence, high-level synthesis tools and flows, and approaches for increasing design productivity.

## **GRAPHICAL SYSTEM DESIGN ACHIEVEMENT AWARDS**

18

Read about the most innovative user applications based on NI software and hardware that are being recognized during NIWeek 2012.

## **BUILD YOUR OWN EMBEDDED SYSTEM**

20

Learn how to use the NI LabVIEW Real-Time and LabVIEW FPGA modules to build a fully configured and programmed NI CompactRIO embedded system.

## **NURTURING INNOVATION IN EMERGING COUNTRIES: REDUCING SOCIAL DISPARITY THROUGH TECHNOLOGY**

20

Discover how the Planet NI program is providing access to technology in emerging countries.

## **TRAINING AND CERTIFICATION**

21

Gain in-depth product knowledge, learn best practices for developing applications, and validate your skills.





# Academic Forum

- The Academic Forum provides a platform for academic professionals to share best practices in engineering education methods, discuss the future of engineering, and network with colleagues. View presentations from experts in engineering application areas, and learn how they integrate NI solutions to reinforce concepts and bring learning objectives to life.

## KEYNOTE

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### **An Ecosystem for Every Student**

Monday, August 6 → 11:30 a.m.–1:15 p.m. → Ballroom A  
**Dave Wilson**, NI

The challenge of equipping students with the practical experience required for future success is more pressing than ever, but flexible technology ecosystems based on standard platforms can help them take advantage of generations of innovation and theory. As these platforms evolve, cost, time, and space constraints are decreasing so that every student can access industry-standard technology anytime, anywhere to incorporate theory into experimentation and “do engineering.” At this keynote, preview the next ecosystem that students will use to meet the challenges that attracted them to engineering in the first place.

## TECHNICAL SESSIONS

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### **Cross-Layer RF and Communications Education With Software Defined Radio**

Monday, August 6 → 3:00–3:30 p.m. → Ballroom B  
**Marina Petrova**, RWTH Aachen University

Software defined radio (SDR) provides new efficiencies in RF/communications research and education. Hands-on curricula can extend beyond the physical layer to incorporate MAC layer principles and prepare both undergraduate and graduate students for research and industry. Learn how one of the top engineering schools in Germany is using LabVIEW and the NI USRP™ (Universal Software Radio Peripheral) platform for SDR education.





# Academic Forum

## DaNI Robots: Educational Research Platform

Monday, August 6 → 11:00–11:30 a.m. → Ballroom B

**Nina Mahmoudian**, Michigan Technological University

Explore the basic capabilities of LabVIEW Robotics Starter Kit (DaNI) robots and their application as part of a lab-scale multivehicle control system in the Nonlinear and Autonomous Systems Laboratory at Michigan Technological University.

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## Digital Wireless Communication: Physical Layer Exploration

Monday, August 6 → 3:30–4:00 p.m. → Ballroom B

**Robert Heath**, The University of Texas at Austin

Digital communications is a quickly evolving field of study, which presents a challenge for educators. Learn how LabVIEW, the NI USRP™, and turnkey course materials can help you keep your course up to date and incorporate a hands-on approach that combines both timeless principles and the latest RF/communications approaches.

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## Enhancing Student Learning in Online and On-Site Engineering Courses

Monday, August 6 → 11:00–11:30 a.m. → Ballroom C

**Jodi Reeves**, National University

Discover how National University incorporates hands-on experimentation into online engineering courses and on-site graduate classes. The Electrical Circuits and Systems course features the NI Educational Laboratory Virtual Instrumentation Suite (NI ELVIS) to introduce online students to electrical circuit laboratory activities, and a graduate-level, on-site class in signal processing theory incorporates Emona DATEx. See how student satisfaction with learning, teachers, course content, and technology improved from 13 to 28 percent and GPAs increased 8 percent.

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## Exploring an Electric Buggy Using CompactRIO

Monday, August 6 → 10:30–11:00 a.m. → Ballroom B

**Ghislain Remy**, IUT de Cachan

Learn how a Université Paris-Sud course teaches real-time programming, sensor, and control and supervision principles by helping students transform a gas-powered buggy into an electric buggy. Find out how the school receives positive course feedback by combining project-based learning with a relevant application using CompactRIO and LabVIEW to control and monitor the electric driver of the buggy.

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## Implementing a Portable Levitation Device Using NI myDAQ

Monday, August 6 → 3:30–4:00 p.m. → Ballroom C

**Feras Mousilli** and **Ahmad Zaatari**, Ideation Systems

See how The University of Texas incorporates experimentation into mechatronics, automatic control, and multi-energetic modeling courses with the PortaLAB Levitation device. Built on the NI myDAQ platform using LabVIEW, PortaLAB is ideal for the development of inexpensive and portable laboratory experiments. Students can simulate, debug, prototype, and test their PortaLAB experiments without the expensive instruments usually required in a lab setting.

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## Incorporating Design, Build, and Test Challenges Throughout the Engineering Curriculum

Monday, August 6 → 1:30–2:00 p.m. → Ballroom B

**Martin Levesley**, University of Leeds

To develop students' practical, team-working, and communication skills, the University of Leeds School of Mechanical Engineering uses highly engaging design, build, and test team challenges. Based on the principles of conceive, design, implement, and operate (CDIO), the hands-on challenges feature LabVIEW and CompactRIO and offer first- and second-year students a learning progression that prepares them for research and careers in industry.



# Academic Forum

## Increasing Engineering Enrollment With *FIRST* and University Partnerships

Monday, August 6 → 2:00–3:30 p.m. → Ballroom B

**Luan Heimlich**, Macquarie University

Macquarie University partnered with *FIRST* (For Inspiration and Recognition of Science and Technology) to inspire and engage primary and secondary school students in a fun, fast-paced, and hands-on learning environment. Macquarie has had great success not only with the “business” of the university but also in actively supporting the local community with this approach. Learn how the engineering department has grown from just four graduating students in 2009 to over 150 incoming freshmen in 2012.

## Integrating Design Challenges Into First-Year Engineering Courses With NI myDAQ

Monday, August 6 → 2:00–2:30 p.m. → Ballroom C

**Greg Bucks**, **Navindran Davendralingam**, **Masaki Kakoi**, and **William Oakes**, Purdue University

Hear how first-year Purdue engineering students learn about computing with LabVIEW and explore design with NI myDAQ. This combination produces a wide variety of challenging and creative projects for a diverse set of student interests. The session also offers examples of student work and evaluations.

## Integrating Virtual Instrumentation Into Physics Demonstrations and Student Labs

Monday, August 6 → 10:30–11:00 a.m. → Ballroom C

**Urs Lauterburg**, University of Bern, Physikalisches Institut

To increase the impact of physics experiments and student labs using LabVIEW and virtual instrumentation, the University of Bern uses Hopf pendulum and Doppler experiments in the hands-on examples. In the Hopf experiment, students transition between the inherent steady states of a mechanical system driven by chaotic properties. In the Doppler experiment, they measure and analyze the acquired signals of rotating sound sources. Learn how students use LabVIEW and NI DAQ hardware to drive and analyze measurements.

## Introducing LabVIEW to Biomedical Engineering Sophomores Through a Design Course

Monday, August 6 → 8:30–9:00 a.m. → Ballroom C

**Matthew Bollom** and **Amit Nimunkar**, University of Wisconsin–Madison

To teach University of Wisconsin–Madison biomedical engineering students technical and design skills, engineering professors developed a new sophomore-level course called Biomedical Engineering Fundamentals and Design. It uses LabVIEW to introduce students to electronic instrumentation and microcontroller programming; data acquisition, digital signal processing, and data archiving; and textual-based microcontroller programming concepts.

## LabVIEW Student Design Competition 2012 Finalists

Monday, August 6 → 1:30–2:00 p.m. → Ballroom C

Review the LabVIEW Student Design Competition finalists and discover how teams used LabVIEW and graphical system design to tackle socially relevant engineering challenges.

## Panel Session: The Evolution of Design in the Engineering Curriculum

Monday, August 6 → 4:00–5:00 p.m. → Ballroom A

**Shekhar Sharad**, NI

Join leading experts in engineering education at a panel discussion on the teaching and research challenges that colleges and universities face today. Topics include enrollment, engagement, retention, funding, and technology instruction.

## Reinvention of Technical Training for the 21st Century

Monday, August 6 → 9:00–9:30 a.m. → Ballroom B

**Sam Samanta**, Finger Lakes Community College

To meet the challenge of training technologists with adaptable skills, Finger Lakes Community College partnered with over a dozen local high-tech businesses to launch a two-year academic program called Instrumentation and Control Technologies. The program’s physics and mathematics instructors use LabVIEW and NI myDAQ to overcome learning barriers, and have reinvented technical training for the 21st century using LabVIEW for data acquisition, precision motion control, and machine vision.



# Academic Forum

## Use of LabVIEW and NI myDAQ in the UT Introduction to Electrical Engineering Course

Monday, August 6 → 9:30–10:00 a.m. → Ballroom C

**Gary Hallock**, The University of Texas

First-semester UT freshmen learn about LabVIEW, NI Multisim, and NI myDAQ in their first electrical engineering course.

Eleven of the 12 labs they perform feature a LabVIEW component, and all complement the DC circuit analysis course. Work progresses from simple circuits such as voltage dividers to more complex concepts like Thevenin equivalent circuits and op-amps. Students also complete one high-level lab (an audio equalizer) to demonstrate the more powerful processing capabilities of embedded processors.

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## Using LabVIEW and CompactRIO to Teach Embedded Computing

Monday, August 6 → 9:30–10:00 a.m. → Ballroom B

**Harry Powell**, University of Virginia

Explore how the University of Virginia is using the combination of LabVIEW and CompactRIO to teach an introduction to embedded computing course for third-year undergraduates in electrical and computer engineering. The platform helps students learn basic embedded and programming concepts by comparing similar ideas from embedded C programming to LabVIEW.

## Using Practical Examples in LabVIEW to Move From Programming Basics to Advanced Architectures

Monday, August 6 → 9:00–9:30 a.m. → Ballroom C

**Piotr Maj**, AGH University of Science and Technology

Discover how students progress from programming basics to advanced architectures in three school semesters using LabVIEW. Also learn how to cultivate Certified LabVIEW Developers by introducing data acquisition, field-programmable gate array (FPGA) programming, multithreading, and advanced architectures through practical student project examples.

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## Using Practical Experimentation to Put the Ingenious Back Into an Engineering Curriculum

Monday, August 6 → 3:00–3:30 p.m. → Ballroom C

**Danielle George**, The University of Manchester

Learn how The University of Manchester School of Electrical and Electronics Engineering improved student satisfaction with practical coursework. Explore the five ways the school introduces practical experimentation throughout the engineering curriculum using NI ELVIS, NI myDAQ, LabVIEW, and Multisim.

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## Academic Forum and Global LabVIEW Student Design Competition Reception

Monday, August 6 → 5:00–6:00 p.m. → Ballroom A

See how engineering students from around the world are incorporating LabVIEW and graphical system design into a variety of design projects at this reception. From inexpensive medical devices to complex underwater autonomous vehicles, student projects are helping engineer a better world using LabVIEW. Check out submissions during the reception and see the complete list of 2012 submissions at [ni.com/studentdesign](http://ni.com/studentdesign).

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# NASA Invites You to Explore the Cutting Edge

 **TECH BRIEFS**

The best new design ideas and engineering innovations developed under NASA's \$12 billion R&D budget are reported **FIRST** in *NASA Tech Briefs* — America's largest-circulation design engineering magazine.

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Meet us in Booths 601 & 607

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# Academic Forum—UT Lab Tours

- Tour some of the cutting-edge labs at The University of Texas at Austin to see their work in a variety of application areas and how they are furthering academic research using LabVIEW and other NI technologies.

## **Department of Physics Texas Petawatt Laser (TPW) Laboratory**

This facility conducts fundamental research on exotic states of matter with high-energy densities and ultrahigh electromagnetic fields using the highest peak power laser in the world currently in service. The TPW science goal is to derive high-quality science results from proton acceleration and proton beam isochoric heating of dense plasmas; wakefield electron acceleration above a gigaelectronvolt; and fusion neutron generation in pulsed magnetic fields. Project staff members use LabVIEW with PXI controllers to manage several hundred control points and different instruments within the laser system.

## **Department of Aerospace Engineering and Engineering Mechanics Radionavigation Laboratory**

This laboratory explores novel ways to exploit and protect radionavigation systems such as GPS. The lab develops technologies that advance software-defined GNSS receivers, enable opportunistic navigation, ensure navigation security and integrity, and explain ionospheric phenomena. Research is broadly organized into the categories of radionavigation security, GNSS software receiver development, opportunistic navigation, radionavigation integrity, and ionospheric research. The multidisciplinary research group members, from aerospace, electrical, and computer engineering, use LabVIEW and PXI in their applications, including analysis in the signal properties of GPS jammers.

## **Department of Biomedical Engineering Biomedical Imaging Laboratory**

Research in this lab is directed toward the development of novel optical tomographic imaging modalities and laser surgical procedures for the diagnosis and treatment of disease in humans. The lab is at the forefront of bringing an imaging technique known as optical coherence tomography (OCT) into the practice of cardiology and glaucoma early diagnosis. The goal of lab projects in cardiology is to refine the technology so it can identify one more hallmark of a plaque vulnerable to rupturing within blood vessels. Ruptures of these fatty deposits are the most common cause of heart attacks and strokes, which are the leading causes of death worldwide. Research staff members include LabVIEW and PXI in applications such as a real-time parallel OCT acquisition program.

Monday, August 6 → 8:30–11:15 a.m. → The University of Texas at Austin

*Tour participants should meet in the registration area for transportation at 8:15 a.m.*



# Future of System Design Symposium

- This symposium brings together leaders from industry and academia to share insights on the cutting-edge tools and technologies that will shape the world of system design in the coming years. Learn how semiconductor technologies including CPUs and FPGAs are evolving and converging to provide powerful platforms that enable meeting the most difficult engineering challenges. Also listen to experts describe innovations in high-level synthesis tools and flows, as well as approaches for increasing design productivity.

## KEYNOTE

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### **The Evolution of “All Programmable” Platforms and System Design Tools**

Tuesday, August 7 → 10:30–11:30 a.m. → Room 15

**Lawrence Getman**, Xilinx

Discover major innovations transforming the system design landscape with the vice president of Processing Platforms Marketing at Xilinx. Learn how processor and FPGA technologies are converging to deliver breakthrough “all programmable” system-on-a-chip platforms and how design tools are adapting to use these platforms.



## TECHNICAL SESSIONS

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### **High-Level Synthesis Revisited: Progress and Applications**

Tuesday, August 7 → 1:00–1:30 p.m. → Room 15

**Jason Cong, PhD**, UCLA

High-level synthesis (HLS) has a long history dating back to the 1980s with contributions from many in the electronic design automation field, but early acceptance of the technology was limited. At this session, learn about the genesis of the successful xPilot HLS system developed at UCLA that was later licensed to AutoESL Design Technologies and ultimately acquired by Xilinx. Explore real-world results of the technology along with current research on system-level synthesis and generating HLS-friendly source code.

### **Increasing Abstraction and the Future of LabVIEW FPGA**

Tuesday, August 7 → 1:30–2:00 p.m. → Room 15

**Jeff Washington**, NI

Many engineers and scientists have used LabVIEW FPGA to access FPGA technology due to its abstracted nature and familiar graphical programming style. However, engineers seeking to optimize performance or create multirate DSP applications must still think carefully about the underlying hardware during the design process. At this session, discover how HLS technology can offer increased FPGA programming abstraction alongside design optimization. Also explore models of computation for multirate FPGA applications, and how HLS can be used as a back-end compiler technology across models of computation.



# Future of System Design Symposium

## Capitalizing on Moore's Law With Many-Core Computing

Tuesday, August 7 → 2:15–2:45 p.m. → Room 15

**Jim Jeffers**, Intel

Learn how processing architectures are evolving to meet the needs of demanding applications and take advantage of Moore's law. Examine the highly parallel Intel® Many Integrated Core (Intel MIC) architecture and the performance potential and developer productivity that this technology enables.

## Designing Reconfigurable, Heterogeneous High-Performance Computing Systems for Spintronics Research

Tuesday, August 7 → 2:45–3:15 p.m. → Room 15

**Jan Jacob, PhD**, University of Hamburg

Spintronics is an active field of research with potential applications in memory technology, data processing, and other areas. In this session, examine how heterogeneous computing systems incorporating CPUs, FPGAs, GPUs, and I/O are being used for both computationally intensive offline simulations of spin and charge transport and online control tasks on the microsecond scale. In addition, explore the use of LabVIEW as a unified system design tool for accelerating this research.

## Optimizing Electric Vehicle Design Through Virtual Test

Tuesday, August 7 → 3:30–4:00 p.m. → Room 15

**Darrell Teegarden**, Mentor Graphics

Development of the "More Electric Automobile" is continuing at an unprecedented pace, with motors, power electronics, and software controls replacing all-mechanical vehicle systems. Waiting until a physical prototype is available to develop test programs that verify system performance is unacceptable. Virtual prototypes can be a helpful tool when making critical design decisions for sizing and integrating components from various disciplines. In addition, they help define and develop adequate testing strategies and apparatus. This presentation demonstrates the integration of brushless DC or induction motors; digital, analog, and power electronics; vehicle mechanical dynamics; and control software with a complete LabVIEW vehicle drive-cycle test program.

## The Future of LabVIEW: System Design Innovation for the Next Decade

Tuesday, August 7 → 4:00–4:30 p.m. → Room 15

**David Fuller**, NI

Explore the ideas, research, and vision that are shaping LabVIEW innovation for the design space and transforming the LabVIEW environment into a world-class system design platform. Learn how this platform can meet the challenges imposed by increasing design sophistication and the rapid evolution of hardware and software technologies.

## Experts Panel: The Future of System Design

Tuesday, August 7 → 4:45–5:45 p.m. → Room 15

**James Truchard, PhD**, NI; **Jason Cong, PhD**, UCLA; **Lawrence Getman**, Xilinx; and **Jim Jeffers**, Intel

Participate in an interactive discussion with seasoned industry and academic experts as they take on challenging questions and make bold predictions about the future of system design. Which technologies will win and which will sputter? What are the future design bottlenecks that no one is thinking about? Can system design innovation come out of this economic downturn?







• GRAPHICAL SYSTEM DESIGN •

# ACHIEVEMENT AWARDS

- The Graphical System Design Achievement Awards recognize the most innovative user applications based on NI software and hardware. This year, more than 250 authors from around the world submitted technical papers that depict their greatest achievements in graphical system design. Visit the contest poster display, located outside Exhibit Hall 4, to learn about the finalist applications for each of the eight application categories. Winners of each category as well as the recipients of several featured awards including the NI Community's Choice, Green Engineering, Humanitarian, Editor's Choice, LabVIEW FPGA Innovation presented by Xilinx, Multicore presented by Intel, and the 2012 Application of the Year will be announced at the invitation-only awards dinner on Tuesday, August 7.

## ADVANCED CONTROL SYSTEMS

- Building a Nanomeasuring Machine Using LabVIEW and NI PXI  
By Johannes Klöckner, Steoan Zschäck, Felix Balzer, and Brandon Percle, TU Ilmenau, Germany
- UC San Diego Uses LabVIEW and NI Single-Board RIO to Build an Agile Mobile Robot  
By Nicholas Morozovsky and Thomas Bewley, UC San Diego, USA

## ADVANCED RESEARCH

- Developing an EMC Desktop Evaluation System Using a New Measurement Technique  
By Naoki Hoshino, PERITEC Inc., Japan
- Cleaning Up Dirty RF: RF/Communication Physical Layer Research With LabVIEW and NI USRP™  
By Jan Dohl, TU Dresden, Germany

## AUTOMATED TEST

- Using LabVIEW, NI TestStand, and PXI to Test a Medical Glucose Meter and Insulin Delivery System Within a Regulated Manufacturing Environment  
By Matthew Kelton, Advanced Instrument Technologies, and Venkat Raghavan, TestPro Systems, USA
- Emulating a System Controller CPLD for Automated RF Daughter Board Test  
By Rick Garza, Avera, USA

## EDUCATION

- Creating a Real-Time Simulator for Power Quality Signals  
By Miguel E. Hernandez, Davis Montenegro, and Gustavo A. Ramos, Universidad de los Andes, Colombia
- Measuring and Analyzing the Effects of Waves in an Experimental Basin Using PXI Express  
By Álvaro Álvarez Vázquez, Instituto de Hidráulica de Cantabria, Spain





Read Lidar Data.vi

Vector Field Histogram.vi



angle to obstacle

Go Forward.vi

Hosted by



## ENERGY

- Developing a Fracturing Pump Controller Using NI LabVIEW, Compact FieldPoint, and CompactRIO  
By Gregory C. Cala and Brad Westfall, Data Science Automation, USA
- Bringing Mobile Phone Coverage to Rural Areas With a Green, Off-Grid Energy Solution  
By Dr. Mike Rendall, Diverse Energy Ltd., United Kingdom

## LIFE SCIENCES

- Using NI FlexRIO for Photoacoustic Quantitative Ultrasound (PAQUS)  
By Pasi Karppinen, Jari Tuovinen, Timo Karppinen, and Edward Hæggström, University of Helsinki; Petro Moilanen and Jussi Timonen, University of Jyväskylä; and Zuomin Zhao and Risto Myllylä, University of Oulu, Finland
- Control of a Heart Simulator With CompactRIO  
By Dr. David Keeling and Ali Alazmani, University of Leeds, United Kingdom
- Developing a Mobile X-Ray Imaging System for Diagnosis Using LabVIEW Software and NI Hardware  
By Duckjune Kim, Kwang-hee Lee, and Dr. Sang-hoon Ji, Korea Institute of Industrial Technology, Korea

## STRUCTURAL AND PHYSICAL TEST AND MONITORING

- Developing an Engine Connecting Rod Fatigue Test System Based on CompactRIO  
By Hongrui Liu and Zhentao Liu, Zhejiang University, China
- University of Nevada Researchers Use LabVIEW, PXI, and CompactRIO to Measure the Effects of Earthquakes on Bridges  
By Dr. Patrick Laplace, University of Nevada, Reno, USA

## TRANSPORTATION

- Siemens Uses CompactRIO, LabVIEW, and DIAdem to Determine the Root Cause of Damaging High-Voltage Transients  
By Ryan Parkinson and Jacob Cassinat, Siemens, USA
- Automated Dynamometer Testing of an Advanced In-Wheel Electric Drive System for Electric Vehicles  
By Mark McDonnell, Protean Electric Ltd., United Kingdom

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# Special Events

- Maximize your NIWeek conference experience by attending the following special events. At the Build Your Own Embedded System hands-on workshop, learn how to prototype an embedded system based on LabVIEW and NI hardware. Also hear directly from business owners in emerging regions how the Planet NI program is reducing poverty through technology.

## **BUILD YOUR OWN EMBEDDED SYSTEM**

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Monday, August 6 → 9:00 a.m.–5:00 p.m. → Room 18B

This hands-on workshop focuses on extending your LabVIEW skills into FPGA-based design using NI reconfigurable I/O (RIO) hardware. Learn how to use the LabVIEW Real-Time and LabVIEW FPGA modules to configure, program, and deploy a RIO-based embedded system and take it home after the conference. There is an additional fee for this full-day workshop.

## **NURTURING INNOVATION IN EMERGING COUNTRIES: REDUCING SOCIAL DISPARITY THROUGH TECHNOLOGY**

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Wednesday, August 8 → 10:30 a.m.–Noon → Room 3

Although emerging countries account for 75 percent of the world's population and 30 percent of the world's economy, thousands of engineers in these countries don't have access to PCs, the Internet, instrumentation, or software tools.

Through Planet NI, National Instruments provides access to graphical system design technologies for innovators in emerging countries. These entrepreneurs can then develop solutions for local economic, social, and environmental challenges.

In this forum, hear from environmentalist and global leader Robert Swan, SME business owners, NGOs, and educators from Africa, Latin America, Lebanon, India, and Southeast Asia. Learn how access to technology is creating jobs, reducing social disparity, and helping students in impoverished areas innovate.

Guest Speakers

**Dr. Suhail Akhtar**, Air University, Pakistan

**Talha Manzoor**, Lahore University of Management Sciences, Pakistan

**Victor Mieres**, National Instruments, Emerging Markets/Asia, USA

**Nitin Mittal**, Instruments & Systems, India

**Carlos Oviedo**, LESS, Mexico

**Benjamin Sarpong**, Texas Instruments, USA

**Richard Sear**, Frost & Sullivan, USA

**Robert Swan**, OBE, 2041, Antarctica



# Training and Certification

- Maximize your NIWeek experience by supplementing conference sessions with training and certification exams. Offered at the Austin Convention Center, training and certification exams help advance and validate your development skills. Visit the NI Services and Training Booth for more information.

## TRAINING AND CONTINUING EDUCATION

Gain in-depth product knowledge and learn best practices for developing applications by attending a two-day training course that begins two days prior to NIWeek. By taking each course, you can earn 1.4 continuing education units to maintain a professional status such as Professional Engineer. The following courses are offered as two-day modules from Sunday, August 5, to Monday, August 6:

- *LabVIEW Real-Time 1*
- *Managing Software Engineering in LabVIEW*
- *LabVIEW Real-Time 2*
- *Object-Oriented Design and Programming in LabVIEW*
- *LabVIEW FPGA*
- *NI VeriStand Fundamentals*

## CERTIFICATION EXAMS

Validate your skills or renew your LabVIEW, NI TestStand, or LabWindows™/CVI certification at NIWeek at discounted rates:

- *All NIWeek attendees: 35 percent off list price*
- *Alliance Partners: 50 percent off list price*

## CERTIFICATION PREPARATION

Not ready to obtain certifications yet? NI offers complementary certification preparation courses for the Certified LabVIEW Developer (CLD) and Certified LabVIEW Architect (CLA) exams prior to NIWeek on Monday, August 6:

- *CLD Prep Session 8:30 a.m.–12:30 p.m.*
- *CLA Prep Session 1:00–5:00 p.m.*

## EXAM SCHEDULE

	Room	August 6	August 7–August 9
Certified LabVIEW Associate Developer (CLAD)	5C	1:30–2:30 p.m.	10:30–11:30 a.m.
Certified LabVIEW Architect Recertification (CLA-R)		3:30–4:30 p.m.	1:30–2:30 p.m.
Certified LabVIEW Developer Recertification (CLD-R)			3:30–4:30 p.m.
Certified TestStand Architect (CTA)			
Certified TestStand Developer (CTD)			
Certified LabVIEW Architect (CLA)	5B		1:00–5:00 p.m.
Certified LabVIEW Developer (CLD)			
Certified LabWindows/CVI Developer (CCVID)			





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# Summits



## **AEROSPACE AND DEFENSE SUMMIT**

24

From factory to field and in-flight, commercial off-the-shelf technology delivers vital test and data acquisition solutions, ensuring innovative and operable aviation and national security systems.



## **BIG PHYSICS AND SCIENCE SUMMIT**

26

Join engineers and scientists from major labs around the world in sharing success stories and new technologies for control, measurement, and diagnostics.



## **ENERGY TECHNOLOGY SUMMIT**

30

Creating sustainable energy to meet worldwide demand is one of the greatest economic opportunities of the 21st century.



## **RF AND WIRELESS TEST SUMMIT**

36

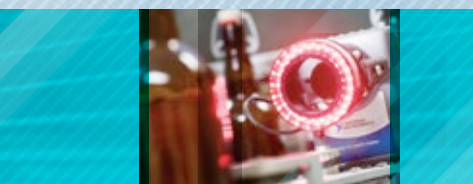
Increasing complexity in wireless devices requires test platforms to deliver fast, accurate, and flexible measurements from prototype to manufacturing.



## **ROBOTICS AND AUTONOMOUS VEHICLES SUMMIT**

40

The proliferation of robotics is happening now; by 2020, robots will be a part of everyday life from working in factories, construction, and maintenance to providing security, entertainment, and health care.



## **VISION SUMMIT**

44

From inspecting consumer goods to helping doctors perform eye surgery, vision technology is essential for improving the productivity and performance in many industries.



# Aerospace and Defense

- For decades, commercial off-the-shelf test platforms have evolved significantly to address complex system requirements while decreasing time to market and reducing total cost of ownership. Learn how to address the entire life cycle of aerospace and defense systems ranging from creating flexible, software-defined test systems to deploying real-time embedded systems for control, monitoring, and operation.

## KEYNOTE

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### **Rapid Innovation on the Cheap: Lessons From DARPA and Commercial Space Flight**

Tuesday, August 7 → 2:15–3:15 p.m. → Room 16B

**Michael Belfiore**, Author

Author and journalist Michael Belfiore reports from the front lines of innovation to show how even the biggest organizations can stay nimble and leap ahead of the technology curve.

Belfiore is the author of *The Department of Mad Scientists*, the first book to go behind the scenes at the Defense Advanced Research Projects Agency (DARPA), and *Rocketeers*, the first book to chronicle the start of the commercial space age. He writes regularly for *Air & Space*, *Popular Mechanics*, *Popular Science*, *Scientific American*, and other leading publications.



## TECHNICAL SESSIONS

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### **CBATS: Improving Test Quality and Reducing Costs for the Air Force With a Common PXI-Based Tester**

Tuesday, August 7 → 3:30–4:30 p.m. → Room 16B

**David Finnie**, CACI

The US Department of Defense (DoD) has adopted the Common Bench-top Automatic Test System (CBATS)—a PXI-based tester that CACI developed for the Air Force—as a member of the DoD Family of ATS. CBATS is not only reducing the cost of testing but also improving mission readiness. It reduces the mean time to repair, so units are returned to the field quicker, and it increases the mean time between failure, keeping units in the field longer. Learn about CBATS and how test program sets developed with NI hardware, LabVIEW, and NI TestStand lead to higher productivity and faster offload from legacy testers facing obsolescence and support issues.

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### **Using a Custom Acquisition System Based on NI Single-Board RIO for Real-Time Portable Measurements**

Tuesday, August 7 → 4:45–5:45 p.m. → Room 16B

**George Stein**, Bloomy Controls, Inc.

See a demonstration of an NI Single-Board RIO device used to implement a lightweight power consumption DAQ system. Also learn how you can adapt the techniques used in this system to create solutions for other custom data acquisition requirements. And examine the electromagnetic interference testing process required to make this Wi-Fi-enabled system comply with FCC A and EN55022 A standards.



# Aerospace and Defense

## **Nondestructive Structural Test for Aerospace**

Wednesday, August 8 → 10:30–11:30 a.m. → Room 16B

**Josh Rouse**, G Systems

Examine a PXI-based industrial laser-ultrasonic system for the nondestructive inspection of aeronautic industry composites. It fires at 400 Hz, requiring synchronized analog and digital I/O, processing, and high-speed signal digitizing between each shot. Learn how using an embedded real-time controller to synchronize all these tasks from the control application reduced the hardware footprint required for implementation of the system. Also see how NI technology can help you easily integrate subsystems like handheld remotes, ranging systems, and an industrial robot using LabVIEW OPC, the LabVIEW Mobile Module, and an NI Embedded Vision System.

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## **Developing and Testing Networked Avionics Systems and Devices**

Wednesday, August 8 → 1:00–2:00 p.m. → Room 16B

**Troy Troshynski**, Avionics Interface Technologies

Today's commercial and military aircraft heavily leverage communications networks like those you might see in the latest server farms. From Fibre Channel to MIL-STD-1553 to ARINC 429, the functioning of the communications systems and each device in them is critical to the success and safety of these aircraft and their missions. Learn techniques and tips for testing the latest avionics devices and systems, including addressing stringent latency and redundancy requirements, from NI partner Avionics Interface Technologies, which has been at the heart of the avionics testing industry for over 12 years.

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## **Testing Systems of Systems: Iron Bird Simulators and System Integration Labs**

Wednesday, August 8 → 2:15–3:15 p.m. → Room 16B

**Nicholas Keel**, NI

System integration labs, often referred to as iron birds, are large distributed real-time simulators used to test entire networks of embedded control modules (ECMs). NI has had some key wins in these types of applications due to unique technologies featured in the NI hardware-in-the-loop (HIL) platform. At this session, learn the fundamental concepts associated with system integration labs and view some demonstrations of the key technologies you need for these types of applications. Also explore a user solution based on the Embraer Legacy 500 Iron Bird.

## **Programming for Multicore: LabVIEW Gets It Right!**

Wednesday, August 8 → 3:30–4:30 p.m. → Room 16B

**Ron Goodman**, The Boeing Company

Learn about the options for developing software that leverages the promised advantages of multicore processors, including the inherent benefits of a graphical dataflow-oriented language. Developing software for multicore processors has proven to be very difficult. Executing operations in parallel is the only way to achieve the performance scaling that Moore's law delivers with each new chip generation. Unfortunately, that is not the way engineers have been trained to think and solve problems. Worse, many software development APIs and tools that focus on the problems associated with parallelism have been promised but have been slow to evolve. Hear tips on how to avoid the pitfalls in multicore program development and learn about mechanisms in LabVIEW that simplify the identification and implementation of parallelism within a program.

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## **Quickly Translate Test Specifications Into Test Programs Through ATML**

Wednesday, August 8 → 4:45–5:45 p.m. → Room 16B

**Ion Neag**, Reston Software, LLC

Explore a process that increases test program implementation productivity in NI TestStand using automated data conversion and code generation. Traditionally organizations have maintained their product test data (test requirements, test specifications, test plans) as paper-like forms stored electronically and then manually referenced these electronic forms when test programs are created. This automated data conversion and code generation process smoothly combines multiple software applications by interacting through a standard XML format conforming to the IEEE 1671.1 Automatic Test Markup Language (ATML) Test Description.

## **Sponsor**

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# Big Physics and Science

- This technical summit brings together scientists and engineers from major international research labs to discuss control, measurement, and diagnostics for particle accelerators, synchrotrons, fusion reactors, and telescopes. Attend the summit to share ideas and results and learn from presenters from facilities such as CERN, Lawrence Livermore National Laboratory, and Oak Ridge National Laboratory.

## KEYNOTES

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### **The National Ignition Facility: The Path to Exploring the Cosmos and Laser Fusion Energy**

Tuesday, August 7 → 10:30–11:30 a.m. → Ballroom E

**Edward Moses**, National Ignition Facility, Lawrence Livermore National Laboratory

Demonstrating fusion ignition with energy gain at the National Ignition Facility (NIF) will be a historic achievement and an essential step toward making Laser Inertial Fusion Energy (LIFE) a reality for safely and sustainably meeting energy needs. NIF uses the world's most energetic laser to compress, heat, and fuse deuterium and tritium to free the energy to ignite the reactions. LIFE, a revolutionary energy generation concept, builds on the unprecedented science, technology, and engineering developed for NIF. In this keynote, explore the capabilities of NIF and the challenges of building an operational prototype of LIFE.

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### **The Amazing Neutron: Frontiers in Science and Engineering Revealed by Pulsed Neutrons**

Wednesday, August 8 → 10:30–11:00 a.m. → Ballroom E

**Kevin Jones**, Oak Ridge National Laboratory

The physical properties of the neutron make it a unique and flexible tool for the study of diverse materials, chemical processes, and engineering systems. At this session, examine the technology and engineering associated with production pulsed spallation neutrons and their useful characteristics. Then learn how those neutrons are used to explore new frontiers in materials, engineering, and fundamental physics. These new frontiers are driving significant investment in new pulsed neutron sources around the world.

## PANEL DISCUSSION

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### **The Quest for Alternative Energy—Anomalous Heat Effect (a.k.a. Cold Fusion)**

Tuesday, August 7 → 4:45–5:45 p.m. → Ballroom E

**Andrea Aparo, PhD**, Ansaldo Energia Spa;

**Robert Duncan, PhD**, University of Missouri;

**Robert E. Godes**, Brillouin Energy Corp.;

**Michael McKubre, PhD**, SRI International; and

**Akito Takahashi, PhD**, Osaka University and Technova Inc.

Several labs around the world are trying to replicate the phenomenon known as “cold fusion.” While the term has evoked controversy, many research facilities have observed over 200 instances of intense heat. This demonstrates either an unknown physical event or a need for better measurement and control tools. In both cases, NI can provide the tools to accelerate innovation and scientific discovery. The Big Physics and Science Summit brings together experts to discuss these anomalous heat effects, the status of theoretical research, experimental results, and the prospect of commercializing this technology for daily energy needs.



# Big Physics and Science

## TECHNICAL SESSIONS

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### Deployment of NI COTS Hardware and LabVIEW in the C2 FRC Experiment

Tuesday, August 7 → 1:00–1:30 p.m. → Ballroom E

**Andy Sibley**, Tri Alpha Energy, and

**Chris White**, ThinkG Consulting

Tri Alpha Energy (TAE) developed the C2 experiment to research the field-reversed configuration (FRC) plasma confinement method, which offers aneutronic fuel potential and a possible faster track toward the use of fusion energy as a power source. Learn how TAE successfully designed and deployed a distributed control and acquisition system using NI commercial off-the-shelf (COTS) technology and LabVIEW. With defined software architectures and the early adoption of standard templates to interface between systems and a central controller, TAE achieved rapid control system design, test, and deployment.

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### GPU-Based Numeric Simulations for Spintronics

Tuesday, August 7 → 1:30–2:00 p.m. → Ballroom E

**Jan Jacob**, University of Hamburg

Learn about a simulation environment for spin and charge transport in semiconductor nanostructures to investigate new devices in spintronics. The algorithm involves inversion and multiplication of extremely large matrices, which presented memory and computational problems. Researchers solved them by developing an efficient and highly parallel implementation in LabVIEW (64-bit) using the new LabVIEW GPU Analysis Toolkit. With the option to prototype GPU algorithms in LabVIEW, researchers cut code development time and shared the application with scientists at different institutes.

### Operating and Controlling More Than 100 Cherenkov Telescopes

Tuesday, August 7 → 2:15–2:45 p.m. → Ballroom E

**Peter Wegner**, DESY

The Cherenkov Telescope Array (CTA) project is an initiative to build the next-generation ground-based very high energy gamma-ray instrument. Compared to current imaging atmospheric Cherenkov telescope experiments, CTA extends the energy range and improves the angular resolution while increasing the sensitivity by a factor of 10. At this session, review the principles of the CTA control system, which processes the evaluation, selection, preparation, scheduling, and execution of observations with the array. Also examine the first prototypes.

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### Developing System Components From Design Patterns on the Discovery Channel Telescope

Tuesday, August 7 → 2:45–3:15 p.m. → Ballroom E

**Paul Lotz**, Lowell Observatory

Explore the implementation of asynchronously communicating, hierarchical stand-alone components from a template developed using the Command, State, and Factory Method design patterns with by-value LabVIEW objects. These components control most systems at the commissioned 4.3 m Discovery Channel Telescope at Lowell Observatory, including the Active Optics System. Components deploy on desktop or real-time (CompactRIO) targets. Serialized objects compose a portion of the data that components publish via networked shared variables.





# Big Physics and Science

## Pure LabVIEW Implementation of EPICS Communication Protocol

Tuesday, August 7 → 3:30–4:00 p.m. → Ballroom E  
**Alexander Zhukov**, Oak Ridge National Laboratory  
Experimental Physics and Industrial Controls Systems (EPICS) is a de facto standard for particle accelerator controls systems. There are several implementations of interfaces between EPICS and LabVIEW. Explore how researchers at the Spallation Neutron Source developed a cross-platform library that enables LabVIEW to talk to EPICS, and can be run anywhere LabVIEW runs. The library demonstrates effective multithreaded use of raw network connectivity VIs.

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## Radiation and Magnetic Testing to Ensure Reliable Operation and Mitigation of NI Platforms

Tuesday, August 7 → 4:00–4:30 p.m. → Ballroom E  
**Ravi Marawar**, NI  
NI technology is used for increasingly critical applications, from beam instrumentation to plasma control. Scientists working with these applications need to understand the effects of neutron and gamma radiation on measurement accuracy and instrument operation. Learn how NI is working with ENEA (Italy), Atomki (Hungary), JSI (Slovenia), and DESY (Germany) to investigate effects such as single-event upsets, partial and complete failure as a function of total integrated dose and fluence, and high magnetic fields (150 mT).

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## COTS-Based Control, Monitoring, and Diagnostics for the Phoenix High-Energy Laser System

Wednesday, August 8 → 11:00–11:30 a.m. → Ballroom E  
**Derek Schaeffer**, UCLA  
Phoenix is a high-energy laser system featuring multiple laser front ends, pulsed power nodes, and target chambers for studying laboratory astrophysics at UCLA. Learn how researchers use NI technology to control, monitor, and diagnose the Phoenix laser system, which would otherwise be too complex and dangerous to operate manually. CompactRIO offers reliable, stand-alone operation of interlock, pulsed power, and laser systems, and LabVIEW helps integrate hundreds of I/O channels and display information in a flexible, expandable software terminal system.

## High-Fidelity Accelerator Simulation

Wednesday, August 8 → 1:00–1:30 p.m. → Ballroom E  
**Eric James**, Indiana University  
Learn how Indiana University Cyclotron Operations used a modular approach to simulate an accelerator's control systems, which is critical to reduce the risks associated with certifying upgrades. This simulation of the proton therapy system control systems uses actual in-system hardware and software as well as LabVIEW simulators and PXI instrumentation to emulate accelerator signals. This allows researchers to FDA-certify control system upgrades in hours instead of weeks, keeping the IU Health Proton Therapy Center operational and profitable.

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## Integrated Signal Programmer for Timing and Firing Sites

Wednesday, August 8 → 1:30–2:00 p.m. → Ballroom E  
**Taren Bowen** and **Joe Huerta**, National Security Technologies  
Explore how National Security Technologies created a signal programmer system with CompactRIO and NI C Series hardware. The central part of the system was developed with an FPGA framework. The programmer is a clock-based signal distribution device that counts down from a configured minus time, through zero, and then up through a positive count. From this clock, the programmer generates timing signals in a preconfigured time sequence that drive external equipment and trigger devices at experimenter stations.

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## Using PXI to Meet High-Performance, Quantum Computing Needs

Wednesday, August 8 → 2:15–2:45 p.m. → Ballroom E  
**Andrew Hammond**, MagiQ Technologies  
The pursuit of a quantum computer is one of today's most challenging scientific endeavors. It uses the murky physics of the quantum realm to solve problems that the most powerful supercomputers cannot. Learn how MagiQ Technologies used PXI speed, size, and scalability to deliver test and measurement solutions to the world's top quantum computing researchers. The company's involvement has led to a line of high-performance PXI RF sources for the academic and commercial markets.



# Big Physics and Science

## Beam Line Automation Using EPICS-Enabled PXI System

Wednesday, August 8 → 2:45–3:15 p.m. → Ballroom E  
**Bruno Cesar**, NI Brazil

Brazilian Synchrotron Light Laboratory (LNLS) is upgrading its in-house, custom beam line control system with off-the-shelf hardware while maintaining backward compatibility using the Linux OS with EPICS as the control standard. Using the NI Real-Time Hypervisor virtualization system to make PXI-based modular instruments available to EPICS, researchers run EPICS/Linux and LabVIEW Real-Time OSs simultaneously in the same PXI controller. At this session, examine how to control an X-ray absorption spectroscopy beam line and reduce software development time for integrating new hardware.

## Status of CMNS/CF/LENR Research at Kobe-Technova

Wednesday, August 8 → 3:30–4:00 p.m. → Ballroom E  
**Akito Takahashi** and **Akira Kitamura**, Technova Inc.

The Kobe-Technova team is elucidating the underlying physics of anomalous heat evolution effects in deuterium (D) and protium (H) gas-loaded nano-metal-compound systems. Basic tools are the twin D(H) gas-loading equipment and the supporting theoretical modeling by the TSC multibody fusion theory. Using various Pd-based and Ni-based nanofabricated samples, the team has reproducibly observed anomalous heat effects with isotopic differences using time-dependent (dynamic) data of thermal-power evolutions, D(H)/metal-atom loading ratios, and their temperature dependence (for Ni-based cases).

## Commercialization of LENR Technology

Wednesday, August 8 → 4:00–4:30 p.m. → Ballroom E  
**Robert Godes**, Brillouin Energy Corporation

In the quest for alternative energy, researchers have tried to understand the intense heat release of Pd-D or Ni-H reactions. By understanding the physics behind this lower energy nuclear reaction phenomenon, researchers can control the reaction. Explore how Brillouin Energy Corporation has demonstrated control over the reaction, who the early adopters are likely to be, the types of systems that will be commercialized, and the applications these systems will address.

## Big Physics and Science Poster Session

Wednesday, August 8 → 4:45–5:45 p.m. → Ballroom E  
**Arun Veeramani**, NI

Review the technical papers, projects, and research work of scientists and engineers from different labs and commercial companies such as LNLS (Brazil), Los Alamos National Laboratory, MagiQ Technologies, Oak Ridge National Laboratory, and Phoenix Nuclear Labs. Learn control and instrumentation best practices through one-on-one conversations with over 15 authors.

## Poster Papers

Development of an Object-Oriented Software Framework in LabVIEW at the Spallation Neutron Source

**Cary Long**, Oak Ridge National Laboratory

Quench Protection System for High-Temperature Superconducting Coils Using NI FPGA-Based Technology

**Piyush Joshi**, Brookhaven National Laboratory

Femto-Second Timing and Synchronization Architectures

**Andrew Hammond**, MagiQ Technologies

FPGA-Based Scanning Probe Microscope Measurement and Control

**Andrew J. Berger**, Department of Physics, OSU

Evaluation and Implementation of High-Performance Real-Time Signal Processing for Rayleigh Scattering-Based Quench Detection for High-Field Superconducting Magnets

**Gene Flanagan**, Muons Inc.

Flexible COTS Platforms for Bringing Particle Accelerators to Market

**Casey Lamers**, Phoenix Nuclear Labs

Example of System Integration for a TAE C2 Experiment—Gas Introduction System Using CompactRIO

**Simone Primavera**, Tri Alpha Energy

Pulsed Power, Fiber-Optic Isolation, and Long-Pulse Integrator Solutions Using NI General-Purpose Hardware for Big Physics Applications

**Tim Ziemba**, Eagle Harbor Technologies

Remote Handling Using NI PXI Platforms

**Ignazio Piacentini**, ImagingLab S.r.l.

Wire Scanner System Using FPGA-Based COTS Systems at LANL

**Thierry Debelle**, Science and Big Physics Segment, NI

Fiber-Optic Sensing for Reliable Strain and Temperature Measurements in Big Physics Systems

**David Potter**, NI

NI Global Services for Big Physics Applications

**Barry Hutt**, NI

Designing Low-Noise Front Ends—Bridging the Gap to a Solution

**Jim Pogge**, Tennessee Tech University

Evaluation of a Variety of Photon Beam Position Monitor Data Acquisition Methodologies at the APS

**Glen Decker**, Argonne National Laboratory



# Energy Technology

- The theme for the 2012 summit is “designing the smart grid—effective development techniques for smart grid embedded control systems.” This event covers a wide range of topics on clean energy, grid-tied power conversion, storage, distribution control systems, and electric vehicles. You don’t want to miss this in-depth technical discussion of design and development techniques for controlling the smart grid.

## KEYNOTES

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### **Sandia and Vestas: Designing a Smarter Wind Farm**

Tuesday, August 7 → 10:30–11:00 a.m. → Ballroom G  
**Jon Berg**, Sandia National Laboratories

To enable rapid, cost-efficient, transformative wind energy technology test and development, the US Department of Energy and Sandia National Laboratories are building a wind energy test center at Texas Tech University called the Scaled Wind Farm Technology (SWIFT) facility. Learn how a small wind park built in collaboration with Vestas Technology R&D and featuring three heavily instrumented turbines incorporates embedded NI controllers to administer DAQ and turbine control functions site-wide. This configuration allows individual turbine control and coordinated control of the entire wind park for interaction studies.



### **HIL at Savannah River National Laboratory and the Clemson Drive Train Test Facility**

Tuesday, August 7 → 11:00–11:30 a.m. → Ballroom G  
**Joe Cordaro**, Savannah River National Laboratory

Discover how Savannah River National Laboratory (SRNL) is adding hardware-in-the-loop (HIL) capability to its high-current laboratory. The laboratory complies with NIST standards for high-current measurement and is capable of producing current pulses up to 100,000 A. SRNL is also incorporating NI high-speed PXI hardware to capture the transients during HIL operation. In addition, hear how SRNL is partnering with Clemson University to add HIL to the 15 MW drive train test facility being built in Charleston, South Carolina.

### **Digital Energy: The Convergence of Energy and Information**

Wednesday, August 8 → 10:30–11:00 a.m. → Ballroom G  
**Michael Webber, PhD**, The University of Texas at Austin

Opening up access to energy and information has yielded positive, social transformation, but both sectors have faced challenges and disruptive technologies. These two markets are merging and following countervailing trends: while energy is moving from large, centralized power plants to smaller, distributed systems in homes, computing is moving from smaller, distributed systems in homes to larger, centralized data centers in the clouds. This interconnection introduces cross-sector constraints. At this session, learn how global energy and information interact, what conflicts are looming, and how they can work together.



# Energy Technology

## **Progress Energy: Smart Maintenance and Diagnostics for Electrical Power Generation**

Wednesday, August 8 → 11:00–11:30 a.m. → Ballroom G

**Bernie Cook**, Progress Energy

Learn about Progress Energy's large-scale monitoring and automation initiative to increase asset availability, reduce cost, and address workforce challenges. In the past, 80 percent of key maintenance and diagnostics (M&D) personnel time and efforts were spent on data collection instead of analytics. The Smart M&D project goals include using a centralized database and distributed, intelligent DAQ nodes to automate the data collection process and shift the focus to data analysis. At this session, explore Progress Energy's new M&D infrastructure featuring CompactRIO.

## **Energy Sustainability and How to Get There: The Power of Vision, Passion, and Teamwork**

Wednesday, August 8 → 4:00–4:30 p.m. → Ballroom G

**Robert Swan, OBE, 2041**

The lessons Robert Swan has learned through his polar expeditions in the harsh Arctic weather, combined with his long-term determination and vision, have enabled him to speak worldwide on the importance of teamwork, determination, and communication. Through each conference presentation, Swan is getting closer to reaching his 50-year mission of preserving Antarctica, the last great wilderness on earth. At this session, he continues to inspire, involve, and challenge leaders like you to make a difference and prove that anything is possible with vision, passion, and patience.

## **Sponsor**



## **TECHNICAL SESSIONS**

### **NREL: Accelerating the Integration of Energy Systems Technology**

Tuesday, August 7 → 1:00–1:30 p.m. → Ballroom G

**Greg Martin**, National Renewable Energy Laboratory

The Energy Systems Integration Facility (ESIF) at the US Department of Energy's National Renewable Energy Laboratory (NREL) will soon be the nation's first facility to conduct integrated megawatt-scale R&D on the components and strategies needed to safely move clean energy technologies onto the electrical grid at the scale and speed required to meet national goals. Explore how NREL and energy companies can use ESIF to conduct integration tests at full power and actual load levels in real-time simulations and evaluate component and system performance before going to market.

### **Electrodynamical Model of the Electrical Power System for Digital Measurement and Control of Power**

Tuesday, August 7 → 1:30–2:00 p.m. → Ballroom G

**Oleg Kuznetsov**, Moscow Power Energy Institute, and  
**Grigory Rudanov**, NI

Examine the development of an electrodynamical model of the electrical power system (EDMPS) and the deployment of a distributed measurement and control system. The digital energy control system provides synchronous control of six independent power generators using the LabVIEW Control Design and Simulation Module and NI FlexRIO field-programmable gate array (FPGA) hardware to implement power control algorithms with a 100  $\mu$ s response time. Learn how to use this system to define custom control algorithms, create a log of control parameters, and monitor real-time analog signals from the entire EDMPS.



# Energy Technology

## **Cutting-Edge Techniques to Design the Optimal Power Converter Control System**

Tuesday, August 7 → 2:15–2:45 p.m. → Ballroom G  
**Veaceslav Spinu**, Eindhoven University of Technology

Learn how advanced “piecewise affine” state-feedback controllers can improve power converter performance and reliability. The design flow includes a correct-by-design methodology to develop optimal control coefficients as well as prototype and implement the FPGA-based controller and real-time hardware-in-the-loop (HIL) simulation for testing. At each step, appropriate verification and validation techniques are used including closed-loop LabVIEW/Multisim co-simulation, cycle-accurate FPGA simulation, and HIL verification of the synthesized design. Also see how NI FlexRIO peer-to-peer streaming capabilities and mathematical techniques can optimize the speed and accuracy of FPGA-based algorithms.

## **Electric Vehicle High-Frequency Multiphase Power Converter Controller Design**

Tuesday, August 7 → 2:45–3:15 p.m. → Ballroom G  
**Olivier Trescases, PhD**, University of Toronto

To improve the performance of long-range electric vehicles, you can develop a hybrid energy storage system (HESS) that combines the high-energy density of lithium-ion batteries and the high-power density of ultra-capacitors. See how a high-efficiency, lightweight bidirectional DC-DC converter controlled with CompactRIO can optimize the real-time power flow between the ultra-capacitors, battery, and load. Also learn how you can use the new FPGA co-simulation design methodology and NI power electronics toolbox to develop the CompactRIO controller and protection scheme.

## **Reconfigurable Grid? FPGAs Versus DSPs for Power Electronics**

Tuesday, August 7 → 3:30–4:00 p.m. → Ballroom G  
**Yvonne Lin**, Xilinx, and **Brian MacCleery**, NI

The recent incorporation of DSPs into FPGA devices is causing the performance per dollar of these new hybrid DSP/FPGA devices to rocket past traditional DSP hardware. Explore the new rules of power electronics design using state-of-the-art hybrid FPGA devices, LabVIEW graphical system design tools, and a new commercial deployment platform designed to reduce the cost and risk of advanced digital energy control systems. Also learn what you can achieve using the ultrafast computation, true parallel execution, and hardware reconfigurability of modern FPGAs.

## **Instrumentation Design Considerations for Digital Energy System Monitoring and Control**

Tuesday, August 7 → 4:00–4:30 p.m. → Ballroom G  
**Jonathan Murray**, Bloomy Energy Systems

Learn how to choose the right embedded reconfigurable I/O (RIO) technology to monitor and control digital energy systems. Explore design considerations such as the impact of measurement resolution and sampling rate on signal harmonics. Also examine ways to implement synchronization in high-channel-count power measurements and to add external isolation to NI modules for high voltage and current signals. Hear about lessons learned while developing and deploying a wide range of electric power applications including microgrid monitoring, energy storage system characterization, and wind turbine control systems.



# Energy Technology

## **High-Performance Real-Time Monitoring of Solar PV Power With Integrated Building Management and Energy Meteorology**

Tuesday, August 7 → 4:45-5:15 p.m. → Ballroom G

**Andre Nobre** and **Mark Kubis**, SERIS

As part of its research efforts to ensure the optimized performance, highest availability, and proven reliability of solar photovoltaic (PV) systems, the Solar Energy Research Institute of Singapore (SERIS) has developed a monitoring and control system based on the CompactRIO platform. The institute used LabVIEW coding with 50 to 60 functional modules to achieve overall system efficiency with <20 percent CPU load factor at the remote logging stations all in real time ("live data"). Combining 25 "superstations," RF mesh networks, and high-speed data links, SERIS has deployed an island-wide communication network for PV systems monitoring, energy meteorology, and building management systems.

## **Hi-Fi PV: Advanced Data Acquisition to Enable Solar Power Production Forecasting**

Tuesday, August 7 → 5:15–5:45 p.m. → Ballroom G

**Gerardo Trevino**, Southwest Research Institute, and **Chris Fronda**, VI Design Group

The Department of Energy and other entities are funding research to improve the accuracy of solar forecasting using high-resolution characterization and instrumentation of solar PV systems. Examine a high-fidelity distributed sensor network at The University of Texas at San Antonio. The system monitors solar irradiance, power quality, and weather information at a 1 s sampling rate and aggregates all data into a centralized data center. This real-time data is then processed, presented on a web page, and loaded into a solar array simulator tool that can model the output power.

## **Next-Generation Instrumentation for Nuclear Power**

Wednesday, August 8 → 1:00–1:30 p.m. → Ballroom G

**Greg Morton** and **Sam Caylor**, AMS Corporation

As nuclear power plants age, the increased monitoring of plant systems and components is critical to maintaining safe and efficient operation. See how next-generation condition monitoring systems developed using LabVIEW and CompactRIO monitor important plant assets such as sensors, rotating equipment, and reactivity control rods during operation. These advanced asset monitoring systems work with wired and wireless configurations for operating nuclear power plants and research reactors worldwide.

## **Virtual Energy: Coordinating Distributed Energy Resources to Create a Supplemental Reserve Power Grid**

Wednesday, August 8 → 1:30–2:00 p.m. → Ballroom G

**Jeffrey Habets**, VI Technologies

To achieve the balance between power supply and demand, some countries must tap into supplemental reserve power. Discover how the Dutch power grid maintainer digitally monitors and controls entire pools of supplemental reserve power suppliers by using CompactRIO remote units distributed throughout the country and connected via the Internet to the VI Technologies server running LabVIEW web services and remote UIs. Hear why this technique works better than modern thin web client options and explore how the system was operational in only three months.





# Energy Technology

## **Hydro Quebec: Detecting Underground Power Distribution Faults With a Partial Discharge Diagnosis Tool for Nonexpert Workers**

Wednesday, August 8 → 2:15–2:45 p.m. → Ballroom G

**Lionel Reynaud**, Hydro-Québec, IREQ

Partial discharge (PD) detection is a growing concern in the power generation industry. The PD Sniffer automatically identifies defective components on underground medium-voltage distribution lines. Since its implementation in Quebec, the PD Sniffer has become the preferred reference tool for nonexpert workers, increasing their safety and confidence. Learn how the sniffer software was developed in LabVIEW using object-oriented programming and how advanced signal analysis algorithms such as time clustering were implemented. The LabVIEW SQL Toolkit was used to synchronize and store data on local and remote databases.

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## **Online Protection and Automatic Fault Detection System for Hydro Generators**

Wednesday, August 8 → 2:45–3:15 p.m. → Ballroom G

**Ozren Orešković**, Veski d.o.o

Explore the design of the CodiS hydro machine condition monitoring and protection system based on NI technology. Learn how the server communicates with CompactRIO hardware over TCP/IP to collect the online calculated data and how the remote data analysis client software analyzes data on the user PC. Understand the implementation of diagnostic application features on the server, which performs failure mode analysis for automatic fault detection and prediction and report generation.

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## **DSSim-RT: Real-Time Distribution Network Simulator**

Wednesday, August 8 → 3:30–4:00 p.m. → Ballroom G

**Davis Montenegro Martinez**, Universidad de los Andes

To improve the design of Advanced Distribution Automation (ADA) systems, the electric power industry is investigating new methods and computational tools for realistic simulation. Learn how to use the LabVIEW Real-Time Module and CompactRIO to develop a real-time distribution network simulator using open source software from the Electric Power Research Institute called OpenDSS. Also see how to reduce design and test times for smart grid equipment at a reasonable cost using real-time hardware-in-the-loop techniques.

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## **Electric Power Generation: Today and Tomorrow**

Wednesday, August 8 → 4:45–5:45 p.m. → Ballroom G

**Jon Berg**, Sandia National Laboratories; **Michael Webber**,

**PhD**, The University of Texas at Austin; **Chris Hickman**,

Innovari, Inc.; **Eric Northeim**, Progress Energy;

**Mike Dunne**, Lawrence Livermore National Laboratory; and

**Owen Golden**, NI (moderator)

Electrical power is essential for the prosperity of mankind and plays a vital role in our energy future. However, there are several methods to generate electricity, each one with unique benefits and drawbacks. This panel brings together power generation experts to discuss the current and future state of the industry, major challenges, governmental obstacles, and possible solutions. These experts represent the fossil fuel, nuclear, renewable, and “virtual” power generation industries.

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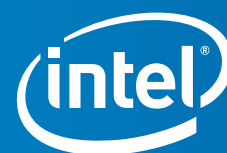
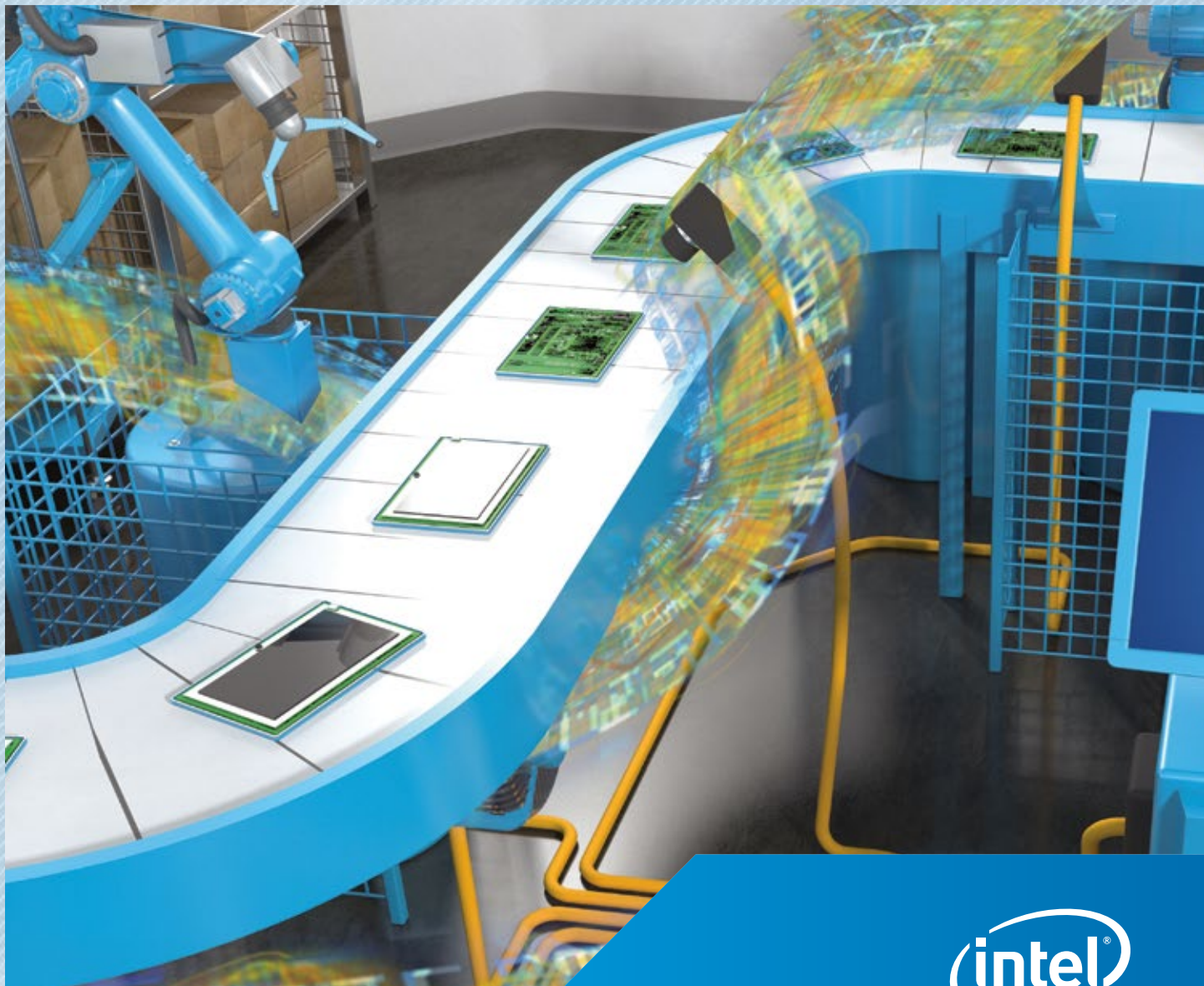
## **The Center for the Commercialization of Electric Technologies (CCET) Public Board Meeting**

Wednesday, August 8 → 1:00–4:00 p.m. → Room 2

Attend the 2012 summer CCET public board meeting. This nonprofit enhances the safety, reliability, security, and efficiency of the Texas electric transmission and distribution system through emerging technologies. CCET brings together electric utilities, high-tech companies, research companies, and university researchers to find technology solutions to challenges the Texas electric power industry faces.

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# RF and Wireless Test

- Learn how National Instruments is redefining RF and wireless test and hear from RF, microwave, and wireless industry experts as they explain the latest trends, emerging technologies, and test techniques.

## TECHNICAL SESSIONS

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### LabVIEW FPGA for RF Test and Measurement Applications

Tuesday, August 7 → 10:30–11:30 a.m. → Ballroom F

**Ryan Verret**, NI

Many RF applications require significant processing, which is traditionally accomplished with microprocessors. By adding user-programmable FPGAs into these systems, you can dramatically reduce test times and increase overall measurement performance. At this session, see a demonstration of novel RF test techniques implemented in LabVIEW FPGA.

### The Art of Amplifier Modeling and Design Optimization With an Active Load-Pull System

Tuesday, August 7 → 1:00–2:00 p.m. → Ballroom F

**Johannes Benedikt**, Cardiff University

Nonlinear device instrumentation is largely based on evolved vector network analyzers that are extended by a load-pull system and directly address the need for rapid and accurate data. The resulting measurements do not capture the entire nonlinear response of a device and require in simulators “an interpretation” through a nonlinear model, which often introduces differences between actual and simulated circuit performance. Learn about the new opportunities emerging from instruments capable of measuring current and voltage waveforms as well as the shaping of these waveforms through harmonic source- and load-pull systems.

### A PXI-Based Test System Implementation for Radio Base Station Unit Testing

Tuesday, August 7 → 2:15–3:15 p.m. → Ballroom F

**Peder Malmlöf**, Gefle Testteknik

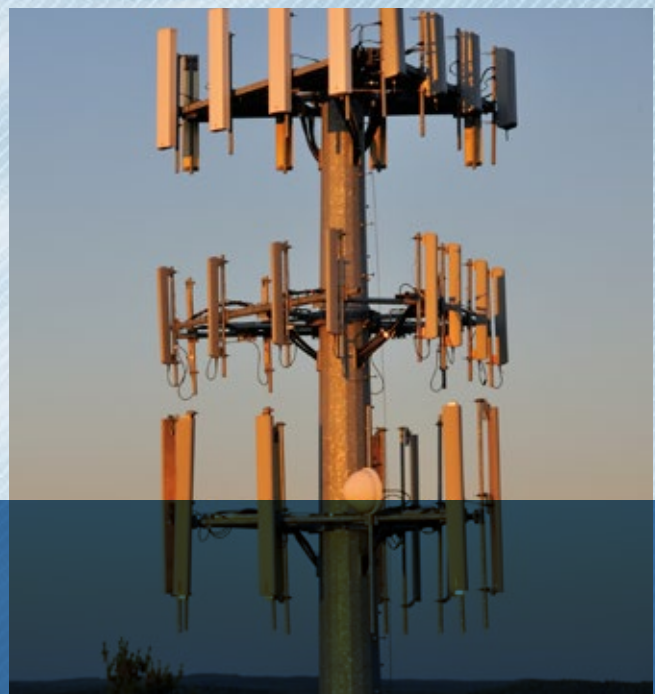
Today’s base station production must overcome the challenges of test time, floor space, and total system cost. Discover how Gefle Testteknik met these challenges with the smaller size, parallel processing, and system-calibration features of PXI.

### Proving the Efficiencies of a Wireless Two-Way Relay System

Tuesday, August 7 → 3:30–4:00 p.m. → Ballroom F

**Costas Georgiades** and **Qiong Wu**, Texas A&M University

Relaying is opening new possibilities for improving spectral efficiency in wireless networks. Hear how Texas A&M University researchers used NI FlexRIO and LabVIEW to create a real-time prototype of a two-way relay system with analog network coding. Also explore how to meet the challenges of implementing channel estimation, synchronization, and TDD operation in real time with LabVIEW FPGA.





# RF and Wireless Test

## **Cleaning Up Dirty RF: Rapid Prototyping With NI USRP and LabVIEW**

Tuesday, August 7 → 4:00–4:30 p.m. → Ballroom F

**Jan Dohl**, Technische Universität Dresden

Learn how the NI USRP™ software defined radio and LabVIEW were used to develop and test improved methods for digitally correcting analog RF impairments using digital signal processing techniques. Also see how to migrate .m file simulations into LabVIEW using a graphical system design approach to address nonlinear amplifier impairments and validate algorithms with real-world RF signals.

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## **Software Defined Radio Experts Panel**

Tuesday, August 7 → 4:45–5:45 p.m. → Ballroom F

**Matt Ettus**, Ettus Research; **Costas Georgiades**, Texas A&M University; **Frederick Harris**, San Diego State University; **Robert Heath**, The University of Texas at Austin; **James Kimery**, NI; and **Ted Rappaport**, NYU and NYU–Poly

Flexible software defined radio (SDR) solutions have emerged as the platform of choice for rapidly prototyping wireless communications systems. During this panel session, hear some of the world's leading SDR experts discuss the future challenges of prototyping RF and communications systems as bandwidths, wireless demands, and complexity grow at an exponential rate.

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## **AWR and NI: Enabling Microwave Education and Biomedical Research Through Integrated Solutions**

Wednesday, August 8 → 10:30–11:30 a.m. → Ballroom F

**Takao Inoue**, NI, and **Changzhi Li**, Texas Tech University

Explore a Texas Tech microwave engineering course for which students designed, laid out, and simulated their circuits in the industry-standard microwave design tool, AWR Design Environment; created a test bench in NI LabVIEW; and took measurements with PXI RF instruments. Learn how these tools were applied to a tumor tracking radar system for lung cancer radiotherapy.

## **Simulating Complex DSP Algorithms to Test Real-Time Broadband Data**

Wednesday, August 8 → 1:00–2:00 p.m. → Ballroom F

**Joe Gerhardstein** and **Zachary Hawkins**, Avera

Discover how Avera used NI FlexRIO and NI RF tools to simulate real-world conditions and verify the design of consumer broadband equipment. Explore the DSP techniques used as well as how to develop the algorithm for the FPGA, verify the accuracy on the host, and provide signal impairments while meeting low-latency requirements.

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## **Coexistence Testing for Wireless Medical Devices**

Wednesday, August 8 → 2:15–3:15 p.m. → Ballroom F

**Nick LaSorte** and **Hazem Refai**, University of Oklahoma

RF wireless technologies are increasingly used in medical devices, especially for products in the license-free RF spectrum, including the industrial, scientific, and medical bands. Understanding RF spectrum sharing (wireless coexistence) is important in designing and verifying a medical device. At this session, explore wireless coexistence test for wireless-based medical devices using NI tools.

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## **Beyond S-Parameters: In Search of a Behavioral Model for Nonlinear Components**

Wednesday, August 8 → 3:30–4:30 p.m. → Ballroom F

**Marc Vanden Bossche**, NMDG

For passive or active components used in their linear mode of operation, S-parameters can be regarded as a measurement-based small-signal behavioral model of the device under test (DUT). However, there is not a uniform approach for dealing with nonlinear RF and microwave systems. This session describes this challenge, the NMDG “S-functions” measurement-based behavioral model, and how this model can be used to accurately predict harmonic and modulation behavior of cascaded, nonlinear components.



# RF and Wireless Test

## BER, EVM, and Digital Modulation Testing for Test and Product Engineers

Wednesday, August 8 → 4:45–5:15 p.m. → Ballroom F

**Keith Schaub**, Wireless SOC Test, Inc.

System-level testing is growing more popular and stands to overtake parametric testing as the standard in high-volume production test. At this session, explore several over-the-air system-level tests such as bit error rate (BER) and error vector magnitude (EVM) that are used in a high-volume manufacturing environment.

## RF Power Amp Testing With NI Products

Wednesday, August 8 → 5:15–5:45 p.m. → Ballroom F

**James Hannah**, RF Test and Measurement Solutions, LLC

The importance of optimized test time, capital cost control, and a standardized test methodology cannot be overemphasized in semiconductor testing. Learn how this is particularly true in testing power amplifiers for mobile devices that support multiple modulation standards.



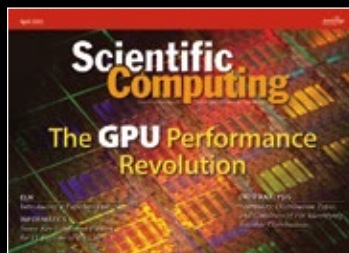


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# Robotics and Autonomous Vehicles

- This summit unites the world's top roboticists, researchers, design engineers, and domain experts working on robotics applications. With in-depth technical sessions and corresponding live demonstrations at the Robotics Pavilion on the expo floor, you can learn how to apply the latest technology from real-time devices, FPGAs, and graphical and textual programming to design robotics systems faster than your peers.

## KEYNOTE

### Past, Present, and Future of Robotics Software

Tuesday, August 7 → 10:30–11:30 a.m. → Room 17A

**Peter Corke**, Queensland University of Technology

Because robots can be considered software that moves, software is critical to any robotic system. In the past, most researchers wrote their own robot middleware that required tremendous effort to develop and maintain. This created a significant barrier to entry and a fragmented field. Learn how you can overcome these challenges in your current and future robotic systems.

## TECHNICAL SESSIONS

### From Precision Motion Control to Mechatronics Systems Involving Humans

Tuesday, August 7 → 1:00–1:30 p.m. → Room 17A

**Masayoshi Tomizuka**, Department of Mechanical Engineering, University of California, Berkeley

Learn how mechatronics researchers at the UC Berkeley Mechanical Systems Control (MSC) Laboratory are using NI technology to study precision motion control for wafer scanners in semiconductor manufacturing. Recent research topics include narrowband disturbance rejection, enhanced repetitive control, and iterative learning control. Also hear how these researchers are sending the outputs of inertial measurement units mounted on human body parts over a wireless network to help rehabilitation therapists.





# Robotics and Autonomous Vehicles

## A Sound-Based Navigation System

Tuesday, August 7 → 1:30–2:00 p.m. → Room 17A

**Grant Schultheis**, Glenelg High School

Discover how a custom automated navigation system used a light wave to trigger the emission of discrete pulses of sound as specific frequencies from the perimeter of an open field. The time to receipt of each sound pulse by a microphone inside the field identified the location of the microphone. LabVIEW controlled timing, sound-signal identification, and position calculation for an autonomous lawnmower.

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## Vision Guided Motion: Autonomous Optically Guided Tomato Harvester

Tuesday, August 7 → 2:15–2:45 p.m. → Room 17A

**Emily Schultheis**, Fractional Robotics

Explore how to use machine vision and LabVIEW to autonomously guide a robotic arm to a target of arbitrary size and distance. LabVIEW matched optical templates to images from binocular cameras with parallel axes to drive stepper motors to rotate vertical and horizontal joints and extend a boom. The median displacement of the center of the target from the center of the cameras' fields of view was calculated by processing serial optical images of the target.

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## Exploring Fuzzy Logic for the Masses

Tuesday, August 7 → 2:45–3:15 p.m. → Room 17A

**Norm Dingle**, EMP Technical Group

Take an introductory trip through the basics of fuzzy logic at this session designed for the developer or engineer who is not a seasoned controls engineer. Examine the basic terminology and theory of a fuzzy logic system without getting into the math and learn how to use the Fuzzy System Designer and LabVIEW palette controls in code. Also view a simple demonstration of an elementary control system using fuzzy logic.

## First Look at LabVIEW Robotics Simulators

Tuesday, August 7 → 3:30–4:00 p.m. → Room 17A

**Andy Chang**, NI

Examine the broad range of features in the LabVIEW Robotics simulators. Also learn how to import your custom robot design from SolidWorks into the 3D physics-based simulator and seamlessly deploy algorithms to an embedded controller.

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## Create Haptic-Enabled Mobile Robotics With LabVIEW Robotics

Tuesday, August 7 → 4:00–4:30 p.m. → Room 17A

**Mehrdad Zadeh**, Kettering University

Learn how haptic feedback from the steering wheel and haptic gas pedal affects operator performance during mobile robot teleoperation. The lack of environment perception reduces the effectiveness of the operator. To increase operator awareness, you can add haptic effects with joystick-like applicators. Explore how to use LabVIEW Robotics to create a force feedback steering wheel and haptic gas pedal during an obstacle avoidance task to reduce collisions.

## Sponsor

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# Robotics and Autonomous Vehicles

## LabVIEW Hacker: Hacking the Real World

Tuesday, August 7 → 4:45–5:45 p.m. → Room 17A

**Jeff Jensen** and **Zachary Nelson**, NI

Watch NI engineers hack new sensors, actuators, and robots in this encore presentation of “LabVIEW Hacker.” They spent the last year hunting for the cool devices students and hobbyists use to interact with the real world. They selected the best for live demonstrations and created tutorials and software packages you can use in your next project. Arrive early to get a seat at one of the most popular NIWeek sessions.

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## KUKA youBot and LabVIEW: Scalable Mobile Manipulation Robotics Platform

Wednesday, August 8 → 10:30–11:30 a.m. → Room 17A

**Rainer Bischoff**, KUKA Laboratories GmbH, and  
**Andy Chang**, NI

Mobile manipulation is a crucial technology for future cognitive service and manufacturing robotics. But meeting stringent industry and academic requirements makes providing a streamlined hardware platform and robotics software framework challenging. At this session, explore the viability of using the KUKA youBot, an omnidirectional mobile manipulator platform, with the LabVIEW programming and simulation environment for a complex robot application.

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## FIRST 101: How to Get Involved

Wednesday, August 8 → 1:00–1:30 p.m. → Room 17A

**Emily Thomson**, NI

Everybody’s doing it. Learn how your company can get involved in *FIRST* by donating time, talent, or dollars to the largest after-school robotics competition in the world.

## A Data Acquisition Platform for Autonomous Ground Vehicles

Wednesday, August 8 → 1:30–2:00 p.m. → Room 17A

**Ben Goldman**, **Michael Teresi**, and **Mark Umansky**, VPI & SU Mechatronics Lab

Hear how the Virginia Tech Mechatronics Lab is establishing a database of rural scenes that autonomous ground vehicles encounter. Researchers created a sensor platform to capture both LIDAR and multispectral electro-optical data using a Windows OS. They supplemented this platform with an ARM target capable of capturing secondary data such as scene location, heading, and temperature. They used LabVIEW to communicate with the sensor platform and ARM target for data acquisition and database accumulation.

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## Reconfigurable Automated Parameter-Identifying Dynamometer (RAPID) Powered by LabVIEW MathScript and NI myDAQ

Wednesday, August 8 → 2:15–2:45 p.m. → Room 17A

**Nick Morozovsky**, University of California, San Diego

Learn how the Coordinated Robotics Lab at UC San Diego developed an automated dynamometer to characterize DC motors for robotics applications. Researchers used NI myDAQ to read the sensors integrated into the dynamometer and used the LabVIEW MathScript language to process measured sensor data. Then they calculated the parameters that best fit the observed data to the mathematical model. They also deployed LabVIEW code to a real-time target for embedded control.



# Robotics and Autonomous Vehicles

## **Robot Operating System and LabVIEW**

Wednesday, August 8 → 2:45–3:15 p.m. → Room 17A

**Ryan Gariepy**, Clearpath Robotics

The open-source Robot Operating System (ROS) is one of the most popular architectures for robotics research. See how you can use LabVIEW to control existing ROS-based systems and incorporate the power of LabVIEW Real-Time and LabVIEW FPGA hardware in a ROS architecture. Also watch a demonstration of ROS robot control using graphical system design.

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## **A Low-Cost Vision System for Autonomous Mobile Robots**

Wednesday, August 8 → 3:30–4:00 p.m. → Room 17A

**Xiaohe Wu**, Bethune-Cookman University

Explore how you can integrate a low-cost vision system, built using LabVIEW and a web camera, into an autonomous mobile robot so that it can follow a single-colored line on the floor. Learn how you can easily adapt the vision system for other tasks and improve debugging by streaming what the robot sees, or what the processed images look like, to a host computer via a Wi-Fi connection. The system provides a reference design for students and engineers alike.

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## **Advanced Robotics Solution for Quality Control and Inspection**

Wednesday, August 8 → 4:00–4:30 p.m. → Room 17A

**Giacomo Angione**, **Cristina Cristalli**, and **Luca Lattanzi**, AEA srl - Gruppo Loccioni

By combining the high degree of accuracy and repeatability of robots with complementary perception technology (machine vision and force sensing), the Gruppo Loccioni developed several advanced robotic solutions for quality control and inspection. Learn about robotized quality control systems for visual and tactile inspections in industrial production lines, a mobile robot with manipulation and diagnostic capabilities, and a mobile robot for railway route and switch inspection and measurement.

## **Bipedal Robots Imitate Human-Like Walking Through LabVIEW Autonomous Feedback Control**

Wednesday, August 8 → 4:45–5:15 p.m. → Room 17A

**Aaron Ames**, Texas A&M University

Examine human-inspired control strategies to achieve flat-ground walking in an underactuated physical bipedal robot named AMBER. See how to use the LabVIEW Real-Time and LabVIEW FPGA modules to develop and verify during simulation the formal models and controllers that guarantee physically realizable robotic walking. Then learn how to implement an efficient voltage-based controller to create the robust and efficient human-like robotic walking AMBER achieves.

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## **Complex Multidegree-of-Freedom Mobile Robots Using LabVIEW Robotics**

**Jason Block** and **Luke Woolley**, Rose-Hulman Institute of Technology

Wednesday, August 8 → 5:15–5:45 p.m. → Room 17A

Examine an NI-sponsored senior design project at Rose-Hulman that integrated a 5-degree-of-freedom manipulator into an existing mobile robotics platform. Students used a variety of LabVIEW Robotics libraries to integrate the mobile platform with additional sensors (such as PID-controlled line following) and to integrate the control of the manipulator with an inverse kinematic model. The result was an educational reference architecture that demonstrated how LabVIEW graphical system design tools can control a complex and multidegree-of-freedom mobile platform.



# Vision

- For the last six years, this summit has offered one of the most comprehensive conference lineups in North America on imaging applications and technologies. It features two full days of interactive technical sessions and hands-on workshops as well as three days of exhibitions on the NIWeek show floor in the Vision Pavilion. Learn about new technologies and industry best practices and network with vendors, integrators, end users, and other vision experts including NI R&D representatives.

## KEYNOTE

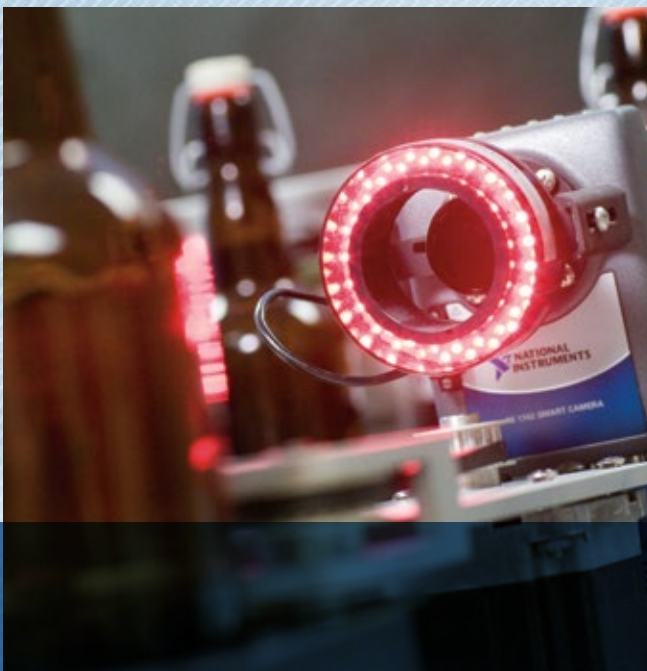
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### The Evolution of Embedded Vision

Tuesday, August 7 → 1:00–2:00 p.m. → Room 17B

**Jeff Bier**, Embedded Vision Alliance

“Embedded vision” refers to machines that understand their environments through visual inputs. Once a niche technology, embedded vision is now impacting almost every category of electronic equipment. Meanwhile, consumer products such as Microsoft’s Kinect game controller and Mobileye’s driver assistance systems are raising awareness of the potential of embedded vision. At this session, trace the trajectory of embedded vision technology from niche applications to widespread deployment and examine the trends in processors, sensors, and development tools that are enabling engineers to incorporate visual intelligence into wide-ranging applications.



## TECHNICAL SESSIONS

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### Inside the Thunderdome—FPGAs Versus Multicore Processors

Tuesday, August 7 → 10:30–11:30 a.m. → Room 17B

**Daniel Wilding**, NI

With the parallel nature of field-programmable gate arrays (FPGAs), you can accelerate many types of image processing algorithms and dramatically reduce processing time, latency, and jitter compared to CPU implementations. In this session, learn the best practices for taking an algorithm from theory to hardware using LabVIEW FPGA, and benchmark the performance improvements in a head-to-head comparison with a multicore processor system.

### Extending Machine Vision in LabVIEW to 3D Applications

Tuesday, August 7 → 2:15–2:45 p.m. → Room 17B

**Gianbattista Gualeni**, ImagingLab srl

ImagingLab and AQSENSE have collaborated to release another LabVIEW add-on to extend the NI machine vision platform to 3D acquisition and processing. The 3D library integrates seamlessly with 2D NI vision tools and includes calibration software. You can address complex 3D applications using a wide range of off-the-shelf hardware. The library is also useful for robotics applications, from bin picking to robot guidance.



# Vision

## Visual Servoing Using RIO Technology

Tuesday, August 7 → 2:45–3:15 p.m. → Room 17B

**Christophe Caltagirone** and **Priya Ramachandran**, NI

Modern test and automation machines often require some level of integration between vision and motion subsystems to increase flexibility or performance. Depending on application requirements, engineers can apply different approaches and technologies to accomplish tasks like motion guidance, camera positioning, and many more. In this session, focus on visual servoing, a technique that extracts information from an image and is used as a control parameter for a motion control system. Also learn about the benefits and challenges of this low-level integration and discuss use cases and approaches when designing visual servoing applications based on reconfigurable I/O (RIO) technology.

## Vision Inspection for Defects in Wafer Fabrication Process

Tuesday, August 7 → 3:30–4:00 p.m. → Room 17B

**Romik Chatterjee**, Graftek Imaging Inc., and **David Lorek**, Spansion Inc.

The high costs of semiconductor manufacturing demand tight control of metal polishing processes to minimize the residual metal that adversely impacts overall product quality and cycle time. At this session, learn how Graftek Imaging's Residual Detection System was integrated into Spansion's Chemical Mechanical Planarization equipment to provide a high-throughput, real-time, automated semiconductor wafer inspection process. Discover how Spansion has used this process to improve efficiency, reduce production scrap, and implement a closed-loop process controller.

## Automated Seed Germination Monitoring System With Multispectral and Color Image Analysis

Tuesday, August 7 → 4:00–4:30 p.m. → 17B

**Paul Falkenstein**, Coleman Technologies Inc.

Learn how Coleman Technologies Inc. has implemented custom multispectral and color processing algorithms based on the NI LabVIEW Vision Development Module and LabVIEW while developing a seed germination monitoring system. The system acquires high-resolution color, 3D height, and chlorophyll fluorescent images of various seeds' bar-coded trays over extended time periods. It also automates measuring germination and growth statistics. Learn about the advantages and challenges of using color analysis and multispectral techniques for automated image analysis.

## Best Practices: Image Calibration

Tuesday, August 7 → 4:45–5:15 p.m. → Room 17B

**Antony Vance**, NI

Any engineer who has designed a machine vision system has undoubtedly learned that sometimes perfectly arranged studio quality images are not always a possibility. At this best practices session, discuss performing machine vision on images that are imperfect due to curved surfaces, lens distortion, and angle distortion and how these issues can be corrected with the LabVIEW Vision Development Module's Image Calibration tools.

## h Getting Started With NI Vision

Tuesday, August 7 → 2:15–3:15 p.m. → Room 18C

Thursday, August 9 → 10:30–11:30 a.m. → Room 18C

**Elmar Widowitz**, NI

Explore the features of NI Vision Builder for Automated Inspection in an instructor-led environment. Learn how to acquire and process images and build complete applications using NI vision hardware, including NI Smart Cameras.



# Vision

## **Aligning and Calibrating Multiple Line Scan Cameras for Web Inspection**

Tuesday, August 7 → 5:15–5:45 p.m. → Room 17B

**Doug Wilson**, PVI Systems, Inc.

Discover the benefits and challenges of multiple line scan camera web inspection systems. Also explore how software based on NI vision and LabVIEW technology, camera and lighting adjustment mechanisms, and custom calibration methods developed by PVI Systems provide the system-level tools for success. Lastly, review a case study on glass-encased product inspection with a dual-sided line scan system to learn how to perform this alignment and calibration.

---

## **Getting Started With LabVIEW FPGA for Vision Applications**

Wednesday, August 8 → 10:30–11:30 a.m. → Room 17B

**Vivek Nath**, NI

With the LabVIEW FPGA Module, you can take advantage of the parallel processing capabilities of field-programmable gate arrays (FPGAs) without being an expert in VHDL or Verilog. At this introductory session, review the basics of LabVIEW FPGA and learn how to get started when implementing various image processing algorithms in LabVIEW FPGA for high-performance vision applications.

---

## **What's New in the NI Vision Development Module 2012—3D Vision and More**

Wednesday, August 8 → 1:00–2:00 p.m. → Room 17B

**Pawankumar Kamat**, NI

The Vision Development Module is designed to help you develop and deploy machine vision applications. It includes hundreds of functions to acquire and process images for feature location, object identification, dimensional measurement, and more. At this session, examine new Vision Development Module features, including the 3D stereo vision functions.

## **Vision at Mach 1**

Wednesday, August 8 → 2:15–3:15 p.m. → Room 17B

**Robert Tait**, GE

Learn how to slow down time with high-speed still photography. At this session, hear imaging expert Robert Tait discuss amusing and practical applications that use stroboscopy to capture clear images at extremely high speeds. See examples and demonstrations involving water droplets and bullets, and discover how you can use these techniques for industrial monitoring to observe the centripetal acceleration of a spinning steam turbine.

---

## **Optics and Lighting Best Practices**

Wednesday, August 8 → 3:30–4:30 p.m. → Room 17B

**Greg Hollows**, Edmund Optics

Optics and lighting are critical components that are all too frequently overlooked in machine vision applications. At this session, discover how to complete your vision system and reduce vision-related development time with proper optical component use. Learn tips and tricks for lighting design, lens selection, filter use, and more.

---

## **Applying Industry Standards in Imaging**

Wednesday, August 8 → 4:45–5:15 p.m. → Room 17B

**Stephen Varga**, Procter & Gamble

Many people agree that having common standards across an industry achieves cost reductions, but choosing the right standard can be difficult with so many standards available. Vendors, suppliers, integrators, and end users all can benefit from understanding the importance of industry standards and how to select specific standards for advancement. At this session, hear and share perspectives on the importance of industry standards in imaging.

---

## **USB3 Vision in a Nutshell**

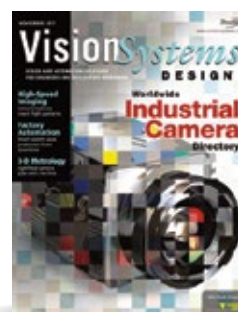
Wednesday, August 8 → 5:15–5:45 p.m. → Room 17B

**Eric Gross**, NI

Explore the upcoming USB3 Vision standard and what it delivers to the machine vision industry. Also examine how it can complement existing standards and inspire new types of applications.



# Sweet.



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# Technical Sessions

## **a** ADVANCED TECHNICAL SESSIONS

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- NIWeek advanced technical sessions examine some of the most sophisticated applications of evolving technology in industry and academia. Targeted at those with proficiency in their respective topics, these sessions feature knowledge sharing from leading experts in their fields.

## **h** HANDS-ON TECHNICAL SESSIONS

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- NIWeek hands-on technical sessions give attendees the chance to interact directly with the latest technologies and the experts who developed them. In these popular forums, you have the opportunity to learn how to use these tools and work with them more efficiently. Attend these technical sessions to get hands-on experience.

## **MACHINE CONDITION MONITORING SESSIONS**

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- NIWeek machine condition monitoring (MCM) sessions focus on the tools and techniques used to develop online MCM solutions. Learn from industry experts and NI R&D engineers at the following sessions about best practices and the latest technologies to make your MCM systems successful:

<i>Aggregate Data From Distributed Measurement Systems With the NI Technical Data Cloud</i>	58
<i>Architecting Embedded Control and Monitoring Applications</i>	58
<i>Hands-On: CompactRIO Waveform Reference Library</i>	50
<i>Hands-On: Watchdog Agent Prognostics Toolkit for LabVIEW</i>	65
<i>Lessons Learned From Implementing a Large-Scale Embedded Asset Monitoring System</i>	52
<i>Machining Analytics: Real-Time Production Intelligence</i>	52
<i>Machine Condition Monitoring, Predictive Failure Analysis, and Advanced Alarming Within LabVIEW and CompactRIO</i>	52
<i>A Scalable Plug-In Architecture for Monitoring Distributed Real-Time Applications</i>	58
<i>Simplifying High-Speed Waveform Acquisition on CompactRIO</i>	54
<i>Using CompactRIO and LabVIEW in Advanced Logging Solutions</i>	55
<i>Using New Stand-Alone NI CompactDAQ for Embedded Monitoring</i>	55
<i>Wireless Communication Standards for Data Acquisition and Transmission</i>	72



# Technical Sessions

## EMBEDDED SOFTWARE VALIDATION SESSIONS

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- These sessions are ideal for engineers tasked with the testing, validation, or quality management of the electronic control units found in automobiles, aircraft, medical devices, energy production equipment, and other intelligent systems. Learn from industry experts and NI engineers about the latest technologies and techniques for staying ahead of this rapidly growing challenge of embedded software validation and quality management.

<i>Developing and Testing Networked Avionics Systems and Devices</i>	25
<i>Do Real-Time Right With the NI Jitter Benchmarking Framework</i>	59
<i>Embedded Software Validation Best Practices</i>	67
<i>Finding Faults in Embedded Software</i>	68
<i>Hardware-in-the-Loop and Real-Time Testing Techniques</i>	68
<i>High-Fidelity Electric Motor Simulation With JMAG-RT and NI VeriStand</i>	68
<i>Modernizing Mechanical Test Systems With Real-Time Simulations</i>	70
<i>Playing Well With Others: Combining NI VeriStand, NI TestStand, and NI DIAdem in One Application</i>	70
<i>Rapid SIL Development With NI VeriStand and PXI Real-Time Hardware</i>	70
<i>Real-Time Testing With NI VeriStand</i>	70
<i>Standardize Your CAN Applications With NI-XNET</i>	71
<i>Testing Systems of Systems: Iron Bird Simulators and System Integration Labs</i>	25
<i>Understanding the Key Technologies of In-Vehicle Data-Logging Applications</i>	71

## CAN'T MISS LabVIEW SESSIONS

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- Learn new techniques to give you a leg up as you develop and deploy LabVIEW applications by attending the following five technical LabVIEW sessions:

<i>Smartphones and Tablets for Measurement and Control</i>	63
<i>Tips and Tricks to Speed LabVIEW Development</i>	64
<i>Using LabVIEW and GPUs in Real-Time High-Performance Computing Systems</i>	64
<i>The What, Why, and How of a Network Connection Manager</i>	64
<i>What's New in LabVIEW 2012</i>	65



# Embedded Monitoring and Control

## **30,000 Paintballs: Building a High-Speed, High-Channel-Count Delivery and Sorting Machine**

Wednesday, August 8 → 4:45-5:45 → Room 12B

**Michael Bell**, Rose-Hulman Institute of Technology

Learn how a senior design team at Rose-Hulman Institute took a crazy concept from whiteboard to show floor using NI tools for machine design. The machine drops 60 channels of reusable paintballs at up to 30 balls per second, with individual channel drop control, machine vision-based sorting, and variable recirculation.

## **a Addressing Embedded Device Security in LabVIEW RIO Systems**

Thursday, August 9 → 10:30–11:30 a.m. → Room 16B

**Sanjay Challa**, NI

In the wake of the Stuxnet worm and growing cyber threats, there is a deepening concern for industrial and embedded device security. Examine best practices for securing development machines and NI reconfigurable I/O (RIO) embedded hardware targets against a variety of threats.

## **Advanced Motion Control for Machine Automation**

Thursday, August 9 → 10:30–11:30 a.m. → Room 12B

**Eric Brewster**, Kollmorgen

Servo systems provide fast command response, outstanding disturbance rejection, and highly repeatable motion. At this session, review advanced servo algorithms such as observers, high-order filters, and multiple feedforward paths. Also learn how to configure and tune your system, including the roles of automatic and manual tuning methods.

## **Benefits of the NI Real-Time Hypervisor**

Wednesday, August 8 → 3:30–4:30 p.m. → Room 12B

**Sanjay Challa**, NI

The NI Real-Time Hypervisor is a virtualization tool that can simultaneously run Windows and LabVIEW Real-Time OSs on select NI real-time controllers. Learn how to take advantage of this technology to create a more efficient and cost-effective system by going beyond single OS solutions.

## **CompactRIO and Machine Vision: A Perfect Match**

Wednesday, August 8 → 1:00–2:00 p.m. → Room 11A/B

**Asa Kirby**, NI

Advances in CompactRIO processing capabilities have made it an effective platform for control and monitoring applications that require the flexibility of machine vision. In this session, learn about vision guided motion, integrating images into your monitoring tasks, and other ways to take your application to the next level with vision and CompactRIO.

## **h CompactRIO Part I—Programming With LabVIEW Real-Time**

Tuesday, August 7 → 1:00–2:00 p.m. → Room 18B

Wednesday, August 8 → 1:00–2:00 p.m. → Room 18B

**Tim Weilert**, NI

Learn how to quickly build and deploy embedded monitoring and control applications using CompactRIO and the LabVIEW Real-Time Module. Also explore LabVIEW Real-Time features that increase flexibility and integration with the FPGA when programming with scan mode.

## **h CompactRIO Part II—Programming With LabVIEW FPGA**

Tuesday, August 7 → 2:15–3:15 p.m. → Room 18B

Wednesday, August 8 → 3:30–4:30 p.m. → Room 18B

**Doug Browne**, NI

Take advantage of the power of reconfigurable FPGAs for custom timing/triggering, inline signal processing, and fast closed-loop control. In this hands-on session, explore the basics of customizing CompactRIO with LabVIEW FPGA Module programming. Attendees should have basic LabVIEW and LabVIEW Real-Time knowledge.

## **h CompactRIO Waveform Reference Library**

Tuesday, August 7 → 4:45–5:45 p.m. → Room 18B

Wednesday, August 8 → 4:45–5:45 p.m. → Room 18B

**Jeff Tipps**, NI

Discover how to use a triggered, state machine data-logging application on CompactRIO for high-speed waveform data acquisition.



# Embedded Monitoring and Control

## Developing Custom CompactRIO Modules

Wednesday, August 8 → 3:30–4:30 p.m. → Room 12A

**William Johnston**, Bloomy Controls, Inc.

Explore the core concepts of custom CompactRIO module development from initial design to final release. Also learn about enhanced CompactRIO Module Development Kit 2.0 features as well as the PCB design requirements, proper end-user API structures, and the details of development and release modes.

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## Distributed Monitoring System Using Wireless Sensors, Cloud Storage, and iPads

Tuesday, August 7 → 3:30–4:30 p.m. → Room 16A

**Jeremiah Fasl**, University of Texas, and **Richard Lindenberg**, Wiss, Janney, Elstner Associates, Inc.

Examine an innovative structural health monitoring system featuring wireless sensor network nodes with onboard LabVIEW processing, cellular modem connections, NI Technical Data Cloud storage, and easy configuration using iPads. Learn how to deploy this system for highway bridge real-time fatigue analysis and how to incorporate enterprise networking, cloud storage, and mobile integration in your next embedded application.

---

## **a** Effectively Deploy, Replicate, and Manage LabVIEW Real-Time and LabVIEW FPGA Applications

Wednesday, August 8 → 1:00–2:00 p.m. → Room 12B

**Sanjay Challa**, NI

Review best practices and proper methods for deploying LabVIEW Real-Time and LabVIEW FPGA applications. Also learn how to prepare targets for deployment, send application updates to deployed targets, and use common APIs to help with deployment and system replication management. Lastly, discuss the caveats of remote deployments.

## Integrating NI Components With Other Products and Existing Industrial Systems

Tuesday, August 7 → 2:15–3:15 p.m. → Room 11A/B

**Michael Sopko**, NI

NI embedded systems, including CompactRIO, are used in a variety of applications that require interoperability with existing equipment, including programmable logic controllers, enterprise networks, and I/O systems. Many of these systems need additional components such as human machine interfaces and enclosures. In this session, explore these hardware components as well as industrial protocols to communicate with these systems.

---

## Introduction to NI SoftMotion

Tuesday, August 7 → 10:30–11:30 a.m. → Room 11A/B

**Michael Johansen** and **Jeff Adair**, NI

See how NI uses all the building blocks of the LabVIEW RIO architecture to provide a powerful motion control and machine design platform. Learn how NI SoftMotion technology spans Windows, real-time, and FPGA targets, and discover the flexibility this gives you in designing a system.

---

## **a** Introduction to Power Electronics Design With LabVIEW FPGA and NI Multisim Co-Simulation

Thursday, August 9 → 10:30–11:30 a.m. → Room 12A

**Bhavesh Mistry**, NI

Explore the fundamentals of FPGA-based power electronics control design using LabVIEW FPGA and Multisim co-simulation. See a co-simulation of LabVIEW FPGA control algorithms and Multisim analog circuitry, and compare the results to actual experimental measurements. Also learn how LabVIEW and Multisim help you achieve complete, bidirectional development of embedded FPGA system code.



# Embedded Monitoring and Control

## **LabVIEW FPGA Design Flow and Best Practices, Part 1**

Wednesday, August 8 → 1:00–2:00 p.m. → Room 12A

**Ben Weidman** and **Patrick Pease**, NI

With LabVIEW FPGA, you can target and program reconfigurable I/O (RIO) devices without expertise in VHDL or Verilog. This helps you design, prototype, and deploy embedded systems faster with more flexibility. In this session, learn the LabVIEW FPGA design flow stages and gather best practices for tackling the initial design and implementation of your application.

---

## **LabVIEW FPGA Design Flow and Best Practices, Part 2**

Thursday, August 9 → 2:15–3:15 p.m. → Room 17A

**Paul Butler** and **Ben Weidman**, NI

In this follow-up session to Part 1, continue to explore best practices for LabVIEW FPGA programming. Learn about the advanced stages of the LabVIEW FPGA application development flow and how you can streamline the optimization, compilation, and debugging of your designs.

---

## **Lessons Learned From Implementing a Large-Scale Embedded Asset Monitoring System**

Thursday, August 9 → 10:30–11:30 a.m. → Room 11A/B

**Stuart Gillen**, NI

A large-scale utility company is using CompactRIO to implement a plant-wide condition monitoring system. In this session, learn best practices for architecting and networking a robust, ready-to-run CompactRIO system for asset monitoring.

## **Machine Condition Monitoring, Predictive Failure Analysis, and Advanced Alarming With LabVIEW and CompactRIO**

Wednesday, August 8 → 3:30–4:30 p.m. → Room 11A/B

**Janarde Lepore**, Tandel Systems, Inc.

A new algorithm for LabVIEW, implemented in CompactRIO, detects failures and predicts impending problems long before the traditional conditional alarms used within LabVIEW. It reliably identifies 25 quality criteria including oscillations, hunting, control deterioration (even in the presence of noise), and complex patterns that confuse current technologies. Learn how to implement this alarm in your own application.

---

## **Machining Analytics: Real-Time Production Intelligence**

Thursday, August 9 → 2:15–3:15 p.m. → Room 11A/B

**Jaime Rodriguez**, Gradient Technologies

Explore the development and implementation of a real-time control system and human machine interface that precisely predict cutting tool wear and are based on adaptive learning algorithms in LabVIEW. The machining center features a combination of transducers (current transformers, triaxial accelerometers, tachometers, and encoders) to obtain real-time feedback of each of these parameters.

---

## **Make Your Windows Embedded Application Beautiful and Bulletproof**

Tuesday, August 7 → 3:30–4:30 p.m. → Room 11A/B

**Andrew Mierau**, NI

Microsoft Windows Embedded OS software features can help you create rich, robust, and reliable embedded applications using NI embedded devices. Learn how the enhanced write filter (EWF) and hibernate once, resume many (HORM) functions can protect your application from severe failures while a custom OS shell can give your interface a polished and professional feel.



# Embedded Monitoring and Control

## Measuring Electrical Power With LabVIEW and CompactRIO

Thursday, August 9 → 1:00–2:00 p.m. → Room 11A/B

**Brett Burger**, NI

Power measurement and monitoring applications are widespread. From device and appliance test to smart grid research and development, power quality and consumption are more important than ever. In this session, learn the basics of power and how to make some of the most common power measurements with NI tools including NI CompactDAQ, CompactRIO, and LabVIEW.

## Move Beyond Your Chassis With New C Series Expansion Options

Tuesday, August 7 → 3:30–4:30 p.m. → Room 12A

**Brandon Treece**, NI

Discover how you can add industrial, signal-conditioned I/O to a new or existing system using NI C Series expansion options. Also explore how you can design a fully distributed monitoring and control system with NI reconfigurable I/O (RIO) systems. This session features information on newly released C Series expansion products.

## NI Motion

Tuesday, August 7 → 3:30–5:30 p.m. → Room 18C

Wednesday, August 8 → 1:00–3:00 p.m. → Room 18C

**Eric Myers** and **Nate Holmes**, NI

Explore how to implement a multiaxis coordinated motion control system with CompactRIO and the LabVIEW NI SoftMotion Module.

## Proven Architectures for Machine Control Applications

Thursday, August 9 → 1:00–2:00 p.m. → Room 12B

**Christian Fritz**, NI

It is no secret that machine control systems are becoming more complicated. Requirements like flexible manufacturing processes, higher throughput, and increased quality are driving the creation of machines that are capable of running more autonomously than ever before. Today, embedded systems handle the rising complexity of modern machine control applications. In this session, learn about recommended architectures that you can use for your next design and get a jump-start on the development of a state-of-the-art machine control system that leverages NI LabVIEW RIO technology.

## Rapidly Prototype an Electronic Control Unit (ECU)

Thursday, August 9 → 10:30–11:30 a.m. → Room 18A

**Gary Parente**, NI

Prototyping ECUs can be a tedious task. Modifying embedded software and hardware can take lots of time and engineers as well as a redesign or new commercial off-the-shelf equipment. Discover how you can use NI CompactRIO and Drivven products to rapidly prototype an embedded control application for greater product innovation and shorter time to market.

## RMC Design for NI Single-Board RIO

Wednesday, August 8 → 10:30–11:30 a.m. → Room 12B

**Steven Bassett**, **Nathan Russell**, and **Vance Toth**, NI

The RIO Mezzanine Card (RMC) provides custom expansion to unique, application-specific I/O. In this session, examine the best practices and resources available for RMC hardware design and LabVIEW FPGA driver development. This is a must-attend session for those developing custom RMCs.



# Embedded Monitoring and Control

## Selecting the Right LabVIEW RIO Target for Your Next Application

Tuesday, August 7 → 2:15–3:15 p.m. → Room 12A

**Brandon Treece**, NI

As the number of NI reconfigurable I/O (RIO) hardware targets grows, so do the ways to serve different applications. Learn how to choose the right hardware target to satisfy your embedded project needs and explore different CompactRIO, NI Single-Board RIO, and expansion I/O options for your next application.

---

## Selecting the Right User Interface Technology for Your Next Embedded Application

Thursday, August 9 → 1:00–2:00 p.m. → Room 12A

**Jonah Paul**, NI

Many distributed and embedded applications require a user to interact with the system. But selecting the appropriate human machine interface (HMI) for the job—whether a touch panel, mobile platform, or other UI—can be challenging. Learn about thick- and thin-client technologies for designing and deploying HMIs with the LabVIEW RIO platform architecture.

---

## Simple, Efficient, and Flexible Network Communication With NI Embedded Devices

Wednesday, August 8 → 4:45–5:45 p.m. → Room 11A/B

**Sheldon Kryger**, Kryger Innovations

Review the basics of TCP network communications and discover a simple, efficient method of communicating commands and data across a network. See how you can use type-defined enumerations and clusters (custom data structures) to accomplish this and create a flexible and expandable communication system between a combination of PCs and/or embedded systems such as CompactRIO.

## Simplifying High-Speed Waveform Acquisition on CompactRIO

Thursday, August 9 → 2:15–3:15 p.m. → Room 12A

**Jeff Tipps**, NI

The CompactRIO Waveform Reference Library simplifies the acquisition of waveform data and provides a starting point in your field-programmable gate array (FPGA) code. Learn how you can use the reference library to streamline your code development, including FPGA pipelining, error handling, and DMA transfers.

---

## State Pattern Implementation for Scalable Control Systems

Tuesday, August 7 → 4:45–5:45 p.m. → Room 12A

**Paul Lotz**, Lowell Observatory

Define a state machine and examine a state pattern implementation using LabVIEW objects with the factory method pattern and basic user interfaces. Also explore a real-time control application example for the Discovery Channel Telescope as well as ways to apply top-level states in the design of a hierarchical control system.

---

## Success of the LabVIEW RIO Platform Architecture in Complex Life Science Applications

Tuesday, August 7 → 1:00–2:00 p.m. → Room 11A/B

**Joe Spinozzi**, Cyth Systems

As different as they may appear, many embedded life science products have striking similarities that make the LabVIEW RIO architecture an excellent choice for tackling a variety of projects. Learn from NI Embedded Design Alliance Partner Cyth Systems about several real-world medical and biotech projects and the development challenges of each. Also see a live demonstration of a patient simulator used to train surgical staff during an actual bypass surgery.



# Embedded Monitoring and Control

## **Taking COTS to the Next Level in the Embedded Design World**

Wednesday, August 8 → 4:45–5:45 p.m. → Room 12A

**Joe Spinozzi**, Cyth Systems

Explore the benefits of using commercial off-the-shelf (COTS) products to design, prototype, and deploy embedded systems. See how NI Embedded Design Alliance Partner Cyth Systems converts circuitry and source code into reusable elements for other design projects. Also explore real-world examples and finished systems used in a variety of industries.

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## **The Art of Motor and Drive Sizing**

Tuesday, August 7 → 1:00–2:00 p.m. → Room 12A

**Paul Coughlin** and **Doug Kanipe**, Kollmorgen

Most deployed motors are too large for their applications, and 97 percent of operating costs over a motor's lifetime can result from energy consumption rather than hardware investments. In this session, learn how correctly sizing motors can be one of the most important decisions in any machine design.

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## **The Secrets Of Ruggedness: A Live CompactRIO Teardown**

Wednesday, August 8 → 2:15–3:15 p.m. → Room 12B

**Jeremy O'Rarden** and **Vance Toth**, NI

Many system integrators praise the ruggedness of the CompactRIO platform. At this session, learn how to define, achieve, test, and maintain operating temperature and vibration durability specifications with both CompactRIO and NI Single-Board RIO. Also get an exclusive look inside a CompactRIO system.

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## **Tuning Deployed LabVIEW Real-Time Applications**

Thursday, August 9 → 2:15–3:15 p.m. → Room 12B

**Kris Quillen**, NI

Do you distribute LabVIEW Real-Time applications? Explore tools to manage real-time software deployments, run-time variable settings, and fault logs and learn about a LabVIEW Real-Time toolkit for creating your user interface without stopping or opening the real-time code.

## **Unlocking Our Dynamic Planet**

Tuesday, August 7 → 4:45–5:45 p.m. → Room 11A/B

**Matthew Burkhardt** and **Larry Oolman**, University of Wyoming Department of Atmospheric Science

The University of Wyoming King Air, an atmospheric research aircraft, helps researchers understand clouds, thunderstorms, tornados, and hurricanes. Onboard LabVIEW Real-Time systems synchronize, georeference, process, display, and archive data from RADAR, LIDAR, and other instruments using analog, digital, serial, and Ethernet interfaces. Learn how to integrate these components and interface with proprietary third-party instruments using LabVIEW FPGA.

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## **Using CompactRIO and LabVIEW in Advanced Logging Solutions**

Wednesday, August 8 → 10:30–11:30 a.m. → Room 11A/B

**Anders Meister** and **Simon Stenfeldt**, CIM Industrial Systems A/S

Examine how CIM Industrial Systems A/S developed an advanced distributed, wireless, and GPS synchronized logger solution. Hear from LabVIEW architects about how they overcame challenges from requirements to delivery, with a focus on the technical implementation. Experience with CompactRIO, LabVIEW Real-Time, and LabVIEW FPGA is required.

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## **Using New Stand-Alone NI CompactDAQ for Embedded Monitoring**

Wednesday, August 8 → 10:30–11:30 a.m. → Room 12A

**Doug Farrell** and **Brian Phillipi**, NI

New stand-alone NI CompactDAQ helps you develop online monitoring solutions more easily than ever before. Explore this new platform and how you can benefit from the features it adds to embedded, online monitoring.



# Embedded Monitoring and Control

## Using the LabVIEW RIO Architecture to Clean Up Your Engine

Tuesday, August 7 → 10:30–11:30 a.m. → Room 12A

**Gary Parente**, NI

Engine researchers worldwide use Drivven's Combustion Analysis Toolkit to examine advanced modes of combustion including homogeneous charge compression ignition (HCCI) and other low-temperature combustion engines. Learn about these advanced engines and how the LabVIEW RIO architecture is used to research, develop, and control them.

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## What's New in NI C Series Platforms

Tuesday, August 7 → 10:30–11:30 a.m. → Room 16A

**Brett Burger** and **Elizabeth Smith**, NI

This must-attend session for anyone designing measurement or control systems covers the latest advancements in the C Series platforms, including NI CompactDAQ, CompactRIO, and C Series I/O modules. Learn about the benefits and advantages of each platform, such as the different software approaches, system architectures, and target applications.

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## When to Use FPGAs for Custom Motion and Motor Control

Tuesday, August 7 → 2:15–3:15 p.m. → Room 12B

**Kiran Sreekantham**, NI, and **Yvonne Lin**, Xilinx

Programmable hardware technology is an ideal solution for high-performance or custom motor control. In this session, learn when to use programmable hardware for motion, explore Xilinx IP for motor control, and discuss how Xilinx FPGAs and NI technology provide a compelling system design tool for motion applications.

## When to Use Programmable Hardware for Embedded Vision and Image Processing

Wednesday, August 8 → 2:15–3:15 p.m. → Room 11A/B

**Carlton Heard**, NI, and **Yvonne Lin**, Xilinx

Xilinx programmable hardware technology delivers a high-performance solution for high-speed image processing. Learn from NI and Xilinx when to use programmable hardware for custom and high-speed image processing algorithms. Also explore the different NI reconfigurable I/O (RIO) hardware options with Xilinx FPGAs as well as LabVIEW FPGA and Xilinx IP software for embedded vision applications.

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## Wireless Sensor Networks

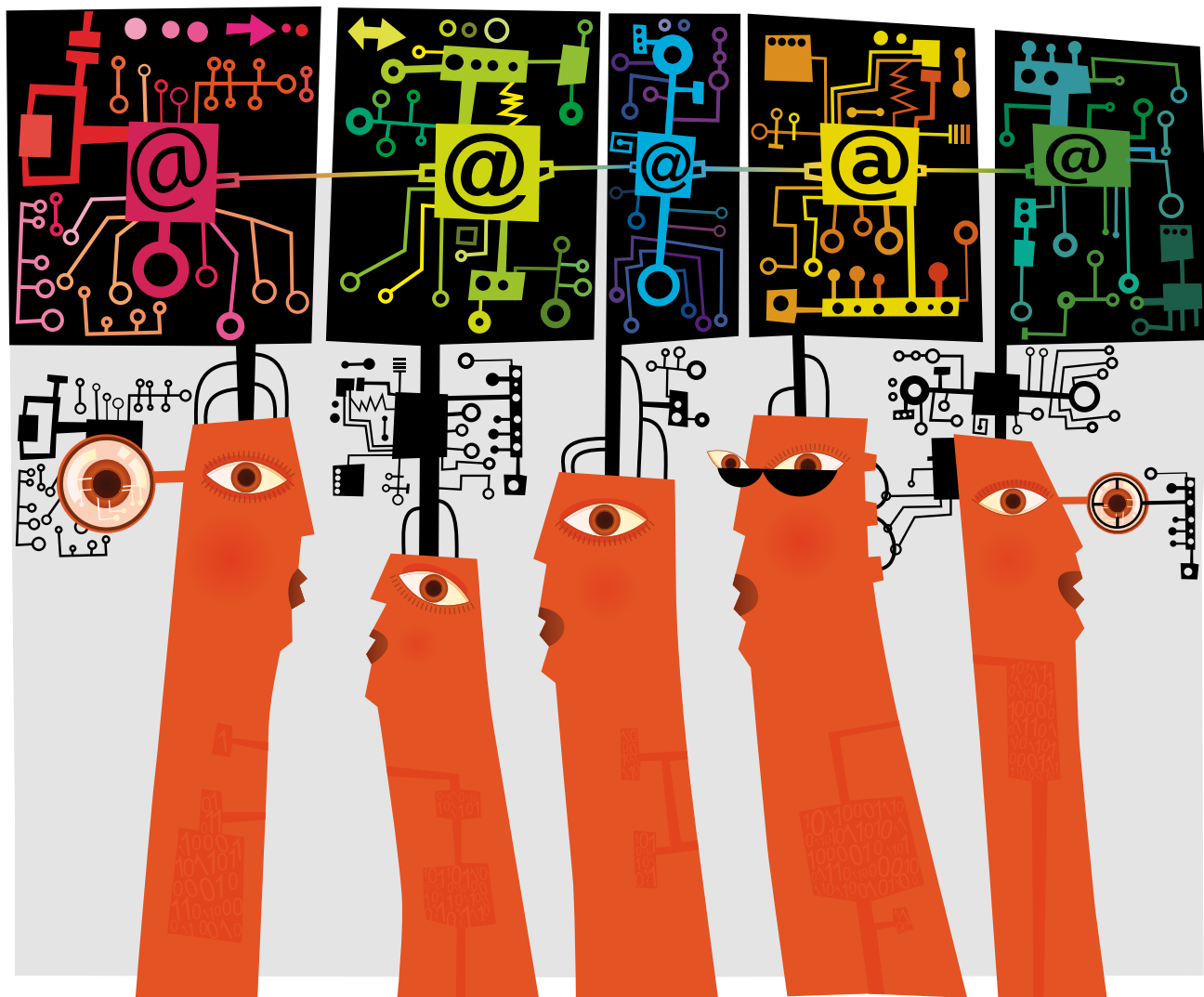
Tuesday, August 7 → 3:30–4:30 p.m. → Room 18B

Wednesday, August 8 → 2:15–3:15 p.m. → Room 18B

**Brian Aswege** and **Nick Butler**, NI

Go beyond the limits of traditional monitoring systems with NI wireless sensor networks (WSNs). In this hands-on session, examine the latest NI WSN products and learn how to configure the network and acquire data using LabVIEW. Also use the LabVIEW WSN Module to embed local processing and decision making on the node itself.





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# Software Development Techniques

## **.NET Developers Guide to Building Test and Measurement Applications**

Wednesday, August 8 → 2:15–3:15 p.m. → Room 19A

**Anna Kozminski**, NI

Learn how to build informative and professional test and measurement applications in Visual .NET using NI .NET drivers and the NI Measurement Studio integrated suite of tools designed to help Visual C# and Visual Basic .NET developers program faster. Get tips on acquiring, analyzing, presenting, and logging data in Windows or web applications.

## **A Scalable Plug-In Architecture for Monitoring Distributed Real-Time Applications**

Thursday, August 9 → 10:30–11:30 a.m. → Room 16A

**Fabiola De la Cueva**, Delacor

Watch LabVIEW Champion and LabVIEW Architects Forum Founder Fabiola De la Cueva demonstrate a scalable, configurable plug-in-based architecture for monitoring multiple distributed targets even if the targets are different system types. Examine advanced techniques like LabVIEW object-oriented programming and subpanelling and take the code home with you.

## **a Actor Framework**

**h** Wednesday, August 8 → 3:30–5:30 p.m. → Room 18C

**Stephen Mercer** and **Allen Smith**, NI

Explore how the Actor Framework (AF), part of LabVIEW 2012, helps you build LabVIEW applications involving multiple parallel tasks that must communicate with each other. With AF, you can reuse more code and avoid many of the common deadlock and race conditions of parallel systems. Some knowledge of AF and LabVIEW object-oriented programming is helpful for this session. See [ni.com/actorframework](http://ni.com/actorframework).

## **a Aggregate Data From Distributed Measurement Systems With the NI Technical Data Cloud**

Wednesday, August 8 → 3:30–4:30 p.m. → Room 19A

**Derrick Snyder**, NI

One of the challenges of building distributed measurement or monitoring systems is the aggregation of data from these remote systems. This session previews the NI Technical Data Cloud, an emerging technology that uses cloud computing to simplify the accumulation, storage, and management of data from distributed measurement systems.

## **Architecting Embedded Control and Monitoring Applications**

Tuesday, August 7 → 1:00–2:00 p.m. → Room 12B

**Meghan Kerry**, NI

Discover how choosing the right architecture can help you increase the robustness and maintainability of your application. Also get a solid start on your next project by applying NI-recommended architectures for CompactRIO control and monitoring applications included in the LabVIEW 2012 Real-Time and FPGA modules.

## **h Build a VI Package With VI Package Manager**

Tuesday, August 7 → 10:30–11:30 a.m. → Room 18C

**Robert Des Rosier**, NI

Learn how to set up the most efficient processes to build and distribute VIs and utilities for free. This session includes tips on how to package your LabVIEW code in reusable components that are easy to track and share with other users. In addition, see how to easily install VIs on multiple computers and versions of LabVIEW as well as license your LabVIEW packages to quickly turn your code into a commercial product.



# Software Development Techniques

## **h** Code Review Best Practices

Tuesday, August 7 → 10:30–11:30 a.m. → Room 18B

**Nancy Hollenback** and **Brian Powell**, NI

LabVIEW R&D engineers review all (yes, ALL) code that goes into the product and encourage you to do the same. In this session, examine best practices and learn how your team can use these ideas.

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## **a** Create High-Performance and Resource-Efficient FPGA Algorithms With LabVIEW FPGA IP Builder

Wednesday, August 8 → 2:15–3:15 p.m. → Room 12A

**Alejandro Asenjo**, NI

Use state-of-the-art high-level synthesis (HLS) technology from Xilinx to create resource- and timing-optimized FPGA IP without relying on advanced LabVIEW FPGA optimization concepts. This means you can concentrate on the high-level design of your algorithm, quickly explore design trade-offs, and reuse IP to meet new design requirements.

---

## Custom Code Deserves Custom Analysis

Thursday, August 9 → 1:00–2:00 p.m. → Ballroom G

**Elaine Ramundo**, Bloomy Controls, Inc., and **Ellen Zhang**, NI

Examine how to use the LabVIEW VI Analyzer Toolkit to help automate large project code reviews, especially when creating custom rules for specific code base/project needs. This session includes a demo and tutorial worksheet.

---

## Data Communication With LabVIEW

Tuesday, August 7 → 3:30–4:30 p.m. → Room 12B

**Grant Heimbach**, NI

Get an overview of some of the most effective techniques for sending and receiving data and commands within a LabVIEW application. See how to stop multiple loops, send messages to an undefined number of plug-ins, set up two-way communication, communicate in a distributed embedded system, and address other common challenges.

## Design and Implement an Object-Oriented Instrument Abstraction Layer With UML and LabVIEW

Wednesday, August 8 → 4:45–5:45 p.m. → Room 16A

**Charlie Knapp**, NI

Learn how to design a simple object-oriented oscilloscope abstraction layer in Unified Modeling Language (UML) and implement this layer in LabVIEW. The design is extendible to include other instrument types, and the LabVIEW source API works with multiple models from different vendors, other A/D devices, and simulated waveform acquisition tools.

---

## Developing ANSI C Applications to Communicate With FPGAs in Secure Environments

Thursday, August 9 → 10:30–11:30 a.m. → Room 19A

**James Kneale**, Northrop Grumman Corporation, and **Anna Kozminski**, NI

Application development in highly regulated industries often requires software integration in classified environments. Learn how to use the C Interface to LabVIEW FPGA to program real-time processors on NI FPGA-based hardware using C tools such as LabWindows™/CVI while maintaining configuration control when working in both secure and unrestricted environments.

---

## Do Real-Time Right With the NI Jitter Benchmarking Framework

Thursday, August 9 → 2:15–3:15 p.m. → Room 16A

**Robert Des Rosier**, NI, and **Troy Troshynski**, Avionics Interface Technologies

One of the most important and often challenging aspects of any real-time system is the characterization of jitter. In this session, learn how you can improve and document the performance of your real-time system with the NI Jitter Benchmarking Framework for LabVIEW Real-Time using Avionics Interface Technologies as a case study.



# Software Development Techniques

## Everything You Ever Wanted to Know About Functional Global Variables

Wednesday, August 8 → 3:30–4:30 p.m. → Room 19B

**Nancy Hollenback**, NI

As a longtime foundational design pattern in the LabVIEW community, the functional global variable (FGV) meets many common challenges but can also be overused. Join this discussion of best practices for global data storage and the transition from FGVs to data value references.

---

## Explore Tools to Customize LabVIEW

Wednesday, August 8 → 2:15–3:15 p.m. → Room 18D

**David Ladolcetta**, NI

Customize LabVIEW by adding functions to the LabVIEW Project Explorer. Also learn to access additional resources and tools to improve the LabVIEW development environment.

---

## Extending Your LabVIEW Skills to LabVIEW Real-Time and LabVIEW FPGA

Thursday, August 9 → 1:00–2:00 p.m. → Room 19B

**Meghan Kerry**, NI

Have you used LabVIEW for your desktop and considered using LabVIEW Real-Time or LabVIEW FPGA for your next project? Learn what to expect when making the transition and how to avoid common pitfalls.

---

## Fire and Forget: Bulletproof Builds Using Continuous Integration With LabVIEW

Thursday, August 9 → 1:00–2:00 p.m. → Ballroom E

**Omar Mussa**, JKI

With continuous integration (CI), you never have to manually build code. A build server automatically builds the application when new code changes are checked in and sends reports when problems are encountered. Learn how JKI created an automated CI system for LabVIEW code using free, off-the-shelf tools.

## Forget-Me-Not Seat Sensor Protects Children

Thursday, August 9 → 2:15–3:15 p.m. → Room 19A

**Keith Schaub**, Wireless SOC Test

Learn how Wireless SOC Test used LabVIEW and other tools to develop an inexpensive and highly reliable safety system to protect infants and children in car seats. This system, called Forget-Me-Not, alerts you if a child is placed in the seat, becomes unrestrained, or is inadvertently left in the vehicle.

---

## Generating Reports for LabVIEW Data

Tuesday, August 7 → 2:15–3:15 p.m. → Room 19B

**Stephanie Orci**, NI

Now that you have successfully created a LabVIEW application that collects a lot of data, discover the best ways to develop a report that highlights key data findings and is easy to maintain.

---

## Inside the LabVIEW 2012 Core Templates

Thursday, August 9 → 10:30–11:30 a.m. → Room 18D

**Elijah Kerry**, NI

Spend time with the new templates and sample projects in LabVIEW 2012 with technical experts in the room who can answer questions.

---

## Introduction to Acquiring and Storing Data With NI LabVIEW

Tuesday, August 7 → 10:30–11:30 a.m. → Room 19B

**Adri Kruger** and **Derrick Snyder**, NI

Discover why thousands of engineers and scientists worldwide trust LabVIEW graphical system design software to acquire measurement data and control benchtop instruments. In addition to introducing fundamental concepts, this session features live demonstrations of instrument control, data acquisition, visualization, file I/O, and postprocessing.



# Software Development Techniques

## Introduction to Data Analysis and Signal Processing With LabVIEW

Tuesday, August 7 → 1:00–2:00 p.m. → Room 19B

**Grant Heimbach, NI**

LabVIEW offers hundreds of native data analysis and signal processing functions. Learn how to add inline analysis and offline processing to your application quickly and effectively.

---

### **h** Introduction to LabVIEW

Tuesday, August 7 → 1:00–2:00 p.m. → Room 18C

**Derrick Snyder, NI**

Explore LabVIEW for the first time and review fundamental LabVIEW concepts such as data flow, wiring, basic structures, user interfaces, and simple debugging.

---

### **a** Introduction to LabVIEW Scripting

Thursday, August 9 → 2:15–3:15 p.m. → Room 19B

**David Ladolcetta, NI**

Gain an introduction to programmatically creating, modifying, and inspecting G code. Familiarity with VI Server is recommended but not required.

---

### **h** Introduction to LabWindows™/CVI

Wednesday, August 8 → 4:45–5:45 p.m. → Room 18D

**Anna Kozminski, NI**

Discover how C programmers performing instrument control, data acquisition, and control design are using LabWindows/CVI to create their applications. Also learn how you can use built-in LabWindows/CVI engineering and scientific tools to be a more productive C programmer.

---

## Introduction to Object-Oriented Programming in LabVIEW

Tuesday, August 7 → 4:45–5:45 p.m. → Room 19A

**Derrick Snyder, NI**

Object-oriented programming (OOP) is a fundamental programming methodology designed to promote applications that are more scalable, reliable, and maintainable. Review the history behind OOP and learn how to use OOP techniques in LabVIEW.

---

### **h** Introduction to OOP in LabVIEW

Wednesday, August 8 → 10:30–11:30 a.m. → Room 18C

**Derrick Snyder, NI**

If you already understand the fundamental concepts of OOP, this session helps you learn the mechanics behind implementing object-oriented designs in LabVIEW.

---

## Introduction to the LabVIEW FPGA Module

Tuesday, August 7 → 3:30–4:30 p.m. → Room 19B

**Jonah Paul, NI**

Explore how you can use the LabVIEW FPGA Module to take advantage of reconfigurable hardware with graphical programming. Also review application examples and NI field-programmable gate array (FPGA) hardware targets.

---

## Introduction to the LabVIEW Real-Time Module

Wednesday, August 8 → 10:30–11:30 a.m. → Room 19B

**Tanya Visser, NI**

Learn how you can use LabVIEW Real-Time to create reliable, stand-alone monitoring and control systems. Also find out more about real-time OSs and key concepts such as jitter and determinism.

---

### **a** LabVIEW 2012 Advanced Design Templates and Sample Projects

Tuesday, August 7 → 3:30–4:30 p.m. → Room 19A

**Elijah Kerry, NI**

Focus on the more complex templates and sample projects in LabVIEW 2012 and explore concepts like how to create and add your own.



# Software Development Techniques

## LabVIEW Classes: The State of the Art

Tuesday, August 7 → 2:15–3:15 p.m. → Room 19A

**Stephen Mercer**, NI

Review LabVIEW object-oriented programming (OOP) trends over the last year with LabVIEW OOP Lead Developer Stephen Mercer. This session includes interesting tricks and tips, new 2012 features, and tales from other users to educate and entertain.

---

## **h** LabVIEW Data Management and Postprocessing

Thursday, August 9 → 10:30–11:30 a.m. → Room 18B

**Stephanie Orci**, NI

Explore DIAdem and improve your postprocessing productivity by using data management techniques to quickly locate and load data from any file format. Also graph and visualize data without the limitations of software such as Microsoft Excel, perform interactive engineering analysis, export professional reports, and automate repetitive processing tasks.

---

## **a** LabVIEW FPGA: Under the Hood

Thursday, August 9 → 2:15–3:15 p.m. → Room 17B

**Jonathan Brumley**, NI

Discover how the LabVIEW FPGA Module actually runs LabVIEW code on a field-programmable gate array (FPGA) and learn how the LabVIEW block diagram is synthesized into the basic digital logic blocks of an FPGA.

---

## LabVIEW Object-Oriented Design Process for Hardware

Wednesday, August 8 → 10:30–11:30 a.m. → Room 16A

**Marcus Johnson**, Symbio

Explore a real-world project for which Unified Modeling Language and object-oriented tool support helped build a flexible system that can be adapted to new requirements. Focus on hardware abstraction and design robustness as you discuss the design process.

## Measurement and Model-Based Design

Wednesday, August 8 → 2:15–3:15 p.m. → Room 19B

**Andy Chang** and **Jeannie Falcon**, NI

Discover how to easily add measurements to the model-based design process for embedded control systems. Also learn how to apply online system identification to create an adaptive control system and use measurements to fine-tune a theory-based model.

---

## Network Streams—More Than Just Streaming

Wednesday, August 8 → 1:00–2:00 p.m. → Room 16A

**Nancy Hollenback**, NI

The Network Streams API simplifies the streaming of buffered, lossless data between two computers or between a real-time target and a host PC. It also supports messaging between two LabVIEW targets or across application instances. Explore the mechanics and common mistakes of using this API and learn ways to abstract the API for use across a project team.

---

## New LabWindows™ /CVI 2012 Features for Future-Proof ANSI C Development

Wednesday, August 8 → 3:30–4:30 p.m. → Room 16A

**Anna Kozminski** and **Jonathan Newton**, NI

LabWindows/CVI offers ANSI C programmers a powerful yet streamlined and flexible integrated development environment (IDE) for efficiently writing test and measurement applications. It continues to evolve as NI strives to advance usability, performance, and platform support. At this session, learn about the latest LabWindows/CVI 2012 feature improvements and explore NI's vision for the future of this IDE.

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## NI TestStand Operator Interface Development in Practice

Thursday, August 9 → 1:00–2:00 p.m. → Room 19A

**Morten Pedersen**, CIM Industrial Systems A/S

Learn best practices for architecting and developing NI TestStand operator interfaces using LabVIEW and see how toolkits can simplify operator interface development by abstracting common functionality.



# Software Development Techniques

## Optimizing Performance in LabVIEW Real-Time

Thursday, August 9 → 1:00–2:00 p.m. → Room 17A

**Sanjay Challa**, NI

Gain insight from National Instruments experts on how to improve reliability, reduce jitter, and optimize performance in your real-time systems.

## Options for Integrating IP Into Your FPGA Designs

Thursday, August 9 → 10:30–11:30 a.m. → Ballroom G

**Alejandro Asenjo**, NI

Save time by reusing or automatically generating IP for your next FPGA-based design. Learn about the many sources of FPGA IP and how they integrate with LabVIEW FPGA.

## Overcoming Microsoft Excel Limitations for LabVIEW Data Analysis and Reporting

Thursday, August 9 → 1:00–2:00 p.m. → Room 16A

**Stephanie Orci**, NI

If you're frustrated with Microsoft Excel's slowness or inability to handle the size or format of your data file, learn how to use a tool designed for engineers instead of being limited by one designed for accountants.

## Parallelizing the Unparallelizable

Wednesday, August 8 → 2:15–3:15 p.m. → Room 16A

**Christian Altenbach**, UCLA

LabVIEW is well suited for parallelization, but fully using a large number of cores requires smart code design. LabVIEW Champion Christian Altenbach shows you how to design code to automatically scale as more cores become available, even if the important loops are initially not directly parallelizable. Also examine benchmarks.

## Reusing External Code in LabVIEW

Wednesday, August 8 → 1:00–2:00 p.m. → Room 19B

**Jeannie Falcon** and **Adri Kruger**, NI

LabVIEW can be the “tie that binds” code from different programming environments. Learn the latest tips on how to integrate your existing code, algorithms, and models in LabVIEW. This session covers integration approaches for .m files, .NET code, and C code and features software and hardware demonstrations.

## Secret Sauce: Non-LabVIEW Tools to Make You a Better LabVIEW Developer

Tuesday, August 7 → 10:30–11:30 a.m. → Room 12B

**Justin Goeres**, JKI

If you could save one hour a day by working smarter, how much more value could you create and how much less stress would you feel? LabVIEW Champion Justin Goeres shows you how to manage your code, projects, and commitments using the same free and low-cost tools JKI engineers use.

## Smartphones and Tablets for Measurement and Control

Wednesday, August 8 → 10:30–11:30 a.m. → Room 19A

**Chris Delvizio**, NI

Explore NI solutions for smartphones and tablets such as iPhone, iPad, and Android devices and discover how you can take advantage of mobile computing devices for measurement and control applications.

## Software Engineering Best Practices for LabVIEW

Tuesday, August 7 → 4:45–5:45 p.m. → Room 19B

**Elijah Kerry**, NI

The complexity of today's challenging applications requires effective software engineering, meaning development practices that ensure the scalability and maintainability of software. Learn how applying these practices correctly improves overall application quality and developer productivity as well as lowers maintenance costs.



# Software Development Techniques

## **h** **Software Engineering With LabVIEW**

Wednesday, August 8 → 3:30–4:30 p.m. → Room 18D

**Elijah Kerry**, NI

Explore about topics ranging from source code control to regression testing frameworks that you can use with LabVIEW.

---

## **Subversion and LabVIEW: Tips, Tricks, and Pitfalls**

Wednesday, August 8 → 4:45–5:45 p.m. → Room 19B

**Buddy Haun**, VirtEx LLC

Get tips for setting up Subversion and using it for your LabVIEW source code control. LabVIEW Champion Buddy Haun explains why source code control on any LabVIEW project is a must.

---

## **The Art of Designing a Software Architecture**

Thursday, August 9 → 2:15–3:15 p.m. → Ballroom G

**Arnoud de Kuijper**, T&M Solutions B.V.

Gain insight into the decision-making process for setting up a software architecture, especially the design phase. Designing a flexible software architecture requires certain skills, experience, and user behavior knowledge. Cover coupling and cohesion, communication strategies, the use of design patterns as building blocks, and more.

---

## **a** **The Future of UI Design—WPF .NET Technology**

Wednesday, August 8 → 1:00–2:00 p.m. → Room 19A

**Aaron Cederquist** and **Jonathan Meyer**, NI

Windows Presentation Foundation (WPF) is a next-generation presentation system for building Windows client applications in .NET with visually stunning user experiences. This is an introductory session for .NET developers interested in learning about WPF and its benefits for test and measurement application software.

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## **The What, Why, and How of a Network Connection Manager**

Thursday, August 9 → 10:30–11:30 a.m. → Room 19B

**Mike Bailey**, NI

Learn what a network connection manager is, why you need one in your system, and how you can construct it in LabVIEW. Also explore the technical details of the build up as well as connection protocols, management, and methods. Lastly, see how to use the API to integrate this into your own system.

---

## **Tips and Tricks to Speed LabVIEW Development**

Thursday, August 9 → 10:30–11:30 a.m. → Ballroom E

**Darren Nattinger**, NI

Hear from the “world’s fastest LabVIEW programmer” about some simple techniques that can help you code more quickly. Also learn about little known LabVIEW features, advanced functions, and other tools that can help you save development time.

---

## **a** **Using LabVIEW and GPUs in Real-Time High-Performance Computing Systems**

Wednesday, August 8 → 4:45–5:45 p.m. → Room 19A

**Alejandro Asenjo** and **Darren Schmidt**, NI

Examine options for performing computationally intensive analysis with LabVIEW, including using multicore CPUs, FPGAs, and GPUs. Learn how to interface with GPU hardware using the new LabVIEW GPU Analysis Toolkit, and review example applications and benchmarks. In addition, explore capabilities in the new LabVIEW Multicore Analysis and Sparse Matrix Toolkit.

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## **Using LabVIEW Templates and Sample Projects for Desktop Applications**

Tuesday, August 7 → 1:00–2:00 p.m. → Room 19A

**Elijah Kerry**, NI

LabVIEW 2012 features new templates and sample projects that you can use as the building blocks for new applications. This session examines some of the fundamental templates and the decisions behind their design.



# Software Development Techniques

## **Watchdog Agent Prognostics Toolkit for LabVIEW**

Tuesday, August 7 → 10:30–11:30 a.m. → Room 18D

**Doug Farrell**, NI

Learn how to use the IMS Center's Watchdog Agent Prognostics Toolkit to predict and classify system faults. With a patented analysis technique and industry-standard algorithms, the toolkit adds ready-to-use prognostics health management algorithms and graphic displays to your LabVIEW applications.

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## **What's New in LabVIEW 2012**

Tuesday, August 7 → 10:30–11:30 a.m. → Room 19A

**Elijah Kerry**, NI

Attend this staple NIWeek session to learn about new LabVIEW features designed to accelerate your success, and take a demo-heavy tour through the latest version of LabVIEW.

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## **What's New in LabVIEW Real-Time and LabVIEW FPGA**

Tuesday, August 7 → 4:45–5:45 p.m. → Room 12B

**Jonah Paul**, NI

Explore the latest improvements, watch a few demos, and learn how you can take advantage of new features that improve productivity and add new capabilities to your reconfigurable I/O systems.

## **What's New in NI TestStand 2012**

Thursday, August 9 → 10:30–11:30 a.m. → Room 17B

**Jervin Justin**, NI

Discover the new features in NI TestStand 2012 test management software. Learn how the new plug-in architecture can help you optimize and simplify automated test results processing and how the new version can make common development tasks easier.

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## **XControls in Theory and Practice**

Thursday, August 9 → 2:15–3:15 p.m. → Ballroom E

**Michael Porter**, Lime Instruments Inc.

Obtain useful and practical guidance on how to effectively develop XControls. LabVIEW Champion Michael Porter presents both the theory of operation and practical best practices for XControl development and troubleshooting in LabVIEW.

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## **2012 LAVA/OpenG NIWeek BBQ**

Tuesday, August 7 → 7:00 p.m. → Scholz Garten, 1607 San Jacinto Blvd., Austin

This yearly event brings together LabVIEW R&D engineers and our online and real-world friends from the LAVA and OpenG forums. Step away from the hustle and bustle of the NIWeek expo floor and enjoy good BBQ with your fellow wire workers. Tickets are \$30 USD per person. Learn more at [lavag.org/bbq](http://lavag.org/bbq).

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# Test and Data Acquisition

## An Optimal Test Data Format for Modern ATE Systems

Tuesday, August 7 → 2:15–3:15 p.m. → Room 13A/B

**Patrick Kelly**, IntraStage

Data collection complexity usually results from the different data formats test teams use at large organizations. Over multiple generations of a product, test data capture methods can change. This results in a fractured ecosystem of data formats and prevents test engineers from obtaining a global view of their product quality. Learn how to overcome these challenges.

---

## Audio Testing 101

Tuesday, August 7 → 4:45–5:45 p.m. → Room 18D

**Charlie Piazza**, NI

Develop an audio test procedure with both analog output and analog input channels. Learn how to account for signal delay and perform the most common audio test analyses on stimulus-response data.

---

## Avoid Common Mistakes When Integrating Switches Into Automated Test Systems

Thursday, August 9 → 1:00–2:00 p.m. → Room 15

**Jake Hamack**, NI, and **Jerry Hopp**, VPC

Explore ways to efficiently integrate switches into automated test systems for improved throughput and reduced system costs. From choosing the right architecture to making connections in software and hardware, this session thoroughly covers switch implementation and shows you how to simplify connectivity with mass interconnect solutions.

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## Best Design Practices for High-Channel-Count PXI Systems

Thursday, August 9 → 2:15–3:15 p.m. → Room 15

**Dave Baker**, G Systems

Discover best practices for high-channel-count test and measurement systems design. These practices produce scalable solutions that integrate with production equipment and information systems while reducing development time and cost. Also see how you can combine LabVIEW and PXI to create a variety of structural tests and ensure straightforward deployment and adequate data storage.

## Best Practices for Getting Accurate Data Out of Measurement Microphones

Tuesday, August 7 → 2:15–3:15 p.m. → Room 18D

**Jacob Soendergaard**, G.R.A.S. Sound & Vibration, and **Shea Clymer**, NI

Go beyond developing a sound pressure level meter and examine how to add measurements like loudness and sharpness and what they mean.

---

## Best Practices for Upgrading NI TestStand Systems

Wednesday, August 8 → 4:45–5:45 p.m. → Room 13A/B

**Yves Lemay**, Avera

As technologies evolve, automated test systems must be upgraded to simplify maintenance and increase efficiency. Learn how to proactively and holistically upgrade your test executive software to the latest version of NI TestStand for large systems. Also examine the Sequence Analyzer, File Differ Application, and enhanced LabVIEW integration as well as tips and tricks to reduce risks and costs.

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## Build an Automated Test System From Scratch

Tuesday, August 7 → 1:00–3:00 p.m. → Room 18A

Wednesday, August 8 → 1:00–3:00 p.m. → Room 18A

**Jervin Justin**, NI

Examine ways to develop an automated test system from start to finish and how to use NI TestStand to quickly sequence your measurements. Also discover how you can use LabVIEW to easily communicate with measurement instruments.

---

## Choosing NI Platforms for Structural Test Applications

Thursday, August 9 → 10:30–11:30 a.m. → Room 17A

**Jody Cronenberger**, Southwest Research Institute, and **Shea Clymer**, NI

The Southwest Research Institute studies and designs mechanical systems for the aerospace industry. In this session, review structural test system architectures built using LabVIEW and a variety of NI hardware platforms.



# Test and Data Acquisition

## **a** **Creating High-Speed Streaming Systems With NI PXI Hardware**

Wednesday, August 8 → 3:30–4:30 p.m. → Room 14

**Chetan Kapoor**, NI

Learn how to architect PXI-based high-speed data recording, processing, and playback applications. Also examine the technical details of how to maximize PXI Express system performance and use the correct software architectures to create systems with data throughputs of up to 12 GB/s.

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## **a** **DAQ Advanced: Real-Time Data Acquisition**

Tuesday, August 7 → 2:15–3:15 p.m. → Room 16A

**Daniel Domene** and **Zach Hindes**, NI

Get tips and tricks from NI R&D engineers for building applications with the LabVIEW Real-Time Module and NI data acquisition hardware.

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## **a** **DAQ Advanced: Streaming and Performance**

Thursday, August 9 → 10:30–11:30 a.m. → Room 15

**William Earle** and **Sunil Kowlgi**, NI

Gain in-depth knowledge on hardware and software technologies for high-performance, single-point, and buffered I/O. Learn tips on how to maximize throughput and obtain the best performance.

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## **a** **DAQ Advanced: Timing and Synchronization**

**h** Wednesday, August 8 → 1:00–2:00 p.m. → Room 18D

**Mark Grotewold** and **Craig Jennings**, NI

Discover methods and best practices for synchronizing NI CompactDAQ systems. Try out techniques for synchronizing measurements between multiple modules, multiple chassis, and across the world.

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## **Designing a Reliable and Scalable Test Framework**

Tuesday, August 7 → 1:00–2:00 p.m. → Room 13A/B

**Grant Gothing** and **Elaine Ramundo**, Bloomy Controls, Inc.

Whether writing your own test architecture or using off-the-shelf products like NI TestStand, be aware of the common pitfalls of test frameworks. Learn how a good design allows for both reliable test execution and the flexibility to grow with the needs of a changing product and production environment.

## **Designing Effective Metrics for Automated Test**

Tuesday, August 7 → 10:30–11:30 a.m. → Room 16B

**Michael Albright**, Signal X

Production line noise, vibration, and harshness (NVH) pass/fail testing requires a flexible metric design environment, robust data collection, easy retrieval, and automated postprocessing tools to satisfy a typical manufacturing setting. See how you can use LabVIEW to deploy these tools in the high-volume production NVH tests of products such as engines, axles, and electric vehicle motors.

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## **Designing Highly Scalable Semiconductor Validation Systems With PXI and LabVIEW**

Tuesday, August 7 → 1:00–2:00 p.m. → Room 16B

**Brigham Steele**, SMSC

As market windows continue to shrink for semiconductor products, engineers face ever-tighter project schedules. On the other hand, increasing device complexity along with the need to support a greater product mix demands optimal hardware and software architectures that must scale while remaining easy to maintain. Learn how to meet these challenges.

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## **Embedded Software Validation Best Practices**

Wednesday, August 8 → 10:30–11:30 a.m. → Room 13A/B

**Scott Fairbrother**, IBM

Embedded control software is growing exponentially in mechanical systems, which forces test methods to evolve even faster. Learn how test component reuse is providing superior system quality and validation efficiency for these systems by enabling consistent testing, results analysis, and traceability throughout the development process.

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## **h** **Fiber-Optic Sensing**

Tuesday, August 7 → 3:30–4:30 p.m. → Room 18A

**Kellis Garret**, NI

Discover how to use fiber-optic sensors to conduct common measurements including temperature and strain. Also connect sensors to the NI PXIe-4844 optical sensor interrogator, configure them in software, and read from them using LabVIEW system design software.



# Test and Data Acquisition

## Fiber-Optic Sensing Basics

Thursday, August 9 → 2:15–3:15 p.m. → Room 13A/B

**Kellis Garrett**, NI

Explore the basics of fiber-optic sensing technology, the different types of sensors, and the various methods for interrogating the signal from the sensors. Watch a demonstration of both temperature and strain measurements using NI solutions for fiber-optic sensing.

## Finding Faults in Embedded Software

Wednesday, August 8 → 10:30–11:30 a.m. → Room 15

**Alexis Despeyroux**, All4Tec; **Mugur Tatar**, QTronic; and **Nicholas Keel**, NI

As embedded software becomes more complex, the number of tests required to sufficiently evaluate ECUs grows exponentially faster. With automated test case generation, you can intelligently cover a broader range of embedded software testing to ensure high-quality embedded software. Learn about advancements in automated test case generation including automated requirements tracking and data analysis.

## Future Requirements of Test Cell Data Acquisition Systems

Thursday, August 9 → 10:30–11:30 a.m. → Room 13A/B

**Tony Tenison**, Jacobs Technology, and **Jim Black**, NI

Discover how Jacobs Technology selects data acquisition systems based on future needs and explore some of the company's latest test cell installations.

## Get the Picture: Perceived Picture Quality, HDMI, LVDS, and Infotainment

Wednesday, August 8 → 4:45–5:45 p.m. → Room 15

**Alexandre Boyer**, Avera; **Kevin Carstensen**, Harman; and **Ben James**, NI

Learn how Picture Quality Analysis automates streaming video test to eliminate operator inspection, and explore the latest consumer interface standards including HDMI, LVDS, and wireless. Also see an example system from Avera of a 4-up tester that dramatically increased test throughput on an infotainment system including AM/FM, DAB, HD/XM, Wi-Fi, Bluetooth, iPod, and auxiliary inputs.

## Hack Your Car With NI CAN Interfaces and LabVIEW

Thursday, August 9 → 2:15–3:15 p.m. → Room 14

**Noah Reding**, NI

Examine the automotive diagnostics (OBD-II) and controller area networking used in every car produced since 2008. Discover how to use LabVIEW and NI USB Controller Area Network (CAN) interfaces to gain hidden data from your car, read diagnostic trouble codes, and build custom automotive diagnostic applications.

## Hardware-in-the-Loop and Real-Time Testing Techniques

Wednesday, August 8 → 3:30–4:30 p.m. → Room 15

**Nicholas Keel**, NI, and **Torsten Blochwitz** and **Jens Schindler**, ITI

Real-time testing applications require greater reliability and determinism than a typical stimulus-response test system. Examine several of these applications and the architectures and technologies used to develop them. Also learn about hardware-in-the-loop testing and when to use it, NI VeriStand software, and model generation.

## High-Fidelity Electric Motor Simulation With JMAG-RT and NI VeriStand

Tuesday, August 7 → 1:00–2:00 p.m. → Room 16A

**Ben Black**, NI, and **David Farnia**, POWERSYS

Testing embedded software for electric motor engine control units introduces new challenges, such as increased simulation speed and model fidelity, that cannot be addressed by traditional hardware-in-the-loop testing methods. Learn how NI and JSOL Corporation have partnered to address these new challenges by creating an industry-leading electric motor simulation platform.

## High-Speed Digital Interfacing and Characterization: Tips for Selecting the Right Implementation

Tuesday, August 7 → 4:45–5:45 p.m. → Room 14

**Brandon Brice**, NI

Explore NI high-speed digital I/O products for meeting common digital challenges. Learn about advanced topics that require FPGA-based processing and how to address these applications using NI FlexRIO high-speed digital I/O products. This session includes interfacing and bit error rate testing demonstrations as well as advanced techniques such as FPGA-based protocol aware test.



# Test and Data Acquisition

## Improving System Throughput and Test Times With the Latest PXI Express Technology

Wednesday, August 8 → 2:15–3:15 p.m. → Room 15

**Chetan Kapoor**, NI

NI PXI platform capabilities are increasing with the incorporation of the latest commercial technologies such as PCI Express Gen 2. Learn how you can use these capabilities to address the needs of new applications and improve your test system's throughput and test times.

## Increase Your Proficiency With High-Throughput LabVIEW FPGA Programming

Tuesday, August 7 → 3:30–4:30 p.m. → Room 13A/B

**Browning Griggs**, NI

NI FlexRIO introduced new capabilities to the PXI platform, but efficiently using them requires a thorough understanding of the LabVIEW FPGA Module and associated hardware architectures to process hundreds of megabytes per second of data while using a combination of high clock rates (>100 MHz) and wide data paths. Preview the high-throughput LabVIEW FPGA training material designed to address these applications.

## **h** Introduction to Data Acquisition, Part 1

Tuesday, August 7 → 1:00–2:00 p.m. → Room 18D

**Aaron Ortals**, NI

Learn programming basics and the fundamentals of data acquisition by test-driving LabVIEW with NI CompactDAQ to create basic applications that acquire, analyze, and display measurement data.

## **h** Introduction to Data Acquisition, Part 2

Wednesday, August 8 → 10:30–11:30 a.m. → Room 18D

**Aaron Ortals**, NI

Continue exploring the use of LabVIEW with NI CompactDAQ to acquire, analyze, and display measurement data.

## Introduction to PXI

Tuesday, August 7 → 1:00–2:00 p.m. → Room 14

**Kira Theuer**, NI

Examine the basics of the PXI platform and learn why top Fortune 500 companies are embracing it to address their test, measurement, and control needs. Also get a sneak peek at new products and customer solutions.

## Introduction to SC Express

Tuesday, August 7 → 10:30–11:30 a.m. → Room 14

**Marti Chance**, NI

Examine the new signal conditioning capabilities for PXI Express modules and explore the architecture and use cases for SC Express hardware.

## Introduction to Stand-Alone NI CompactDAQ

Tuesday, August 7 → 4:45–5:45 p.m. → Room 16A

**Elizabeth Smith**, NI

NI CompactDAQ is even more flexible with new chassis including options for built-in controllers that run stand alone. Learn about the new stand-alone NI CompactDAQ system to acquire and save data to the onboard storage for portable logging and embedded monitoring applications.

## **h** Introduction to Stand-Alone NI CompactDAQ

Tuesday, August 7 → 3:30–4:30 p.m. → Room 18D

**Paul Davidson** and **Elizabeth Smith**, NI

Be one of the first to try out the new stand-alone NI CompactDAQ system. View a demonstration of system features and capabilities and learn to build an embedded measurement system that you can interact with through a mobile device.

## Learn 10 Functions to Handle 80 Percent of Your DAQ Application

Thursday, August 9 → 2:15–3:15 p.m. → Room 16B

**Aaron Ortals**, NI

The DAQ Assistant is an effective way to get started taking measurements quickly, but the DAQmx API can offer much more flexibility and advanced capabilities. Learn 10 functions that you can use to move beyond the DAQ Assistant and take advantage of the powerful NI-DAQmx driver.

## **a** Maximizing Your PXI System Uptime

Thursday, August 9 → 1:00–2:00 p.m. → Room 14

**Chetan Kapoor**, NI

PXI serves demanding applications that require maximum uptime and high reliability. Because all electronic and automation devices have a finite lifetime, you need to know your application's uptime requirements. Learn how to calculate the availability of your PXI system, select the right products, and apply best practices to maximize uptime.



# Test and Data Acquisition

## Meeting Sensor Challenges in Harsh and Demanding Environments

Wednesday, August 8 → 10:30–11:30 a.m. → Room 14

**Alexis Mendez, PhD**, MCH Engineering, and **Alan Turner**, Micron Optics Inc.

See how you can use fiber-optic sensors to meet DAQ and monitoring challenges with reliable and versatile measurements in harsh and challenging environments. Specific case studies include monitoring containment structures at a nuclear power plant and monitoring the large dome structure of the Milan Cathedral.

## Modernizing Mechanical Test Systems With Real-Time Simulations

Thursday, August 9 → 1:00–2:00 p.m. → Room 16B

**Darryn LaZar**, Wineman Technologies, and **Chris Washington**, NI

Explore how you can use real-time simulations in test cells to improve the quality and efficiency of mechanical testing, and learn about the latest technologies and techniques to implement these simulations in your applications.

## **h** NI FlexRIO and LabVIEW FPGA

Tuesday, August 7 → 10:30–11:30 a.m. → Room 18A

Tuesday, August 7 → 4:45–5:45 p.m. → Room 18A

**Ben Sisney**, NI

Learn how to build an NI FlexRIO system.

## NI FlexRIO for Test and Embedded Applications

Wednesday, August 8 → 2:15–3:15 p.m. → Room 14

**Rolando Ortega**, NI

Explore ways to use NI modular instruments, NI FlexRIO field-programmable gate array (FPGA) adapter modules, peer-to-peer data streaming, and the LabVIEW FPGA Module to accelerate and enable new test applications.

## **a** Optimize Your Test System and Reduce Test Time Using LabVIEW and NI TestStand

Tuesday, August 7 → 3:30–4:30 p.m. → Room 14

**Jervin Justin**, NI

Discover how to optimize the performance of your test system by implementing parallel test using NI TestStand.

## Out-of-the-Box Productivity Tools for NI FlexRIO

Tuesday, August 7 → 10:30–11:30 a.m. → Room 13A/B

**Rolando Ortega**, NI

Check out a new way to get up and running quickly with your NI FlexRIO hardware. Discuss a new LabVIEW FPGA default personality and host API that you can use to take measurements without compiling any FPGA code, which provides data for better algorithm design and subsequent FPGA implementation.

## Playing Well With Others: Combining NI VeriStand, NI TestStand, and NI DIAdem in One Application

Tuesday, August 7 → 4:45–5:45 p.m. → Room 13A/B

**Ronald Kaempf**, WKS Informatik, and **Noah Reding**, NI

Creating an automated test system with real-time I/O and data analysis is challenging. Learn how to take advantage of several NI software products designed for these tasks by seamlessly integrating them with each other. Also explore an example of how NI Alliance Partner WKS Informatik GmbH did exactly that with its product RTStand.

## Rapid SIL Development With NI VeriStand and PXI Real-Time Hardware

Wednesday, August 8 → 3:30–4:30 p.m. → Room 13A/B

**Mike Cox**, Tandel Systems

Because of complex real-time simulations and I/O requirements, traditional system integration labs (SILs) have been implemented with high-cost proprietary hardware and software. Learn how you can use NI VeriStand, NI FlexRIO, and the LabVIEW Real-Time Module to rapidly implement a complex modular SIL for a fraction of traditional costs.

## Real-Time Testing With NI VeriStand

Tuesday, August 7 → 2:15–3:15 p.m. → Room 14

Thursday, August 9 → 2:15–3:15 p.m. → Ballroom F

**Nicholas Keel**, NI

NI VeriStand is a software environment for configuring real-time testing applications. While no programming knowledge is required to take advantage of this environment, you can use a variety of NI and third-party tools to add custom functionality. Learn how NI VeriStand can help you create real-time testing applications more efficiently.



# Test and Data Acquisition

## Standardize Your CAN Applications With NI-XNET

Wednesday, August 8 → 1:00–2:00 p.m. → Room 14

**Noah Reding**, NI

NI-XNET products for the CAN, LIN, and FlexRay protocols make it easy to develop a single application that you can port to different environments and platforms including PXI, PCI, NI CompactDAQ, and CompactRIO. Learn how a single API and high-performance hardware can reduce development time for automotive network communication across multiple networks and platforms.

## **h** Strain Gage Fundamentals

Wednesday, August 8 → 10:30–11:30 a.m. → Room 18A

Wednesday, August 8 → 3:30–4:30 p.m. → Room 18A

**Justin Petry**, NI

Learn about the three unique use cases for strain gages. Examine a quarter-bridge, half-bridge, and three-element rosette and practice applying adhesive and bonding a quarter-bridge strain gage to a metallic surface.

## Structural Testing With NI CompactDAQ: No Programming Required

Wednesday, August 8 → 2:15–3:15 p.m. → Room 13A/B

**Mark Yeager** and **Chase Petzinger**, Integrated Test & Measurement

Do you ever want to just log data without having to spend hours programming? Learn about ITM's tools based on LabVIEW for configuring, logging, and interpreting your measurement data with NI CompactDAQ.

## Synchronizing Multichassis Data Acquisition for Large Test Facilities

Wednesday, August 8 → 1:00–2:00 p.m. → Room 15

**Joe Cordaro**, Savannah River National Laboratory

Explore a drive train test facility (DTTF) under construction at the Clemson University Research Institute. It is designed to test wind turbine nacelles, including the generator and the gearing that connects to the wind turbine blades, rated up to 15 MW. The DTTF is the only facility in the world with the capacity to test large offshore wind turbines.

## Tips and Tricks to Avoid Common Pitfalls on DC Measurements

Wednesday, August 8 → 1:00–2:00 p.m. → Room 13A/B

**Joey Tun**, NI

Successfully performing high-precision measurements often requires correctly recognizing and overcoming issues such as dielectric absorption, current leakage paths, and thermal electromotive forces (emfs). At this session, identify some of the most common traps in low-current, low-voltage, and low-resistance measurements and discuss techniques to overcome them.

## **a** Understanding and Measuring Jitter

Thursday, August 9 → 10:30–11:30 a.m. → Room 14

**Jordan Dolman**, NI

Evolving technology makes it increasingly difficult for system developers to produce and maintain complete, unimpaired signals in digital systems. Putting it succinctly, there are two kinds of designers: those who have signal integrity problems and those that will. This session provides insight into jitter-related digital system challenges and describes their causes, characteristics, effects, and solutions.

## **h** Understanding Stimulus-Response Measurements With Impact Hammers and Accelerometers

Wednesday, August 8 → 10:30–11:30 a.m. → Room 18B

**Sang Kim**, Modal Shop, and **Michael Denton**, NI

Walk through a modal analysis with Modal Shop and NI experts and learn how to select sensors and excitation techniques. Also watch an actual modal analysis, examine the underlying software architecture, and try it out using real-world data files.

## Understanding the Key Technologies of In-Vehicle Data-Logging Applications

Thursday, August 9 → 1:00–2:00 p.m. → Room 13A/B

**Noah Reding**, NI

In-vehicle logging applications require a wide breadth of I/O options, a configurable and easy-to-use software environment, and an open framework to extend constantly evolving projects. Learn how the combination of the new NI CompactDAQ stand-alone system and NI software tools can help you meet these challenges.



# Test and Data Acquisition

## Using Structural Testing With PXI Data Acquisition and Reflective Memory

Thursday, August 9 → 1:00–2:00 p.m. → Ballroom F

**Patrick Laplace**, University of Nevada, Reno

PXI provides an ideal platform for expanding data acquisition. Learn how to add this capability into a structural test system without having to redo the existing control system.

## What the New DO-178C Means for Your Next Test Application

Wednesday, August 8 → 4:45–5:45 p.m. → Room 14

**Jeff Gray**, CertTech, LLC

The new regulatory guidance for airborne software defined in RTCA DO-178C addresses techniques such as model-based and object-oriented design. It also introduces a new approach for categorizing development and verification tools and new criteria for determining if a tool needs to be qualified. Get a brief overview of RTCA DO-178C and discuss tool qualification in depth.

## Wireless Communication Standards for Data Acquisition and Transmission

Thursday, August 9 → 10:30–11:30 a.m. → Ballroom F

**Doug Farrell** and **Jim Schwartz**, NI

Examine the different wireless standards for data acquisition, including Wi-Fi, ZigBee, low Earth orbit satellite, broad spectrum radio, and cellular, and review best practices for each.

# Getting all your engineers working together.



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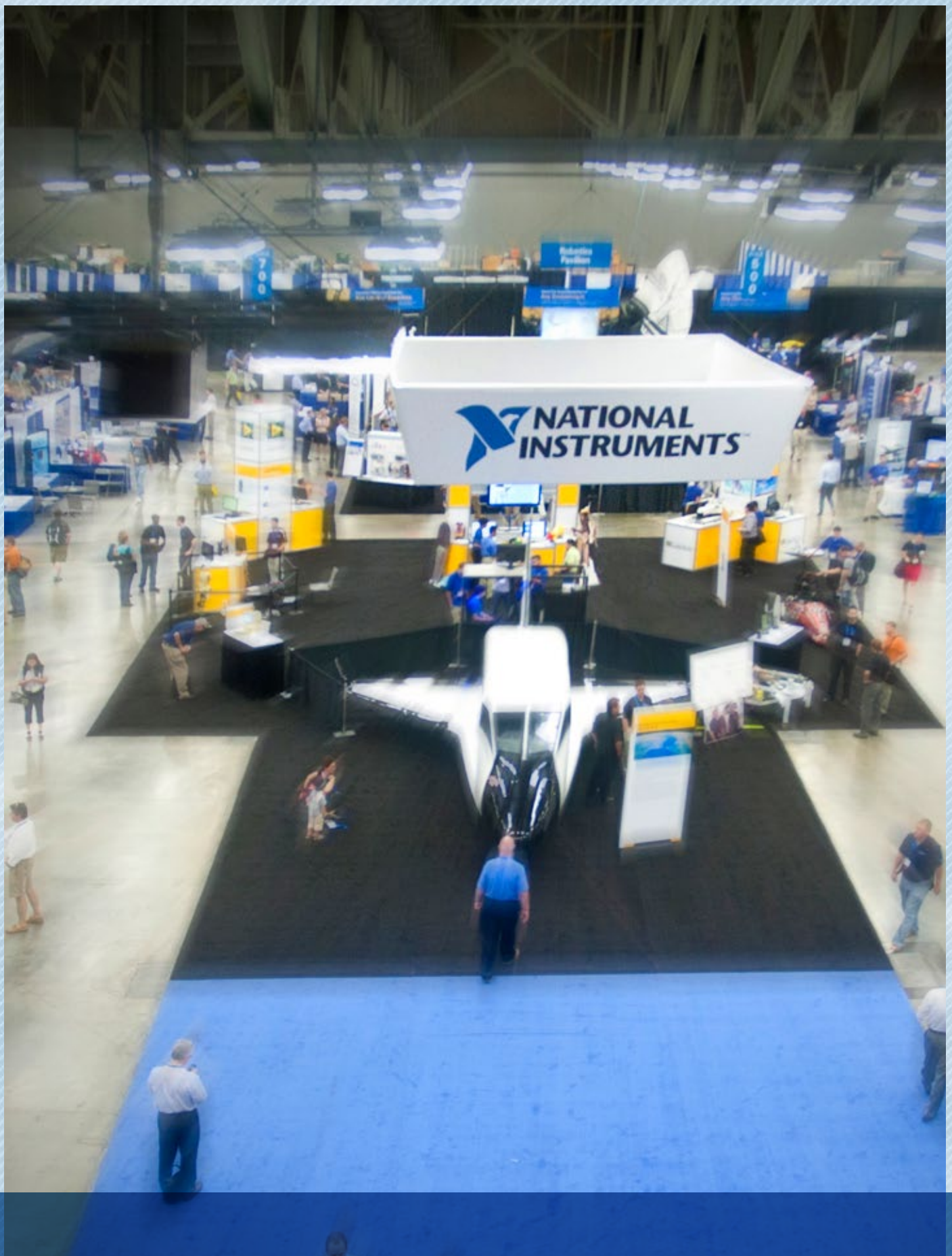
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Join us at **Booth# 131** at NI Week 2012 Conference and learn more about IBM Rational Systems Solutions and collaboration with National Instruments.

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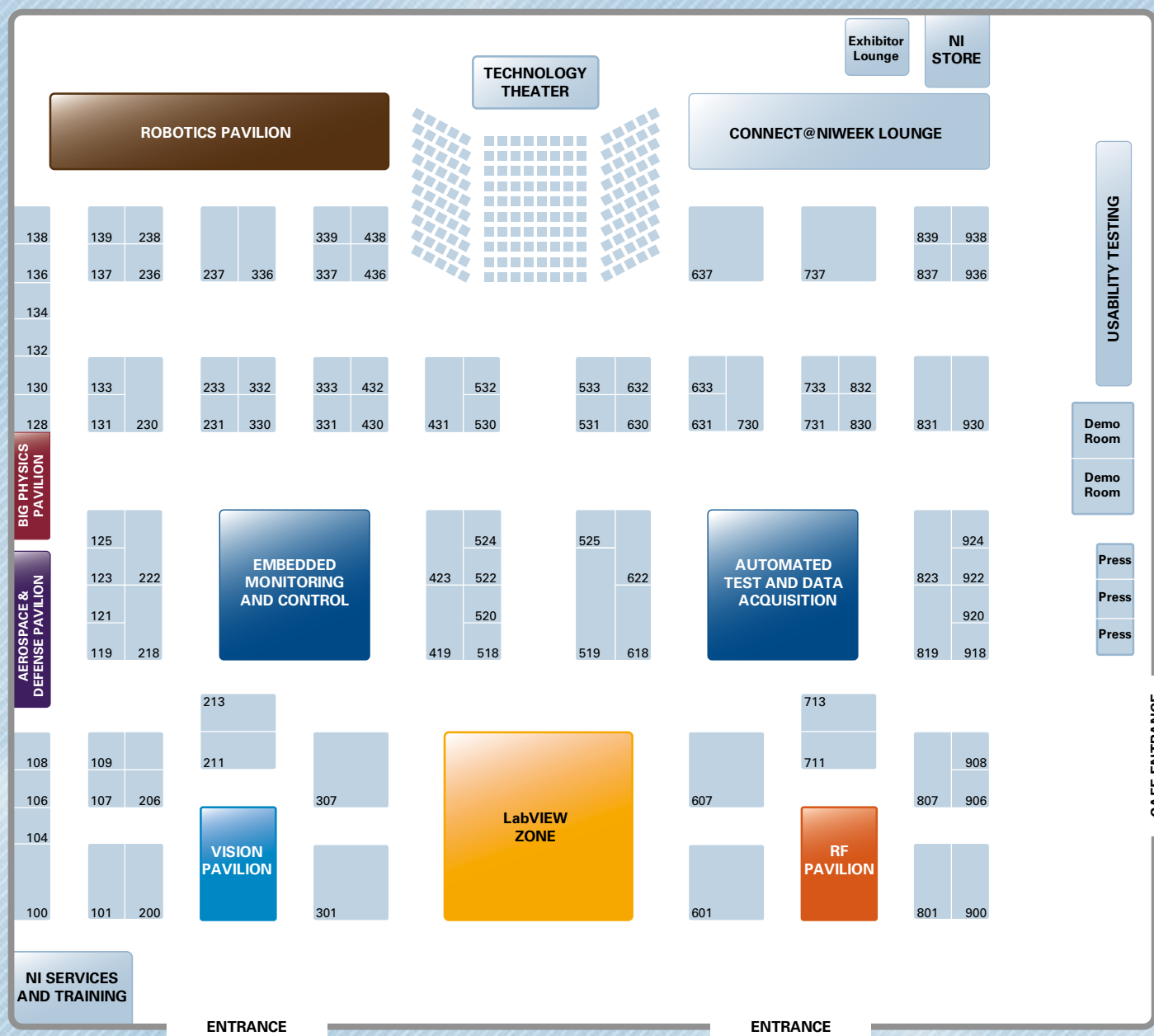


# Exhibition Quick Reference Guide

Advanced Illumination .....	109	JOT Automation Ltd. ....	938
Alfamation .....	713	Joule Technologies .....	339
Allied Vision Technologies .....	107	Konrad Technologies .....	123
AMETEK Solartron Metrology .....	631	KSE-Texas, Inc. ....	206
Amfax Ltd .....	830	LHP Software, LLC .....	137
Amtec Corporation .....	900	Logic Instrument USA Inc. ....	104
ARC Technology Solutions .....	832	MAC Panel Co. ....	823
Avena .....	601 & 607	MagiQ Technologies .....	128
Avionics Interface Technologies .....	106	Maintainable Software .....	632
Bare Board Group .....	431	Maplesoft .....	233
Basler Vision Technologies .....	430	Meggitt Sensing Systems .....	533
BiRa Systems Inc .....	133	Mentor Graphics .....	213
Bloomy Controls Inc. ....	519	Micron Optics, Inc. ....	132
Boston Engineering Corporation .....	238	Mink Hollow Systems, Inc. ....	920
Bruel & Kjaer .....	520	MoviMED .....	524
Cal-Bay Systems Inc. ....	819	National Technical Systems .....	218
California Eastern Laboratories .....	330	NETUSA .....	231
CCS America .....	121	Optimation Technology .....	419
Chromasens GmbH .....	134	Pansino .....	831
CIMAT .....	633	PCB Piezotronics, Inc. ....	530
Circuit Check Inc. ....	711	PFC Flexible Circuits Limited .....	839
Cygnus .....	230	Phase Matrix Inc. ....	801
Cyth Systems, Inc. ....	307	ProPhotonix .....	922
DENSO Robotics .....	525	PVI Systems, Inc. ....	730
DeVry University .....	918	Quanser .....	423
Dytran Instruments, Inc. ....	136	S.E.A. Datentechnik GmbH .....	331
e2v .....	101	Schneider Optics .....	107
Edmund Optics .....	211	Sciometric Instruments Inc. ....	232
Emona Instruments Pty Ltd .....	438	Sistemi Software Integrati .....	237
Enable Training and Consulting, Inc. ....	236	Sixclear .....	924
Ettus Research LLC .....	906	Solutions Sources Programming, Inc. (SSP) .....	807
FLIR Systems, Inc. ....	837	SVTronics, Inc. ....	130
FunctionSIM - ExpertControl .....	432	T&M Atlantic Inc .....	139
G Systems .....	518	TDK-Lambda Americas .....	532
G.R.A.S. Sound & Vibration .....	531	Teclution .....	436
GDCA .....	108	Teledyne Microelectronics/Teledyne Scientific .....	930
Graftek Imaging, Inc. ....	200	TestEquity LLC .....	337
Huntron .....	731	Texas Instruments .....	222
IBM .....	131	Trescal/Dynamic Technology Inc. ....	100
IEEE Central Texas .....	522	UT Austin - Master of Science in Technology Commercialization Program .....	332
ImagingLab Germany GmbH .....	138	Verivolt LLC .....	125
Integrated Test & Measurement (itm) .....	936	VI Service Network Co. Ltd. ....	908
Japan Pavilion .....	637 & 737	Virginia Panel Corporation .....	622
JENOPTIK   Defense & Civil Systems .....	119	Westak .....	333
JKI .....	630	Wineman Technology, Inc. ....	336
JMAG Division, JSOL Corp. ....	733	Xilinx, Inc. ....	618



# Exhibition Hall



## EXHIBITION HALL HOURS

Monday, August 6 → 5:30–7:00 p.m.

Tuesday, August 7 → 10:00 a.m.–7:00 p.m.

Wednesday, August 8 → 10:00 a.m.–7:00 p.m.

Thursday, August 9 → 10:00 a.m.–7:00 p.m.



# Product Showcase

- Visit the NI Product Showcase to see demonstrations of the latest NI hardware and software products, talk to NI developers, and discover ways to incorporate NI products into your test, monitoring, and control applications.

## **LabVIEW ZONE**

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Discover what's new in LabVIEW and get a close-up look at demos featured in the conference. Along with learning about new programming resources, you can interact with other LabVIEW users as you try some of the fun and exciting demos powered by LabVIEW. See what amazing things LabVIEW can do.

### **LabVIEW Zone Exhibitors**

Drivven  
Integrated Test & Measurement  
Intel  
Jacobs Engineering  
Microsoft

## **AUTOMATED TEST AND DATA ACQUISITION**

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Check out the latest data acquisition and automated test applications ranging from a single-channel thermocouple device, to high-channel-count structural test, to 13 GHz automated test systems based on industry-leading PXI technology.

### **Automated Test and Data Exhibitors**

G.R.A.S. Sound & Vibration

## **EMBEDDED MONITORING AND CONTROL**

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Explore how graphical system design is benefiting areas such as life science, next-generation power electronics, custom design, condition monitoring, oil and gas, and machine control as well as see demos of the latest products based on the LabVIEW RIO architecture.

### **Embedded Monitoring and Control Exhibitors**

Airwolf 3D  
Drivven  
Lime Instruments



# Connect @NIWeek Lounge

- Take a break and relax in the Connect @NIWeek Lounge in the back of the Exhibition Hall. Find comfortable couches, free Wi-Fi, and charging stations so you and your devices can recharge throughout the conference. In the lounge, you can connect what's happening offline at NIWeek with online conversations about the conference through social networking.

## GET SOCIAL

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Grab a spot on our sofas and follow conversations and photos via social media. Include #NIWeek in any of your own tweets and updates, and you might see them on the jumbo screen before NIWeek keynotes and during the NIWeek conference party. "Like," "Follow," or "Friend" NIWeek to get official conference information in real time and participate in social media activities.

## MAKE YOUR MARK

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Take a fun photo and make your mark on the global map of NIWeek attendees. This interactive experience automatically updates your NI Community profile with your new and improved avatar. By entering your location and application interests, you receive recommendations for special NI Community groups to join so you can connect with like-minded individuals and keep conversations alive after NIWeek is over.

## COMPUTER BAR

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Snag a computer workstation and check your email or NIWeek session schedule online. Also learn how you can stay connected during and after NIWeek by joining the online community at [ni.com/niweekcommunity](http://ni.com/niweekcommunity) to view keynote presentations, download code, watch videos of demos, read blog posts, and more.

## NI STORE

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Take the NIWeek experience home with you. Visit the NI Store to purchase NI-branded merchandise including stylish polos and other apparel. The store accepts American Express, MasterCard, and VISA, and it's open during Exhibition Hall hours.



# Technology Theater

- Located in the Exhibition Hall, the Technology Theater features technology presentations and focused product and service demonstrations from exhibiting and partner companies as well as NI developers. These sessions are open to all NIWeek attendees.

<b>Tuesday, August 7</b>	11:00–11:30 a.m.	Extreme-Speed HIL on NI Real-Time Platforms
	Noon–12:30 p.m.	Harris Design Technical Challenge
	12:30–1:00 p.m.	System Acceleration With All Programmable Technology
	1:00–1:30 p.m.	Intro to Next-Generation Robotics Platform—KNR and Basketball Robot Competition
	2:00–2:30 p.m.	Poland's Fastest LabVIEW Programmer
	3:00–3:30 p.m.	<i>FIRST</i> 101—How to Get Involved
	4:00–5:00 p.m.	VI Shots “Live”
	5:00–5:30 p.m.	High-Efficiency Hybrid Automobiles With the StarRotor Engine
	5:45–6:15 p.m.	Challenge the Champions
	6:15–7:00 p.m.	World's Largest LabVIEW User Group Meeting
<b>Wednesday, August 8</b>	11:30 a.m.–Noon	Using LabVIEW FPGA to Accelerate Resource-Intensive Algorithms
	Noon–12:30 p.m.	Real-Time Direction of Arrival Estimation Using Volumetric Antenna Arrays
	12:30–1:00 p.m.	Behind the Scenes of the Intel® Industrial Control in Concert Demo
	1:00–1:30 p.m.	How to Win a Graphical System Design Achievement Award and Other NI Case Study Secrets
	2:00–2:30 p.m.	The LabVIEW Tools Network Award Winners
	3:00–3:30 p.m.	Standardization in Vehicle Safety Analysis—Challenges and Solutions Based on NI DIAdem
<b>Thursday, August 9</b>	11:00–11:30 a.m.	Managing Complexity in Flexible Automation
	Noon–1:00 p.m.	LabVIEW Coding Challenge Face-Off



# Technology Theater

## **Behind the Scenes of the Intel® Industrial Control in Concert Demo**

### **Intel**

Intel Industrial Control in Concert is a demo based on the YouTube hit “Pipe Dreams” by Animusic that brings into reality the fantasy of an autonomous band playing a song in perfect harmony—in an unconventional way. Join Sisu Devices as they take you down the path of creating this whimsical demo that showcases the ease of designing on Atom, shorter time to market, hardware and software scalability, and port of choice.

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## **Challenge the Champions**

Watch the LabVIEW Champions battle the NI LabVIEW Marketing Team in a game of LabVIEW wits. Who will win bragging rights for the next year? Join this annual fun event and find out for yourself.

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## **Extreme-Speed HIL on NI Real-Time Platforms**

### **Maplesoft**

Learn how to quickly develop high-fidelity physical plant models that run on NI real-time platforms orders of magnitude faster than conventional approaches. Explore applications in automotive, aerospace, power, and others.

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## **FIRST 101—How to Get Involved**

### **FIRST in Texas**

Everybody's doing it. Learn how your company can get involved in *FIRST* by donating time, talent, or dollars to the largest after-school robotics competition in the world.

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## **Harris Design Technical Challenge**

### **Harris Corporation**

Harris Corporation is engineering a better world using LabVIEW. See the winning demonstration of the Harris Green engineering project brought to you by Harris employees.

## **High-Efficiency Hybrid Automobiles With the StarRotor Engine**

### **Texas A&M University**

The StarRotor engine will use the Brayton cycle rather than the Otto cycle found in most gasoline automobiles. Predicted to have 30 to 40 percent more efficiency and produce fewer pollutants, this engine is capable of running on many fuel types including gasoline, kerosene, jet fuel, diesel, alcohol, methane, hydrogen, and vegetable oil. This engine can be supplemented with a novel high-torque electric motor that can produce 200 hp in the volume of a conventional alternator.

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## **How to Win a Graphical System Design Achievement Award and Other NI Case Study Secrets**

### **NI**

Learn best practices for sharing your successes with NI including how to develop an award-winning paper for the Graphical System Design Achievement Awards and other success-sharing methods you can take advantage of beyond the standard case study.

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## **Intro to Next-Generation Robotics Platform—KNR and Basketball Robot Competition**

### **NI**

Explore some cool applications showing what KNR can do and see highlights of a basketball robot competition that incorporated KNR.

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## **LabVIEW Coding Challenge Face-Off**

Watch as Andrzej Przybylak, Poland's fastest LabVIEW programmer, faces off with NI's Darren Nattinger, reigning champ, for the world's fastest LabVIEW programmer title.

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## **Managing Complexity in Flexible Automation**

### **ImagingLab GmbH**

This presentation shows LabVIEW users how robots can easily be integrated in their applications, allowing them to increase their application areas (domains) and make the transition from test to manufacturing systems.



# Technology Theater

## **Poland's Fastest LabVIEW Programmer**

### **Veritech**

Andrzej Przybylak has competed in coding competitions in Poland but now he is traveling to NIWeek 2012 to take on Darren Nattinger, reigning world's fastest LabVIEW programmer, for the main title. Listen to his story of LabVIEW coding challenges in Poland and how he is preparing for his contest against Darren.

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## **Real-Time Direction of Arrival Estimation Using Volumetric Antenna Arrays**

### **Texas A&M University**

Volumetric distributions of receiving antennas are investigated using a multichannel NI PXI system for its ability to mitigate aliasing and enhance the real-time direction of arrival (DOA) estimation. Surface and volumetric distributions in canonical arrangements (cubic and spherical) of elements and configurations inspired by crystallographic lattices (cubic, tetragonal, and so on) are investigated using the Multiple Signal Classification (MUSIC) algorithm. These are compared to planar and linear distributions, and experimental observations from basic transmission measurements are used to evaluate several of the element distributions and compare their performance.

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## **Standardization in Vehicle Safety Analysis—Challenges and Solutions Based on NI DIAdem**

### **measX GmbH & Co. KG**

Discover the demands that international vehicle safety regulations have put on data analysis. Also explore a DIAdem solution that is already standard in all Euro-NCAP laboratories.

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## **System Acceleration With All Programmable Technology**

### **Xilinx**

Learn how innovative “all programmable” systems on chips (SoCs) are enabling unprecedented levels of components integration, power reduction, design productivity, and performance to systems used for motor control, image/video processing, and many other applications.

## **The LabVIEW Tools Network Award Winners**

### **NI**

Learn about the products that won the prestigious 2012 LabVIEW Tools Network Awards. These awards recognize the top third-party products.

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## **Using LabVIEW FPGA to Accelerate Resource-Intensive Algorithms**

### **ALE System Integration**

Smith Waterman is a bioinformatics algorithm for finding DNA and protein matches. Examine how this computationally intensive algorithm can be accelerated using LabVIEW FPGA. Datacenter and energy consumption can be reduced by a factor of 20.

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## **VI Shots “Live”**

### **VI Shots**

Watch the VI Shots biweekly podcast recorded LIVE from the technology theater. Join the discussion with host Michael Aivaliotis and become part of the LabVIEW ecosystem. Michael will be moderating a panel discussion with prominent members of the LabVIEW community on a wide range of topics focused on taking your LabVIEW skills to the next level. Audience participation is encouraged, so bring your questions!

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## **World's Largest LabVIEW User Group Meeting**

Help us make history by attending the World's Largest LabVIEW User Group Meeting. This event during the Block Diagram party includes an awards ceremony for incredible user group leaders as well as a LabVIEW technical presentation from a LabVIEW Champion. Enjoy all the great things that make up a user group meeting: technical content, networking opportunities, and of course fun. You won't want to miss it!



# Aerospace and Defense Pavilion

- Discuss your applications with NI engineers presenting live demonstrations of the latest technologies for automated test and embedded design. Also see demonstrations including automated test systems, RF, hardware in the loop (HIL), structural test and monitoring, and more.

## **CBATS: COMMON BENCH-TOP AUTOMATED TEST SYSTEM**

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Learn about the newest Department of Defense automatic test system and how it is reducing the cost of testing over 95 avionics line replaceable units and improving mission readiness for the US Air Force.

## **HIL SIMULATION AND TEST**

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Provide stimuli to a flight controller using a joystick or autopilot on a simulated plane. View how the controller commands the control surfaces on a physical model and observe simulated flight information through a digital display.

## **RADAR PATTERN GENERATION**

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Learn how engineers solve problems in signal intelligence and microwave receiver applications by leveraging software-defined instrumentation.

## **STRUCTURAL TEST AND MONITORING**

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See how PXI Express and LabVIEW provide instrumentation-grade I/O and industrial-grade control to perform tests on a structure as well as to monitor structure thermal expansion using fiber Bragg grating (FBG) optical sensors.

## **NI SOFTWARE SHOWCASE**

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Learn how NI software tools reduce development time and improve test execution performance as exemplified by testing a jet fighter pilot helmet and its head-up display.

## **AEROSPACE AND DEFENSE PAVILION EXHIBITORS**

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Advint  
CACI  
Phase Matrix



# Big Physics and Science Pavilion

- Visit the Big Physics and Science Pavilion to learn how scientists and engineers are using NI platforms to conduct fundamental physics research, attain energy from fusion, and help cure cancer through particle therapy.

## MEASUREMENT, DIAGNOSTICS, AND CONTROL TO MEET THE WORLD'S TOUGHEST CHALLENGES

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- *See how CERN uses a high reliability and availability chassis in its quest for the Higgs boson particle*
- *Learn how Los Alamos National Laboratory and Oak Ridge National Laboratory are using the Experimental Physics and Industrial Control System (EPICS) with NI platforms for neutron science*
- *Control a ring that simulates the plasma within a fusion reactor to generate energy from fusion*
- *Watch a simulation of a robotic arm helping with the remote handling and maintenance of a fusion reactor*
- *Discover how precision timing and synchronization help with the operation of the Nevada National Security Site*
- *Learn how experimentalists are trying to reproduce heat through low-energy nuclear reactions (a.k.a. cold fusion)*

## MEET THE EXPERTS

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Speak with experts from research facilities and national laboratories to see how they are using NI platforms in measurement, diagnostics, and control. Also learn how you can take advantage of architectures and share best practices for your current and future projects.

## BIG PHYSICS AND SCIENCE EXHIBITORS AT NIWeek

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BiRa Systems Inc.  
Eagle Harbor Technologies  
MagiQ Technologies  
National Security Technologies  
Verivolt LLC



# RF and Wireless Pavilion

- Visit the RF and Wireless Pavilion to learn more about how National Instruments is redefining RF test with new software-designed instrumentation to address the ever-increasing challenges of evaluating the latest RF and wireless technologies.

## **REDUCE THE COST OF TEST WITH THE PXI PLATFORM**

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PXI instruments use high-performance, multicore processors to dramatically reduce test times and lower test costs. View demonstrations of test systems that feature software-designed instrumentation to meet your time-sensitive validation and production test needs. Also watch demonstrations that showcase how the high-speed PXI Express data bus, multicore processors, and FPGAs can deliver test times that are 10 times faster than traditional instruments.

## **PROTOTYPE, VALIDATE, AND TEST ON A SINGLE PLATFORM**

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With the flexibility and accuracy of PXI RF instruments, you can use the same set of RF hardware for a MIMO transceiver, a GPS simulator, and a communications tester for protocols such as WLAN 802.11ac, LTE, Bluetooth, GSM/EDGE, WCDMA, WiMAX, GPS, and many others. At the RF and Wireless Pavilion, see how the software-designed NI PXI platform can meet the fast-evolving needs of the wireless industry. View the following demonstrations that implement this software-designed approach:

- *WLAN 802.11ac Test System With Industry-Leading Speed and EVM Measurements*
- *New Soft Front Panels Further Expand the Capabilities of NI RF Instruments*
- *Head-to-Head Comparison of the NI PXIe-5665 and Agilent PXA*
- *Open FPGA-Based Instrument Architecture Using P2P Streaming for Real-Time Measurements*
- *Phase Matrix VSA and QuickSyn Software*

## **RF AND WIRELESS PAVILION EXHIBITORS AT NIWeek**

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Alfamation

Averna

AWR

Bloomy Controls

Cal-Bay Systems

Circuit Check

Ettus Research

Mink Hollow Systems

Optimation Technology

Phase Matrix

Solution Sources Programming

Virginia Panel Corporation



# Robotics Pavilion

- The Robotics Pavilion is an interactive exhibit demonstrating how LabVIEW software and the National Instruments embedded hardware platforms are used across the robotics landscape in academia and industry. Visit the pavilion to learn how the NI robotics platform helps students, engineers, and scientists rapidly design and prototype their designs for any robotics application.

## ROBOTICS IN ACTION

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Stop by the Robotics Pavilion to see how LabVIEW and NI hardware are used in a range of robotics applications:

- *Human-Inspired Walking Robot Designed by a Texas A&M University Research Group*
- *Controlling KUKA youBots With Smartphones to Navigate a Ball Through a Maze*
- *Industrial and Military Unmanned Robots Explore Aggressive Terrain*
- *Latest LabVIEW Robotics Module Features Including the New Robotics Simulator*

## LabVIEW ROBOTICS

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National Instruments offers tightly integrated hardware and software tools for developing a wide array of robotics applications. The LabVIEW Robotics Module helps roboticists prototype complex applications from physics simulation to final design. The module provides ready-to-use drivers and algorithms for sensor communication, obstacle avoidance, path planning, kinematics, steering, and more. Check out the latest LabVIEW Robotics software at the Robotics Pavilion.

## ROBOTICS EXHIBITORS AT NIWeek

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Clearpath Robotics	SuperDroid Robots
DENSO Robotics	Texas A&M University
Epson Robotics	The University of Oklahoma
KUKA youBot	Toshiba
Mitsubishi Electric	UC San Diego Coordinated Robotics Lab
Robotis	University of Leeds
Robotronix	Yaskawa
Rose-Hulman Institute of Technology	



# Vision Pavilion

- Stop by the Vision Pavilion to see machine vision solutions and the latest vision tools in action. Speak with vision industry experts, component providers, and systems integrators to get your vision applications up and running.

## SEE NEW VISION TECHNOLOGIES IN ACTION

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Discover cutting-edge vision technologies and how you can use them with NI vision products for complete, real-world solutions through these entertaining and informative demonstrations:

- *FPGA Image Acquisition and Processing*
- *3D Stereo Vision Technology*
- *Vision Guided Motion*
- *Embedded Vision Technology*

## MEET THE EXPERTS

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Speak with experts from many of the world's leading vision companies about how you can successfully use NI vision hardware and software in your applications. Talk to NI engineers about the new features in the NI Vision Development Module and how to integrate them in your current and future projects.

## COMPLETE YOUR VISION SYSTEM

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View product demonstrations and speak with vision exhibitors about lighting, cameras, optics, and systems integration. Visit with partners and integrators about how their products and services can make your vision application come to life when combined with NI vision products.

## VISION EXHIBITORS AT NIWeek

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Advanced illumination	Graftek Imaging, Inc.
Alfamation	ImagingLab
Allied Vision Technologies	JENOPTIK
Basler Vision Technologies	KSE Texas, Inc.
Chromasens GmbH	moviMED
Cyth Systems	NET USA
e2v	PVI Systems, Inc.
Edmund Optics	Rose-Hulman Institute of Technology
FLIR Systems	



# NI Services and Training Booth

- Visit the NI Services and Training Booth to learn about a variety of global services and training and certification programs to meet your needs at every stage of the application life cycle—from planning and development through deployment and ongoing maintenance.

## **NI OFFERS A WIDE RANGE OF SERVICES**

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- *Hardware services—assembly, installation, repair, calibration, and maintenance*
- *Software services—software support, maintenance, and volume licensing*
- *Training and certification—training on key software and hardware offerings at multiple certification levels*

## **NI SERVICES AND TRAINING SOLUTIONS ENSURE YOUR SUCCESS**

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- *Identify and obtain the technical skills you need to shorten your application development time by half*
- *Stay up to date with the latest LabVIEW features*
- *Reduce your total cost of ownership with calibration and maintenance*

## **VISIT THE NI SERVICES AND TRAINING BOOTH**

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Conveniently located near the main entrance to the Exhibition Hall, the NI Services and Training Booth is the best place to learn more about NI global service offerings as well as training and certification.

- *View demos and information about calibration, technical support, and training*
- *Talk with our proficiency consultants about the best ways to obtain the skills your application requires*
- *Learn about professional development opportunities through training and certification at NIWeek and in your area*

## **SERVICES AND TRAINING EXHIBITORS AT NIWeek**

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Dynamic Technology



# Exhibitors

## **Advanced Illumination**

109

An LED lighting solutions provider, Advanced illumination designs and manufactures versatile lighting for the machine vision industry, including standard and customized LED fixtures and electronics.

**advancedillumination.com**

## **Alfamation**

713

Founded in 1991, Alfamation is a solutions provider that challenges traditional approaches to functional test applications in the automotive, consumer electronics, telecom and medical industries.

**alfamationglobal.com**

## **Allied Vision Technologies**

107

Allied Vision Technologies offers a wide range of machine vision cameras with FireWire and Gigabit Ethernet (GigE) interfaces. AVT is the supplier of choice for cameras used for industrial inspection, automation, medical imaging, scientific research, traffic monitoring, security, and many other demanding applications.

**alliedvisiontec.com**

## **AMETEK Solartron Metrology**

631

Solartron Metrology is a leader in precision dimensional and position measurement.

**ametek.com**

## **Amfax Ltd**

830

Amfax designs, manufactures, and supports functional and special solutions ranging from fixtures and cable assemblies to large-scale ATE systems. More than 20 years of experience supplying to the aerospace/defense, RF, and automotive markets.

**amfax.co.uk**

## **Amtec Corporation**

900

Solutions - Concept to Reality. Amtec can Design, Build, and Test solutions enabling customers to accomplish their mission. System Engineering, Integration & Test; Automation, Robotics&Manufacturing.

**amtec-corp.com**

## **ARC Technology Solutions**

832

ARC products include a range of high speed digital test sub systems, mixed signal automated testers, and a complete test automation and digital TPS creation software suite.

**arcserv.com**

## **Averna**

601 and 607

Averna is a premier manufacturing solution provider for communications and electronics device-makers worldwide, helping them deliver a better end-user customer experience.

**averna.com**

## **Avionics Interface Technologies**

106

AIT is a leading designer and manufacturer of Test Instrumentation, Databus Analyzers, and Rugged/Embedded interface solutions for Military and Commercial applications.

**aviftech.com**

## **Bare Board Group**

431

Bare Board Group specializes in providing quality, high-mix, low-to-high volume circuit boards at offshore prices with the ease of domestic purchasing. Visit [bareboard.com](http://bareboard.com) for information.

**bareboard.com**

## **Basler Vision Technologies**

430

Basler is a leading manufacturer of industrial digital cameras. Interfaces include GigE Vision, USB3 Vision, Camera Link, and FireWire. Now offering an industry-leading 3 year warranty!

**baslerweb.com**

## **BiRa Systems Inc**

133

Since 1972 BiRa Systems has been recognized for its design and manufacture of electronics, data-acquisition and control hardware for the physics and general science community worldwide.

**bira.com**

## **Bloomy Controls Inc.**

519

Bloomy Controls specializes in high-performance automated test, data acquisition, and control systems for research, validation, and manufacturing for the energy, medical, mil/aero, and semiconductor industries.

**bloomy.com**

## **Boston Engineering Corporation**

238

Boston Engineering is a design firm with electrical, mechanical, embedded, and software engineers on staff who work together to deliver a complete solution.

**boston-engineering.com**



# Exhibitors

## **Bruel & Kjaer**

520

Bruel & Kjaer will present acoustic and vibration transducers including specialty microphones, high temperature IEPE accelerometers, signal conditioning, vibration test solutions, and a LabVIEW based Audio Analyzer.

**bkhome.com**

## **Cal-Bay Systems Inc.**

819

Cal-Bay is a recognized leader for test & measurement solutions when product quality is critical, serving leading companies in Biomedical, Mil/Aero, Semiconductor and Power Generation.

**calbay.com**

## **California Eastern Laboratories**

330

California Eastern Laboratories (cel.com) develops the MeshConnect™ line of IEEE 802.15.4/ZigBee radio modules and transceiver ICs and is a member of the ZigBee Alliance (zigbee.org).

**cel.com**

## **CCS America**

121

CCS America is dedicated to providing its customers with the highest quality LED lighting for image processing applications. Our innovative designs will give you images of superior quality and maximum contrast.

**ccsamerica.com**

## **Chromasens GmbH**

134

The German company Chromasens designs, develops and produces innovative image capturing and optical measurement systems. Product portfolio: standard and customized cameras, light, 3D, spectral imaging.

**chromasens.de**

## **CIMAT**

633

CIMAT is the Center for Research in Mathematics; located in Guanajuato, México. Its objectives are: to foment research, development and spread of mathematics.

**cimat.mx**

## **Circuit Check Inc.**

711

CCI is the leading Total Test Solutions provider including test fixtures, complex product interfaces, and full turn-key automated test solutions.

**circuitcheck.com**

## **Cygnus**

230

Cygnus is a Mexican company that provides turn-key solutions for the manufacturing industry, with competitive prices and supported by highly qualified committed people.

**cygnusmx.com**

## **Cyth Systems, Inc.**

307

Cyth Systems is the premier engineering company in Southern California for designing automated test, machine vision, and embedded control systems.

**cyth.com**

## **DENSO Robotics**

525

DENSO offers a range of compact, four-axis SCARA and six-axis articulated robots for payloads up to 20 kg and reaches from 350 to 1,300 mm.

**densorobotics.com**

## **DeVry University**

918

DeVry University provides onsite and online high-quality, career-oriented associate, bachelor's, and master's degree programs in technology, healthcare technology, engineering technology, science, business, and the arts.

**devry.edu**

## **Dytran Instruments, Inc.**

136

A solid reputation for trusted, field proven experience in the design and manufacture of sensors for dynamic testing. Dytran's broad product line includes single axis and triaxial DC MEMS style accelerometers utilizing state-of-the-art variable capacitance accelerometer sensing elements.

**dytran.com**

## **e2v**

101

Technology solutions for high performance systems; delivering high reliability solutions, sub-systems and components to advanced systems companies.

**e2v.com**

## **Edmund Optics**

211

Edmund Optics is a leading producer of optics and imaging products. EO's vast offering of machine vision products provides a variety of solutions for any application.

**edmundoptics.com**



# Exhibitors

## **Emona Instruments Pty Ltd**

438

Emona Instruments manufactures add-on boards for NI ELVIS II/+ : DATEx—wireless telecoms, FOTEx—fiber optics, HELEx—green energy, SIGS-311—EE Signals & Systems labs.

**emona.com.au**

## **Enable Training and Consulting, Inc.**

236

Enable's team of Certified LabVIEW programmers is based near Toronto, Ontario. We focus on high-end LabVIEW systems integration including web, database and mobile app extensions.

**EnableEng.com**

## **Ettus Research LLC**

906

Ettus Research designs and builds the Universal Software Radio Peripheral (USRP), enabling engineers to rapidly create powerful, flexible, and low-cost software radio systems.

**ettus.com**

## **FLIR Systems, Inc.**

837

FLIR Systems designs, manufactures and markets infrared imaging systems worldwide. Commercial product applications include non-destructive testing, research and development, manufacturing process control, and predictive maintenance.

**flir.com**

## **FunctionSIM—ExpertControl**

432

FunctionSIM is a dedicated group of engineering professionals committed to providing computer-aided solutions to mechanical and control-systems product design and development.

**functionsim.com**

## **G Systems**

518

G Systems is a leading provider of solutions for automated test and measurement, data acquisition, and control systems. Services range from consulting to complete system builds.

**gsystems.com**

## **G.R.A.S. Sound & Vibration**

531

G.R.A.S. offers a broad range of acoustical devices: standard measurement microphones and preamplifiers, sound intensity microphones, ear and mouth simulators, telephone-testing equipment, HATS, pistonphones, calibrators.

**gras.dk**

## **GDCA**

108

GDCA is the leader in the field of obsolescence management: ensuring legacy applications by turning the hassles of EOL into just another manageable business function.

**gdca.com**

## **Graftek Imaging, Inc.**

200

Graftek Imaging provides machine vision components and solutions for the industrial, medical and scientific imaging markets.

**graftek.com**

## **Huntron**

731

When you need to test, diagnose or troubleshoot complex circuit boards, Huntron lets you access, explore and discover more.

**huntron.com**

## **IBM**

131

IBM's software and systems lifecycle management solutions support collaboration and process improvements enabling clients to accelerate time to market, improve quality, and beat their competition.

**ibm.com/software/rational**

## **IEEE Central Texas**

522

IEEE, the world's largest technical professional association, is dedicated to advancing technology for the benefit of humanity. Through its highly cited publications, conferences, technology standards, and professional and educational activities, IEEE is the trusted voice on a wide variety of areas ranging from aerospace systems, computers and telecommunications to biomedical engineering, electric power and consumer electronics. Learn more at [ieee.org](http://ieee.org).

**ieee.org**

## **ImagingLab Germany GmbH**

138

ImagingLab develops LabVIEW robotic libraries and add-ons allowing to control industrial robots (DENSO, Mitsubishi, KUKA, Toshiba, Epson).

**imaginglab.de**



# Exhibitors

## **Integrated Test & Measurement (itm)**

936

Leveraging 44 years and 2 generations of mechanical/structural testing and analysis experience, ITM provides its customers with Testing Services (TS) and Industrial Monitoring (IM) solutions.

**un-yah.com**

## **Japan Pavilion**

637 and 737

Learn about the latest Japanese technologies from E.I. SOL, Japan Probe, Keisoku Giken, Kyoto University Research Institute, Matsuura Denkosha, Orient Brains, and Peritec.

## **JENOPTIK | Defense & Civil Systems**

119

As an integrated optoelectronics group, Jenoptik divides its activities into five divisions: Lasers & Material Processing, Optical Systems, Industrial Metrology, Traffic Solutions and Defense & Civil Systems.

**jenoptik.com/us-defense**

## **JKI**

630

An innovator in the world of LabVIEW, JKI provides expert consulting services, commercial-grade LabVIEW add-ons, and unsurpassed leadership in the LabVIEW community.

**jki.net**

## **JMAG Division, JSOL Corp.**

733

The JMAG Group provides the leading-edge simulation software for electromechanical design and development, JMAG, as a new standard in performance and quality worldwide.

**jmag-international.com/**

## **JOT Automation Ltd.**

938

JOT Automation is global test and production solution supplier for several industry leading companies including telecom, automotive and life science industries.

**jotautomation.com**

## **Joule Technologies**

339

Joule Technologies manufactures custom test fixtures for electronic manufacturers. Our focus is Excellent Service, Robust Quality, Predictable Lead Times and Getting It Right The First Time

**jouletechnologies.com**

## **Konrad Technologies**

123

Konrad Technologies focuses on the integration of customer-specific test systems for electronic production, including semiconductor test, in-circuit test, vision systems and automated assembly/test lines.

**konrad-technologies.de**

## **KSE-Texas, Inc**

206

KSE Texas Inc. is a private labeler and master distributor of cision system lighting such as LED, incandescent, fiber optics, and fluorescent lighting products, with an on-site lighting lab.

**ksetexas.com**

## **LHP Software, LLC**

137

LHP Software is a software engineering company specializing in Model-Based Design and embedded controls.

**lhpssoftware.com**

## **Logic Instrument USA Inc.**

104

Logic Instrument supports commercial and US Military applications (PCI, PCIe, PXI, PXIe, cPCI) with ruggedized, expandable and customized portable computing platforms and display solutions.

**logic-instrument.com**

## **MAC Panel Co.**

823

MAC Panel provides modular Mass Interconnect solutions for ATE systems. Our high performance SCOUT interface has become the benchmark interface for PXI based ATE globally.

**macpanel.com**

## **MagiQ Technologies**

128

MagiQ Technologies delivered the first commercial quantum cryptography system in 2003 and provides advanced solutions to the test & measurement, optical sensing, and military communications markets.

**magiqtech.com**

## **Maintainable Software**

632

Maintainable Software provides data management solutions for manufacturing test. Our modern, web-based software has tools for managing operations, engineering, and quality assurance. [maintainable.com](http://maintainable.com)

**Maintainable.com**

## **Maplesoft**

233

Maplesoft is the leading provider of advanced engineering software that applies mathematical principles to solve any engineering problem, no matter the complexity or domain.

**maplesoft.com**



# Exhibitors

## **Meggitt Sensing Systems**

533

Meggitt Sensing Systems, a Meggitt group division is a leading supplier of high-performance sensing and monitoring systems for physical parameter measurements in extreme environments.

**endevco.com**

## **Mentor Graphics**

213

Mentor Graphics is a technology leader in electronic design automation providing products, consulting services and award-winning support for the world's leading electronics and semiconductor companies.

**mentor.com**

## **Micron Optics, Inc.**

132

Micron Optics, a leading provider of optical sensing systems, offers a comprehensive portfolio of fiber optic sensors and instruments for strain, temperature, displacement, and acceleration.

**micronoptics.com**

## **Mink Hollow Systems, Inc.**

920

Mink Hollow Systems integrates custom, off-the-shelf solutions using a mix of standard NI components, custom hardware, and LabVIEW software.

**minkhollowsystems.com**

## **MoviMED**

524

MoviMED, a National Instruments Alliance Partner and Certified Vision Integrator, provides custom turnkey machine vision systems, AF150x framegrabbers for CompactRIO and Thermal Imaging Solutions

**movimed.com**

## **National Technical Systems**

218

NTS provides integrated engineering services, technical solutions, product testing, compliance design, regulatory standards compliance testing, evaluation, project management, technical resources, engineering solutions and managed services.

**ntscorp.com**

## **NETUSA**

231

NET USA supplies high-quality cameras as GimaGO GigE Vision, FOculus IEEE 1394, iCube USB 2.0, OEM boards, and camera heads for medical and industrial applications.

**net-usa-inc.com**

## **Optimation Technology**

419

Optimation provides solutions and services for industrial and manufacturing applications, including process and mechanical engineering, automation, systems integration, test systems, fabrication, installation, construction and maintenance.

**optimation.us**

## **Pansino**

831

Beijing Zhong Ke Fan Hua M&C Co., Ltd. is established in 1997. That is the only distributor of National Instruments in mainland of China.

**pansino.com.cn**

## **PCB Piezotronics, Inc.**

530

PCB Piezotronics, a global leader in the design and manufacture of microphones, vibration, force, torque, load, strain, and pressure sensors, and pioneer of ICP® technology

**pcb.com**

## **PFC Flexible Circuits Limited**

839

PFC designs, manufactures, and assembles flexible circuits; single and double-sided, multilayer and rigid-flexible circuits. Specializing in Fine Line and Impedance control. ISO -9001

**pfcflex.com**

## **Phase Matrix Inc.**

801

Manufacturer of RF and microwave T&M instruments, subsystems, and components. Products include PXI synthetic instruments (downconverters/local oscillators) and instrument-grade, fast-switching QuickSyn® synthesizer modules.

**phasematrix.com**

## **ProPhotonix**

922

ProPhotonix designs and manufactures diode-based laser modules and LED Systems for leading OEMs in the Machine Vision, Medical, and Security markets and distributes laser diodes.

**prophotonix.com**

## **PVI Systems, Inc.**

730

PVI Systems, a Certified Alliance Partner, offers custom and turn-key systems for data acquisition, vision and process control applications

**pvisys.com**

## **Quanser**

423

Market leader Quanser provides universities worldwide with captivating, hands-on experiments for students and researchers. Stop by to learn about our exciting collaborations with National Instruments.

**quanser.com**



# Exhibitors

## **S.E.A. Datentechnik GmbH**

331

S.E.A. provides CompactRIO Modules for GPS, Mobile-Communication and Bus Interfaces, Single-Board Embedded Control and Acquisition Devices for LabVIEW, LabVIEW Add-On Toolkits, Language Translation, GPS-Synch, cRIO-Displays

**sea-gmbh.com**

## **Schneider Optics Inc.**

107

Schneider Optics Inc. designs, develops, manufactures, and markets optical and optomechanical components and subassemblies for machine vision and other image processing applications.

## **Sciometric Instruments Inc.**

232

Sciometric Instruments Inc. provides traceability and process quality control for manufacturers and offers global visibility and data records for every process critical to manufacturing quality across industries.

**sciometric.com/**

## **Sistemi Software Integrati**

237

SSI is a leading designer of advanced software systems for mission-critical applications in Space and Defense. Draw on an ongoing commitment to research and development

**ssi.it**

## **Sixclear**

924

Sixclear is committed to delivering world-class training and development services ranging from LabVIEW Fundamentals to diverse industry verticals. In fact, we're taking LabVIEW training to another level with our innovative, modern, online training application to go along with our classic onsite offering.

**sixclear.com**

## **Solutions Sources Programming, Inc. (SSP)**

807

Solution Sources Programming is a global test and measurement provider specializing in designing and implementing turnkey test solutions tailored to customers' needs throughout the product lifecycle.

**rftms.com**

## **SVTronics, Inc.**

130

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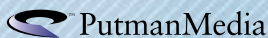


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