



NIDDays



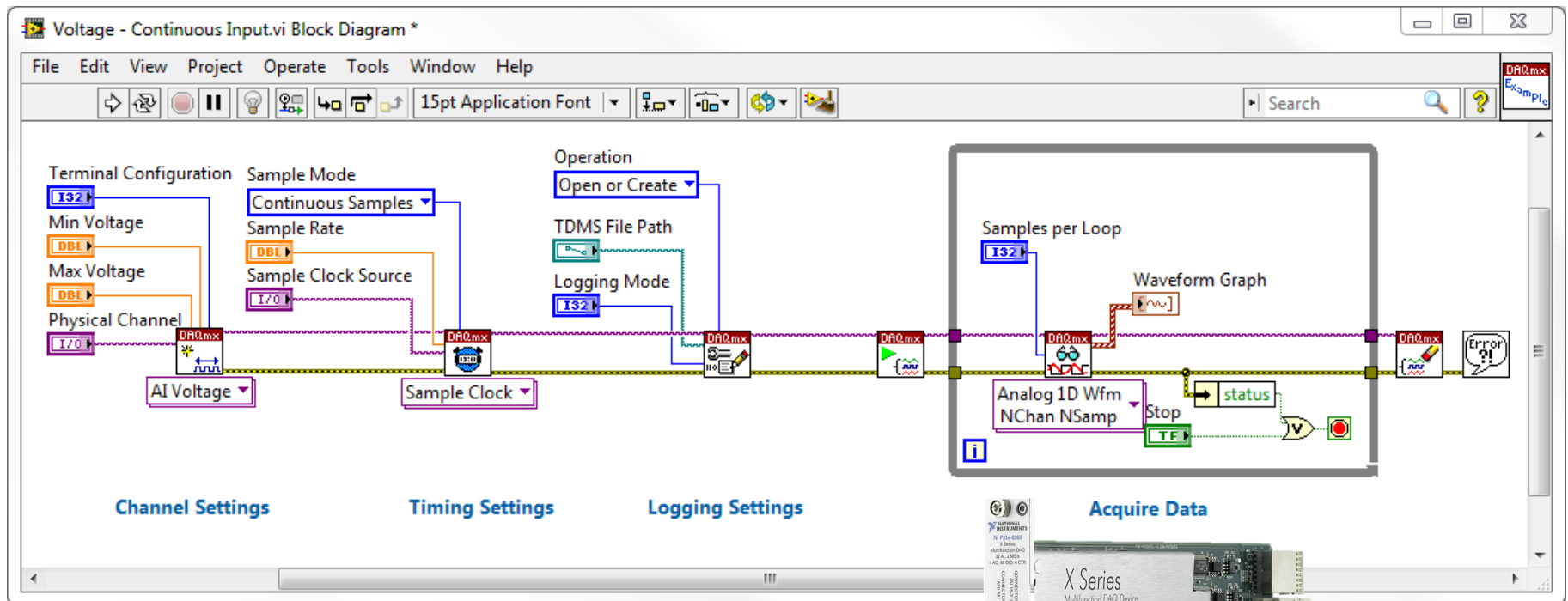
Enhance Your DAQ Application with R Series Multifunction RIO

<Presenter>

Agenda

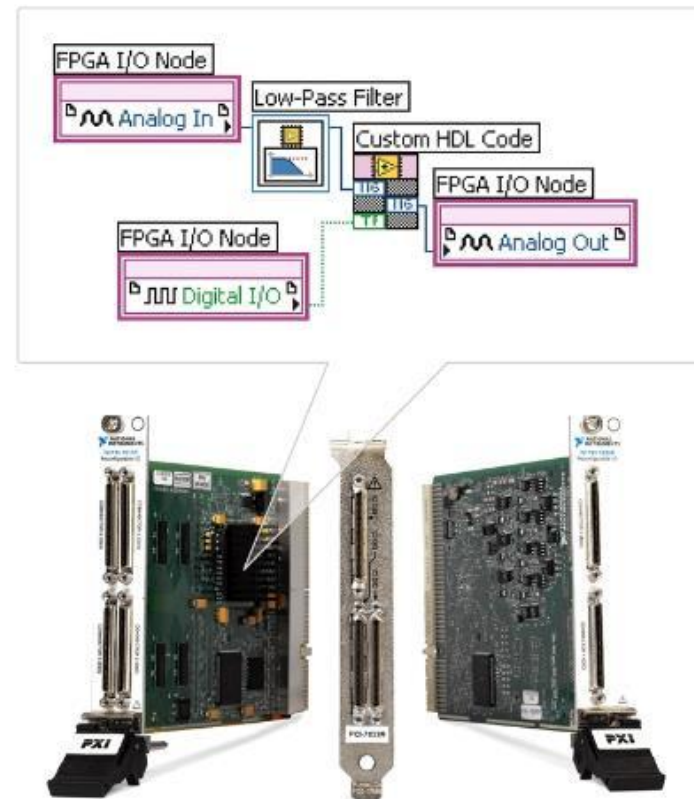
- Introduction to R Series Multifunction RIO
- Programming R Series Multifunction RIO Devices
- Example Applications

Typical Multifunction DAQ



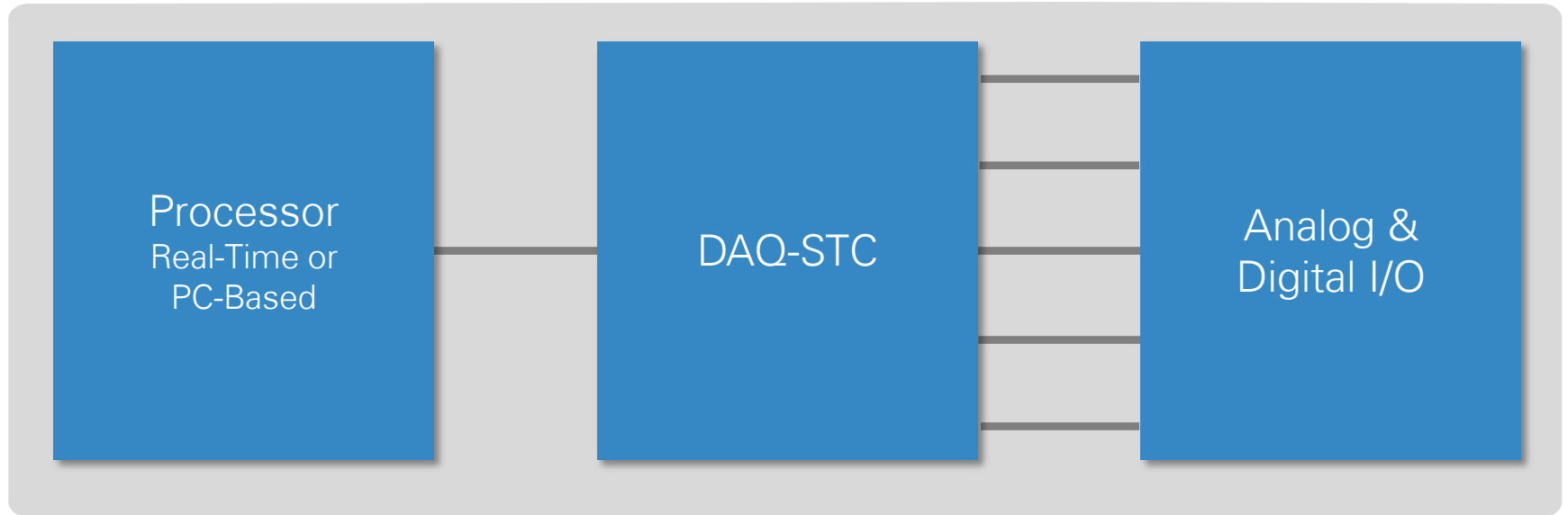
Customize Your DAQ Device...

- Custom timing & synchronization
- Multi-rate sampling
- Custom triggering
- Custom counters
- Flexible PWM
- Flexible encoder interface

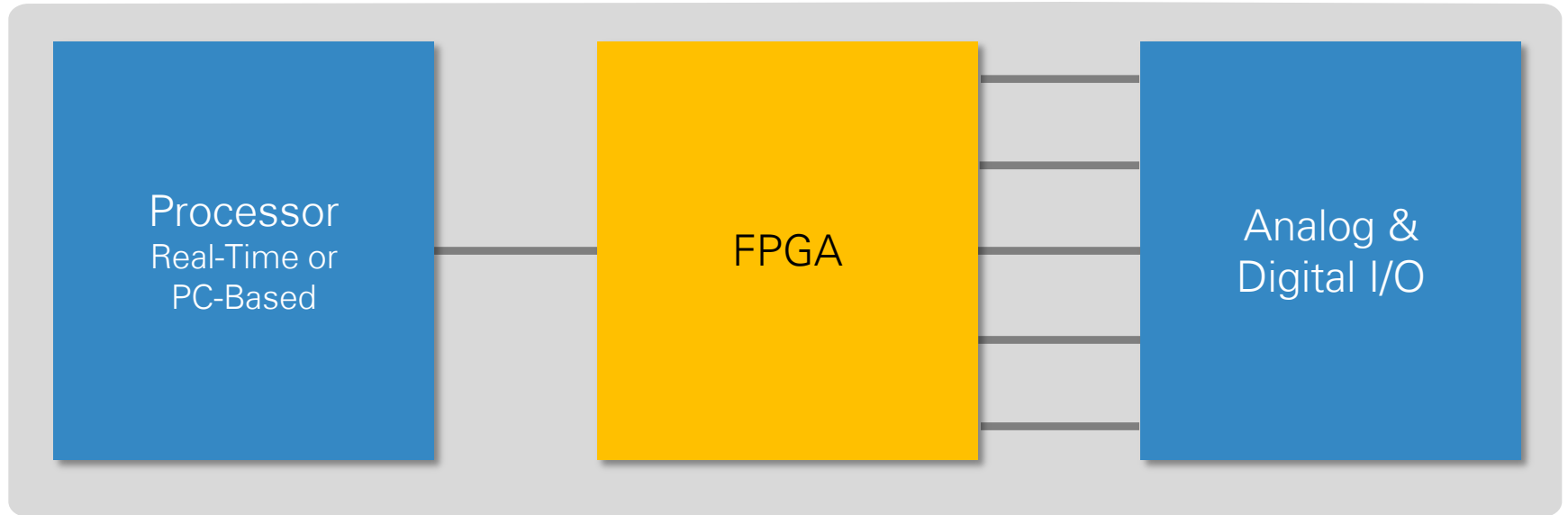


...With R Series Multifunction RIO

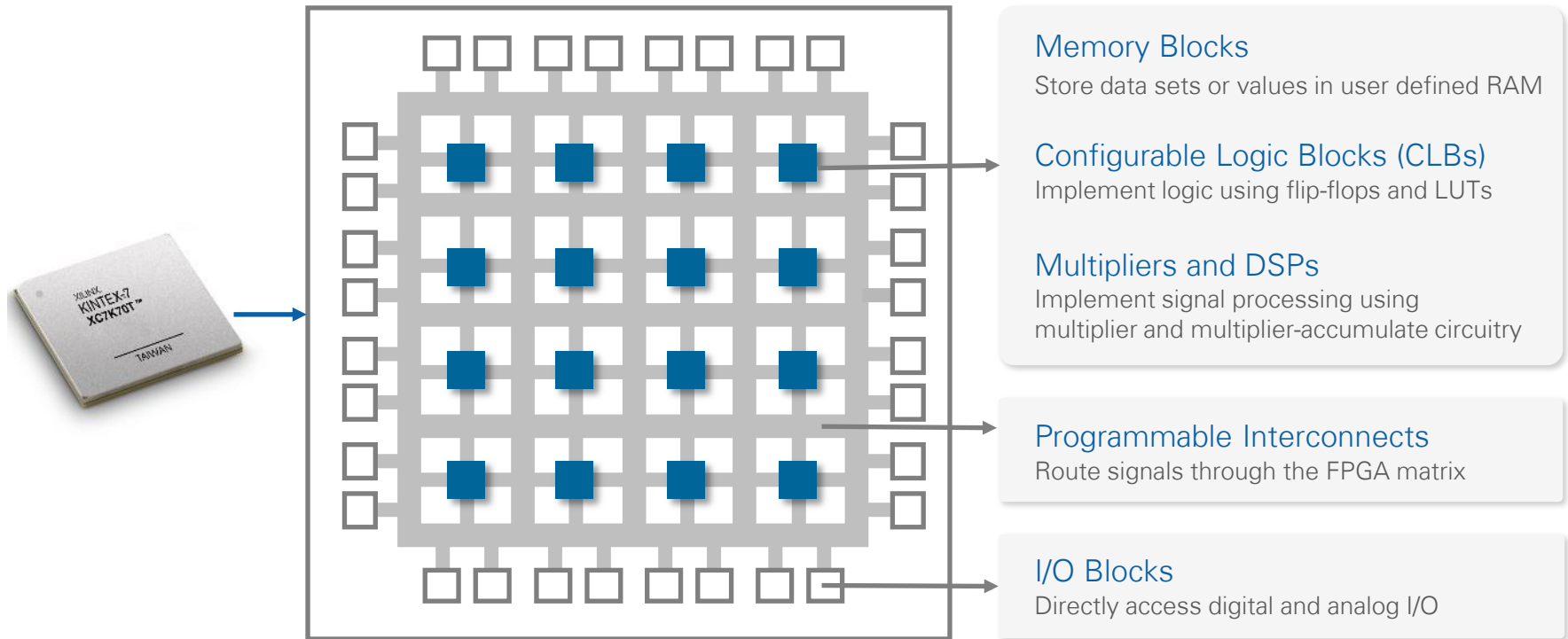
The NI Approach to DAQ Hardware



The NI Approach to *Customizable* DAQ Hardware

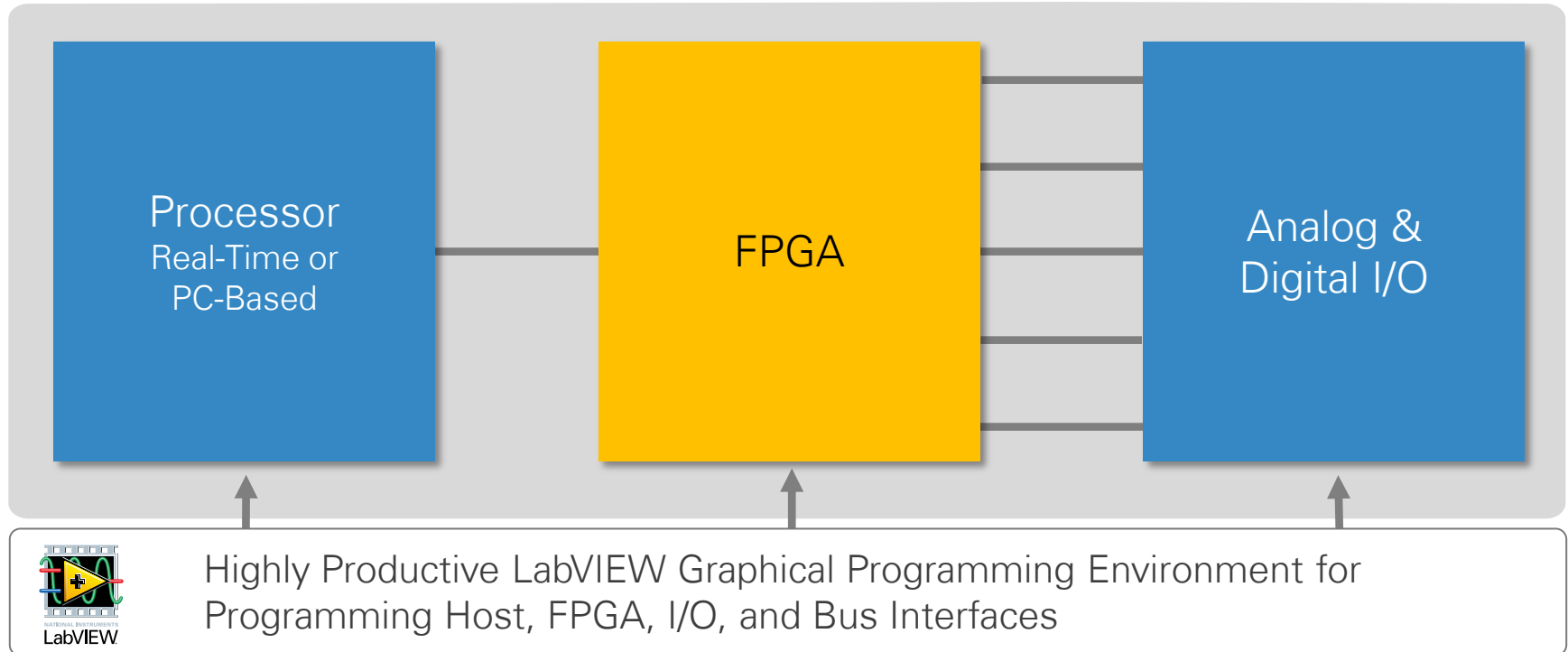


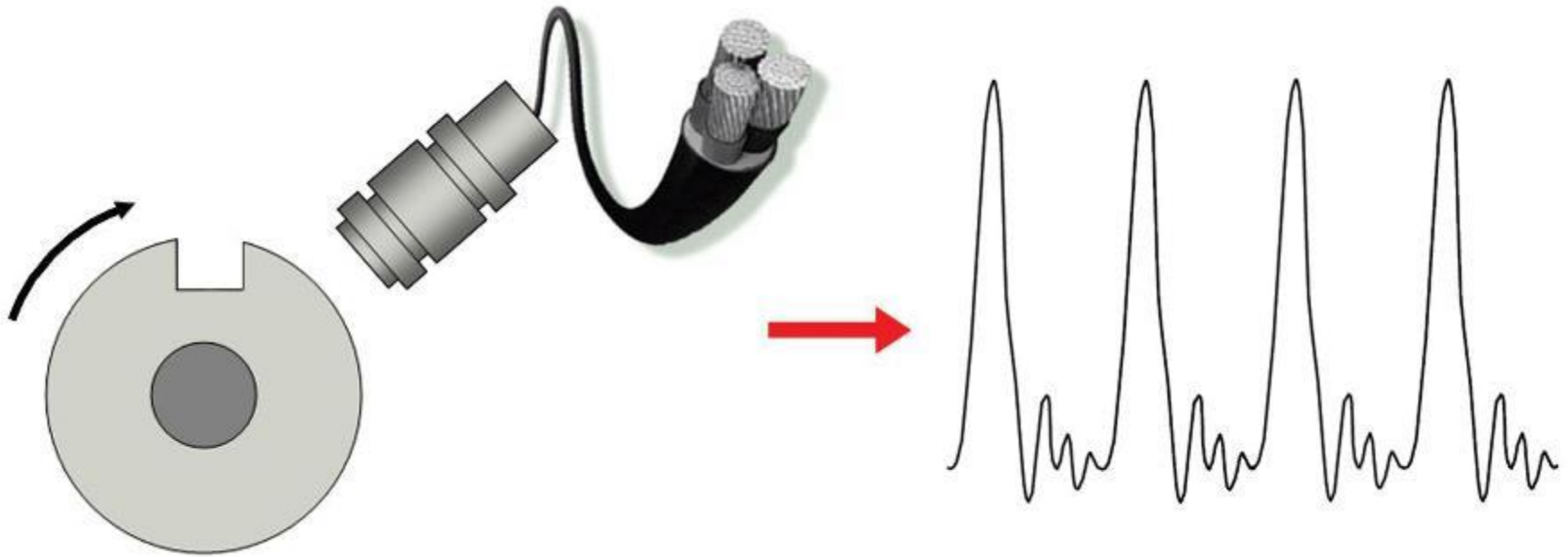
Field-Programmable Gate Array (FPGA)



The NI Approach to *Customizable* DAQ Hardware

We call this the LabVIEW RIO Architecture.





“Using National Instruments FPGA hardware in conjunction with LabVIEW and the LabVIEW FPGA Module allowed for the rapid design, simulation, development, and testing of a tachometer signal acquisition and processing system.”

– Daniel Hooks, Cal-Bay Systems, Inc.

	X Series	R Series
I/O Control	Fixed ASIC for timing and triggering	Open FPGA for timing and triggering
Analog I/O	Shared sample clock	Independent operation
Digital I/O	Up to 32 lines, Hardware timed	Up to 160 lines, hardware timed
Counters	4 general purpose counters	Custom counters on any digital line



NI R Series Multifunction RIO



NI R Series Multifunction RIO Specifications

Product	Bus/Form Factor	FPGA	16-Bit Analog Inputs	Max Sampling Rate per Channel	16-Bit Analog Outputs	Max Update Rate per Channel	Digital I/O
R Series Multifunction RIO Devices							
NI 7856R NEW!	USB	Kintex-7 160T	8	1 MS/s	8	1 MS/s	48
NI 7856R OEM NEW!	USB	Kintex-7 70T	8	1 MS/s	8	1 MS/s	48
NI 7855R NEW!	USB	Kintex-7 160T	8	1 MS/s	8	1 MS/s	48
NI 7855R OEM NEW!	USB	Kintex-7 70T	8	1 MS/s	8	1 MS/s	48
NI 7854R	PXI	Virtex-5 LX110	8	750 kS/s	8	1 MS/s	96
NI 7853R	PXI	Virtex-5 LX85	8	750 kS/s	8	1 MS/s	96
NI 7852R	PCI Express, PXI	Virtex-5 LX50	8	750 kS/s	8	1 MS/s	96
NI 7851R	PCI Express, PXI	Virtex-5 LX30	8	750 kS/s	8	1 MS/s	96
NI 7842R	PCI Express, PXI	Virtex-5 LX50	8	200 kS/s	8	1 MS/s	96
NI 7841R	PCI Express, PXI	Virtex-5 LX30	8	200 kS/s	8	1 MS/s	96

Today's Setup



8 Independent ADCs

Dedicated 16-bit 1 MS/s analog-to-digital converters per channel

8 Independent DACs

Dedicated 16-bit 1 MS/s digital-to-analog converters per channel

32 High Speed Digital I/O Lines

Up to 80 MHz per line for custom counter/timers, PWM channels, or as ports for custom protocols

16 Low Speed Digital I/O Lines

Up to 10 MHz per line for custom counter/timers, PWM channels, or as ports for custom protocols

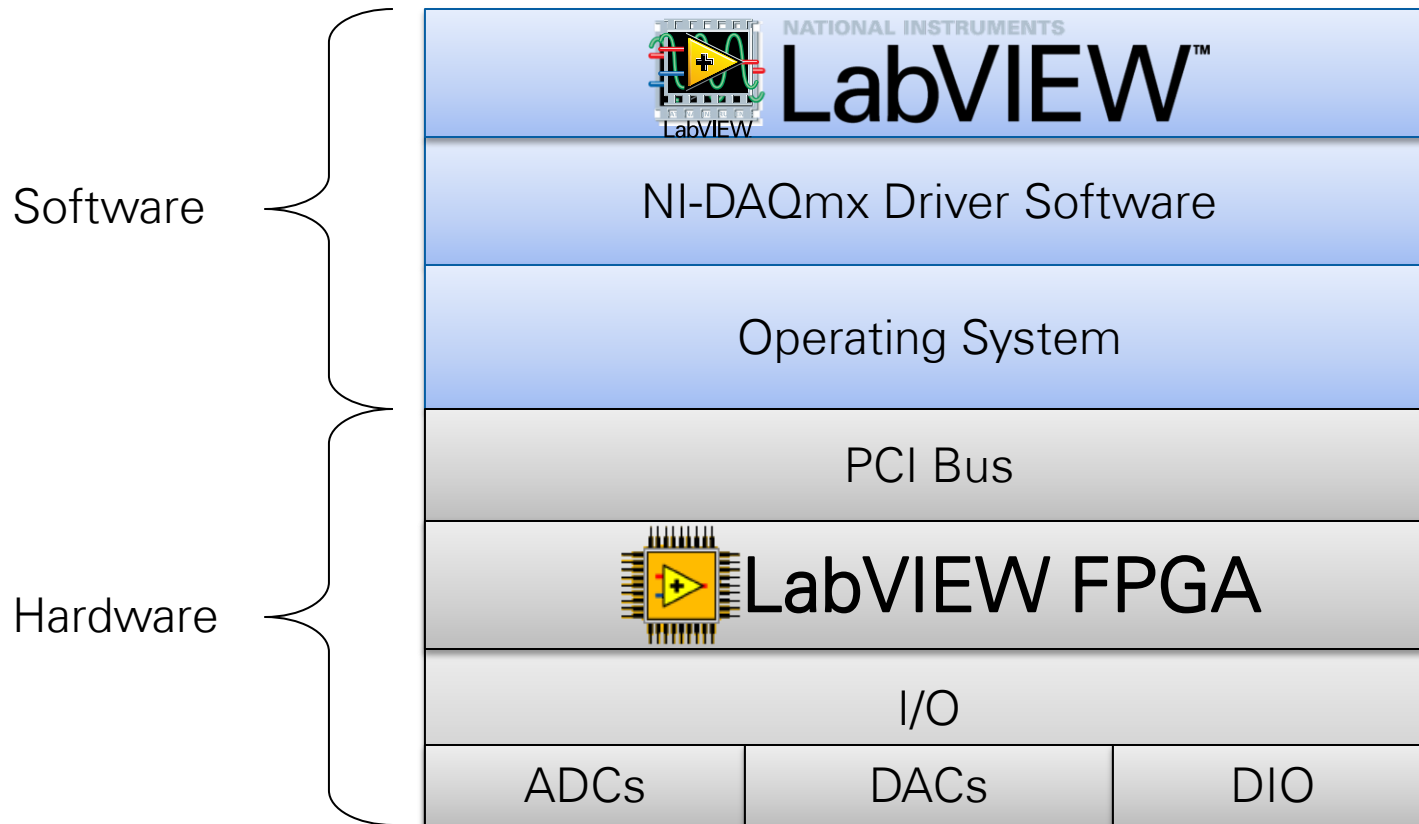
Xilinx Kintex-7 FPGA

Rapidly create custom hardware circuitry with the LabVIEW FPGA Module

USB Connectivity

Connect to your R Series device through a standard USB connection, or disconnect the cable for stand-alone autonomous operation

R Series Programming



Shipping Example DAQ Personalities

Balanced AI/AO

Multi-rate Analog Output

Pulse Width Modulation

Quadrature Encoder

64-bit Counter

LabVIEW FPGA Functions and IP

In Product	Online
  	<p>ni.com/IPnet</p>

- Filters (Butterworth, Notch, DC-RMS, etc.)
- PID control
- Control of brushless DC motors
- Digital buses and protocols (SPI, I2C, UART, etc.)
- Image Processing
- RF communications
- Linear and nonlinear systems
- PWM
- Encryption
- Data manipulation
- Device drivers (LCD display, IR sensors, etc.)
- Video processing
- Basic elements (counters, accumulators, etc.)
- Signal generation
- High-throughput math
- Transforms
- Trig functions
- Digital signal processing
-and more

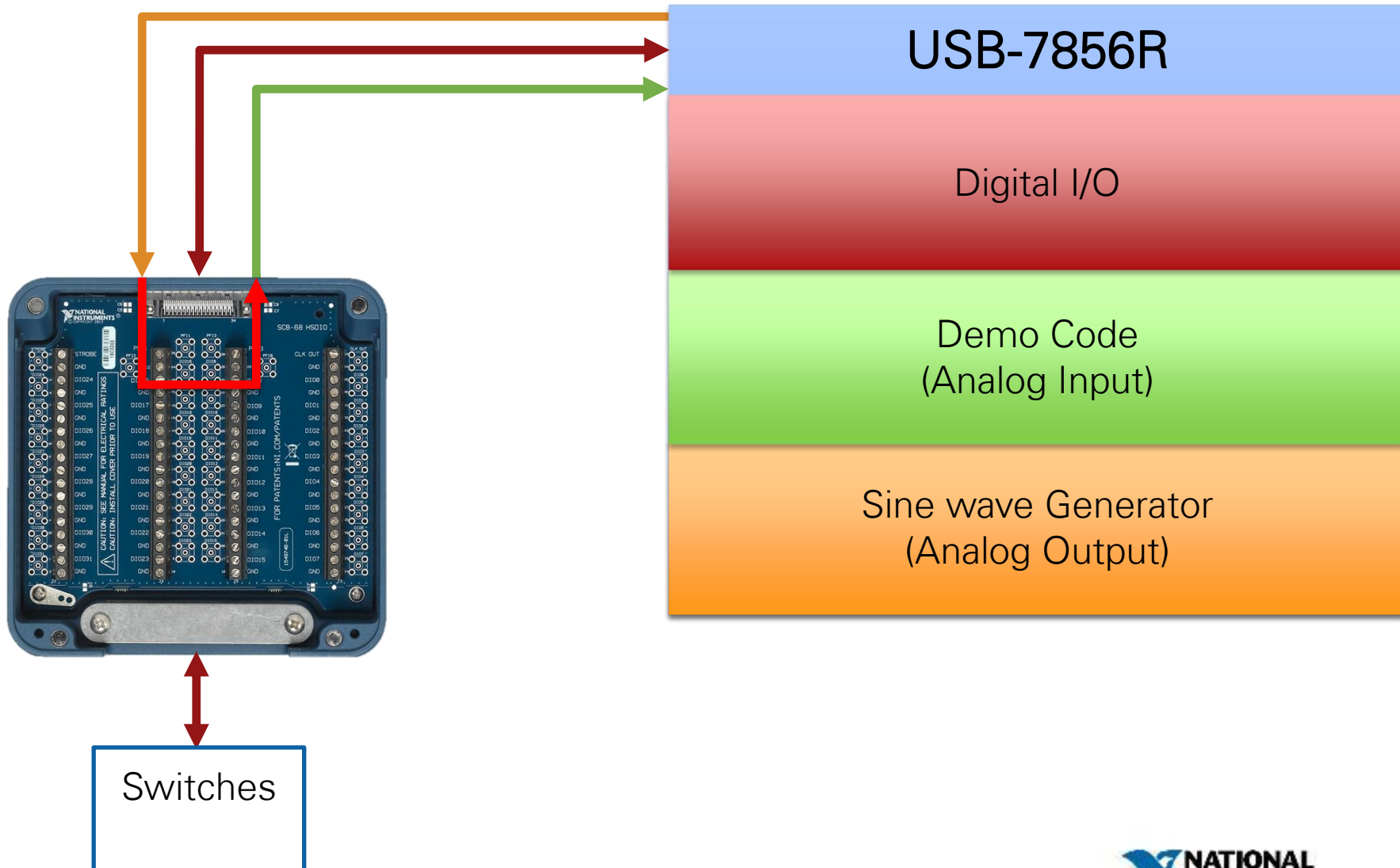


“By programming in LabVIEW FPGA, we were able to vary the timing and power of each pulse to optimize for speed and precision.”

– Michael Wiltberger, OptiMedica Corporation

Laser Assisted Cataract Removal | OptiMedica

Today's Setup - Demo



Summary

Use R Series Multifunction RIO for...

High-Speed Control

Custom Timing & Triggering

Custom Protocol Communication

Onboard Signal Processing

Precise Timing & High Reliability

FPGA Training - ni.com/training

- Instructor lead (in-person and online)
- On demand online
- Visit the NI Training booth to learn more



Where to Go After NIDays

www.ni.com/events

www.<country>.ni.com

www.ni.com/rseries

www.ni.com/daq

[<toll-free number>](tel:<toll-free number>)