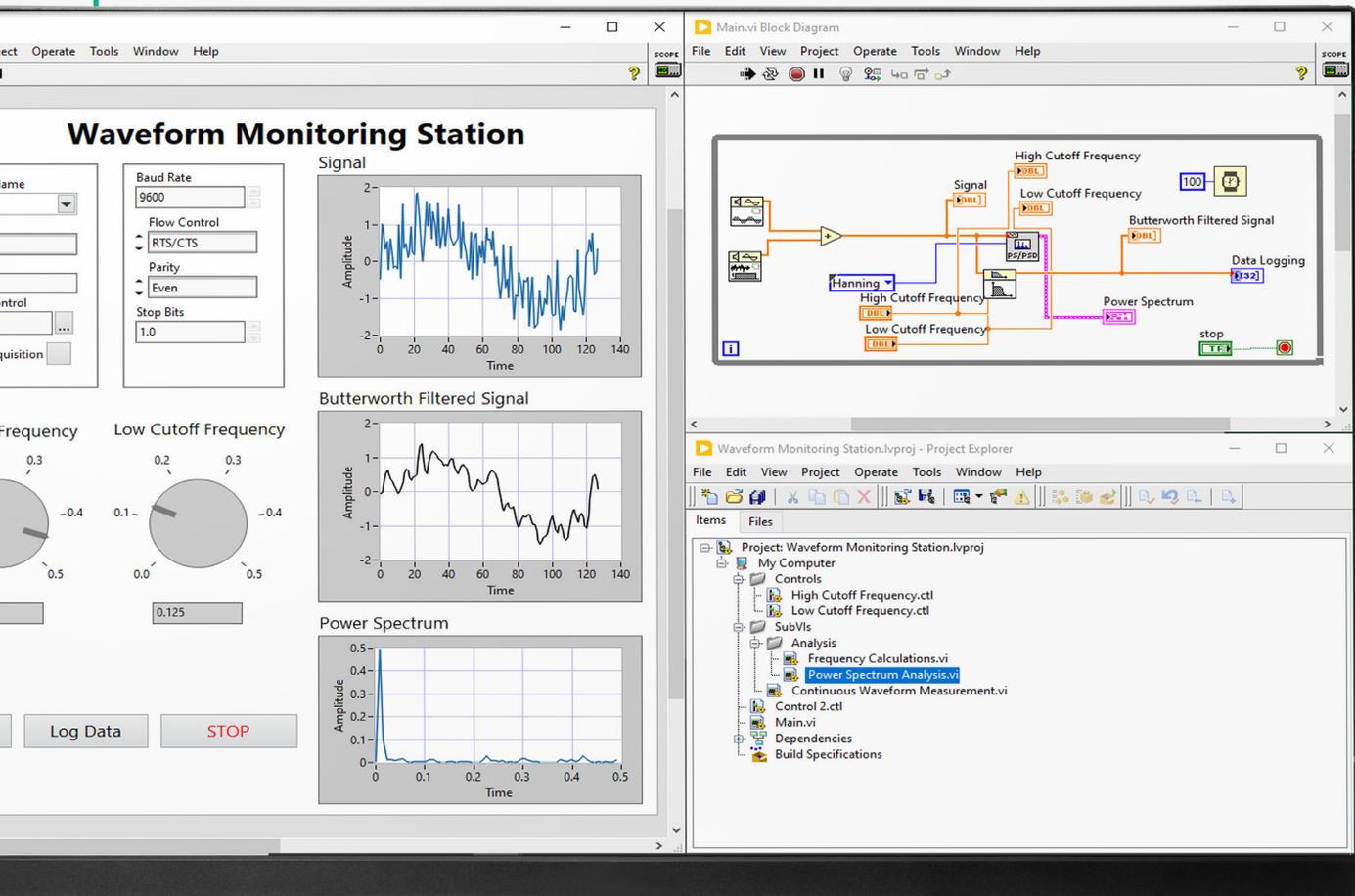# New Product Guide

LABVIEW 2021

New Product Guide

NI offers hardware, software, and services that help you turn real-world data into insights that drive your business decisions. Check out the new products we have launched so far this year to help you test faster, design better, improve reliability, and maximize your test data.

"The software and hardware environment need for fast, convenient, and stable system development is indispensable, and NI has it all."

Dr. Zhizhong Wang
China Steel Corporation

Performance and Innovation

You know that innovation and performance go hand in hand.

For example, back in the late 1990s, an innovative approach to data storage hit the market with the promise to disrupt the digital storage industry. The SuperDisk LS-120 could hold up to 120 MB of data—almost two orders of magnitude more than standard floppy disks that could hold only 1.44 MB. The buzz around them grew. They were a total software game-changer.

But as revolutionary as the SuperDisk's storage was, it lacked performance. It didn't live up to what was users hoped it would be and it didn't catch on. All promise, no punch. There's a lesson here: Innovation can't thrive without performance.

Every day, you innovate for your customers and work to deliver performance that was once thought nearly impossible. But great performance can only be achieved with great test. High-performance test systems create essential insights to help you truly understand and improve your innovation's performance. At NI, helping customers increase performance is in our DNA. Our modular, software-centric approach to test makes data-driven insights possible. With it, you can adapt to rapidly changing innovation requirements, achieve performance goals, and bring true game-changers to market faster.

You're creating so many exciting innovations—including hypersonic flight, autonomous vehicles, and an increasingly connected world. But performance is crucial to bring these ideas to reality. NI's products and systems help test and measure that performance. Partner with NI to accelerate your innovations and Engineer Ambitiously™.

SCOTT RUST
EXECUTIVE VICE PRESIDENT
OF PLATFORM AND PRODUCT, NI

SOFTWARE

From interactive exploration and test development to systems and data management, NI's software portfolio helps you drive actionable insights at scale while proactively improving product performance.
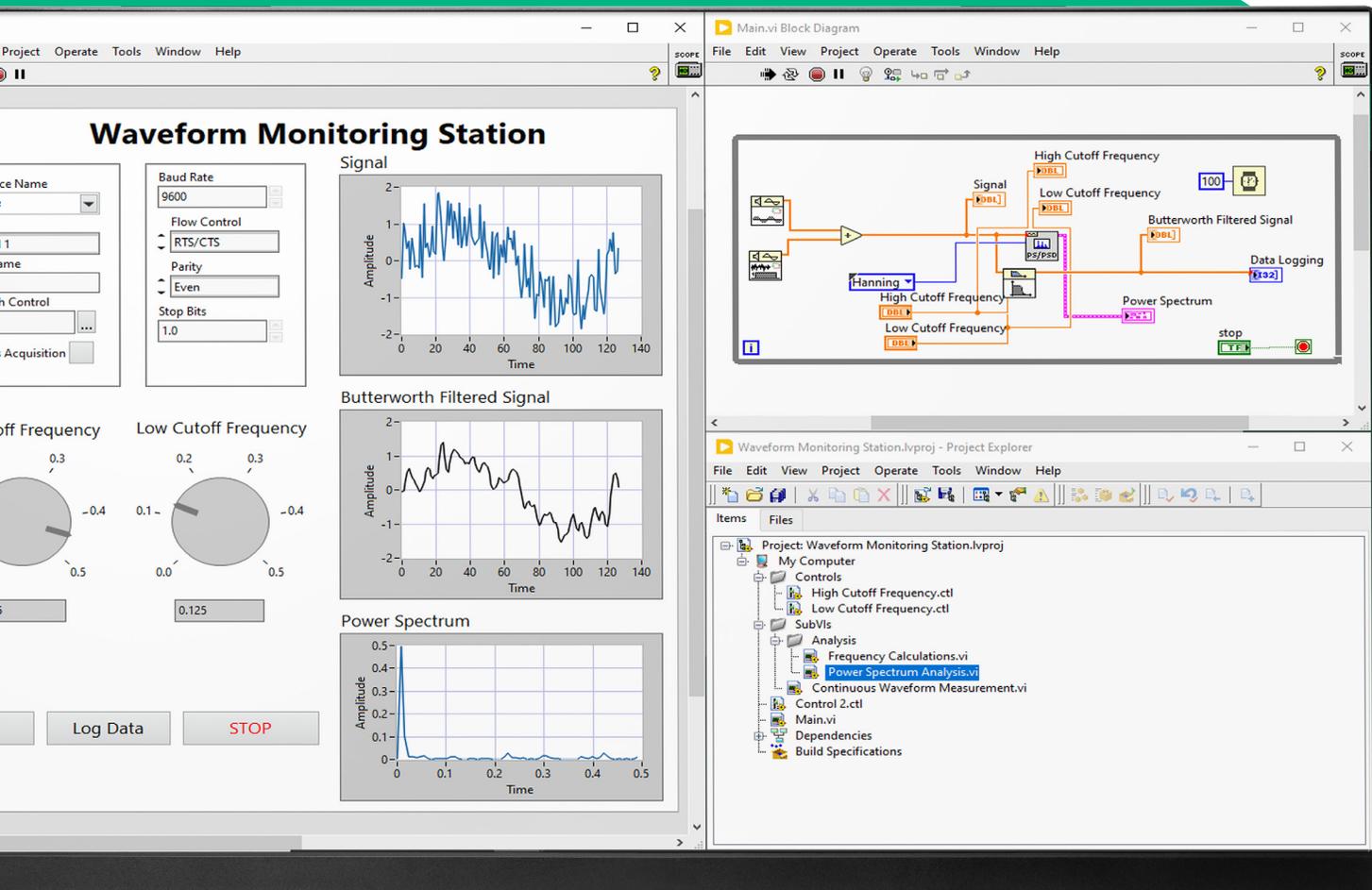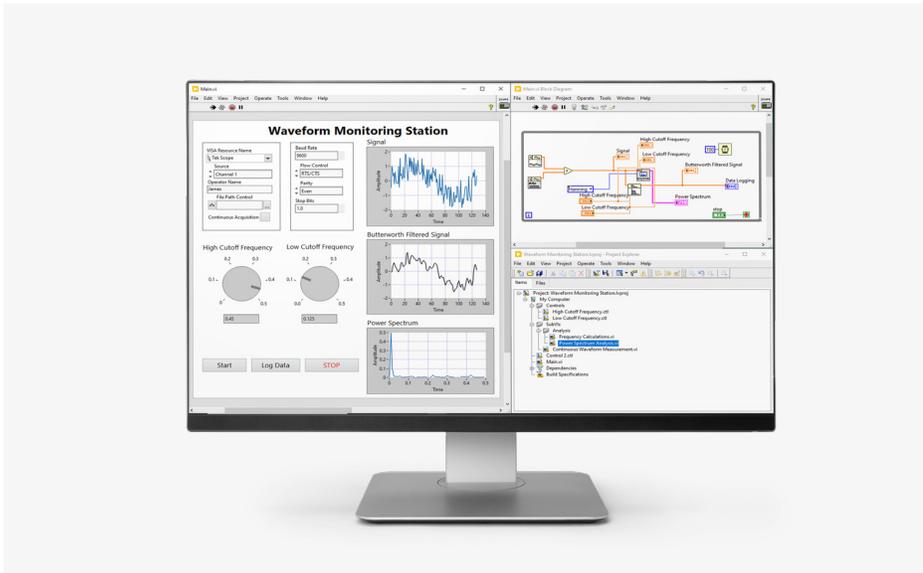
LabVIEW

LabVIEW 2021 aims to continuously enhance user productivity with new features— including interoperating with Python and MathWorks MATLAB® software, developing Real-Time and FPGA applications, and improving integration with software engineering tools. Additionally, this release improves user experience with block diagram wiring and front-panel visualization enhancements and preventing automatic execution in applications.

- Supports Python 3.6 through 3.9 and removes support for Python 2.7
- Features enhanced "run when opened" capability
- Provides access to LabVIEW on any OS (supported versions of Windows, Linux, and MacOS)
- Includes MacOS 11 (Big Sur) support
- Is not supported on older Windows 32-bit OSs such as Vista/XP/7/8.x and Windows Server 2003/2008/2012
- Features a hidden controls feature
- Offers increased MATLAB support
- Provides improved wire routing
- Includes SSH File Transfer Protocol support

Learn more

Read the release notes
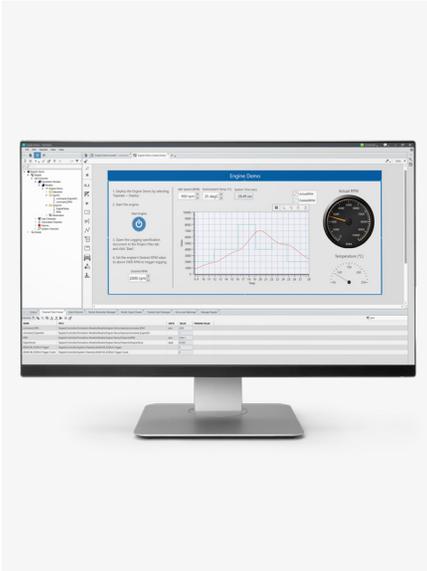
VeriStand 2020 R6

VeriStand application software helps you configure I/O channels, data logging, stimulus generation, and host communication for NI real-time hardware. VeriStand helps test engineers reduce the time they need to test their products with a wide range of functionality, including configurable data acquisition, simulation model integration, test sequencing, and logging. This release includes several key enhancements, which include:

- Improvements to the VeriStand editor, such as the ability to customize and extend the editor using C#
- Using a scripting API to turn FPGA bitfiles into flexible and reusable system-definition files
- Monitoring system memory usage with the new Telemetry Custom Device

Learn more

Read the release notes
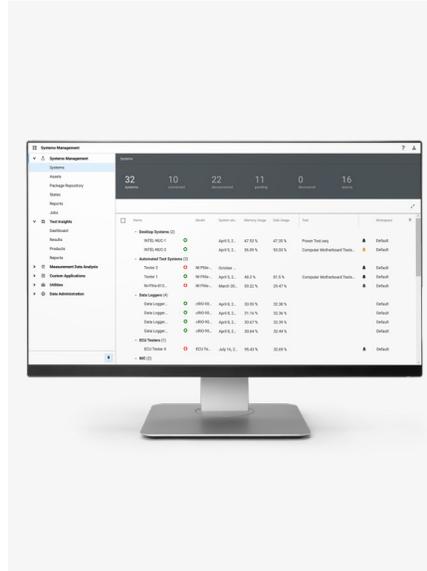
SystemLink

SystemLink™ software centralizes system and data management in a single, unified environment for a holistic view of your organization. The SystemLink 2020 R2 release brings to market the exciting new feature for role-based access control with SystemLink Server Advanced, which includes enterprise-class access-control features designed for customers with multiple sites or product lines:

- Seamlessly preview test results data when stored as CSV file attachments in the SystemLink web application
- Enable or disable software feeds for your systems
- Find assets faster with alias support in the Asset Manager application
- Use improved support for Python-based DataPlugins

Learn more

Read the release notes

LabVIEW NXG 5.1

LabVIEW NXG gives you the ability to configure, automate, and visualize your test results, all within a single tool. New features available with this release include:

- The ability to save VI panel and control images
- New options for configuring graphs, charts, and VI window position
- Programmatically reading and writing to additional control and indicator properties

Version 5.1 will be the last release of LabVIEW NXG.

Learn more

Read the release notes
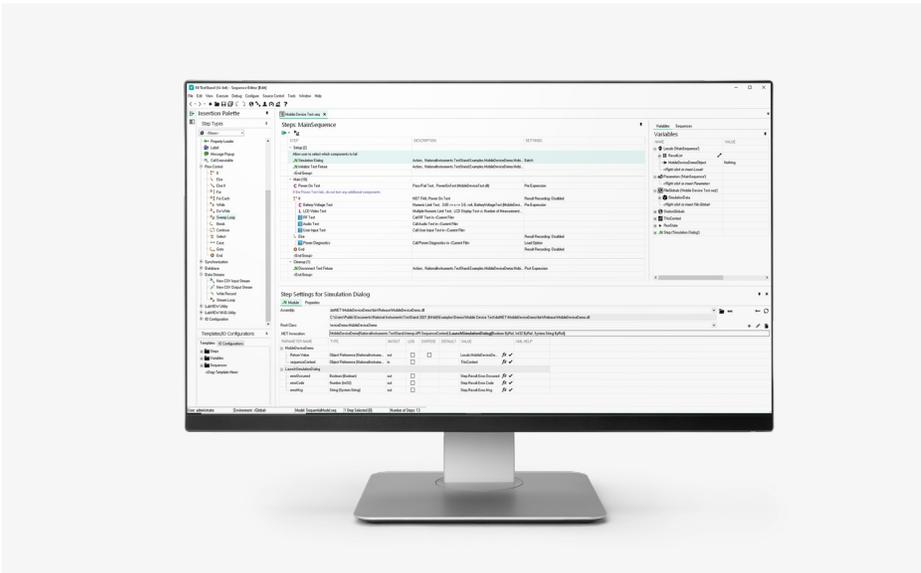
TestStand 2021

TestStand is a reusable test framework that eliminates the need to reinvent the wheel every time you create or maintain test stations. TestStand also organizes test sequences with development support for multiple programming languages such as Python, C/C++/C#, and LabVIEW.

TestStand 2021 includes an overhaul of the Sweep Loop step—a key investment aimed at improving test engineer productivity.

With TestStand, you can save up to 75 percent in development and 33 percent in maintenance time, ultimately modernizing test stations:

- Create nested and parallel parameter sweeps by changing the level of one or more parameters in a Sweep Loop step.
- Automatically create a variable when you specify a parameter name.
- Choose between Static and Dynamic modes to specify whether values for a strategy should use constants or expressions.
- Use the Table View to interact with values and test vectors resulting from a sweep across selected parameters at edit time and run time. Functionality includes the ability to enable or disable, filter, and export test vectors.
- Display captured data, as well as the parameters in the Sweep Loop step, at execution time with Table View.
- Import and export parameter and test vector data to or from a CSV file.

Learn more

Read the release notes

DIAdem 2021

DIAdem helps engineers accelerate root-cause analysis through efficient data postprocessing. With more than 200 DataPlugins, DIAdem indexes your directory for targeted search and retrieval of any data type. Through predefined and customizable dashboards and reports, you can synchronize data across map, video, and waveform data to see multiple points and get the full picture. Automate the entire process from import to insight with scripting routines in Python and VBS. This update focuses on new and improved usability, including:

- Python 3.8 support and the ability to select an external Python integrated development environment so that you easily can use an external debugger for troubleshooting
- New Bird's Eye View display type in VIEW to display radar data (road course, lane, object list, and sensor fields) from a "bird's eye" perspective
- Create video channels in the Data Portal to easily add display panels in VIEW and set frame rate and start time
- Design dialog boxes with new slider controls for user input

Learn more

Read the release notes
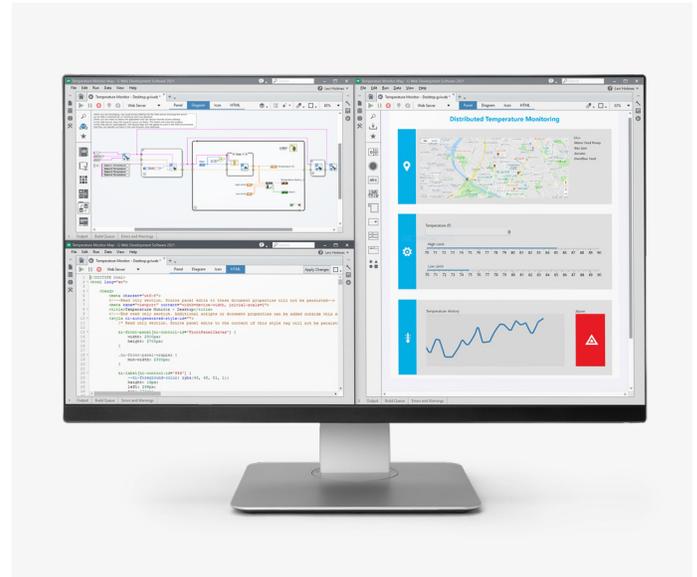
G Web Development Software

With G Web Development Software, you can create test and measurement web applications using graphical programming and run them—without plug-ins or installers—in any modern web browser. Additionally, you quickly can visualize and share data on the web from distributed systems through industry-standard technologies. G Web Development Software simplifies both front- and back-end development with graphical programming that creates modern UIs accessible on any browser, along with APIs to simplify data communication and security:

- It's compatible with LabVIEW NXG WebVIs
- You can connect to test systems that do not use LabVIEW
- LabVIEW is not required to use G Web Development Software

Learn more

Read the release notes
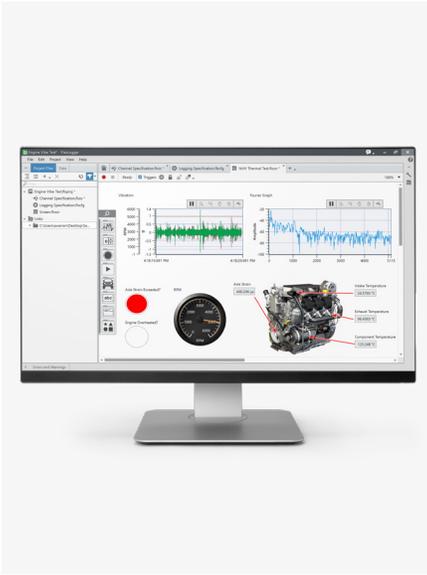
FlexLogger 2021 R3

FlexLogger™ software helps you build flexible, scalable data-logging systems with NI DAQ hardware—no programming required. This revision includes additional hardware support and new usability features for access control and project management:

- Expanded PXI support with the addition of two analog output modules (PXIe-6738 and PXIe-6739) and a C Series Frequency Module (NI-9326)
- The ability to pause a test and utilize increased user-experience permissions to prevent unauthorized changes and updates

Learn more

Read the release notes

InstrumentStudio 2021

InstrumentStudio™ free application software provides an integrated approach to interactive PXI measurements. Feature updates in this release include:

- An RF signal generator soft front panel
  - Debug & Monitor mode
  - STS pin map support
  - Configuration export
  - Continuous and arbitrary waveform support
- Plug-ins for InstrumentStudio software
- New device support for select source measure units and RF signal generators

Learn more

Read the release notes
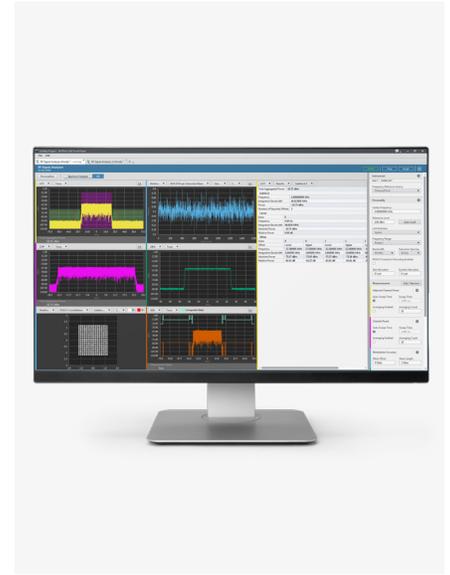
RFmx 20.7

The 20.7 release of NI's measurement-oriented RF software (RFmx) features faster execution and expanded coverage of the latest 5G New Radio and Wi-Fi 7 wireless standards.

Learn more

Read the release notes
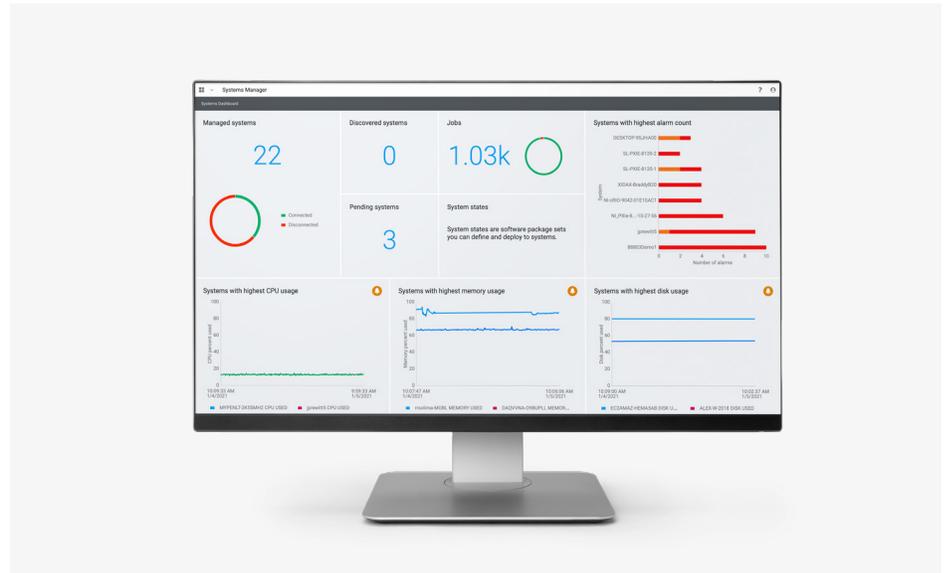
Test Workflow

Test Workflow is a software bundle that equips engineers with application-specific tools so that they can choose the right one for the job—from graphical programing environments to no-code and interactive software applications. Use Test Workflow software to perform quick ad-hoc tests, build an automated test system, automate data analysis and reporting, develop test sequences, and more.

Instead of purchasing a few key tools and filling the gaps with custom development or outsourced contracts, test professionals can use a bundle of software designed to provide all of the tools they need to mitigate time-to-market, performance, and quality concerns:

- Develop automated test systems with LabVIEW
- Access, view, and analyze data and create reports with DIAdem
- Perform data acquisition and logging on NI hardware with FlexLogger™ software
- Create automated test sequences with TestStand
- Build web applications for test with G Web Development Software

Learn more

Read the realese notes

Q&A with Research & Development

WHAT IS MOST EXCITING ABOUT THIS PRODUCT?

The most exciting thing about SystemLink™ 2021 R1 is how it unites product features into a more cohesive overall experience. From the ability to pull in more types of data from TestStand, to the unified Systems grid, to the new navigation structure, 2021 R1 is about giving customers the data they expect where they expect it.

WHAT IS THE FEATURE YOU'RE MOST PROUD OF?

The feature I'm most proud of in this release is our new Universal Left Navigation experience. For a long time, SystemLink used a plug-in browser page that made navigation across different parts of the product disjointed and unintuitive. From a user perspective, the new navigation is an exciting, modern visual refresh; from a developer perspective, it's more fun to work on, easier to test, and faster to add new features.

HOW IS THE SYSTEMLINK SOFTWARE TEAM EMBODYING NI BRAND VALUES?

BE BOLD—The new navigation was a risky feature because it replaced the visual platform SystemLink software has used from the beginning. This is a big step towards modernizing our web UIs, and I'm proud of the bold effort we put into making sure we got it right in one release.

BE KIND—Because SystemLink still is a relatively new product, we get to work more closely with individual customers. This release, we implemented several customer requests for our TestStand plug-in, and we have more in the pipeline.

BE CONNECTORS—SystemLink is all about connections—from pulling in test results from TestStand or LabVIEW to hosting a JupyterHub install that connects to our Python APIs. Within our teams, we are learning how to work collaboratively even though we're not in the office together, share innovation ideas across teams, and support other groups throughout the company.

WHAT WAS SOMETHING THAT YOU LEARNED IN THE DEVELOPMENT PROCESS?

Something I learned while working on SystemLink is the value of fresh ideas and mindsets. About half of my team was new to the product for this release, and it was both refreshing and challenging to have influence from other areas of R&D helping us avoid becoming stuck in our ways.
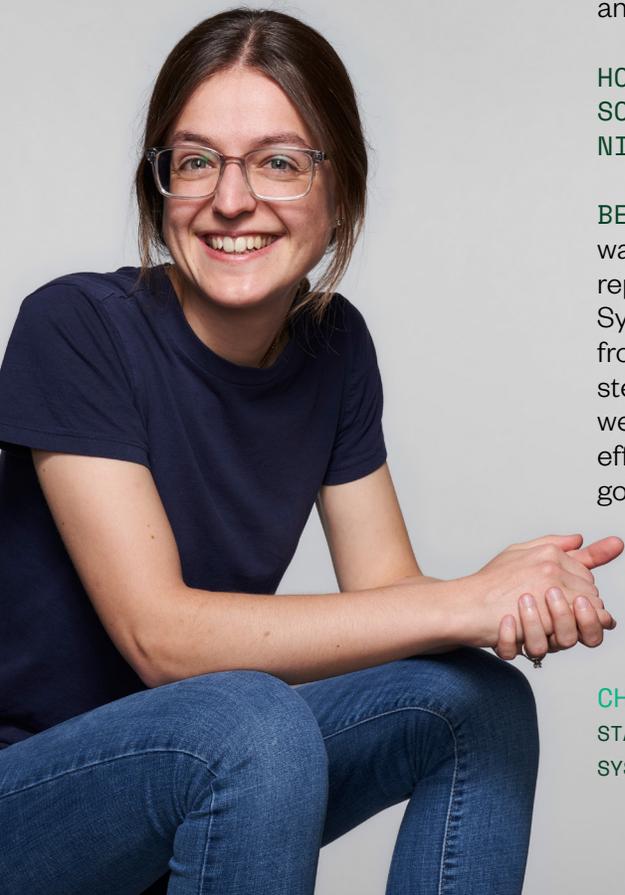
CHRISTINE KARAS
STAFF SOFTWARE ENGINEER,
SYSTEMS AND DATA MANAGEMENT, NI

HARDWARE

Data Acquisition and Control

Data acquisition and control products are designed for a specific sensor or measurement type. They include products that help you control and monitor external hardware.

"We consider NI DAQ hardware the industry standard for production test applications. The close integration with NI software ensures ready access to our coverage requirements."

Christian Wolf
Global Manufacturing Test Manager, GN Audio

Ultrarugged Data Acquisition System

No programming required—this complete system configuration based on FieldDAQ hardware comes with everything you need (including software and accessories) to acquire data in rugged environments, configure a real-time UI, alarm on preset conditions, and log data to an open file format with included metadata:

- Configuration-based software ready to log right out of the box
- 1 μs synchronization between measurement channels
- Open, compatible data formats such as .csv and .tdms
- Support for line, star, and ring network topologies

Learn more

Acoustic Functional Test Solution

As Internet of Things (IoT) devices experience worldwide growth, many electronic products are adopting a voice-command user interface, bringing new acoustic and audio functional test challenges. Using an FPGA-based NI DAQ card, you directly can input and demodulate digital signals with hardware-level speed and reliability. The LabVIEW PDM Acquisition Toolkit ensures that you rapidly can develop custom measurements or test steps:

- Confidently meet stringent test coverage specifications with high-accuracy hardware
- Insulate station investment from specification changes by updating test steps with device under test (DUT)-specific parameters in software
- Increase throughput with fast measurement speed and built-in parallel testing
- Free up budget with a lower cost per channel

Learn more

No programming required—these complete system configurations based on CompactDAQ come with everything you need (including software and accessories) to acquire data from your specific sensor.

Expandable Thermocouple Data Acquisition System

Acquire data from up to 16 thermocouples, configure a real-time UI, alarm on preset conditions, and log data to an open file format with included metadata:

- Reduce setup time with turnkey, configuration-based software that's ready to log right out of the box.
- Optimize your system for cost, performance, and future expansion with modular hardware.
- Keep sensor wires short, with rugged hardware installed close to the test fixture.
- Improve data management and collaboration with open and compatible data formats such as .csv and .tdms.
- Increase confidence in test repeatability and quality using hardware with multiple levels of calibration available worldwide.

Learn more

Sound and Vibration Data Acquisition System

Acquire data from up to eight accelerometers or microphones, configure a real-time UI, alarm on preset conditions, and log data to an open file format with included metadata:

- Configuration-based software ready to log right out of the box
- Modular, expandable hardware
- Open, compatible data formats such as .csv and .tdms
- Built-in Integrated Electronic Piezoelectric Excitation

Learn more

Load, Pressure, Force, and Strain Test System

Acquire data from up to eight dynamic load or pressure cells, configure a real-time UI, alarm on preset conditions, and log data to an open file format with included metadata:

- Configuration-based software ready to log right out of the box
- Modular, expandable hardware
- Built-in or external sensor excitation options
- Open, compatible data formats such as .csv and .tdms

Learn more

Mixed-Sensor Electromechanical Test System

Acquire data from ±10 V signals, thermocouples, and digital I/O lines; configure a real-time UI; alarm on preset conditions; and log data to an open file format with included metadata:

- Configuration-based software ready to log right out of the box
- Modular, expandable hardware
- Open, compatible data formats such as .csv and .tdms
- Adjustable gain settings for voltage input channels

Learn more

PCIe-8239 Frame Grabber

The PCIe-8239 Frame Grabber Device is designed for machine vision and scientific applications requiring high-resolution, high-speed digital imaging. It offers a range of features, including onboard programmable region of interest, pixel decimation, image scaling, and lookup tables. Acquire from additional cameras using hubs connected to ports, and take advantage of:

- Power-over-Ethernet (PoE) technology that reduces the need for external power supplies
- Optimized high-resolution and high-frame rate camera performance through the combination of independent Gigabit Ethernet ports and the high-performance GigE Vision driver software

Learn more

PXIe-4135 and PXIe-4137 40W

The PXIe-4135 and PXIe-4137 40W are 40 W variants of the PXIe-4135 and PXIe-4137 Source Measure Units. These have the same specifications as the 20 W version, and also include:

- Increased DC sourcing to 40 W
- Increased DC sinking to 40 W
- Extended range pulsing enhancements

Learn more

PXIe-8821, PXIe-8840, PXIe-8880

PXI controllers come with standard features such as an integrated CPU, hard drive, RAM, Ethernet, video, keyboard/mouse, serial, USB, and other peripheral I/O. They provide up to 8 GB/s system throughput and 2 GB/s slot throughput. We have created NI Linux Real-Time shipping kits for PXI Express controllers that previously supported Phar Lap. If you historically used Phar Lap PXI controllers, we hope to ease the transition process so that you do not have to manually provision the target.

Learn more

PXI-2566 Relay Module

The PXI-2566 is a general-purpose switch module that features independent single pole double throw (SPDT) Form C armature relays. Each relay is nonlatching, with very low on-resistance and low thermal offsets. The PXI-2566 is ideal for switching, routing, and controlling high-current signals. Each relay channel has a normally closed (NC), normally open (NO), and common (COM) terminal. Due to compliance requirements, this variant of the PXI-2566 has a 60 V operation, ensuring that we can ship to the EU. The PXI-2566 offers:

- 16 channels
- 2 A
- SPDT relay

Learn more

FPGA Carrier for FlexRIO Module Development Kit: PXIe-7986, PXIe-7990, PXIe-7991, PXIe-7992

PXI FlexRIO Module Development Kits provide the Xilinx UltraScale back-end FPGA interface necessary to support custom, integrated FlexRIO I/O modules. These modules are hardware only and do not include documentation for custom I/O development. They are designed for people with custom printed circuit board (PCB) design and hardware description language (HDL) code development experience. Products include:

- PXIe-7986—Integrated Serial, KU15P FPGA, 8 GB DRAM
- PXIe-7990—Integrated Parallel, KU025 FPGA
- PXIe-7991—Integrated Parallel, KU035 FPGA, 2 GB DRAM
- NPXIe-7992—Integrated Parallel, KU060 FPGA, 4 GB DRAM

Learn more

PXIe-1090 Two-Slot Chassis

NI's new two-slot chassis is designed for lab desk or benchtop use.

Highlights
- MXI-Express over Thunderbolt 3 with daisy-chain support
- Designed for lab desk/benchtop use
- Acoustics optimized for benchtop use case
- Vertical or horizontal orientation

Specifications
- 2 PXI Express (Gen3 x1) slots with 58 W/slot cooling support 1 PXI Express hybrid slot, 1 PXI Express slot
- 2 GB/s system bandwidth
- ~190 mm wide x 270 mm deep x 70 mm high (2U tall)
- Universal AC input: 100 VAC to 240 VAC, 50/60 Hz
- Temperature range: 0 °C to 50 °C

Learn more

Delivering Wireless Services from the Sky with USRP

Learn more

Challenge

The University of York needed to implement a cost-effective low-altitude aerial testbed that could verify novel wireless-communications applications between the airborne node and ground terminals while meeting tight constraints for payload weight, volume, and power consumption.

Solution

Combining the rapid prototyping capabilities of the LabVIEW Communications System Design Suite with the processing power of USRP RIO directly drove tailored antenna elements in a highly flexible wireless testbed. The testbed is carried onboard a tethered aerial platform Helikite that can be deployed for hours, at up to 400 meters in altitude, which allows multiple trials.

"By offloading intensive processing tasks, such as fast Fourier transform (FFT) and modulation/coding, to USRP's built-in FPGA, we increased the determinism, signal integrity, and reliability of the system whilst freeing up the host processor for data logging and simpler processing tasks such as visualizing power spectrum and constellation diagrams."

David Grace
University of York, Professor

HARDWARE

Electronic Test and Instrumentation

NI's electronic test and instrumentation products feature specialized synchronization and key software features for high-performance automated test, design, and device validation.

"Without SLSC, we may have needed to spend thousands of work hours and many thousands of Euros in materials to develop the system ourselves."

Anders Tunströmer
SAAB Aeronautics

SET-1215 RTD Simulation SLSC Module

The SET-1215 RTD simulation card is a high-precision 16-channel resistance temperature detector simulator now available for purchase through NI. The simulation ranges from 90 Ω to 410 Ω and 900 Ω to 4,100 Ω, with an accuracy up to 1 °C. It contains 16 galvanic isolated channels which you can connect in two-terminal sensing and four-terminal sensing. Each channel of the SET-1215 card can simulate common short-circuit and open-circuit conditions that a system could experience due to faulty wiring or sensors. To maximize customizability, the SET-1215 has two plug-in module slots that can provide features such as line fault insertion and instrument connections. Additionally, the SET-1215 RTD card comes with a high-current fault-injection bus.

Absolute Maximum Ratings

PARAMETER	CONDITION	VALUE	COMMENT
Maximum Input Voltage	Any Pin-to-Chassis Ground	60 VDC	Transient 65 V, Limited by Connector
Minimum Input Voltage	Any Pin-to-Chassis Ground	-60 VDC	
Maximum Input Voltage	Between CHx_F+ and ChxF-	15 V	
Minimum Input Voltage	Between CHx_F+ and ChxF-	-0.3 V	
Maximum Short-Circuit Current		1.5 A	
Maximum Simulation Current		10 mA	
Minimum Simulation Current		100 µA	
Maximum Switching Power	DC, Resistive Load	60 W	
Maximum Simulation Power		400 mW	

Technical Data

PARAMETER	CONDITION	VALUE	COMMENT
Maximum Simulation Voltage	Between CHx_F+ and ChxF-	10 V	
Minimum Simulation Voltage	Between CHx_F+ and ChxF-	0 V	
Resistor Value Update Time		50 µs	SLSC Communication Delay Not Included
Simulation Resolution	PT100 Configuration	0.1 Ω	
	PT1000 Configuration	1 Ω	
Initial Resistance		< 10 M	
Expected Electrical Relay Lifetime	1 A, 30 VDC Resistive	Minimum 10^5 operations	
	2 A, 30 VDC Resistive	Minimum 10^4 operations	

Learn more

Aliaro AL-1010 Multifunction SLSC Module

The AL-1010 is now available for purchase through NI. Connect this 12-channel multifunction board between the DUT and the instrumentation part of the test system. The board provides signal conditioning and switching capabilities on each channel. Each pin can route either AI/AO/DI/DO/PWM and, by default, fault injection on all pins.

The board interfaces with NI PXI and/or CompactRIO instrumentation devices for developing, verifying, and validating electronic control unit software and hardware. It's recommended for systems requiring high flexibility. Using the Aliaro Configurator software, you easily can configure the pins and deploy them with NI VeriStand, so that you can update the hardware-in-the-loop (HIL) system setup without changing hardware and saving test-development time. The AL-1010 features:

- 60 V, 10 A per channel
- 12 independent and isolated channels in three banks
- Two common buses per bank, with switches to each channel
- A brake up switch for each channel
- A programmable level threshold on each channel
- A parallel connection possibility for high-current signals
- An included LabVIEW driver
- NI VeriStand compatibility

General Specifications

PARAMETER	CONDITION	VALUE
Power Supply		24 VDC, +/-5%
Channel-to-Channel Isolation	(50 Ω/100 kHz)	40 dB
Maximum Operating Voltage	Any Pin	+60 V
Minimum Operating Voltage	Any Pin	-60 V
Calibration	Not Required, Recommended on System Level	

Fault-Insertion Specifications

PARAMETER	CONDITION	VALUE
Maximum Continuous Current	DUT to Load	10 A (40 A using parallel channels)
	DUT to AUX 1 and 2	10 A (40 A using parallel channels)
	All Other Pins	100 mA
Maximum Peak Current (<100 ms, 25°C)	DUT to Load	40 A/50 ms
	DUT to AUX 1 and 2	40 A/50 ms

Learn more

Aliaro AL-3011 SLSC Resistor Emulation Module

The AL-3011 is now available for purchase through NI. You can use this resistor emulation module for switch load signal conditioning (SLSC) systems in HIL simulators. You can use this module for applications requiring simulation of resistive sensors with multifunctionality. The AL-3011 supports 10 Ω to 8 MΩ resistance (RES) for each channel and features fault insertion (FIU) on each channel, providing short to FI+ or FI-.

The board interfaces with NI PXI and/or CompactRIO instrumentation devices for developing, verifying, and validating electronic control unit software and hardware. Using software such as Aliaro Configurator, you easily can configure the pins and deploy them with NI VeriStand, saving test-development time. The AL-3011 features:

- 16 independent and isolated channels
- 16 programmable channels for resistor emulation
- 50 s programming resistance sequence
- Two expansion slots for add-on boards
- Two common buses per bank with switches to each channel
- A brake up switch for each channel
- Pull up and pull down on each channel
- An included LabVIEW driver
- A custom VeriStand device driver

AL-3011 Specifications

PARAMETER	RANGE	VALUE
Maximum Voltage		60 V
Maximum Current		100 mA
Maximum Power		400 mW
Range		10 Ω – 8M Ω
Resolution		0.5 Ω
Overall Accuracy at 20 ˚C – 40 ˚C	10 – 100 Ω	<5%
	100 – 2k Ω	<0.5%
	2k Ω – 100k Ω	<0.2%
	100k Ω – 1.5M Ω	<0.5%
	1.5M Ω – 8M Ω	<2%
Calibration	The card has an open calibration feature, meaning that the customer has access to this feature and can use it for system calibration, as well.	

Learn more

SET-1240 xVDT Emulation SLSC Module

The SET-1240 xVDT card can emulate four-, five-, or six-wire linear variable-differential transformers, rotary variable-differential transformers, and resolvers, and is now available for purchase through NI. The card offers eight independent, galvanically isolated channels. In addition to a wide excitation frequency range from 400 Hz to 10 kHz, the card also offers various self-test options. The transformers are located on exchangeable subcards (SET-1241 or SET-1242) which you easily can exchange or request.

Absolute Maximum Ratings

PARAMETER	CONDITION		VALUE
Maximum Excitation Voltage	Recommended Operation Range	Daughterboard: SET-1241	400 Hz ≤ fExc ≤ 1 kHz: 3 Vrms
		Daughterboard: SET-1242	1 kHz < fExc ≤ 10 kHz: 7 Vrms
	Operation without Damage		10 Vrms
Minimum Input Voltage	Between CHx_F+ and ChxF-		-0.3 V
Maximum Common Mode Excitation Voltage			45 VDC
Minimum Common Mode Excitation Voltage			-45 VDC
Maximum RTI Control Voltage			+10 V
Minimum RTI Control Voltage			-10 V
Excitation Frequency	Recommended Operation Range		400 Hz to 10 kHz

Technical Data

PARAMETER	CONDITION	VALUE	COMMENT
Update Time		10 ms	SLSC Commit CMD Duration
Expected Electrical Relay Lifetime	1 A, 30 VDC Resistive	105 Operations	
DC Resistance of Transformers		115 Ω ± 15%	

Learn more

SET-2110 Fault-Insertion SLSC Module

The SET-2110 fault-insertion card is a large-scale, high-density switching matrix now available for purchase through NI.

You can connect each line of the 32 single-ended or 16 differential channels individually and flexibly to the high-current fault injection bus. You can select one or both fault bus signal pairs dynamically for every channel. The SET-2110 fault-insertion card also generates short circuits between a channel's positive and negative signal.

Unlike traditional routing matrix cards, the SET-2110 is designed specifically for the challenges of signal routing in HIL systems. To maximize customizability, the SET-2110 features two plug-in module slots that offer additional features, such as instrument connectivity.

Absolute Maximum Ratings

PARAMETER	CONDITION	VALUE
Maximum Input Voltage	Any Pin	60 VDC
Minimum Input Voltage	Any Pin	-60 VDC
Maximum Switching Power	DC, Resistive Load	60 W
Maximum Current Rating		1.5 A

Technical Data

PARAMETER	CONDITION	VALUE	COMMENT
Update Time		10 ms	SLSC Commit CMD Duration
Maximum Initial Contact Resistance	J1 → XJ2, J2 → XJ2, J1 → J2	500 mΩ	
Expected Electrical Lifetime	1 A, 30 VDC Resistive	105 Operations	
Expected Electrical Lifetime	1,5 A, 30 VDC Resistive	104 Operations	
Bandwidth	-3 dB, 50 Ω Termination	≤ 20 MHz	

Learn more
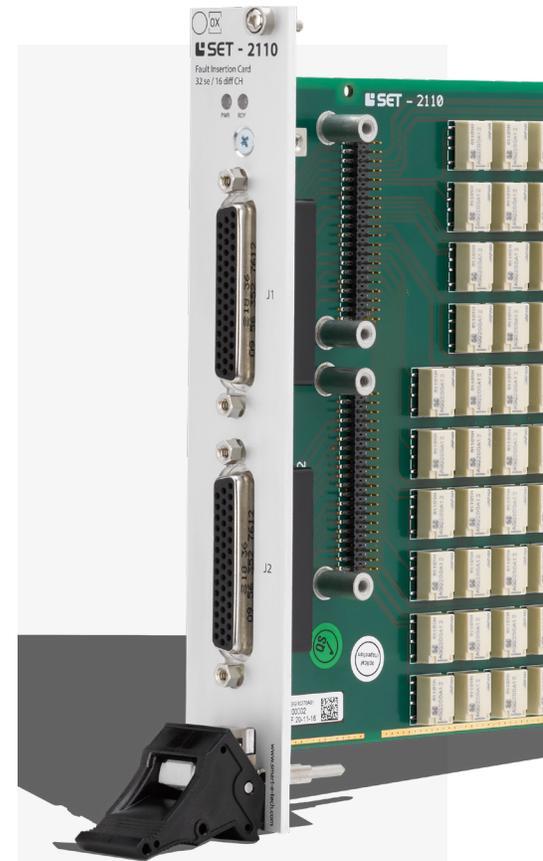
HARDWARE

Wireless Design and Test

Wireless technology is constantly evolving. NI creates fast and cost-effective wireless test solutions that help you design innovative and high-quality products.

USRP X410 Software Defined Radio

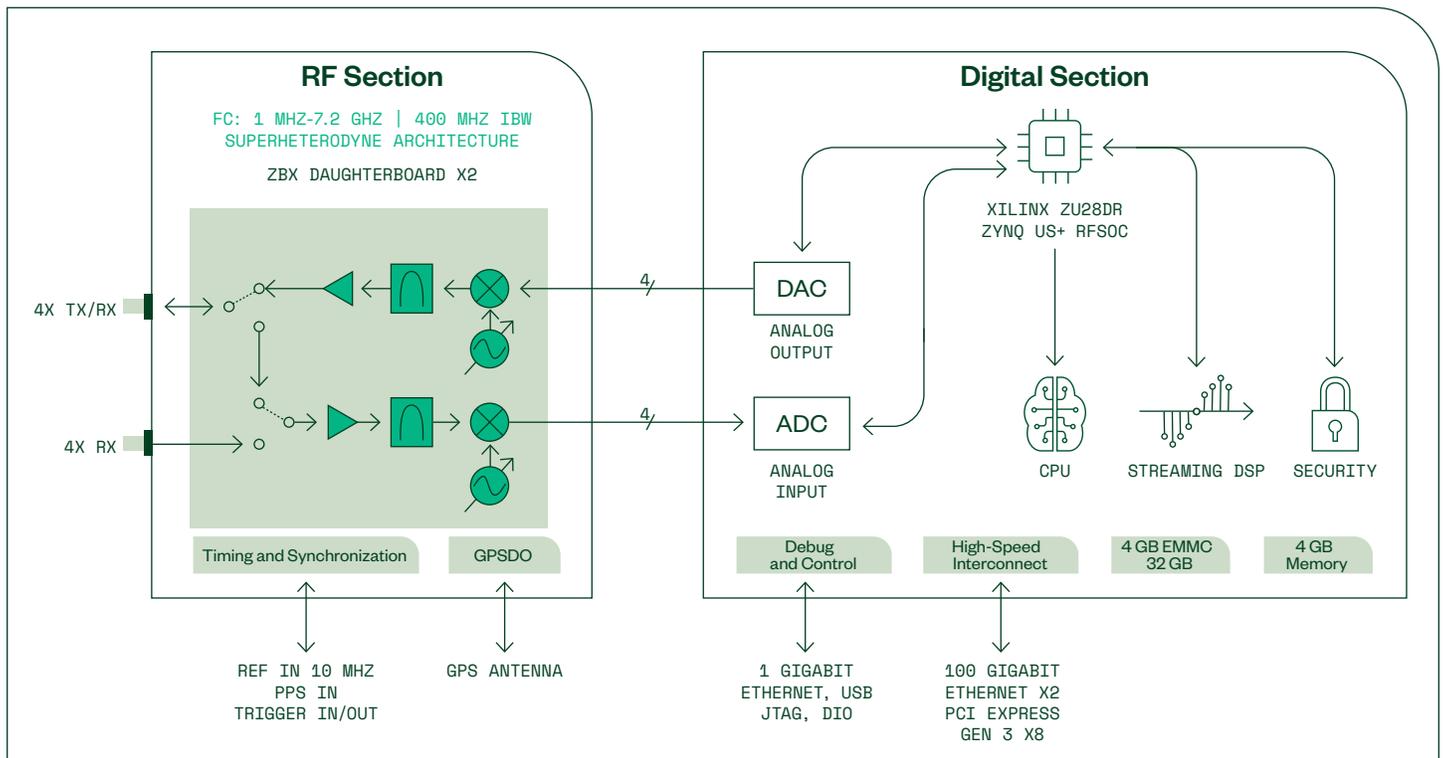Introducing the next leap in software defined radio from NI: The NI Ettus USRP X410. Ready for advanced signal-processing applications such as 5G research test beds and wideband signal intelligence applications, and built on the powerful Xilinx Radio Frequency System-on-Chip (RFSoC) technology, the USRP X410 is the most powerful software defined radio on the market.

Key RF capabilities include:
- 1 MHz to 7.2 GHz frequency range
- 400 MHz signal bandwidth
- Four RX and four TX channels
- Up to 22 dBm TX and 0 dBm RX maximum power

Key digital capabilities include:
- Zynq UltraScale+ RFSoC FPGA technology
- Dual QSFP28, PCI Express Gen 3 x8 interfaces
- SD-FEC, DDC, DUC onboard IP
- UHD, GNU Radio, and LabVIEW software support
- Onboard GPS disciplined oscillator (DO) synchronization

RF Section

FC: 1 MHZ-7.2 GHZ | 400 MHZ IBW
SUPERHETERODYNE ARCHITECTURE

ZBX DAUGHTERBOARD X2

4X TX/RX

4X RX

Timing and Synchronization

GPSDO

REF IN 10 MHZ
PPS IN
TRIGGER IN/OUT

GPS ANTENNA

Digital Section

XILINX ZU28DR
ZYNQ US+ RFSOC

DAC
ANALOG
OUTPUT

ADC
ANALOG
INPUT

CPU

STREAMING DSP

SECURITY

Debug
and Control

High-Speed
Interconnect

4 GB EMMC
32 GB

4 GB
Memory

1 GIGABIT
ETHERNET, USB
JTAG, DIO

100 GIGABIT
ETHERNET X2
PCI EXPRESS
GEN 3 X8

Learn more

Pick the Right USRP for Your Application

PXIe-5832 mmWave Vector Signal Transceiver

The PXIe-5832 extends the capabilities of the mmWave vector signal transceiver (VST) to have continuous frequency generation from 22.5 GHz to 44 GHz. With the procurement of appropriate export licenses for end use, you now can operate with full functionality in the 31.3 GHz to 37 GHz frequency range.

	PXIe-5832	
Frequency Range	5 GHz to 21 GHz 22.5 GHz to 44 GHz	
Instantaneous Bandwidth	1 GHz	
RF Channels	Up to 32	
EVM (5G NR 100 MHz, Loopback)	0.65% @ 28 GHz	
VSG Maximum Output Power (CW @ 1 GHz)	+15 dBm @ 6 GHz to 10 GHz +15 dBm @ 28 GHz	
Tuning Time	0.75 ms	0.80 ms (Including Frequency Lock Time)
Excitation Frequency	400 Hz – 10 kHz	
Phase Noise (Typical, Onboard LO, 31.3 GHz to 40 GHz, 20 kHz Offset)	-99 dBc/Hz	
Output Frequency Response (0 dBm Reference, 31.3 GHz to 37 GHz)	2.0 dB	
Slots	6 (4 without mmWave Configurations)	
Supports mmWave Test Heads	Yes	
Digital I/O	8 Channels at 60 MHz, 4 Channels High-Speed Serial up to 12 Gb/s	

Learn more

Q&A with Research & Development

WHAT IS MOST EXCITING ABOUT THIS PRODUCT?

The most exciting part of the USRP X410 project for me was pushing the product line to next level of performance and capability. Seeing the product do things that none of its predecessors could do is my favorite part of the job.

WHAT IS THE FEATURE YOU'RE MOST PROUD OF?

The latest USRP has the ability to reconfigure its data path depending on the throughput requirements of the application. This allows us to use the resources of its FPGA more efficiently by only using what is needed for each application.

WHAT WAS A CHALLENGE YOU OVERCAME OR SOMETHING YOU LEARNED IN THE DEVELOPMENT PROCESS?

Pushing beyond the limits of our existing products always uncovers interesting challenges that are difficult to predict. This makes finding the right balance between product features, development schedules, and R&D resources especially difficult. It requires us to be flexible and capable of adapting quickly to shifting priorities.

WADE FIFE
PRINCIPAL DIGITAL
HARDWARE ENGINEER, NI

INDUSTRY-SPECIFIC SOLUTIONS

Semiconductor

As devices get smarter, so do our semiconductor test solutions. We know that semiconductor technology requirements outpace traditional test coverage approaches. That's why we prioritize investments in software and systems that help you build solutions that meet your evolving needs at every step of the process.
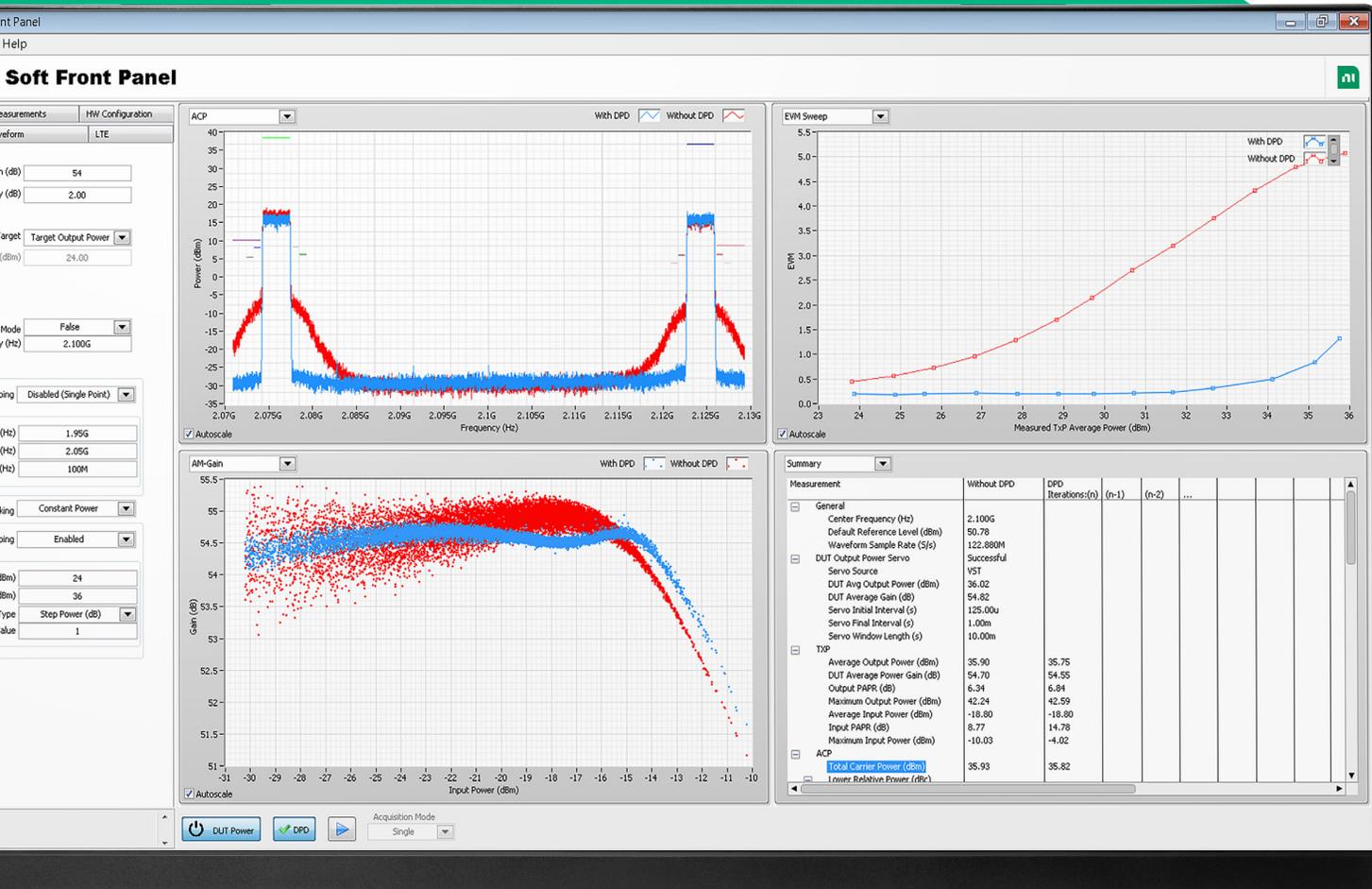
RF Front-End Validation Solution

NI's RF front-end validation reference architecture simplifies wideband RF power amplifier (PA) validation workflows for demanding applications such as 5G and Wi-Fi 6. The RF front-end validation reference architecture includes powerful new benefits:

- Accurate measurements with pathloss and fixture calibration using S-parameter de-embedding
- Greater understanding of PA performance through load pull with Focus Microwave tuners
- Precise output power set points every time with power-sensor supported power servo (power leveling)

Use the new key features to:
- Control your PA validation bench and visualize measurement results with the integrated, cockpit-like RFIC Test Software application.
- Easily configure power, frequency, and impedance sweeps, taking advantage of built-in Focus Microwave tuner control for validating PA performance under non-50 Ω conditions.
- Run cutting-edge digital predistortion linearization algorithms and compare linearized versus nonlinearized performance with detailed graphs and results for gain, AM/AM, AM/PM, error vector magnitude (EVM), adjacent channel leakage power ratio (ACLR), PAE, and loading conditions (gamma and voltage standing wave ratio).
- Deploy extensive automated validation sequences with ease thanks to the Automation Wizard and a large collection of ready-to-run code modules and test sequences.
- Calibrate and adjust pathlosses with S2P de-embedding.
- Achieve precise output power levels with power-sensor-based output power servo.

Learn more

"Our engineering teams looked at all the things that were slowing down our characterization process in the lab, and RF measurements using traditional instruments were the most time-consuming. By adopting PXI, we were able to significantly improve test throughput without sacrificing measurement quality."

Ben Thomas
Director, Mobile 5G
Business Development, Qorvo

5G mmWave Over-the-Air Validation Reference Architecture

With NI's fast and accurate mmWave over-the-air (OTA) validation reference architecture, you spatially can validate the latest 5G mmWave beamforming devices 5X to 10X faster—from ultraportable antenna-in-module devices to UE system-level designs. It introduces compact antenna test range capabilities in the same chamber for direct and indirect far-field (DFF and IFF) characterization. This validation reference architecture includes a thermal enclosure for validating OTA device performance over a wide temperature range from -40 °C to 85 °C.

NI's OTA software gives you detailed 3D results and visualization of wideband 5G new radio beam characteristics, such as channel power, EVM, ACLR, SEM, and OBW. With an intuitive user experience, you can configure, run, and visualize measurement results with ease.

Learn more

Semiconductor Device Control Add-On 20.0 for InstrumentStudio

The Semiconductor Device Control Add-On for InstrumentStudio software is an add-on that helps you perform interactive register read/write operations using standard or custom digital protocols. You can save your InstrumentStudio software projects or export setups for automated validation in LabVIEW, Python, .NET, or TestStand. You can use InstrumentStudio software in parallel with automated applications to monitor and debug device control tasks in real time.

The 20.0 release adds RFFE protocol support, powerful scripting capabilities, various usability improvements, and InstrumentStudio 2020 support.

Learn more
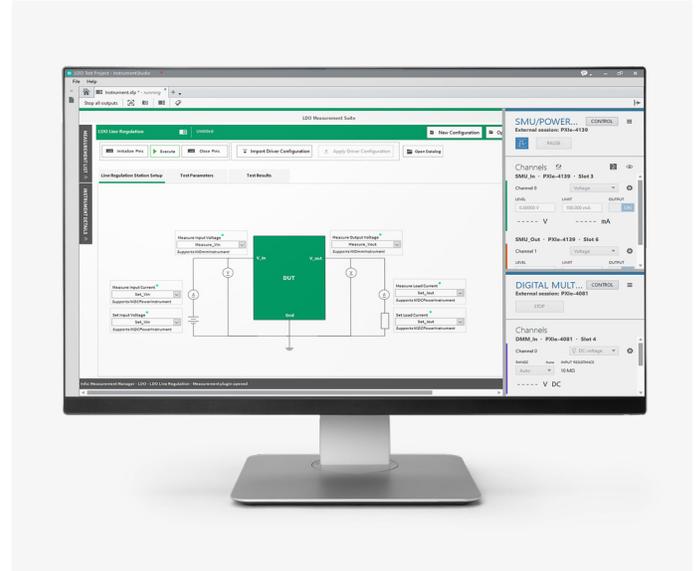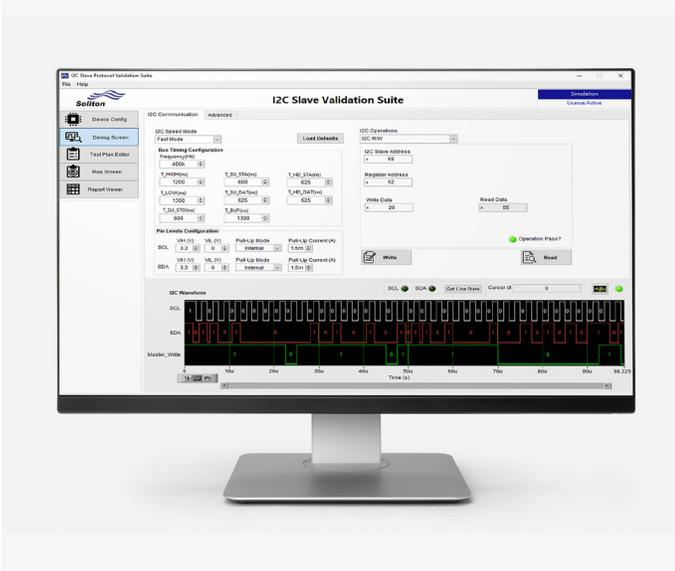
Soliton Protocol Validation Solution for I2C, I3C, SPI, and SPMI Semiconductor Devices

The Soliton Protocol Validation Solution is an off-the-shelf validation tool that uses NI PXI digital instruments and helps chip designers perform protocol validation in as little as a few hours, significantly reducing time to market. The PXI-based validation suite helps validate the device's compliance with timing and electrical specifications of the I2C/I3C/SPI/SPMI protocols and also can validate the device's tolerance to and recovery from a variety of faults and exceptions, providing a comprehensive set of test reports.

Learn more

LDO Validation Solution

NI's LDO Validation Solution combines high-performance PXI instrumentation with the Soliton LDO Measurement Suite to help you validate new LDO designs—from interactive configuration and measurements to fully automated validation. This solution includes prebuilt, configurable LDO measurements, such as line/load regulation, line/load transient, dropout voltage, and power supply rejection ratio (PSRR). You can use an intuitive InstrumentStudio software panel to interactively configure and run LDO measurements, and then you can export those measurement configurations for a simplified path to automation with either prebuilt, drag-and-drop TestStand step types or integrate LDO measurements into your own automated application with a LabVIEW programming API.

Learn more
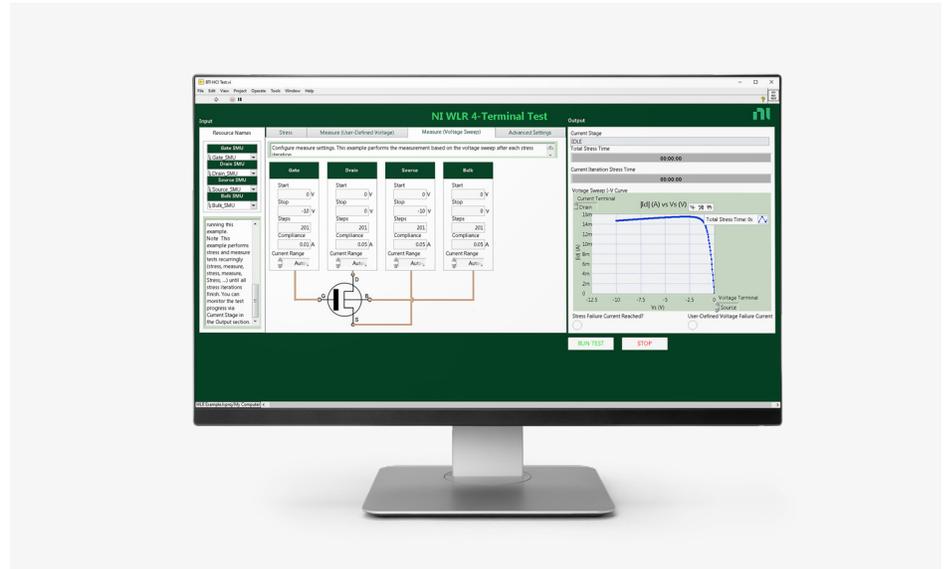
NI Wafer-Level Reliability Software 21.0

NI's wafer-level reliability (WLR) solutions provide a scalable, flexible, and future-proof software and hardware architecture with which you can optimize how you would gather the data required to execute your device or process qualification efforts. Through our parallelism, source measure unit (SMU) density, and performance, we can provide throughput improvements and help you gather more insights and statistics in the same amount of time, or provide you with the same amount of data in less time:

- Leverage parallel SMUs to increase your reliability data velocity between 5X and 10X with custom software
- Easily evaluate our SMU and software capabilities with our WLR examples based on LabVIEW, including:
  - Time-dependent dialectic breakdown
  - Hot carrier
  - Bias temperature instability
- Use a WLR demo box for packaged devices
- Configure, run, and review your stress tests easily within our reference examples
- Build highly synchronized and flexible systems with our SMU-per-pin system architecture and scalability
- Deploy your own custom reliability algorithms leveraging our WLR 21.0 API based on LabVIEW
- Engage more easily with customers on benchmarks

Learn more

Next-Generation Semiconductor Technology Parametric Test

Learn more

Challenge

imec Semiconductor needed to perform accurate electrical wafer-level tests in the semiconductor R&D fabrication (fab) process flow to detect process-related issues at an early stage. This helps to rework the wafers at the right time to manage yield drops and optimize the R&D process flow, reduce costs, and decrease the time-to-market of the newest chip-manufacturing techniques.

Solution

Using the NI PXI platform with PXIe-4135 SMUs, imec built a highly parallel measurement system to use inside the wafer fab and programmed this setup with LabVIEW so that they could keep all of the wafers inside and test them, process the results, and make much faster adjustments to the semiconductor process flow.

"The test-time reduction using this SMU-per-pin method is nothing short of spectacular, and wouldn't be possible with large, traditional box SMUs. Our method eliminated switching and serialized-measurement time, reducing total test time to that of testing a single test point."

Bart De Wachter
imec Semiconductor Technology and Systems Group Researcher

INDUSTRY-SPECIFIC SOLUTIONS

Aerospace, Defense, and Government

When you're working on mission-critical assets, quality and reliability are imperative. From early-stage research to the sustainment of long life-cycle programs, NI can help you address your most significant challenges across design, test, deployment, and maintenance.
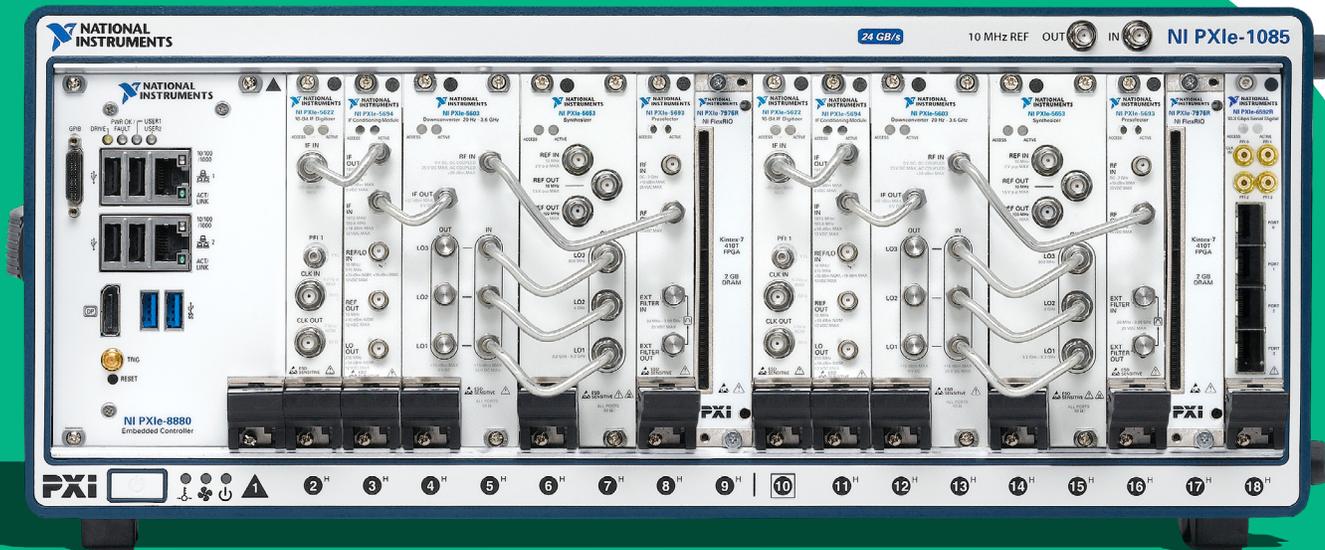
"NI systems allow us to stay on the aggressive timelines that we set for ourselves. They give us the agility to innovate rapidly and adapt quickly."

Omar Mussa
Virgin Orbit

Novator Solutions Hugin 2000 Multichannel Receiver

Engineers and project leaders responsible for installing and deploying signals intelligence sensor sites typically need to use multiple narrowband radios for capturing all signals in the surroundings. However, it's complex to install and maintain multiple radios, especially at remote sensor sites. Using many radios creates a significant volume of data that must be streamed and managed. And as more radios are deployed to cover additional frequency bands, costs escalate. Together with NI Partner Novator Solutions, we offer a solution to:

- Maximize the likelihood of capturing critical electromagnetic signals
- Minimize extraneous data processing and storage
- Reduce the need for scanning and replace traditional narrowband receivers
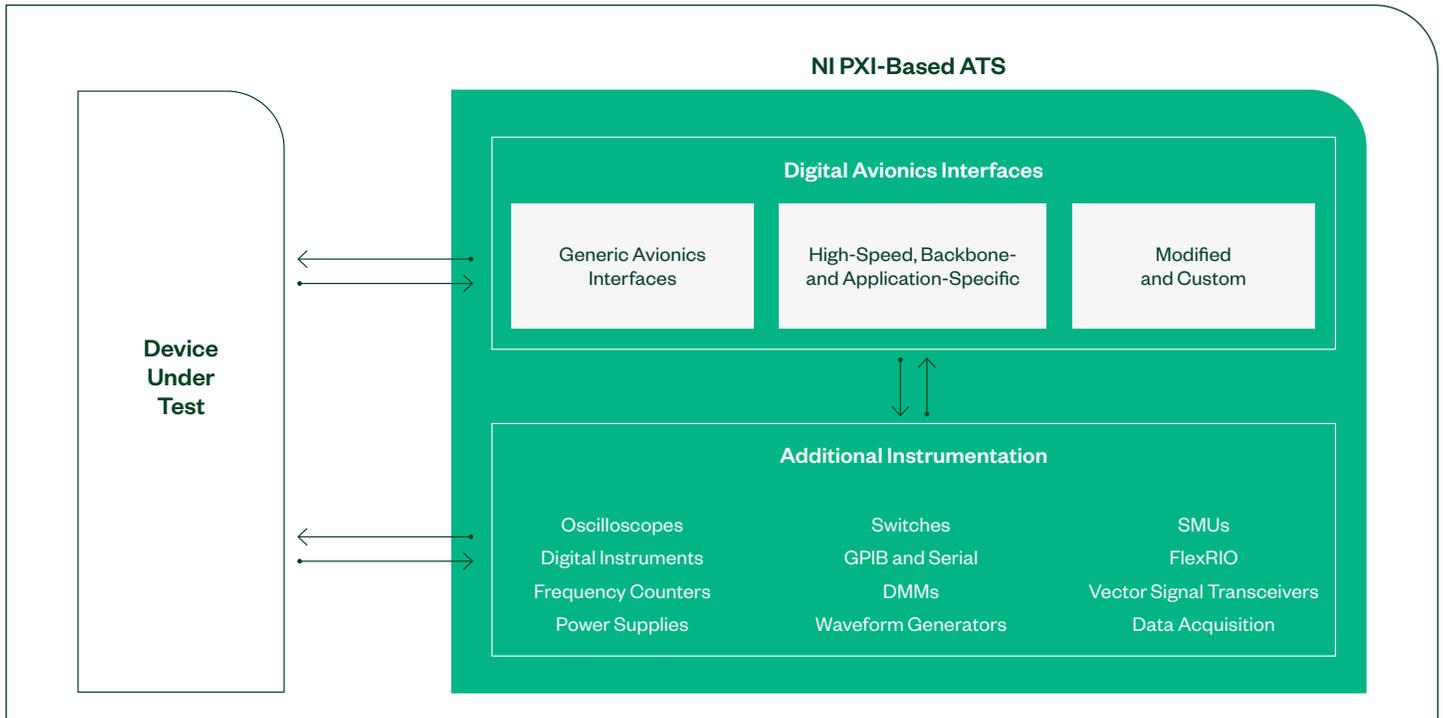
Key Specifications

Hugin 2000 Processing	TCP/IP-controlled server software runs on PXI controller CPU, and signal processing runs on FPGAs
RF Tuner	PXIe-5667 and PXIe-5668
Number of Narrowband Channels	1,024 per RF tuner with aggregated output rate of 125 MS/s to 250 MS/s
Data Movement	SFP+ 10 Gb network for narrowband channel stream
Data Output per Channel	CW, AM, LSB, USB, FM, WFM, or IQ data (no demodulation)

RF Specifications

V/UHF Characteristics	50 MHz Tuner	200 MHz Tuner
Maximum Input Power	+10 dBm	+30 dBm
Analog Bandwidth	50 MHz	200 MHz
Dynamic Range	100 dB to 112 dB	119 dB
Phase Noise	-129 dBc	-126 dBc
Sensitivity	-160 dBm/Hz @ 3.6 GHz	-150 dBm Worst Case

Learn more

NI PXI-Based ATS

Device Under Test

Digital Avionics Interfaces

Generic Avionics Interfaces	High-Speed, Backbone- and Application-Specific	Modified and Custom

Additional Instrumentation

Oscilloscopes	Switches	SMUs
Digital Instruments	GPIB and Serial	FlexRIO
Frequency Counters	DMMs	Vector Signal Transceivers
Power Supplies	Waveform Generators	Data Acquisition

Digital Avionics Interfacing Solution for Manufacturing and Depot Test

Using the Digital Avionics Interfacing Solution for Manufacturing and Depot Test, test engineers can communicate with their DUTs through industry-standard protocols as part of their overall production or maintenance test application. The offering includes network interface cards for common general protocols sold by NI, partner IP for high-speed and application-specific protocols that runs on NI hardware, and an NI tool-based workflow for modifying standard protocols or creating custom interfaces. Unlike the competition, NI provides the broadest spectrum of protocol support with the flexibility to select the exact functionality that you need:

- In addition to traditional instrumentation, NI offers digital avionics interfaces both directly and through trusted partners.
- The solution supports generic interfaces, including MIL-STD-1533, ARINC 429, RS232/RS422/RS482, and CANbus.
- High-speed interfaces include Fibre Channel, Serial RapidIO, ARINC 664p7/AFDX, IEEE 1394b, and Ethernet (up to 40 Gigabit Ethernet).
- Application-specific interfaces include ARINC 708, ARINC 717, ARINC 818, SpaceWire, and DVI.
- For modified or custom protocol applications, NI tools incorporate a user-programmable FPGA for maximum customization.

Learn more

Saab Elevates Testing of the World's Most Cost-Effective Fighter Plane

Learn more

Challenge

Saab needed to find a commercial off-the-shelf (COTS) solution to replace their custom system for interfacing to line-replaceable units (LRUs) in Saab Aeronautics simulators.

Solution

Saab reduced cost and ensured maximum flexibility by joining NI in piloting its SLSC system, rather than developing a custom system to interface to the preferred CompactRIO and PXI-based systems.

"Having a COTS product means we can contain development and maintenance costs, promoting the Saab initiative to break the cost curve. Using the SLSC system further promotes our goal to focus the attention on building HIL test systems and rigs, not developing advanced hardware."

Anders Tunströmer
SAAB Aeronautics

INDUSTRY-SPECIFIC SOLUTIONS

Transportation

Together, we can create a more sustainable future for mobility—without shortcuts. NI can help you ensure quality and accelerate time to market. Let's turn test into your enabler of performance and strategic advantage.

ECU Test System 2.0

The NI ECU Test System (ECUTS) is a configurable, out-of-the-box functional test solution that combines NI software, hardware, and services to ensure your success. Designed to help you focus on value-added production test tasks, this system helps you reduce time and resource waste during implementation as well as move faster to meet your deadlines and time-to-market goals.

Advantages include:
- Faster deployment
- Leaner operation
- Scalability for any test need
- Sustainable execution

This release enhances capabilities to improve adaptability and maintainability.

SOFTWARE—The new software suite and maintenance software directly improve development, debugging, maintenance time, cost, and experience. Paired with the Field Diagnostic Tester (FDT), the new maintenance software increases system configuration, instrumentation, calibration, and diagnostic coverage. Additionally, the new software suite includes InstrumentStudio software integration and new TestStand steps for interactive debugging and faster test-plan development. The TestStand ECU Toolkit also provides a nonprogramming and graphical instrument debug experience, reducing test software development effort. In addition, it supports SLSC load switch modules (SLSC-1225x) in Switch Executive and current measurement steps in TestStand for a consistent user experience across PXI and SLSC switch products.

SYSTEM—More instrumentation options and available 24U and 40U form factors make ECUTS more adaptable to a variety of ECUs, test plans, and manufacturing requirements. The 40U option provides extra rack space for more instrumentation to accommodate your test needs.

Learn more

"NI's ECUTS is the only system we could find in the market that met our aggressive schedule for deploying production testers for our ECUs. Everything—from the initial configuration, to delivery at our site, to the bring-up service—was significantly faster, so we had more time to focus on our test plan implementation and make our project successful."

Wenfeng Wu
Site Industrial TDE
Valeo Interior Controls (Shenzen) Co. Ltd.

Data Record System AD

Data Record System AD is an NI PXI-based system that includes application software designed for high-bandwidth advanced driver-assistance system (ADAS) and autonomous driving (AD) in-vehicle data-logging applications. The combination of PXI instrumentation, timing, and synchronization, paired with out-of-the-box application software, provides a high-performance (raw) sensor data and vehicle network bus recorder with unrivaled customization to address the specific data-logging needs of today and tomorrow.

The system is:

- FUTURE-PROOF—Utilize hardware and software customization, flexibility, and third-party openness
- MORE THAN JUST A LOGGER—It offers single unified toolchain for data record and replay, and hardware in the loop
- RICH WITH INCREASED DATA QUALITY—Instrument-grade I/O, throughput, timing and synchronization, and edge-computing capabilities translate to smart data reduction
- MINIMALLY COMPLEX—A single system means a reduced footprint and power consumption
- EQUIPPED FOR SYSTEM INTEGRATION AND EVOLUTION—NI Certified Solution Partner Konrad Technologies and a vast ADAS ecosystem of IT and cloud subject matter experts provide support

System components include:

- SOFTWARE—Data Record AD application software offers high-bandwidth data recording, including an out-of-the-box experience and full customization options
- PXI MODULE DATA THROUGHPUT, TIMING, AND SYNCHRONIZATION—PCI Express Gen 3 throughput up to 24 GB/s, P2P streaming, subnanosecond latency, and integrated triggering
- PXI MODULE AUTOMOTIVE CAMERA INTERFACES—FPD-Link III and GMSL2 I/O configurations of four-in/four-out, eight-in/eight-out; user-programmable FPGA for inline processing
- PXI MODULE STORAGE—In-chassis RAID and external storage options, including storage as a service at more than 200 TB at >6 GB/s
- PXI EMBEDDED CONTROLLER COMPUTER—Windows and NI Linux Real-Time OS options, Intel Xeon processing, peripheral ports, display output, and an integrated hard drive
- PXI MODULE AUTOMOTIVE NETWORK INTERFACES—CAN (Low-Speed, High-Speed, and Flexible Data-Rate [FD]), FlexRay, automotive Ethernet 100/1000BASE-T1; standard Ethernet up to 40 Gb/s

Learn more

PXI Automotive Camera Interface Modules (FPD-Link III and GMSL2)

The PXIe-1486 and PXIe-1487 represent a key technology for NI in ADAS and AD hardware and software test applications. Using these six variants, you can connect FPD-Link III and GMSL2 PXI interfaces to modern high-bandwidth ADAS/AD camera sensors and ECUs— critical for recording and playing back data to and from DUTs. Using the PXIe-1486 and PXIe-1487, which are built upon NI FlexRIO technology, you can process information in real time, synchronize multiple ADAS sensors, and stream data to the PXI backplane with PCI Express x8 Gen 3 speeds.

These modules include FlexRIO 20.7 driver support, with prerequisites of LabVIEW 2020 and LabVIEW FPGA Module 2020.

Learn more

Body and Chassis HIL Solution

For validation engineers who have continually changing test requirements with less time and fewer resources to address them, NI offers body and chassis HIL test solutions comprised of high-performance modular hardware with a wide breadth of I/O and FPGAs, simplified load switching, and fault insertion.

Use these solutions to:
- Minimize cost and ensure reliability with HIL simulation, reducing the need for expensive real-world tests.
- Reduce test development time and enjoy quick start-up with a system built with modular NI hardware along with our HIL partner ecosystem.
- Maximize system reuse with a flexible tester designed to be extended and customized to meet changing requirements.

HIL test system component benefits include:
- NI SLSC hardware that standardizes connectivity and simplifies overall system integration by reducing system point-to-point wiring through signal accumulation and standard cable use.
- A custom PXI or CompactRIO system with a broad range of modular I/O connected directly to the FPGA for testing with higher fidelity through high-speed deterministic execution.
- VeriStand, which includes features to configure real-time I/O, import and simulate models, and automate real-time tests.

Learn more

Battery Test System 2.0

NI developed the Battery Test System (BTS) to optimize battery test workflows and give test teams the access and flexibility they need to respond to rapidly changing test requirements. The BTS features robust test automation, remote asset management, and pre-existing test scripts along with flexible, vendor-agnostic equipment integration (chamber, chiller, cycler) so that you can reuse existing test team assets. The BTS can help you stay ahead of requirements churn and drive test efficiency improvements to accelerate schedules, increase test coverage and quality, and reduce the total cost of test.

The 2.0 release is an iteration of the original BTS that launched in 2020, and adds functionality that includes:

- Multi-DUT Support—Test up to four battery packs/modules at one time (per DUT RT control plus additional I/O)
- Accessibility Improvements—Use instrumentation drawers for integrator/technician access
- User Interface Configuration Scripting—Script operator state, configuration, or test panels

Learn more

Noffz A^{2}B Network Simulation and Testing

Road noise cancellation, personal audio zones, telematics systems, and A/V conference room systems are some of the most common audio challenges faced by infotainment test engineers. These demand more expensive microcontrollers and external memory, increasing system complexity and test time. The ITD 1024 is an off-the-shelf infotainment test device for A²B, an emerging automotive audio bus. In combination with a comprehensive set of software tools, you can use ITD 1024 to rapidly test various A²B components such as audio speakers, amplifiers, microphone arrays, sensors, and actuators.

Learn more
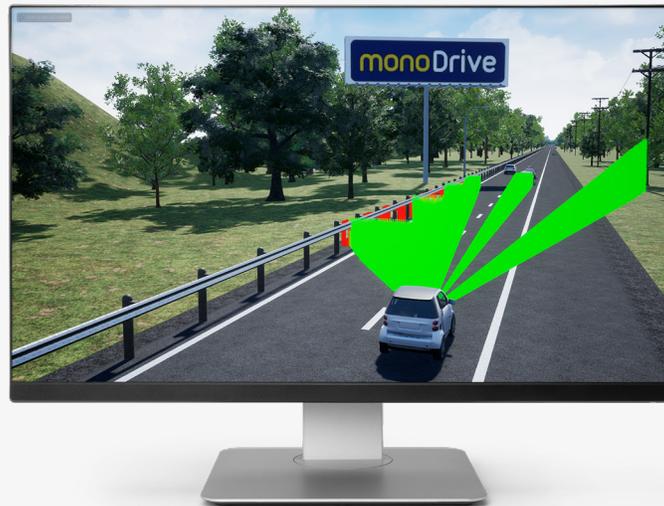
monoDrive Simulator

The monoDrive Simulator is powerful simulation software for testing ADAS and autonomous driving perception algorithms. Focused on ultrahigh-fidelity sensor simulation, it features real-world tuned physics-based sensor models, realistic driving scenarios, and diverse environments. You can use the simulator in a desktop environment for development, run it in closed-loop real-time for HIL, and deploy it as a cloud-based application to test at scale.

Advantages include:

- SIMULATION REALISM—monoDrive's simulator and sensor models are focused on creating high-fidelity sensor data for camera, radar, lidar, ultrasonics, and GPS/GNSS so that your simulation results match what you'll see in the real world.
- REAL-TIME PERFORMANCE—Sensor models have been optimized for running natively on GPUs to achieve real-time performance for HIL applications without sacrificing fidelity.
- PARALLEL TEST—Use the Kubernetes-native application to deploy easily to any private or public cloud for testing at scale.
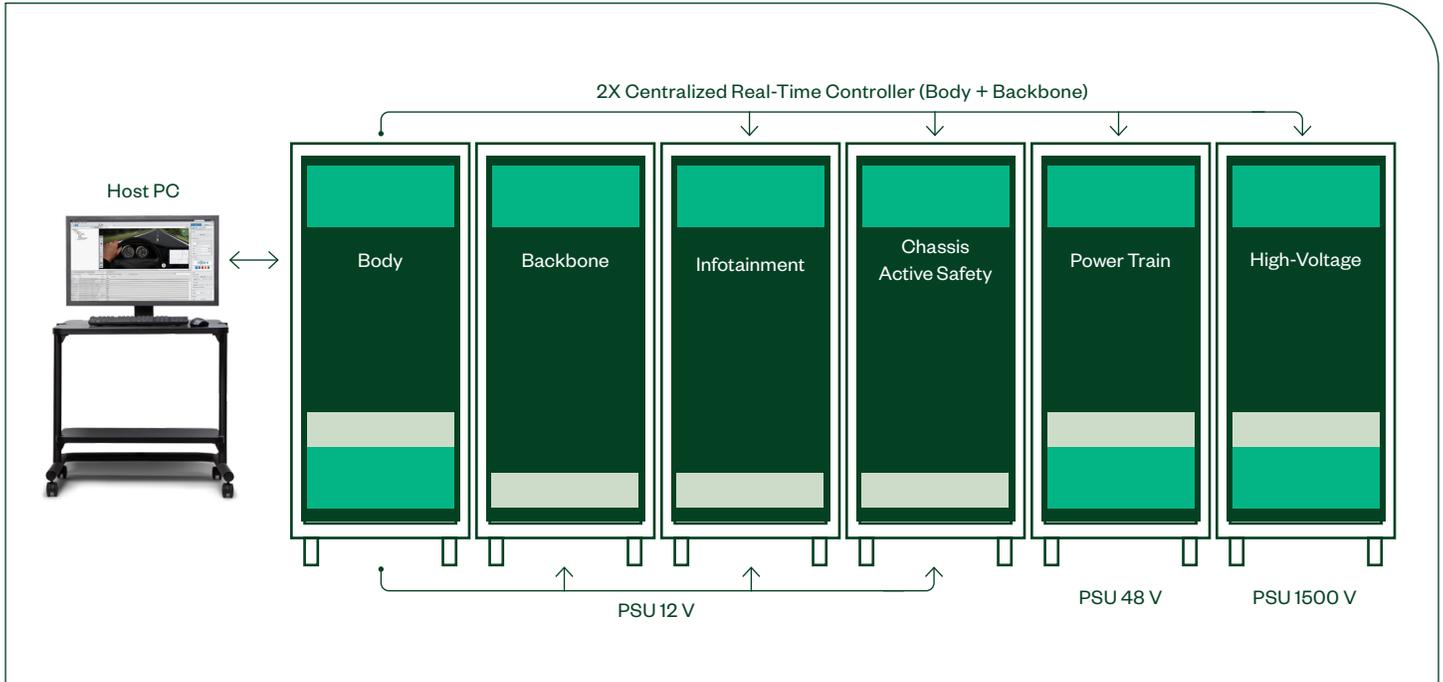
Learn more

monoDrive Digital Twin Creator

The monoDrive Digital Twin Creator provides an end-to-end solution for creating high-fidelity assets and maps for simulation and testing. Sensor fusion and machine-learning algorithms construct 3D meshes from lidar and image data that capture both static and dynamic objects. Direct texturing is then overlayed to produce more realistic maps than human artists or procedural algorithms can. Use this solution to take advantage of:

- INCREASED TEST COVERAGE—Create digital twins of real drives that you can modify in simulation to test thousands of scenarios.
- HIGH FIDELITY—Using real data as the basis for simulations creates more realistic drive scenarios for better test fidelity.
- FASTER SCENARIO CREATION—Automate scenario creation from real data without hand-labeling.

Learn more

2X Centralized Real-Time Controller (Body + Backbone)

Host PC

| Body | Backbone | Infotainment | Chassis Active Safety | Power Train | High-Voltage |

PSU 12 V

PSU 48 V

PSU 1500 V

System-Level HIL Solution

As vehicles grow more complicated, systems-integration testing is more important than ever. Rigorous systems-integration HIL testing ensures that ECUs across the vehicle—in different systems, developed by different teams—all function correctly and safely together.

Use this solution to take advantage of:

- AN OPEN AND FLEXIBLE APPROACH
  - With PXI, you can extend your current test capabilities with a wide range of modules to meet different system-integration testing needs as you add new ECUs to the system.
  - VeriStand supports new and existing models in an HIL test system.
  - Comply with standards—including ASAM, AUTOSAR, and FMI—so that you can incorporate additional suppliers' offerings in the future as your requirements change.
- TEST REUSE—Selecting a modular, open ecosystem means that you can reuse hardware and software as testing scales from component level to system level to full vehicle-system testing.
- A SCALABLE AND RECONFIGURABLE SOLUTION—Swiftly reconfigure complex, multichannel systems.
- FULLY AUTOMATED COMPLETE VEHICLE FUNCTIONAL TEST—Incorporating HIL testing to perform this validation moves test earlier in the design cycle, so that you can make adjustments before requiring a full prototype vehicle.

Learn more

Signal-Level Inverter Tester

Use the Signal-Level Inverter Tester for testing hybrid and electric vehicle inverters for software and electrical functionality at the signal level with a closed-loop simulator. Using a simulator instead of dynamometer means that you can test sooner in the design process—cheaper, and with greater test coverage. With NI's open, flexible, platform-based approach, you can own the test system IP and make changes quickly, rather than relying on a third-party vendor.

With this system, you can:

- Run motor and electrical models at up to 4 MHz loop rates to achieve sufficient model accuracy for testing the inverter in simulation.
- Deploy quickly using existing models, tools, and workflows.
- Use fault insertion in hardware for opens and shorts and software for network messages.
- Integrate third-party models, including MathWorks Simulink® software, on NI COTS FPGA technology.

Learn more

"By adopting FPGA-based simulation using the NI hardware and software platforms, we achieved the simulation speed and model fidelity required for verification of an electric motor ECU. We reduced test time to 1/20th of the estimated time for equivalent testing on a dynamometer."

Mr. Tomohiro Morita
Subaru

SUCCESS SPOTLIGHT:

BMW Designs and Develops a Digital Twin for Low-Voltage Vehicular Power Systems

Learn more

Challenge

Vehicle electrification and automation greatly impact safety-relevant and functional power system requirements because interferences to those can cause fatalities. Critical situations should be discovered in the early concept phase through simulation, and countermeasures such as harness redesign, component modifications, and anti-interference solutions can help. Virtual designs reduce development time and preserve financial resources, but they require a closed measurement feedback loop to validate models against the real physical systems and system-inherent retroactive effects.

Solution

The BMW Group designed and developed a digital twin for low-voltage vehicular power systems. With a newly defined validation approach and the development of a system-level physical and digital twin, BMW simulated and emulated highly dynamic processes to fully stress the low-voltage power system and identify weaknesses quickly, which reduced development time and costs.

"High-performance modular instruments allow us to do testbench-based development of future vehicular fail-operational low-voltage power systems. Through communication with selected measurement and control components, the system under test can be stressed electrically with an automated validation test process. Highly dynamic and accurate measurements are immediately evaluated. Results from these physical tests help us to significantly improve our models deployed in our digital twin."

Martin Baumann
Simulation Electrical Power Supply, BMW

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Visit **ni.com/shop** to explore NI's full portfolio
of products designed to help you

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