

# NI RIO Technology

**Intel Core i7 Processor  
on NI CompactRIO**  
Adding Multicore Processing Power

**NI Single-Board RIO  
Gets Smaller**  
Taking RIO to Smaller Embedded Devices

**Custom Instrumentation  
With FlexRIO**  
Bringing FPGAs to High-End Applications

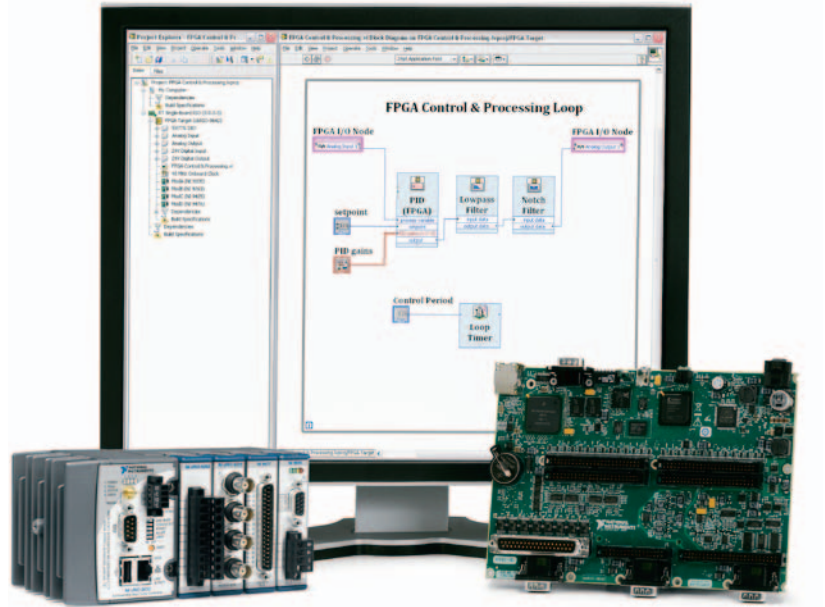
## New NI RIO Hardware Products

From Design to Test With  
a Standard Technology Platform

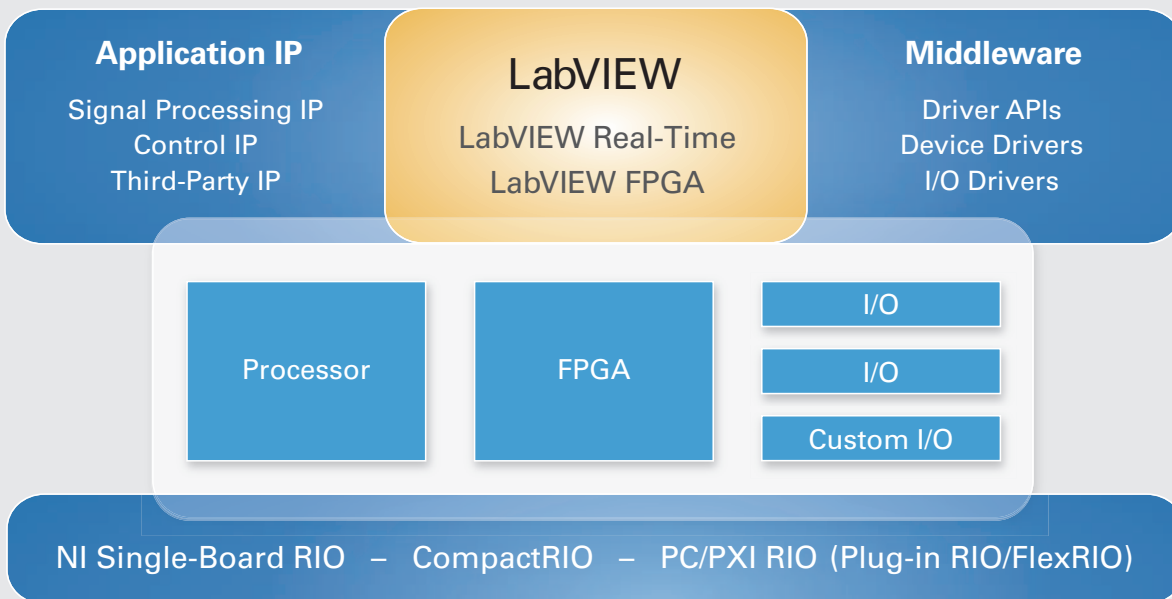


# From Design to Test With a Standard Technology Platform

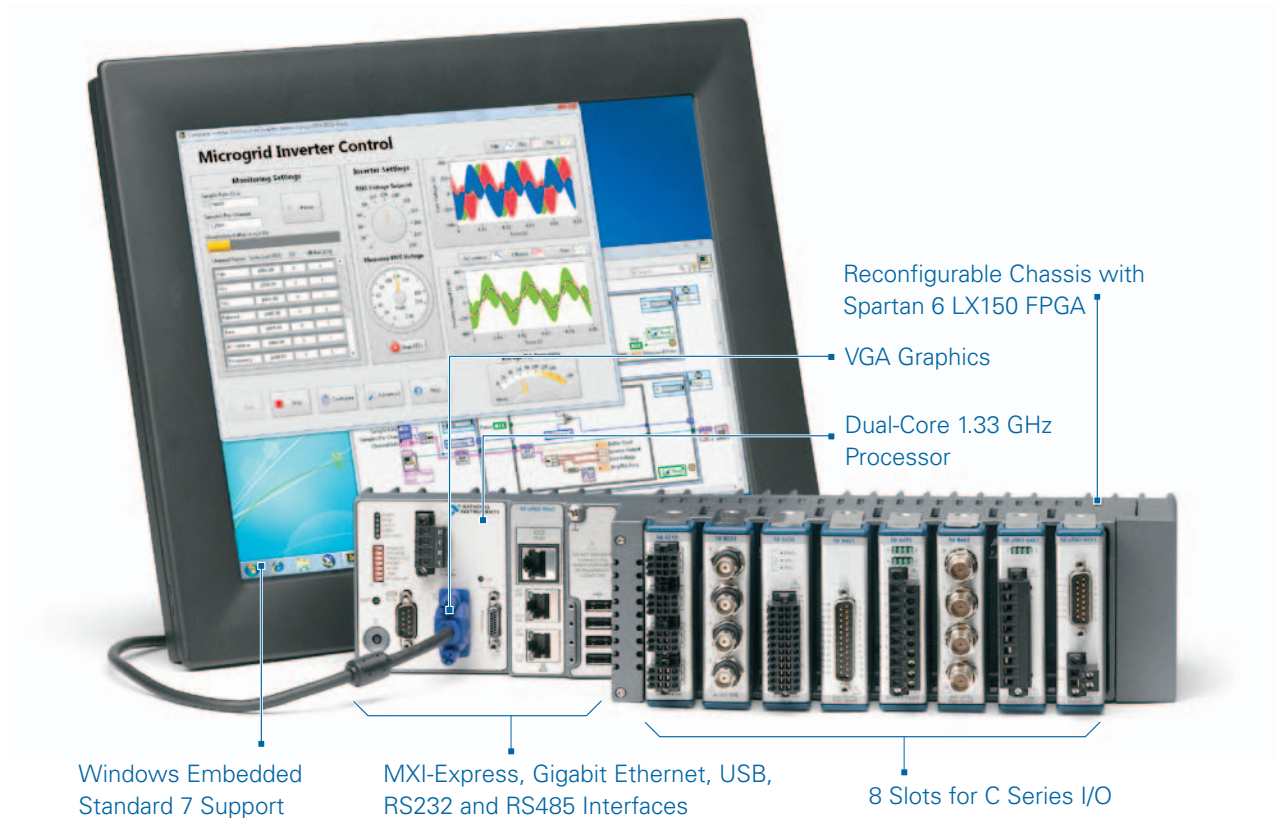
An integral part of the NI graphical system design platform, NI RIO technology combines NI LabVIEW software with commercial off-the-shelf hardware to simplify development and shorten time-to-market when designing advanced control, monitoring, and test systems. NI RIO hardware, which includes CompactRIO, NI Single-Board RIO, R Series boards, and PXI-based NI FlexRIO, features an architecture with powerful floating-point processors, reconfigurable field-programmable gate arrays (FPGAs) and modular I/O. All NI RIO hardware components are programmed with LabVIEW to give engineers the ability to rapidly create custom timing, signal processing, and control for I/O without requiring expertise in low-level hardware description languages or board-level design.



## RIO Technology Platform

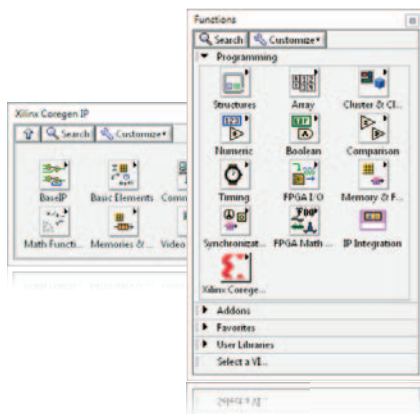


# New Multicore CompactRIO Featuring Intel Core i7



The high-performance multicore cRIO-908x systems provide advanced Intel Core i7 dual-core processing, built-in VGA display output for an integrated user interface, and the option to use a Microsoft Windows Embedded Standard 7 (WES7) or LabVIEW Real-Time OS. The increased processing power of the cRIO-908x systems makes them well suited to perform the advanced processing tasks required by complex control and monitoring applications, such as rapid control prototyping for control systems within renewable energy and automotive industries and autonomous vehicle control. LabVIEW graphical system design software can be used to program the high-performance multicore processor and the reconfigurable Xilinx FPGA embedded with the cRIO-908x systems allowing for fast prototyping and deployment of these CompactRIO systems. Choose WES7 to take advantage of the extensive Windows ecosystem of software and display capabilities made possible by LabVIEW. The high-performance multicore cRIO-908x systems also provide the widest array of connectivity and expansion options available in the CompactRIO platform, including the high-bandwidth and low-latency MXI-Express bus for expansion using the 14-slot MXI-Express RIO chassis.

[ni.com/compactrio](http://ni.com/compactrio)



## Develop FPGA Code More Efficiently With the NI LabVIEW 2011 FPGA Module

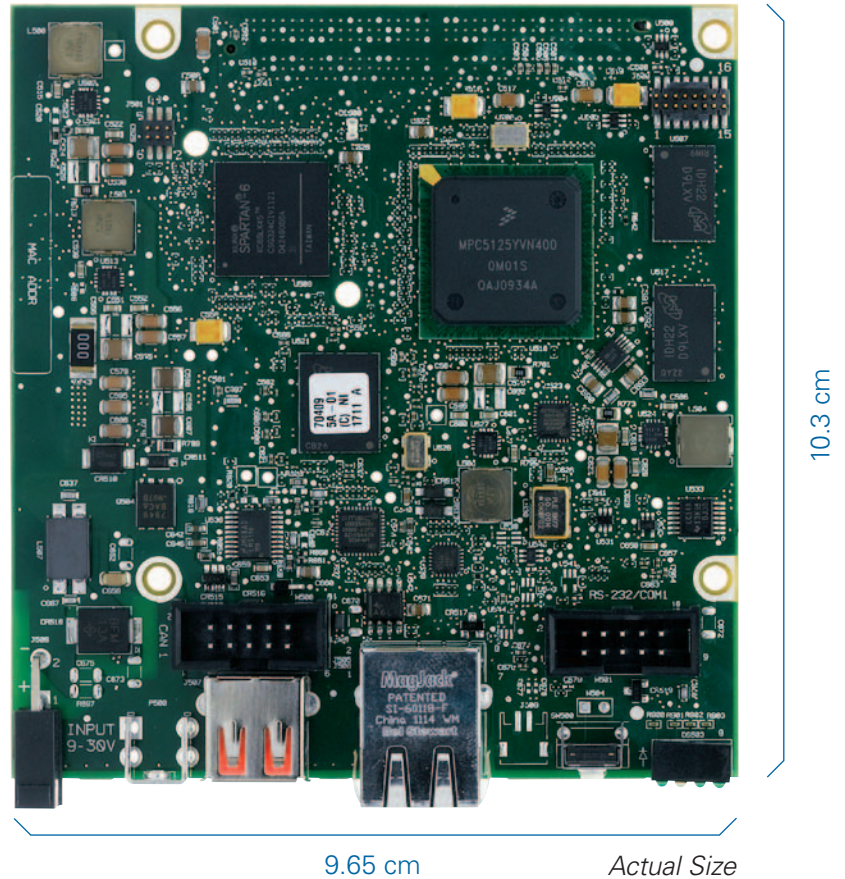
- Simplified CORE Generator IP Access: Retrieve selected Xilinx CORE Generator IP blocks directly from the LabVIEW FPGA palette
- More Efficient Development: Take advantage of edit-time performance optimizations to reduce programming time
- Expanded Options for Cycle-Accurate Simulation: Simulate LabVIEW FPGA code using ISim and create LabVIEW test benches for ModelSim simulations

[ni.com/labview/fpga](http://ni.com/labview/fpga)

# New NI Single-Board RIO Products Make RIO Even Smaller

- 400 MHz real-time processor and Spartan-6 FPGA on a single board
- Up to 256 MB DRAM and 512 MB nonvolatile storage
- RIO mezzanine connector for direct FPGA I/O access and customization
- Built-in RS232 serial and Ethernet with available CAN and USB

[ni.com/singleboard](http://ni.com/singleboard)



## NI FlexRIO FPGA-Based Custom Instrumentation

- Virtex class FPGAs for high-performance algorithms in PXI
- Analog I/O up to 16 bits, 250 MS/s, or 32 channels
- Digital I/O up to 1 Gb/s (500 MHz) or 54 channels
- Peer-to-peer data streaming up to 800 MB/s (FPGA to FPGA)
- Adapter Module Development Kit for user-defined hardware

[ni.com/flexrio](http://ni.com/flexrio)

## New NI RIO Frame Grabber With On-Board Image Processing

- Places FPGA in image path for on-board pre-processing and control applications
- Programmed using LabVIEW FPGA
- New PCI-Express form factor offers cost-effective deployment option complementing FlexRIO prototyping platform options
- Ideal for high-throughput systems in medical imaging, food sorting, semiconductor wafer alignment, flat panel display inspection, and more

[ni.com/vision](http://ni.com/vision)



# Customer Success From Design to Test

By combining the productivity of NI LabVIEW system design software with a standard, high-performance hardware architecture, engineering teams can leverage NI RIO technology for applications spanning from designing embedded control and monitoring systems to high-performance test systems.

Embedded



## Embedded FedEx Fire Suppression System Using NI LabVIEW and NI Single-Board RIO

“We were able to rapidly prototype our system for FedEx with LabVIEW and CompactRIO and create a final deployed solution with NI Single-Board RIO – all in under one year.”

— *Jeremy Snow, Ventura Aerospace*

## Using Graphical System Design to Rapidly Develop a Low-Cost Device for Helping Premature Infants Learn to Oral Feed

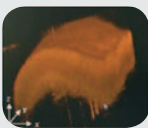
“With LabVIEW and NI CompactRIO, we were able to reduce our development cost by \$250,000. In addition, we were able to reduce our development time from four months to four weeks, and avoid the necessity of developing custom control software and drivers.”

— *Daryl Farr, KC BioMedix*

## Powering Remote Villages With Revolutionary Airborne Wind Technology Using NI CompactRIO

“The seamless interface between the CompactRIO and the NI LabVIEW development environment offers a turnkey hardware/software solution with very little learning required.”

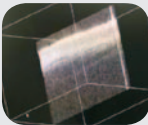
— *Matt Bennett, Windlift*



## Developing the World’s First Real-Time 3D OCT Medical Imaging System With LabVIEW and NI FlexRIO

“We leveraged the flexibility and scalability of the PXI platform and NI FlexRIO to develop the world’s first real-time 3D OCT imaging system. We used LabVIEW to program, integrate, and control the different parts of the system, combining high-channel-count acquisition with FPGA and GPU processing for real-time computation, rendering, and display.”

— *Dr. Kohji Ohbayashi, Kitasato University, Graduate School of Medical Science*







## Using NI FlexRIO to Develop a Cost-Effective Solution for 3D and HD Video Test

“Using NI FlexRIO, we were able to focus our effort on the video test application. We estimate that we developed a complete product for several applications in approximately half the time it would have taken to develop a fully custom solution.”

— *Mauro Arigossi, Alfamation*

Test

## NI RIO Hardware Platform

	CompactRIO and NI Single-Board RIO			PXI/PCI RIO
				
	Value	Ultra Rugged	Performance	High Performance
Processor performance	Up to 400 MHz	Up to 800 MHz	Up to 1.33 GHz Dual-Core	Up to 2.26 GHz Quad-Core
FPGA performance	Up to 43,661 logic cells, up to 58 multipliers	Up to 110,592 logic cells, up to 64 multipliers	Up to 147,443 logic cells, up to 180 multipliers	Up to 94,208 logic cells, up to 640 multipliers
Analog I/O speed	Up to 1 MS/s	Up to 1 MS/s	Up to 1 MS/s	Up to 250 MS/s
Operating system	Real-Time OS	Real-Time OS	Windows/Real-Time OS	Windows/Real-Time OS
Ruggedness	-20 to 55° C <sup>1</sup> , passively cooled	-40 to 70° C, passively cooled	0 to 55° C, passively cooled	0 to 55° C, actively cooled
Size	Starts at 17.8 x 9.3 x 8.7 cm <sup>3</sup>	Starts at 18 x 9.3 x 8.7 cm <sup>3</sup>	Starts at 40.4 x 13.4 x 8.7 cm <sup>3</sup>	Starts at 25.7 x 21.4 x 18.4 cm <sup>3</sup>
Target application examples	<ul style="list-style-type: none"> <li>▪ Smart grid analyzer</li> <li>▪ Environmental monitoring</li> <li>▪ Mobile robotics</li> <li>▪ Medical diagnostics and device control</li> <li>▪ Special purpose machines (SPM)</li> <li>▪ Chemical process control</li> <li>▪ Motion control</li> </ul>	<ul style="list-style-type: none"> <li>▪ Machine vision</li> <li>▪ In-vehicle logging</li> <li>▪ Machine condition monitoring</li> <li>▪ Industrial, machine control</li> <li>▪ Oil and gas monitoring</li> <li>▪ Power monitoring</li> <li>▪ Structural monitoring</li> <li>▪ Automated welding control</li> </ul>	<ul style="list-style-type: none"> <li>▪ Power distribution/control</li> <li>▪ ECU prototyping</li> <li>▪ Analytical instruments</li> <li>▪ Turbine control</li> <li>▪ Industrial robotics</li> <li>▪ Rapid control prototyping</li> <li>▪ Big physics and research</li> </ul>	<ul style="list-style-type: none"> <li>▪ Hardware-in-the-Loop (HIL) Test</li> <li>▪ Medical imaging</li> <li>▪ High-end simulation</li> <li>▪ Protocol aware test</li> <li>▪ Wireless test</li> <li>▪ Software-defined radio</li> <li>▪ Signal intelligence</li> </ul>

<sup>1</sup>NI Single-Board RIO versions are available that operate from -40 to 85° C and start at 10.3 x 9.7 x 2.4 cm<sup>3</sup>



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