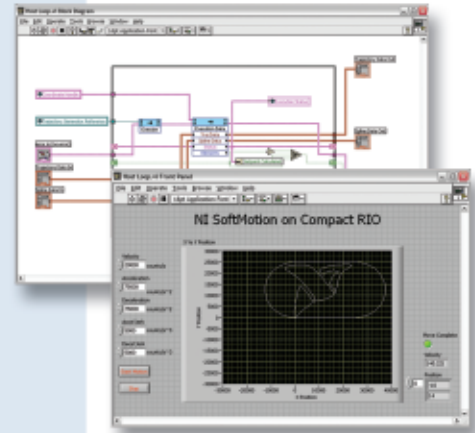


Motion Control Development Module for LabVIEW

NI SoftMotion Development Module for LabVIEW

- Offers custom motion control system development in software
- Contains LabVIEW, LabVIEW Real-Time, and LabVIEW FPGA VIs for:
 - Trajectory generation
 - Spline interpolation
 - Position/velocity control
 - Encoder implementation on FPGA
- Designed to work with:
 - CompactRIO
 - Plug-in DAQ modules
 - Compact FieldPoint
- Ideal for machine builders, OEMs and researchers
- Includes example programs for multiple platform common applications
 - Single-axis move
 - Coordinated multiaxis move with blending
 - Contoured move

NEW



Overview

The National Instruments NI SoftMotion Development Module for LabVIEW is for machine builders and OEMs who want to create custom motion controllers for better machine performance, and for researchers who want to implement advanced motion control design algorithms. The module includes functions for trajectory generation, spline interpolation, position/velocity PID control, and encoder implementation on LabVIEW Real-Time and/or LabVIEW FPGA. With the NI SoftMotion Development Module, you can create a custom motion controller using CompactRIO, plug-in DAQ modules, plug-in R Series reconfigurable I/O (RIO) devices, or Compact FieldPoint, depending on your performance requirements.

Components

Trajectory Generator

The trajectory generator is a multiaxis, preemptive, 64-bit floating-point engine that handles coordinated motion with linear and circular interpolation. It features position, velocity, acceleration, deceleration,

acceleration jerk, and deceleration jerk parameters. You can perform 2D, 3D (roll, yaw, and pitch), and helical circular interpolation with contouring and registration moves. The trajectory generator also includes support for cubic splining, and provides coefficients for spline interpolation.

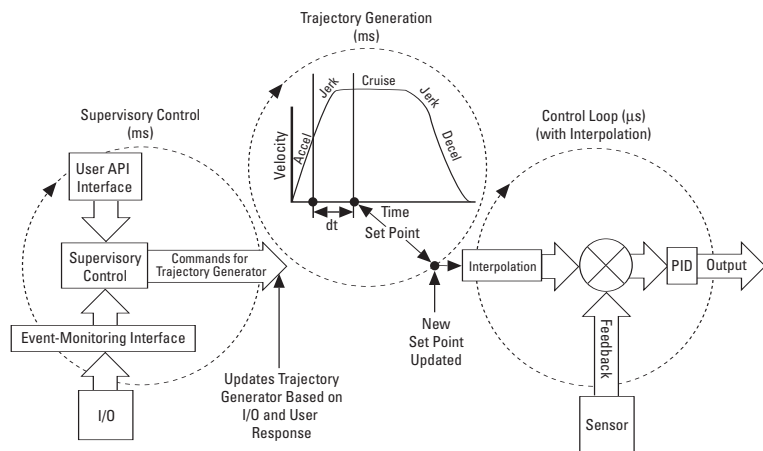


Figure 1. Motion Control System Architecture.

Motion Control Development Module for LabVIEW

Spline Interpolation

The spline interpolation function uses coefficients created by the trajectory generator to generate interpolated points. You can program spline interpolation through LabVIEW Real-Time and LabVIEW FPGA.

Control Loop

The control loop is an enhanced PID algorithm that features dual feedback, both position and velocity loops, velocity feedforward, and acceleration feedforward. You can program the control loop through LabVIEW Real-Time and LabVIEW FPGA.

Encoder Implementation

With the encoder implementation code and LabVIEW FPGA, you can implement custom encoders. You can calculate velocity and indicate direction at speeds as fast as 20 MHz.

Choosing the Right Hardware Target

CompactRIO and R Series RIO hardware offer the highest degree of customization and performance with the NI SoftMotion Development Module. With control loop rates as low as 5µs, you can use plug-in DAQ modules that offer analog output lines and direct input from quadrature encoders for applications requiring loop rates of 1 ms, such as packaging and material handling. Compact FieldPoint, which offers lower loop rates of 5 ms, is suited for simple motion control applications such as servo hydraulics and conveyors, or for systems with high inertia. Table 1 compares the performance of the CompactRIO and R Series RIO platforms with a traditional plug-in motion controller.

Hardware Platform	Trajectory Generator	Spline Interpolation	Position/Velocity Control Loop	Encoder Implementation	Control-Loop	Applications
PCI/PXI with Plug-in Motion Controller	Motion Controller DSP				62.5 µs	High-precision machines in semiconductor, biomedical applications
CompactRIO	LabVIEW Real-Time	LabVIEW FPGA			5 µs	Ultrahigh-precision machines for nanotech and MEMS applications
PCI/PXI with R Series RIO Device	LabVIEW Real-Time	LabVIEW FPGA			5 µs	Ultrahigh-precision machines in nanotech and MEMS applications, and research
PCI/PXI with Plug-in DAQ Device		LabVIEW Real-Time		–	1 ms	Packaging and material handling applications
Compact FieldPoint		LabVIEW Real-Time		–	5 ms	Servo hydraulics, conveyors, high-inertia systems

Table 1. Choose your platform for motion control based on your price-performance requirements.

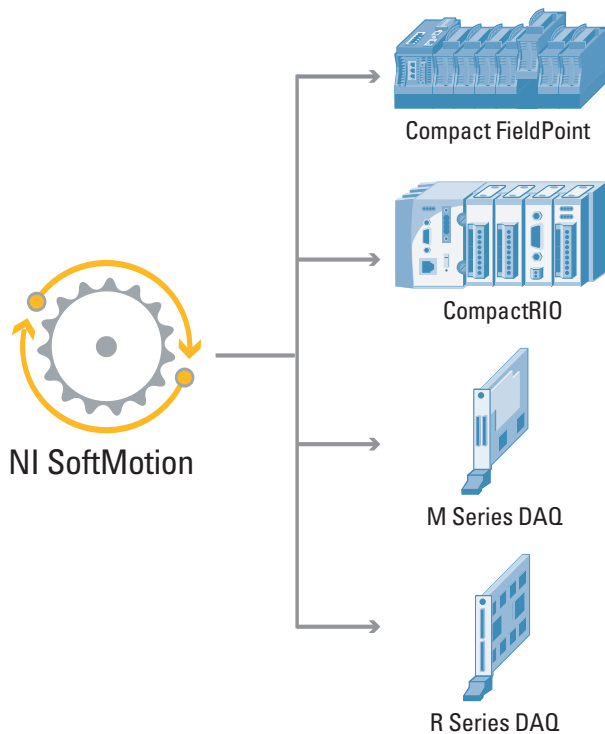


Figure 2. Use NI SoftMotion to create custom motion controllers on CompactRIO, Compact FieldPoint, M Series DAQ and R Series DAQ.

Example Programs

The NI SoftMotion Development Module includes examples for different hardware targets, from simple applications such as a single-axis straight-line move to more complex applications such as multiple-axis contoured moves.

Is the NI SoftMotion Development Module Right for Me?

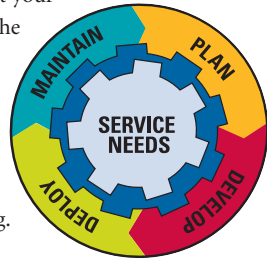
The NI SoftMotion Development Module is designed for the experienced motion control engineer developing machine control systems, or for the scientist researching complex control design algorithms. When considering the NI SoftMotion Development Module, consider the advantages of using a plug-in NI 73xx family controller motion that comes with easy-to-use NI-Motion driver software. You can then use NI Motion Assistant to quickly prototype your motion system with automatic LabVIEW code generation.

Ordering Information

NI SoftMotion Development Module for LabVIEW	779032-03
NI SoftMotion Deployment License	900854-01
SSP, NI SoftMotion Development Module for LabVIEW	930032-01

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