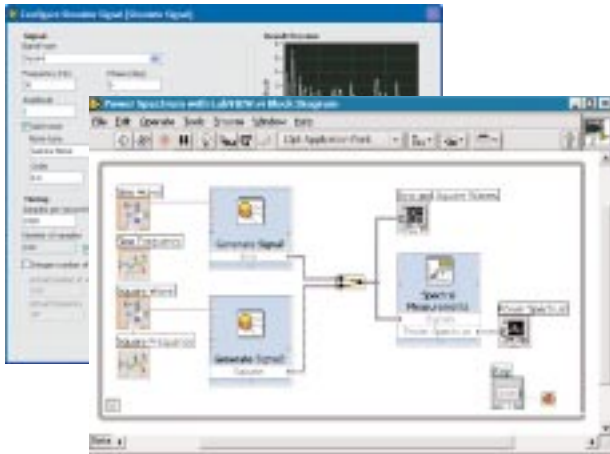


NI Announces the Latest Release of LabVIEW!



**Express VIs
Handheld and PDA Applications
Interactive Instrument Control**

"With Express VIs, programming time is reduced while providing a convenient and flexible way of configuring measurement tasks. Simpler really is better."

– Gordon Murray, L-3 Communications

"LabVIEW 7 breaks the barrier between dataflow and event-driven programming. The improved event structure and the added support for user-defined events greatly expand the capabilities of the G language."

– Nicola Chiari, SDeA S.p.A.

"Not only did [LabVIEW 7 Express] features such as Express VIs and the new data acquisition framework help us reduce development time, they made it easy for colleagues who had never used LabVIEW to step in and begin programming immediately."

– Albert Geven, Royal Philips Electronics



Attend NIWeek 2003 to learn more about LabVIEW 7 Express!

Introducing LabVIEW 7 Express

Build Measurement Applications in Seconds with Express VIs

- Implement frequently used measurement functionality with easy-to-use interactive VIs
- Simply configure your applications with a few mouse clicks
- Take advantage of more than 40 Express VIs included in the new release

Dramatic Performance Increase for Data Acquisition with LabVIEW and NI-DAQ

- Define sophisticated data acquisition tasks in seconds with the DAQ Assistant
- Automatically generate LabVIEW code from interactive dialogs for low-level customization
- Control multiple data acquisition processes simultaneously with multithreaded data acquisition applications
- Perform 50 kHz single-point I/O 20 times faster than previous versions of NI-DAQ

Connect and Control Instruments Easily with the Interactive Instrument I/O Assistant

- Increase efficiency by auto-parsing data from instruments
- Interactively view data from your instruments to minimize programming
- Save time by automatically formatting instrument responses into LabVIEW data types
- Increase your flexibility by building reusable sequences of commands for your instruments

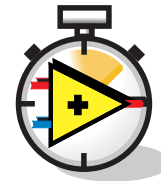
Streamlined Development Environment Makes Programming Measurements Easy

- Never start from scratch with VI templates, design patterns, and more than 500 included examples
- Create custom graphical user interfaces easily with properties pages for front panel objects
- Interactively debug applications with conditional breakpoints and custom probes
- Create robust, maintainable code faster with automatic wire-routing and wire cleanup

“Express VIs give me a convenient one-step alternative...for some of my commonly used LabVIEW functions.”

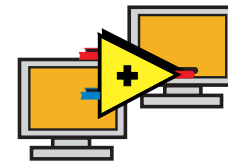
– Ashish Khanna, Cisco Systems

Add-On Modules Extend LabVIEW to New Areas



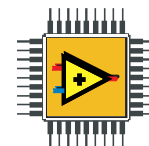
LabVIEW Real-Time Module

Combine the ease of graphical development with the determinism of a real-time system.



LabVIEW Datalogging and Supervisory Control Module

Take advantage of the power of graphical development for creating distributed monitoring and control applications.



LabVIEW FPGA Module

Use graphical development to configure custom I/O on an FPGA with the LabVIEW FPGA Module and NI reconfigurable I/O hardware.



LabVIEW PDA Module

Take LabVIEW anywhere on your Microsoft Pocket PC or Palm OS PDA.

Instrumentation

The Worldwide Publication for Measurement and Automation

Third Quarter 2003

Newsletter™



Productivity You Can Measure with LabVIEW 7 Express

With more engineering in LabVIEW 7 Express than any other release, National Instruments introduces a new level of productivity in LabVIEW graphical programming. LabVIEW 7 Express delivers a powerful, flexible development tool in an easy-to-navigate environment. Major innovations, including configuration-based VIs, interactive measurements requiring no programming, tools for advanced applications, performance improvements, and more LabVIEW deployment targets, result in measurable productivity gains.

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Instrument Communication
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Instrumentation

Newsletter

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The Next Generation of LabVIEW

With LabVIEW 7 Express, National Instruments is proud to bring you the next generation of breakthrough innovation in graphical programming. This release, the culmination of hundreds of man-years of intense engineering effort, creates a cleaner, faster, more interactive graphical programming approach. The new set of Express technologies can be summed up in one primary philosophy – simpler is better. As a result



The LabVIEW 7 Express R&D team, comprised of more than 120 engineers, spent hundreds of man-years creating the newest version of LabVIEW.

of this focus on simplifying tasks, LabVIEW 7 Express makes it easier for people to get up the learning curve faster. But just as important, our customers who have used LabVIEW for years gain a powerful new environment with configuration tools that generate high-performance, clear block diagrams, new programming constructs, and programming architecture templates that deliver significant gains in productivity over any previous version of LabVIEW.

Since the invention of LabVIEW in 1986, subsequent releases have always introduced continuous improvement with new features, technology, and tools. LabVIEW 7 Express is no exception, with features such as the tree control, the feedback node, and more. But not since we introduced LabVIEW on Windows have we made such revolutionary improvements to the usability of the language itself, driving a new vector of productivity for graphical programming.

LabVIEW continues to serve a spectrum of developer needs from rapid prototyping to large systems development and deployment. Over the years, we've learned a lot from you about what works and what doesn't for data acquisition, instrument control, process automation, and signal processing. Based on that information, we created LabVIEW 7 Express. We created a new set of VIs that you can program using configuration dialogs. We created automatic tool selection, automatic routing of wires, and automatic code generation from wizards. We created NI-DAQ 7, which retains full backwards compatibility with NI-DAQ 6.x, while simultaneously delivering

a new API that dramatically simplifies difficult data acquisition tasks. We created an Instrument I/O Assistant that autoparses messages, eliminating 90 percent of all instrument control programming with point-and-click steps.

A strong fundamental core language enables us to develop a new, easier to use, and yet more powerful interface to the development of measurement and automation systems. We have renovated LabVIEW with a new and better interface, while retaining all the performance and flexibility of the language as it has always been and continues to be.

With LabVIEW 7 Express, you also can take on a new arena of distributed systems development using commercial technology including PDAs, RTOSs, FPGAs, and other embedded targets. The LabVIEW revolution continues beyond desktop PC-based systems into real-time and embedded applications, balancing ease of use with high flexibility and performance to engineers from diverse backgrounds with diverse needs. With LabVIEW 7 Express, you are not only an order of magnitude more competitive than an engineer using a script or text-based software package....you are several times more productive than an engineer using previous versions of LabVIEW. ■

John Graff, VP Marketing
E-Mail john.graff@ni.com

ni.com

NI and JDSU Enhance Photonics Development

Developing today's automated systems requires reduced development time and increased system performance. Having quality system elements alone is not enough to achieve these goals – in addition, these elements must integrate seamlessly to ensure the highest productivity. To meet performance requirements for automating photonics systems, JDS Uniphase (JDSU) and National Instruments have combined forces by integrating the JDSU Multiple Application Platform (MAP) optical acquisition and conditioning test system with the analysis and presentation strength of NI LabVIEW software.

The combination of these products results in such seamless photonics development that JDSU not only uses LabVIEW, but also

JDSU not only uses LabVIEW, but also recommends its customers use LabVIEW with the JDSU MAP system for seamless photonics development.

recommends its customers use LabVIEW with the JDSU MAP system. With their endorsement of LabVIEW, JDSU states that customers can now spend more time designing optical test and measurement systems and less time reinventing analysis software packages.

The Best of Both – MAP and LabVIEW

The MAP easily integrates with LabVIEW using ActiveX controls and the software's ActiveX interface. LabVIEW simplifies analysis and presentation of the photonics measurement data that the MAP acquires in photonics test and process monitoring applications, such as components and subsystems, optical amplifiers, 10 Gb transponders, and network line cards. The graphical development environment of LabVIEW lends itself to JDSU's modular platform because customers can quickly and easily link or coordinate the capabilities of several modules to create high-level functions, or subVIs. Users can integrate

these subVIs into larger, automated systems, dragging and dropping them into different applications or running them on their own.

For instance, a user might link a laser module and a power meter to create a virtual insertion loss/return loss module or matching power meter and tunable filter. In another case, a user could match a power meter and tunable filter, creating a virtual instrument that measures optical signal-to-noise ratio.



The JDSU MAP system combines optical and electro-optical measurements in a single platform.

The user then can take advantage of the presentation and analysis tools within LabVIEW. The software's open graphical development environment lends itself to rapid prototyping and easily adding new test functionality with the addition of new hardware.

The MAP environment offers photonics technology in a format more than two-thirds smaller than bench-top equivalents. A full-featured, modular test system, the MAP combines optical and electro-optical measurements in a single platform. The MAP's modularity, with hot-swappable and interoperable cassettes, facilitates manufacturing flexibility and minimizes down time. This makes it a significant contributor to decreasing the costs of photonics manufacturing.

Common Applications for the MAP and LabVIEW

Applications for the combined technology of the MAP and LabVIEW include photonics signal conditioning and routing applications, such as switching level control and the state of polarization control. To assist users in their photonics application development, JDSU plans to expand the breadth of its training and support materials to help users implement the MAP applications in LabVIEW.

With today's emphasis on automation in the photonics arena, JDSU and National Instruments are working together to simplify system development and increase productivity by integrating key technologies. ■

To learn more about LabVIEW, visit ni.com/info and enter nsi3302.



NI LabVIEW simplifies analysis and presentation of the photonics measurement data that the JDSU MAP system acquires in photonics test and process monitoring applications.

ni.com/labview

Productivity You Can Measure with LabVIEW 7 Express

continued from page 1

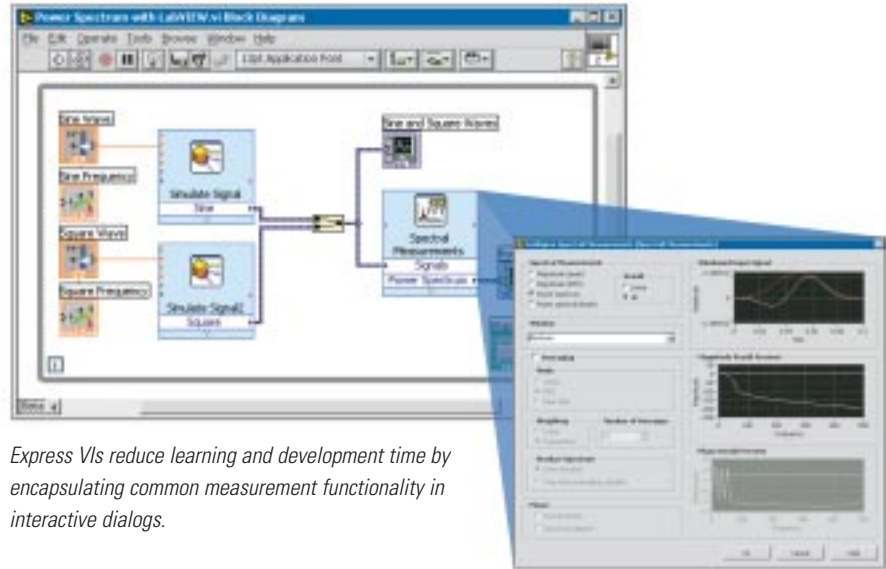
Before LabVIEW, measurement application developers had to make a tradeoff between the flexibility and scalability of traditional programming languages and the ease of use and interactivity of configuration-based tools. With advancements such as Express VIs, measurement I/O assistants, and increased deployment targets, LabVIEW 7 Express closes the gap between power and ease of use.

Streamlined Development with Express VIs

LabVIEW 7 Express dramatically reduces learning and development time with new tools such as Express VIs, application templates, and an intelligent development environment. Created for the most common test and measurement applications, Express VIs encapsulate measurement functionality in easy-to-use, interactive VIs. Simply drop an Express VI on the LabVIEW block diagram and use the properties page to configure your acquisition, analysis, or presentation function with a few mouse clicks. More than 30 powerful Express VIs streamline your development with functionality ranging from data acquisition to instrument control and measurement analysis to file I/O.

LabVIEW 7 Express also includes built-in application templates and design patterns to give you a starting point for new applications. You can use the Web-integrated Example Finder to search LabVIEW for more than 500 shipping examples or expand your search to the Internet for thousands more example VIs. Tell the Example Finder what hardware you have, and it will filter your search results to the relevant example code for your application, streamlining your search to produce only the pertinent results. You also can create your own templates to share with other LabVIEW developers.

In addition, you gain several significant enhancements to the development environment to reduce VI development time. Updates to the AutoTool, first introduced in LabVIEW 6.1, significantly enhance your ability to quickly develop both front panels and graphical code by always selecting the appropriate tool. A new customizable alignment grid makes object alignment



Express VIs reduce learning and development time by encapsulating common measurement functionality in interactive dialogs.

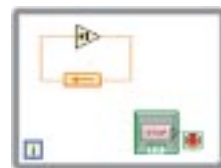
simple, and intuitive icons for front panel object terminals on the block diagram graphically correspond to their front panel counterparts. You also can easily customize front panel objects with new property pages that consolidate front panel attributes into simple configuration dialogs.

Finally, two new structures in LabVIEW 7 Express improve the readability of your code. With the new flat sequence structure, you can lay out your sequence like a filmstrip,



The new flat sequence structure makes it easier to visualize the data flow.

rather than stacking it, which makes it easier to visualize and document the data flow. The new feedback node provides an additional mechanism for passing data between loop



A more intuitive feedback node passes data between loop interactions.

iterations. Identical in function to the shift register, the feedback node is visually more intuitive, particularly for applications incorporating closed-loop control.

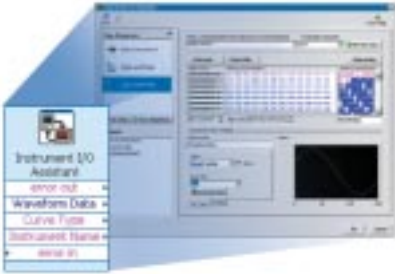
Interactive Instrument I/O and Measurements

While LabVIEW has always simplified the data acquisition process, LabVIEW 7 Express extends I/O compatibilities with several tools designed to streamline data acquisition and instrument control. With a redesigned NI-DAQ driver framework and two new interactive assistants for data acquisition and instrument control, you now can take measurements and analyze the data faster.

The assistants are a new type of VI that include a step-by-step guide for configuring, testing, and programming measurement tasks that can automatically generate code for customization. With the new DAQ Assistant, you can quickly configure your data acquisition tasks to include custom timing, scaling, and triggering with no



Use the DAQ Assistant to quickly configure data acquisition tasks.



Use the Instrument I/O Assistant to take quick measurements and develop simple instruments.

programming, and the code it generates is higher performance than before.

With the new Instrument I/O Assistant, you can communicate directly with your GPIB, Ethernet, USB, RS-232/485, PXI, and VXI instruments. You can use this interactive wizard to prototype your instrument control system, take quick measurements, and even develop simple

With advancements such as Express VIs, measurement I/O assistants, and increased deployment targets, LabVIEW 7 Express closes the gap between power and ease of use, increasing productivity for all users.

instrument drivers. Furthermore, LabVIEW 7 Express provides more than 400 built-in measurement analysis functions and many Express VIs designed specifically for quickly extracting useful information from any set of acquired data.

Powerful Tools for Programming Architecture

In addition to making the LabVIEW environment and measurement tools more intelligent and easier to use, we have added new functionality for advanced application design, sophisticated user interface design, and graphical debugging.

The first of these powerful tools is the Event Structure. In LabVIEW 7 Express, the Event Structure is fortified with user-defined and dynamic event capabilities. With user-defined events you now can fire events programmatically instead of relying solely on user inputs to the interface. Additionally, dynamic event registration gives you increased

flexibility in controlling what events to track and respond to depending on the context of your application.

LabVIEW 7 Express also gives you a new utility, the subpanel, for creating sophisticated user interfaces. With subpanels, you can embed



A new native tree control expands the flexibility of your user interface design.

active VI front panels in the interfaces of top-level VIs to create a modular yet seamless user interface. The subpanel is particularly useful for large applications with requirements for advanced user interfaces. A new native tree control further expands the flexibility of your user interface design with this commonly requested technology. Finally, you can use new conditional breakpoints or design your own custom probes to prototype and debug your applications.

New FPGA and PDA Deployment Options

With LabVIEW 7 Express, you can take advantage of advanced technology deployment options for FPGAs and PDAs. Using the LabVIEW FPGA Module with NI



You now can extend your LabVIEW programs to PDAs.

reconfigurable I/O hardware, you can draw hardware logic to implement advanced timing and triggering, onboard decision making, and custom digital I/O applications. The LabVIEW PDA module extends LabVIEW graphical programming to field test systems and portable data acquisition systems on handheld devices.

These new modules complement the upgraded releases of the LabVIEW Real-Time Module and the LabVIEW Datalogging and Supervisory Control Module. You can create real-time applications quickly using the built-in communications wizard and support for two new hardware options in the LabVIEW Real-Time Module. In addition, you can increase the power of your distributed monitoring applications with the new historical data viewer and enhanced database with improved ODBC interface in the LabVIEW Datalogging and Supervisory Control Module.

Closing the Gap between Power and Ease of Use

Since its first release in 1986, LabVIEW has been the most powerful and easy-to-use tool for creating test, measurement, design, and control applications. LabVIEW 7 Express, which is available for Windows, Mac OS X, Solaris, and Linux operating systems, continues to deliver on this tradition of innovation and dedication to your success. With radical innovation to the development environment, powerful new programming tools, interactive measurements, and deployment options, you do not have to choose between power and ease of use when using LabVIEW 7 Express. Instead, you get the benefits of both. ■

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LabVIEW Product Manager
E-Mail nicole.mcgarry@ni.com

For more information, visit ni.com/info and enter nsi3301 to:

- Download a FREE 30-day trial of LabVIEW 7 Express.
- View upgrade information
- Attend a hands-on seminar in your area

ni.com/labview

Speed Development with NI-DAQ 7 and LabVIEW 7 Express

To provide greater ease of use and faster performance for your data acquisition (DAQ) devices, NI offers the newest version of its industry-leading data acquisition driver framework, NI-DAQ 7. The new DAQ Assistant feature of NI-DAQ 7 delivers a step-by-step guide for configuring, testing, and programming your measurement tasks, and automatically generates code for low-level customization. Together with the new Express VIs in LabVIEW 7 Express, the DAQ Assistant makes it easier and faster to develop data acquisition applications. Improvements to the NI-DAQ low-level driver components also enhance your measurement performance by giving you the power to acquire single-point data up to 20 times faster than the acquisition speed of earlier versions and run multithreaded applications to control different device functions simultaneously.

Getting Started with the DAQ Assistant

You can access the DAQ Assistant from the new Input Functions palette in LabVIEW 7 Express. As soon as you drop the DAQ Assistant VI on a block diagram, a dialog launches to help you configure your measurement. Choose from 22 preconfigured virtual channels including voltage, strain,



Figure 1. The DAQ Assistant step-by-step configuration guide helps you configure, program, and test your measurement application.

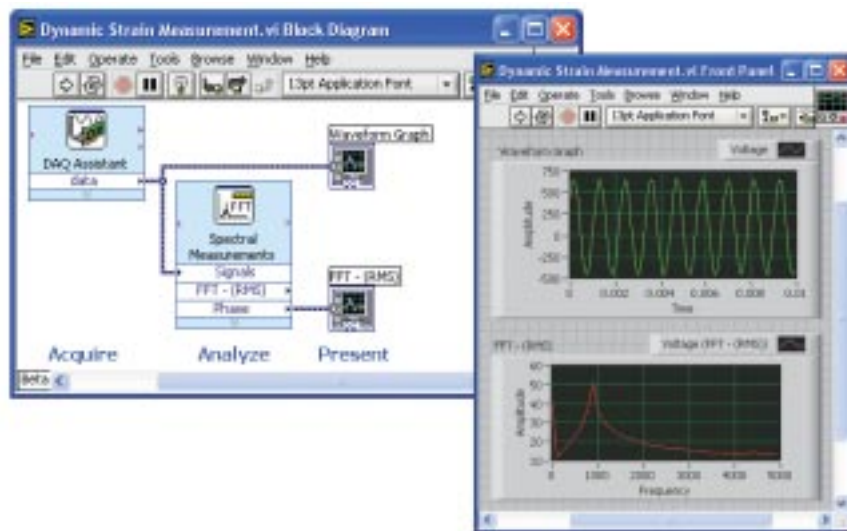


Figure 2. Use the DAQ Assistant and LabVIEW to easily acquire, analyze, and present your measurements.

current output, pulse width, and digital port output. Then configure these virtual channels in the units you want to measure and let NI-DAQ 7 configure your DAQ and signal conditioning devices to take the measurement. If your sensor is not listed, you can choose a voltage measurement and build a custom scale to convert to physical units such as pH, torque, or light intensity. Next, choose the terminals and input limits on the data acquisition or signal conditioning device where your sensors or other signals are connected. You configure the run-time behavior of your acquisition by setting sampling rate, number of samples to acquire, and triggering. Additionally, you can test your measurement task from this dialog to verify that your settings are correct.

After clicking OK, you return to the LabVIEW block diagram, and the DAQ Assistant VI changes its output terminals to the proper data type. The VI now automatically configures your DAQ system and performs the acquisition or generation. You simply wire the output into a graph or analysis VI and run your data acquisition program as demonstrated in Figure 2.

Easy LabVIEW Integration

The DAQ Assistant makes building data acquisition applications faster and easier than

ever before. For example, the DAQ Assistant can help you build a sophisticated data acquisition application in less than 30 seconds. With just the DAQ Assistant VI, you can quickly build and run your first measurement in LabVIEW. Although other VIs run behind the scenes, many applications need only the DAQ Assistant VI. Relaunch the

NI-DAQ 7 gives you the power to acquire single-point data up to 20 times faster than with earlier versions.

DAQ Assistant to quickly iterate and refine your measurement program by changing parameters such as sampling rates, triggering, and scaling.

Additionally, the DAQ Assistant integrates with the powerful analysis functions in LabVIEW 7 Express. As Figure 2 illustrates, you wire the dynamic strain measurement signal directly into the Spectral Measurements Express VI and select your analysis. After the first run, the Spectral Measurements VI uses the acquired data to preview the actual run-time analysis. The waveform graphs on the front panel display the engineering units and time on the axis and automatically label the plots with the name of the signals. This integration between data acquisition and LabVIEW analysis saves you development

time and improves the usability of your final application. For more information on LabVIEW 7 Express VIs, read “Productivity You Can Measure with LabVIEW 7 Express” on page 1.

Code Generation with the DAQ Assistant

The DAQ Assistant is an interface to the NI-DAQ 7 driver framework from LabVIEW 7 Express. While configuring a measurement task, the DAQ Assistant communicates with the Configuration Manager (Measurement & Automation Explorer) to determine the measurement capabilities of your device. When you finish

The configuration dialogs of the DAQ Assistant give you power over the underlying components. Because all the functionality is there, you can convert the DAQ Assistant Express VI to standard, lower level VIs. The VI in Figure 4 is an example of the NI-DAQ VIs generated by the DAQ Assistant. The task I/O control contains all of the configured virtual

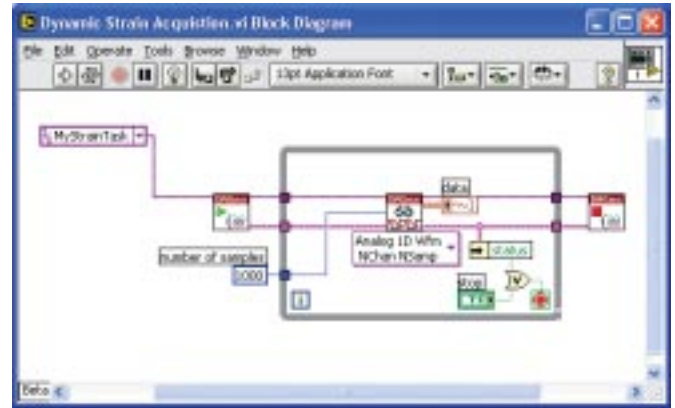


Figure 4. DAQ Assistant generates code for LabVIEW to make building applications faster and easier.

The DAQ Assistant can help you build a sophisticated data acquisition application in less than 30 seconds.

configuring your task, the DAQ Assistant generates subVIs that contain the new NI-DAQ 7 Data Acquisition VIs. At run time, those VIs use components of the NI-DAQ driver engine to control the data acquisition hardware, synchronize different operations, stream data back to your PC, and present the measurement in scaled, physical units.

channel, timing, and triggering information. The VI inside the loop reads the strain data and displays it on a waveform graph. For some advanced applications, such as changing hardware attributes while acquiring data or programmatic control of hardware resources, you can use the DAQ Assistant as a starting point to generate an NI-DAQ 7 example program and then use additional VIs and properties to expand your application.

refined the double-buffering mechanism to give you the maximum possible data transfer rate across the computer bus and into your LabVIEW application. NI-DAQ 7 includes the DAQ Assistant and works with LabVIEW 7 Express. In addition, all code written with previous versions of NI-DAQ continues to work, so you have complete backwards compatibility with the upgrade. ■

Malcolm Borgendale
Product Manager
E-Mail malcolm.borgendale@ni.com

Performance Gains with NI-DAQ 7

NI-DAQ 7 also includes an improved driver engine. Because of reworked data transfer mechanisms and the implementation of a state-based architecture, depending on the system, single-point analog input can reach 50 kS/s, 20 times faster than the previous version. Measurement multithreading prevents blocking while simultaneously using multiple device functions, such as analog input, digital I/O, and counter/timers. Now you can access multiple DAQ functions and devices at the same time without polling and occurrences to control how and when each function is accessed. NI has further

For more information, visit ni.com/info and enter *nsi3303* to:

- Download NI-DAQ 7
- View a demonstration of the DAQ Assistant
- Download a white paper on the value of DAQ driver software
- Learn more about the new features in NI-DAQ 7 and LabVIEW 7 Express

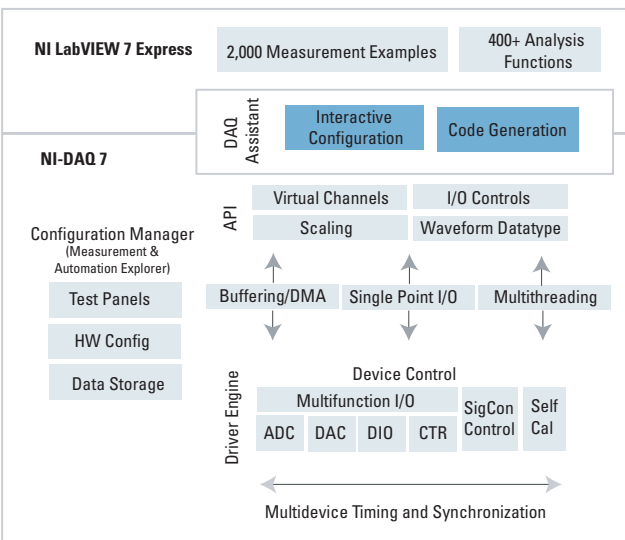


Figure 3. Tight integration between NI-DAQ 7 and LabVIEW 7 Express simplifies the process of acquiring, analyzing, and presenting your data.

ni.com/daq

LabVIEW PDA Module Offers Mobility and Modularity

Personal digital assistants (PDAs) have gained widespread use and satisfy an increasing industry demand for reducing equipment size while increasing system mobility and modularity. Now you can take advantage of the benefits of this technology by using National Instruments LabVIEW. By adding the LabVIEW PDA Module to LabVIEW development systems, you can run VIs on Pocket PC and Palm OS PDA devices. You can use the new LabVIEW PDA Module to build a variety of applications, including field test systems, remote control and monitoring systems, and portable data acquisition systems.

You can easily develop applications on a PDA device with the LabVIEW PDA Module because you can take advantage of most of the LabVIEW development environment. Use the TCP/IP functions to communicate with and acquire data from other equipment networked to the PDA device through a wireless network. Attach a National Instruments PCMCIA E Series data acquisition card and acquire data directly with a set of VIs built on the Measurement Hardware Driver Development Kit. After acquiring the data remotely or directly, choose from more than 400 analysis functions available in LabVIEW to perform a wide variety of measurement analysis on your PDA device, or take advantage of these built-in analysis functions to build your own analysis system. Next, use the file I/O functions to create a data file on the PDA

device that you can transfer to a desktop system the next time you synchronize your PDA. With the native LabVIEW graphs and other controls in LabVIEW, you can display data directly on the PDA screen. Finally, use the VI Server communication to share the data with remote LabVIEW applications for which you need more advanced report generation.

In addition, you can take advantage of the innovations in LabVIEW 7 Express that make development time faster than any previous version of LabVIEW. With improvements such as property pages for controls included in the LabVIEW PDA Module, you can develop applications for PDAs as easily as developing applications for your desktop.

Debugging Your Application

Once you download your LabVIEW application to your PDA, you can debug it in several ways. The LabVIEW PDA Module includes PDA emulators to simulate the PDA environment when the device is not available or simply is inconvenient to access. You can select the emulated environments as if they were the actual PDA, so that you can download and execute VIs to ensure that the application functions correctly.

If the PDA device is available, you can build and download the VI to the device. Using the serial or USB connection to communicate between your desktop and

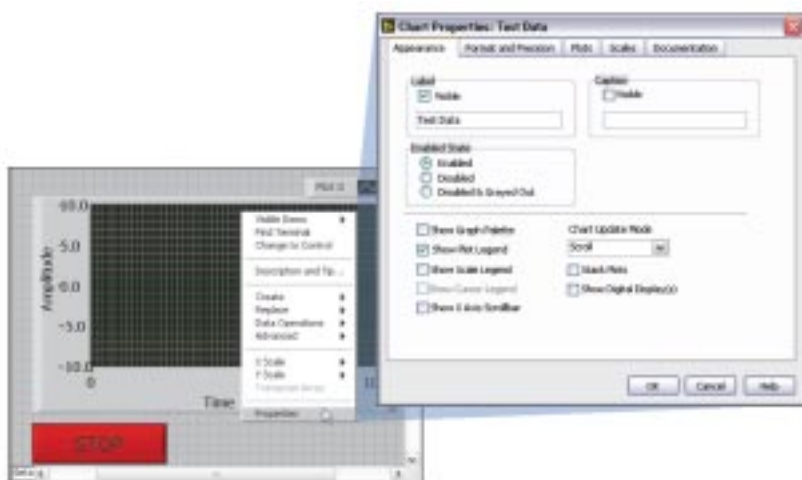


The LabVIEW PDA Module includes an emulator environment for debugging LabVIEW VIs on a PDA when the physical PDA device is unavailable.

PDA during synchronization, you establish a remote connection. With this connection, you can put the VI into debug mode as it runs on the PDA, and also enable “highlight execution” for debugging of the application as it runs. This remote debugging of the application uses the debugging environment from your desktop computer and can verify correct program execution. Once the application passes inspection, you can terminate the remote connection and the VI executes on the PDA as a stand-alone application.

Ideal for a Variety of Applications

Because it brings the ease of use of LabVIEW to the smaller size and lighter weight of a PDA device, the LabVIEW PDA Module is ideal for remote applications such as portable field test systems and remote control modules. Measurement systems running on PDA devices can communicate with other devices with infrared IrDA communication, serial communication, or wireless Ethernet systems using 802.11b or Bluetooth protocols. You can carry these portable test systems anywhere field test personnel need to go, such as cell phone towers and other places where you must test and inspect telecommunication devices. Also, you can carry a LabVIEW PDA Module system throughout an automotive plant, where testing systems are spread across large manufacturing plants, and bringing the control system with you wherever you go is critical.



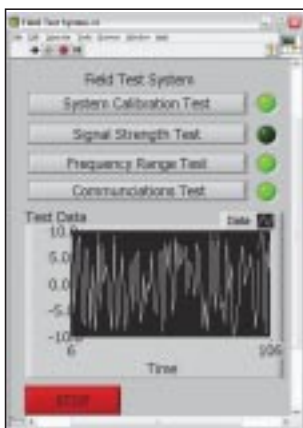
The new LabVIEW module takes advantage of the new features of LabVIEW 7 Express, such as configuration dialogs for controls, to make building PDA applications as easy as possible.

Many PDA devices also have the ability to use CompactFlash and PC-Card devices. Using National Instruments E Series PC-Card data acquisition devices, you can build small and powerful customized portable data acquisition devices. These portable data acquisition systems are ideal in biomedical testing environments, where small devices and portable data acquisition are very convenient, as well as in educational settings, where smaller, less expensive, and very flexible data acquisition devices are desirable.

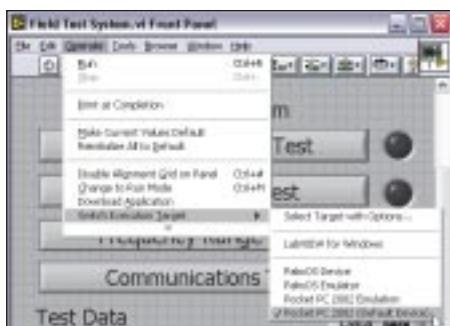
Steps to Easily Building a LabVIEW Application for Your VI

After installing the LabVIEW PDA Module, the development system lists a series of new targets that you can select for deploying LabVIEW applications:

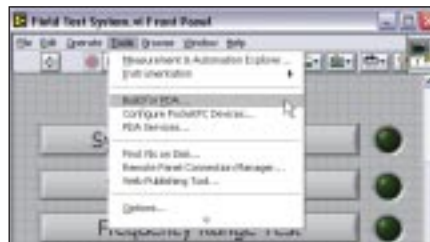
1. Build the VI that you plan to run on the PDA device just as you would to run on a desktop system.



2. Select the target that corresponds to the targeted PDA device.



3. Once you select the device, LabVIEW automatically compiles the VI to run on the selected PDA target and downloads the completed application to the PDA.



4. Now select the VI that appears on the PDA device and run it as you would any other application on the PDA.



Expanding the Power of Virtual Instrumentation

National Instruments continues to take advantage of commercially available technologies to expand the power of virtual instrumentation, so you can develop the most flexible and powerful user-defined solutions. The LabVIEW PDA Module is one of the many National Instruments products that provides the flexibility you need to deploy your measurement and control applications where and how you demand. ■

Eric Reffett
Product Manager
E-Mail eric.reffett@ni.com

For more information about LabVIEW 7 Express and the LabVIEW PDA Module or to download an evaluation version of LabVIEW 7 Express, visit ni.com/info and enter nsi3304.

LabVIEW Now Available for Mac OS X

The LabVIEW revolution started on the Macintosh in 1986 and since then, a loyal and energetic community has committed itself to using and promoting LabVIEW on the Mac platform.

You now can take advantage of LabVIEW 7 Express on the most recent Mac platform, Mac OS X. This latest version of LabVIEW uses the Mac OS X UNIX base to deliver unprecedented performance and provides advanced features such as true protected memory, preemptive multitasking, and advanced memory management.

Along with LabVIEW 7 Express for Mac OS X, NI introduces the LabVIEW Real-Time technology on the Mac platform for the first time. With these real-time technologies, LabVIEW users can develop their deterministic control applications on Mac OS X and then deploy their applications using an embedded PXI controller.

From developing tests for the latest human genome project, to creating a unique interface to LEGO robotics, LabVIEW and the Macintosh reside at the center of many cutting-edge scientific research applications. ■

To find out more about LabVIEW for Mac OS X and to view a complete list of hardware options, visit ni.com/info and enter nsi3305.

ni.com/labview

Real-Time Module Delivers Faster Development and Control

Using the LabVIEW 7 Real-Time Module, you can develop reliable test and control systems quickly. The new version of this software features a communications wizard and application templates for performing difficult real-time tasks, along with support for the NI PCI-7041/6040E RT Series plug-in board that performs 17 times faster than the previous NI real-time board, and an NI PXI-7831R module that makes it easier to use a single device to run multiple control loops.

Faster Development with Wizards and Templates

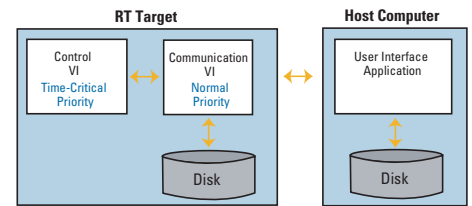
When developing a real-time control application, you often must send data from the real-time system to computers that run noncritical tasks, such as data logging. The image at right shows the architecture for this type of development using a critical control VI and a communication VI. The communication VI, responsible for transferring data to a user interface or another device, runs at a lower priority, thus not impacting the control VI. With the new communications wizard included with the

LabVIEW 7 Real-Time Module, you can develop your control VI and select the user interface objects and data transfer method you need. LabVIEW then generates the communication VI and user interface application for you. In addition, with the included customizable application templates, you can get started on common tasks such as using analog signals or counters to control your real-time loop rates.

Faster Control Loops and Balanced I/O

This release also supports the PCI-7041/6040E, a new RT Series plug-in board that can run dedicated real-time control while plugged in to a Windows PC. The board features a 700 MHz Pentium processor that runs a single PID control loop at a rate of up to 27 kHz. You also can save data and stand-alone executables to automatically load and run from the onboard compact Flash memory.

This upgrade supports a new PXI-7831R module that provides eight analog inputs and outputs and 96 digital I/O lines so you can add more control loops per module. Because



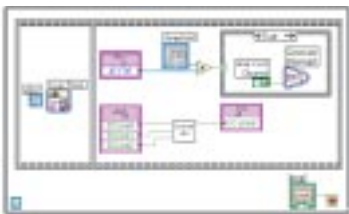
The Control VI on the real-time target receives time from the processor, so the application executes deterministically.

it is a reconfigurable I/O target, you can program the board with the LabVIEW FPGA Module to create logic on the board that executes within a real-time PXI system. Distributing your application across both the FPGA on the board and the real-time operating system on the PXI controller maximizes your application's performance. ■

To learn details about the features of the LabVIEW 7 Real-Time Module, visit ni.com/info and enter nsi3306.

ni.com/pxi

Add Intelligence to Your I/O with LabVIEW FPGA Module



The LabVIEW FPGA VI performs synchronized analog and digital acquisition.

The LabVIEW 7 Express FPGA Module gives design engineers the ability to download LabVIEW code to an FPGA on NI reconfigurable I/O devices, adding intelligence to the I/O.

For the past nine months, LabVIEW experts participating in the LabVIEW FPGA Pioneer Program have used this new technology to create applications such as hardware-in-the-loop (HIL) simulation, custom digital communication protocol interfaces, and closed-loop control. Now, after refining the technology based on their feedback, we release the first version of the LabVIEW FPGA Module with LabVIEW 7 Express.

Our first reconfigurable I/O device, the NI PXI-7831R module features eight analog inputs, eight analog outputs, and 96 digital I/O lines. You can use LabVIEW FPGA to configure any of these digital lines for counters, pulse-width modulation (PWM) channels, custom digital protocols, or simple I/O. You also can define hardware logic in LabVIEW to implement advanced control of timing and triggering, and onboard decision making. Because of this, you can offload your LabVIEW or LabVIEW Real-Time host processor of I/O intensive operations. The VI in the figure at left illustrates how you can use LabVIEW FPGA to implement custom synchronization and triggering on the NI PXI-7831R module.

In this module, the analog and digital input operations occur on the same transition of the global clock. Using the Loop Timer function, you can set the clock and therefore the resolution of synchronization as fine as 5 ns. The custom triggering shown in this example generates an interrupt request to the

host PC when the analog input level drops below a threshold value. Other examples of functionality you can program would include sending out a waveform or reading a PWM signal as a result of the threshold trigger.

Because your execution target is an FPGA, these parallel operations occur simultaneously. In contrast, a VI with parallel operations running on an operating system and a single processor would not occur in parallel. Instead, the operating system would timeslice the processor between those operations. With LabVIEW FPGA, you take full advantage of the inherent parallelism of the graphical programming language and easily achieve parallel operation in hardware. ■

To view both a demonstration of the LabVIEW FPGA Module and full technical details, visit ni.com/info and enter nsi3307.

ni.com/labview

Achieve Synchronized RF Signals with PXI Star Triggers

This series on unique measurement applications highlights how virtual instrumentation enables revolutionary advances in measurement and automation. This is the second application in this series and highlights the role of virtual instrumentation in radio frequency (RF) signal analysis.

RF components and systems are becoming increasingly common in electronic applications and products. To test these devices, you must acquire a number of RF signals throughout the product design. Most RF measurement devices, such as spectrum analyzers, are single channel and acquire multiple RF signals through the use of switching. While this approach is sufficient in many cases, a growing number of applications require synchronized acquisition of RF signals. Such applications include wide-band signal surveillance and verification of I-Q data in communications system design.

Acquiring synchronized RF signals is difficult with traditional instrumentation. While you can synchronize two stand-alone instruments by frequency-locking their timebases, it is more difficult to phase-lock two instruments such that there is a small, relative phase difference that you can later calibrate out.

However, with a PXI system, you can use the PXI star trigger lines to trigger and start acquisition simultaneously across multiple modules. The PXI star triggers are a set of trigger lines with matched trace lengths capable of delivering triggers to each module in the system with less than 1 ns skew. Using the star trigger with PXI measurement

modules, such as the NI PXI-5660 2.7 GHz RF signal analyzer, you can achieve extremely tight synchronization for phase-synchronized measurements across multiple RF analyzers.

Increasing Efficiency with the Spectral Measurements Toolkit for LabVIEW and LabWindows/CVI

With LabVIEW, you can combine your existing instrumentation with graphical programming, inline user-defined analysis, and powerful plug-in data acquisition devices. In many applications, you need to view data simultaneously from multiple modules as one spectrum. For example, you might use multiple RF analyzers to provide real-time capture of a very wide spectrum for applications, including surveillance. When n equals the number of RF analyzers, you can acquire $20n$ MHz of continuous spectra and merge the incoming data sets in software and perform an FFT on the result.

In communications design applications, where the transmitter uses analog I and Q channels to transmit its data, you can use the Spectral Measurements Toolkit to take the acquired time-domain data from each module, perform an FFT separately, and use the resulting frequency-domain data with the original time-domain data in a set of algorithms that compute the I-Q data. With the tools in the Spectral Measurements Toolkit and the synchronization capabilities of PXI, you can perform unique measurements that play a crucial role in the development of phase-synchronized, simultaneous measurements across multiple RF and

Learn Unique Measurements Techniques Online

Browse custom and unique measurement examples at ni.com. Each unique measurement example demonstrates how using a software-based measurement can help you meet your particular measurement application needs. Examples of functions and measurements that you can find online include:

- Measuring ignition coil flyback voltage
- Driving digital print heads
- Building custom video test patterns
- Performing Gabor order tracking
- Acquiring nonadjacent RF frequency bands
- Generating baseband I and Q signals with full amplitude, phase, and offset control

All measurement examples include system block diagrams and information on how to perform the measurement. Many examples include links to application notes and example code. In addition, you can share your unique measurement solutions with colleagues online and help them solve their own unique measurement challenges. ■

To download unique measurements, visit ni.com/info and enter nsi3309.



PXI systems with multiple RF analyzers simultaneously acquire two nonconsecutive 20 MHz blocks of spectrum.

baseband instruments. You also can take advantage of the more than 400 analysis, signal processing, and mathematical algorithms provided in LabVIEW, as well as add-on tools designed for specific areas, to satisfy all of your measurement needs. ■

For more information, visit ni.com/info and enter nsi3308 to:

- Discover how you can use LabVIEW to create your own unique measurements
- Find out more about LabVIEW-based measurement analysis and signal processing

ni.com/measurements

Take High-Voltage Isolated DAQ Measurements

With a simple software upgrade to NI-DMM 2.1, you now can use the NI PXI-4070 FlexDMM as both a full-featured 6½-digit digital multimeter (DMM) and a fully isolated, 1.8 MS/s high-voltage digitizer. With the added digitizer capability, you can use the FlexDMM to acquire both AC and DC-coupled waveforms up to ±300 V (425 V AC peak) input at a maximum sample rate of 1.8 MS/s. In addition, the new NI-DMM 2.1 software vastly improves the measurement throughput of what was already the industry's fastest 6½-digit DMM.

Minimizing Cost

This increased functionality makes the FlexDMM ideal for those test systems that require both high-accuracy and high-speed measurement devices. Hence, the FlexDMM can minimize overall test system cost by eliminating the need to purchase a separate high-speed digitizer and reducing the test fixture size and maintenance costs.

Easily Vary the Digitizer Resolution

With the software-based architecture of the FlexDMM, you can vary the digitizer resolution from 10 to 23 bits by simply changing the sampling rate, as shown in the figure below.

By combining NI LabVIEW graphical development software with the isolated digitizer mode of the FlexDMM, you can

analyze transients and other nonrepetitive high-voltage AC waveforms in both the time and frequency domain.

A common application in the automotive industry is the measurement of the flyback voltage on the ignition coil. The ignition coil creates the high voltages used to generate sparks in the engine, and is made up of a primary and secondary coil. The current flow through the primary coil creates a strong magnetic field between the two coils, and when the current is suddenly shut off, the collapse of the magnetic field induces more than 20 kV onto the secondary coil. This incredibly high voltage is used to ignite the spark plugs.

You make all of the verification tests on the primary coil. The flyback waveform found on the primary coil is usually on the order of 10 ms and has a peak voltage of 40 to 400 V, depending on the ignition coil. Traditionally, you could measure this waveform using a specialized and expensive digitizer that has high-voltage capabilities. Alternatively, you could use a general-purpose 8-bit oscilloscope with an attenuation probe, but this method reduces your accuracy dramatically. You now can easily acquire these flyback waveforms using the FlexDMM digitizer capability and use the built-in analysis functions in NI LabVIEW to measure the peak firing voltage, dwell time, and burn time of each high-voltage waveform.

Increased Measurement Speed

The optimized NI-DMM 2.1 driver software has a dramatic impact on the DC voltage and resistance measurement speed of the FlexDMM. The table below details the performance gains with the new version of the driver software:

Resolution	NI-DMM 2.0	NI-DMM 2.1	Performance Increase
5½ digits	2 kS/s	3 kS/s	50 percent
4½ digits	5 kS/s	10 kS/s	100 percent

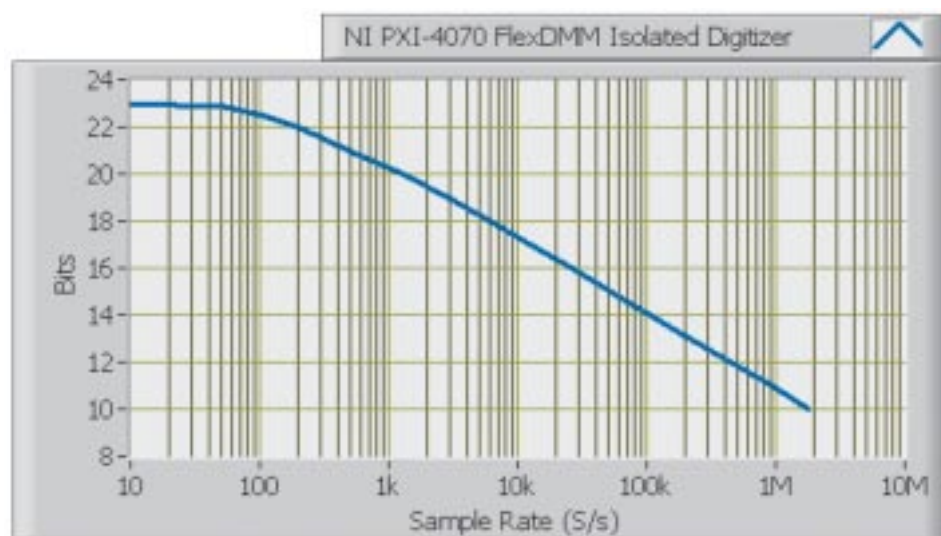
You can optimize your measurements with NI-DMM 2.1 driver software.

The new NI-DMM 2.1 software also provides features such as:

- Simulation mode
- External calibration procedures and functions
- IVI compliance

With NI-DMM, you can measure thousands of channels consisting of voltages, thermocouples, and RTDs by seamlessly integrating the FlexDMM with NI PXI switches, SCXI switches, and NI Switch Executive switch management software. NI-DMM 2.1 driver software, which is shipped with the FlexDMM, is optimized for use with NI LabVIEW, LabWindows/CVI, and Measurement Studio for Visual Basic, Visual C++, and Visual Studio .NET. ■

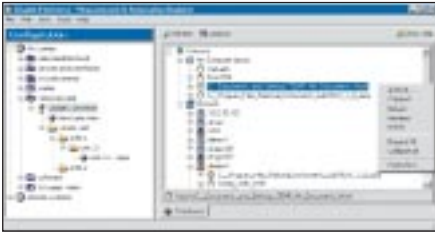
To download FlexDMM digitizer example code, visit ni.com/info and enter nsi3310.



With the software-based architecture of the FlexDMM, you can vary the digitizer resolution from 10 to 23 bits simply by changing the sampling rate.

ni.com/multimeter

Build Better Monitoring and Control Systems with LabVIEW



Easily visualize the content of your networked data.

The LabVIEW 7 Datalogging and Supervisory Control Module maximizes productivity and efficiency so you can interactively develop your distributed monitoring and control systems faster than with other tools, because of new intuitive wizards and dialog boxes. With the new version of this module, you can view data, configure alarms and events, set up security on your applications, easily network OPC devices and LabVIEW Real-Time targets into one complete system, and efficiently log data to the distributed historical database.

This enhanced historical database improves throughput and can log 10 percent more data. You can easily store information on another machine with only the machine and database names, and even give your databases meaningful names to better identify them.

Manage Networked Data

With the new module, you can manage your networked data; use the interactive tools to create, rename, compact, archive, and view any database on your network; or view traces from multiple databases at the same time. For security purposes, you can only rename, delete, or detach databases locally. You can use this functionality programmatically in LabVIEW, and the database is now compliant with industry standards, such as SQL 92 and ODBC 2.5.

Easily Design User Interfaces

Design professional user interfaces more easily

than ever with the included image navigator. The navigator has more than 4,000 images and now features drag-and-drop and cut-and-paste functionality. The LabVIEW 7 Datalogging and Supervisory Control Module also has more than 35 shipping examples to help you better architect and optimize your system. Most of these are new feature examples that show multiple ways to accomplish a task and then explain the advantages of each method. With these new and improved interactive tools, you can develop distributed monitoring and control systems better than ever before. ■

To learn more and to see an online demo of the LabVIEW 7 Datalogging and Supervisory Control Module, visit ni.com/info and enter nsi3311.

ni.com/labview

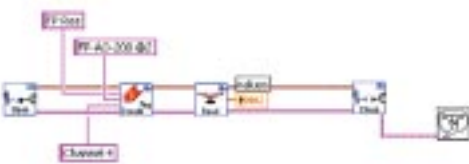
Shorten Development Time with FieldPoint and LabVIEW

NI FieldPoint and Compact FieldPoint together with LabVIEW graphical software can shorten your development time with built-in signal conditioning and simple, menu-based configuration. With the release of LabVIEW 7 Express, you can use FieldPoint and Compact FieldPoint to reduce your distributed I/O configuration and programming time.

Measurement & Automation Explorer-Based Configuration

With LabVIEW 7 Express, you see two major improvements in FieldPoint and Compact

FieldPoint VIs in LabVIEW 6.1



FieldPoint VIs in LabVIEW 7 Express



Reading a single channel once required four VIs, but with the new FieldPoint I/O you now need only one.

FieldPoint. The FieldPoint Explorer configuration utility is now integrated into Measurement & Automation Explorer, so you can configure your FieldPoint real-time, Ethernet, serial, and CAN banks all from the same program used for setting up other NI measurement hardware. NI designed the FieldPoint configuration in Measurement & Automation Explorer to have the same look and feel as the configuration from FieldPoint Explorer to make it easier for you to make the transition.

Easier Programming with New VIs

With this release, NI also dramatically simplifies the FieldPoint VIs in LabVIEW. To communicate with FieldPoint network modules in previous versions of LabVIEW, you had to open a session to the FieldPoint module, create a tag reference to the I/O channel, read or write from the channel, and finally close the session to FieldPoint. Wiring each block together makes large application developing cumbersome and cluttered with block diagrams.

LabVIEW 7 Express provides two new features that make it easy to read from and write to FieldPoint I/O. The first is a FieldPoint

Express VI, which is ideal for new users. You can use it to drop down one LabVIEW VI and configure to read from or write to a FieldPoint channel from a menu-driven window. The second new feature is a new I/O data type called the FieldPoint I/O Point, which provides a pull-down menu that lists all the FieldPoint channels. This data typed is wired directly into FieldPoint-Read or FieldPoint-Write, eliminating LabVIEW wiring complexity and the need to open a session to FieldPoint, create a tag, or close the session. NI still supports the legacy FieldPoint API for LabVIEW and provides backward compatibility for existing systems. With LabVIEW 7 Express, FieldPoint and Compact FieldPoint configuration and programming is easier and faster than ever. ■

To connect to the embedded Web server of a FieldPoint controller in Austin, Texas, and take control of a simulated plastic injection molding system from your Web browser, visit ni.com/info and enter nsi3312.

ni.com/fieldpoint

Instrument I/O Assistant Delivers Interactive Control

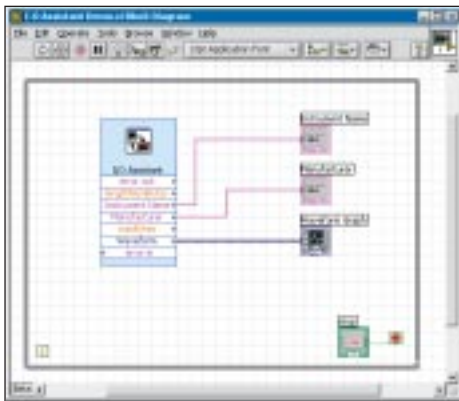


Figure 1. The new Instrument I/O Assistant automatically formats and parses instrument responses into LabVIEW data types, such as waveform data.

At times you may want to perform only a few simple tasks with your instruments instead of developing a complete LabVIEW application. While LabVIEW instrument drivers provide high-level, easy-to-use VIs that give you complete access to the complex measurement capabilities of your instruments, with the new Instrument I/O Assistant in LabVIEW 7 Express, you can

With its interactive display, automatic response parsing, and reusable VIs, the Instrument I/O Assistant helps you program your instruments more easily and save significant time in formatting and parsing instrument commands.

quickly perform simple measurement tasks without worrying about complex data formatting and parsing. In addition, when an instrument driver is not available, the Instrument I/O Assistant can get you up and running quickly.

The Instrument I/O Assistant delivers a step-by-step method to write commands, read responses, and automatically parse data from your GPIB, Ethernet, PXI, USB, serial, and VXI instruments, so you can use it to easily communicate with and program your instruments. Moreover, because the assistant uses an interactive window, you save time by instantly viewing data returned from your instruments, automatically formatting these responses

into LabVIEW data types, and building reusable sequences of commands for your instruments.

Instantly Acquire Data from Your Instruments

You can access the Instrument I/O Assistant from the new Input and Output palettes in LabVIEW 7 Express. Simply place the assistant on the block diagram to open the interactive window and begin sending commands to your instrument and viewing the responses in real time (see Figure 1).

The Measurement and Automation Explorer, a configuration utility included with all NI driver software, automatically generates a list of instruments. After you search for and assign unique names to your instruments, they automatically show up in the Instrument I/O Assistant. You can then select the appropriate instrument from the drop-down instrument list and add steps to communicate with it (see Figure 3). Before you read back measurement data, you may want to configure parameters such

as triggering or coupling on your instrument. You can write these specific commands using the “write” step in the Instrument I/O Assistant. You can then perform a “query and parse” step to send a command to the instrument and

automatically display the response in the interactive window.

Automatically Format Responses and Run in LabVIEW

After you receive a response from the instrument, the Instrument I/O Assistant can parse the response for you, thereby automatically converting the data into a more useable format, such as a waveform or numeric data type. For example, in Figure 2 a query and parse command returned a waveform in binary format. The Instrument I/O Assistant automatically converts this data into a waveform data type and displays it at the bottom of the interactive window. Because parsing data is usually

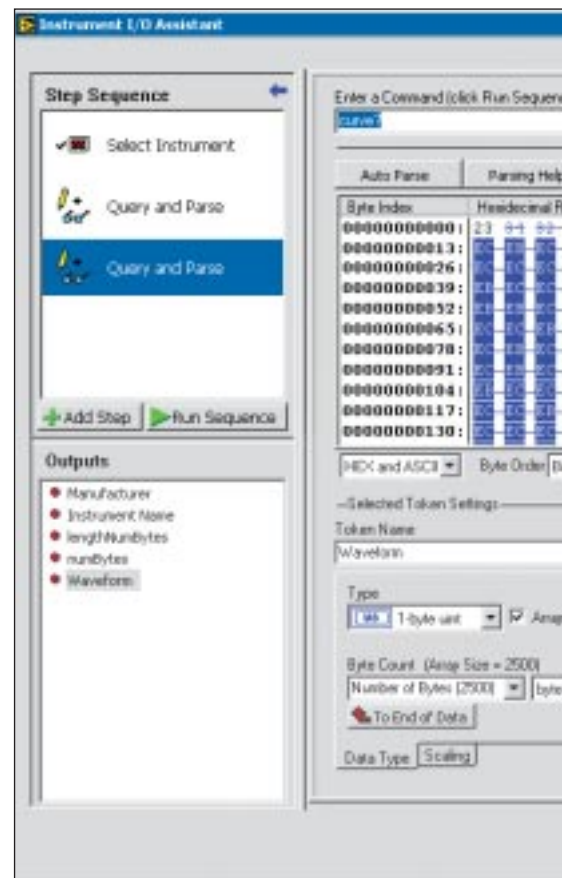
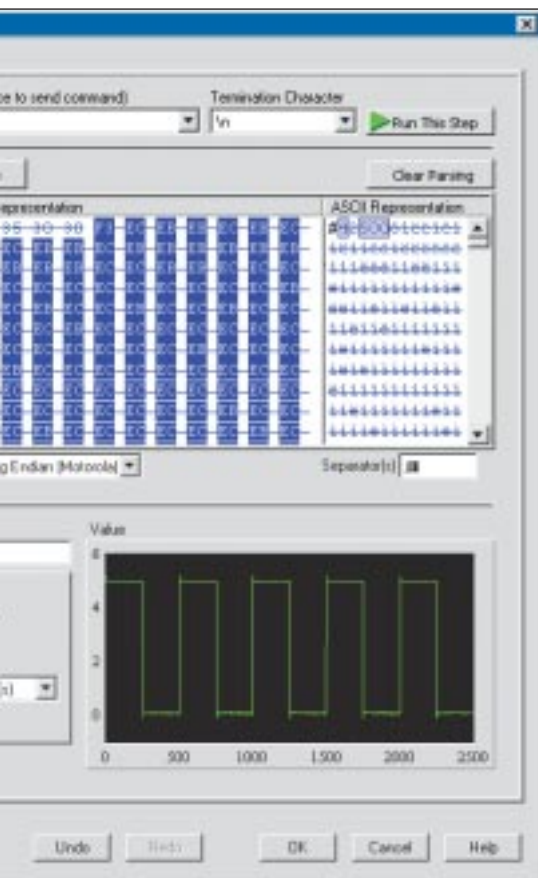


Figure 2. Interactive windows in the Instrument I/O Assistant deliver automatic parsing and formatting of data.

the most tedious aspect of instrument programming, the Instrument I/O Assistant can save you significant application development time.

Simply assign tokens, or outputs, to the parsed data in the interactive window. For instance, the outputs on the left side of Figure 2 are the current tokens for this sequence of commands and responses, and they can pass data to indicators or other VIs as shown in Figure 1. Furthermore, you can apply scaling for your tokens to convert the responses from your instrument into real-world data. With the interactive parsing and scaling functionality of the Instrument I/O Assistant, you can read back your instrument data correctly the first time without extensive debugging.



...iver real-time viewing of instrument responses, as well as

Instrument I/O Assistant helps you program your instruments more easily and saves significant time in formatting and parsing instrument commands. In addition, the NI Instrument Driver Network delivers more than 1,400 LabVIEW-compatible instrument drivers from over 150 vendors, giving you greater flexibility in programming your instrumentation systems. Together, LabVIEW instrument drivers and the Instrument I/O Assistant deliver an easy way to connect to and control your instruments. ■

Matthew Smith
Product Manager
E-Mail matthew.smith@ni.com

To view a demo of the Instrument I/O Assistant in LabVIEW 7 Express, visit ni.com/info and enter nsi3313.

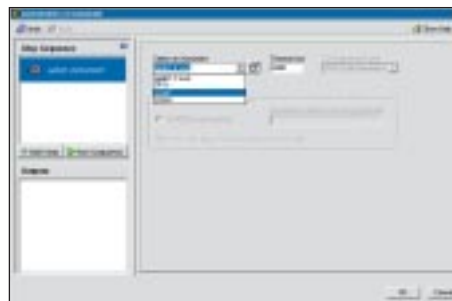


Figure 3. Select different instruments from the drop-down control in the Instrument I/O Assistant.

Reuse Your Instrument I/O Assistant Express VIs

You can reuse the sequences of commands you built in the Instrument I/O Assistant in LabVIEW VIs. After you set up an Instrument I/O Assistant Express VI to communicate with an instrument, you can reuse the same VI in applications that require communication with that instrument. Because this code is easily reused, you reduce your application development time when communicating with the same instrument in the future.

Flexibility in Programming Your Instruments

With its interactive display, automatic response parsing, and reusable VIs, the

Instrument Driver Network Delivers More Than 1,400 LabVIEW-Compatible Drivers

When you need to access the complex measurement capabilities of your instruments, instrument drivers make it easier to control and communicate with the hardware in your systems. The NI Instrument Driver Network features driver software from NI Instrument Driver Developer Program members. These certified instrument drivers offer engineers and scientists quality software support for thousands of instruments to simplify programming and to improve overall ease of use and application development.

With more than 1,400 LabVIEW-compatible instrument drivers from more than 150 vendors, the Instrument Driver Network is an industry-leading source for LabVIEW instrument drivers. Each month, the Instrument Driver Network hosts tens of thousands of visitors who come to search for and download instrument drivers, read the latest information on instrument control and drivers, and find the newest instrument drivers.

The Instrument Driver Network features a searchable database of instrument drivers categorized by company, instrument type, driver type, application development environment, and instrument interface.

For more information on the Instrument Driver Developer Program, see “Driver Developer Program Provides LabVIEW Integration” on page 19. ■

To download more than 1,400 LabVIEW instrument drivers from over 150 vendors, visit the Instrument Driver Network at ni.com/idnet.

NI ELVIS Increases Student Interest in Engineering

To spur interest in engineering and science, universities strive to provide hands-on, project-based education that encourages creativity and problem solving. However, educators face significant logistical challenges because traditional laboratory instrumentation can be expensive, rigid, and fragmented, and only offers fixed functionality. To overcome these challenges, National Instruments offers NI Educational Laboratory Virtual Instrumentation Suite (ELVIS) as a unique, affordable, and interactive platform that students can use to apply their classroom theory to real-world applications.

Integrated, Flexible Environment

NI ELVIS is a revolutionary LabVIEW-based platform designed to provide an integrated and flexible environment that enhances measurement, design, and prototyping in an educational laboratory. NI ELVIS integrates LabVIEW 7 Express software, a multifunction data acquisition board, and the specially designed NI ELVIS workstation to build a suite of virtual instruments. It includes traditional instrument functionalities such as an arbitrary waveform generator and an oscilloscope; at the same time, the applications are completely open and customizable in LabVIEW, making them useful in courses ranging from early

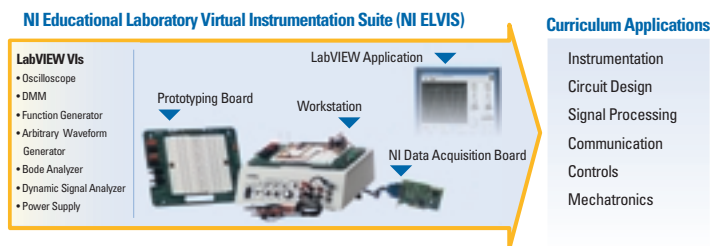
demonstrations in lecture halls. Moreover, NI ELVIS includes high-voltage and short-circuit protection and provides the programmable power supply needed for educational laboratory use.

Approval from Texas Higher Education Coordinating Board

The Texas Higher Education Coordinating Board recently approved a proposal to offer LabVIEW and NI ELVIS to all accredited Texas EE and CE programs in an effort to improve engineering student retention.

The use of NI ELVIS in engineering and science classrooms can inherently improve the quality of education students receive, as well as enhance students' interest and ease the work of professors. ■

For student project ideas, an NI ELVIS data sheet, and examples of curriculum adoption, visit ni.com/info and enter nsi3314.



NI ELVIS provides a platform that students can use to apply their classroom theory to real-world applications.

division basic to advanced-level circuit design, signal processing, and communications, as well as in various other engineering and science disciplines. A small footprint and portable nature make NI ELVIS ideal for live

ni.com/academic

LabVIEW Tools for DIAdem Save Reporting Time

Using DIAdem and the new Express VIs in LabVIEW 7 Express, you now can save time exploring “what if” data analysis. If you want to run several tests to optimize a particular aspect of your design, or explore why certain events occur, DIAdem can help you visually inspect and interactively analyze your data. With DIAdem, you can take a user-defined approach to analyzing your data. The interface of this analysis and reporting software is laid out logically, separating similar functionality into groups for data management, visualization, analysis, reporting, and task automation.

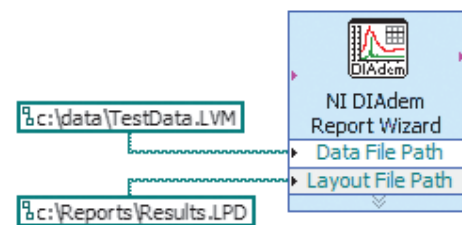
Easily Manage Data

After you collect your data in LabVIEW, the new Express VIs included in DIAdem offer a simple way to pass data from LabVIEW to DIAdem. The configuration-based approach requires only that you provide the name of the data file you wish to transfer – LabVIEW does the rest. DIAdem adds value to your

LabVIEW applications by providing an environment to interactively manage, visualize, analyze, and report your data. Whether you want to develop a new LabVIEW application or extend an existing one, the new DIAdem Report Express VI helps you benefit from the interactive DIAdem tools.

Additional Integration Functions

You can access additional LabVIEW and DIAdem integration functions through a set of connectivity VIs. You can find everything from high-level file I/O to low-level function calls organized in a LabVIEW palette available FREE at ni.com/downloads. If your LabVIEW applications would benefit from post acquisition, interactive analysis, user-configurable report generation, and visual data analysis, the new DIAdem Report Wizard Express VI in LabVIEW 7 Express



The new express VI approach connects LabVIEW with DIAdem.

combined with DIAdem software gives you new and powerful ways to manage, visualize, analyze, and report your data. ■

To download a FREE evaluation version or learn more about DIAdem, visit ni.com/info and enter nsi3315.

ni.com/diadem

Reduce Development Time with NI DAQ Designer 2003

The NI DAQ Designer 2003 CD is a comprehensive resource for designing and implementing complete data acquisition (DAQ) systems, and is packed with more than 100 customizable measurement example programs. This easy-to-use hardware advisor assists you in selecting the optimal NI software and hardware tools for your application. It also offers application notes, and tutorials that outline application-development and performance-enhancing techniques.

If you need to develop a new measurement system or want to improve your current system, the CD is an ideal tool. After you answer a few questions about your system and application, DAQ Designer 2003 recommends the software and hardware combination that best meets these requirements. Use the CD to configure DAQ systems for a variety of applications: data logging, signal acquisition and generation, acoustic/vibration, and control and simulation. The 2003 edition of this advisor used

by thousands also includes more than 100 customizable example programs for NI LabVIEW, Microsoft Visual Basic, and C, which reduce setup time by demonstrating how to develop common applications.

Available in Seven Languages

This CD provides additional resources including product descriptions, tutorials, data sheets, and application notes in seven languages – English, French, Chinese, Japanese, Korean, Portuguese, and Spanish. NI also expands the features of NI DAQ Designer 2003 with Web resources such as pricing information, an online catalog, 15 online product advisors, and more than 1,800 additional measurement example programs. ■

To obtain your FREE copy of the NI DAQ Designer 2003 CD or use an online configuration advisor, visit ni.com/info and enter nsi3316.



Reduce development time by using the NI DAQ Designer 2003 CD to identify the software and hardware combination that meets your application requirements.

ni.com/daq

Gain Measurement Knowledge with New Resource CD

Learn about the latest sound and vibration measurement tools from National Instruments with the new Sound and Vibration Resource CD. Through platform diagrams, simulated analysis software demonstrations, tutorials, and third-party solutions, you gain a better understanding of how NI measurement and analysis tools combine to create a powerful, flexible, and cost-effective integrated measurement platform. The NI sound and vibration platform includes powerful NI LabVIEW

software and high-performance dynamic signal acquisition hardware. On the CD, you find platform diagrams and data sheets for:

- LabVIEW graphical development tools for sound and vibration applications
- Scalable system architectures for two to 5,000 channels of data acquisition
- Modular, 24-bit dynamic signal acquisition hardware

Example Analysis Techniques

See the wide range of LabVIEW analysis capabilities on the new CD by running examples from the Sound and Vibration Analysis Toolset and Order Analysis Toolset. From simple measurements, such as sound level and FFT, to extended measurements such as peak search, power in band, and order analysis, you can explore many analysis techniques that meet your sound and vibration measurement needs. The CD sorts examples by type of measurement analysis and each includes common applications, block diagrams, and simulated data.

Discover Which Products Improve Your Application

If you want to brush up on your measurement skills, the measurement fundamentals section of the CD provides an overview of the components that make up a sound and vibration measurement application. The CD covers the three basic steps to creating a sound and vibration measurement system – system setup, dynamic signal acquisition, and analysis and presentation. By learning about the different components, you can make informed decisions about the products you buy, and ultimately ensure the success of your application.

Additionally, the CD contains more than 40 customer solutions from a variety of industries, including aerospace, academic, and manufacturing test. ■

To receive a FREE copy of the new National Instruments Sound and Vibration Resource CD, visit ni.com/info and enter nsi3317.

ni.com/pxi



Learn details about the latest sound and vibration measurement tools from NI with the new Sound and Vibration Resource CD.

Read Alphanumeric Characters with NI OCR Software

To improve quality, manufacturers are inspecting more printed information on manufactured goods, including text, symbols, and foreign characters. To help simplify this process, NI now delivers a powerful and flexible tool to correctly identify these characters – NI Optical Character Recognition (OCR) software.

Increased System Flexibility

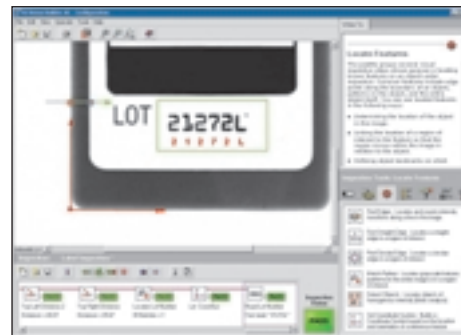
NI OCR software increases system flexibility by giving you the power to program applications that learn and read unique characters, symbols, and fonts. While NI OCR software is perfect for standardized industrial fonts such as OCR A, OCR B, and SEMI, it also features a training engine that does not limit you to predefined fonts. These capabilities are used in hundreds of applications in a wide variety of industries, from interpreting text on machine-stamped parts in the automotive industry to identifying wafers in the semiconductor

industry to reading packaging labels and lot codes in the pharmaceutical industry.

Simplifying Character Recognition

One of the challenges in character recognition is determining how to segment individual characters in an image. NI OCR software includes a large collection of parameters that help you segment and learn individual characters with ease. The built-in segmentation routine can distinguish between individual characters even under the most difficult imaging conditions.

NI OCR software ships with the new NI Vision Builder for Automated Inspection software, an interactive environment that quickly configures, benchmarks, and deploys machine vision applications. In addition, you can integrate the OCR tools with the NI Vision Development Module in NI LabVIEW and LabVIEW Real-Time, Microsoft Visual Basic, and C/C++. ■



With NI OCR software, shown here in Vision Builder for Automated Inspection, you can program applications that learn and read unique characters.

To download the NI Vision Builder for Automated Inspection evaluation software, visit ni.com/info and enter nsi3318.

ni.com/imaq

Gigabit Ethernet for PXI Increases Network Performance

National Instruments substantially increases the network performance of PXI systems with new Gigabit Ethernet modules for PXI. With the NI PXI-8231 Gigabit Ethernet module and the NI PXI-8232 combination Gigabit Ethernet and GPIB module, you can

speeds of approximately 500 MB/s and receive speeds of approximately 800 MB/s. This is due to the 32-bit PCI bus bandwidth and holds true for PXI as well as desktop computers. These speeds are five to eight times faster than 100BaseTX Fast Ethernet.

switches between 10, 100, and 1,000 megabit modes, depending on your network's capability as determined by your server speed, switch/router capacity, and wiring capacity.

Whether you use Ethernet on PXI for day-to-day networking tasks, distributing measurement data, or other applications, Gigabit Ethernet greatly enhances your network system performance while maintaining all existing compatibility.

To view data sheets on the PXI-8231 and PXI-8232 Gigabit Ethernet modules and to read about Ethernet applications for PXI, visit ni.com/info and enter nsi3319.

Category	Gigabit Ethernet	Fast Ethernet
Max theoretical throughput (MB/s)	1000	100
Typical throughput (MB/s)	500-800	100
Supported data rates (MB/s)	1000, 100, 10	100, 10
Cabling	Category 5	Category 5

These benchmark tests show that Gigabit Ethernet delivers significantly higher performance than Fast Ethernet.

more effectively use PXI systems for high-speed instrument control, networked measurement applications, and rapid network file transfers.

Real Performance Gains

While Gigabit Ethernet can deliver up to 1,000 MB/s transmission speed, you can more realistically expect transmission

With Gigabit Ethernet, you can transfer files over the network at the speed limit of your hard drive.

Maintaining Compatibility

Gigabit Ethernet is fully compatible with existing Ethernet standards and cabling. You can continue to use standard category 5 Ethernet cables, provided all the conductor pairs in the cable are connected. Additionally, the Gigabit Ethernet modules automatically detect cable polarity, so there is no need to swap between crossover and noncrossover cabling for various network configurations. The Gigabit Ethernet port also automatically

ni.com/pxi

Driver Developer Program Provides LabVIEW Integration

Through the new Instrument Driver Developer Program (IDDP), NI and leading instrument vendors worldwide create standard driver software that integrates open and intuitive NI software with a wide variety of third-party instruments. Members of this program collaborate with NI to develop LabVIEW instrument drivers that customers use to easily communicate with and control their instruments. This program presents an opportunity for instrument vendors to easily provide their existing and potential customers with easy connectivity to industry-standard software.

Easing Instrument Communication

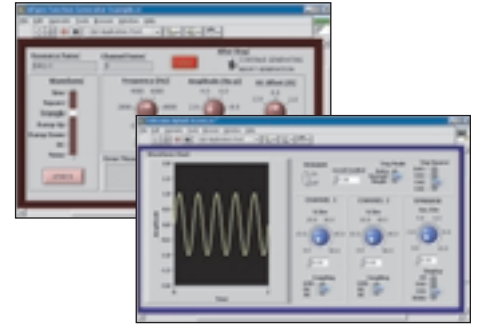
The IDDP ensures that LabVIEW users can quickly add instruments to their existing test systems and gain complete access to the complex measurement capabilities of a wide variety of instruments. Because LabVIEW instrument drivers maintain a common architecture and interface, engineers can use them to quickly and easily connect to and

communicate with their instruments with little or no programming. With the standard programming model of LabVIEW instrument drivers, engineers can easily communicate with their instruments without learning new communication protocols or spending time understanding new programming paradigms.

Increasing Instrument Capability

The IDDP includes several valuable technical and marketing benefits for its members, including the opportunity to store and promote their instrument drivers on the Instrument Driver Network at ni.com/idnet, technical support for customers downloading their instrument drivers, and instrument driver maintenance for at least one year.

In addition, this program gives instrument vendors the opportunity to enhance their products and increase instrument functionality with PC-based instrument control, increased software support, and standard, easy-to-use, and flexible driver software. LabVIEW



The Instrument Driver Network features 2,200 instrument drivers from more than 150 vendors.

instrument drivers deliver easy integration of instruments into existing software applications and guaranteed technology compatibility for future versions of LabVIEW. ■

To join the Instrument Driver Developer Program, visit ni.com/info and enter nsi3320.

ni.com/idnet

New NI-VISA Support for USB Instrument Communication

You may already use NI-VISA, the NI implementation of the Virtual Instrument Software Architecture specification, to control your instruments through the GPIB, serial, VXI, PXI, or Ethernet buses. Now, you also can use NI-VISA to communicate with and control USB-based instruments. With the addition of USB support, you can use NI-VISA to communicate with virtually any instrument on the market.

NI-VISA provides an easy-to-use application programming interface (API) for configuring your instruments, as well as writing commands to and reading responses from them. The VISA API is independent of the specific bus that your instrument uses, which helps you easily change the instrumentation in your system without modifying your software programs. You can access the NI-VISA API from NI LabVIEW and LabWindows/CVI or from general purpose programming languages such as Microsoft Visual Basic, Visual C++, or Visual C# by using NI Measurement Studio.

NI-VISA is the interface that most driver developers use to create instrument drivers.



VISA software can communicate with devices through many different interfaces.

In fact, the vast majority of the 2,200 instrument drivers available on the Instrument Driver Network (ni.com/idnet) use the VISA API for communicating to the instrumentation hardware.

Creating USB Instruments

The USBTMC standard states the requirements for IEEE 488.2 (GPIB) communication over

USB. It defines how to send data packets and service requests and perform command transfers such as triggers and serial polls over USB. Basing the USBTMC protocol on the IEEE 488.2 model ensures backward compatibility with GPIB instruments and empowers vendors to create more powerful instruments.

To help instrument vendors create their instrument firmware and support the creation of USB instruments, NI also has updated NI-Device, an easy-to-use API for developing IEEE 488.2-compatible instruments. With the bus-independent NI-Device API, instrument manufacturers now can easily provide GPIB, Ethernet, and USB connectivity for their instruments with only minor modifications to the instrument firmware. ■

To upgrade to the latest version of NI-VISA, visit ni.com/info and enter nsi3321.

ni.com/visa

Experience LabVIEW 7 Express through the Community

The new features and streamlined interfaces in LabVIEW 7 Express will change the way you define, develop, and deploy your applications. Learn about the newest release of LabVIEW and how its features will reduce your development time and extend your development possibilities through the LabVIEW community.

Get in the Loop

The online LabVIEW community portal, *LabVIEW Zone*, is filled with information, tips, and tricks that quickly bring you up to date on the latest in LabVIEW and show you how to use LabVIEW 7 Express to enhance your unique application. *LabVIEW Zone* currently showcases various features of LabVIEW 7 Express through:

Articles – Hear from beta users, lead LabVIEW users, and other developers about how the new features of LabVIEW have impacted their development

Web Presentations – Check out these comprehensive presentations for the most in-depth information on the newest features of LabVIEW 7 Express

Discussion Forum – Talk with your peers about the latest release of LabVIEW, share your development successes, and learn

new tips for using LabVIEW 7 Express in your application

Online User Group Meetings – Join in on one of many online user group in-depth, real-time discussions about LabVIEW development with LabVIEW 7 Express

Online Interviews – Interact with LabVIEW developers during the LabVIEW Live! broadcast to get a behind-the-scenes look at the creation of LabVIEW 7 Express

Download Code – Get a head start on using the new LabVIEW features in your applications by downloading sample code

Join the Community

Once you visit *LabVIEW Zone*, take the next step and check out some of the other activities and resources available in the LabVIEW community to learn more about this latest release:

- Attend a local user group meeting in your area for technical presentations and discussions on the newest features
- Attend the LabVIEW worldwide tour starting June 2 to meet LabVIEW developers and fellow LabVIEW users
- Attend an entire week of technical training on LabVIEW and see the new features of LabVIEW 7 Express at NIWeek in August

LabVIEW Zone Highlights

Articles

- Will the Event Structure Change the Face of Design Patterns?
- Seven Time-Saving Features You Can't Miss
- Hints for Using the New Tree Control and Subpanel Features
- What LabVIEW 7 Express Brings to the Experienced User

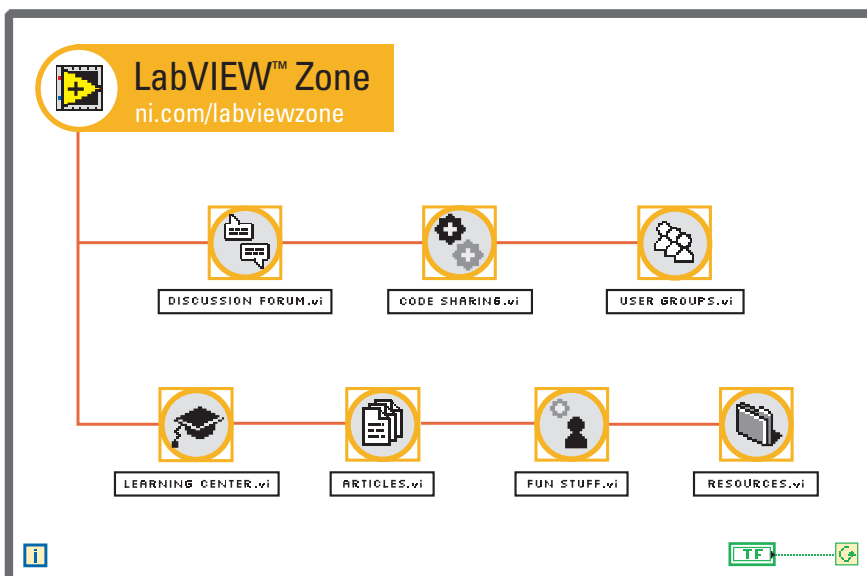
Web Presentations

- LabVIEW 7 Express Overview
- Deploying to Palm and Pocket PC Devices
- In-Depth with the LabVIEW FPGA Module
- Taking Advantage the New DAQ Interface

Join us today at ni.com/labviewzone.

- Read articles covering LabVIEW 7 Express features in the latest version of LabVIEW Technical Resource (LTR)
- Join discussions with long-time LabVIEW users on info-labview

Whether you are a new LabVIEW user or have used LabVIEW since version 1.0, the latest release has features that can dramatically improve the way you develop LabVIEW applications. To learn how or to share your own successes, participate in LabVIEW community activities near you. ■



LabVIEW Zone, at ni.com/labviewzone, is your source for all things LabVIEW.

ni.com/labviewzone

Reducing Cost of ECU Testing with FPGA Module

By Matt Viele, Senior Software Engineer,
Woodward Governor Company

The Challenge: Developing an engine simulator for hardware-in-the-loop testing of engine controller modules

The Solution: Using National Instruments LabVIEW 7 Express, LabVIEW 7 Real-Time Module, LabVIEW 7 FPGA Module, and NI PXI-7831R reconfigurable I/O modules to provide real-time simulation with precise, flexible timing and synchronization of I/O signals.

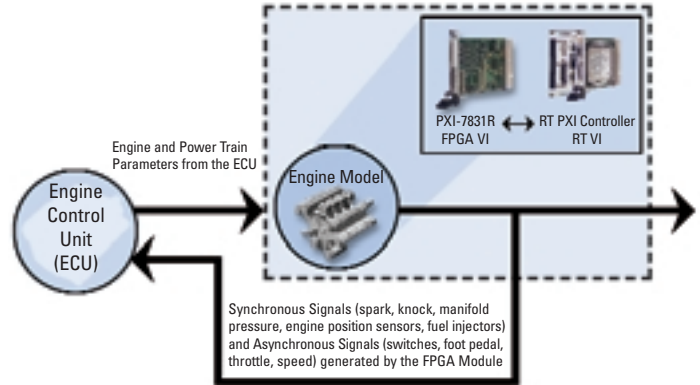
As the worldwide leader in industrial energy control technologies, we at Woodward Industrial Controls work closely with engine and turbine original equipment manufacturers to develop efficient control solutions. To test a new line of engine controllers, we needed to create a system capable of simulating all inputs and outputs of a running engine.

The engine controller we tested continually adjusts the ignition, fuel injectors, and other outputs responsible for engine performance. The test system must make these adjustments

in a real-time, closed-loop fashion to respond to engine parameters such as manifold pressure, mass air flow, engine speed, and engine temperature. The test system also must detect engine knock, control the waste gate for the turbo charger, and achieve the desired levels of engine speed and torque set by the operator through the throttle.

We selected the LabVIEW 7 Real-Time Module for the simulation because it delivered deterministic operation. For the I/O signals, we wanted to use an FPGA board to meet our timing and synchronization requirements. We needed the FPGA to run at speeds much higher than the main simulation loop to generate output waveforms and pulse trains.

By using the LabVIEW 7 FPGA Module to program the FPGA on the NI PXI-7831R reconfigurable I/O module, we exceeded our specifications and saved 90 percent of the



FPGA and Real-Time NI PXI-7831R Reconfigurable I/O System Setup

cost of building our own hardware. Part of this cost savings resulted from productivity gains. With the LabVIEW 7 FPGA Module, we can configure the FPGA by easily programming in LabVIEW 7 Express without assigning an expensive and hard-to-find VHDL designer to the project. ■

To read the full-length customer solution, visit ni.com/info and enter nsi3322.

ni.com/success

Developing a Vibration Test System with LabVIEW and PXI

by Dean Cyphery, System Integrator,
B & B Technologies, Inc.

The Challenge: Developing a system for Sandia National Laboratories (SNL) that can acquire and store up to 160 channels of vibration test data at speeds of up to 102.4 kHz for up to 120 minutes.

The Solution: Using National Instruments hardware and LabVIEW to create a measurement vibration test system capable of triggering, synchronizing, acquiring, displaying, and storing to disk all test data with local area network (LAN) connectivity.

Prior to implementing this system, SNL could not synchronize, acquire, or digitally store the data from systems with high-channel counts and fast scan rates. Because module synchronization requires the use of the PXI

star trigger lines, which only extend to slot 14, we built two PXI chassis – each with 10 DSA modules plus a PXI-6653 timing module and a PXI-MXI-3 interface module. The PXI-6653 timing module provides the scan clock and simultaneously triggers all of the DSA channels in both chassis. With extensive testing, we found that the test requirements exceeded even the fastest computer's bus and bandwidth limitations, resulting in the need for two workstations to handle the high-channel-count and high-scan-rate scenarios. With a data throughput of 25 Mbytes/s or 1.5 Gbytes/min per chassis, this dictated the use of Ultra 160 SCSI storage drives rather than Ultra ATA IDE hard disk drives. The Ultra 160 SCSI storage drive permits longer, potentially infinite, test durations because SCSI drives are hot-swappable, and a single SCSI bus can support up to 16 drives. ■



Master and Slave Setup Screen for the Two-Workstation, Two-PXI Configuration

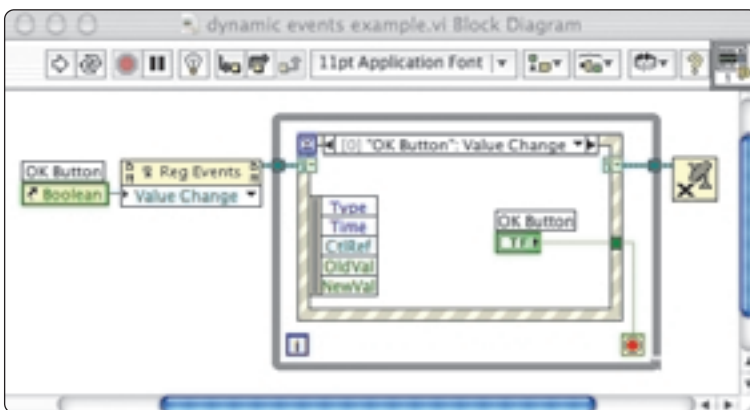
To read the full-length customer solution, visit ni.com/info and enter nsi3323.

ni.com/success

Improve Programmable Configuration of Events in LabVIEW

You can quickly and easily build a user interface for applications by using LabVIEW. With only a few mouse clicks, you can have a button, graph, and other graphical controls appear on your front panel ready to display data or handle user interactions. In the past, however, it could be challenging to program that interface to respond quickly to user interactions, particularly when the application was running a lot of code in the background.

The event-driven programming features introduced last year in LabVIEW 6.1 made it easier and more efficient for you to develop flexible user interfaces that are also highly responsive. Now, the new features introduced in LabVIEW 7 Express increase the flexibility of the event structure even further. The primary event-related enhancements in LabVIEW 7 Express are dynamic event registration and response to programmatic changes to controls.



With LabVIEW 7 Express, you can define and generate your own events.

Dynamic Events

Dynamic event registration significantly increases flexibility in using events, which means the architecture you use to design VIs is more efficient and powerful. By using dynamic event registration, you can design an application so that it responds to events only at specific points in the program execution. If events occur outside of these instances, the application will not handle these events. As a result, VIs execute event-handling code only when necessary, rather than each time you interact with the front panel.

In addition to reducing the load on the CPU, you can incorporate dynamic

event registration to monitor events that meet specific criteria. For example, an application executes for some time, allowing you to interact with all of the controls on the front panel. When the application enters a state that requires extra caution, the program activates a fail-safe feature that begins monitoring events and only permits you to press the Stop button after you press the Halt Operations button, so the equipment shuts down properly.

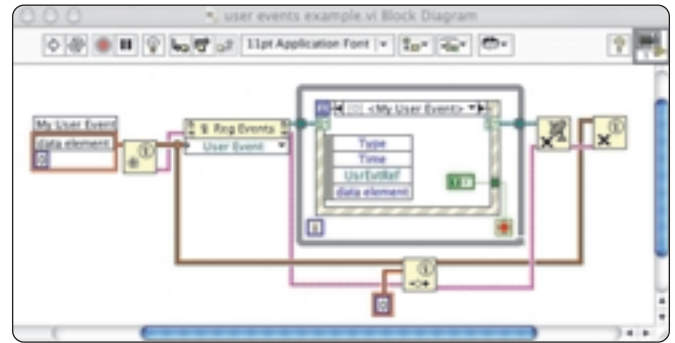
Dynamic events also provide an additional benefit that increases the modularity of application design in LabVIEW. You can design an application with a single subVI that handles all of the events generated by every VI in that application.

This means that you only need to modify this one subVI to alter the way the application responds to events.

This is possible because each event that you register as a dynamic event provides a reference to that event. You can pass this reference into a subVI, which can handle the events it receives from the entire application. This dramatically improves on the event capabilities in LabVIEW 6.1, where you could not pass references to subVIs because there was no dynamic event registration.

Programmatic Changes to Controls

LabVIEW VIs can modify control values programmatically, and the LabVIEW event structure now can respond to these modifications. With LabVIEW 6.1, the event structure ignored programmatic changes to control. Now, when you change the control



You now can register for events "dynamically" using VI Server.

using a property node, the application captures and responds to this change. This is important for the case where applications call subVIs to perform specific tests.

For example, the VI can update the results on the main VI front panel based on the results of the test. In previous versions of LabVIEW, this update displayed, but you could not capture it as an event. With LabVIEW 7 Express, you now can capture this update as an event, and the application can respond to the programmatic update as though you had actually clicked on the main front panel and performed a manual update.

With the new dynamic event registration and response to programmatic changes to controls in LabVIEW 7 Express, you can develop applications in LabVIEW with greater flexibility and more modular design than ever before. ■

To learn more about the new event features of LabVIEW 7 Express, visit ni.com/info and enter `nsi3324`.

Eric Reffett
LabVIEW Product Manager
E-Mail eric.reffett@ni.com

Receive Expedited Support on *ni.com*

At ni.com/support, you now can obtain technical help more quickly and easily with National Instruments newly redesigned customer support area. This area features two new sections that expedite the process through which you receive technical support.

Using the Product-Specific Self-Help section, you quickly can find answers to technical questions online by entering the name of your software or hardware and accessing a list of product-specific solutions to common problems, as well as other resources, such as articles, examples, tutorials, and the latest drivers and updates.

“I have used LabVIEW for about 14 years now, and I must say that your technical support system is one of the best. By starting the request online, I get in touch with the appropriate engineer within minutes.”

***– Dean G. Anderlie, Senior Design Technician
Guidant Corporation***

With the new Request Support section, which is localized in 13 languages, you can work with a National Instruments engineer by phone, e-mail, or online discussion forum. When you call or e-mail, you reach an NI engineer with expertise on your product. If you begin your technical support phone call online by completing an easy, three-step service request, you benefit from priority placement in the calling queue. If you live in North America or Brazil and you generated your service request online, an applications engineer will respond to your request before responding to customers who called a customer service representative – even if the other customer has been waiting five minutes and you have been waiting 30 seconds.

NI also offers an online discussion forum, where you can post questions on the Web and receive answers from NI engineers or other members of the worldwide NI user community. You also can use ni.com/support to search other NI content or read details about the company’s newest products. ■

For quick answers to your technical questions, visit ni.com/support

New LabVIEW 7 Express Resources Available on *ni.com*

At ni.com, you now can learn more about the latest version of LabVIEW through valuable LabVIEW 7 Express resources, including various product demos, downloadable evaluation software, and a new interactive tutorial.

The online product demonstrations highlight the newest features of LabVIEW, such as express VIs, to help you streamline your application development. These demos also show you how to use interactive wizards and automatic code generation to build your data acquisition applications and easily capture your data.

You now can try LabVIEW 7 Express by downloading a FREE 30-day evaluation copy. After you install the software, take the LabVIEW Basics tutorial, which shows you how to build your own block diagram and front panel. You also can register to receive the evaluation

software CD with included instrument drivers by mail, so you can use the full functionality of LabVIEW 7 Express during your trial period.

Also, check out the interactive “Acquire, Analyze, and Present” tutorial to learn about virtual instrumentation and building measurement and automation applications with LabVIEW. The tutorial presents an overview of how you can use LabVIEW to quickly and easily acquire, analyze, and present your data. ■

For more information, visit ni.com/info and enter nsi3325 to:

- *Download the LabVIEW 7 Express demo*
- *Take the interactive “Acquire, Analyze, and Present” tutorial*
- *Download your FREE 30-day evaluation copy of LabVIEW 7 Express*

Find a System Integrator at *ni.com*

You now can use the new Request for Quote resources available at ni.com/alliance/rfq to describe your application problem and submit it to NI for assistance in selecting a National Instruments Alliance Program member. With more than 600 members specializing in various industries and applications, the Request for Quote makes it easier to identify the appropriate member to solve your integration needs. Simply go to ni.com/alliance/rfq to submit a Request for Quote form, and NI will contact you with a list of applicable NI Alliance Program members. ■



By generating your service request online, an applications engineer will respond to your request before requests generated by phone.

Easily Upgrade Your Software with NI SSP

Take advantage of the National Instruments Software Subscription Program (SSP) to receive FREE product upgrades, such as LabVIEW 7 Express, and updates for one year. Current SSP subscribers have already received copies of LabVIEW 7 Express. Rather than purchasing a one-time product upgrade, SSP maximizes your application software investment through automatic delivery of future software upgrades, including LabVIEW and LabVIEW add-on modules, such as LabVIEW Real-Time. As an SSP member, you also can enjoy:

- Priority technical support to resolve any issues that may arise while developing your application
- A 10 percent training discount, so you can quickly master LabVIEW and save development time

By subscribing to the SSP for a year, you save time and money when planning, developing, deploying, and maintaining your application. Contact your sales representative to inquire about special pricing for upgrade and SSP combination purchases.

NI Developer Suite

NI Developer Suite is a comprehensive package of the latest versions of NI software, including LabVIEW, LabWindows/CVI, Measurement Studio, and add-on toolkits. Annual NI Developer Suite subscriptions also include the newest driver and configuration software CDs and printed documentation, priority support,

training course discounts, and quarterly software upgrades. The NI Developer Suite subscription provides a cost-efficient alternative to the expense and maintenance of purchasing each component individually. By renewing

The NI Developer Suite subscription provides a cost-efficient alternative to purchasing each component individually.

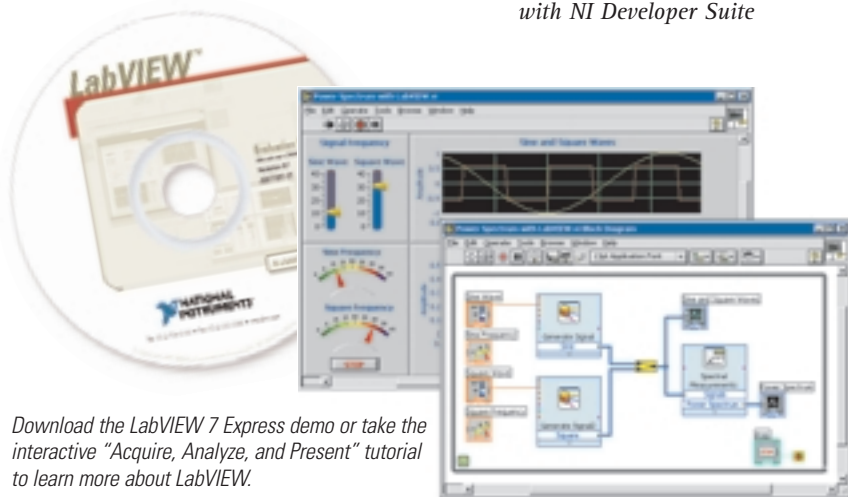
NI Developer Suite subscriptions annually, you stay at the forefront of NI cutting-edge application software.

Multiple-Seat License Program

With the NI Multiple-Seat License Program (MSLP), you receive significant discounts on software and centralized license management in your organization. As an MSLP subscriber, you can more easily manage your NI software assets through a single annual purchase. You also receive the automatic upgrades and priority technical support included with the SSP program. In addition, colleges and universities participating in SSP maintenance agreements can expect updates every six months during winter and summer breaks. Contact your NI sales representative for MSLP details. ■

For more information, visit ni.com/info and enter nsi3326 to:

- *Upgrade to new application software releases through the NI SSP*
- *Learn more about obtaining the latest powerful, industry-standard software with NI Developer Suite*



Download the LabVIEW 7 Express demo or take the interactive "Acquire, Analyze, and Present" tutorial to learn more about LabVIEW.

Increase Your Productivity with LabVIEW Training

National Instruments offers a wide range of LabVIEW courses that are the fastest way to realize large productivity gains using LabVIEW. By taking LabVIEW training courses, you can learn to develop high-performance applications at lower costs, while also reducing development time. Experienced instructors teach courses that provide hands-on experience with software and hardware. All LabVIEW courses now use LabVIEW 7 Express, so you can learn new features, including interactive Express VIs and the streamlined NI-DAQ driver framework.

- **LabVIEW Basics I – Introduction:** This three-day course introduces students to the LabVIEW environment, features, and dataflow programming
- **LabVIEW Basics II – Development:** This two-day course details how to design complete, stand-alone applications in LabVIEW
- **LabVIEW Advanced – Performance and Communication:** This three-day course demonstrates advanced design features in LabVIEW
- **LabVIEW Advanced Application Development:** This four-day course focuses on creating large, high-quality applications that incorporate advanced design features

You can register for courses held at NI corporate headquarters in Austin, at any regional training center worldwide, or you can schedule an NI instructor to teach courses onsite at your facility to reduce employee travel time and expenses. All NI courses are eligible for CEU/PDH credits. With the appropriate coursework and experience, you may qualify to take the tests for the NI LabVIEW Developer and LabVIEW Architect certifications. ■

Register for these courses online by visiting ni.com/info and entering nsi3327.

ni.com/services

Event Sequencer Offers Timing and Control Solutions

National Instruments Select Integration Partner B&B Technologies, Inc. introduces the PES-1632 Precision Event Sequencer System for explosives-related and launch-sequencing applications. This system generates and captures TTL-level events at precise universal time code time of day, with a resolution of less than 10 microseconds.

Because the PES-1632 system can synchronize to global positioning satellites, you can use multiple systems to generate and capture timing events over large geographical areas, making this a complete timing and control solution for a variety of applications such as rocket launch sequencing, synchronized explosives testing, and demolitions sequencing. Additionally, the PES-1632 system can operate either in stand-alone or remote mode, further enhancing the system flexibility.

You can integrate several National Instruments PXI instrumentation cards to achieve 16 input and 32 output channels (expandable to 32/32). This system also uses the NI PXI-1020 chassis with built-in display,

making it a convenient, all-in-one system. The custom Windows API written in NI LabVIEW helps you create, edit, and run complete event sequencing timelines, which contain the output event timing information for each output channel.

B&B Technologies developed the PES-1632 system around commercial off-the-shelf components for easy maintenance and expandability. You also can set up this system to run on any PXI chassis containing one CPU slot and seven or more instrumentation module slots. ■

To learn more about the PES-1632 system, visit ni.com/info and enter nsi3328.



With the Precision Event Sequencer System from B&B Technologies, you gain a complete timing and control solution for a variety of applications.

ni.com/alliance

ISMB Modal Generator Excites Mechanical Structure

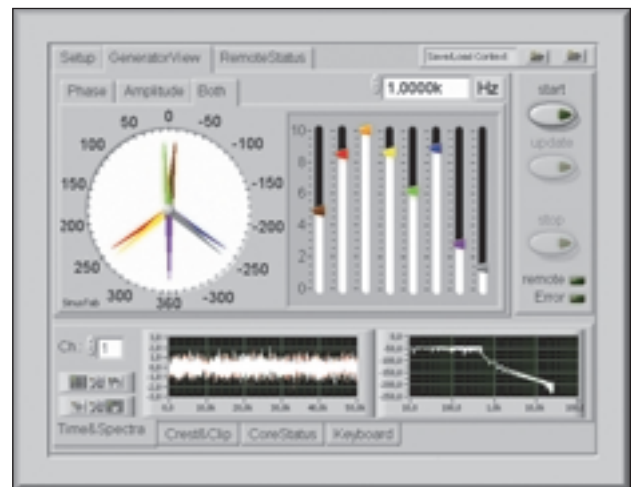
National Instruments Alliance Program member Integrated Structural Dynamics Measurement and Analysis (ISMB) introduces the ISMB Modal Generator. This signal generator is based on NI LabVIEW and an NI 6733 high-speed analog output device. It combines high-end requirements with an easy-to-use, intuitive interface through a touch screen or TCP/IP as a decentralized device in the network.

The ISMB Modal Generator gives you both premium signal quality for excitation types and up to eight simultaneous channels in one device. With this signal generator, you can choose from several excitation modes, including band restricted random noise, sinus, sinus sweep, pulse, and multiphase step sine.

Also, because all signals are high-quality, you can eliminate glitches and protect the structure, shaker, and amplifier during

activation, operation, and deactivation. You also can control the ISMB modal generator remotely and use it as a decentralized source. ■

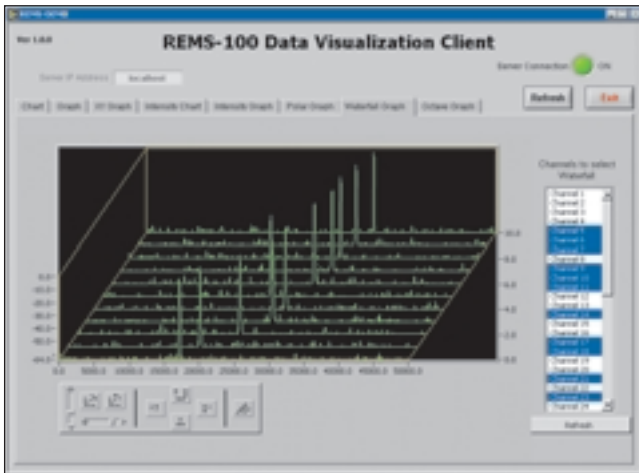
To learn more about the ISMB Modal Generator, visit ni.com/info and enter nsi3329.



The ISMB Modal Generator delivers premium signal quality for excitation types and up to eight simultaneous channels in one device.

ni.com/alliance

REMS-100 Monitors Vibration of Rotating Machinery



With the Cal-Bay Systems REMS-100 series, you can easily configure your monitoring systems.

National Instruments Select Integration Partner Cal-Bay Systems announces the REMS-100 series of fully engineered turnkey systems for easy, intuitive configuration of monitoring systems. With these systems, you can record common parameters such as rms, vibration power, and order-normalized

spectral amplitudes by monitoring a variety of inputs, including ICP accelerometers, gap voltage, shaft displacement, and motor current.

You can use REMS-100 systems, which include the NI PXI-4472 digital signal acquisition module and the NI PXI-6602 counter, to simultaneously acquire rotational velocity measurements with acceleration, velocity, or displacement data from rotating equipment. Using NI LabVIEW interfaces you

can easily configure acquired channels and common calculated parameters, such as rms vibration power and order-normalized spectral amplitudes. REMS-100 system software also uses the NI LabVIEW Order Analysis Toolset to extract orders from acquired data.

The REMS-100 system has a Web-based interface for easy remote configuration and monitoring. You can configure this system to record trends of vibration energy or to include sophisticated plotting capabilities for orbit plots, order spectra, and 3D waterfall plots such as amplitude versus rotational speed versus frequency or order. You can use REMS-100 systems as stand-alone "headless" systems in a NEMA-4 enclosure, or with a monitor, keyboard, and mouse in a 19 in. rack or desktop configuration.

Additional services are available for field start-up, installation, and system maintenance. You can specify this system to comply with API specification 670 for rotating equipment monitoring. ■

For more information on the REMS-100 system, visit ni.com/info and enter nsi3330.

ni.com/alliance

m+p SmartOffice Tools for Noise and Vibration Applications

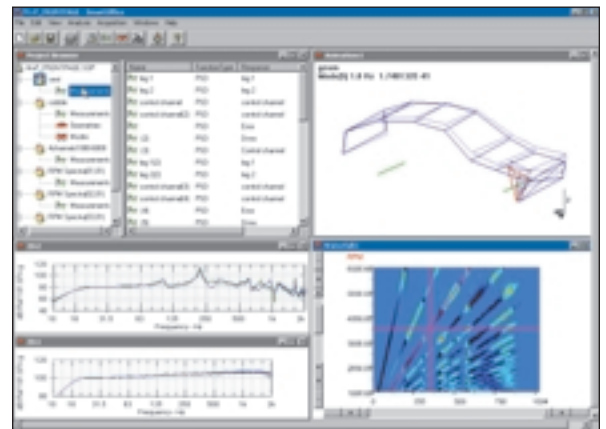
National Instruments Alliance Program member m+p International introduces SmartOffice noise and vibration tools for measurement applications. These intuitive and easy-to-use Windows-based tools work with a variety of standard noise, vibration, and harshness (NVH) data file formats, and include 2D and 3D graphics, animation, ActiveX viewers, wizard-driven acquisition, and analysis and reporting capabilities.

SmartOffice tools support the NI-4472 dynamic signal analysis hardware, which helps you easily configure PCI or PXI systems that have up to 112 input channels. The SmartOffice programming language also gives you unlimited expandability and direct connection with NI LabVIEW.

SmartOffice tools have a variety of measurement functionality such as FRF, auto and cross power, power spectral density,

transfer function, coherence, and auto and cross correlation. These tools include dedicated wizards for impact testing, rotating machinery, acoustics, and digital throughput of time data to disk. SmartOffice tools also include an advanced post-processing wizard that uses real-time displays for time and frequency domain analysis. This wizard can help you create graphics for live and previously recorded signals. Take advantage of complete interactive training offered on SmartOffice from m+p International. ■

To receive a FREE trial copy of SmartOffice, visit ni.com/info and enter nsi3331.



Intuitive SmartOffice tools from m+p International work with a variety of standard noise, vibration, and harshness data file formats.

ni.com/alliance

Upcoming NI Events Around the World



August 13, 14, 15 • Austin, TX USA

Join us for NIWeek 2003, the worldwide virtual instrumentation conference held in Austin, Texas. This annual conference and exhibition provides highly technical information and training for applying virtual instrumentation to design, test, measurement, and control applications. Take a look at what is ahead for NIWeek 2003:

- Meet more than 2,000 engineers and scientists from an array of industries
- Gain application knowledge as industry experts present more than 140 conference sessions
- Discover new products and solutions among more than 200 exhibition booths and pavilions

- Network with NI sales engineers, developers, and executives

Exhibition Hall Features

- Visit three new pavilions: Sensors Pavilion, LabVIEW Design Pavilion, and Analog and Digital Test Pavilion
- Test-drive the newest NI products
- Find solutions for your virtual instrumentation applications
- Participate in the RoboLAB challenge
- Enjoy evening receptions and activities

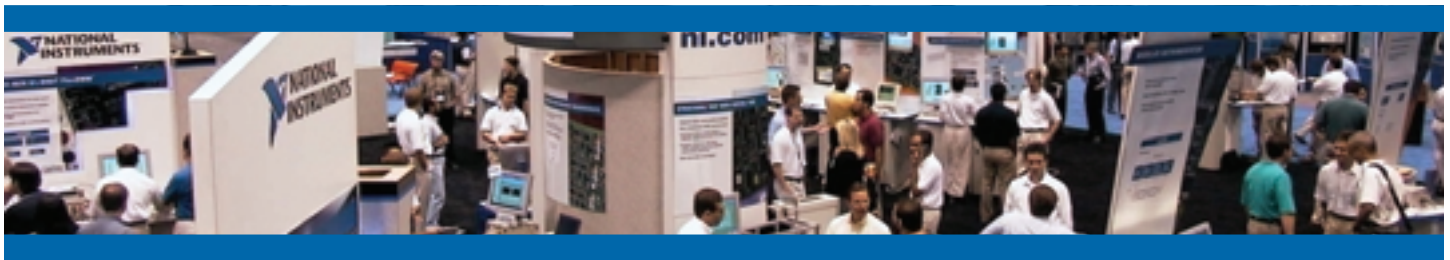
Conference Exhibitors

- System integrators and VARs who integrate NI products into their solutions
- Product vendors involved in design, test, measurement, and control application areas such as sensors, PXI/instrumentation, motion, and test fixture/mass interconnect

Conference Information

Each year, customers, National Instruments Alliance Program members, and educators come together to share ideas and experiences concerning the latest advancements in virtual instrumentation. At NIWeek 2003, choose from more than 140 unique sessions presented by National Instruments engineers, industry specialists, and analysts from companies such as Microsoft, Texas Instruments, and NASA. Sessions focus on products and industry-specific applications including automotive, biotechnology, aerospace, sensors, and design. In the exhibit hall, see products in action and find systems integrators and product solutions to meet your needs. ■

To learn more and register for NIWeek 2003, visit ni.com/info and enter nsi3334.



LabVIEW 7 Express Events Give You the Inside Track

With the launch of LabVIEW 7 Express, NI offers a variety of in-person and online events to bring you up to speed on new LabVIEW features and functionality.

Attend a Live LabVIEW Web Event

NI is hosting a series of Web events highlighting the newest version of LabVIEW and its exciting features and tools. Take advantage of the special sessions for new users, experienced users, and everyone in between. Register now for one of these live question-and-answer sessions and learn how you can benefit from LabVIEW 7 Express. ■

To view topics and register, visit ni.com/info and enter nsi3332.

LabVIEW 7 Express Worldwide Tour Comes to You

Learn firsthand about LabVIEW 7 Express at the LabVIEW 7 Express Worldwide Tour. NI designed these events to illustrate the ease of use for new users and to answer questions for experienced users who need to see the latest enhancements to the LabVIEW environment. Also, meet with NI LabVIEW developers and architects at select events. At this event, you:

- Learn how to streamline your development with Express VIs
- Discover how to capture your data faster with interactive measurement tools
- See how to target your applications to real-time, FPGA, and PDA devices ■

For more information and to register for the LabVIEW 7 Express Worldwide Tour, visit ni.com/info and enter nsi3333.

Acquire, Analyze, and Present with LabVIEW Graphical Development Seminar

This three-hour seminar discusses how you can use LabVIEW to build your test, measurement, and automation applications quickly and easily. Learn about the concept of graphical programming and how you can use it to create powerful instrumentation and data acquisition systems. You also can see six software-based demonstrations and hear user successes from Volkswagen, the Royal Australian Armed Forces, and Virginia Tech. ■

To register for this seminar and other upcoming seminars in your area, visit ni.com/info and enter nsi3335.

ni.com/events

Protect Your PCI Investment with Universal Compatibility

If you have tried to put a PCI board in a new computer and it did not fit, then you have experienced a growing pain associated with the evolution of PCI bus technologies. Computer manufacturers can prevent older 5 V PCI devices from fitting in the computer with the latest revision of the PCI bus standard. New PCI slots now often use the high-performance 3.3 V communications standards.

The Best of Both Worlds

NI recognizes the need to work with the newest, fastest computers for high-performance applications and with older computers for existing, automated measurement systems. Therefore, NI has chosen to revise all of its current PCI products to Universal PCI, which conforms to older 5 V PCI slots, new 3.3 V PCI slots, and even new 3.3 V PCI slot variations such as PCI 66 MHz and PCI-X.

Determine if Your Device is Universal PCI-Compliant

Pick up your PCI board and take a close look at the bottom connector. A single notch in the connector toward the

back of the board indicates compatibility with the older 5 V PCI slots. A single notch toward the front of the PCI board indicates compatibility with all new standard PCI slots. If there are two notches in the PCI connector, then you have a universal PCI board, an ideal solution to protect your investment for years to come. ■

Contact an NI technical expert today at (800) 454-6119 to find out if your next NI product is universal PCI-compliant.

You also can use the Compare Specs tool to find the right data acquisition product to meet your needs. Visit ni.com/info and enter nsi3336.

PCI Slot	5 V Traditional PCI Device	Universal PCI Device
5 V PCI (traditional)	✓	✓
3.3 V PCI	–	✓
3.3 V PCI 66 MHz	–	✓
3.3 V PCI-X 66 MHz	–	✓
3.3 V PCI-X 100 MHz	–	✓
3.3 V PCI-X 133 MHz	–	✓

Universal PCI devices bridge the gap between motherboards built for traditional 5 V devices and the newer 3.3 V PCI devices.

ni.com/daq

National Instruments Acquires MATRIXx Software Family

National Instruments recently acquired the MATRIXx product line, a comprehensive software suite designed for dynamic simulation, control design, system validation, modeling and analysis, and data visualization. It also delivers advanced automatic code and documentation generation capabilities. The product family includes:

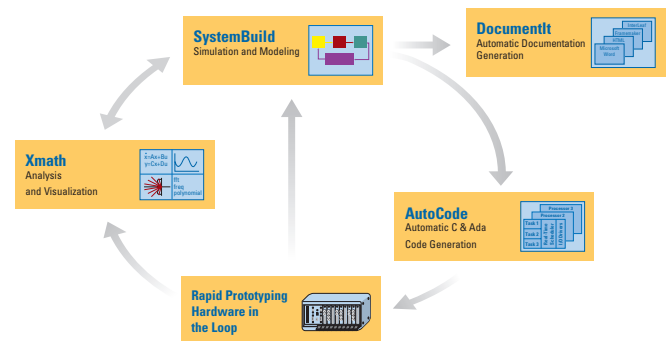
- Xmath** – interactive, matrix-based, analysis and visualization with advanced control design libraries and scripting capabilities
- SystemBuild** – graphical modeling and simulation, interactive capabilities to incorporate user input, and specialized modules for simulation of finite state machines, real-time applications, and artificial neural networks
- AutoCode** – template-based, real-time code generation for floating/fixed-point simulation and continuous/discrete-time simulation; customizable for specific hardware target requirements
- DocumentIt** – automatic documentation generation with template-based model parameter extraction
- Add-On Modules** – application-specific libraries for developing models, algorithms,

and simulations in less time. Automotive leaders such as General Motors, Ford, BMW, DaimlerChrysler, and Honda have implemented MATRIXx in a variety of applications, including engine management, climate control, and vehicle stability management.

Aerospace customers including Lockheed Martin, EADS, Honeywell, Boeing, and NASA use MATRIXx for engine modeling and control and automatic flight code generation. For example, the International Space Station has more than 280,000 single lines of code generated by MATRIXx as part of its guidance navigation and control and environmental control systems.

In addition, engineers and scientists use the software to develop control systems in the semiconductor, biomedical, and advanced research industries.

To help support existing MATRIXx customers, NI recently added a number of new National Instruments Alliance Program



MATRIXx is a leading design and simulation tool for automotive and aerospace automatic control systems.

members that have previous knowledge and decades of expertise with MATRIXx. These companies include Octant Technologies, Opal-RT, ITK Engineering, and Real-Time Innovations, Inc. ■

For more information on the MATRIXx software suite and the National Instruments Alliance Program, visit ni.com/info and enter nsi3337.

ni.com/matrixx

NI Alliance Program Members Deliver New Products

VISTA – Training and Tools for LabVIEW Users

With the release of LabVIEW 7 Express, VI Engineering, an NI Select Integration Partner, introduces updated versions of the VISTA tools and the LabVIEW Advanced Application (LVAAT) training course. VISTA includes training, tools, and templates you can use to address large-scale, complex projects with LabVIEW and also to satisfy your configuration management needs. The principles of VISTA are learning and applying software engineering best practices to the LabVIEW environment. Developers using VISTA for LabVIEW 6.1 achieved an increase in productivity of 20 percent or more. This percentage increased even more dramatically in LabVIEW environments where several people work on similar or related projects.

VISTA begins with a training course to teach the design of efficient, reusable code. With the introduction of new features in LabVIEW 7 Express, such as subVI panels and dynamic events, learning to apply good architecture in LabVIEW application development is simple. When combined with LabVIEW 7 Express, each of the VISTA tools adds significant productivity and quality content to application development. Using the new subVI panel feature in LabVIEW 7 Express, you can embed entire VIs into the front panel of your application, making code reuse almost automatic. Additionally, you can use dynamic events to increase the modularity of your application.

Current VISTA tools offerings from VI Engineering include the LVAAD training course, a set of tools and templates that you can use in configuration management with Microsoft Visual SourceSafe and Rational ClearCase Source Code Control tools, and a suite of tools and guidelines for implementing reuse of LabVIEW in team environments. VI Engineering currently offers the LVAAD training course throughout the United States and Japan through National Instruments and its Certified Training Centers, and soon will offer it in Europe. ■

For more information on VISTA consulting, training, tools, and templates, visit ni.com/info and enter nsi3338.

Developing a Numerical Recorder and Player Utility

National Instruments Alliance Program member SAPHIR introduces TAOS, a scalable, numerical recorder and player utility based on a computer with plug-in boards controlled by NI LabVIEW 7 Express. TAOS_Recorder offers a simple GUI that you can use to set up and trigger recording a continuous stream of multiple channels, clustered in groups of different sample frequencies. With LabVIEW 7 Express, TAOS serves TCP emission of acquired data so that a networked user application can act as a client to analyze signals immediately. TAOS_Player presents complementary modes of time and spectrogram views, so you can search and observe discrete events among large recorded signals. Using the SAPHIR “polyglot” architecture, you can easily localize the TAOS user interface for your own language. ■

To download a fully functional, time-limited evaluation version of TAOS, visit ni.com/info and enter nsi3339.



Using LabVIEW 7 and FiberQA to Enhance Defect Detection

National Instruments Alliance Program member PVI Systems recently upgraded its fiber inspection software, FiberQA, to reduce development time and improve code reuse with the new features of LabVIEW 7 Express. Using the subpanel embedding feature offered with LabVIEW 7 Express, PVI has significantly improved the user interfaces of its fiber inspection software. The defect detection algorithms of FiberQA benefit industries such as automotive, glass, and telecommunications. The fiber inspection software performs image analysis to measure surface defects such as scratches, particles, and chips on metal, plastic, and glass surfaces. ■

For more information on FiberQA and LabVIEW 7 Express, or to obtain news and event information from PVI Systems, visit ni.com/info and enter nsi3340.



Using LabVIEW 7 Express, PVI Systems upgraded its fiber inspection software to reduce development time and improve code reuse.

National Instruments Alliance Partners are business entities independent from National Instruments and have no agency, partnership, or joint-venture relationship with National Instruments.

LabVIEW 7 Express – Get to Measurements Faster



LabVIEW Zone

www.ni.com/labviewzone

LabVIEW Zone – Your Developer Community

Visit LabVIEW Zone today for in-depth LabVIEW 7 Express technical information, including:

- Articles by LabVIEW customers highlighting how LabVIEW 7 Express works for them
- “Inside LabVIEW 7 Express” Web presentations illustrating specific features in this new version
- LabVIEW 7 Express development tips and tricks
- Discussion forums and code sharing with the global LabVIEW user community



DISCUSSION
FORUM



CODE
SHARING



LEARNING
CENTER



USER
GROUPS



ARTICLES



FUN
STUFF



RESOURCES

Upgrade to LabVIEW 7 Express at ni.com/upgrade

Upgrade today to power your applications with:

- Express VIs
- Interactive Instrument Control and DAQ Assistants
- Automatic Code Generation
- Real-Time, PDA, and FPGA Targets

Use the NI Software Upgrade Advisor to determine the right upgrade option for you. Visit ni.com/info and enter nsi3341.

Learn More about LabVIEW Events Online or Near You

- Visit ni.com/info and enter nsi3342 to attend an online Web event showcasing new features in LabVIEW 7 Express
- See “LabVIEW 7 Express Events Give You the Inside Track” on page 27 for more information on LabVIEW Days in locations worldwide
- Come see LabVIEW 7 Express at NIWeek 2003

More Information and Resources

- For a complete listing of recent newsletter issues, other resources, and new product information, visit ni.com/info and enter newsletter
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