

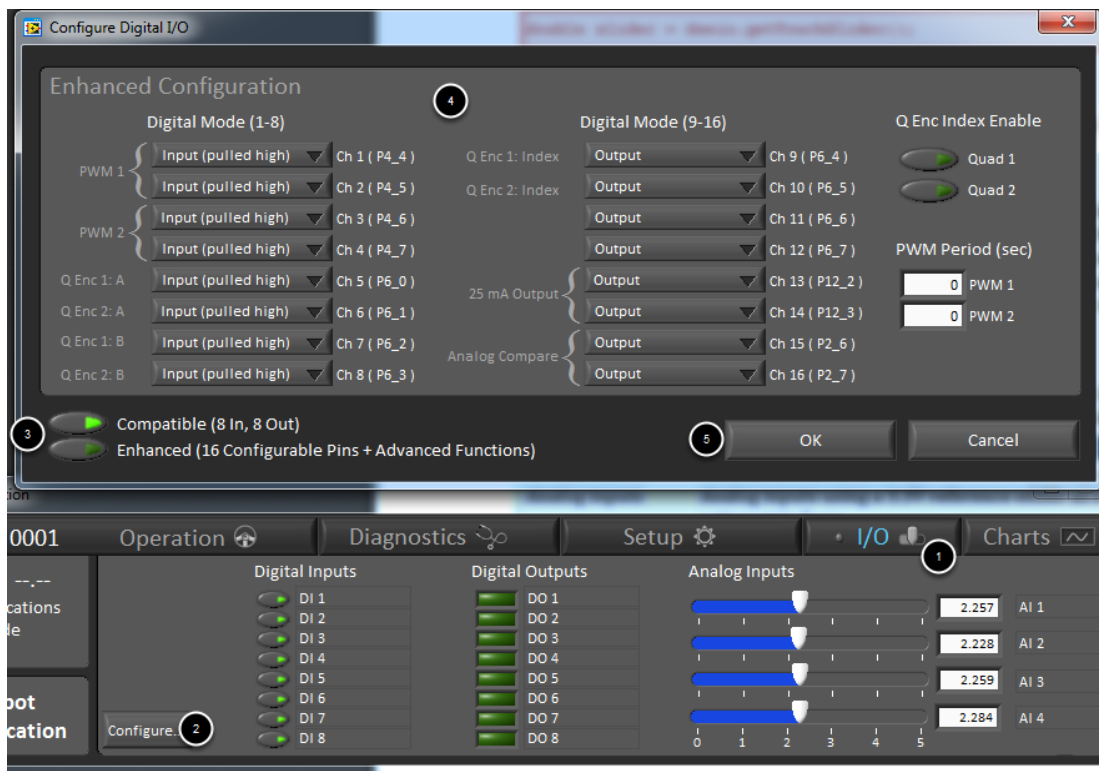
Custom IO - Cypress FirstTouch Module

The Cypress FirstTouch IO module is a board that allows teams to interface to custom IO solutions such as potentiometers, buttons, switches, encoders, and much more. The methods used with the Cypress board in standard (compatible) mode may also be used to interface with virtual IO provided by the DS software if the Cypress board is not attached.

Programming the FirstTouch module

Before using the FirstTouch module the proper software must be loaded onto the board. For additional details see [this article](#).

Configuring the mode



The Cypress board can be set to one of two modes when used with the FRC Driver Station. Additionally, the function of each pin and another of other advanced features can be configured if the board is set to advanced mode. To set the mode of the board, click on the I/O tab of the Driver Station, then click the Configure button. Select Compatible or Enhanced at the bottom of the

Custom IO - Cypress FirstTouch Module

dialog, and configure the settings in the box above if using Advanced mode (these settings do not apply to Compatible mode), then click Ok.

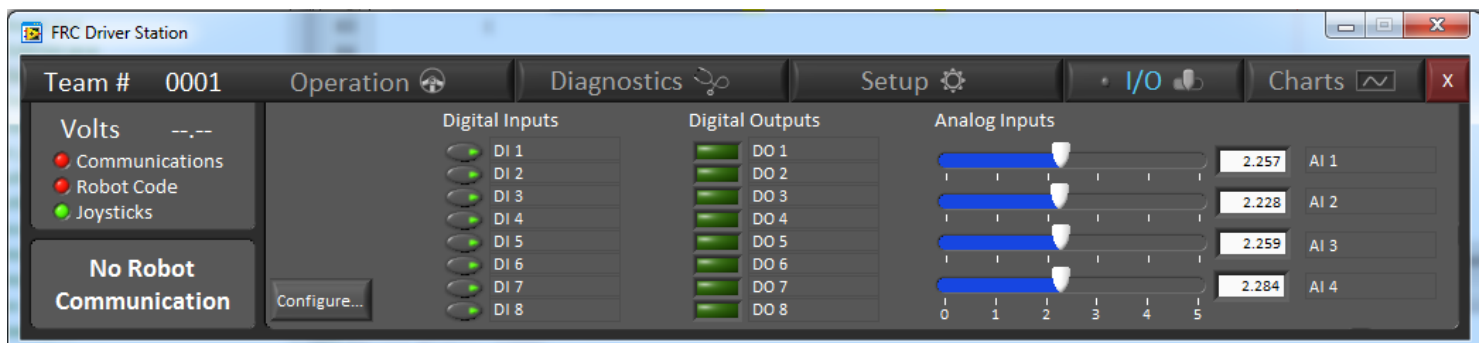
Standard Mode

```
double analogValue;  
boolean boolValue;  
analogValue = DriverStation.getInstance().getAnalogIn(1);  
boolValue = DriverStation.getInstance().getDigitalIn(6);  
DriverStation.getInstance().setDigitalOut(3, boolValue);
```

When the Cypress Board is in standard/compatible IO mode the data it provides is accessed through the Driver Station class. Each of the three types of IO requires a parameter of the channel number and digital outputs require a value. Valid channels for the IO types are:

- Analog: 1-4
- Digital Input: 1-8
- Digital Output: 1-8

Virtual IO



The same Driver Station methods can be used to interact with Virtual IO if no Cypress Board is present. On the IO tab of the Driver Station there are controls for each of the 8 Digital Inputs (click to toggle), indicators for the 8 Digital Outputs, and controls for the 4 Analog Inputs (click and drag or type in the box to set).

Enhanced Mode

```
DriverStationEnhancedIO dseio;  
dseio = DriverStation.getInstance().getEnhancedIO();
```

Custom IO - Cypress FirstTouch Module

If the Cypress board is set to enhanced mode, you must use the `DriverStationEnhancedIO` class to set and retrieve values. This class has additional methods to handle configuration of the board in enhanced mode and getting and setting values associated with the advanced features such as PWM generation and quadrature decoding.

Configuration

The Enhanced IO configuration can be set either using the IO tab of the Driver Station as shown above or by using the methods in the `DriverStationEnhancedIO` class. Changes made in the Driver Station will persist across runs of the DS software by using a configuration file, but will not persist across different machines even if the same Cypress board is used. Configuration set in the robot code will override the configuration loaded from the file by the DS but may not override any changes that are made on the IO tab after the robot has linked to the DS.

Data

Function	Information
Accelerometer	Returns acceleration in Gs
Analog inputs	Analog inputs using a 3.3V reference either as a voltage or in ratiometric form
Analog outputs	2 channels (either A01 or A02) of analog output. About 0-3V and about 100uA of drive current
Button state	Get the state of either the button on the board or 5 additional configurable buttons
LED output	Set the state of any of 8 LEDs
Digital input	Read digital input values for switches, etc.
Digital output	Set digital output lines
PWM outputs	2 pairs of I/O lines capable of PWM output. There is a PWM generator for each pair. Pairs have common periods but independent duty cycles.
Quadrature encoder input	There are 2 signed 16 bit 4X quadrature encoder inputs with optional index functionality.
Capacitive touch slider	There is a touch sensitive capacitive slider on the board. Returns value between 0-1 with -1 indicating no touch.

The Enhanced I/O module has a very powerful and expanded set of capabilities beyond just simple analog and digital I/O. The table above details the available options.