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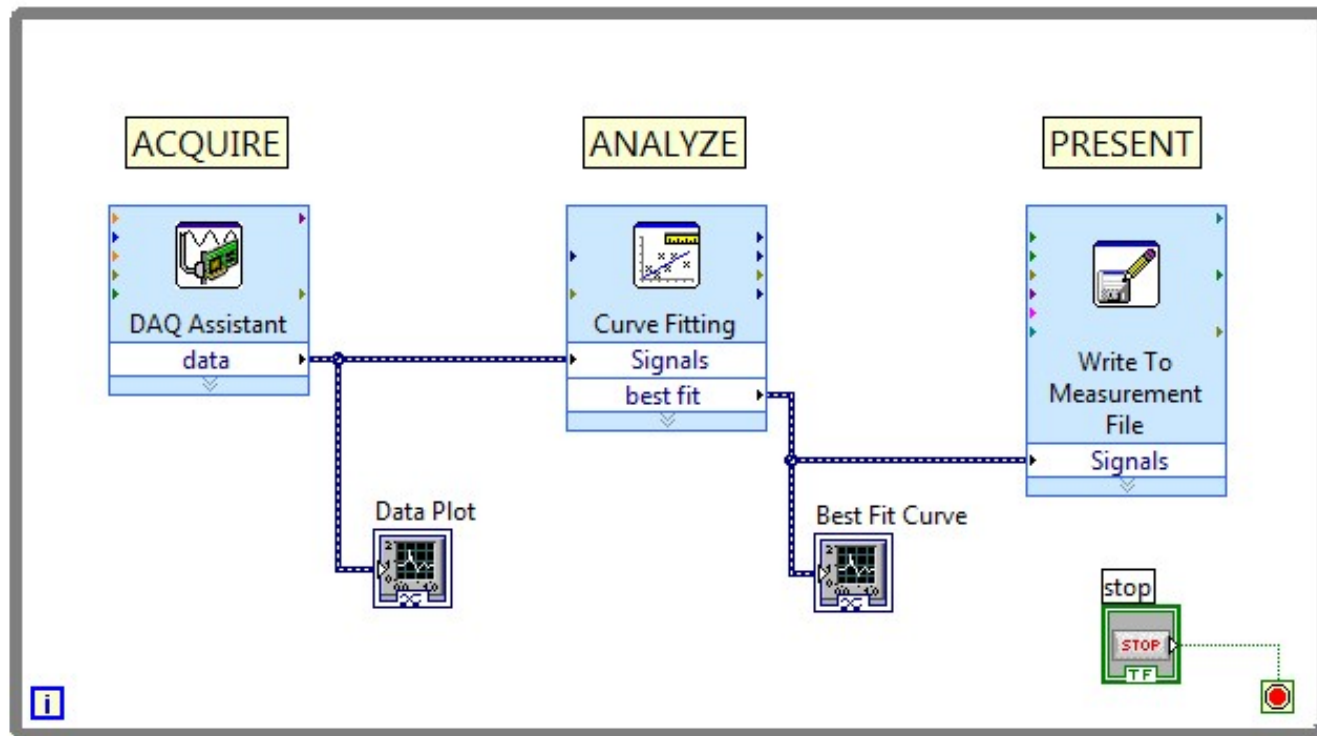


Cyber-Physical Industrial Systems

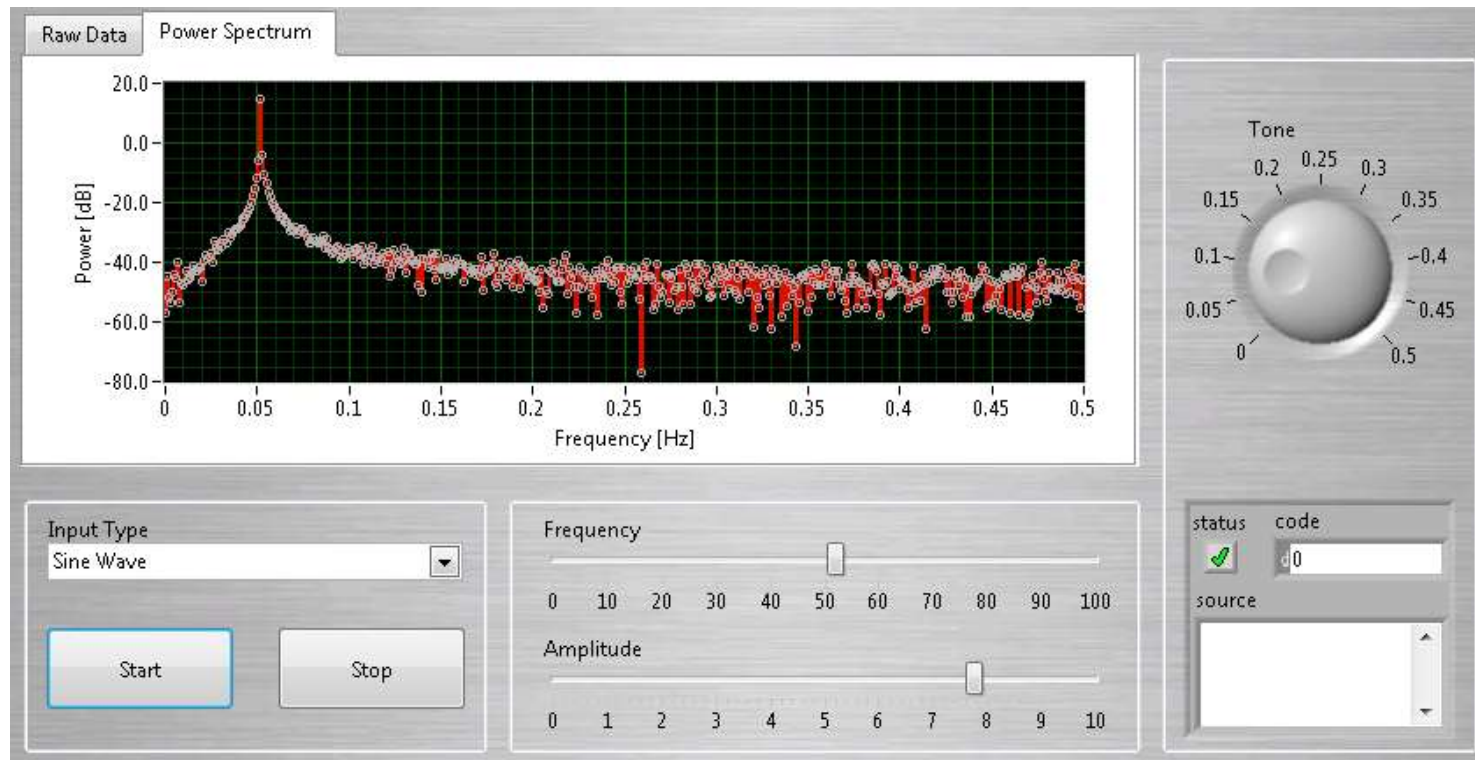
Module 3 Session 2
Data processing basics
Lecture



DAQ steps

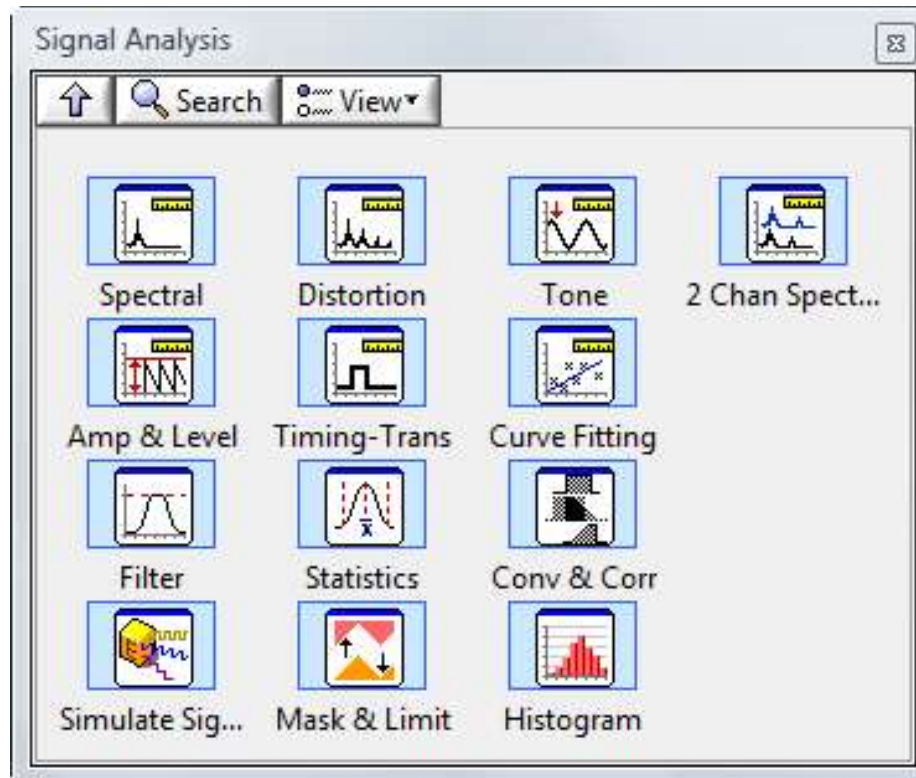


Data processing example





Signal Analysis Express VIs



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Measurement configuration

Amplitude Measurements

DC
 RMS

Apply window

Maximum peak
 Minimum peak
 Peak to peak
 Cycle average
 Cycle RMS

Input Signal

Amplitude vs Time graph showing a periodic waveform. The y-axis ranges from -1.5 to 2.0, and the x-axis ranges from 0 to 1.0. A red label 'Sample Data' is overlaid on the waveform.

Results

Measurement	Result
DC	0.099983

Result Preview

Amplitude vs Time graph showing a periodic waveform. The y-axis ranges from -2 to 2, and the x-axis ranges from 0 to 1. A red label 'Sample Result' is overlaid on the waveform.

<http://www.ni.com/tutorial/9319/en/>

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Filter configuration

Filtering Type

Lowpass

Filter Specifications

Cutoff Frequency (Hz)
100

High cutoff frequency (Hz)
400

Finite impulse response (FIR) filter

Taps
29

Infinite impulse response (IIR) filter

Topology
Butterworth

Order
3

Input Signal

Amplitude

75
50
25
0
-25
-50

Sample Data

Time
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

Result Preview

Amplitude

40
20
0
-20
-40

Sample Result

Time
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

View Mode

Signals Show as spectrum

Transfer function

Sample configuration

Acquisition Type

Single segment

Continuous

Align

Alignment Interval

Global

Common

Resample

Resampling Interval


Lowest dt

Specific dt


Reference signal

Open interval

Sample Input Data



Result Preview



Interpolation Mode

Linear

Coerce

Spline

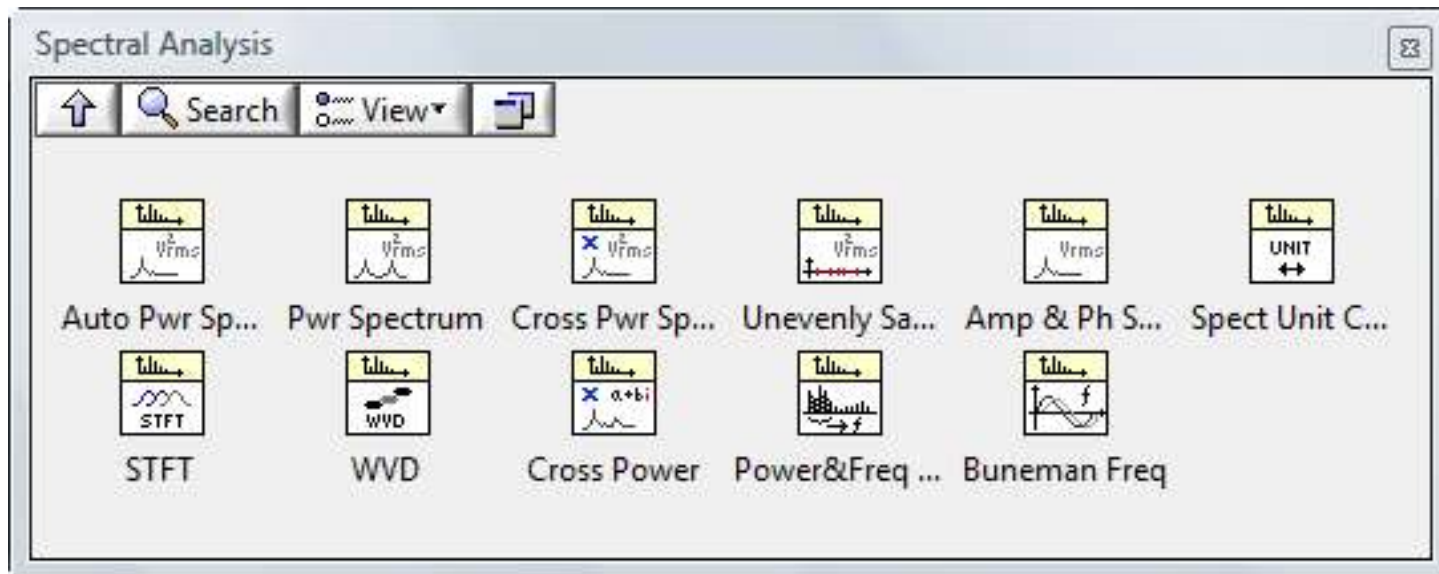
FIR filter

FIR Filter Parameters

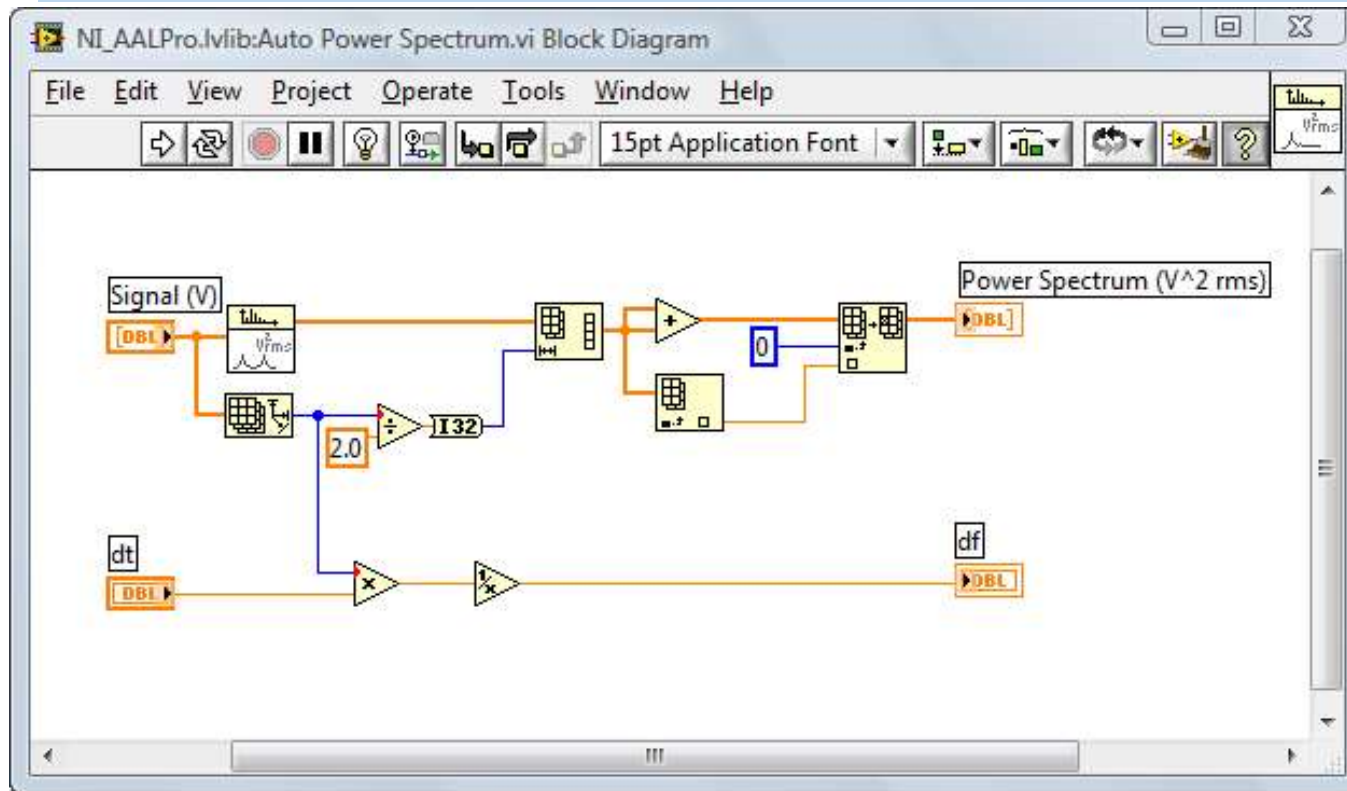
Alias rejection (dB)

Normalized bandwidth

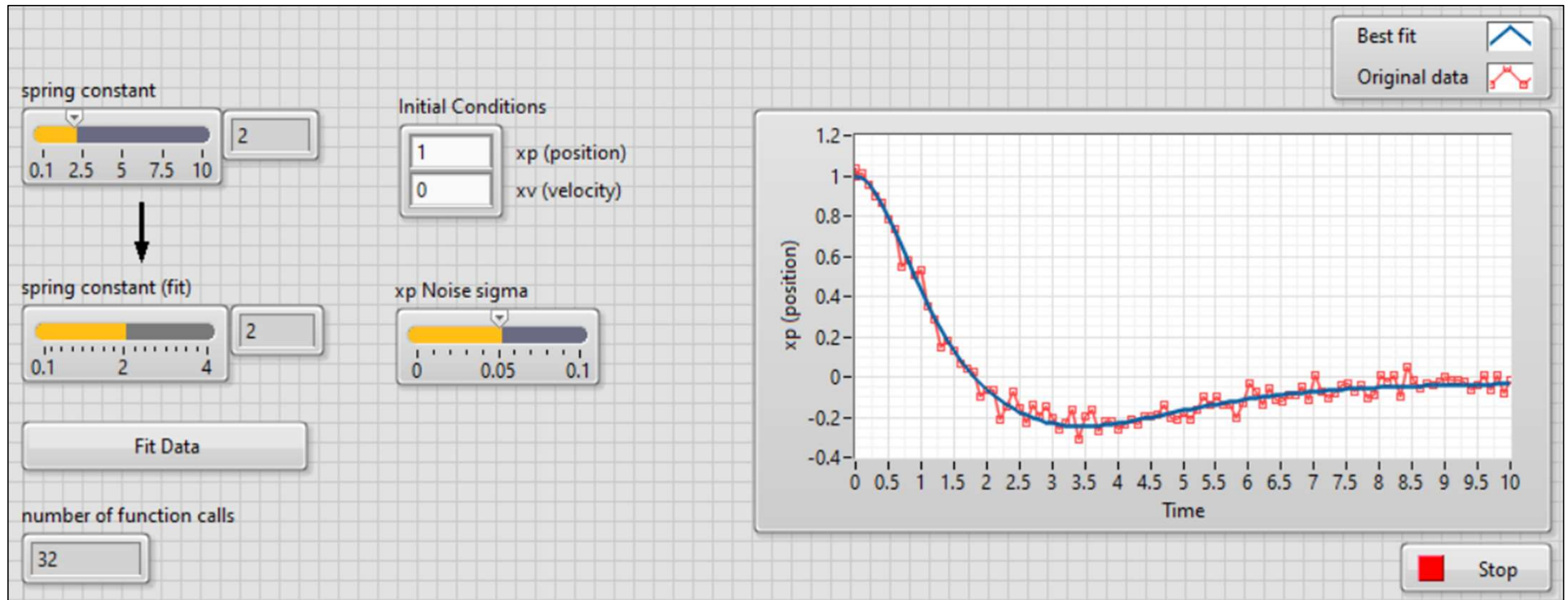
Spectral analysis VIs



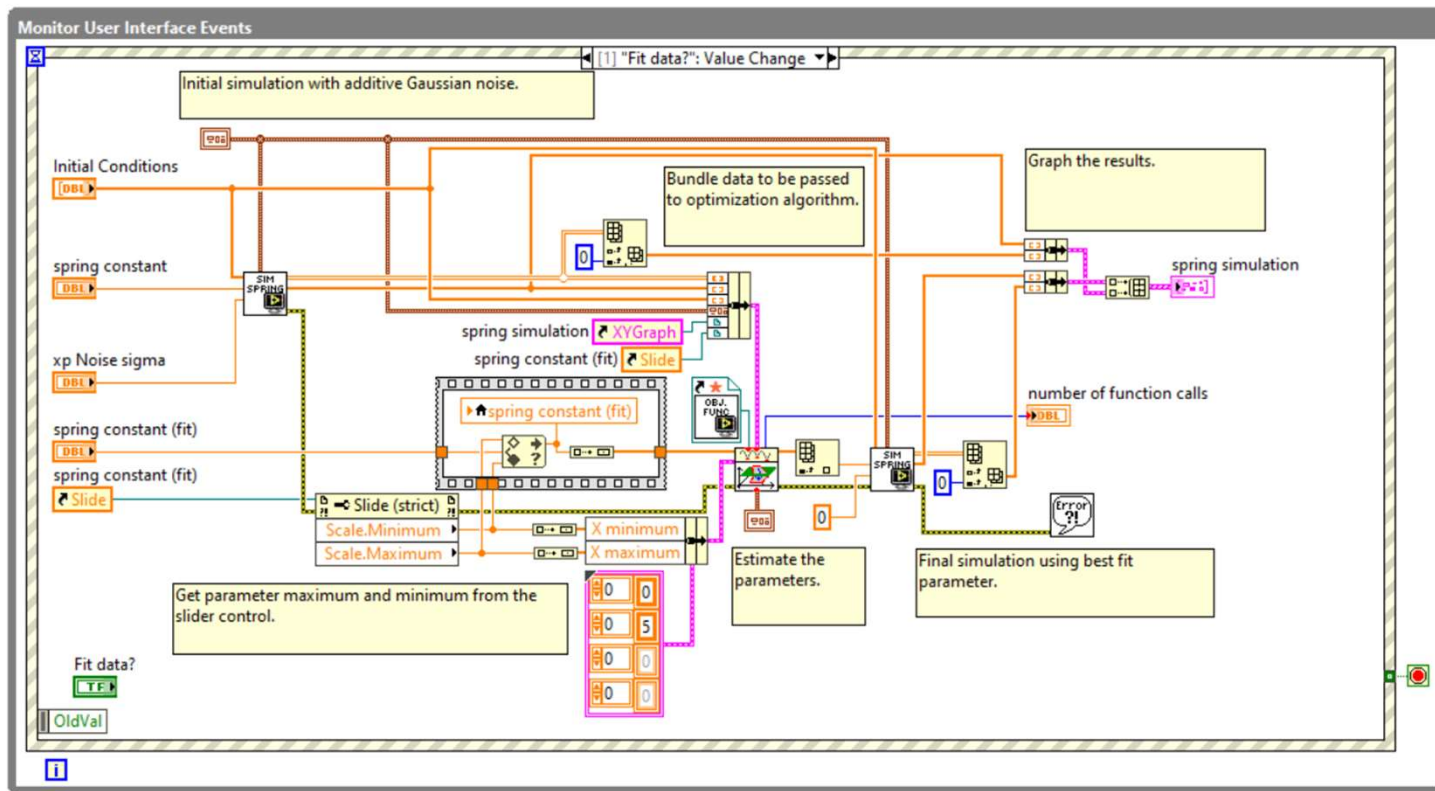
Auto Power Spectrum VI



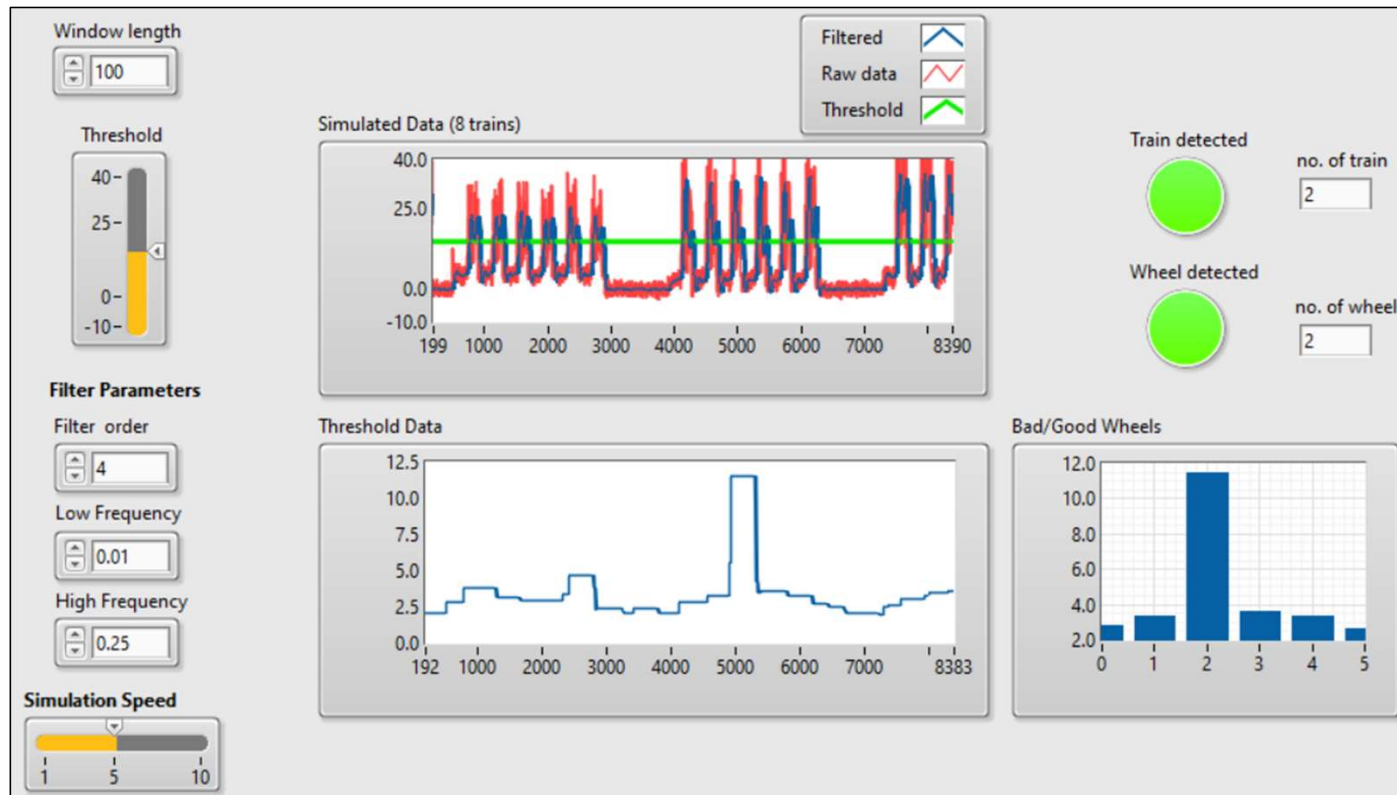
Example: Nonlinear spring constant fit



Example: Nonlinear spring constant fit



Example: Train wheel detection



Example: Power spectrum

