Motor Adapter for myRIO

Overview

The Motor Adapter for NI myRIO allows you to easily connect and control either one stepper motor, two DC motors or two servos independently through the MXP connector on your myRIO. It has been designed so that no additional circuitry is required to drive motors. The board uses theAllegro A4973, a powerful full-bridge, bidirectional PWM motor controller - just supply power and you're on your way!

Servo motors are connected via standard 3-pin headers while DC motors are connected via 6-pin or screw terminal connectors and stepper motors are connected using screw terminals. PWM signals from the standard myRIO FPGA personality are routed to the DC and servo motor inputs. Motor 0 Quadrature encoder inputs are routed to the myRIO encoder inputs and Motor 1 are routed to general purpose digital I/O. Filtered motor voltage and current are routed back to the myRIO analog inputs to enable real-time monitoring.

Key Features:

- Uses the myRIO Expansion Port (MXP) connector
- Can be use to control 2 DC motors, 1 stepper motor, or 2 RC servos
- Current/voltage sensing and control with over-current protection
- 6V-16V input voltage using screw-terminal supply connections
- 34-pin female breakout allowing direct user access to signal pins
- Onboard quadature encoder interface to myRIO encoder inputs
- Power LED indicator

Connector Pin-outs

Motor PWR (J6) : DC Motor Power Screw-terminal Block

Pin#	Pin Name	Notes
1	GND	Negative motor voltage

Pin#	Pin Name	Notes
2	6…16VDC	Positive motor voltage, 6-16VDC

Motor Encoders (J7, J13) : Encoder Signals Screw-terminal Block

Pin#	Pin Name	Notes
1	ENCB	Encoder Phase B
2	ENCA	Encoder Phase A

Servos PWR (J8): Servo Motor Power Screw-terminal Block

Pin#	Pin Name	Description
1	SVDC	Positive Servo Motor voltage, 4.8-6VDC nominal - check servo mfr spec
2	GND	Servo Motor Power Ground

Servo Motors (J10, J11): Hobby Servo Motor Headers

Pin#	Pin Name	Description
1	PWMx	Servo Motor PWM Control Signal
2	SVDC	Positive Servo Motor voltage
3	GND	Servo Motor Ground

Motor 1 and Motor 2 (J3, J9): Digilent standard 6-pin motor/encoder connector (see Digilent Gearmotor)

Pin#	Signal	Description
1	EncB	Encoder phase B
2	EncA	Encoder phase A
3	GND	Ground
4	+5V	Encoder Power
5	M+	Motor Positive Voltage
6	M-	Motor Negative Voltage

Using the Adapter with myRIO

DC Motors If using Digilent gearmotors that are already terminated with the 6-pin connector, just plug in to connectors J3/J9 and motor/encoders will be connected to the

proper terminals. Alternatively, connect your DC motor(s) to the screw terminals (J4 and/or J5) and if using encoders, wire signals to J7/J13. Connect motor power (16V max) to the Motor Power screw-terminals (J6). Motor direction is controlled by setting myRIO “DIR0” or “DIR1” pin HIGH or LOW and speed/torque is controlled by setting the duty cycle on the myRIO PWM0 and/or PWM1 pins. The A4973 driver has been configured for a 1.5A max current (at 100% duty cycle). Motor voltage and current can be monitored by reading the myRIO analog inputs according to this table:

MXP Pin#	Name	Motor Signal
3	AI0	Motor 0 Current
5	AI1	Motor 1 Current
7	AI2	Motor 0 Voltage
9	AI3	Motor 1 Voltage

Hobby Servo Motors J10 and J11 are standard 3-pin hobby servo motor connectors and will work with most popular servo motors with no modification. The PWM control signals are connected directly to the myRIO PWM pins on the MXP port, so no additional wiring is required other than providing external power to J8.

Stepper Motors A single standard 4-wire (bipolar) stepper motor can be controlled by wiring each winding to one of the motor terminal blocks (J4 and J5). Typically, the two windings are controlled and coordinated using a variety of patterns from simple ON/OFF (100% duty cycle and 0%) in quadrature between the two windings (Full Step) to “Half-Step” control to help smooth transitions and increase positional resolution, to microstepping, where many levels of PWM are used to approach a sine/cosine control of the windings. There are many resources for help choosing the best control approach. This applications note from ST Micro is one example, and the datasheet for the Allegro driver device used the board is also a good resource.

Please visit the myRIO Community Website for example code and project ideas.