

Camera Advisor Provides an Online Machine Vision Resource

In the complex world of machine vision and scientific imaging camera features, specifications, and compatibility issues, where can you turn for guidance based on your vision system needs? With National Instruments Camera Advisor, now available online, you can compare the features for a variety of



Compare scientific and industrial cameras for vision applications using Camera Advisor.

cameras from manufacturers including Sony, Dalsa, JAI, Kodak, Basler, and Cohu to configure a solution for your vision system. It provides 75 technical specifications for more than 100 cameras. The advantage of the Camera Advisor is that it selects solutions

based on your criteria and specifications. You can count on technical information to help you make a selection that easily integrates with the vision system you are building.

Using Camera Advisor, you can search the database of more than 100 cameras and compare and contrast up to four cameras at the same time. You can view the most important features in making your selection and receive compatibility specifications for National Instruments IMAQ products. You also have access to supplemental information about vision systems and can directly link to the camera manufacturer's site.

Learn about progressive scan and line scan cameras and rank cameras based on frame rate, pixel clock rate, sensor size, and physical dimensions. Use this tool to help find the right camera for your application.

Compare Features

In addition to viewing cameras from different manufacturers that meet your specifications, compare camera features in an easy-to-read, side-by-side table. You can also view descriptions

and images of the cameras you are interested in as well as the manufacturer's specification sheet in PDF format. Once you have selected your camera, you can link to the manufacturer directly. Camera Advisor always provides

With Camera Advisor, you can compare industrial machine vision camera features from manufacturers including SONY, Dalsa, JAI, Kodak, Basler, and Cohu.

information about National Instruments image acquisition products that work with the camera you have chosen.

Now you can access the software and files needed to use your camera of choice with National Instruments vision products. Furthermore, you can access links and download systems integrators, software, product information, and application notes. ▶

Visit www.ni.com/camera to access Camera Advisor.

www.ni.com/vision

High-Performance Motion Control Products Released

Advanced motion trajectories, fast proportional integral derivative (PID) control, and sophisticated onboard programming capabilities make the newly released 7344 Series ideal for complex, real-time motion applications. The PCI-7344 and PXI-7344 are high-performance FlexMotion four-axis motion control boards; FlexMotion 4.5 software and the VI Library make using the boards easy enough for a novice. Improvements over previous-generation FlexMotion boards include independent configuration of any axis as servo or stepper, an additional eight bits of digital I/O (32 total), and new end connectors for easier access to digital lines. These are the first motion control boards on the market to have RTSI bus capability for synchronization to DAQ and IMAQ boards.

The MID-7604 and MID-7602 are four-axis and two-axis CE-certified power drives

for stepper motors. These drives are compact, have integral power supplies, and connect seamlessly with all 73xx Series FlexMotion and ValueMotion™ control boards. External switches for all configuration parameters make setup quick and easy, while front-panel status LEDs enable rapid diagnosis of fault conditions.

The UMI-7764 is an enhanced terminal block that simplifies connection of control signals and motion I/O signals (trigger inputs, breakpoint outputs, and analog inputs) when you use third-party power drives. The UMI-7764 is not simply a dumb terminal block, but has built-in inhibit logic and passive signal conditioning. Improvements over the previous-generation UMIs include more intuitive layout and labeling, a separate block for Inhibit All and Shutdown signals, and compatibility with both FlexMotion and ValueMotion 73xx Series motion control boards. ▶



Use the PXI/PCI-7344 FlexMotion boards for your motion control solutions.

For more information, check motion datasheets on the reply card or visit www.ni.com/info/news

www.ni.com/motion

Creating a Test Station with TestStand™

by Heath Buchanan, Engineering Associate,
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Guidance & Navigation Corporation

The Challenge: Automating the testing of a wide range of new and existing DC motor controller circuit assemblies.

The Solution: Developing a test station using National Instruments TestStand, LabVIEW, and PXI products.

Introduction

Kearfott Guidance & Navigation Corporation designs, develops, manufactures, and maintains land, air, sea, and space navigation and guidance products for military and commercial customers worldwide. Kearfott specializes in different DC motor controller circuit assemblies used in a wide range of applications. The circuit assemblies are primarily controllers for three phase brushless DC motors, which are used in a closed loop, position feedback system. In addition, potentiometers are used for position feedback information. The controllers use this and the command voltage to determine the error signal for motor control.

Test Requirements

The test station supplies power and stimulus to the controller. Measurements are then made of certain key parameters. We supply command and position feedback voltages to the controller under test. We then stimulate

TestStand is an excellent tool for bringing together many different LabVIEW programs (VIs) for measurement and automation.

the Hall Effect Device inputs and check the controllers for proper motor output sequencing for different command and position feedback voltages. Power is supplied to the unit, and it measures onboard voltages. We then load the motor outputs to certain current levels, and measure the output FET voltage drops. The controllers use frequency compensation circuitry to tailor the frequency response of the system.



The combination of National Instruments hardware and software simplified test station development.

The user can then examine the step response of the controller with the Test Station.

The Test Station

Using the test station, we can automate testing on many different DC motor controllers. The tests require rapid implementation for new and existing products on a common test platform. We selected National Instruments products for their availability, reliability, and ease of software development and integration. We specified PXI because of its ruggedness over conventional PCs and its low cost. For example, a PXI-8156 embedded computer, using the secure Windows NT 4.0 operating system, controls the test station. It features an Ethernet connection so users can remotely access test data.

We take measurements via two PXI modules.

The PXI-6031E is a multifunction module featuring 64 channels of analog inputs. These channels measure many different voltages of less than 10 V. The eight TTL digital input/output lines simulate Hall input signals for the controller. The two analog outputs provide command and position feedback voltages.

We use the NI 5102 15 MHz digital oscilloscope in conjunction with an NI 2503 PXI switch module to take measurements

greater than 10 V. The NI 2503 is configured in one-wire multiplexer mode with 48 inputs. The multiplexer accesses many different points with the scope. High current switching of the motor outputs is accomplished by using two ASCOR 7010 PXI modules, which each feature eight 10 A relays.

Two GPIB-controlled power supplies provide +6, +25, and -25 VDC and up to 80 VDC. A Hewlett Packard 6050A Programmable DC Electronic Load electrically loads the controllers, permitting versatile loading without the use of many different set-value resistive loads. The MAC Panel L2000 series tests interface products and connects the instruments to the controllers under test.

We programmed the test station operation using National Instruments LabVIEW for all measurements and control of instruments. We used National Instruments TestStand as a test executive to control the automation and documentation of the testing process. We store test results in the computer's hard drive and make them available via the network connection.

Results

Using National Instruments hardware and software, we greatly simplified development of the test station. TestStand is an excellent tool for bringing together many different LabVIEW programs (VIs) for measurement and automation. With PXI, we can create a compact and rugged environment for both the embedded computer and the measurement and control modules. Each PXI module has easy-to-use VIs for straightforward integration of the hardware and software. With these attributes, the user can focus on his primary purpose – to develop a comprehensive test in as short a period of time as possible. ▶

For more information, contact Heath Buchanan, Kearfott Guidance and Navigation Corporation, Rt. 70, Black Mountain, NC 28711, tel (828) 686-3811 ext. 257, fax (828) 686-5764, www.kearfott.com

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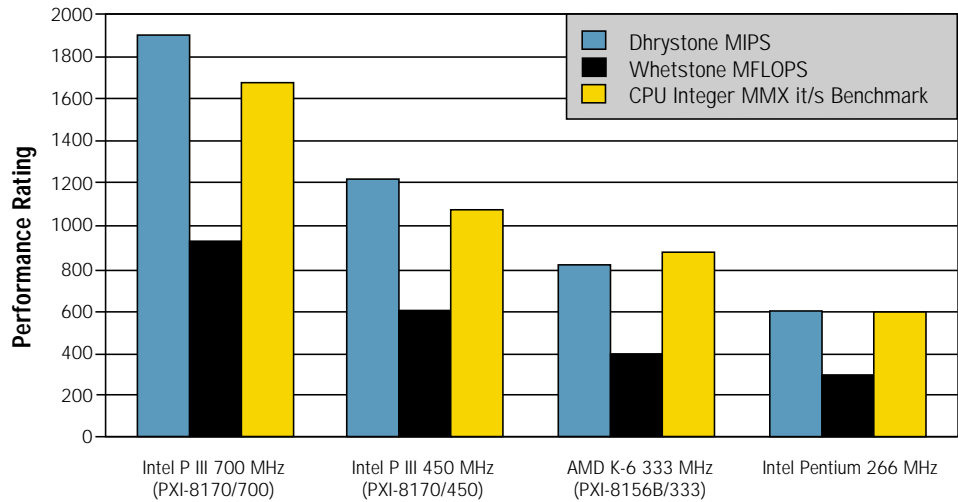
Highest Performance 3U Controller Available Today

To meet the growing needs of PXI and CompactPCI users, National Instruments introduces a series of embedded PXI/CompactPCI computers featuring Intel Pentium III processors for maximum computing power and faster system performance.

The high-performance PXI-8170 Series controllers package the latest 700 MHz and 450 MHz Intel processors into the compact 3U Eurocard size. The controllers operate with all PXI and CompactPCI peripheral modules and are available with Windows 98 or Windows NT installed. PXI-8170 controllers are also available with preloaded National Instruments application software, including LabVIEW and LabWindows/CVI.

High-Performance Processor

The pioneering mechanical design of the PXI-8170 Series features an Intel high-performance Pentium III microprocessor with an Intel BX chipset in a 3U PXI/CompactPCI controller. Users can order these controllers complete with integrated AGP video, 64 MB of 100 MHz SDRAM (upgradable to 256 MB), standard floppy drive, ultra DMA33 hard drive, USB, keyboard/mouse ports, and serial/parallel ports. Intel's 700 MHz Pentium III processor powers the PXI-8170/700. The lower cost PXI-8170/450 uses a 450 MHz Pentium III processor. The PXI-8170 Series controllers also have integrated LCD drive capability

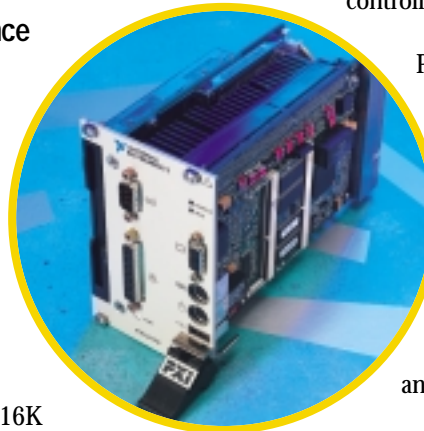


The Dhrystone is a synthetic benchmark program intended to be representative for system (integer) programming. The Whetstone benchmark is a synthetic benchmark program, intended to be representative for numerical (floating-point intensive) programming.

for National Instruments PXI chassis with built-in video displays (model PXI-1020).

Twice the Performance

The PXI-8170 Series controllers deliver more than twice the overall computing performance of National Instruments PXI-8156B Series controllers. The Pentium III processor features a true 32-bit internal architecture, MMX technology, 16K/16K



PXI-8170 Series controller delivers the highest performance 3U PXI/CompactPCI controller available today.

The high-performance PXI-8170 brings the latest PC technology to the modular instrumentation PXI architecture while freeing up your benchtop space because you can integrate your instruments, fixturing, and PC in a single chassis.

nonblocking Level 1 cache, and an integrated 512 K Level 2 (450 MHz version) cache or 256 K of advanced transfer cache (700 MHz version). The chart illustrates the relative processor performance of the PXI-8156B and PXI-8170 embedded controller series using industry-standard benchmarks.

Integrating the full size Pentium III cartridge into the 3U controller was challenging, but now users can build smaller measurement and automation systems without sacrificing performance. National Instruments

About PXI Systems Alliance

The PXI specification is an open industry standard that extends CompactPCI for measurement and automation systems. The PXI Systems Alliance has more than 50 member companies. PXI – a superset of CompactPCI – ensures complete interoperability between PXI and CompactPCI, making available the use of hundreds of CompactPCI modules in PXI systems. ✎

For more information on PXI and the PXI Systems Alliance, visit www.ni.com/pxi

PXI-8170 Options	
Characteristic	PXI-8170
CPU	450 MHz Intel Pentium III 700 MHz Intel Pentium III
Peripherals	1 Serial port 1 Parallel port 1 USB port PS/2 keyboard connector PS/2 mouse connector 4 GB hard drive, minimum 3.5 in. 1.44 MB floppy drive Super VGA with 2 MB DRAM
DRAM	256 MB with upgrades
Operating System	Windows 2000/NT/9x
Pre-Loaded Application Software	LabVIEW or LabWindows/CVI

www.ni.com/pxi

Calibrating Computer-Based Instruments, Part Two

In Part One of this series, we looked at the internal calibration process on traditional and computer-based instruments and discussed the effects of the PC environment on the accuracy of your measurements.

In Part Two, we plan to define external calibration and discuss the different methods available to perform an external calibration of computer-based instruments.

External Calibration

Computer-based instruments, like traditional instruments, use a high accuracy, onboard voltage source to perform internal calibration, compensating for the effects of the measurement environment. After a period of time, typically one year, this onboard voltage source needs calibration. The process of calibrating this voltage source is known as external calibration.

External calibration requires the use of high-precision external standards. During external calibration, the onboard calibration constants are adjusted with respect to these external standards. This type of calibration is reserved for metrology laboratories or other facilities that maintain traceable standards.

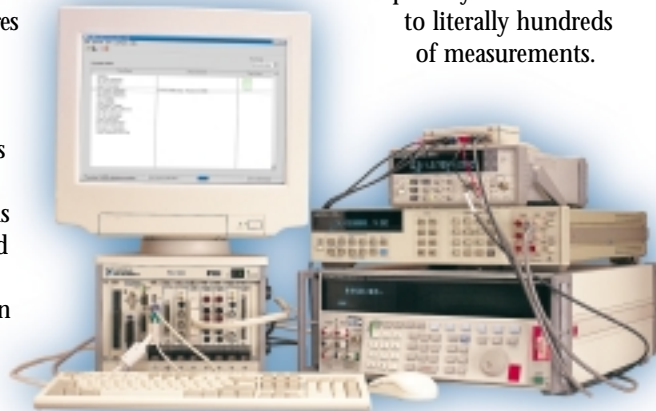
Once an external calibration is complete, the new calibration constants are stored in a protected area of instrument memory and are not available to the user. This protects the calibration integrity from accidental tampering. As with any instrument, the manufacturer must provide the appropriate procedure and calibration software required to perform an external calibration on a computer-based instrument.

Manual and Automated Calibration Procedures

Manual calibration procedures contain step-by-step instructions on how to perform an external calibration on your instrument. These procedures are often available for sale as

part of an instrument's maintenance manual. Manual procedures for National Instruments measurement products are available for download at www.ni.com/calibration

The drawback to manual procedures is that they are often time-consuming to perform because of the lengthy measurement verification process rather than the actual adjustment of the instrument. In order to meet calibration guidelines, you must verify the instrument's performance before and after calibration. This must be done to determine if the instrument is operating within specifications prior to calibration and after calibration. For example, to perform an external calibration on a National Instruments E Series product, you must take three measurements at each gain, range, and polarity. This can lead to literally hundreds of measurements.



The National Instruments Calibration Executive automates this process for metrology labs, significantly reducing the time required to calibrate computer-based instruments. Version 2.0 of the Calibration Executive, recently introduced, is based on National Instruments TestStand, LabWindows/CVI, and IVI products. The Calibration Executive sets and reads external voltage values from the instruments by communicating with external standards via GPIB. These values are then used to verify and calibrate the board. The board specifications are automatically read from configuration files, and a detailed calibration report is generated at the end of the procedure.

This tool is designed to meet the stringent calibration requirements of metrology laboratories. Currently, the Calibration Executive works with the Fluke 5700A calibrator and all digital multimeters (DMMs) with IVI-compliant instrument drivers.

The Calibration Executive automates this process for metrology labs, significantly reducing the time required to calibrate computer-based instruments.

Calibration Services Available

For larger companies with onsite metrology labs, the manual procedures and National Instruments Calibration Executive are available. For companies that do not maintain metrology labs, National Instruments has developed relationships with metrology service companies around the world to provide the services mentioned above. For users in North America, companies can send their computer-based instruments to National Instruments corporate headquarters in Austin, TX, for calibration.

Two types of external calibration certificates are available. One, the basic calibration certificate, provides traceability to NIST (or your local standards institute) and information about the environmental conditions that existed during calibration. The detailed calibration certificate provides the information contained in the basic certificate, plus complete before and after data for each measurement performed. To meet specific guidelines such as ANSI/NCSL Z540-1, which is primarily used by the United States, or the more generally accepted ISO guide 25, detailed calibration certificates are required. ▶

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Choosing the Best Interface for Your Instrument Driver

Choosing the best instrument driver largely depends on the interface that the instrument driver exports and the application development environment (ADE) that you use. There are several popular instrument driver interface types to choose from – LabVIEW programs (VIs), an ANSI C dynamic link library (DLL) with a LabWindows/CVI function panel file, a C++ interface, or a Component Object Model (COM) interface.

COM is emerging as a popular standard for packaging software. You can use an instrument driver that has a COM interface in a variety of ADEs including LabVIEW, LabWindows/CVI, Visual C++, and Visual Basic. While COM is one of the best interfaces to use with Visual Basic, it is not the best interface to use with all ADEs. For example, in LabVIEW it is fairly simple to use an instrument driver that has a COM interface and to access the various methods and properties of that driver. However, it is more intuitive to use a driver that has native LabVIEW VI programs as its interface. Similarly, in LabWindows/CVI, it is easier to use a C-based driver with LabWindows/CVI

function panels than a COM-based driver.

National Instruments is committed to providing customers with the best instrument driver, regardless of their choice of programming language or ADE. IVI-compliant drivers currently available from our instrument driver network – www.ni.com/idnet – already adhere to this philosophy by providing interfaces for LabVIEW and LabWindows/CVI. In the future, these drivers will also have C++ interfaces. Once the IVI Foundation completes its definition for a COM interface to IVI instrument drivers, we plan to update each driver to incorporate a COM interface as well. Therefore, users will have the complete instrument control solution and can choose the best driver interface for their particular applications. ➤



Build interchangeable test systems using IVI.

For more information about National Instruments IVI products, please select the IVI flyer on the reply card or visit www.ni.com/ivi

www.ni.com/ivi

National Instruments Now Offering Linux-Compatible Products

National Instruments traditionally has provided measurement and data acquisition tools on all industry-standard computer platforms. Linux is no exception. National Instruments already offers Linux-compatible products, such as LabVIEW and GPIB instrument control plug-in boards. Now, Linux support for National Instruments products includes the VXIpc™-870 Series of VXI embedded controllers and MXI-2, National Instruments high-speed link between desktop computers and VXI/VME systems.

About Linux

Linux is a free Unix-type operating system with an independent POSIX implementation and includes true multitasking, virtual memory, shared libraries, demand loading, proper memory management, TCP/IP networking, and other features consistent with Unix-type systems.

Linux and National Instruments

Those who use VXI or VME for their test, measurement, and automation needs can now use Linux to control these systems using industry standard NI-VXI™/VISA™. Users who have developed their VXI or VME system with NI-VXI/VISA software can easily port their applications without any modification to Linux using a VXIpc-870 embedded controller or VXI/VME PCI-8026 kit for PC control of VXI/VME systems.

The VXIpc-870 Series, National Instruments fastest VXI embedded controllers, uses an innovative mechanical design to package the high-performance Intel Slot I Pentium II and Pentium III microprocessors in a two-slot C-size unit. The controller comes complete with a standard floppy drive, CD-ROM, Ultra DMA 33 hard drive, PC card expansion, and a number of high-performance peripherals.

The VXIpc-870 also uses the latest chipset technology from Intel and National Instruments high-performance MITE™ and MANTIS™ ASICs to deliver superior VXI and PC performance. With the Slot 1 architecture, users can upgrade the VXIpc-870 CPU as Intel develops faster microprocessors.

With the VXI/VME PCI-8026 kit, users can migrate to PCI-based desktop systems using Linux because NI-VXI/VISA software is standard across operating systems. The kit contains a PCI-MXI-2 plug-in card, MXI-2 cable, VXI-MXI-2 module, and NI-VXI/VISA for Linux. ➤

For more information, visit www.ni.com/linux

www.ni.com/linux

Lexmark – When Speed and Accuracy Matter

by Ed Coleman

The Challenge: Testing printer ink cartridges more accurately while maintaining production volume.

The Solution: Upgrading existing PC-based test instrumentation to use the highly accurate NI 5911 oscilloscope.

Lexmark is a global developer, manufacturer, and supplier of printing solutions, including laser, inkjet, and dot matrix printers and associated consumable supplies for the office and home markets.

At various sampling rates, the accuracy of the NI 5911 oscilloscope surpasses other alternatives for a PC and virtually eliminates stand-alone instrument solutions.

The companies in the highly competitive printer market rely on high volume production and short time-to-market cycles with a critical focus on managing costs to maintain margins. In this environment, test engineers must quickly develop low-cost test systems that keep pace with production. In particular, the total system cost is a concern for Lexmark because the company must deploy the test system for the Inkjet product line in manufacturing plants in Scotland and Mexico and duplicate it several times. For this reason, Lexmark chose a PC-based test solution to test ink cartridges used with the inkjet family of printers including the Lexmark Z11, 3200, Z31, 5700, Z51, and the 5770 models.

Measuring Voltage with a Computer-Based Oscilloscope

Initially, Lexmark used the National Instruments NI 5102 oscilloscope installed in a PC, and developed the tests using LabVIEW. The NI 5102 is a PCI-based oscilloscope featuring 8-bit resolution and a 20 MS/s sampling rate (15 MHz input bandwidth). For testing the ink cartridge, the NI 5102 sequentially measured the resistance of more than 200 inkjet nozzles

on the ink cartridge. The cartridge was stimulated using a custom designed driver card that simulates the voltage waveforms typically generated by the printer. The current is pulled through a single resistor connected to an operational amplifier (Op Amp). The NI 5102 measured the output of the Op Amp.

Another requirement for the test systems is that you cannot stimulate each nozzle longer than 2 μ s.

Otherwise, the nozzle becomes damaged. A PC-based solution, combined with a digitizer, is capable

of acquiring an accurate signal in that 2 μ s window. This results in measurement time that takes less than one second because of the high-speed PCI interface from the oscilloscope to the PC.

Improving Quality with the NI 5911

To improve the quality and increase the production yield, we needed more stringent test requirements. In particular, Lexmark increased the resistance measurement accuracy specification. To meet the new accuracy requirement, Lexmark sought a PC-based oscilloscope with at least 12 bits of vertical resolution at 12.5 MHz to replace the NI 5102. The 8-bit vertical resolution of the NI 5102 yields 2.5 percent accuracy. With the increase in the accuracy specification, we dramatically narrowed the number of available options.

Ultimately, Lexmark chose the NI 5911 flexible resolution oscilloscope. The NI 5911 possesses high accuracy at the required sampling rate, which surpasses other alternatives for a PC and virtually eliminates stand-alone instrument solutions. For the required sampling rate of 12.5 MS/s in the inkjet test, the NI 5911 achieves over 12 bits of vertical resolution for yielding an overall accuracy of 0.006 percent of full-scale range



With the NI 5911 oscilloscope, you can increase your measurement accuracy from 8 to 21 bits by varying sampling rates from 100 MHz to 10 kHz.

satisfying the new requirement. Because the NI 5911, like the NI 5102, is PCI-based, Lexmark maintained the overall test time of less than one second.

Transitioning Made Simple

Although they selected new instrumentation hardware for the test system, Lexmark did not incur significant development delays transitioning to the NI 5911. The LabVIEW test programs written for the NI 5102 did not require modification because both

Using the PCI-based NI 5911 oscilloscope, Lexmark maintained the overall test time of less than one second.

products support a common application programming interface (API).

Using the NI 5911 and LabVIEW, Lexmark increased the quality of their products and production yields and maintained their test performance with minimal development expense. ▶

For more information, contact Ed Coleman, Lexmark International Inc., 740 West New Circle Road, Lexington, KY 40550, e-mail coleman3@lexmark.com

www.ni.com/success

LabWindows/CVI 5.5 Advances C-Based Virtual Instrumentation

National Instruments LabWindows/CVI Version 5.5 is the latest development environment for creating virtual instrumentation using the C programming language.

Built on more than 12 years of innovative technology at National Instruments, LabWindows/CVI Version 5.5 is one of the most powerful text-based programming tools available today for creating measurement applications.

LabWindows/CVI 5.5 delivers many features requested by LabWindows/CVI users, including:

- Multithreading
- Source code control
- User interface enhancements
- Internet connectivity
- User interface localization
- ActiveX automation enhancements
- Simplified report generation
- Integration with Visual C++ and Visual Basic

Complete Multithreading Functionality

Because multithreaded applications are difficult to develop, most programmers do not take advantage of this technology when building applications. However, LabWindows/CVI 5.5 multithreading

Total Number	Time	Operator ID	Result	Mean 1	Mean 2
1	9/22/99 12:51:49	513	✓	8.95	12.34
2	9/22/99 12:51:49	518	✓	8.74	3.87
3	9/22/99 12:51:49	412	✗	8.86	11.19
4	9/22/99 12:51:49	812	✓	8.18	2.29
5	9/22/99 12:51:49	L6	✗	8.47	6.15
6	9/22/99 12:51:49	Y13	✓	8.87	12.98
7	9/22/99 12:51:49	M7	✓	8.52	6.74
8	9/22/99 12:51:49	617	✓	8.54	6.96

technology is built into the programming environment and gives you a simplified model to take advantage of more efficient CPU usage, better user interface response, and improved performance. With only one function call, you can create a multithreaded application. If you have more complex needs, you can also use libraries to create thread buffers that can pass data through your application. Because the compiler and debugger are multithreaded, you never have

to leave the environment to create and debug a complete multithreaded application.

Integrated Source Code Control

Many applications require teams of programmers to rapidly develop a complete system. Now with integration into standard source code control environments such as Visual Source Safe and Perforce, several programmers can work on the same application without worrying about accidental file loss. With the source code control integrated into the environment, you do not have to launch a separate application to check in and out your code.

User Interface Enhancements

LabWindows/CVI 5.5 delivers a comprehensive table control to display your array data, whether it is numbers, strings, pictures, or all three.

Internet Connectivity

With the addition of DataSocket™ to LabWindows/CVI, you can harness the power of the Internet to broadcast, exchange, and control measurement data between a measurement system and an unlimited number of subscribing applications or Web pages. With the simplified use of the standard URL address format, DataSocket simplifies the immediate distribution and control of live data across the Internet to Java Applets, LabVIEW, Web pages, or many other forms of applications. DataSocket also uses an event driven model to exchange data, optimizing the transfer of data via the Internet and cutting down on network traffic, all of which makes your application truly responsive to data changes or user interaction.

User Interface Localization

With the emergence of the global market, it becomes more important for you to translate your applications into customers' native languages. In LabWindows/CVI 5.5, you can translate user interface text and make it load the appropriate file at run time. This

cuts down on hours of localization time, and helps extend your application into emerging markets.

Improved ActiveX

LabWindows/CVI 5.5 enhances its ActiveX automation capabilities by adding dual interface support and event compatibility. Events can notify you of other applications

LabWindows/CVI Version 5.5 is the most powerful text-programming tool available today.

activities, thus improving communication and control of another application from inside your LabWindows/CVI application. Dual interface support improves performance when talking to DLL automation servers.

Simplified Report Generation

LabWindows/CVI 5.5 offers new enhancements for users who need professional text reports instantaneously. You can now programmatically set margins, add headers and footers, and save or print sophisticated test reports easily.

Integration with Visual C++ and Visual Basic

LabWindows/CVI 5.5 is now part of Measurement Studio, the complete package for any text-based programmer. National Instruments worked with Microsoft to integrate LabWindows/CVI functions into Visual C++ and Visual Basic. For the same price as LabWindows/CVI alone, you now receive a complete package for programming in all three languages. To help you integrate your existing LabWindows/CVI applications with Visual C++ applications, a wizard converts your project into a Visual C++ project. To learn more, please see the Measurement Studio article on page 1. ➤

For more information, please check LabWindows/CVI white paper on the reply card or visit www.ni.com/info/news

www.ni.com/mstudio

Measurement Studio Bolsters Analysis Capabilities

National Instruments Measurement Studio – integrated measurement tools for developing custom test and measurement applications with common text-based programming languages – offers high-level software building blocks for all aspects of measurement, including data acquisition, analysis, and report generation. This article highlights several key features of the software that make it an ideal choice to assist with your development of the analysis portion of your custom measurement applications.

Software Choices for Common Programming Languages

The analysis capabilities of Measurement Studio are easy to deploy, regardless of your particular language choice. National Instruments software engineers have designed each Measurement Studio component to harmonize with the style and constructs of the programming language at

hand. For example, Measurement Studio draws on the features of Visual C++ to automate array manipulation. ComponentWorks relies on class constructors and destructors for certain types of analysis functions. As such, the software can automatically handle memory allocation with data types and analysis functions that require dynamic memory allocation.

Analysis Tools Given Greater Functionality

The software uses function overloading, which simplifies programming. Because of

National Instruments software engineers have designed each Measurement Studio component to harmonize with the style and constructs of the programming language at hand.

this feature, you can call up C++ functions with parameters of various types, and the library automatically invokes the appropriate version of a routine. For example, when you apply the Invert function to calculate the inverse of a matrix, the library automatically chooses the appropriate algorithm for this operation depending on whether the matrix is real or complex.

Ease of use does not mean much if the software does not include the analysis tools you need now and in the future. Each component of Measurement Studio includes

Measurement Studio Analysis Features
1D and 2D array operations and manipulation
Frequency analysis
Statistics
Vector and matrix algebra
Curve fitting
Interpolation
2D and 3D visualization
Digital filtering

an extensive set of tools for analysis and signal processing. Highlights of these features are in the above table, and a complete function

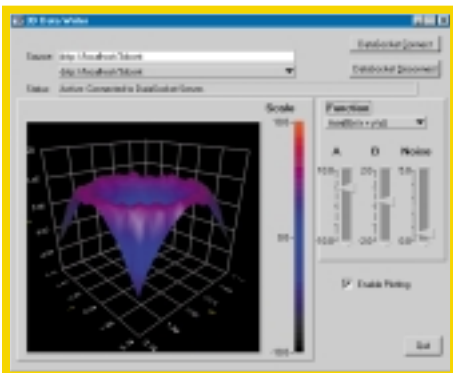
list is available at www.ni.com/analysis

Each of the three Measurement Studio components use an extensive library of analysis and digital signal processing (DSP) tools with high-level functions for data

acquisition, instrument control, visualization, and report generation. With this breadth of measurement-related analysis tools, you can quickly build custom test and measurement applications with extensive analysis and signal processing capabilities. ▶

Sam Shearman
Signal Processing and Analysis Software
Product Manager

www.ni.com/analysis



Build Measurement Studio applications with features such as 3D data visualization.

New Measurement Studio Courses Keep You Productive

We are announcing two new hands-on courses – LabWindows/CVI Basics I and Basics II – to help you explore the power of Measurement Studio.

LabWindows/CVI Basics I examines the basics of the LabWindows/CVI 5.5 environment including automatic code generation, function panels, building a graphical user interface, and debugging tools such as tool tips, variable watches, and interactive execution.

We updated the Basics II class to cover the latest technologies in LabWindows/CVI 5.5. New user interface topics include menu bars, toolbars, table controls, and creating your own custom controls. In addition, we cover more interapplication topics, including communication over TCP/IP, live data transfers using DataSocket, and ActiveX. We also discuss dynamic link libraries (DLLs), multithreading, and interfacing with other development environments.

These new technologies make the LabWindows/CVI Basics II course perfect to prepare you for large-scale applications. ▶

For more details visit www.ni.com/custed or call us at our new toll-free number (888) 484-4436.

www.ni.com/custed

Get Connected at NIWeek™ August 16-18, 2000

Learn about the latest computer-based technologies that help you test products faster, reduce development time, shorten time-to-market, and improve the bottom line at NIWeek 2000.

In addition to visionary keynotes, workshops, tips, and techniques, this year's conference features expanded advanced and hands-on sessions as well as a greater focus on the latest in computer technology. In addition, the Automotive Measurement and Automation track boasts a full day of presentations, case studies, how-to sessions, and networking with automotive industry

engineers and managers. Also new in 2000 are special managerial sessions focused on enterprise solutions. For more information about the NIWeek 2000 technical program, visit www.ni.com/niweek

Call for Papers

Share your innovative applications of computer-based measurement and automation with colleagues around the world. We invite you to submit a paper to the NIWeek 2000 Best Applications of Measurement and Automation Contest. All abstracts are due April 7, 2000. Papers are due May 5, 2000.

To request an author's packet, send an e-mail to paper.contest@ni.com or fax (512) 683-5759.

Calling All Exhibitors

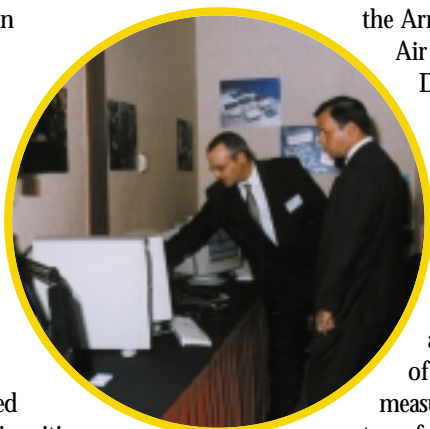
Find the latest computer-based measurement and automation products and services for your applications at the NIWeek exposition. Interested in exhibiting? It's not too late to reserve booth space at NIWeek 2000. To request an Exhibitor's Prospectus, visit www.ni.com/niweek

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HRH Prince Faisal bin al-Hussein Opens NIDays Jordan

We held NIDays Jordan in Amman on Sunday, November 21, 1999.

Hosted by National Instruments distributor, Technology Integration, we welcomed the Patronage of his HRH Prince Faisal bin al-Hussein to the opening of our three-day event. His HRH toured the exhibit, which included participants from local universities, colleges, and the Royal Scientific Society. About 80 people attended the opening from



the Armed Forces, Royal Air Force, Civil Defense Department, local industries, and universities. After touring the exhibit, his HRH commented on the exhibit to attendees from the Kingdom of Saudi Arabia and Qatar. His HRH spoke about the specific benefits of computer-based measurement and automation systems for different entities. Two local newspapers as well as three local TV stations covered the event in Jordan.

National Instruments held NIDays across the Americas, Asia, and Europe throughout the autumn 1999. NIDays 99 are one-day technical conferences packed with technical sessions that include in-depth training on our hardware and software products. You gain critical information for your current and future applications. ❧

For more information, contact Monah Fakhoury at Technology Integration, P.O. Box 1788, Amman, Jordan 11118, tel (962) 6464-9345, fax (962) 6464-4145, e-mail techint@firstnet.com.jo

www.ni.com/nidays

Windows 2000 Ships

On December 15, 1999, Microsoft announced the release to manufacturing of the Microsoft Windows 2000 Professional, Windows 2000 Server, and Windows 2000 Advanced Server operating systems. After almost four years of development and testing, Microsoft confirmed that Windows 2000 meets expectations for scalability, performance, reliability, and software quality. You can find Windows 2000 in stores on February 17, 2000.

Windows 2000 gives you a platform for building reliable, highly scalable, and

distributed applications. It also provides a comprehensive and integrated set of capabilities including ActiveX and COM+ component services, database access, security, expanded hardware support, built-in networking, integrated Web browsing, and a high performance Web server. You can quickly build state-of-the-art measurement and automation applications with Windows 2000 and National Instruments products. Windows 2000 is an ideal platform for the next generation of computer-based applications and addresses the full range of your PC computing

requirements, from laptops and desktops to engineering workstations and servers.

You can find details on these and other performance results on Microsoft's Web site at www.microsoft.com/windows2000. National Instruments is testing the final release of Windows 2000 Professional to ensure compatibility with LabVIEW, DAQ, GPIB, and many other National Instruments hardware and software products. ❧

www.ni.com/tech2000

LabVIEW Driver Available for Cascade Microtech Probe Stations

Microsys Technologies, an Alliance Program member, has developed the Summit Series LabVIEW Integration Toolkit. With this toolkit, which includes a comprehensive driver for the Cascade Summit Series semiautomatic prober, semiconductor test engineers can completely integrate and automate their wafer test processes.

The Summit Series toolkit empowers the semiconductor test engineer to take advantage of the many benefits of LabVIEW. By using the toolkit to integrate the Cascade probers, you can combine measurements made with computer-based instruments with the control of the prober to completely automate wafer

test applications. You can also use the flexibility of LabVIEW to integrate machine vision, statistical process control, and other technologies into the application. Benefits of the Summit Series Toolkit include:

- Effortless integration of measurement software with prober station control
- Complete automation of wafer test procedures
- Rapid, easy-to-use test development
- Fully customizable solutions

The Summit Series LabVIEW Integration Toolkit is compatible with Windows 95 and LabVIEW 5.x. It works with both the GPIB and dynamic data exchange servers of the

Cascade PCS. The toolkit comes with an instrument driver, several sample programs, an automated installation utility, online help, and an operating manual.

Microsys Technologies Inc. develops automated test systems for the RF/microwave, automotive, and telecommunications industries. ❧

For pricing and more information, contact Cascade Microtech, tel (800) 550-3279, e-mail sales@cmicro.com, www.cascademicrotech.com or Microsys Technologies, tel (905) 761-5250, e-mail coreym@microsys.com, www.microsys.com

New Server Version of LabVIEW Technical Resource

LabVIEW Technical Resource, the quarterly journal written by and for LabVIEW users and developers, recently released the Server Version of the *Library of Back Issues* on CD. Organizations with a large number of LabVIEW users can now make these back issues available via their internal networks. Consequently, the Server Version simplifies the ordering and distribution of this valuable technical resource.

The *LabVIEW Technical Resource Library of Back Issues* CD Vol. 1-6 Server Version includes the contents of more than 20 issues



and resource disks published by LTR Publishing since 1993. Using an online LTR

search engine, users can easily browse through more than 150 articles and access virtual instruments for specific topics about LabVIEW programming using the custom download utility. ❧

For more information, contact LTR Publishing Inc., 6060 N Central Expwy, Ste 502, Dallas, TX 75206, tel (214) 706-0587, fax (214) 706-0506, e-mail ltr@ltpub.com, or visit www.ltpub.com to download a sample issue.

Wireworks West Develops LabVIEW Toolkit

With the Wireworks West Simple Network Management Protocol (SNMP) Toolkit, LabVIEW users can quickly build programs (VIs) for testing SNMP-managed equipment. These

VI programs exercise the MIBs of SNMP-compliant devices or use SNMP in test sequences to configure and monitor devices during other types of testing. The package also handles the design of network performance applications, fault



monitoring applications, and SNMP server agents that reside on remote entities. The toolkit contains the following SNMPs – get-request, set-request, get-next-request, get-response, and trap – along with a set of demonstration and simulation programs that show how to incorporate the SNMP routines into a network test system.

The SNMP toolkit is a library of LabVIEW VI programs which encode and send SNMP request messages and receive and decode SNMP response messages. Users can directly access all the

information sent and returned in an SNMP packet, including the community name, the variable syntax, the error status, and the error index. Such information is a critical component for the diagnosis of network problems and testing of network entities.

The SNMP Toolkit retains the original LabVIEW cross-platform feature, which you can use on any platform that includes the UDP VI programs. The Windows toolkit includes an MIB compiler. ❧

For more information about this product, contact Wireworks West, 7186 Bluegrass Court, Boulder, CO 80301, tel (303) 530-2640, e-mail chris@wireworkswest.com

DRIVE™ Automotive Systems Get PXI Upgrade

Datappli, Inc. is redesigning two of its core data acquisition (DAQ) systems to improve power and flexibility and reduce costs for their customers. To accomplish this task, Datappli selected National Instruments PXI/Compact PCI modular instrumentation hardware. The hardware improves overall system performance, increases speed, and reduces cost.

Datappli's revamped line of DRIVE products includes the new DRIVE-BP™ brake performance system. This system acquires in-vehicle dynamic braking data

as it relates to brake performance testing. It also monitors data from several types of vehicle transducers and sensors that use different sensing technologies. The PXI solution provides a robust, modular system that withstands harsh operating environments and rough handling needed by the automotive test industry.

The PXI performance and mechanical integrity is the ideal platform for the new family of DRIVE products. The rugged, portable format provides a modular instrumentation solution making the BP

system easy to configure and deploy in any vehicle. The PXI solution also provides the user with vital system component portability. The PXI-8150B Series controller module is easily removed from the vehicle, so users can analyze post-processing of data in a more conducive environment. ▸

For more information, contact Datappli, Inc., 21314 Melrose Ave, Southfield, MI 48075, tel (248) 353-5212, fax (248) 353-4913, e-mail niteam@datappli.com, www.datappli.com

NI-Based System for Emissions Testing

Quantum Controls, an Alliance Program member, is offering EmissionsView, a LabVIEW and SCXI-based solution for automotive emissions testing. Over the past several decades, the Environment Protection Agency (EPA) has placed increasingly stringent emissions standards on the automotive industry. EmissionVIEW addresses these requirements by analyzing vehicular exhaust for hydrocarbons, carbon monoxide, oxides of nitrogen, and carbon dioxide in both batch mode and real time.

EmissionsView communicates with the Rosemount NGA analyzers over LonWorks to collect data. It also controls analog inputs, analog outputs, and digital I/O modules



through an SCXI chassis mounted on the emissions bench. The bench itself supplies 0-5 VDC for each analyzer and includes Ethernet connectivity to a host cell computer.

You can also apply EmissionsView in other markets including offroad vehicles, diesel engines, aircraft engines, fixed exhaust stacks, and others where the EPA Code of Federal Regulations apply. ▸

For more information, contact Quantum Controls, Inc., 44747 Helm Ct, Plymouth, MI 48170, tel (734) 414-1900, fax (734) 414-1911, e-mail grimes@quantumone.com, www.quantumone.com

IVI Update

From November 2-5, 1999, Rohde & Schwarz hosted the IVI Foundation meetings in Munich, Germany. More than 62 people attended the meetings representing most of the members of the Foundation. At the meetings, the members finalized the revisions to the specifications for digital multimeters, oscilloscopes, switches/matrices, arbitrary waveform/function generators, and DC power supplies. They later approved those specs through an official vote. The Foundation members also continued discussions for defining a COM interface to IVI drivers and demonstrated prototypes of

two COM-based oscilloscope drivers. Finally, nine new member companies were welcomed to the Foundation, bringing the total membership up to 44 companies.

National Instruments plans to host the next IVI Foundation meetings in Austin, Texas in February 2000. ▸

For more information about the IVI Foundation and its recent press conference materials, visit their Web site at www.ivifoundation.org or select the IVI flyer on the reply card.

Reference

"Virtual Measurements," by James T. Truchard, *Research & Development*, June 1999. **A1646**

"National Instruments Takes Aim at Test and Measurement Field," by Alan R. Elliott, *Investor's Business Daily*, October 1999. **A1647**

PXI Alliance Update

As the PXI marketplace grows, the PXI Systems Alliance continues to serve its members and PXI users by providing a forum for promotion and further development of the PXI standard.

At their recent meeting held in Munich, Germany, PXI Alliance members voted to create a new sponsor membership level to help fund professional administration of the Alliance. Bode Enterprises was selected as the management firm to handle incorporation, provide business hour service, manage the accounting and dues collection, and maintain the Web site. In addition, several new members were also introduced at the Alliance meeting, bringing total membership to 54 companies. ✎

For more information on the PXI Systems Alliance, visit www.pxisa.org or select the PXI Systems Alliance brochure on the reply card.

www.pxisa.org

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Learn about the new features of LabWindows/CVI 5.5 including multithreading, source code control, and Internet connectivity. Read more on page 19.



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Printed in the USA

Look for the National Instruments booth at these upcoming trade shows:

Embedded Systems – Nürnberg, Germany	Feb 16-18	Vision Show – Boston, MA	April 4-6
Nepcon West – Anaheim, CA	Feb 29-Mar 2	Nepcon Exhibition – Birmingham, UK	April 4-6
Embedded Systems – Chicago, IL	Feb 29-Mar 2	Opto Southwest – Albuquerque, NM	April 10-11
SAE – Detroit, MI	Mar 6-9	ISA Alberta – Edmonton, Alberta	April 12-13
Control and Instrumentation – Birmingham, UK	Mar 9-11	Board Computer 2000 – Tokyo, Japan	April 19-21
Pittcon – New Orleans, LA	Mar 13-16	Rocky Mtn. Tech. Expo – Denver, CO	April 26-27
KOFA 2000 – Seoul, Korea	Mar 13-17	Offshore Technology – Houston, TX	May 1-4
Drivers and Control – Telford, UK	Mar 14-17	Nepcon Philadelphia – King of Prussia, PA	May 3-4
Hannover Messe – Hannover, Germany	Mar 20-28	Sensors Expo – Anaheim, CA	May 9-11
International IC China 2000 – Shenzhen, China	Mar 23-24	ISA Toronto – Toronto, ON	May 9-10
Salon Solutions Vision – Paris, France	Mar 28-30	MicroElettronica – Vicenza, Italy	May 11-13



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