SignalPad Data Logging and Analysis Software

Overview

SignalPad is a data logging and analysis application developed with National Instruments LabVIEW. The configuration-based user interface provides ready-to-run functionalities for you to perform signal acquisition, storage, playback, and analysis. You can use SignalPad to acquire signals, such as voltage, current, sound, vibration, strain, temperature, and CAN, through integration with NI DAQ hardware. The analysis functions include power spectrum, filtering, integration, mathematics, sound level, vibration level, frequency response function, octave analysis, order tracking, waterfall, sound power, sound intensity, modal analysis, and so on.

SignalPad
KeyGoTech

Data Logging & Analysis
Sound&Vibration

Features

- No programming required
- Seamless integration with NI DAQ devices
- Configurable and easy-to-use user interface
- Comprehensive noise, vibration, and strain signal processing functionalities, which include filters, power spectrum, frequency response, shock response spectrum, octave, colormap, waterfall, order tracking, sound power, sound intensity, microphone array noise source identification, principal stresses/strain, and so on

Applications

Combined with NI DAQ hardware, including PXI, CompactDAQ, and CompactRIO dynamic signal acquisition modules, SignalPad offers an efficient tool for performing data logging and sound, vibration and strain applications. Simple configuration steps enable high channel counts (up to hundreds of channels) and high sample rates (up to 100 MS/s) of DAQ and analysis applications.

- Data logging and playback
- Machine condition monitoring
- Structural test and modal test
- Noise, vibration, and harshness
- Acoustic test and rub & buzz test
- Microphone array, sound camera
- Fatigue analysis, principal stresses/strain

Advantages of SignalPad Data Logging and Analysis Software

- **Comprehensive set of analysis functions for sound, vibration and strain applications**

SignalPad has integrated almost all of the signal processing and analysis functions of LabVIEW, such as FFT power spectrum, octave spectrum, sound level, order tracking, waterfall, envelop detection, correlation, cepstrum, cross spectrum, loudness, sharpness, and so on. SignalPad also adds many new functions to extend NI hardware to more application areas. For example, you can use SignalPad to calculate effective shock duration measurement, shock response spectrum, sound power, sound intensity, and noise localization by sound camera (microphone array), and so on.

- **Support of multiple international standards**

SignalPad extends NI LabVIEW functions to support multiple international standards in more specific domains, including but not limited to:

- Sound power, sound intensity: IEC 61043, ISO 9614-1, ISO 9614-2，ISO 3745
- Sound absorption coefficient and impedance measurement: ISO10534-1，SO10534-2，GB/T-18969.2
- Vehicle pass-by noise testing: ISO 10844-1994, GB 1495-2002, GB 1496-1979
- Sound quality evaluation of automobile subsystem or component: GMW14155, GMW14240
- Loudness: DIN45631
- Noise testing of wind turbine power generator: IEC 61400-11 Ed2.1, BWEA, AWEA, GBT 22516-2008

- **Better hardware integration - CompactRIO in-vehicle data logging**

CompactRIO is ideal for in-vehicle data logging because of its rugged hardware architecture and small form factor. Temperature ranges of -40 °C to 70 °C (-40 °F to 158 °F), 50 g shock rating, and a variety of international safety, electromagnetic compatibility (EMC), and environmental certifications and ratings are all available with CompactRIO.
With the SignalPad customized CompactRIO firmware, you can now use the CompactRIO system with SignalPad just like using NI EthernetDAQ system and no programming skill is required. SignalPad supports acquisition of different types of physical signals critical to a vehicle, including voltage, current, pressure, temperature, strain, vibration, and noise. Signals on a CAN bus can also be acquired and logged by SignalPad as well as GPS signal via UART.

SignalPad customized CompactRIO firmware also includes a start-up application running in LabVIEW Real-Time, which makes the CompactRIO a standalone system. This means you can use CompactRIO as a data logger without computer in field and download the data from CompactRIO when you are back to the office.

- **Better hardware integration - High throughput data acquisition**

SignalPad is optimized for high throughput data acquisition. You can use SignalPad to acquire data of hundreds of channels, or you can acquire data with very high sampling rate. The playback UI of SignalPad is well-designed for large data preview and processing. For example, you can use SignalPad to acquire data from multiple NI 6368 modules running at 2.00 MS/s per channel.
*For high throughput application, Solid-State Disk (SSD) or RAID is recommended.

- **Better hardware integration - Synchronized acquisition using multiple high-speed digitizers**

By leveraging NI-TClk technology, SignalPad can synchronize multiple high-speed digitizers. TClk provides a high level of synchronization between instruments by aligning sample clocks that may not be initially aligned despite being phase-lock looped. TClk can align sample clocks and keep them aligned over time. With TClk, SignalPad can ensure that multiple devices can react to the same trigger signal in the same clock period, which results in a synchronized acquisition. SignalPad minimizes the complexity of multiple digitizer synchronization. You can easily use SignalPad to accomplish a synchronized acquisition task of multiple high-speed digitizers.

- **Better hardware integration - Synchronized acquisition of massive channel count DSA channels**

SignalPad provides customized real-time applications, which enable synchronization between multiple PXIe chassis using NI PXIe-6674T, IEEE 1588 or GPS. You can acquire and log data in each chassis controller separately and download the data later. Using an 8-slot PXIe chassis and 6 NI 449x DSA board, each chassis can provide the ability of acquiring 96 channels simultaneously. The phase difference between any selected channels does not exceed 0.5 degrees (1 kHz). This structure has been verified on a system with 400+ DSA channels and proved to be reliable. You can also use SignalPad to acquire data from multiple NI CompactRIO chassis simultaneously.

SignalPad Package Selection Guide

SignalPad provides the following packages to meet the requirements of different applications from basic data logging to advanced processing with domain specific.

- **Basic -** Supports general data logging, display, and playback with NI DAQ devices.
- **Full -** Supports math functions, analysis functions for time domain and frequency domain, limited sound and vibration measurement.
- **Professional -** Supports all the functions for data logging and play back, advanced DAQ support, math & signal processing, basic & advanced sound vibration functions, and so on.
- **Ultimate -** Supports additional comprehensive applications, like sound camera, or test procedure to meet the industry domain standards.

You can order SignalPad via National Instruments by using the following part numbers.

NI Part Number	Description
783878-35	SignalPad Basic
783879-35	SignalPad Full
783880-35	SignalPad Professional
783881-35	SignalPad Ultimate

Category	Function	Basic	Full	Professional	Ultimate
Data Logging and Playback	Acquire, storage, and playback with NI DAQmx	●	●	●	●
	Save raw data as TDMS	●	●	●	●
	Play back data	●	●	●	●
	Waveform display	●	●	●	●
	XY graph display	●	●	●	●
	Numeric display	●	●	●	●
	Table display	●	●	●	●
	Cursor value reading and measurement	●	●	●	●
	Export data to TXT/CSV/Excel	●	●	●	●
	Export data as graphics	●	●	●	●
	Play signal through PC sound card	●	●	●	●
	Signal generation	●	●	●	●
Advanced DAQ Support	Multiple digitizer synchronization			●	●
	High-speed DAQ (ex. PXIe 6368)			●	●
	CompactRIO			●	●
	Multiple PXI chassis synchronization for massive channel DAQ				●
Signal Processing and Measurement	Power spectrum		●	●	●
	Filters		●	●	●
	Statistics		●	●	●
	Histogram		●	●	●
	Integration		●	●	●
	Re-sampling		●	●	●
	Math		●	●	●
	Correlation		●	●	●
	Cross spectrum		●	●	●
	Phase difference		●	●	●
	Frequency/Phase/THD/SNR		●	●	●
Basic Sound and Vibration	Sound level		●	●	●
	Vibration level		●	●	●
	Octave spectrum		●	●	●
	Tachometer		●	●	●
	Order spectrum			●	●
	Order tracking			●	●
	Colormap			●	●
	Waterfall (along with slice view)			●	●
	Orbit/Timebase plot			●	●
	Polar plot			●	●
	Cepstrum			●	●
	Envelop detection			●	●
	Time-varying loudness			●	●
	Specific loudness			●	●
	Time-varying sharpness			●	●
	Specific sharpness			●	●
Strain and Fatigue	Fatigue load spectrum			●	●
	Fatigue damage spectrum			●	●
	Principal stresses/strain			●	●
Advanced Sound and	Shock duration measurement			●	●
	Shock response spectrum			●	●

Category	Function	Basic	Full	Professional	Ultimate
Vibration	Frequency Response			●	●
	Sound power				●
	Sound intensity				●
	Impedance tubes			●	●
	Microphone array sound camera				●
Domain Specific	Wind turbine noise evaluation (IEC61400-11 Ed2.1, AWEA 9.1, BWEA 2008)				●
	Vehicle pass-by noise test (GB1495-2002, ISO-362-1998)				●
	Automobile subsystem and component sound quality evaluation (GMW14155)				●

Recommended Hardware

For sound and vibration data acquisition, KeyGo Technologies recommends NI DSA devices. With 24-bit ADCs and DACs and integrated anti-aliasing filters, DSA devices are ideal for acoustic, noise, and vibration measurements.

Product	Bus	Input Resolution (bits)	Dynamic Range (dB)	Sampling Rate per Channel	Analog Input	Input Range	Gain Settings	Coupling	TEDS Support	Analog Output
High-Performance										
NI 4461	PXI, PCI	24	118	204.8kS/s	2	±42 V to 316 mV	-20 to 30 dB in 10 dB increments	AC/DC	Yes	2
NI 4462	PXI, PCI	24	118	204.8kS/s	4	±42 V to 316 mV	-20 to 30 dB in 10 dB increments	AC/DC	Yes	0
High-Density										
NI 4492	PXI	24	114	204.8kS/s	8	±10V to 1V	0 and 20 dB	AC/DC	Yes	0
NI 4495	PXI, PXIe	24	114	204.8kS/s	16	±10 to 1 V	0 and 20 dB	DC	Yes	0
NI 4496	PXI, PXIe	24	114	204.8kS/s	16	±10 to 1 V	0 and 20 dB	AC	Yes	0
NI 4497	PXI, PXIe	24	114	204.8kS/s	16	±10 to 1 V	0 and 20 dB	AC/DC	Yes	0
NI 4498	PXI, PXIe	24	114	204.8kS/s	16	±10 V to 316 mV	0 and 30 dB in 10 dB increments	AC	Yes	0
NI 4499	PXI, PXIe	24	114	204.8kS/s	16	±10 V to 316 mV	0 and 30 dB in 10 dB increments	AC/DC	Yes	0
Low-Cost										
NI 4472	PXI, PCI	24	110	102.4 kS/s	8	±10 V	N/A	AC/DC	-	0
NI 4474	PCI	24	110	102.4 kS/s	4	±10 V	N/A	AC/DC	-	0
Portable/Compact										
NI 4431	USB	24	100	102.4 kS/s	4	±10 V	N/A	AC/DC	Yes	1
NI 4432	USB	24	101	102.4 kS/s	5	±40 V	N/A	AC/DC	Yes	0
NI 9218	USB, WiFi	24	-	51.2kS/s	2	±16 V or ±65mV	N/A	AC/DC	-	0
NI 9232	USB, WiFi	24	99	102.4 kS/s	3	±30 V	N/A	AC/DC	Yes	0
NI 9234	USB, WiFi	24	102	51.2 kS/s	4	±5 V	N/A	AC/DC	Yes	0
NI 9237	USB, WiFi	24	-	50 kS/s	4	±25 mV/V	N/A	-	-	0
NI 9214	USB, WiFi	24	-	1,088 S/s	16	±78.125 mV	N/A	-	-	0

TEDS = transducer electronic data sheet

More about SignalPad

The SignalPad Data Logging and Analysis Software is developed fully based on National Instruments LabVIEW and provides perfect support for NI data acquisition devices. The SignalPad development team has rich experience in LabVIEW software development and signal processing, and provides professional technical support and services.

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