

GETTING STARTED WITH THE 2013 CONTROL SYSTEM

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Getting Started With the ScreenSteps Documentation

Getting Started With the Screen Steps Documentation

ScreenStepsLive is a new tool that FRC/WPI are using to create and present documentation. This document is a brief introduction to the ScreenStepsLive site and the documentation contained here.

What's Here?

The documentation on the ScreenStepsLive site encompasses a number of potentially familiar documents from previous seasons such as the Getting Started with the 201X Control System, Getting Started with C++, Getting Started with Java, WPILib Cookbook, Vision Whitepaper and more. It also includes quite a bit of brand new documentation such as the Control System Software and Hardware Overviews, documentation on new features or tools such as Robot Builder and Live Window/Test Mode, and new documentation on existing tools such as Getting Started With the SmartDashboard.

Navigating the Site

The screenshot shows a documentation page for 'Configuring Wind River Workbench'. At the top, there is a navigation bar with links for 'Home', 'About', 'Log In', and 'Logout'. Below the navigation bar, the title 'Configuring Wind River Workbench' is displayed with a red box highlighting it. A sub-section titled 'Creating a Target Server Connection' is shown with a screenshot of the Workbench software interface. The interface shows a 'Remote Systems' tree view with entries like 'Local', 'vsemd (Wind River Vivavita 6.1)', 'vsemd_1', and 'Wind River Target Debugger (Wind River Vivavita 6.1)'. A context menu is open over the 'Wind River Target Debugger' entry. The 'Create...' option in the menu is highlighted with a red box. Other options in the menu include 'Run', 'Debug', 'Download', 'Show in Table', 'Show in Properties', and 'Refresh'. Below the interface, there is explanatory text and a note about showing the 'Remote Systems' tab. On the left side of the page, there is a sidebar with sections for 'Last Updated' (Oct 31, 2012), 'Other Resources' (WPILib PROGRAMMING DOCUMENTATION, SOFTWARE TOOLS), and links for 'Beta testing WPILib for 2013', 'Download Lesson PDF', and 'Download Manual PDF'. The entire page has a light gray background with red boxes highlighting specific sections of the title, menu, and sidebar.

The documentation is organized into a hierarchy with Sections at the very top, followed by Manuals, Chapters, then Lessons. At any time while you are browsing through the documentation, you can use the navigation at the top of the screen to go back to the Manual or to the home screen. You can also use the navigation on the left side of the screen when viewing a Manual or Chapter to jump to a different Manual. Each article also has a Prev and Next link at the top and bottom of the article to take you to the previous article or next article in the Manual.

Using the Search

Filter Search Results

Check the options below to only search specific manuals

BETA TESTING FOR 2013

- Beta testing WPILib for 2013

WPILIB PROGRAMMING DOCUMENTATION

- Getting started with C++
- Getting started with Java
- WPILib programming
- Command based programming

SOFTWARE TOOLS

- RobotBuilder
- Extending RobotBuilder
- SmartDashboard
- Debugging and testing robot programs

2013 CONTROL SYSTEM

- Getting Started With the 2013 Control System

Search Results

RobotBuilder 

Match any search term Match all search terms

Total articles found: 21 [Reset Search](#)

[Starting RobotBuilder](#)

Locating the **RobotBuilder**.jar file
RobotBuilder is shipped as a .jar ... in the example above).
Starting **RobotBuilder** from the command line
In ... ;java -jar RobotBuilder.jar" from the directory that contains **RobotBuilder**.jar

MANUAL [RobotBuilder](#)

[Overview of RobotBuilder](#)

...
Add each subsystem to the **RobotBuilder** project
Each subsystem will be ... ;Subsystems" folder in the **RobotBuilder** application

A search bar is located at the top of each page which you can use to search the site. After entering a search query you will be brought to the search results page. From this page you can refine your query by selecting whether to "match any" or "match all" terms in the search. You can also narrow your search to specific manuals by checking them in the left pane.

Downloading PDFs

The screenshot shows two pages from a documentation site:

- Generating C++ code for a project**: This page contains a table of properties for a C++ robot project. A red box highlights the "Java Package" row (set to "org.usfirst.frc2010") and the "C++ Windriver Workspace" row (set to "C:\WindRiver\workspace"). A red circle labeled "1" is over the "Java Package" row, and a red circle labeled "2" is over the "C++ Windriver Workspace" row.
- Import the project into WindRiver Workbench**: This page shows the WindRiver Workbench interface with the "Project Explorer" and "Debug Symbol Browser" tabs visible.

On the left sidebar, there is a "Topics" section with the following items:

- The basic steps to create a robot program** (12)
- Writing C++ code for your robot** (4)
- Writing Java code for your robot** (5)
- Advanced techniques** (4)

Below the sidebar, there is a note: "Documentation site powered by [ScreenSteps Live](#)".

A button at the bottom left says "Learn more about ScreenSteps Live".

Under "Last Updated", it says "Oct 31, 2012".

At the bottom left, there are two download links with red boxes around them: "[Download Lesson PDF](#)" and "[Download Manual PDF](#)".

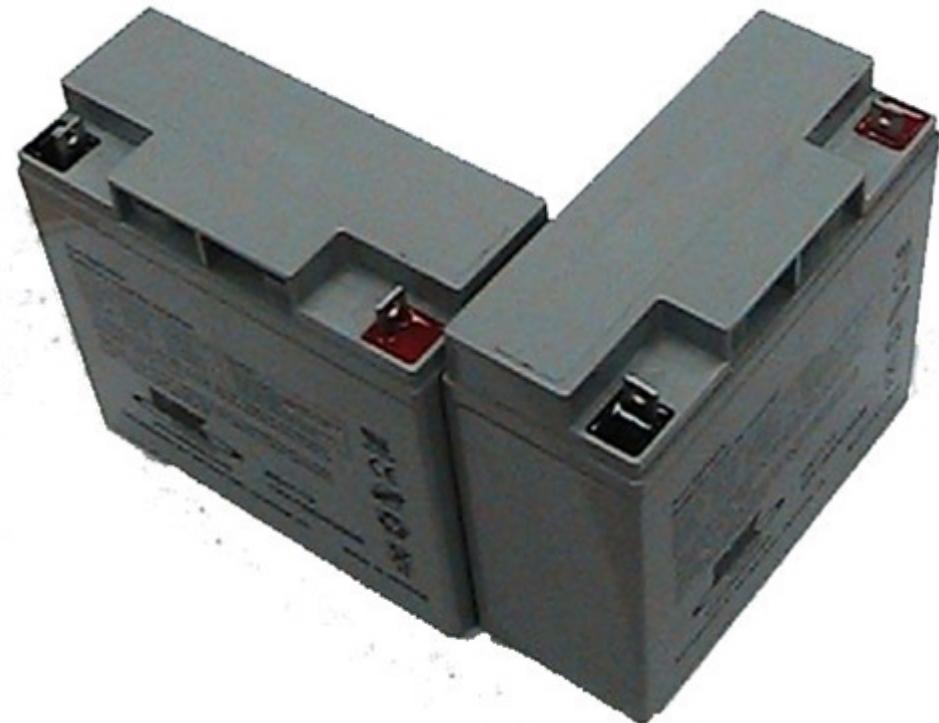
For offline viewing, every Manual in the documentation can be downloaded as a PDF. From the manual page or from any of the Lessons within the manual you can download the manual PDF by clicking the link on the left side of the window. Additionally, some individual Lesson PDFs can be downloaded from the lesson pages.

2013 Control System Hardware

2013 FRC Control System Hardware Overview

The goal of this document is to provide a brief overview of the hardware components that make up the 2013 FRC Control System. Each component will contain a brief description of the component function, a brief listing of critical connections, and a link to more documentation if available. Note that for complete wiring instructions/diagrams, please see the [Wiring the 2013 Control System](#) document, and the [Power Distribution Diagram and Data Connectivity Diagram linked here](#).

Robot Battery



The power supply for an FRC robot is a single 12V 18Ah battery. The batteries used for FRC are sealed lead acid batteries capable of meeting the high current demands of an FRC robot. For more information, see the Datasheets for the [MK ES17-12](#) and [Enersys NP18-12](#).

120A Circuit Breaker



The 120A Main Circuit Breaker serves two roles on the robot: the main robot power switch and a protection device for downstream robot wiring and components. The 120A circuit breaker is wired to the positive terminals of the robot battery and Power Distribution boards. For more information, please see the [Cooper Bussmann 18X Series Datasheet](#) (PN: 185120F)

Power Distribution Board



The Power Distribution Board (PD) is designed to distribute power from a 12VDC battery to various robot components through auto-resetting circuit breakers, as well as provide specialized, regulated supplies for powering specific Control System Components. The PD provides 8 output pairs rated for 40A continuous current and 12 pairs rated for 30A continuous current. The PD provides a regulated 24V power supply to power the cRIO, a special, regulated 12V power supply for powering the robot radio and a 5V power supply for powering an Axis camera.

Snap Action Circuit Breakers



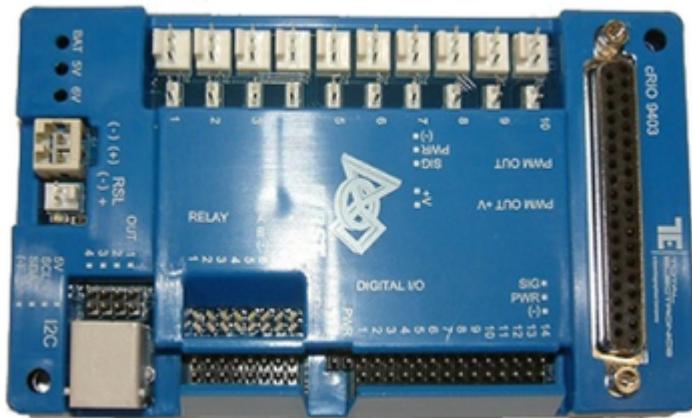
The Snap Action circuit breakers, MX5-A40 and VB3 series, are used with the Power Distribution board to limit current to branch circuits. The MX5-A40 40A MAXI style circuit breaker is used with the larger channels on the Power Distribution Board to power loads which draw current up to 40A continuous. The VB3 series are used with the smaller channels on the PD to power circuits drawing current of 30A or less continuous. For more information, see the Datasheets for the [MX5 series](#) and [VB3 Series](#).

National Instruments cRIO



The NI-cRIO is the main robot controller used for FRC 2013. The cRIO supplements its PowerPC processor with an FPGA controller and plug-in modules used to interface with IO. For FRC the FPGA controller is loaded with a provided image which provides functionality such as Quadrature decoders and analog accumulators as well as implements safety features. The controller pictured is the 4-slot cRIO-FRCII which is the version currently available from NI and provided in all rookie kits. The previous version, the 8-slot cRIO FRC is still legal and compatible for FRC use. The cRIO should connect to the 24V port on the Power Distribution board for power, an ethernet port on the D-LINK DAP 1522 radio for communications and modules and their associated breakout boards for input and output. The User Manuals contain more information about the [cRIO-FRCII](#) and [cRIO-FRC](#).

Digital Sidecar



The Digital Sidecar is a breakout board which converts the digital I/O from the NI 9403 module into forms more readily usable for FRC. The Digital Sidecar provides 10 PWM outputs with 6V servo jumpers for controlling motor controllers and servos, 8 relay output pairs for controlling Spike H-Bridge Relays, 14 general purpose Digital I/O headers, a 6 pin header for I2C connections, an NXT cable compatible I2C connector, and an output for the Robot Signal Light. The Digital Sidecar should be connected to a cRIO 9403 module, the Power Distribution Board, and motor controller devices or I/O as necessary.

Analog Breakout Board



The Analog Breakout board converts the Analog input pins of the NI 9201 module into a form more readily usable by FRC teams. The board provides a jumper for monitoring battery input voltage and 8 3 pin headers providing 5V power, an Analog input and ground. Note that the battery voltage monitoring functionality utilizes channel 8. The Analog Breakout board should be plugged into an NI 9201 and connected to the Power Distribution Board.

Solenoid Breakout Board



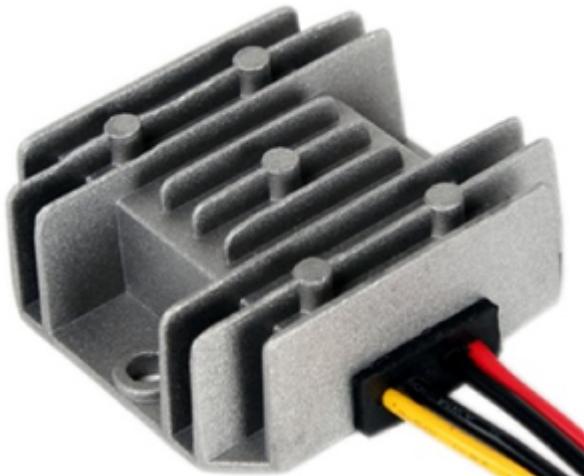
The Solenoid Breakout Board takes the Digital Outputs of the NI 9472 module and converts them into a form more readily usable by FRC teams. The Solenoid breakout board accepts 12V or 24V input power and provides a signal and ground output for each of the 8 output channels. The Solenoid Breakout Board should be plugged into the NI 9472 module and plugged into the Power Distribution Board.

D-Link DAP-1522 Rev B



The D-Link DAP-1522 Rev B robot radio is used to provide wireless communication functionality to the robot. The device can be configured as an Access Point for direct connection of a laptop for use at home. It can also be configured as a bridge for use on the field. The robot radio should be powered by the 12V-5V power converter and connected to the cRIO controller over Ethernet. For more information, see [Programming your radio for home use](#) and the [D-Link DAP1522 Support Page](#).

12V-5V Power Converter



The 12V-5V Power Converter converts the 12V power output from the dedicated radio output on the Power Distribution Board to 5V for use with the D-Link DAP-1522 Robot Radio. The Power Converter should be connected to the dedicated radio output on the end of the Power Distribution Board and to the D-Link DAP 1522 robot radio power input.

Axis M1011 / Axis 206 Ethernet Camera



The Axis M1011 and Axis 206 Ethernet cameras are used for capturing images for vision processing and/or sending video back to the Driver Station laptop. The camera should be wired to the 5V power output on the Power Distribution Board and either the robot radio or ethernet port 2 of an 8-slot cRIO-FRC. For more information, see [Configuring an Axis Camera](#) and the [Axis 206](#) and [Axis M1011](#) pages.

Jaguar Motor Controller



The Jaguar Motor Controller from VEX Robotics is one of three variable speed motor controllers for use in FRC. The Jaguar can be controlled using either the PWM interface or over the CAN bus. The Black Jaguar can also be used to convert from RS232 (from the cRIO serial port or BDC-Comm program) to the CAN bus. The Jaguar should be connected using one of these control interfaces and powered from the Power Distribution Board. For more information, see the Jaguar Getting Started Guide, Jaguar Datasheet and Jaguar FAQ on [this page](#).

Talon Motor Controller



The Talon Motor Controller from Cross the Road Electronics is one of three variable speed motor controllers for use in FRC. The Talon is controlled over the PWM interface. The Talon should be connected to a PWM output of the Digital Sidecar and powered from the Power Distribution Board. For more information see the [Talon User Manual](#).

Victor 888 Motor Controller / Victor 884 Motor Controller



The Victor 888 Motor Controller from VEX Robotics is one of three variable speed motor controllers for use in FRC. The Victor 888 replaces the Victor 884, which is also usable in FRC. The Victor is controlled over the PWM interface. The Victor should be connected to a PWM output of the Digital Sidecar and powered from the Power Distribution Board. For more information, see the [Victor 884 User Manual](#) and [Victor 888 User Manual](#).

Spike H-Bridge Relay



The Spike H-Bridge Relay from VEX Robotics is a device used for controlling power to motors or other custom robot electronics. When connected to a motor, the Spike provides On/Off control in both the forward and reverse directions. The Spike outputs are independently controlled so it can also be used to provide power to up to 2 custom electronic circuits. The Spike H-Bridge Relay should be connected to a relay output of the Digital Sidecar and powered from the Power Distribution Board. For more information, see the [Spike User's Guide](#).

Image credits

Image of cRIO-FRCII courtesy of [National Instruments](#). Images of Jaguar Motor Controller, Victor 888 Motor Controller and Spike H-Bridge Relay courtesy of [VEX Robotics, Inc.](#). All other photos courtesy of [AndyMark Inc.](#)

Wiring the 2013 FRC Control System

This document details the wiring of a basic electronics board for bench-top testing or to accompany the 2013 kitbot.

The images shown in this section reflect the setup for a Robot Control System used with the KOP Drive System in the “narrow” configuration, using a 4-slot cRIO and Victor 888’s. The setup is similar for any other chassis setup or using an 8-slot cRIO and/or Jaguars/Talons. The setup also assumes the motor controllers will be used to control two (2) CIM’s in the robot’s drive train. For a bench-top setup, teams may use any 12V DC motors they choose.

Gather Materials

Locate the following control system components and layout their locations on an appropriate nonconductive surface (e.g. plywood or plastic) to permit wiring connections as shown in the power distribution diagram on the [FRC Kit of Parts Website](#). Plan the positions of the components to leave space to access the various connectors.

- Kit Materials:
 - Power Distribution Board
 - cRIO with modules (1x NI9201 in slot 1; 1x NI 9403 in slot 2; 1x NI 9472 in slot 3)
 - Analog Breakout (to be installed with the NI 9201 module in slot 1)
 - Digital Sidecar (to be connected to the NI 9403 module in slot 2)
 - Solenoid Breakout (to be installed with the NI 9472 module in slot 3)
 - Wireless bridge, DAP-1522 Rev B
 - Circuit breakers
 - Victor speed controllers, qty 2 (Team-provided Jaguars or Talons may also be used)
 - 2 PWM cables
 - 120-amp circuit breaker
 - CIM motors, qty 2
 - 6 AWG wire and ring terminal connectors
 - 18 AWG or better wire
 - Appropriate wire and connectors for size of motors
 - 12V Battery (Enersys NP18-12 recommended)
 - 12V/5V Adapter
 - Dual Lock material
- Tools Required:
 - Wago Tool or small flat-head screwdriver
 - Philips head screw driver
 - M6 nut driver (10mm socket)
 - Wire cutters, strippers, and crimpers
 - 7/16” nut driver

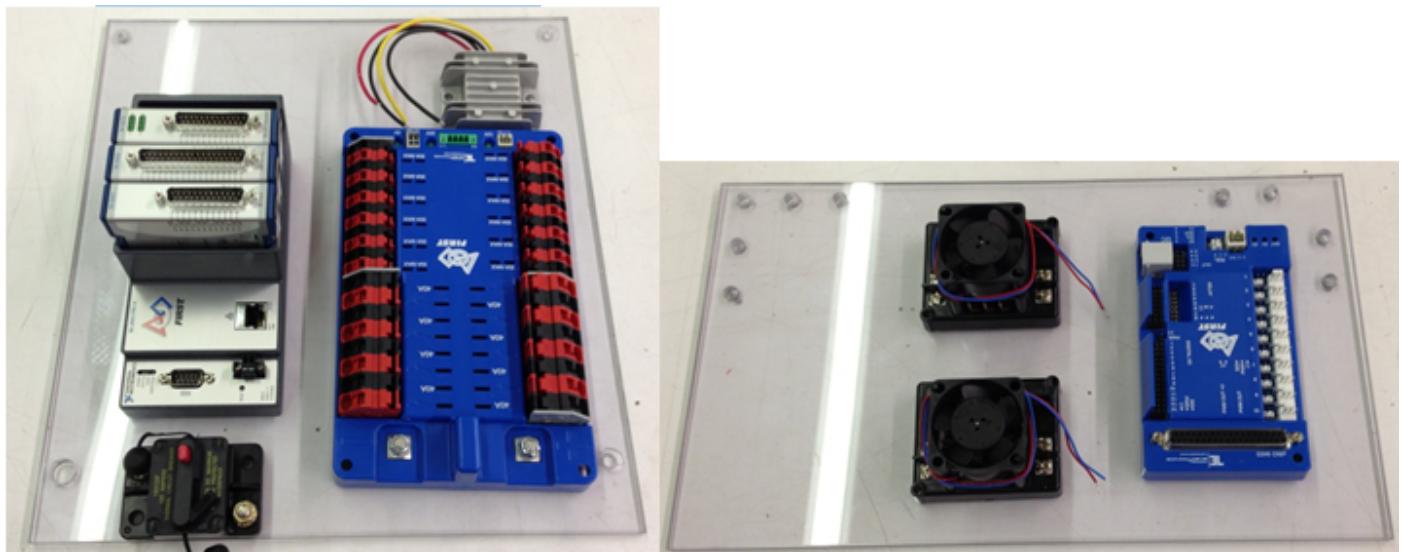
Create the Base for the Control System

Cut pieces of $\frac{1}{4}$ " material (wood or plastic) in the following sizes and drill holes per Appendix A:

- 13" x 7.5"
- 13" x 14"

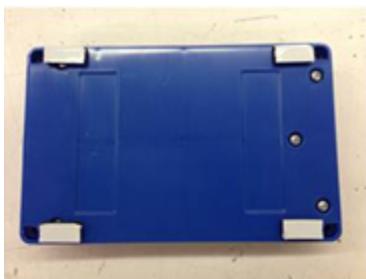
Note that for a non-robot Control System test bed, teams may elect to use only one board.

Layout the Core Control System Components



Layout the cRIO, Power Distribution Board, Digital Sidecar, 120A Main Breaker, 12V/5V converter and (2) motor controllers per the image.

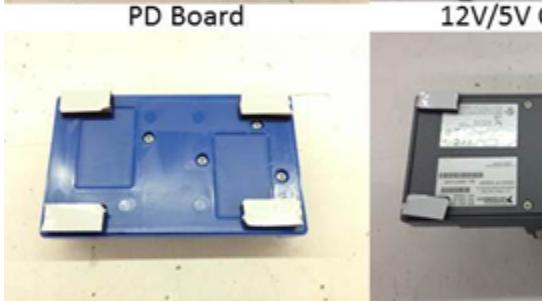
Fasten components



PD Board



12V/5V Converter



Digital Sidecar



cRIO



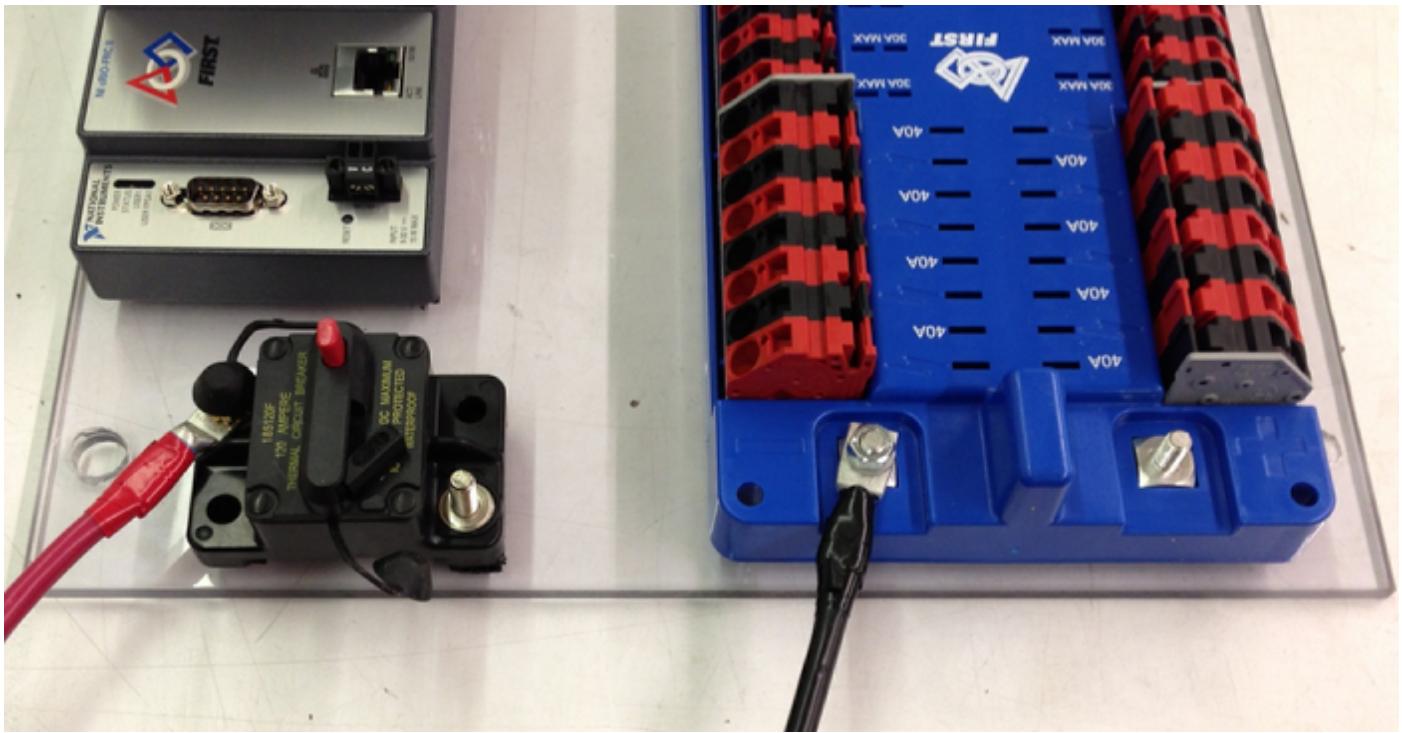
Victor



120A Breaker

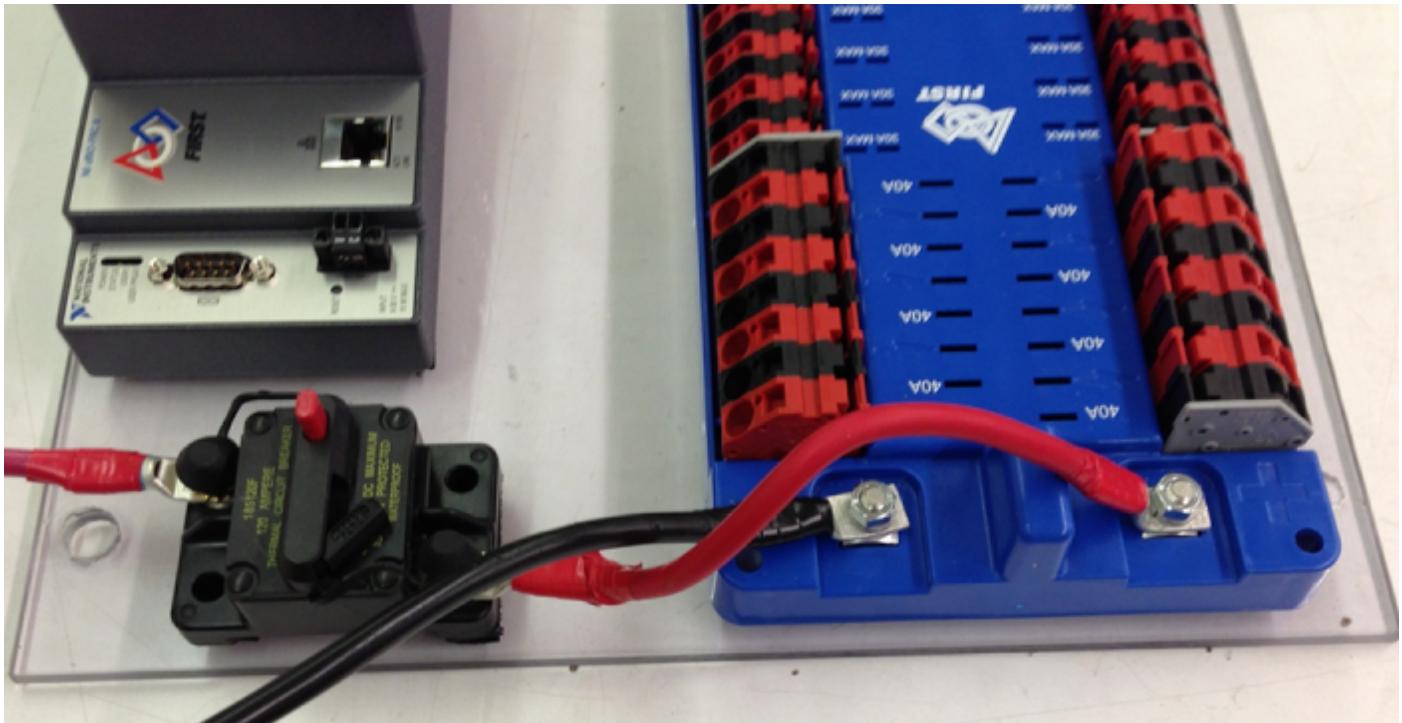
Using the Dual Lock, fasten all components to the board.

Attach Battery Connector



Attach terminal lugs to a battery connector. Then, attach the battery connector to the Power Distribution Board and the 120A Main Breaker.

Wire Breaker to PDB



Connect the 120A Main Breaker to the positive terminal on the PDB using red 6AWG wire and terminal lugs.

Radio 12V-5V Converter



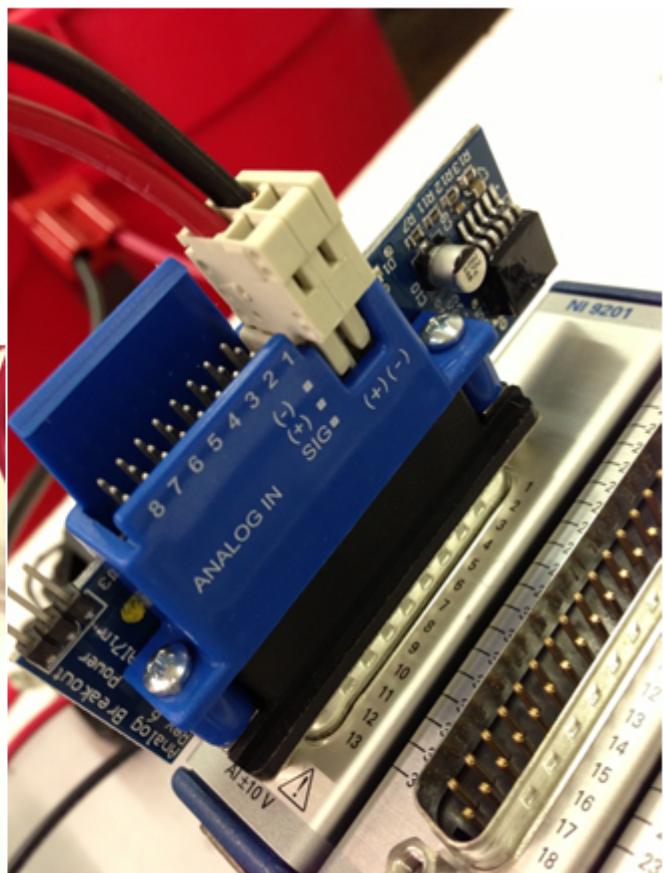
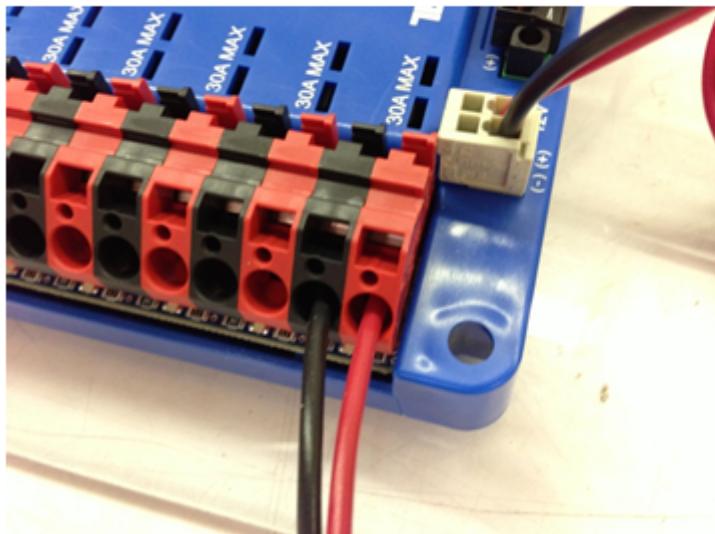
Connect the 12V/5V Converter to the regulated 12V terminal on the PDB using a WAGO connector.

cRIO Power



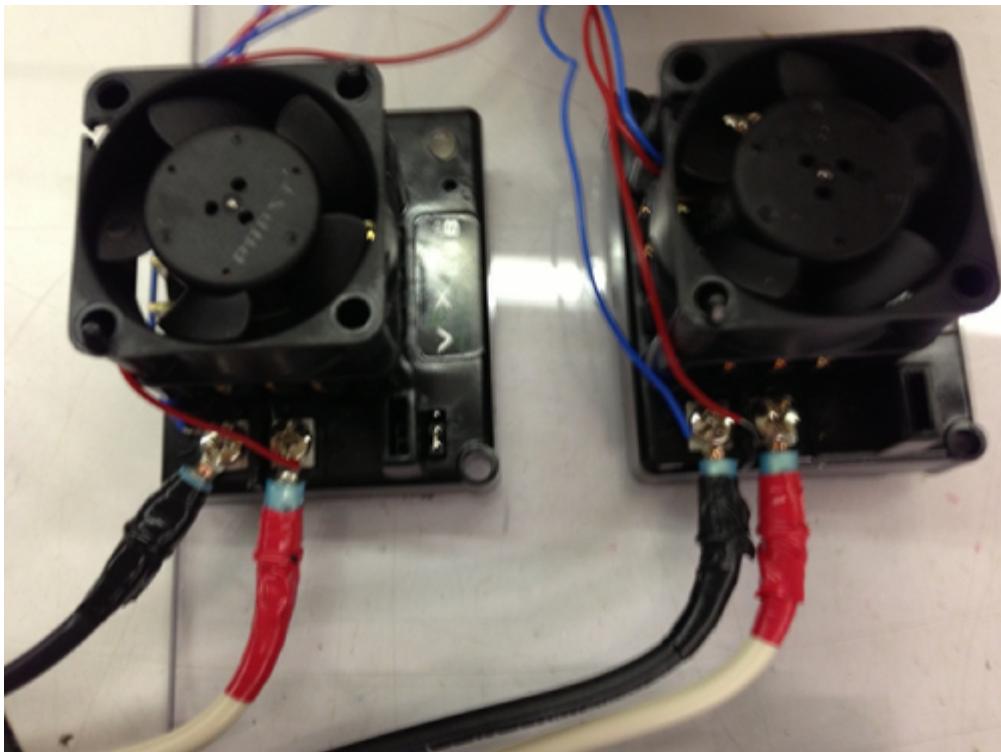
Connect the cRIO power input to the regulated 24V terminal on the PDB using a Sauro connector.

Analog Breakout Power



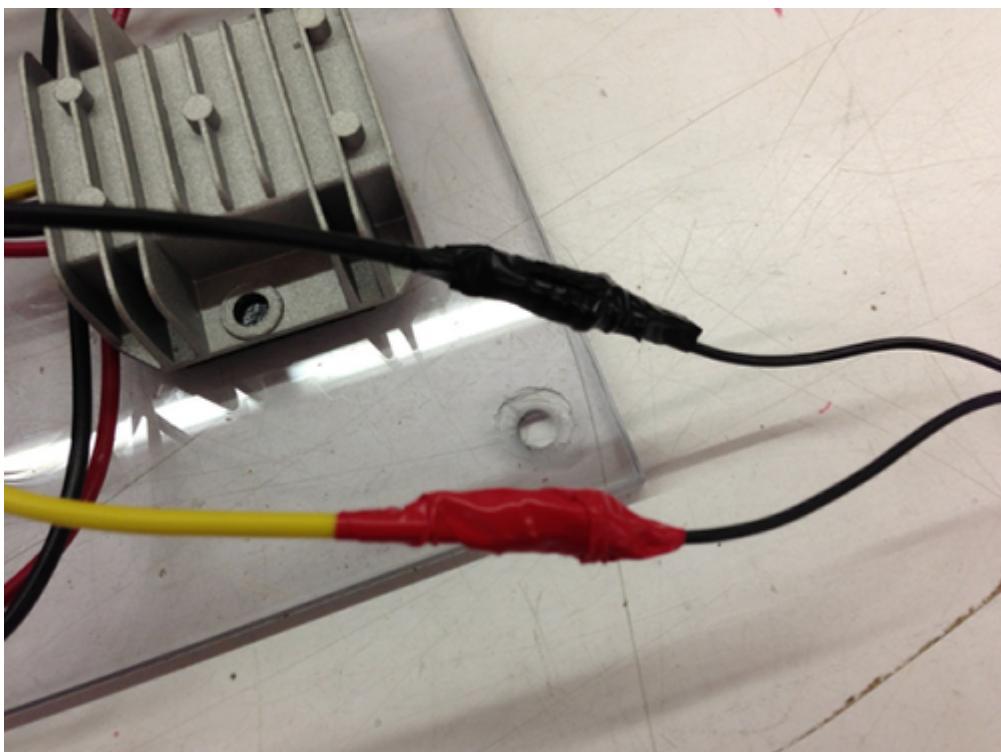
Connect the Analog Breakout (mounted on the 9201 module in Slot 1 of the cRIO) to a 20-amp position the PDB using a WAGO connector.

Motor Controller Power



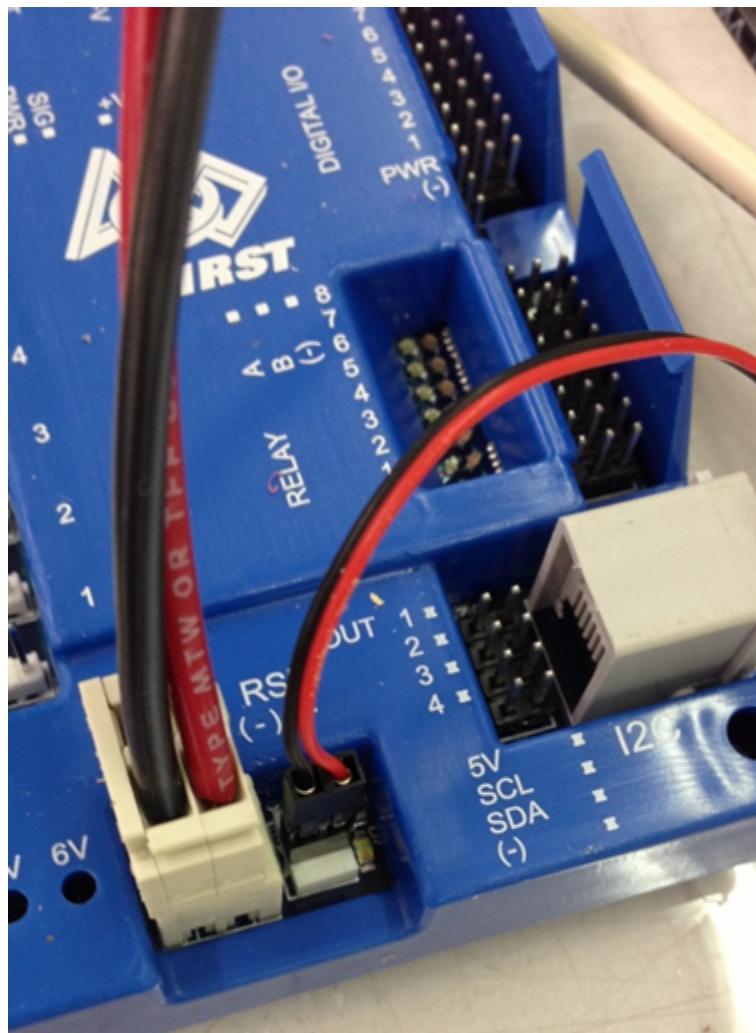
Connect the Motor Controllers to a 40-amp position on the PDB. Also, connect the fan wires to the power input terminals on the motor controller.

Wireless Bridge Power



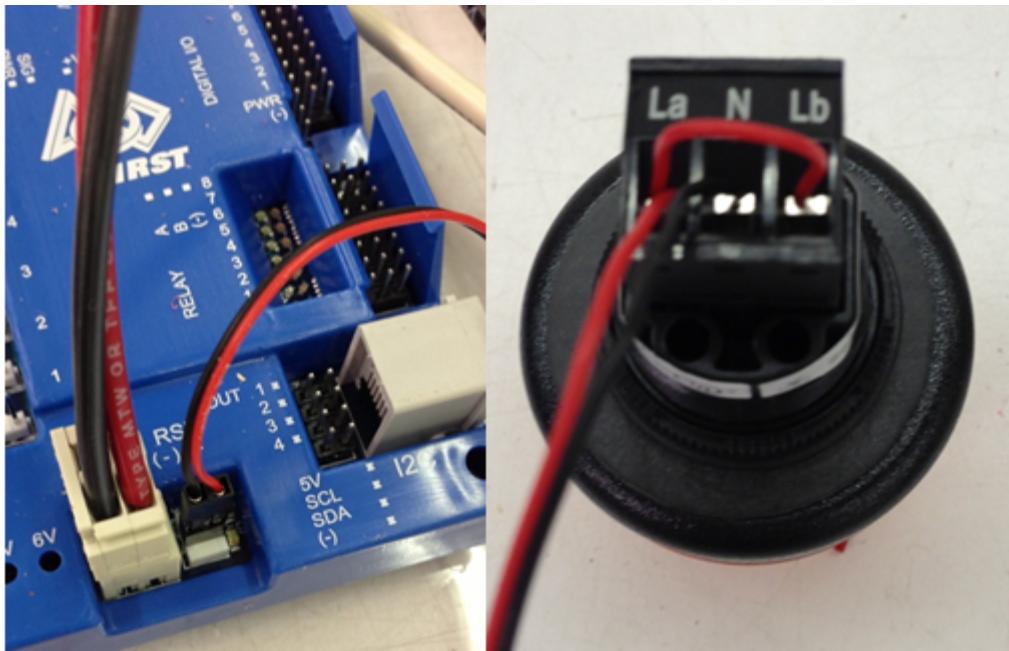
Remove the wall wart from the Wireless Bridge power cord. Then, connect the power cord to the 12V/5V converter (yellow wire to black-with stripe wire).

Digital Sidecar Power



Connect the Digital Sidecar to a 20-amp position on the PDB using a WAGO terminal.

Robot Signal Light



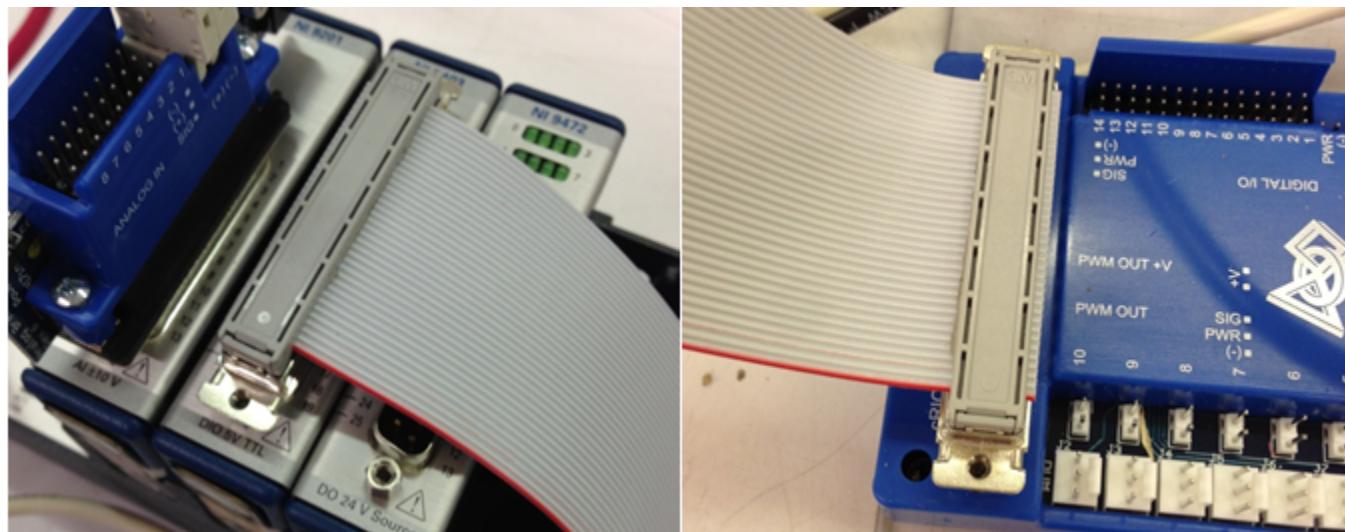
Connect the Robot Signal Light to the “RSL” terminals on the Digital Sidecar. Then, create a jumper between the “La” and “Lb” terminals on the RSL.

Ribbon Cable



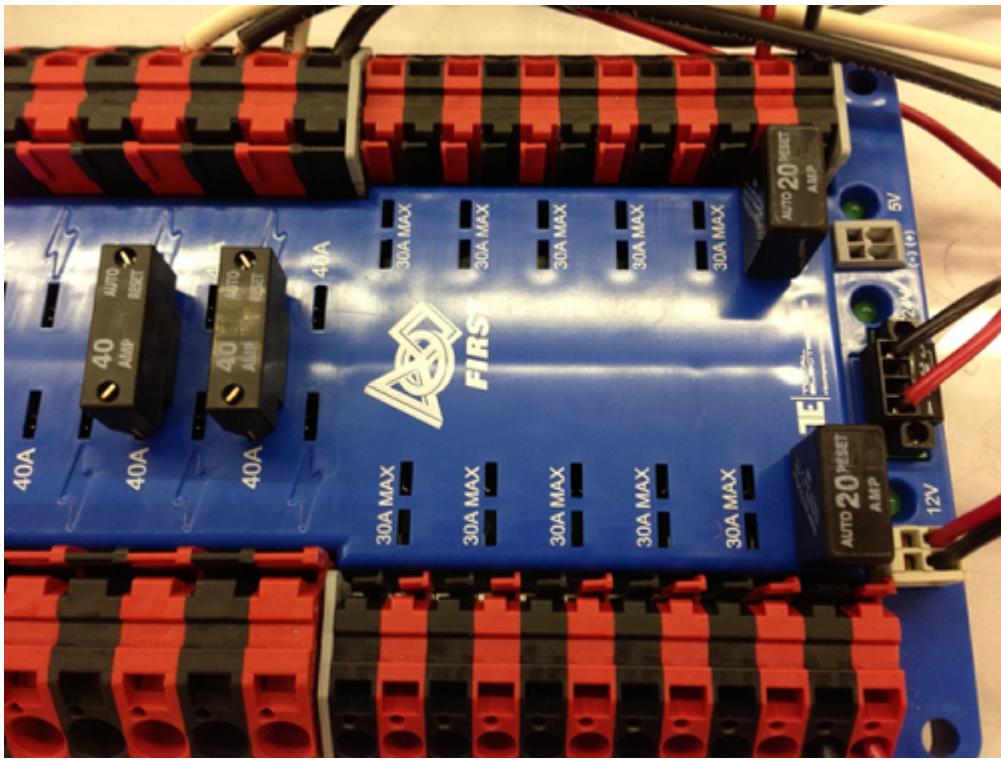
Create the 37-conductor cable to connect the Digital Sidecar and cRIO. Note that the “red stripe” is on the same side when the cable is assembled. Assembling the cable as one piece will help protect the pins and sockets on the individual connectors.

Digital Sidecar Data Cable



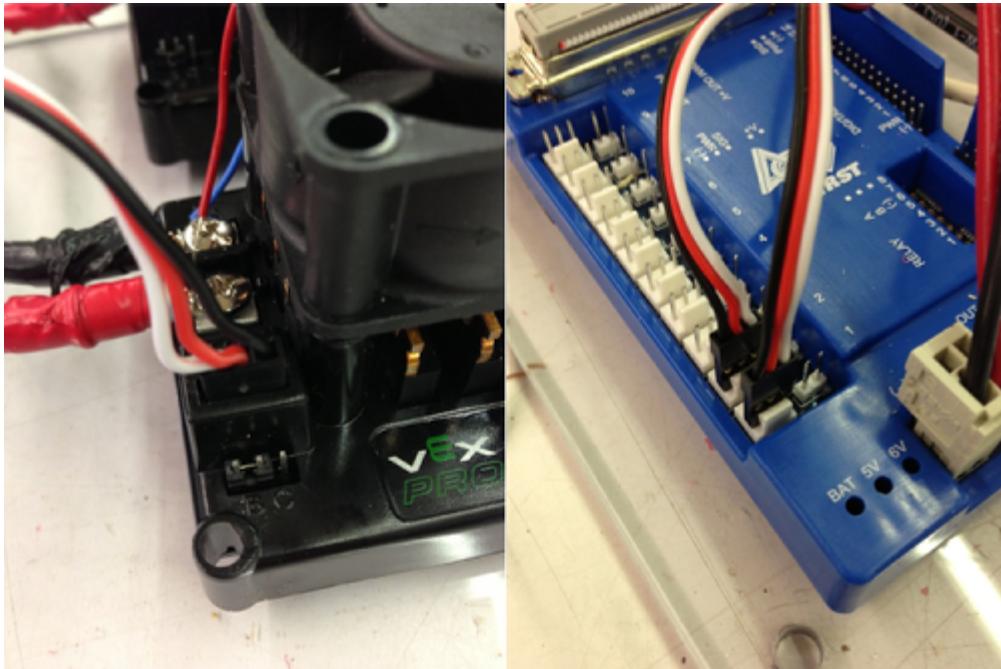
Connect the 9403 module (in Slot 2 of the cRIO) to the Digital Sidecar using the 37-conductor cable.

Circuit Breakers



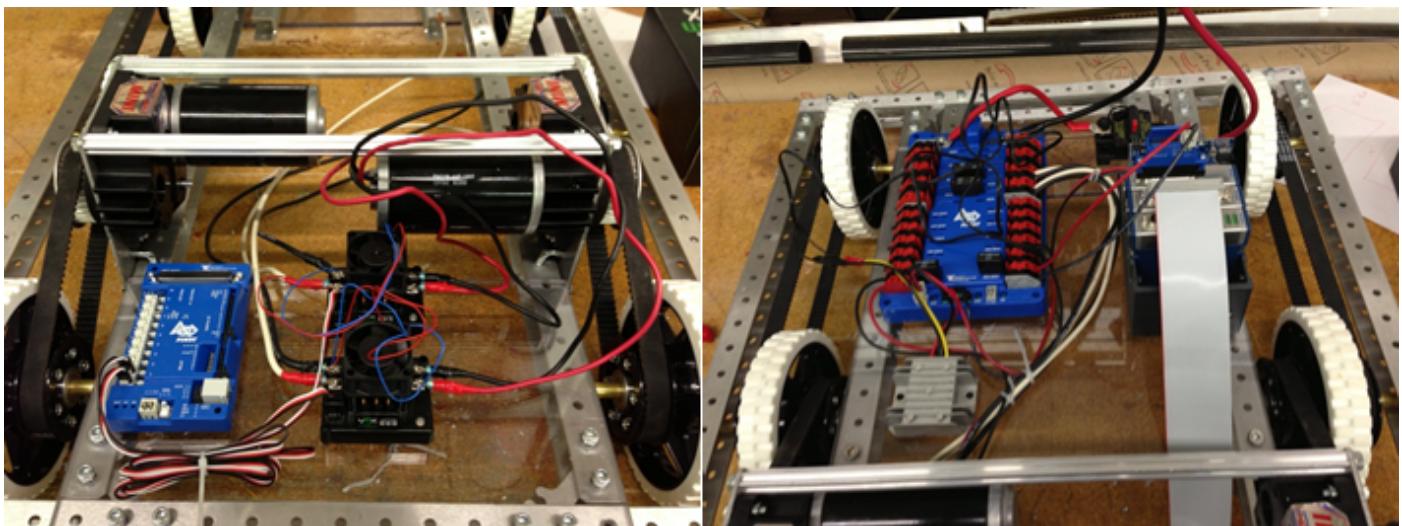
Insert 20-amp and 40-amp Circuit Breakers into positions on the PDB.

PWM Cables



Use a 3-conductor cable (PWM cable) to connect the Digital Sidecar (PWM OUT Ports 1 and 2) to the Motor Controllers.

Attach to Robot



Note that if you are not putting this Control System on a robot, skip this step.

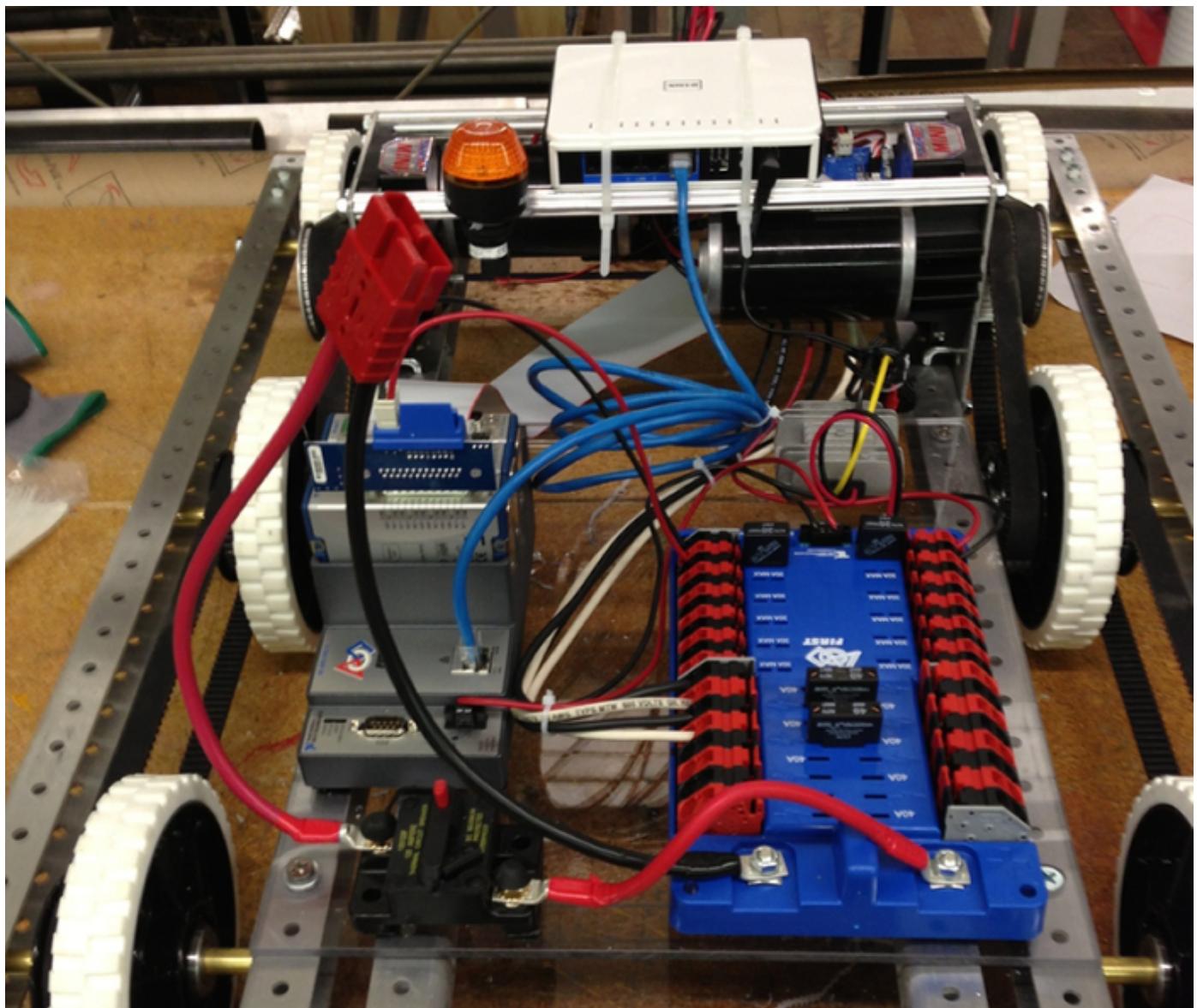
Attach the two boards to the robot (robot shown uses KOP Drive System). Note that temporarily removing some connections (i.e. 37-conductor cable) may make installation easier. Remember to remake all connections.

Motor Power



Connect the motors' power leads to the M+ and M- terminals on the Motor Controllers.

Robot Radio



Connect the Wireless Bridge power and to the Ethernet port on the cRIO.

Wire Management

Use cable ties to manage wire runs, ensuring wires won't get caught in moving robot parts (e.g. belts and wheels).

Configuring a FirstTouch I/O Module for FRC

This document covers the configuration of the [Cypress FirstTouch module](#) for use with the FRC Control System. Before using your Cypress FirstTouch I/O module, you must first program firmware into the USB chip on the board. Remember that you only need to do this step once per board. Make sure that you have the most recent version of the Driver Station software before proceeding.

Hardware Setup

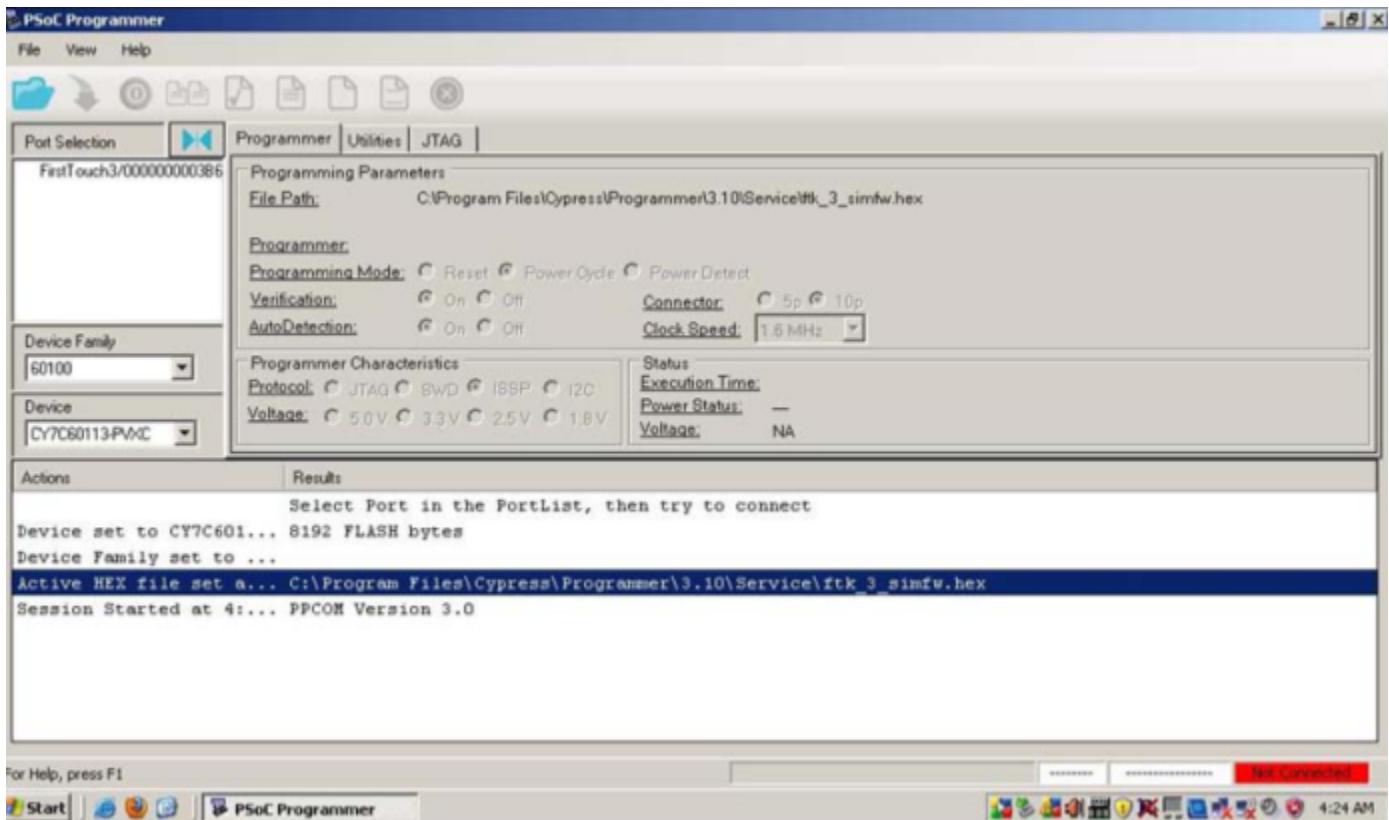
If using the Classmate, log in to the developer account. Plug the USB cable provided in the FirstTouch starter kit into the I/O module and the Classmate. Allow the computer time to find and connect to the new hardware.

Open PSOC Programmer



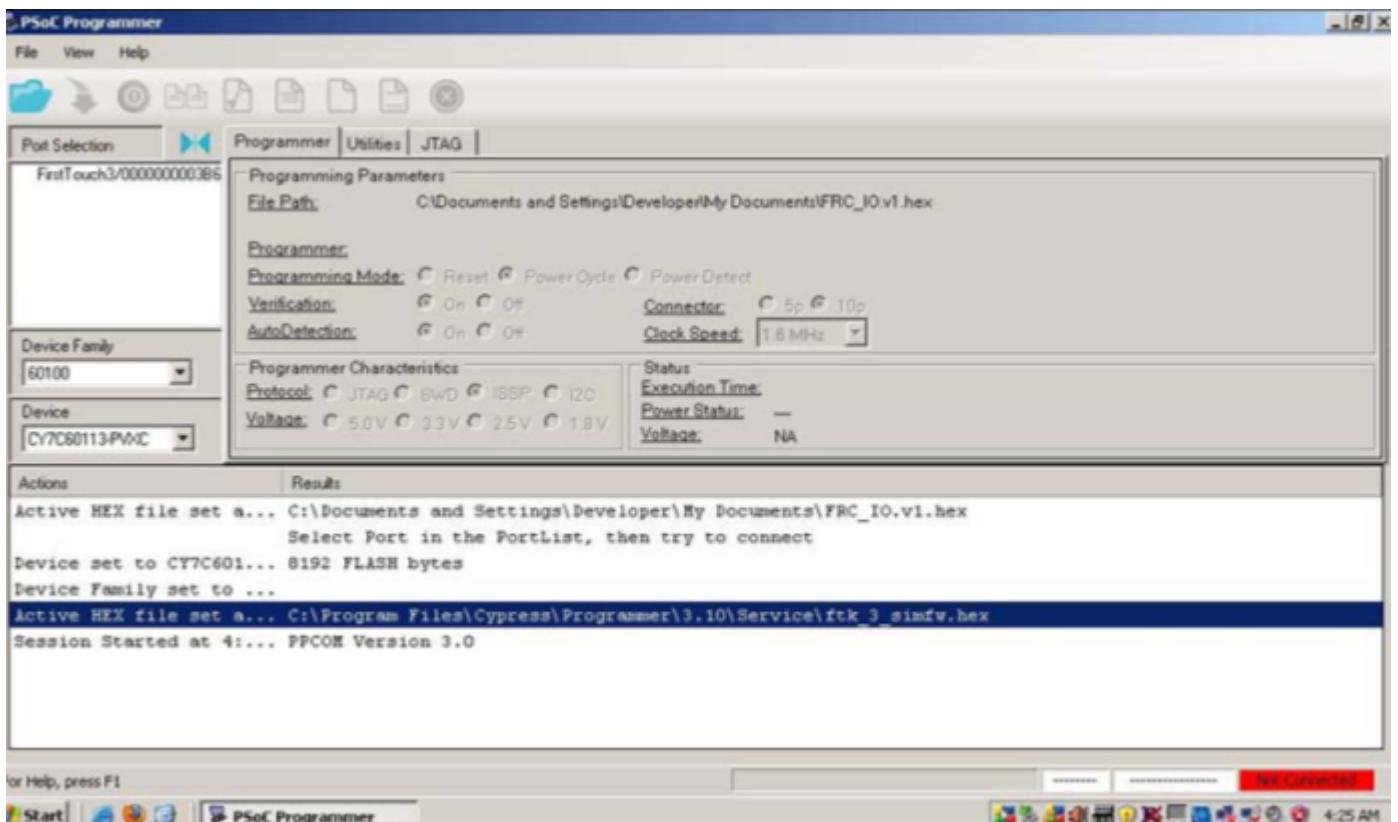
Next, open the Cypress PSoC Programmer. If you are using LabVIEW on the same computer, you can find the PSoC Programmer in the Utilities tab of the Getting Started Window. Otherwise, click on Start > All Programs > Cypress > PSoC Programmer. If you get an Update Reminder, cancel it. Updating the PSoC Programmer will make the Driver Station unable to see the First Touch module

Load Image



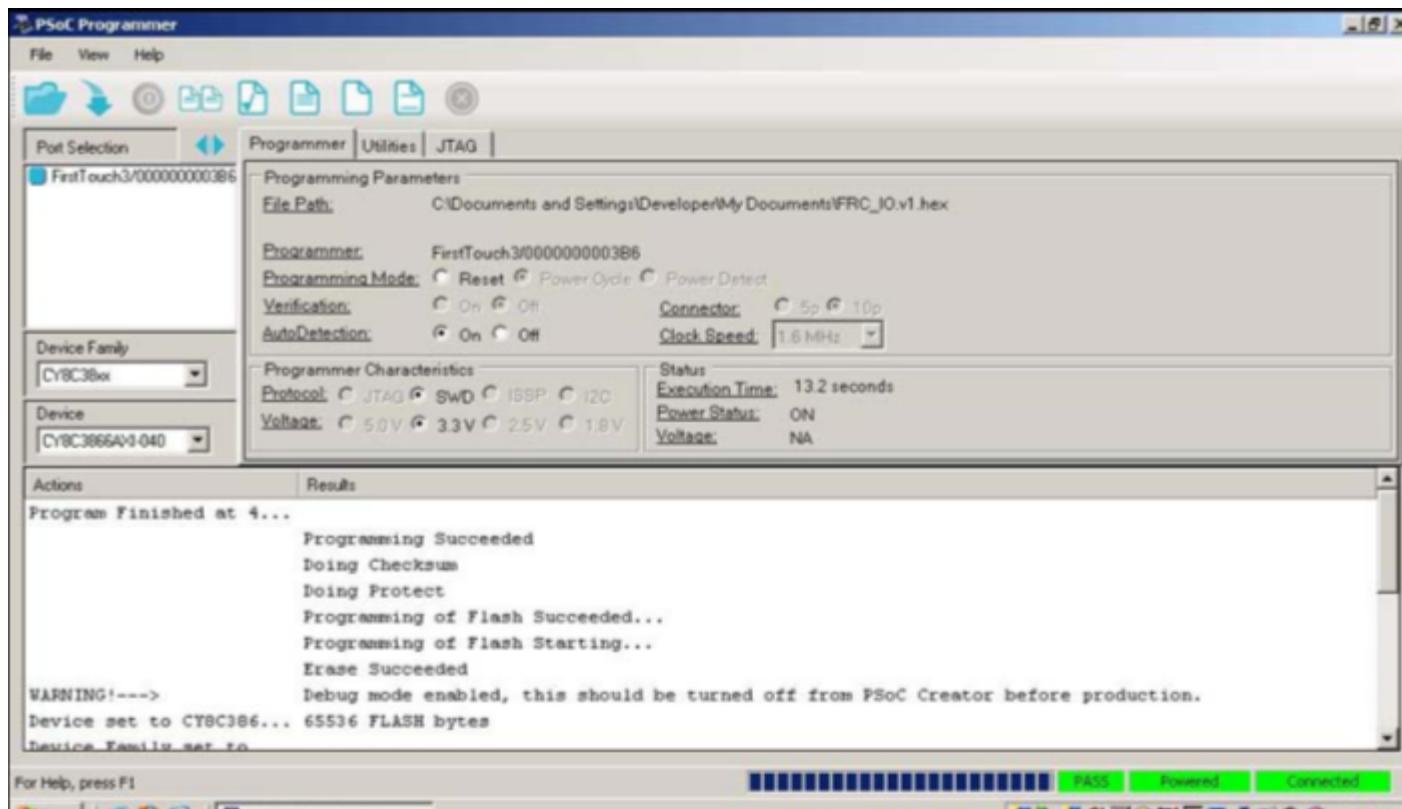
In the top left of the tool bar, you'll see a blue folder icon. Click the folder, browse to Shared or Public Documents/FRC, and select the FRC_IO.v3.hex or FRC_IO.v3.2010.hex (or latest version) file. You must select the correct firmware for the version of the module that you have. The location on the Classmate is Computer»Windows (C:) »Users»Public»Documents»FRC. If you are a rookie, you have a 2012 module. If you are a veteran teams and got your First Touch module in the 2010 or 2011 kit, use that firmware. Selecting the wrong firmware image will result in an error message and will not damage your First Touch module.

Select Port



Directly below the tool bar, on the left, there is a Port Selection window with the device listed in it. Select the FirstTouch device.

Programming Succeeded

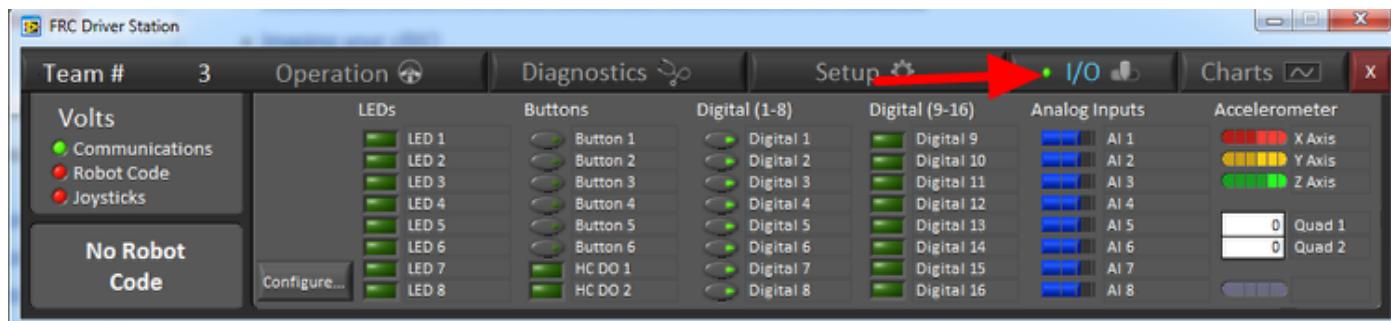


Click the program button on the tool bar, and wait for the programming operation to complete. You will see Programming Succeeded in the Results window.

Verification

Unplug and replug the USB cable and your I/O module will be ready to use. You can check to make sure the process was successful by opening the Driver Station software and confirming that the device is being recognized. With the I/O module plugged in, your I/O tab will indicate that the Hardware I/O is selected with a green indicator. Without the I/O module plugged in, it will default to the Virtual I/O.

Troubleshooting



- If you are unable to find the firmware file, make sure that you have installed the Driver Station update.
- If the PSoC Programmer errors with “The hex file does not match with the acquired device, please check the device”, make sure you selected the correct firmware file for the version of the First Touch module you are using.
- If the Driver Station is unable to detect the First Touch I/O module...
 - Check the version of the PSoC Programmer that you have installed
 - You should have version 3.12.0.827 if you look in Help >> About in PSoC Programmer
 - Check for the module in Device Manager under Universal Serial Bus controllers
 - If the device is listed as “FTK3 (unconfigured)” (USB PID=F119), the CyMiniProg3Service may not be running
 - Check for the service in Control Panel >> Administrative Tools >> Services
 - Check if it is started. If not, start it and configure it to start automatically.
 - If the device is listed as “FTK3 (version)” (USB PID=F11A), and version does not equal 3.4.1.20, you may have installed a newer version of the PSoC Programmer
 - Uninstall the Driver Station Update and the PSoC Programmer update in Control Panel >> Add / Remove Programs
 - Reinstall the Driver Station Update
 - If the device is listed as “FTK3 (3.4.1.20)”
 - Make sure that the bootstrap firmware that is installed matches what the Driver Station needs. The file Program Files\Cypress\Programmer\3.12\Service\ftk_3_simfw.hex should be 29,663 bytes.
 - Make sure that C:\Windows\system32\nicypi.dll is installed and is version 1.0.0.49154
 - The Driver Station still won’t see the First Touch I/O Module
 - Try restarting the Driver Station after you’ve gotten everything else correct and the device is plugged in.

For further help, look for a similar problem on the Cypress forums at
<http://www.cypress.com/?app=forum> (be sure to select the “FIRST Robotics Competition” forum).

2013 Driver Station

Imaging your Classmate (Rookie USB stick)

This document outlines the procedure to image an E12 Classmate PC using the USB Stick provided in the 2013 Rookie Kit of Parts. Veteran teams may not need to image their machines, but should see the section on [Image Download](#) if they wish to do so.

Hardware Setup

1. Make sure the Classmate is turned off, but plugged in.
2. Insert the “2013 Image” USB Thumb Drive from the Kit of Parts into a USB port on the Classmate.

Boot to USB

1. Power on the Classmate and tap the F11 key on the USB keyboard. Tapping the F11 key during boot will bring up the boot menu.
2. Use the arrow keys on the keyboard to select the USB device (it will be called “Generic Flash Disk”).
3. Press the ENTER key when the USB device is highlighted.

Image the Classmate

1. To confirm that you want to reimagine the Classmate, type “1” and click ENTER. Then, type “Y” and click ENTER. The Classmate will load the CTL AutoInstaller. The installation will take 15-30 minutes.
2. When the installation is complete, remove the USB drive.
3. Restart the Classmate. The Classmate will boot into Windows.

Initial Driver Station Boot

The first time the Classmate is turned on, there are some unique steps, listed below, that you’ll need to take. The initial boot may take several minutes; make sure you do not cycle power during the process.

Please note that these steps are only required during original startup.

Enter Setup

1. Log into the Developer account.
2. Click “Ask me later”.
3. Click “OK”. The computer now enters a Set Up that may take a few minutes.

Activate Windows

1. Establish an Internet connection.
2. Once you have an Internet connection, click the Start menu, right click “Computer” and click “Properties”.
3. Scroll to the bottom section, “Windows activation”, and Click “Activate Windows now”
4. Click “Activate Windows online now”. The activation may take a few minutes.
5. When the activation is complete, close all of the windows.

Microsoft Security Essentials

1. Navigate through the Microsoft Security Essentials Setup Wizard. Once it is complete, close all of the windows.

Select a theme

1. Set a theme for your computer by right clicking anywhere on the Desktop and clicking “Personalize”.
2. Scroll within the themes and select a theme. We recommend “Windows 7 Basic”. Note that using any of the “Aero” themes has been shown to slow down processing when using the Microsoft Kinect.

Update Software

In order for the Classmates to arrive at Kickoff locations in time, they were shipped before the final version of the software was ready. It is essential that you update your classmate software before proceeding so that you are using the most updated software throughout this set up and during competition.

NI Utilities Update (Required to Image cRIO)



FRC Utilities

➤ **Install FRC Utilities**

[View Readme](#)

[Browse the Media](#)

[Exit](#)

FRC 2013 Tools Update

ni.com/FIRST

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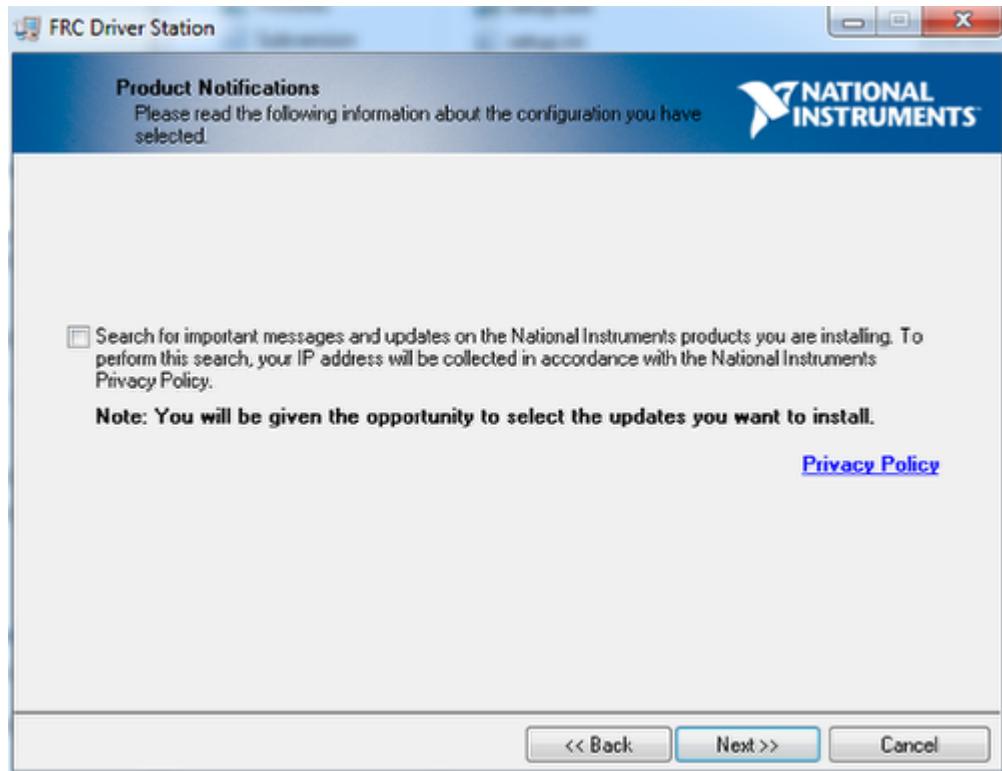
The previous installation steps installed the support files needed for the NI FRC Utilities, but the Utilities themselves are contained in a separate update for release timing purposes. This installation is required to re-image your cRIO. Go [here](#) to download the FRC Utilities Update. Unzip the downloaded file, then locate and double-click **autorun.exe**. Click **Install FRC Utilities** to continue. If you see a security dialog pop-up, click **Yes**.

Utilities Update Installer



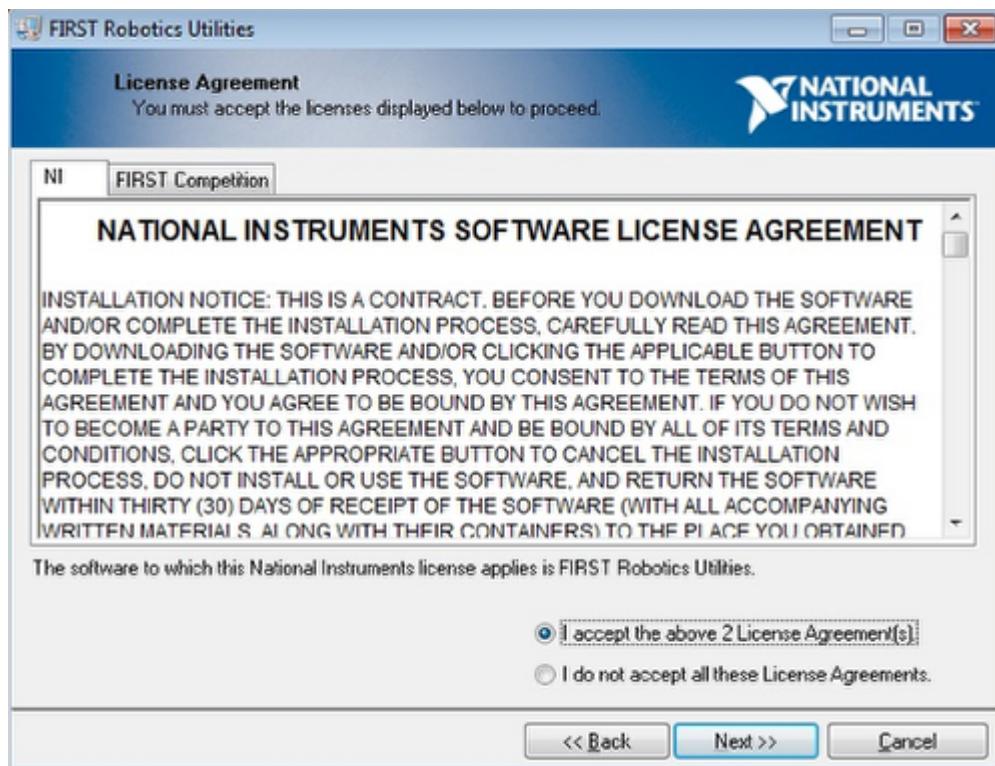
Click **Next** to continue.

Search for Updates



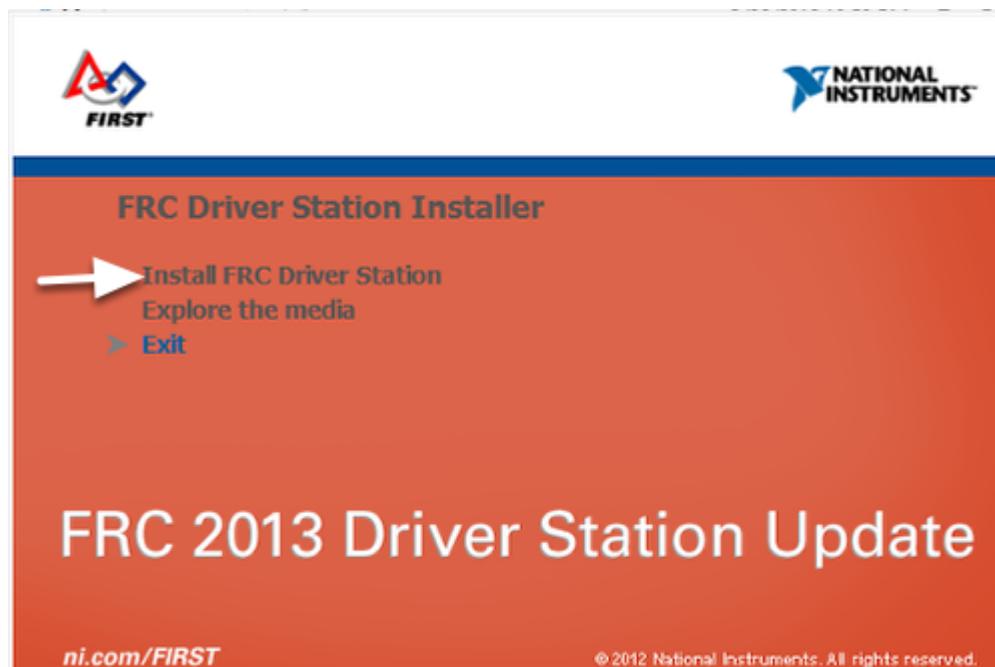
Uncheck the box to **Search for important....** then click **Next** to start the installation.

License Agreement



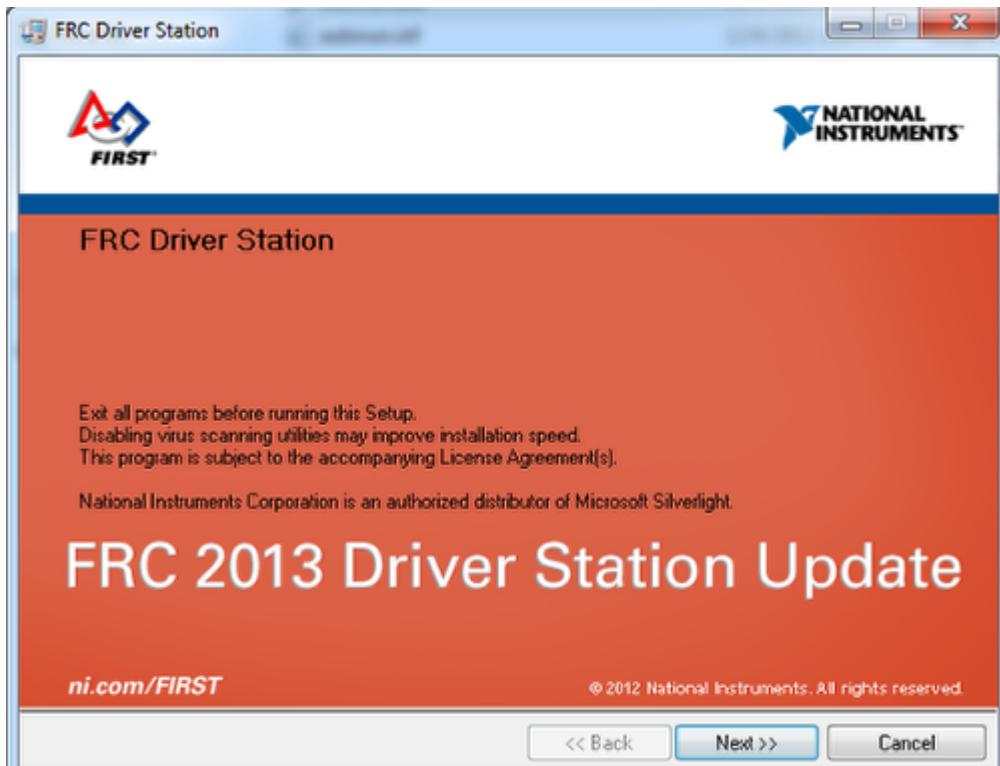
Select the **I accept** bubble to accept the license agreements, then click **Next** to start the installation. When the installation completes, click **Finish** to exit the installer.

FRC Driver Station Update (Required to Control Robot)



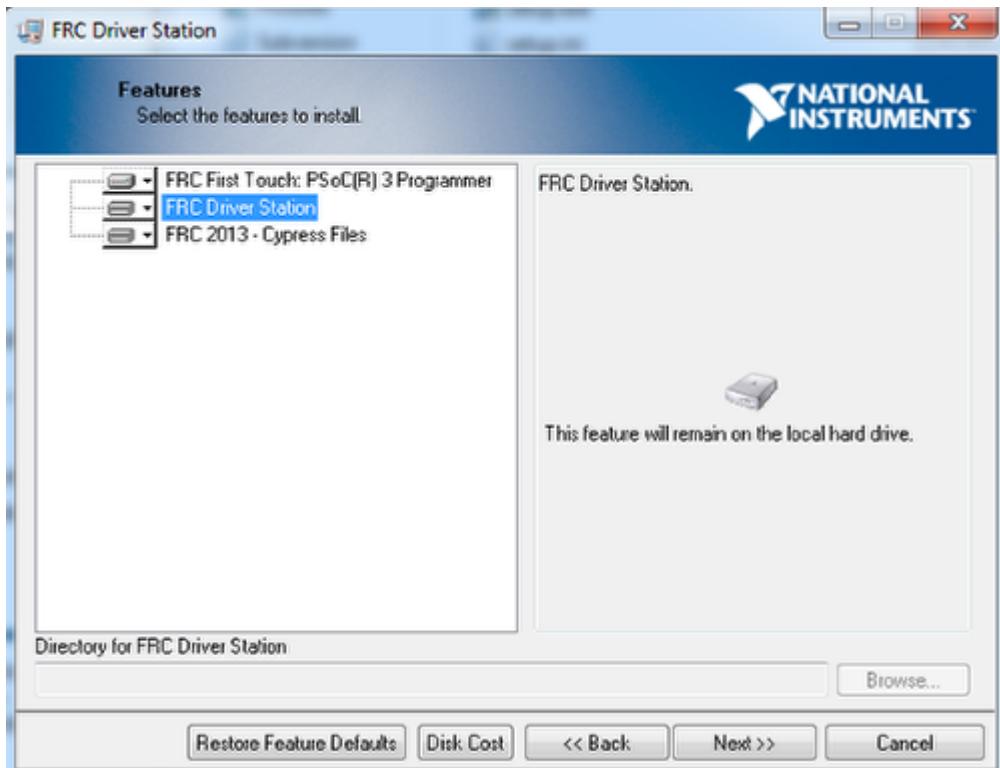
The NI Tools install installs the support files for the FRC Driver Station, the Driver Station program itself is contained in a separate update for release timing purposes. Go [here](#) to download the FRC Driver Station Update. Unzip the downloaded file, then locate and double-click **autorun.exe**. Click **Install Driver Station** to continue. If you see a security dialog pop-up, click **Yes**.

Driver Station Installer



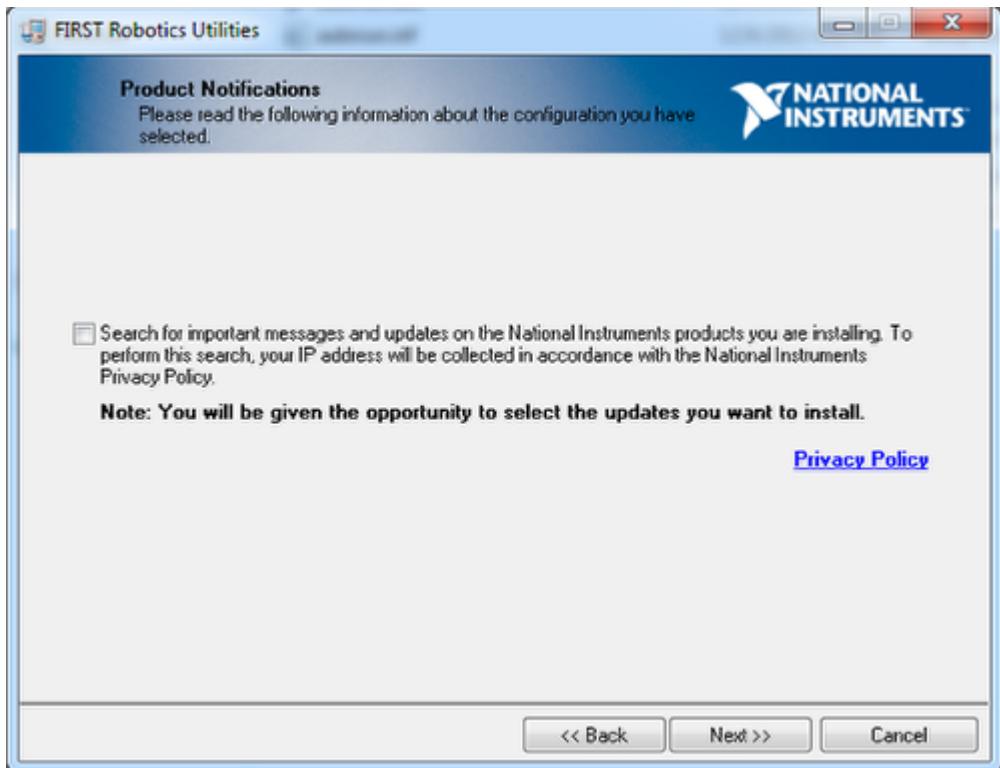
Click **Next** to continue.

Install Options



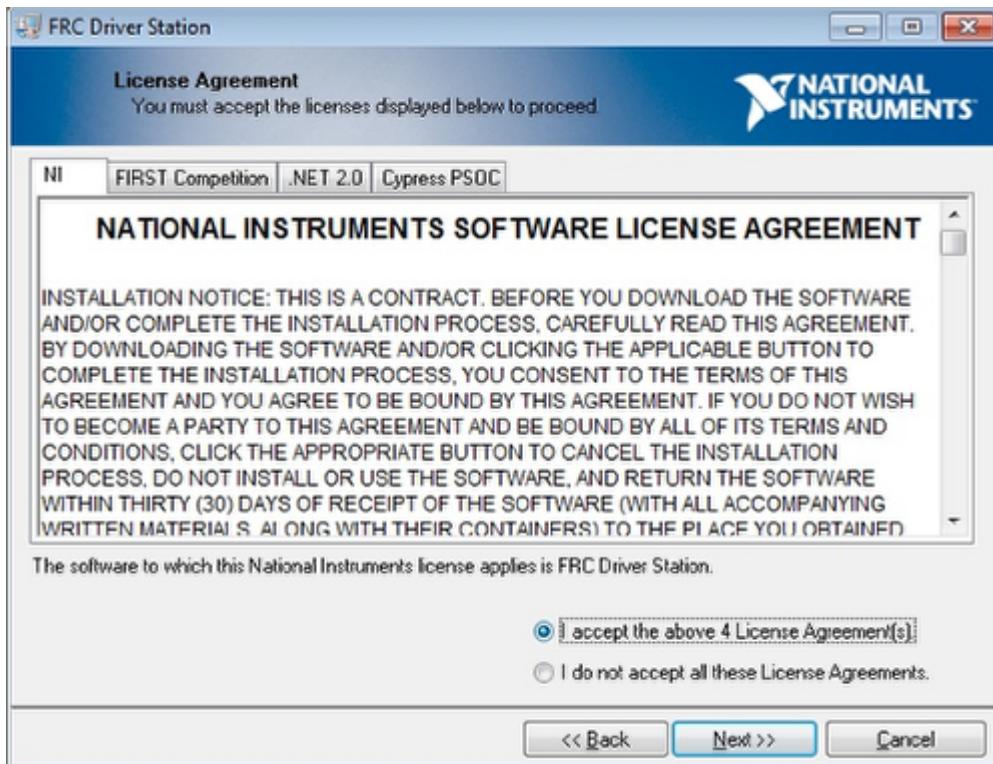
Leave the install options at the defaults and click **Next**.

Search for Updates



Uncheck the box to **Search for important....** then click **Next** to start the installation. When the installation completes, click **Finish** to exit the installer.

License Agreement



Click "**I accept the License Agreement.**" to accept the terms of the license agreements shown, then click **Next**. When the installation completes, click **Finish** to exit the installer.

Imaging the cRIO

After completing the Utilities and DS updates, the cRIO needs to be imaged to work with the FRC Control System, see the [Imaging your cRIO](#) section for details.

Imaging your Classmate (Veteran/Rookie Image Download)

This document describes the procedure for creating a bootable USB drive to restore the 2013 FRC image on a Classmate computer. Note that Veteran teams are not required to re-image their Classmates. If you do not wish to re-image your Classmate you will need either a USB optical drive or to copy the contents of the LabVIEW DVD to a USB Flash drive (the WindRiver DVD as well if using C++) then you can start with the appropriate document for [C++](#), [Java](#), [LabVIEW](#), or [DS only](#).

Prerequisites



[Figure 1: E09 Classmate](#)



[Figure 2: E11 Classmate](#)



[Figure 3: E12 Classmate](#)

1. E09, E11, or E12 Classmate computer
2. 8GB or larger USB drive
3. 7-Zip software installed. [Download here \(www.7zip.org\)](http://www.7zip.org) As of the writing of this document, the current released version is 9.20 (2010-11-18)
4. RMprepUSB software installed. [Download here \(http://www.rmprepusb.com/documents/release-2-0\)](http://www.rmprepusb.com/documents/release-2-0) Scroll down the page and select the stable version's download link. As of the writing of this document, the current stable version is 2.1.648

Download the Classmate Image

Image Filename	Classmate Model	DS Support files and FRC Tools	LabVIEW 2012	C++ (WindRiver 3.0)	JAVA (Netbeans)
E09_DRV_2013_251112.7z	E09	YES	NO	NO	NO
E09_LAB_2013_131212.7z	E09	YES	YES	NO	NO
E09_CPP_2013_251112.7z	E09	YES	NO	YES	NO
E09_JAV_2013_261112.7z	E09	YES	NO	NO	YES
*E11_DRV_2013_261212.7z	E11	YES	NO	NO	NO
*E11_DEV_2013_271212.7z	E11	YES	YES	YES	YES
E12_DRV_2013_071212.7z	E12	YES	NO	NO	NO
E12_DEV_2013_091212.7z	E12	YES	YES	YES	YES

*See details at the end of this document if you are installing an image to an E11 model Classmate.

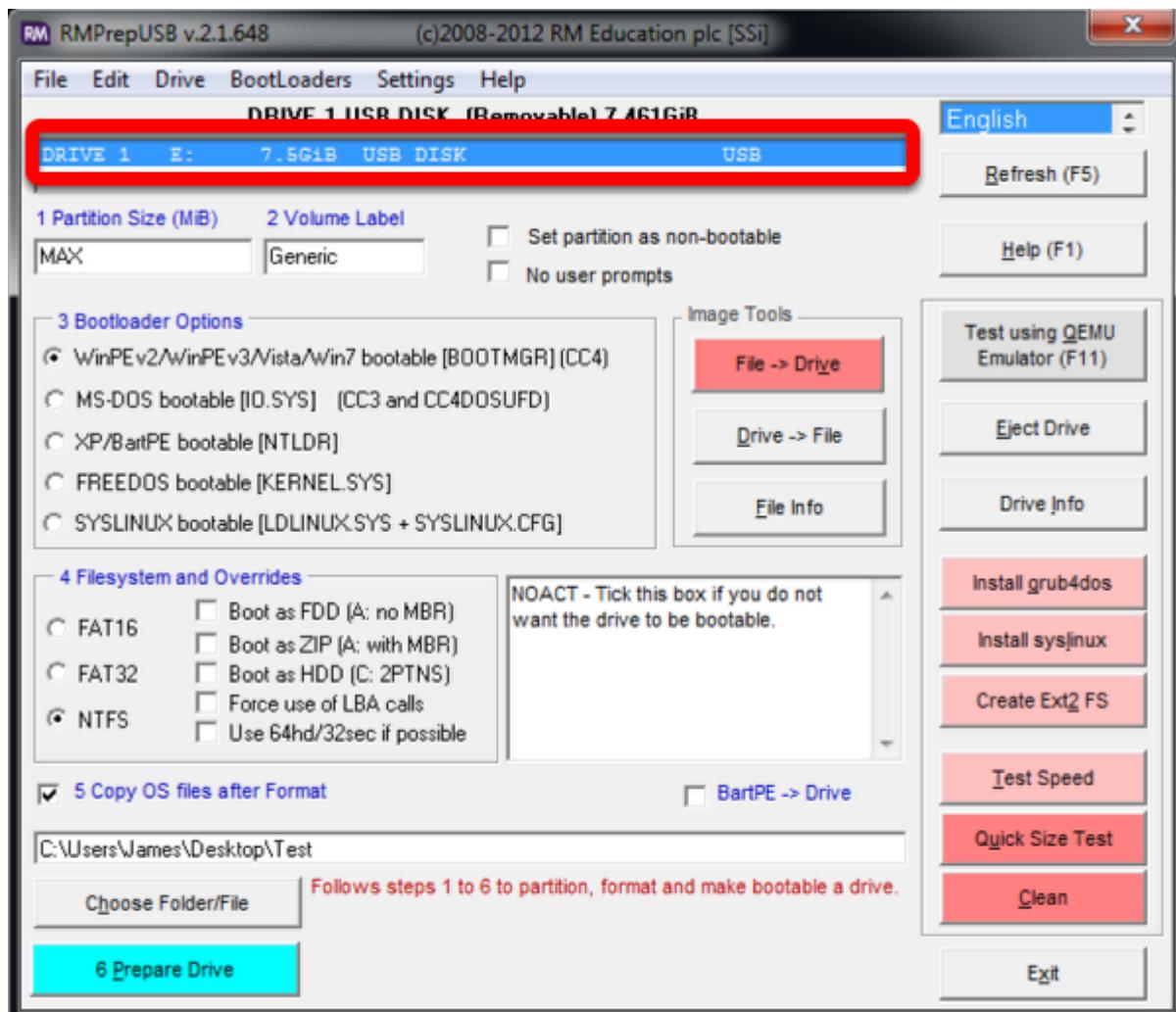
Download the Classmate image from the Intel classmate PC FIRST FRC System Image Portal
<http://www.intel.com/content/www/us/en/intel-learning-series/first-frc-image-system-overview.html>
There are several Classmate images available for the 2013 season. Once you have logged into the download site, select the option that best fits your desired use case; as a Driver Station only, or as a Driver Station and robot code development platform. Due to the limited size of hard drive in the E09, separate images are necessary for each of the development environment options. The E11 and E12 have sufficient space which allows for all the development environments to be installed at the same time.

NOTE: These images only install the prerequisite core FRC software, it is still necessary to install the 2013 season-specific updates. Links for these updates are available via the [FRC Control System web site](#), which goes live at 12PM Eastern on 05Jan2012.

Preperation

1. Place the image file downloaded from the Intel site to a folder on your root drive (e.g. C:\2013_Image)
2. Connect 8GB or larger USB Flash drive to the PC to use as the new restoration drive.

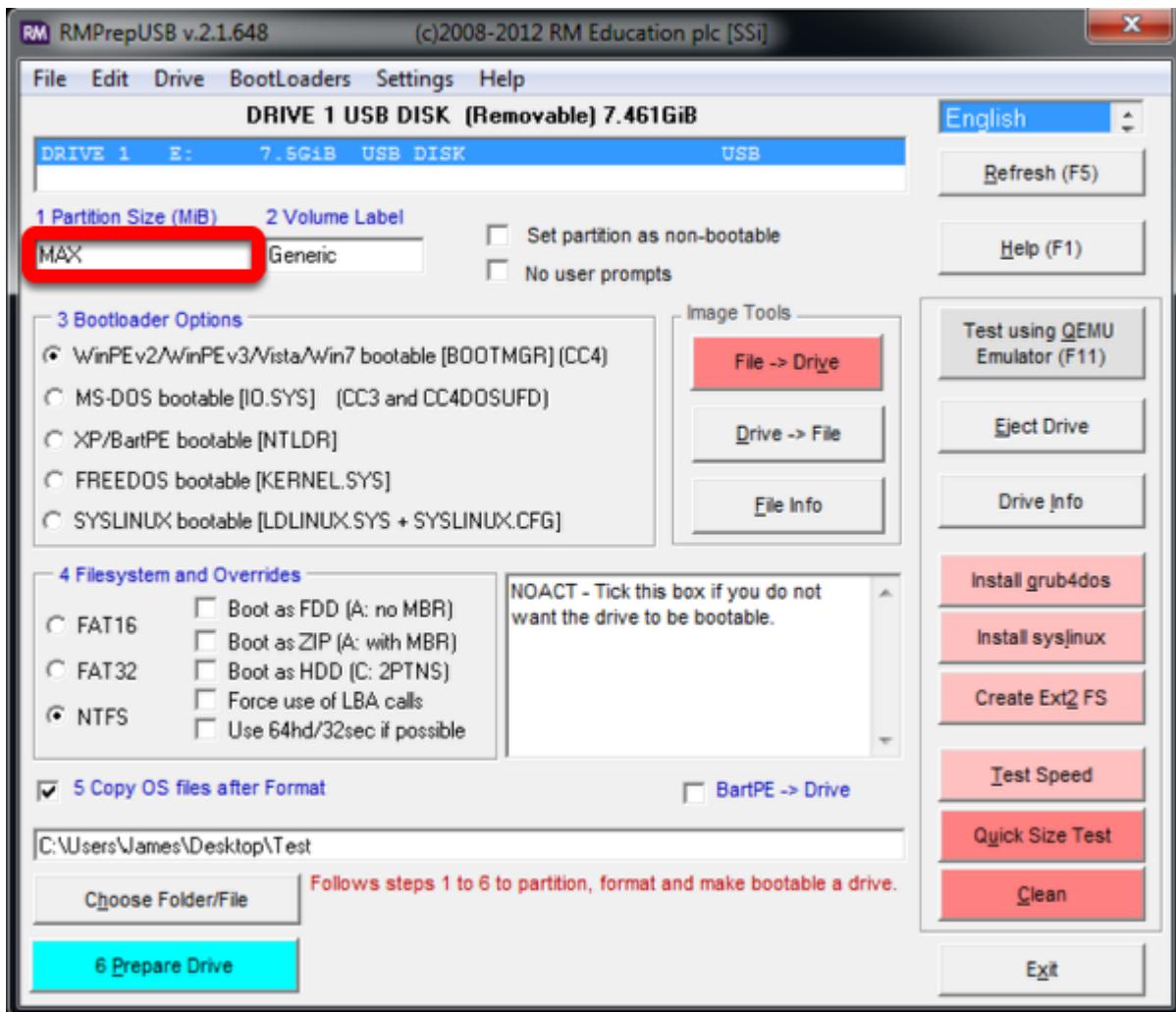
RMPrep



Start/Run RMprepUSB

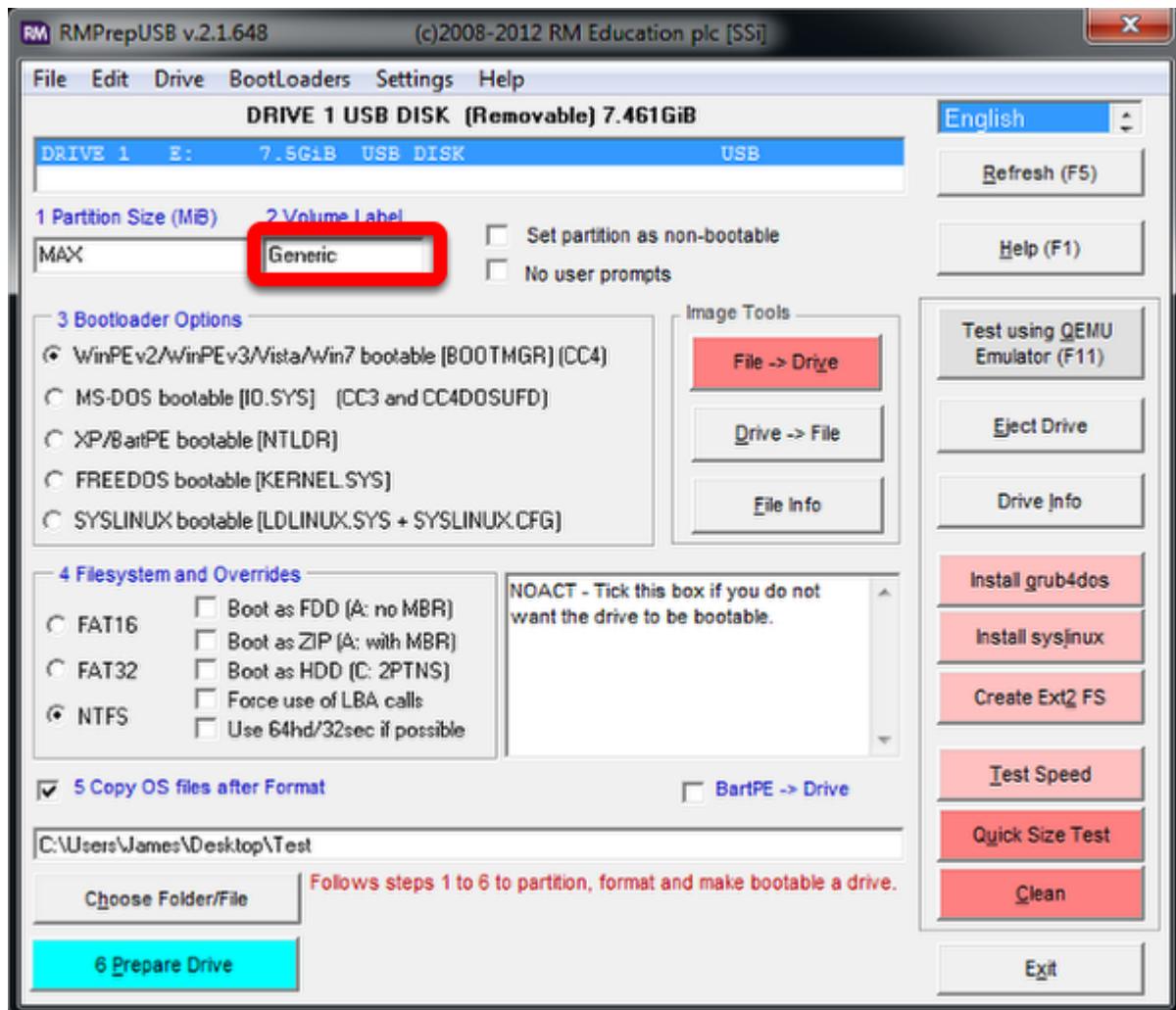
Select USB Drive

Set Partition Size



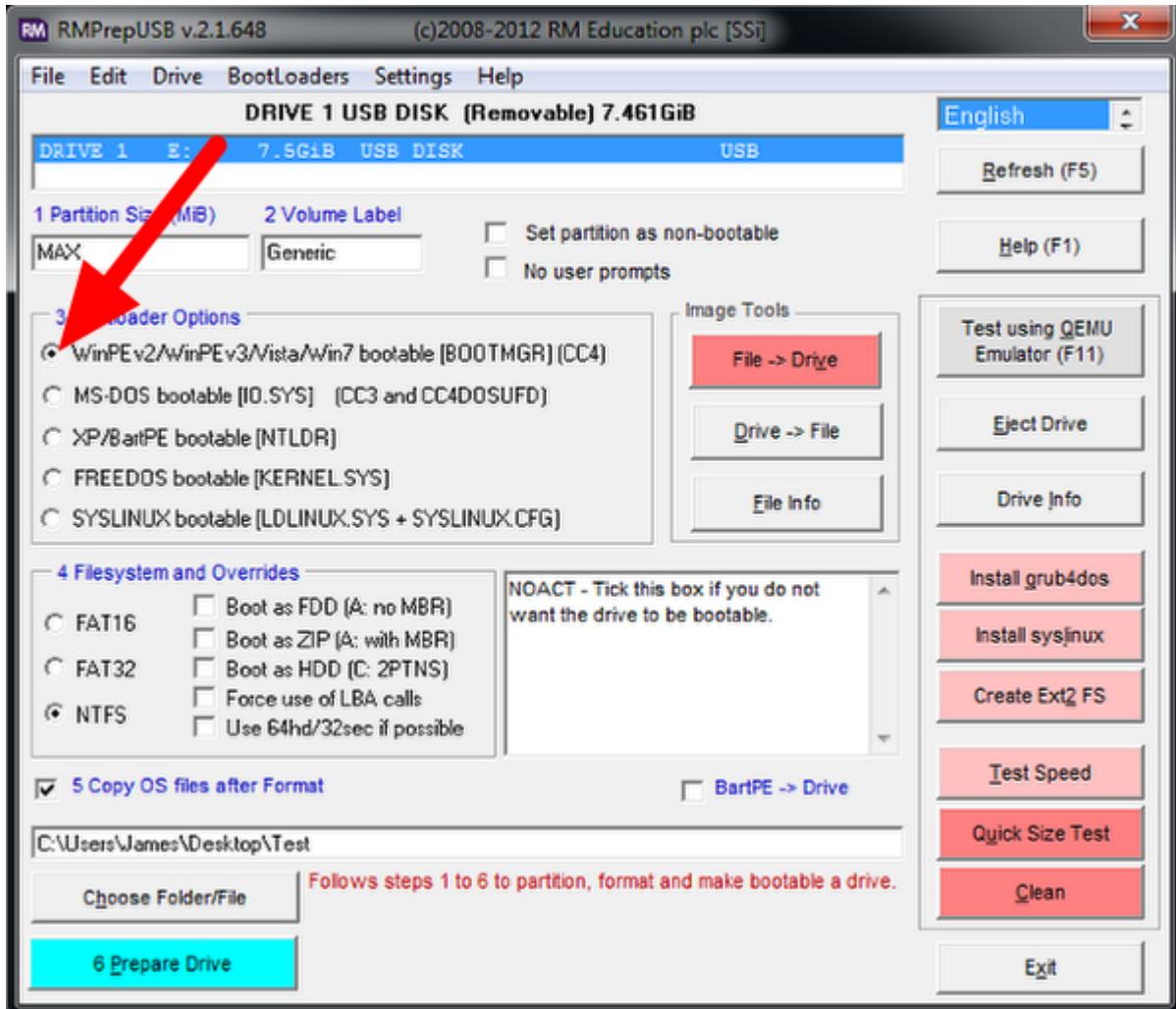
Set Partition Size to MAX

Set Volume Label



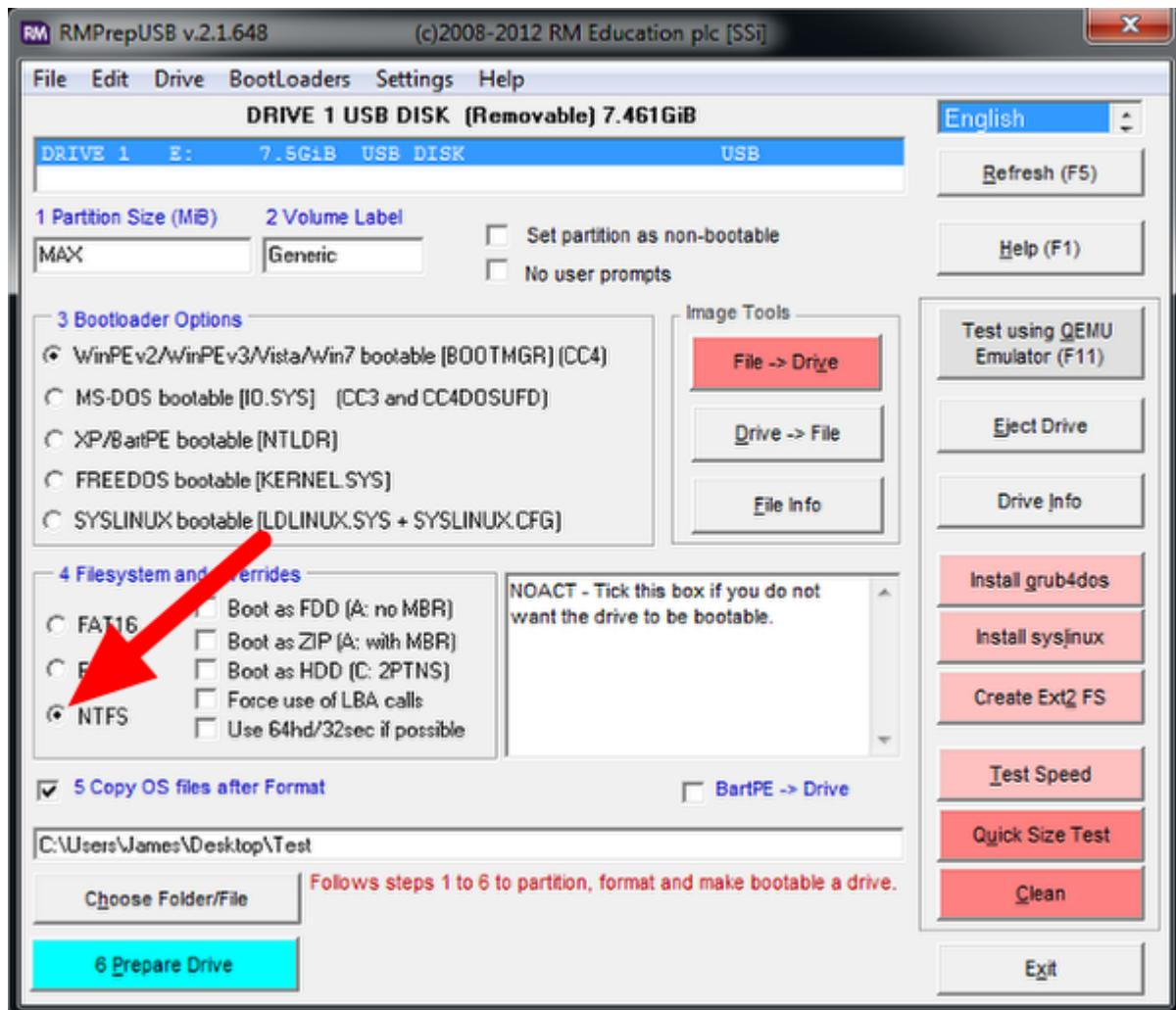
Set Volume Label to Generic

Set Bootloader Option



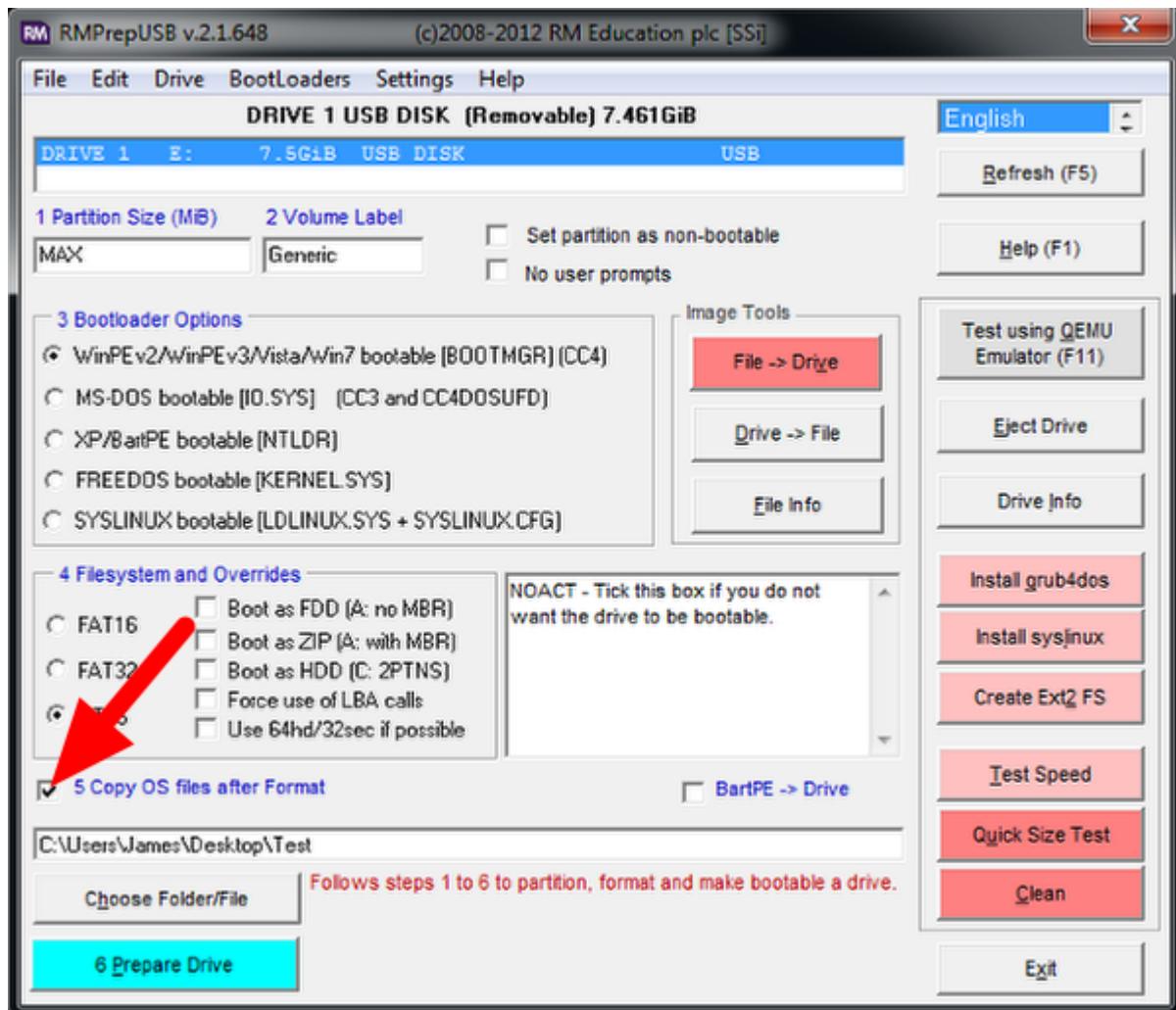
Select Bootloader Option “WinPE v2/WinPE v3/Vista/Win7 bootable”

Select Filesystem



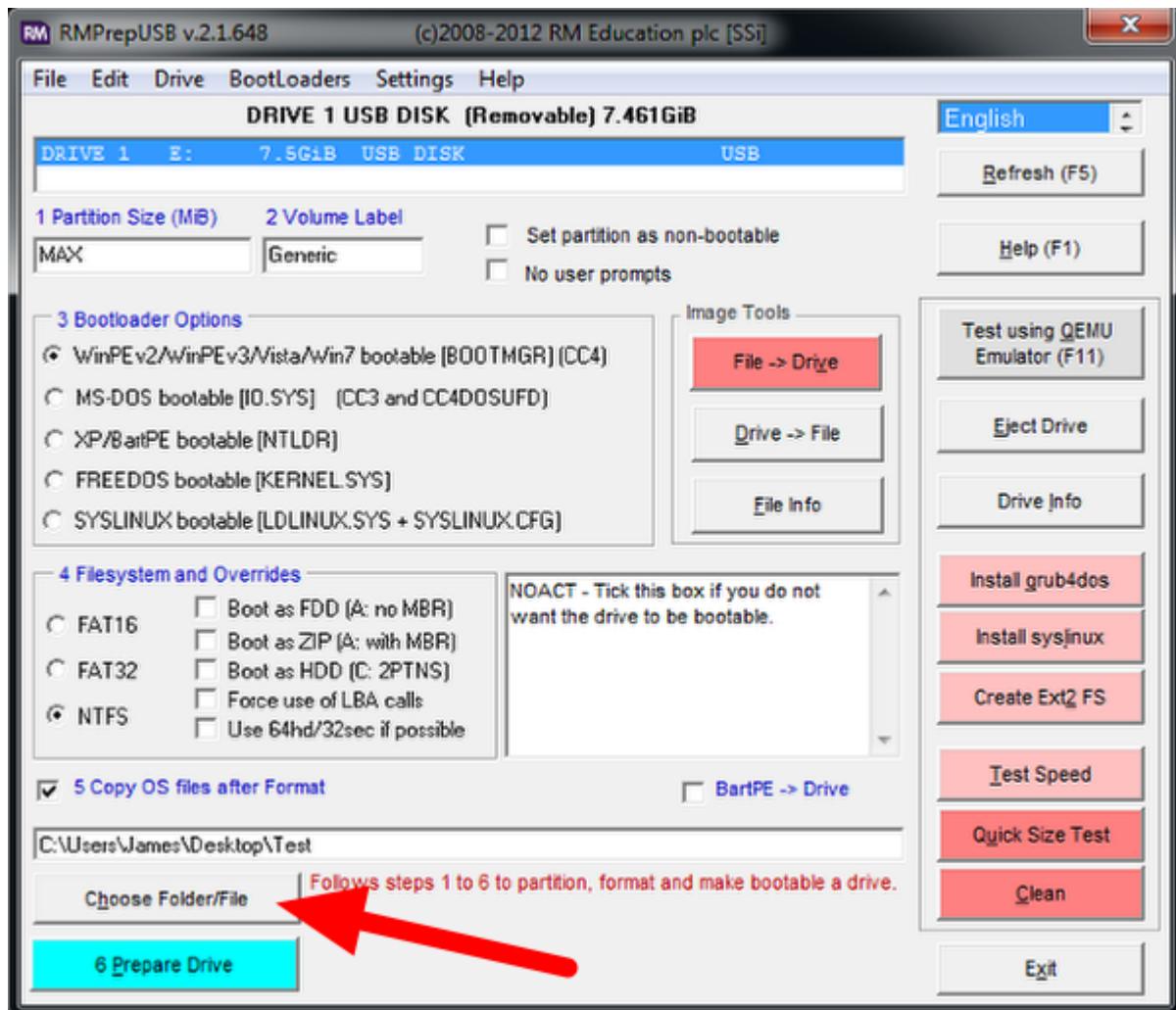
Select NTFS Filesystem

Copy OS Files Option



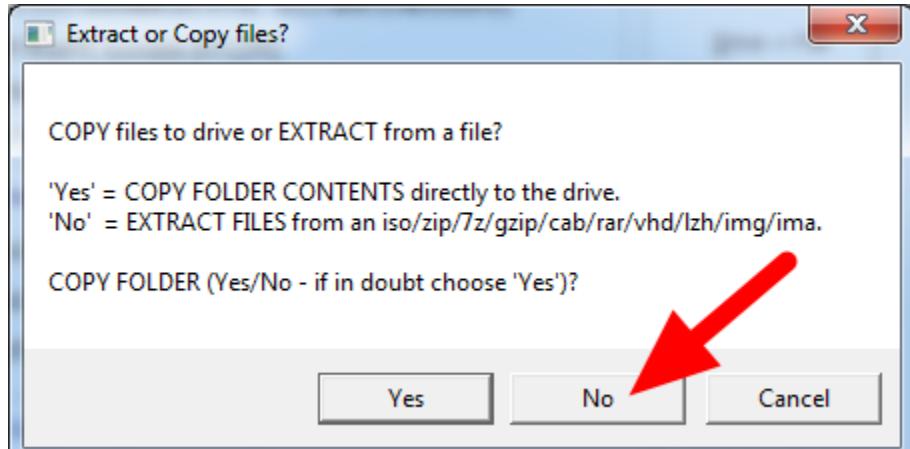
Ensure the “Copy OS files after Format” box is checked

Locate Image



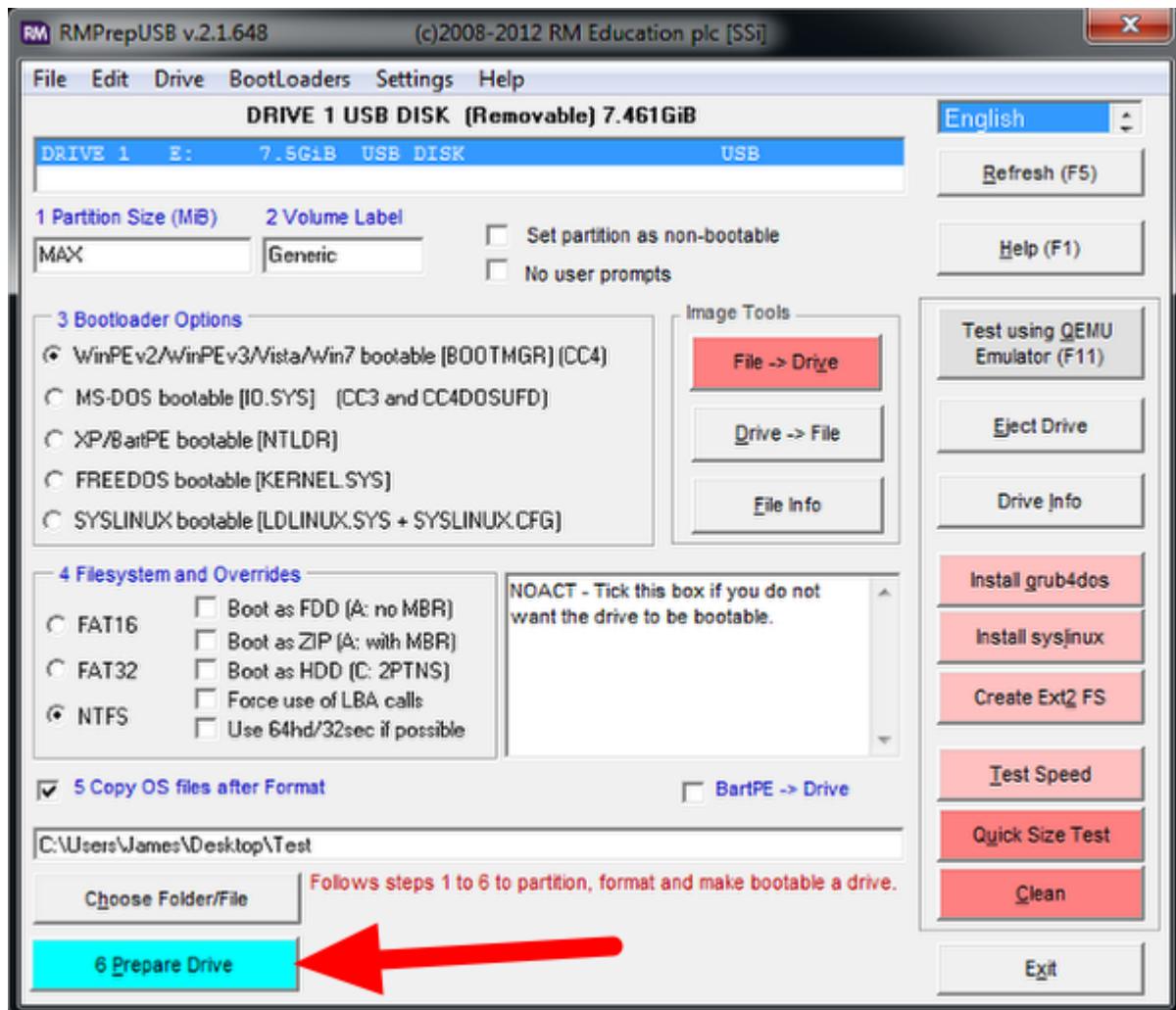
Select the “Choose Folder/File” button

Copy Files Dialog



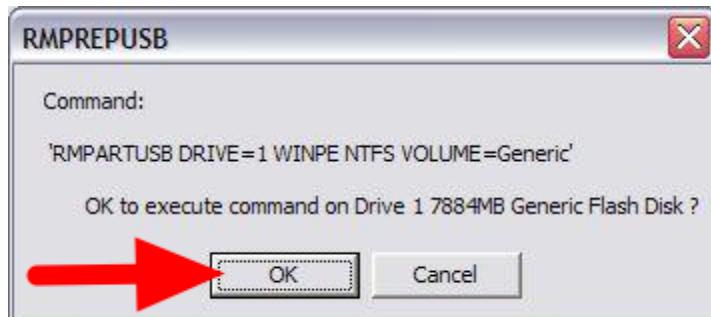
Choose “No” and select your .7z image

Prepare Drive



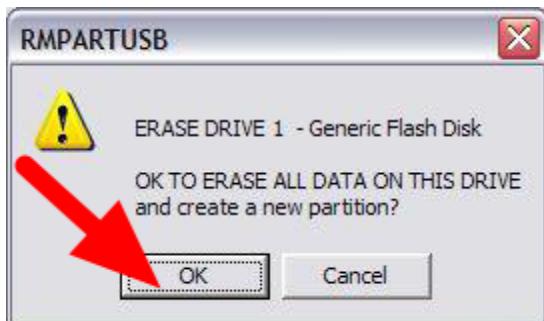
All configuration settings are now complete. Select “Prepare Drive” to begin the process

Confirmation Dialog 1



Click “OK” to execute the command on the selected USB Flash drive. A Command Prompt will open showing the progress.

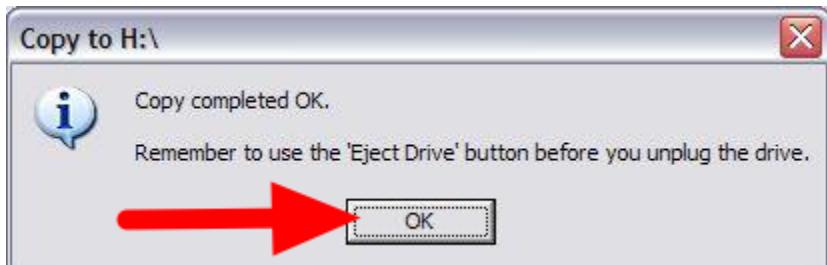
Confirmation Dialog 2



Click "OK" to format the USB drive

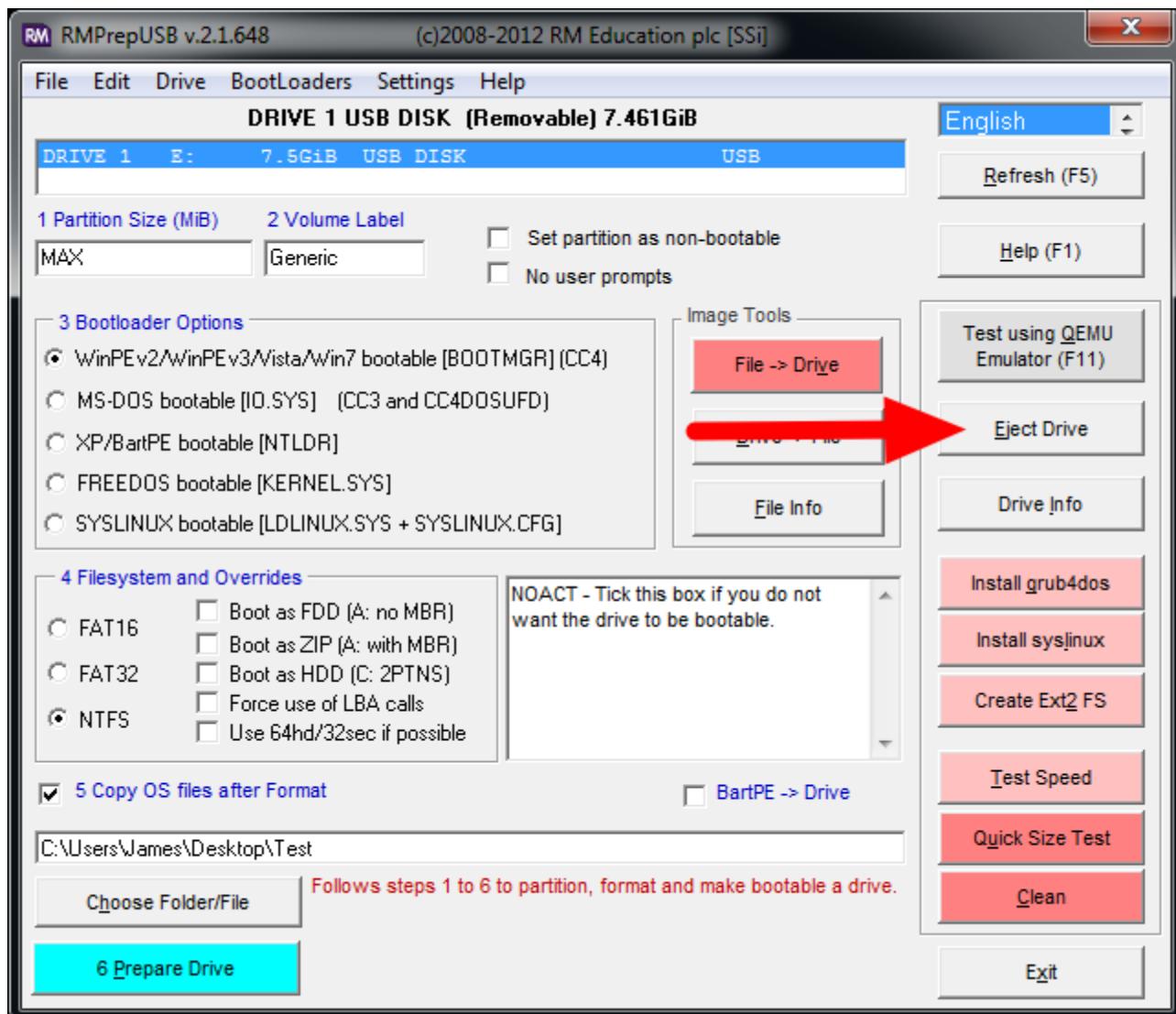
NOTE: ALL DATA ON THE DRIVE WILL BE ERASED!

Copy Complete



Once formatting is complete, the restoration files will be extracted and copied to the USB drive. This process should take ~15 minutes when connected to a USB 2.0 port. When all files have been copied, this message will appear, press OK to continue.

Eject Drive

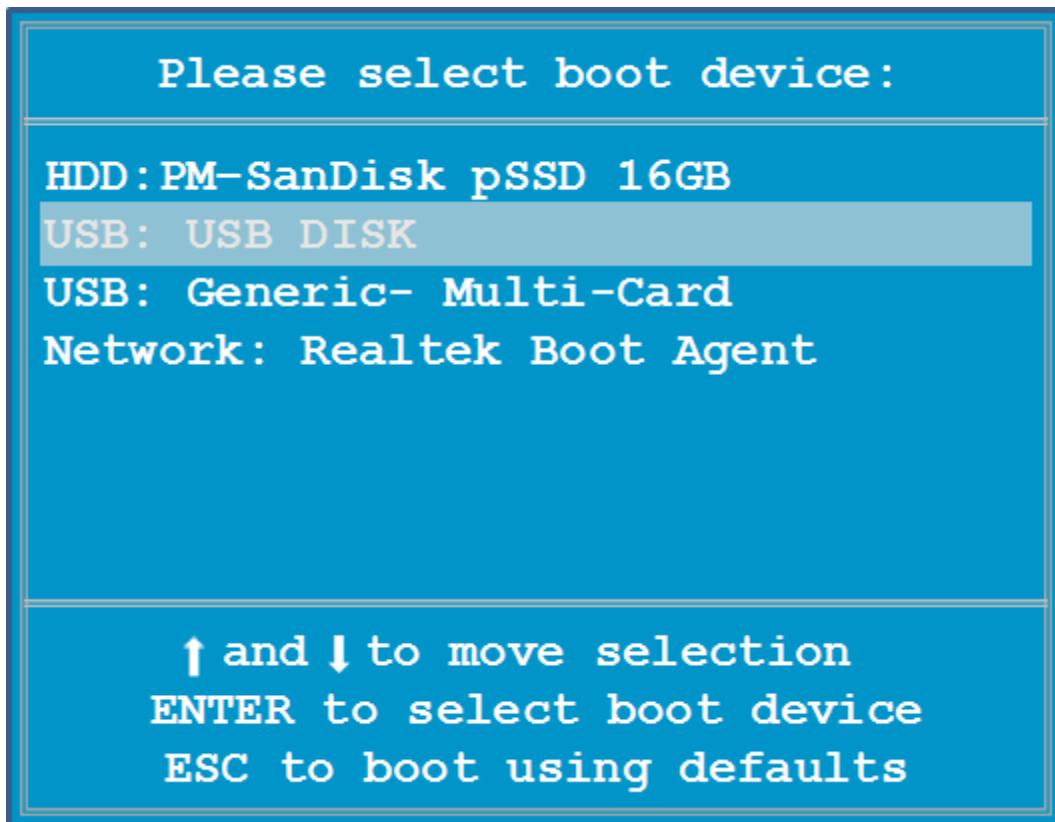


Press the “Eject Drive” button to safely remove the USB drive. The USB drive is now ready to be used to restore the image onto the Classmate PC.

Applying the Image

1. With the Classmate turned ‘Off’; insert the USB Flash drive with the Restoration image into a USB port on the Classmate
2. Turn the Classmate ‘On’; when the “2Go PC” splash screen appears, repeatedly press/release (as if typing) the F11 key until the Boot Options screen appears

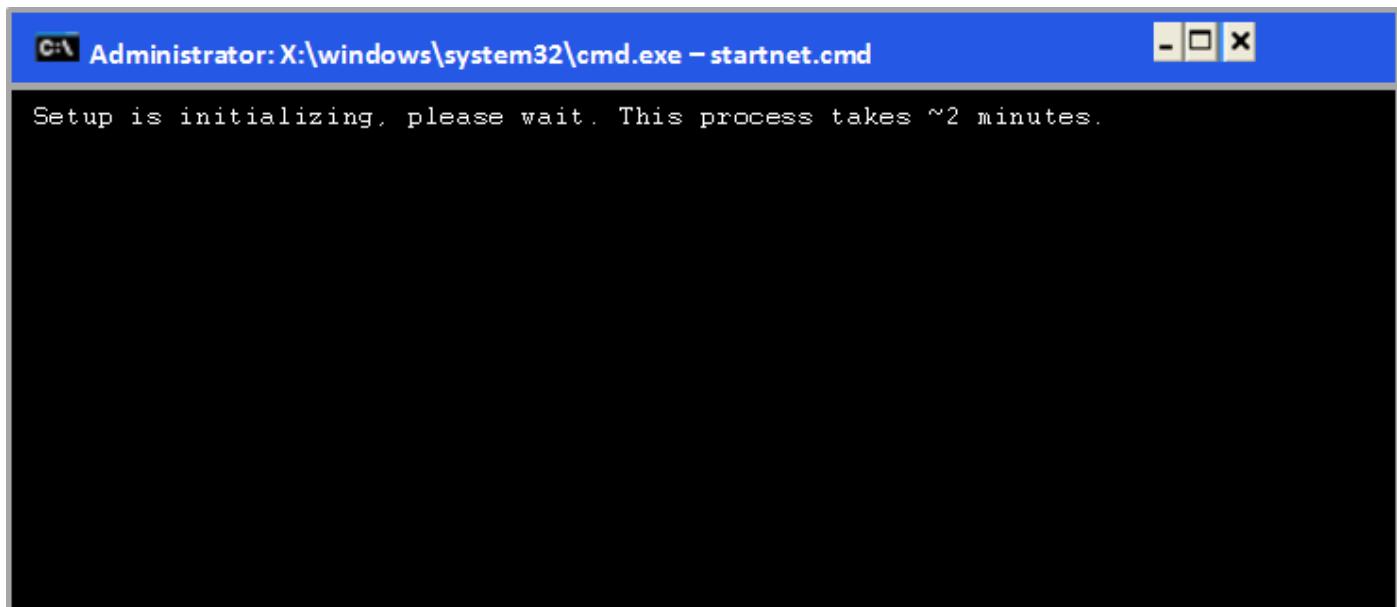
Select USB Drive



Using the arrow keys scroll down to the USB Device and press Enter .

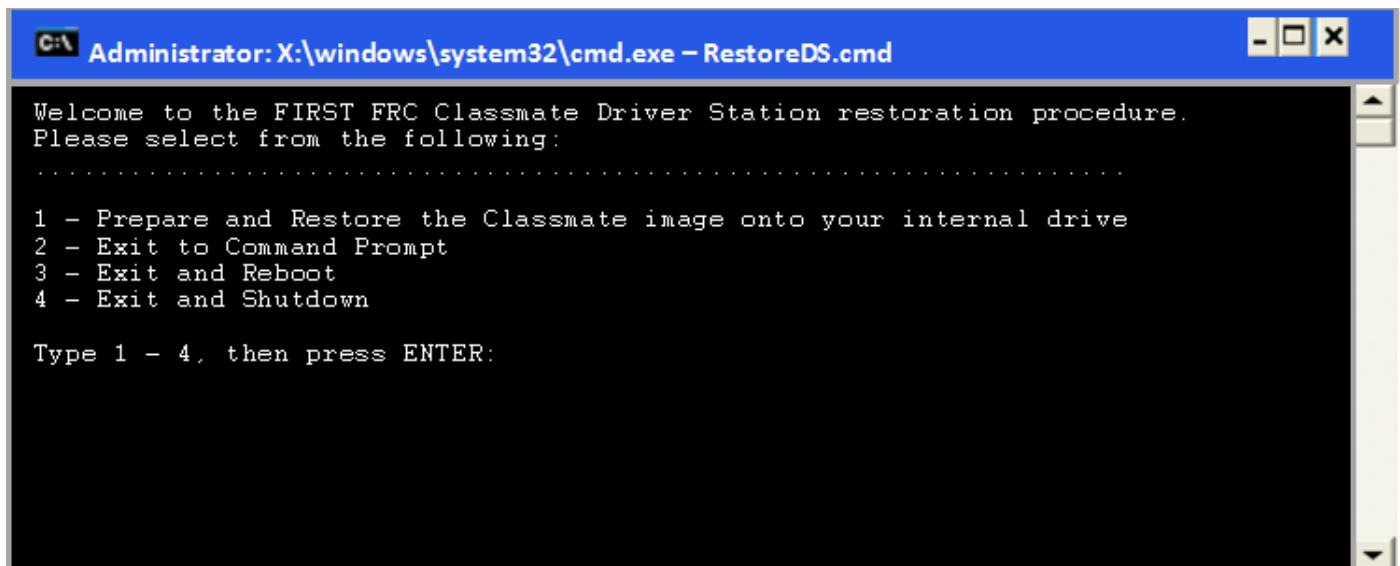
Note, the USB drive used to create this document came up listed only as “USB DISK”. Your USB device may be listed under a different name.

Setup Initializing



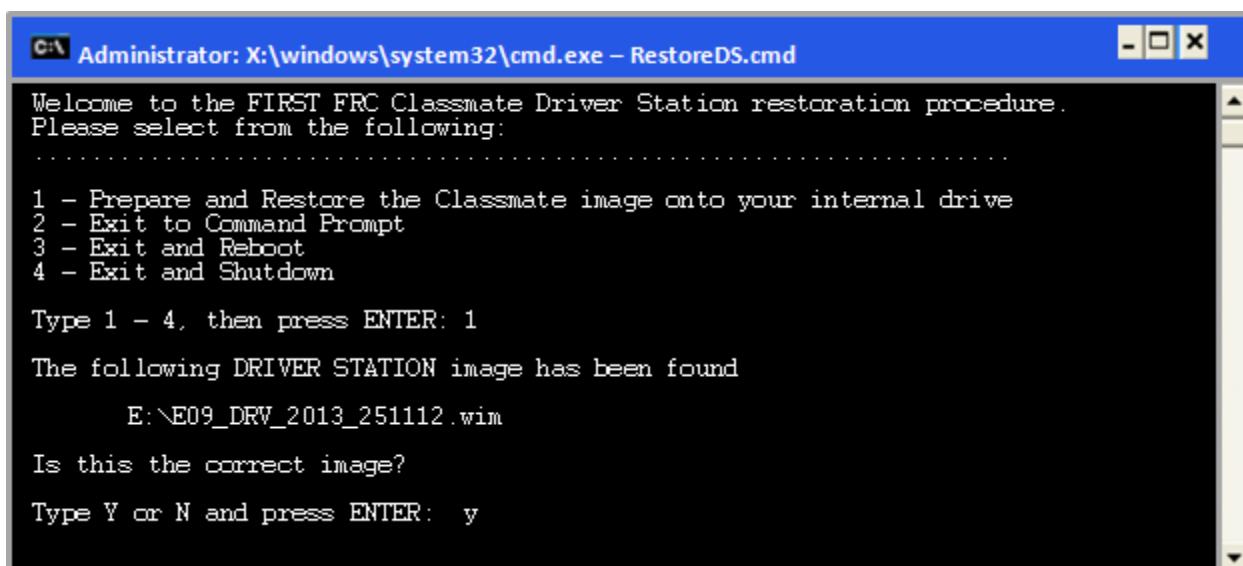
Windows setup will begin to install. This Command Prompt window will be displayed:

Main Menu



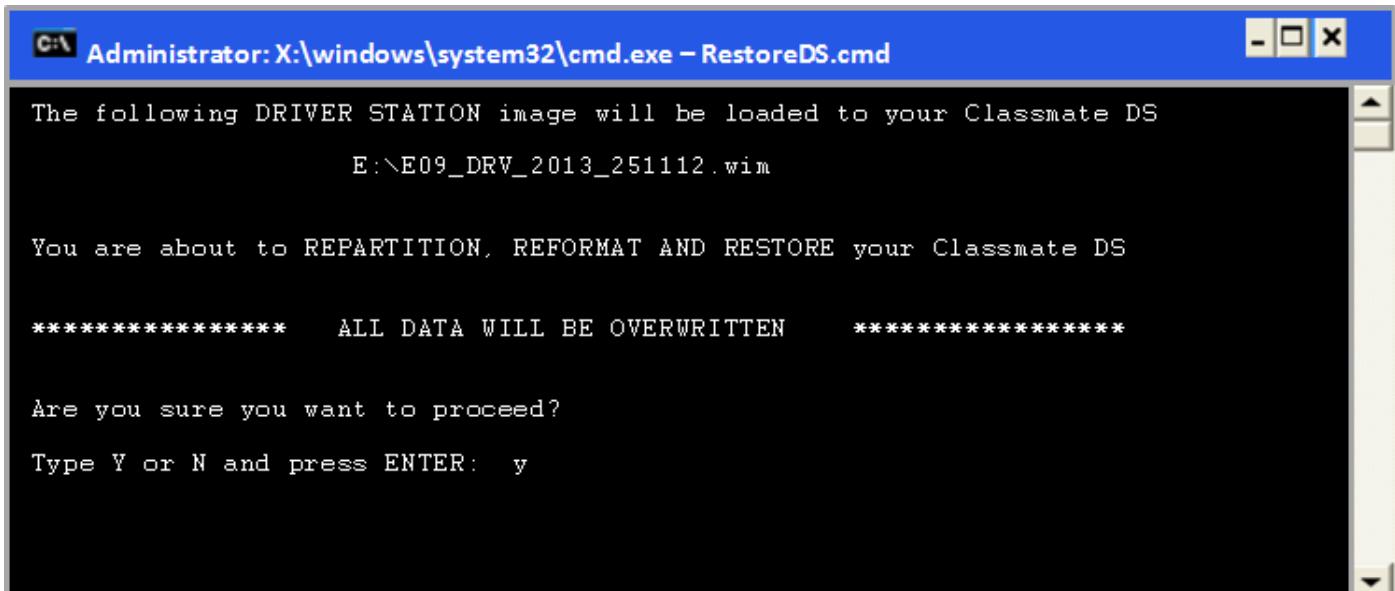
When Setup completes, the Main menu will display. Type 1 to restore the Classmate then press Enter

Image Confirmation



Confirm the Image is correct for your model Classmate and desired image type. Then type "Y" and press Enter. The screenshot below shows the installation for the Driver Station-only image for the E09.

Confirm Restore



The following DRIVER STATION image will be loaded to your Classmate DS
E:\E09_DRV_2013_251112.wim

You are about to REPARTITION, REFORMAT AND RESTORE your Classmate DS

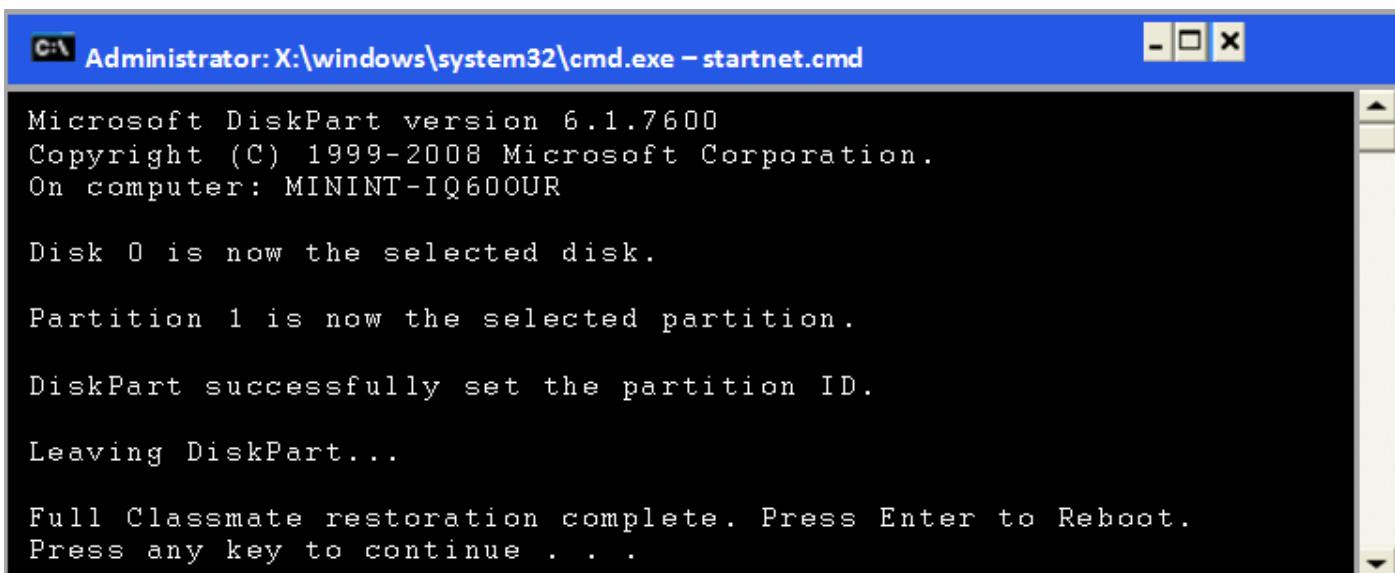
***** ALL DATA WILL BE OVERWRITTEN *****

Are you sure you want to proceed?

Type Y or N and press ENTER: y

Confirm the Restoration by typing “Y” then press Enter

Restoration Complete



Microsoft DiskPart version 6.1.7600
Copyright (C) 1999-2008 Microsoft Corporation.
On computer: MININT-IQ600UR

Disk 0 is now the selected disk.

Partition 1 is now the selected partition.

DiskPart successfully set the partition ID.

Leaving DiskPart...

Full Classmate restoration complete. Press Enter to Reboot.
Press any key to continue . . .

When the Restoration is complete, press any key to reboot

Remove USB Drive

Remove the USB Flash Drive while the Classmate is rebooting.

Errors during Imaging Process

The screenshot shows a Windows Command Prompt window titled "Administrator: X:\windows\system32\cmd.exe – RestoreDS.cmd". The window contains the following text:

```
An error has occurred in processing the image:  
E:\E09_DRV_2013_251112.wim  
Your options are to try:  
1. Using same image on the existing USB Flash drive  
2. Reload the same image onto the USB Flash drive using RMPrepUSB  
3. Reload the same image onto a new USB Flash drive using RMPrepUSB  
4. Download a new image from the FTP site  
  
See the 2013 FRC Classmate Image Restoration Guide
```

If an error is detected during the imaging process, the following screen will appear. Note that the screenshot below shows the error screen for the Driver Station-only image for the E09. The specific image filename shown will vary depending on the image being applied.

The typical reason for the appearance of this message is due to an error with the USB device on which the image is stored. Each option is listed below with further details as to the actions you can take in pursuing a solution. Pressing any key once this error message is shown will return the user to the menu screen shown in Step 4 on page 10.

Option 1

Using same image on the existing USB Flash drive: To try this option, press any key to return to the main menu and select #1. This will run the imaging process again.

Option 2

Reload the same image onto the USB Flash drive using RMPrepUSB: It's possible the error message was displayed due to an error caused during the creation of the USB Flash drive (e.g. file copy error, data corruption, etc.) Press any key to return to the main menu and select #4 to safely shutdown the Classmate then follow the steps outlined starting on page 3 of this document to create a new USB Restoration Key using the same USB Flash drive.

Option 3

Reload the same image onto a new USB Flash drive using RMPrepUSB: The error message displayed may also be caused by an error with the USB Flash drive itself. Press any key to return to the main menu and select #4 to safely shutdown the Classmate. Select a new USB Flash drive and follow the steps outlined starting on page 3 of this document.

Option 4

Reload the same image onto a new USB Flash drive using RMPrepUSB: The error message displayed may also be caused by an error with the USB Flash drive itself. Press any key to return to the main menu and select #4 to safely shutdown the Classmate. Select a new USB Flash drive and follow the steps outlined starting on page 3 of this document.

No WiFi Driver on E11 w/250GB hard drive

The two E11 images posted for download work without issue on the E11 Classmates included in the Kit of Parts during the 2011 FRC season. This model E11 includes a 160GB hard drive.

Teams who received an E11 in the 2012 Kit of Parts or who opted to purchase an E11 Classmate directly from CTL during 2012 received a model with a 250GB hard drive. The images posted on Intel's website will install to this model E11 without any errors during the process, but will not have the necessary driver for WiFi communication installed. The wireless chipset included in the E11 w/ 250GB hard drive is different enough that the software driver isn't compatible with the one included for the E11 w/160GB hard drive.

Teams wishing to use a WiFi connection on the E11 w/250GB hard drive can download the necessary driver from *FIRST* using the link below.

http://www.usfirst.org/sites/default/files/uploadedFiles/Robotics_Programs/FRC/Game_and_Season_Info/2013/WiFi_Driver_E11_250GB_HDD.zip

Installing the Driver

To install the driver:

1. Copy the WiFi_Driver_E11_250GB_HDD.zip to the Desktop of the E11 Classmate.
2. Extract the files (Right-click->Extract All...)
3. Open the folder and execute Setup.exe
4. Follow the prompts to complete the installation; a reboot is necessary upon completion of the install.

Using the Classmate with your cRIO

This document details the basics of connecting your Classmate Computer to a cRIO.

Hardware Setup



Plug the following devices into your Classmate:

1. Joysticks
2. cRIO using an Ethernet cable

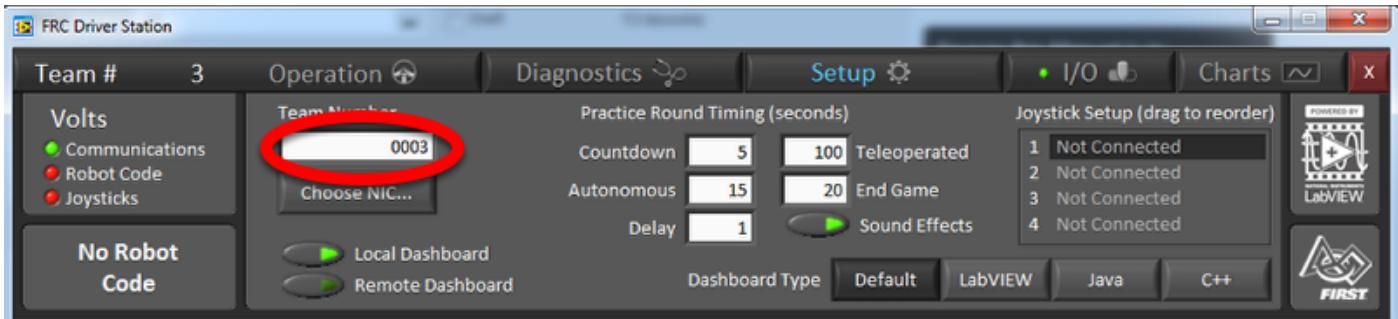
Classmate Login

Power on the Classmate PC and log in to the Driver Account.

Power on the cRIO

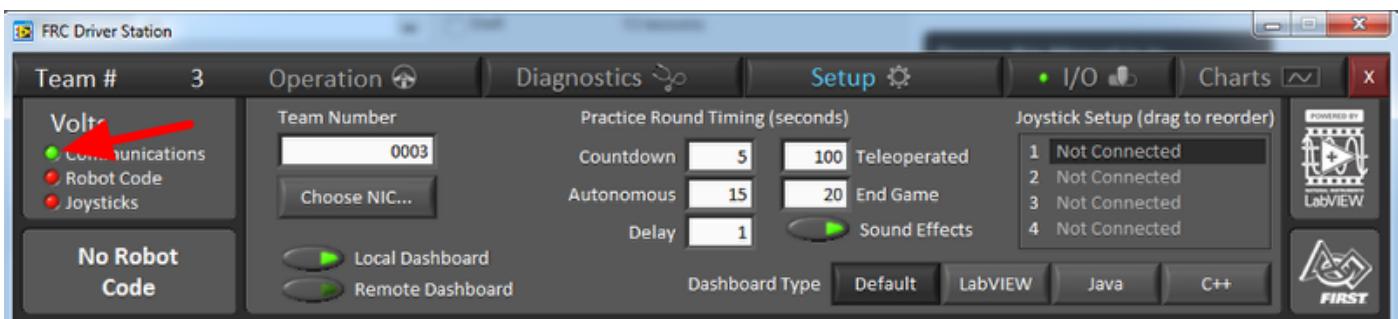
Turn on your cRIO using the 120A main circuit breaker. Make sure that the Analog Breakout Board is attached to the 9201 module in slot 1 of your cRIO and that it has the jumper installed for battery voltage tracking.

Set your Team Number in the DS



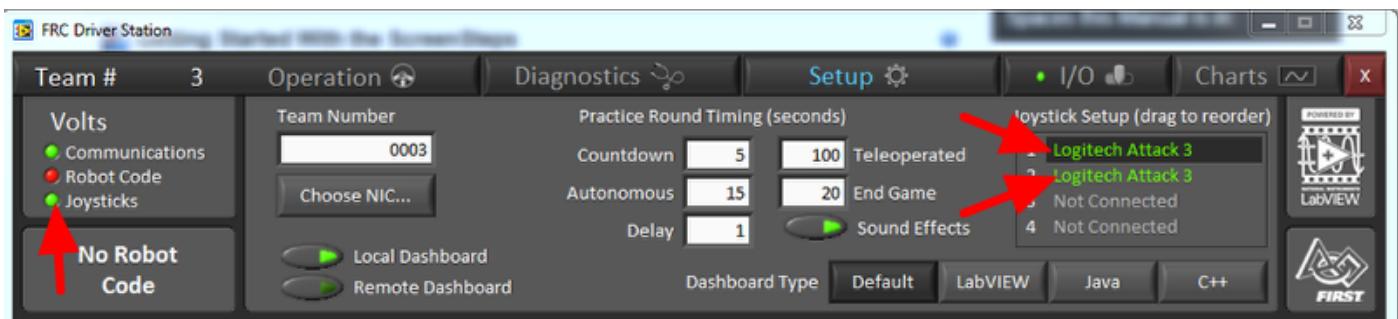
Click on the Set up Tab and enter your team number in the field provided and Tab out of the field. We've used team number 3 for this example.

Confirm Communication



On the left side of the Driver Station window, check the status indicators to confirm that the Classmate has communication with the cRIO (meaning that IP addresses are set and the cRIO has been imaged). This will be indicated with a green light next to Communications.

Confirm Joysticks are Recognized



In the Setup Tab, confirm that the Driver Station recognizes your joysticks. Joysticks should be listed in green. You should also see the Joysticks indicator in the left pane turn green.

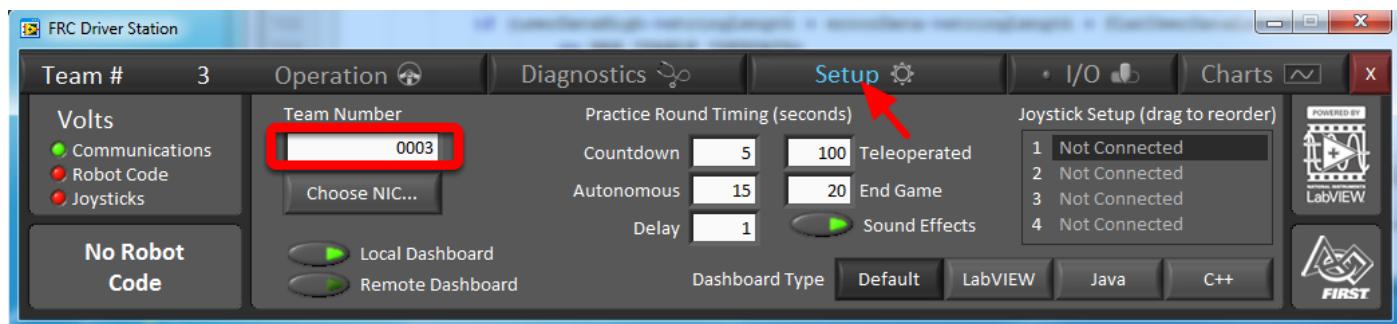
Writing and Loading a Program

To begin programming teams need to install the software update for the appropriate language. Teams should proceed to the install instructions for the appropriate language, [C++ \(Start with the section titled C++ WPILib Workbench Update\)](#), [Java \(Start with Setting the internet plugin location in NetBeans or Set the local path to the downloaded plugins for pre-downloaded encrypted plugins\)](#), [LabVIEW \(Start with Installing the LabVIEW Update\)](#). Teams can continue on from the end of those documents to the documents describing how to write and load their first program.

FRC Driver Station Software

The Driver Station software has had a number of improvements made for 2013 to assist teams in debugging the operation of their robot. This document details the operation of the FRC Driver Station software and explains the purpose and function of the controls and indicators it contains.

Setting Up the Driver Station



For information on installing the Driver Station software see [this document](#). Typically the Driver Station will set the appropriate settings automatically, but if you do have to set the network settings manually, the DS should use the following settings:

- IP: 10.XX.YY.05 (wired interface) or 10.XX.YY.09 (wireless) where XXYY is your 4 digit FRC team number
- Subnet Mask: 255.0.0.0

The DS must be set to your team number in order to connect to your robot. In order to do this click the **Setup** tab then enter your team number in the team number box. Press return or click outside the box for the setting to take effect,

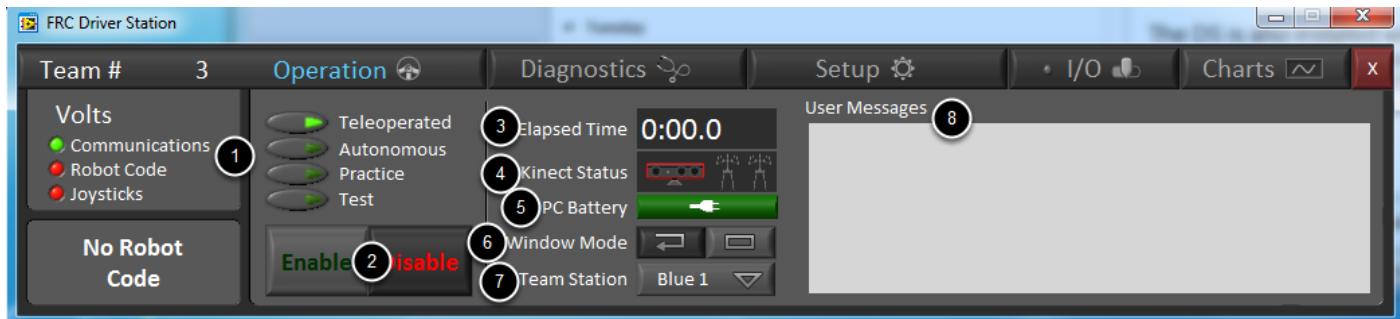
Status Pane



The Status Pane of the Driver Station is located on the left side of the display and is always visible regardless of the tab selected. It displays a selection of critical information about the state of the DS and robot:

1. Team # - The Team number the DS is currently configured for. This should match your FRC team number, to change the number see the Setup Tab.
2. Battery Voltage - If the DS is connected and communicating with a cRIO with a properly wired 9201 and Analog Breakout, this reports the current robot battery voltage
3. Major Status Indicators - These three indicators display major status items for the DS. The "Communications" indicates whether the DS is currently communicating with the FRC Network Communications Task on the cRIO. The "Robot Code" indicator shows whether the team Robot Code is currently running (determined by whether or not the Driver Station Task in the robot code is updating the battery voltage), The "Joysticks" indicator shows if at least one joystick is plugged in and recognized by the DS.
4. Status String - The Status String provides an overall status message indicating the state of the robot, some examples are "No Robot Communication", "No Robot Code", "Emergency Stopped", and "Teleoperated Enabled"

Operation Tab

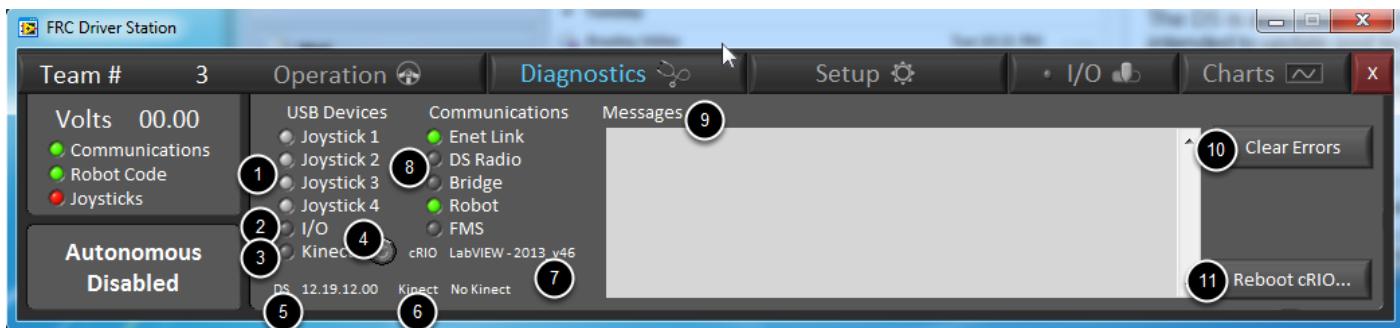


The Operations Tab is used to control the mode of the robot and provide additional key status indicators while the robot is running.

1. Robot Mode - This section controls the Robot Mode. Practice Mode causes the robot to cycle through the same transitions as an FRC match after the Enable button is pressed (timing for practice mode can be found on the setup tab).
2. Enable/Disable - These controls enable and disable the robot. You can also use the F1 key to enable the robot and the Enter key to Disable the robot.
3. Elapsed Time - Indicates the amount of time the robot has been enabled
4. Kinect Status - Indicates the Status of the Kinect device and number of detected skeletons
5. PC Battery - Indicates current state of DS PC battery and whether the PC is plugged in
6. Window Mode - When not on the Driver account on the Classmate allows the user to toggle between floating (arrow) and docked (rectangle)
7. Team Station - When not connected to FMS, sets the team station to transmit to the robot.
8. User Messages - Displays User Messages sent from the robot using the Driver Station LCD Classes/VIs

Note: When connected to the Field Management System the controls in sections 1, and 2 will be replaced by the words FMS Connected and the control in Section 7 will be greyed out.

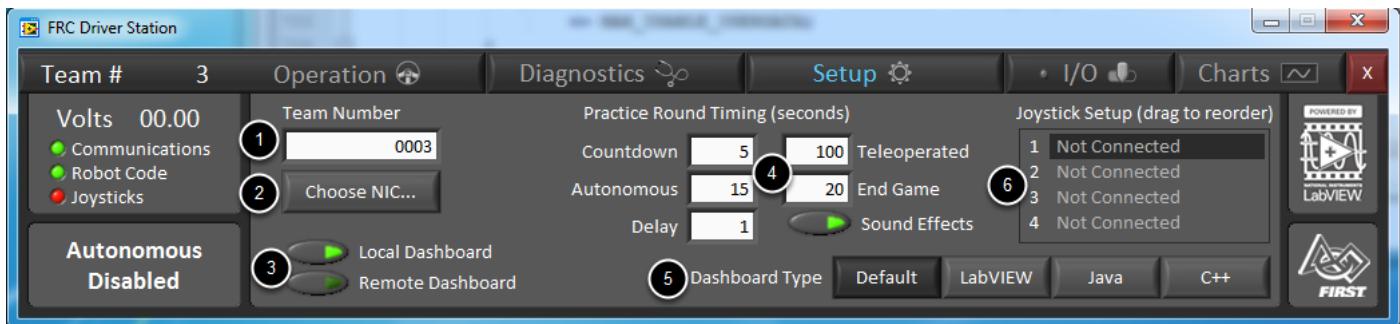
Diagnostics Tab



The Diagnostics Tab contains additional status indicators that teams can use to diagnose issues with their robot:

1. Joystick connection indicators - Green if the joystick is connected.
2. I/O Connection - Indicates if the Cypress I/O board is connected.
3. Kinect - Indicates if the Kinect is connected. Red if no Kinect Server is connected or if Kinect is plugged in, but not working. Grey if a Kinect Server is running but the Kinect is not connected.
4. Restart Kinect Server - Terminates and restarts the FRC Kinect Server if installed
5. DS Version - Indicates the Driver Station Version number
6. Kinect Status String - Detailed indication of Kinect Status (version number if working, status if not e.g. "No Power", "In Use")
7. cRIO Image Version and Language - String indicating the version of the cRIO Image and the configured language.
8. Connection Indicators - Indicate connection status to various components. "Enet Link" indicates the computer has something connected to the ethernet port. "DS Radio" is a legacy indicator used to indicate the ping status to an external radio on the DS side at 10.XX.YY.4. "Bridge" indicates the ping status to the robot wireless bridge at 10.XX.YY.1. "Robot" indicates the ping status to the cRIO at 10.XX.YY.2. "FMS" indicates if the DS is receiving packets from FMS (this is NOT a ping indicator).
9. Messages - This box contains diagnostic warning/error message produced by the Driver Station. Teams will notice many more messages appearing here than in previous years. This is due to many additional warning messages added to the DS in order to help teams diagnose exactly what is going on if they have issues with their robot.
10. Clear Errors - This button clears the Messages box.
11. Reboot cRIO - This button attempts to perform a remote reboot of the cRIO (after clicking through a confirmation dialog)

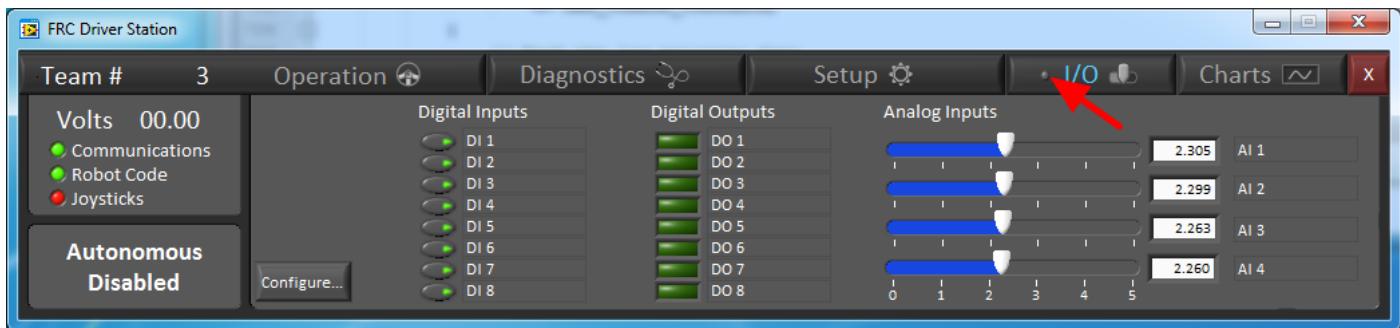
Setup Tab



The Setup Tab contains a number of buttons teams can use to control the operation of the Driver Station:

1. Team Number - Should contain your FRC Team Number. This controls the IP that the DS attempts to set your computer to as well as the IP it expects the robot to be at.
2. Choose NIC button - Brings up the "Choose NIC" dialog which can be used to set which network interfaces the DS will attempt to automatically configure.
3. Dashboard Location Controls - Chooses where to forward the Dashboard information, local dashboard is for a dashboard located on the same machine. Remote Dashboard is used to forward the dashboard information to another PC, clicking this option will create a box to enter the IP of the remote machine.
4. Practice Mode Timing - These boxes control the timing of each portion of the practice mode sequence. When the robot is enabled in practice mode the DS automatically proceeds through the modes indicated from top left down to bottom left then up to top right and down.
5. Dashboard Type - Controls what Dashboard is launched by the Driver Station. **Default** launches the file pointed to by the "FRC DS Data Storage.ini" file, by default this is Dashboard.exe in the Program Files\FRC Dashboard folder. **LabVIEW** attempts to launch a dashboard at the default location for a custom built LabVIEW dashboard, but will fall back to the default if no dashboard is found. **Java** and **C++** launch the SmartDashboard included with the language update for that language. To use the SmartDashboard with camera extension leave the option set to Default and see the SmartDashboard section of the documentation.
6. Joystick Setup - All connected and recognized joysticks will be displayed in this box. Currently enabled joysticks will be displayed in green. Pressing any button on the joystick should turn the display teal and show asterisks next to the device name (***) . Click and drag any device name to reorder to the devices, the order and numbering shown here will match the way the device should be accessed in the robot code. Disconnecting a joystick will disable the robot. If connected to FMS, the robot will not be disabled and the joystick will not be automatically detected if it is reconnected, press the F1 key to force a refresh.

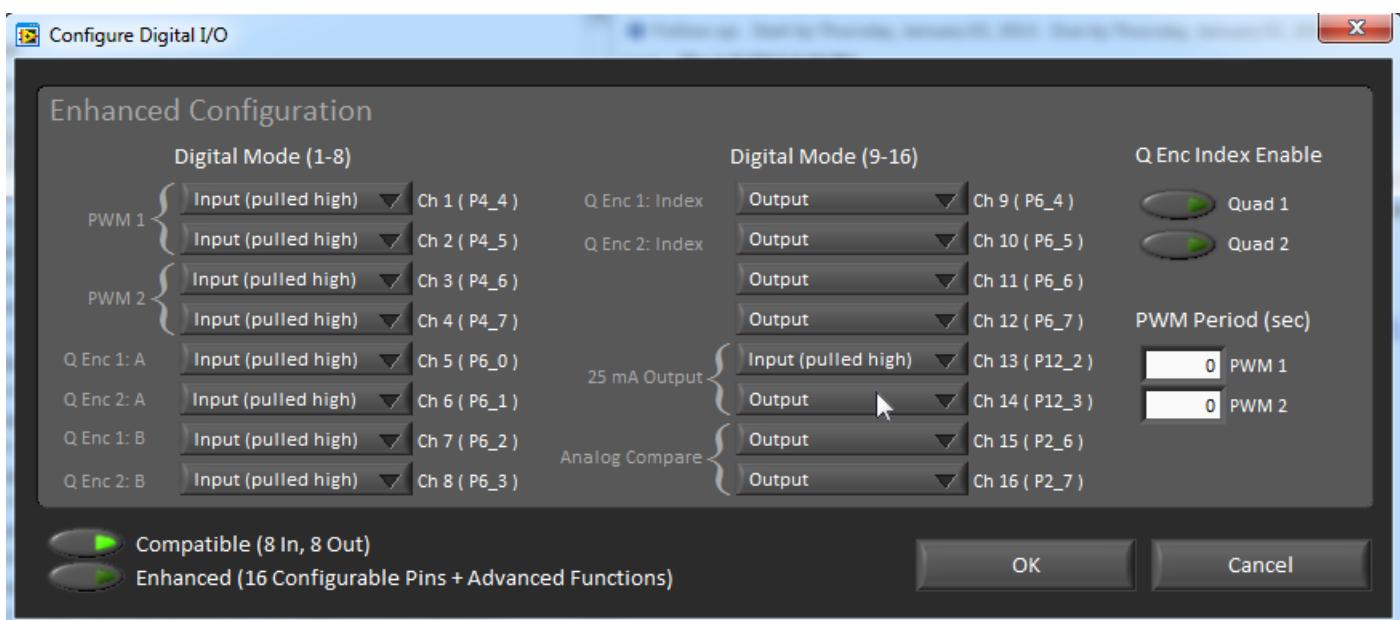
I/O Tab - Compatible Mode



The I/O Tab can be used with the Cypress FirstTouch I/O board, or if the Cypress board is not used, can be used as a virtual I/O Panel. If the Cypress board is connected and functioning the indicator on the I/O tab will be green. If the Cypress board is being used, the state of all objects on this panel will be controlled by the state of the board. If the Cypress board is not being used, the Digital and Analog Input controls can be used with the computer mouse. These controls will send data in the same way as the Cypress Board in Compatible mode and can be read on the robot.

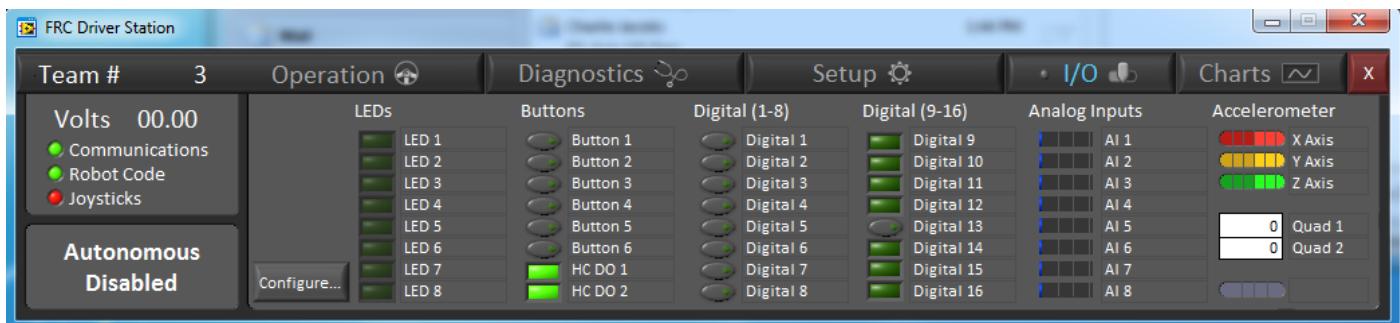
Clicking the Configure button will bring up the Configuration dialog.

I/O Tab - Configuration Dialog



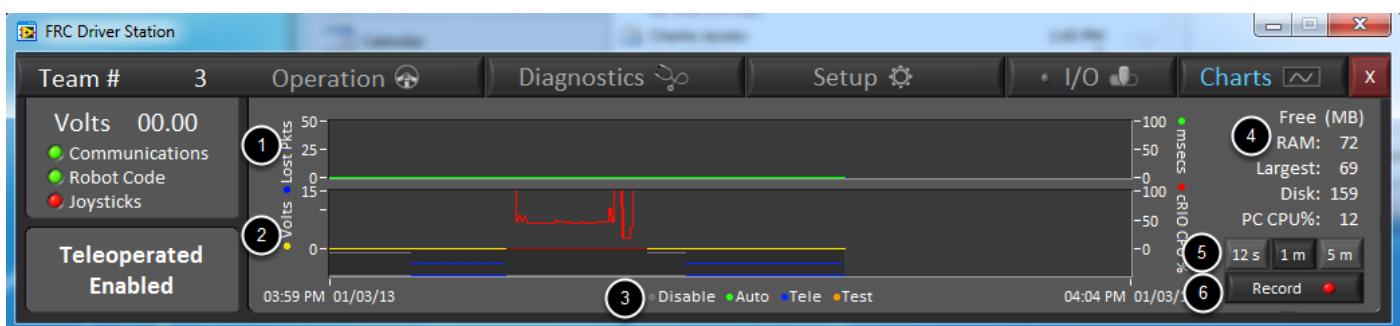
The Configure Digital I/O Dialog is used to configure the mode of the Cypress board (Compatible or Enhanced) and, if using Enhanced mode, to configure the function of each pin and the behavior of the quadrature encoder input and PWM output if used. Teams should take care to set the configuration of the Enhanced I/O in the robot code, or on the DS, but not both.

I/O Tab - Enhanced Mode



When in Enhanced Mode, the I/O tab shows additional indicators for the various Cypress Board functions. The DS I/O tab cannot be used as a virtual I/O panel in Enhanced Mode.

Charts Tab



The Charts tab plots and displays advanced indicators of robot status to help teams diagnose robot issues:

1. The top graph charts trip time in milliseconds in green (against the axis on the right) and lost packets per second in blue (against the axis on the left)
2. The bottom graph plots battery voltage in yellow (against the axis on the left, note that this example is reporting a battery voltage of 0), cRIO CPU in red (note that in the Kickoff release the cRIO CPU is plotted against the Voltage scale resulting in the CPU frequently going off scale, for proper display view the log using the Driver Station Log File Viewer), DS Requested mode as a continuous line on the bottom of the chart and robot mode as a discontinuous line above it.
3. This key shows the colors used for the DS Requested and Robot Reported modes in the bottom chart.
4. Realtime RAM/Disk/CPU indicators - These indicators show the cRIO available RAM, largest free RAM block and free disk space and the PC CPU% in real time. Note that the RAM and Disk indicators retain their value when the robot is disconnected so if a disconnect occurs and the RAM indicator says 0 it is likely that the robot ran out of free memory.
5. Chart scale - These controls change the time scale of the DS Charts
6. This button controls whether the chart data is recorded to a log file. Note that this control will default to on each time the DS is started as the DS log is a very helpful tool to have to diagnose robot issues after the fact.

Driver Station Keys

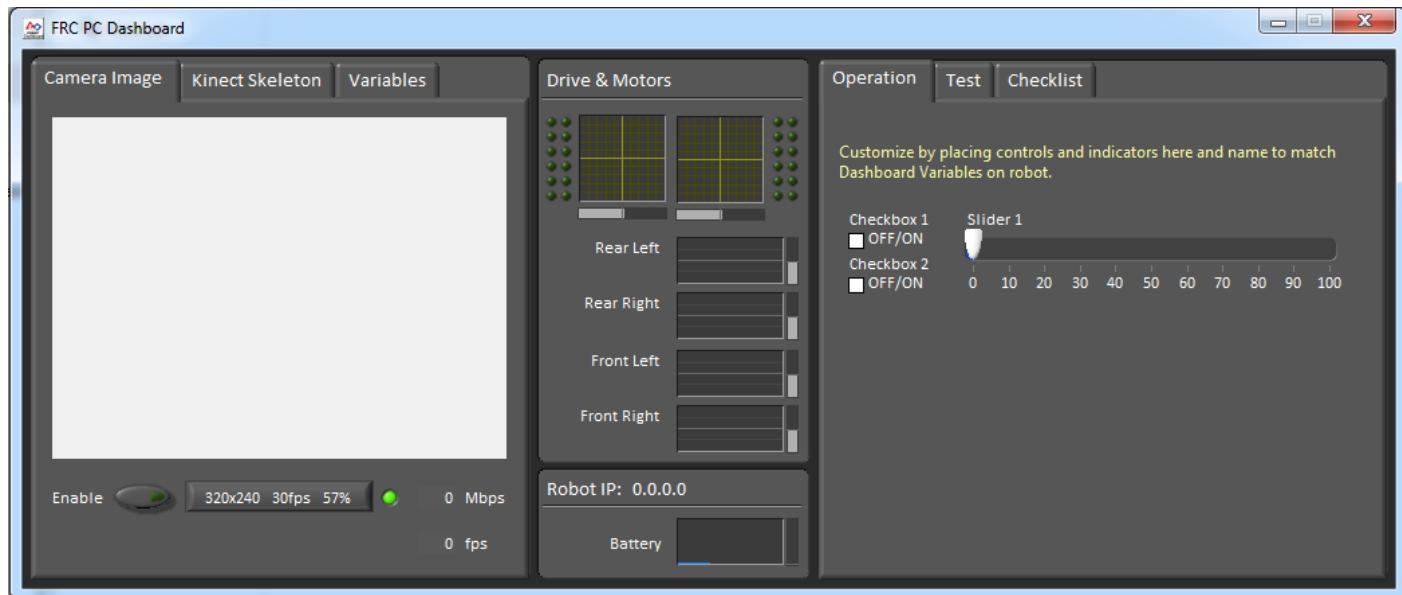
The following keys can be used to control Driver Station operation:

- F1 - Enable the robot. If the robot is enabled, force a Joystick refresh.
- Enter - Disable the Robot
- Space - Emergency Stop the robot. After an emergency stop is triggered the cRIO will need to be rebooted before the robot can be enabled again.

FRC Driver Station LabVIEW Dashboard

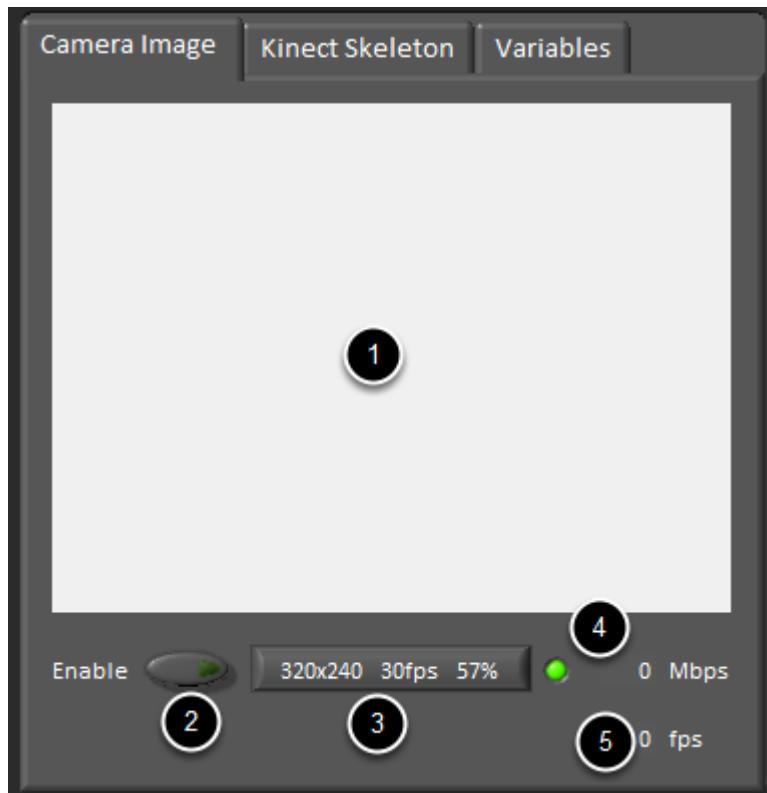
The Dashboard application installed and launched by the FRC Driver Station is a LabVIEW program designed to provide teams with basic feedback from their robot, with the ability to expand and customize the information to suit their needs. This Dashboard application has been re-written this year to use Network Tables and provide additional tools that may be useful to teams.

LabVIEW Dashboard



The Dashboard is broken into three main sections. The left pane contains tabs for displaying a camera image, Kinect skeleton or raw view of the Network Tables variables. The center tab displays joystick and motor information if using the default LabVIEW framework and also displays the robot IP and a chart of the battery voltage. The right pane contains an operation tab that contains example controls and indicators for teams using the LabVIEW framework, a test tab for use with Test Mode in the LabVIEW framework, and a Checklist tab that can be used to create task lists to complete before and/or between matches.

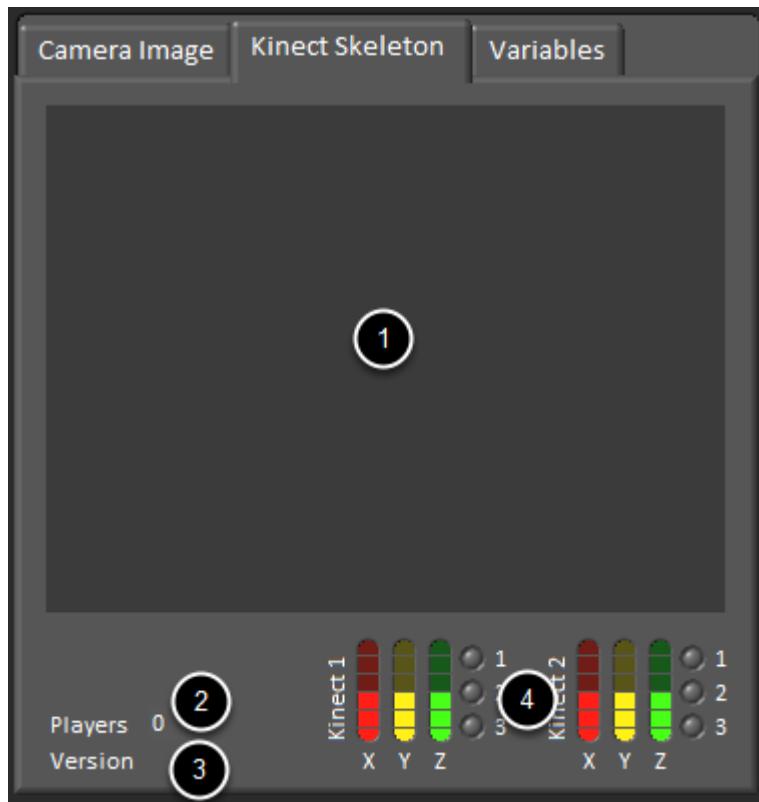
Camera Image



The Camera Image tab of the left pane is used to display a video feed from an Axis camera located on the robot. For instructions on setting up the Axis Camera to work with this display [see here](#).

1. Camera Image Display
2. Enable - Clicking this button toggles the display of the camera image between enabled and disabled
3. Camera Settings - This control allows you to change the resolution, framerate and compression of the image stream to the dashboard, click the control to pop-up the configuration.
4. Bandwidth Indicator - Indicates approximate bandwidth usage of the image stream. The indicator will display green for "safe" bandwidth usage, yellow when teams should use caution and red if the stream bandwidth is beyond levels that will work on the competition field.
5. Framerate - Indicates the approximate received framerate of the image stream.

Kinect Skeleton



The Kinect Skeleton Tab provides feedback if using the Microsoft Kinect and FRC Kinect Server:

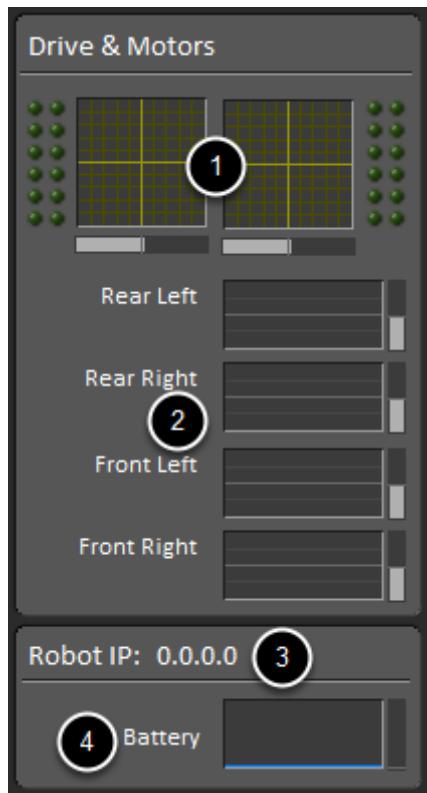
1. Display - If a skeleton is being tracked, a green stick figure representation will be shown here.
2. Players - The number of players currently being tracked is shown here
3. Version - The version of the FRC Kinect Server is displayed here
4. Kinect Sticks - The values of the X,Y, and Z axes and the first three buttons for each of the Kinect pseudo-joysticks is shown here

Variables

Variable Name	Value	Type
SmartDashboard		
Boolean	True	Bool
Checkbox 1	False	Bool
Checkbox 2	False	Bool
Number 1	57.000	Numeric
Number 2	99.897	Numeric
Slider 1	0.000	Numeric
String	Test String	String
Usage		
Client		
192.168.61.106		
Count	0.000	Numeric
KBytes Transf	0.000	Numeric
Kbps	0.000	Numeric
Reads	160.000	Numeric
ReadsPS	-533.333	Numeric
Updates	0.000	Numeric
UpdatesPS	0.000	Numeric
Writes	0.000	Numeric
WritesPS	-30.000	Numeric

The Variables tab of the left pane shows all Network Tables variables in a tree display. The Variable Name (Key), Value and data type are shown for each variable. Information about the Network Tables bandwidth usage is also displayed in this tab.

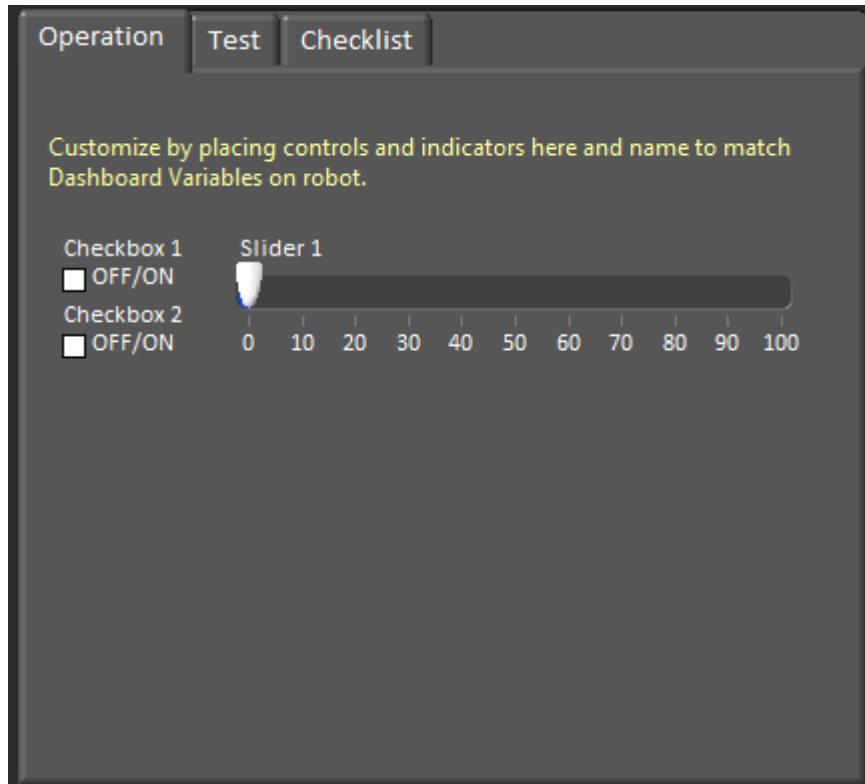
Center Pane: Drive and Motors



The center pane contains a section that provides feedback on the joysticks and drive commands when used with the LabVIEW framework and a section that displays the robot IP and reported battery voltage:

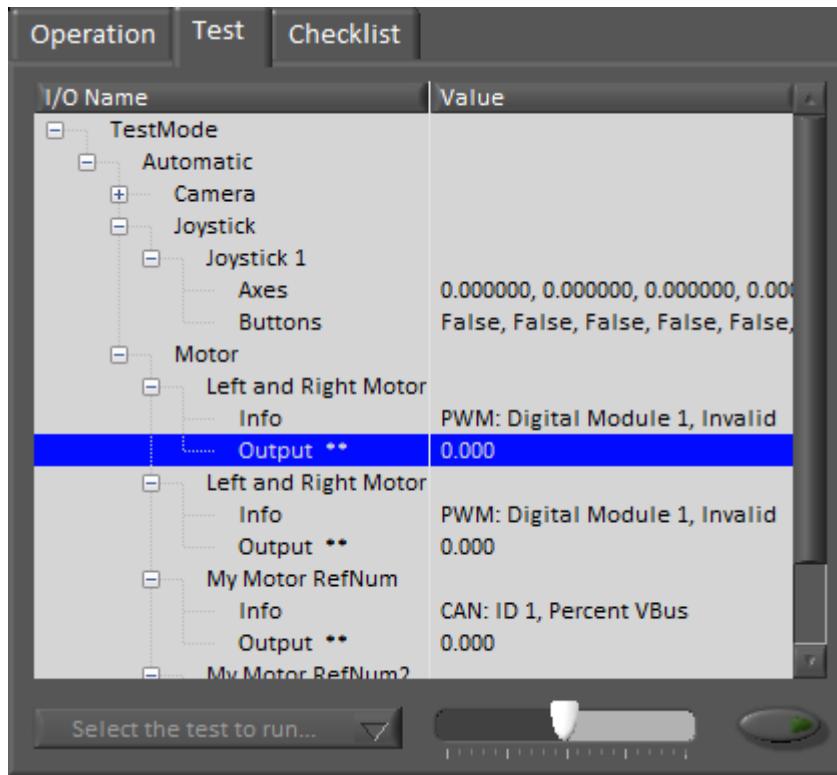
1. Displays X,Y and Throttle information and button values for up to 2 joysticks when using the LabVIEW framework
2. Displays values being sent to motor controllers when using LabVIEW framework
3. Displays the IP address of the robot
4. Displays a brief chart of the reported battery voltage

Operation



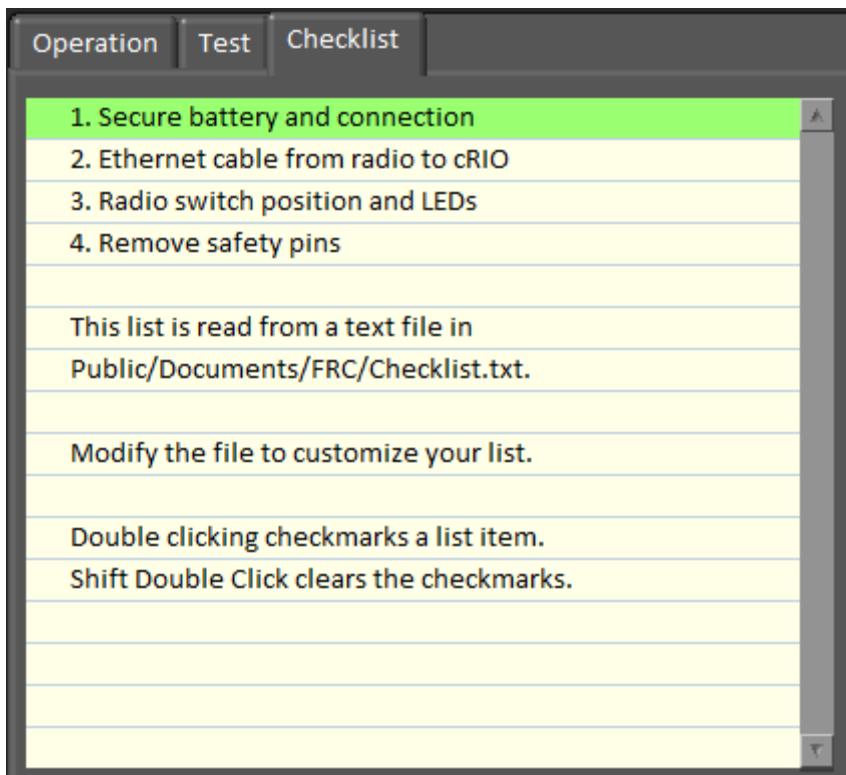
The operation tab contains sample controls and indicators that demo the operation of the new SmartDashboard VIs in LabVIEW. Note that these controls and indicators can also be interfaced with from Java or C++ simply by using the appropriate SmartDashboard datatype and key name.

Test



The Test tab is for use with the new Test mode for teams using LabVIEW (Java and C++ teams should use the Java SmartDashboard when using Test Mode). For many items in the libraries, Input/Output info will be populated here automatically. All items which have ** next to them are outputs that can be controlled by the dashboard. To control an output, click on it to select it, drag the slider to set the value then press and hold the green button to enable the output. As soon as the green button is released, the output will be disabled. This tab can also be used to run and monitor tests on the robot. An example test is provided in the LabVIEW framework. Selecting this test from the dropdown box will show the status of the test in place of the slider and enable controls.

Checklist



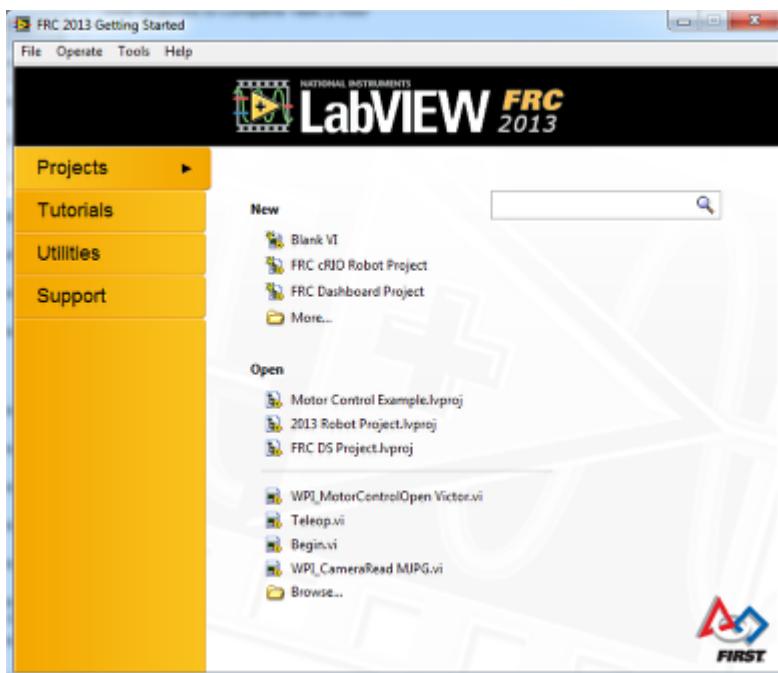
The Checklist tab can be used by teams to create a list of tasks to perform before or between matches. Instructions for using the Checklist tab are pre-populated in the default checklist file.

2013 Control System Software

2013 FRC Software Component Overview

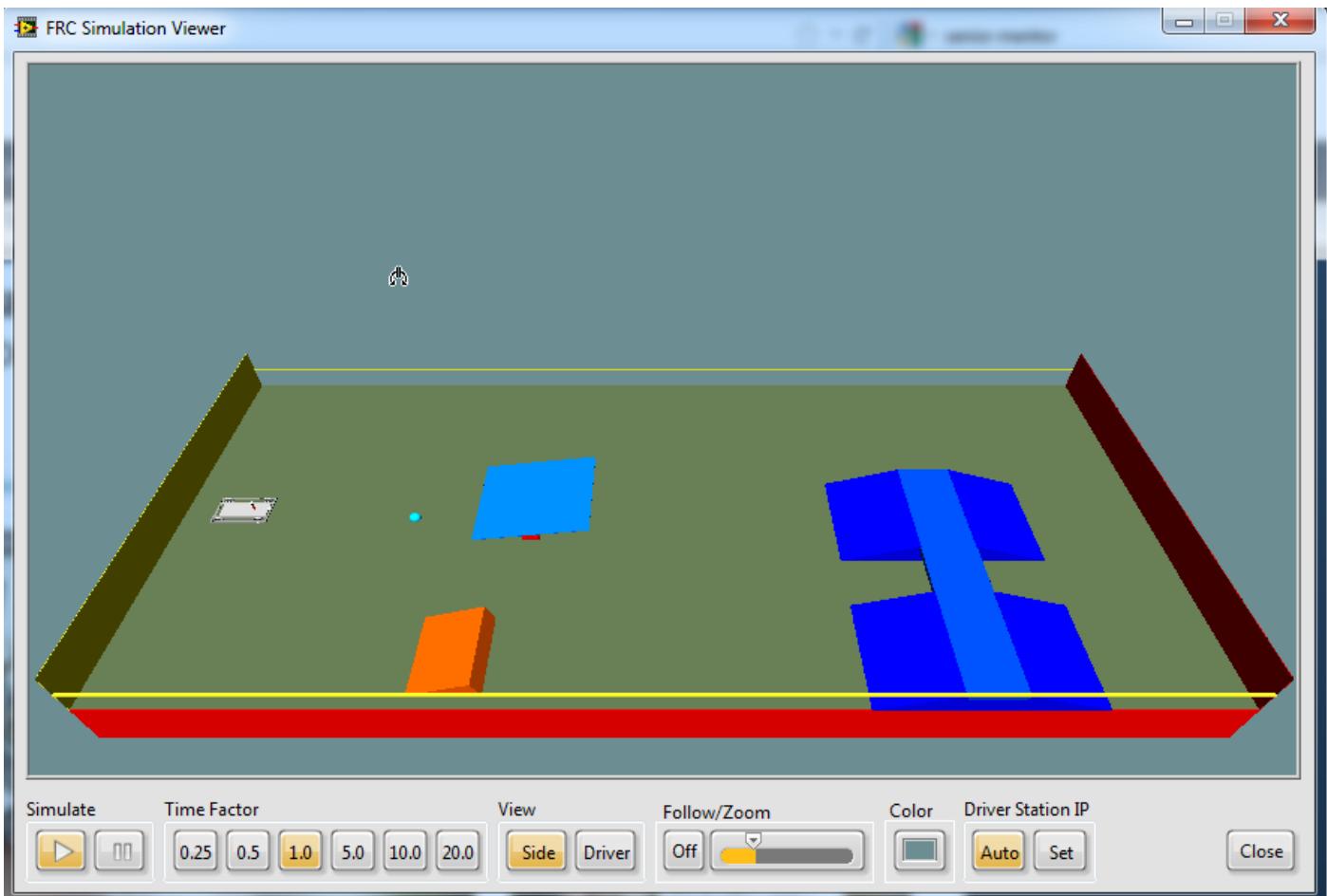
The 2013 FRC Control System consists of a wide variety of mandatory and optional software components designed to assist you in the design, development and debugging of your robot code, control robot operation, and provide feedback to assist with troubleshooting. For each software component this document will provide a brief overview of its purpose, a link to the package download if appropriate, and a link to further documentation where available.

LabVIEW FRC 2013



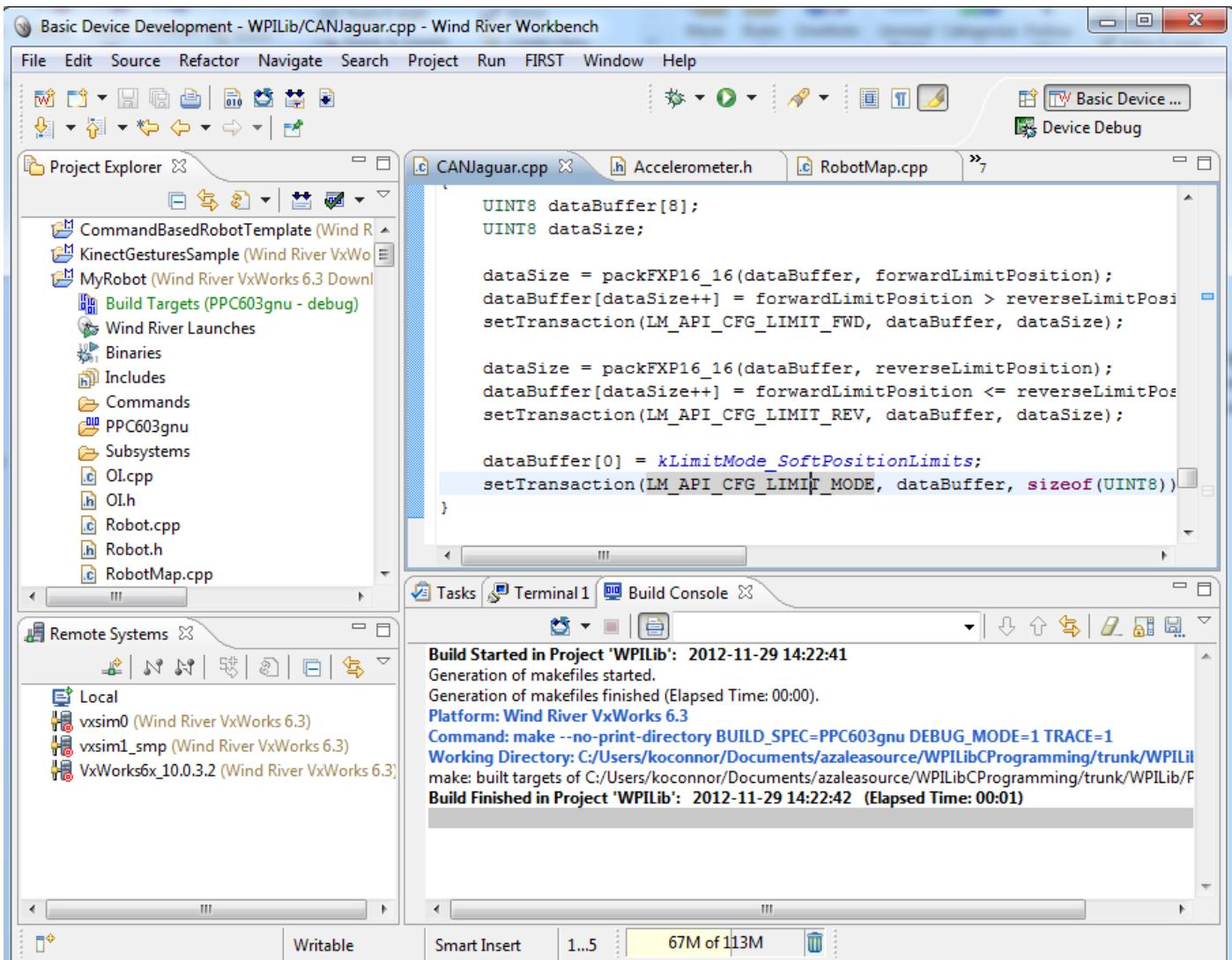
LabVIEW FRC 2013, based on National Instruments' LabVIEW 2012, is the development environment for LabVIEW, one of the three officially supported languages for programming an FRC Robot in 2013. LabVIEW is a graphical, dataflow-driven language. LabVIEW programs consist of a collection of icons, called VIs, wired together with wires which pass data between the VIs. The LabVIEW FRC 2013 installer is distributed on a DVD found in the Kickoff Kit of Parts and is not available for download, the language specific update can be found [here](#). A guide to getting started with the LabVIEW FRC 2013 software, including installation instructions can be found [here](#).

FRC Robot Simulator



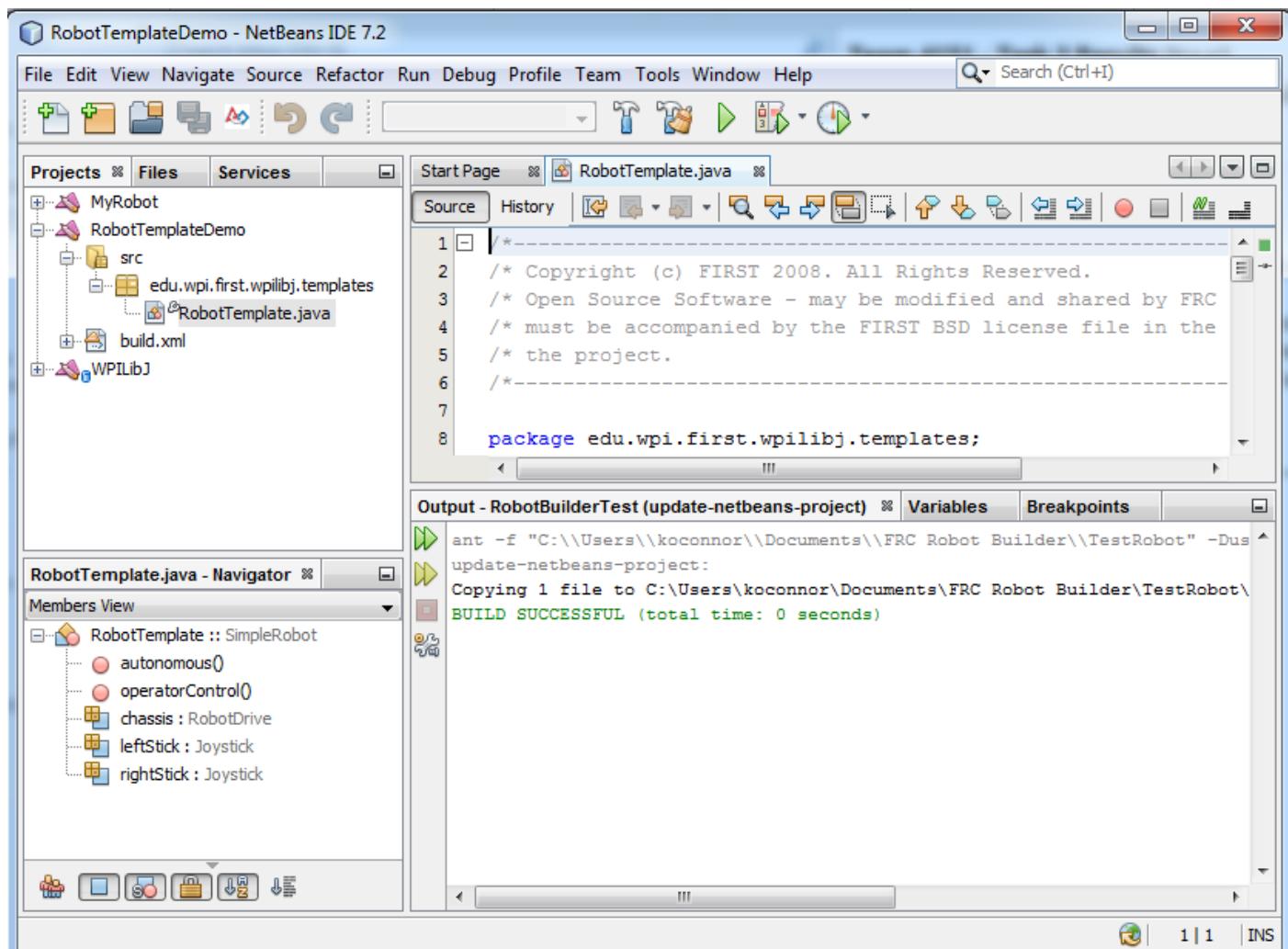
The FRC Robot Simulator is a component of the LabVIEW programming environment that allows you to operate a predefined robot in a simulated environment to test code and/or Driver Station functions. It utilizes a LabVIEW code project as the robot code and communicates with the FRC Driver Station for robot control and the FRC Default Dashboard for robot feedback. The FRC Robot Simulator is installed with LabVIEW FRC 2013. The LabVIEW FRC 2013 installer is distributed on a DVD found in the Kickoff Kit of Parts and is not available for download, the language specific update can be found [here](#). Information on using the FRC Robot Simulator can be found by opening the Robot Simulation Readme.html file in the LabVIEW Project Explorer.

Wind River Workbench



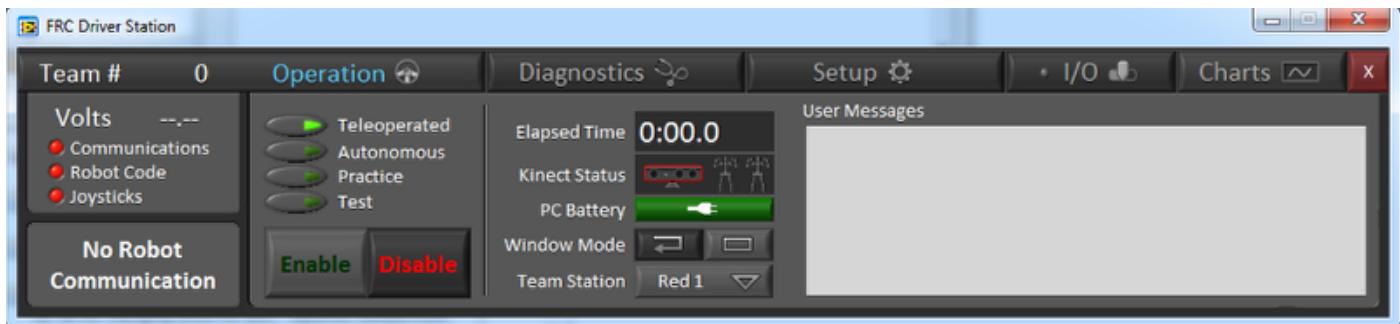
Wind River Workbench is the supported development environment for C++, one of the three supported languages used for programming an FRC robot in 2013. C++ is an object-oriented text based programming language. A program in C++ (for FRC) consists of a number of header (.h) and implementation (.cpp) files. The Wind River Workbench installer is distributed on two DVDs found in the Kickoff Kit of Parts and is not available for download, the C++ Workbench Update can be found [here](#). A guide to getting started with C++ for FRC, including installation of Wind River Workbench, can be found here.

Netbeans



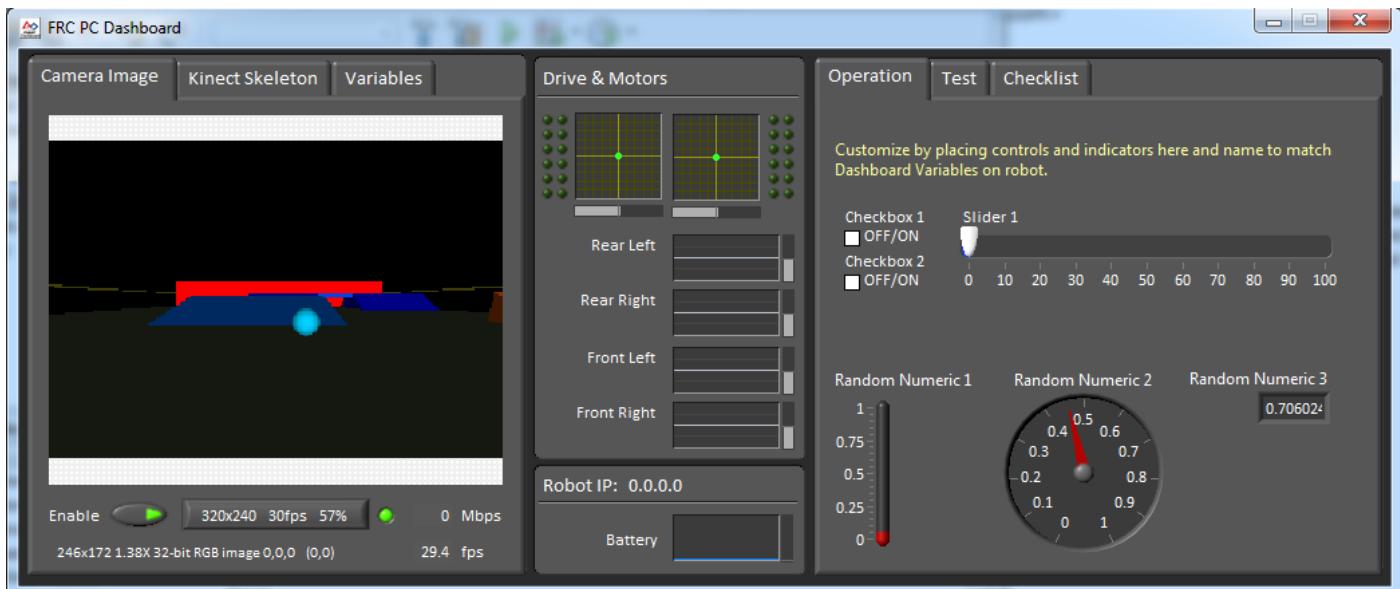
Netbeans is the primary supported development environment for Java, one of the three supported languages used for programming an FRC robot in 2013. Java is an object-oriented text base programming language. A program in Java (for FRC) consists of one or more .java files contained in one or more packages. The Netbeans IDE can be downloaded [here](#). It is recommended to install the language specific updates through Netbeans in order to be automatically notified of updates, if manual installation must be used, the plugins can be found [here](#). A guide to getting started with Java for FRC, including the installation and configuration of Netbeans can be found [here](#).

FRC Driver Station



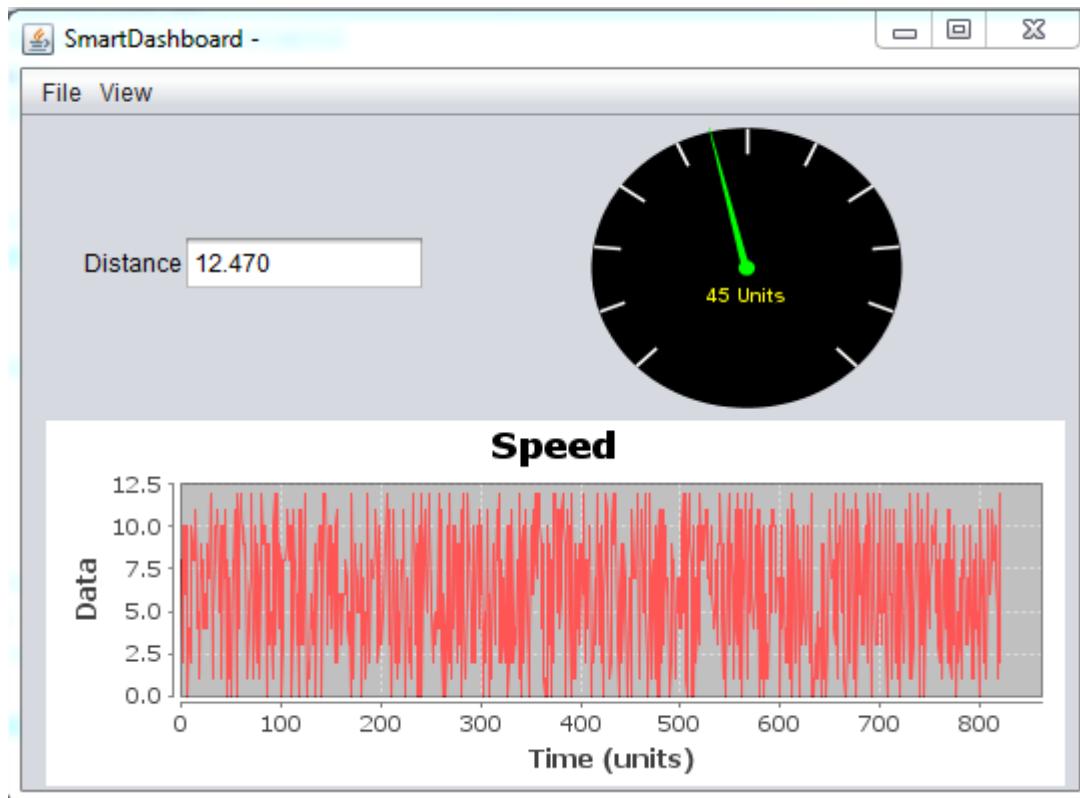
The FRC Driver Station software is the only software allowed to be used for the purpose of controlling the state of the robot during competition. This software contains the code necessary to send data to your robot from a variety of input devices such as joysticks, gamepads, the Cypress FIRSTTouch IO Board, and the Microsoft Kinect. It also contains a number of tools used to help troubleshoot robot issues such as status indicators and log file creation. The FRC Driver Station is included in the FRC Driver Station Update found [here](#), however it also requires the installation of support files from the LabVIEW DVD included in the Kickoff Kit (all 3 options on the DVD include the Driver Station support files). More information about the FRC Driver Station software can be found [here](#).

FRC LabVIEW Dashboard



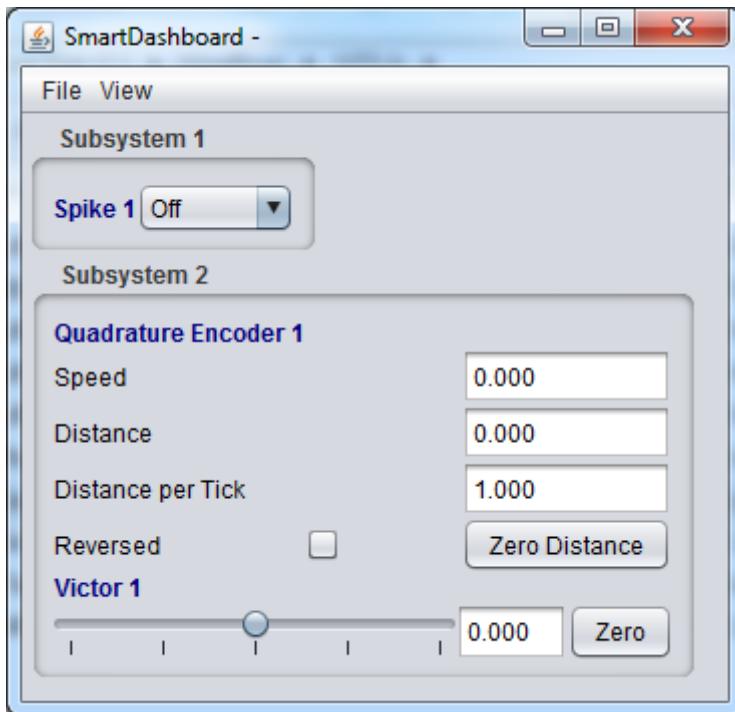
The FRC LabVIEW Dashboard is the default dashboard program installed with, and automatically launched by, the FRC Driver Station. The purpose of the Dashboard is to provide feedback about the operation of the robot. The FRC Default Dashboard serves as an example of the types of feedback teams may want from their robot. It includes a tabbed display that can switch between viewing an image from a camera on the robot, a Kinect skeleton or a display of NetworkTables variables, a display of information regarding the joysticks and drive motors, an indicator of the robot IP and battery voltage, and a second tabbed display that can switch between examples of custom indicators and controls, a test tab for use with the Driver Station Test Mode and a Checklist tab that teams can use to enter a custom checklist to complete before each match. The FRC Default Dashboard is included in the FRC Driver Station Update found [here](#), however it also requires the installation of support files from the LabVIEW DVD included in the Kickoff Kit (all 3 options on the DVD include the Driver Station support files). More information about the FRC Default Dashboard software can be found [here](#).

SmartDashboard



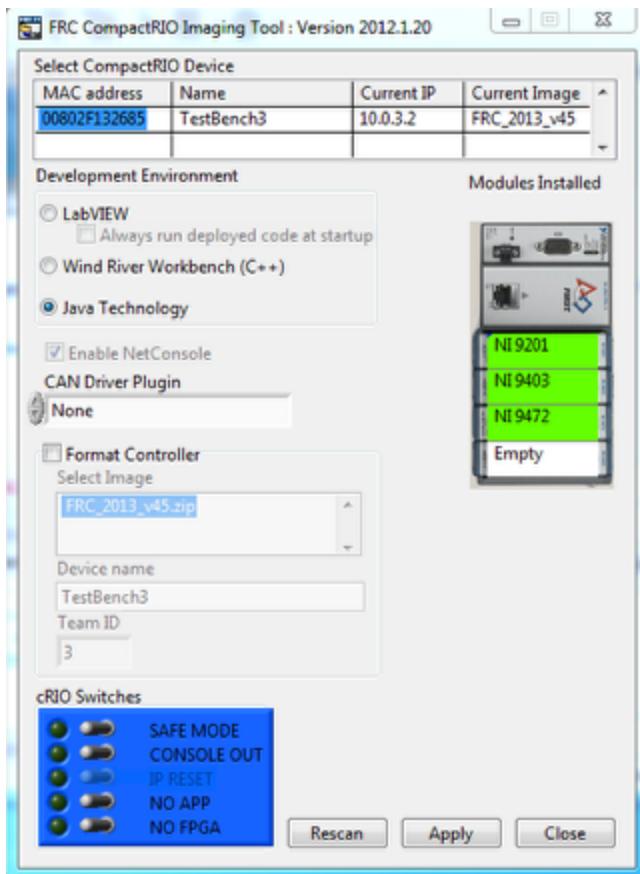
The SmartDashboard is an alternate dashboard application written in Java. The SmartDashboard automatically creates a widget for each variable sent from the Robot sent using the SmartDashboard class or VIs. These widgets can be configured to a number of preset display types, or users can create custom extensions in Java. Vision extensions are available for the SmartDashboard which allow it to display images from the Axis camera on the robot. The SmartDashboard is included in the [C++ and Java](#) language updates (enabled by clicking the C++ or Java buttons respectively on the Setup tab of the Driver Station). The Vision extensions and a standalone installer for the SmartDashboard (for use by LabVIEW teams or installing on a DS without the C++ or Java programming environments) can be found [here](#). Note that teams may need to install the Java Runtime Environment to use the SmartDashboard on computers not set up for Java programming. Additional documentation on the SmartDashboard can be found [here](#).

LiveWindow



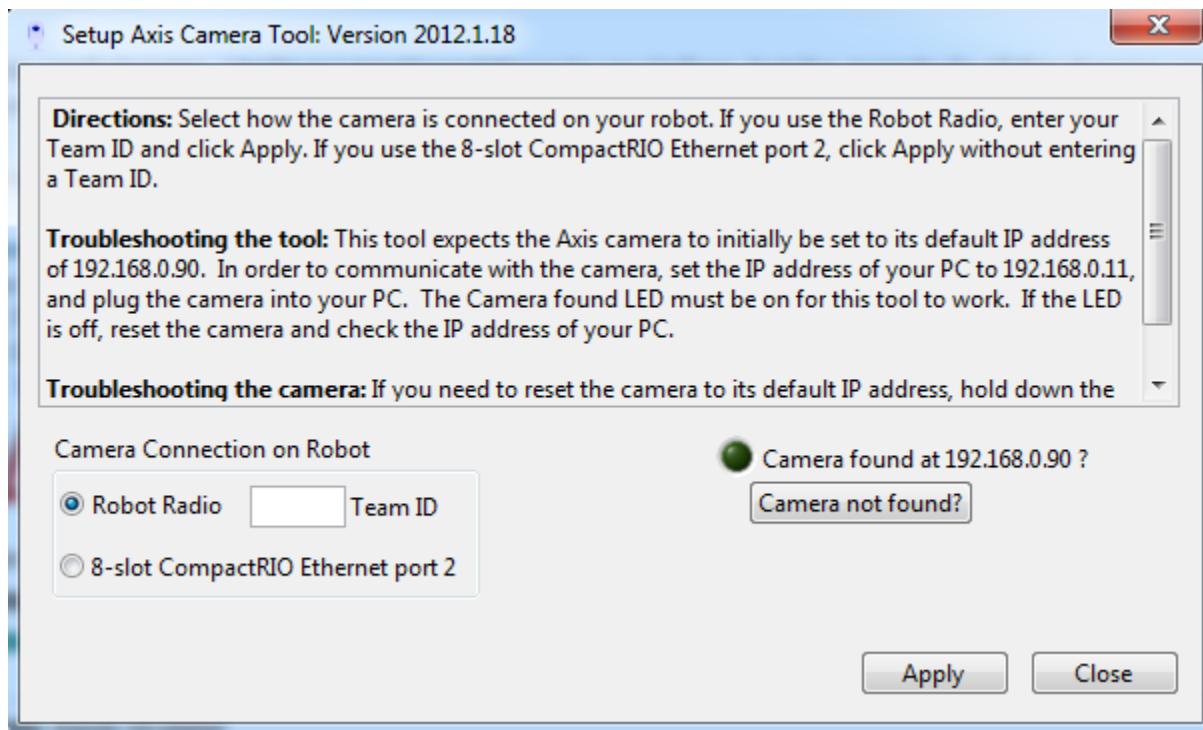
LiveWindow is a new mode of the SmartDashboard for 2013, designed for use with the new Test Mode of the Driver Station. LiveWindow allows the user to see feedback from sensors on the robot and control actuators independent of the written user code. More information about LiveWindow can be found [here](#).

FRC 2013 cRIO Imaging Tool



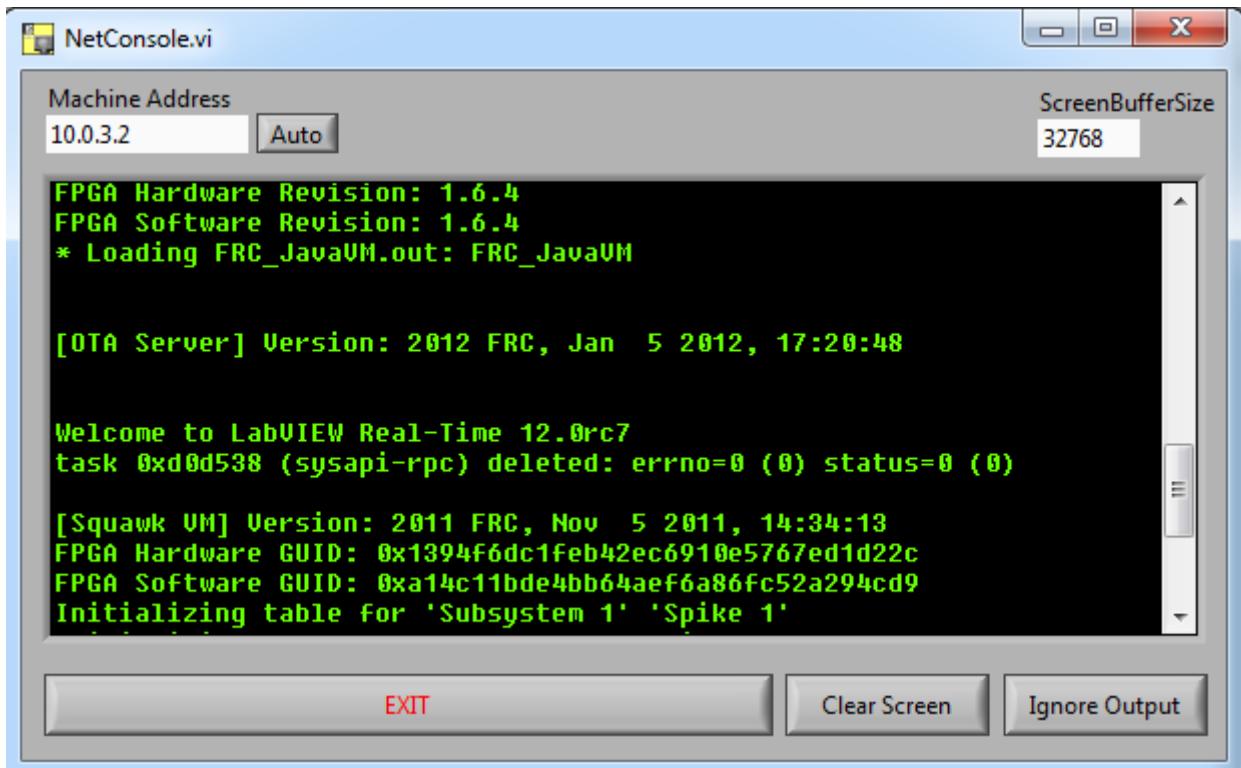
The FRC 2013 cRIO Imaging Tool is a software tool used to format and setup an cRIO-FRC or cRIO-FRCII device for use in FRC. The tool detects any cRIO device on the network, reports the current MAC, name, IP and Image version and indicates if the modules are installed in the correct locations. The tool allows the user to configure the software language, CAN plugin, enable/disable NetConsole, and set the virtual DIP-switches (cRIO-FRCII only) without formatting the device. If the device is being formatted the Device Name and Team ID can also be changed. The FRC 2013 cRIO Imaging Tool is installed as part of the Utilities Update found [here](#), however it also requires support files from the LabVIEW DVD included in the Kickoff Kit of Parts (cRIO Tools or full LabVIEW install options). Additional instructions on imaging your cRIO using this tool can be found [here](#).

Setup Axis Camera



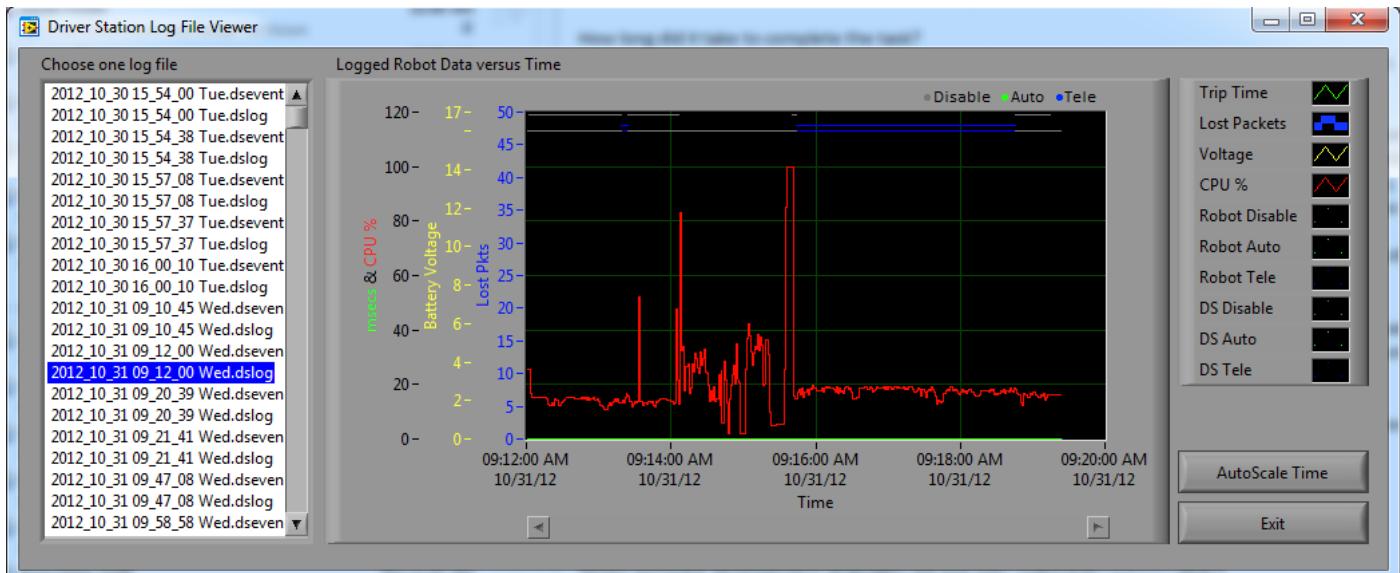
The Setup Axis Camera utility is a LabVIEW program used to configure an Axis 206 or M1011 camera for use on the robot. The tool takes a factory reset camera connected directly to the computer and configures the IP, username and password, anonymous access, and default framerate and compression (for use with the SmartDashboard or other access methods). The Setup Axis Camera tool is installed as part of the Utilities Update found [here](#), however it also requires support files from the LabVIEW DVD included in the Kickoff Kit of Parts (cRIO Tools or full LabVIEW install options). Instructions for using the tool to configure the camera are located [here](#).

NetConsole for cRIO



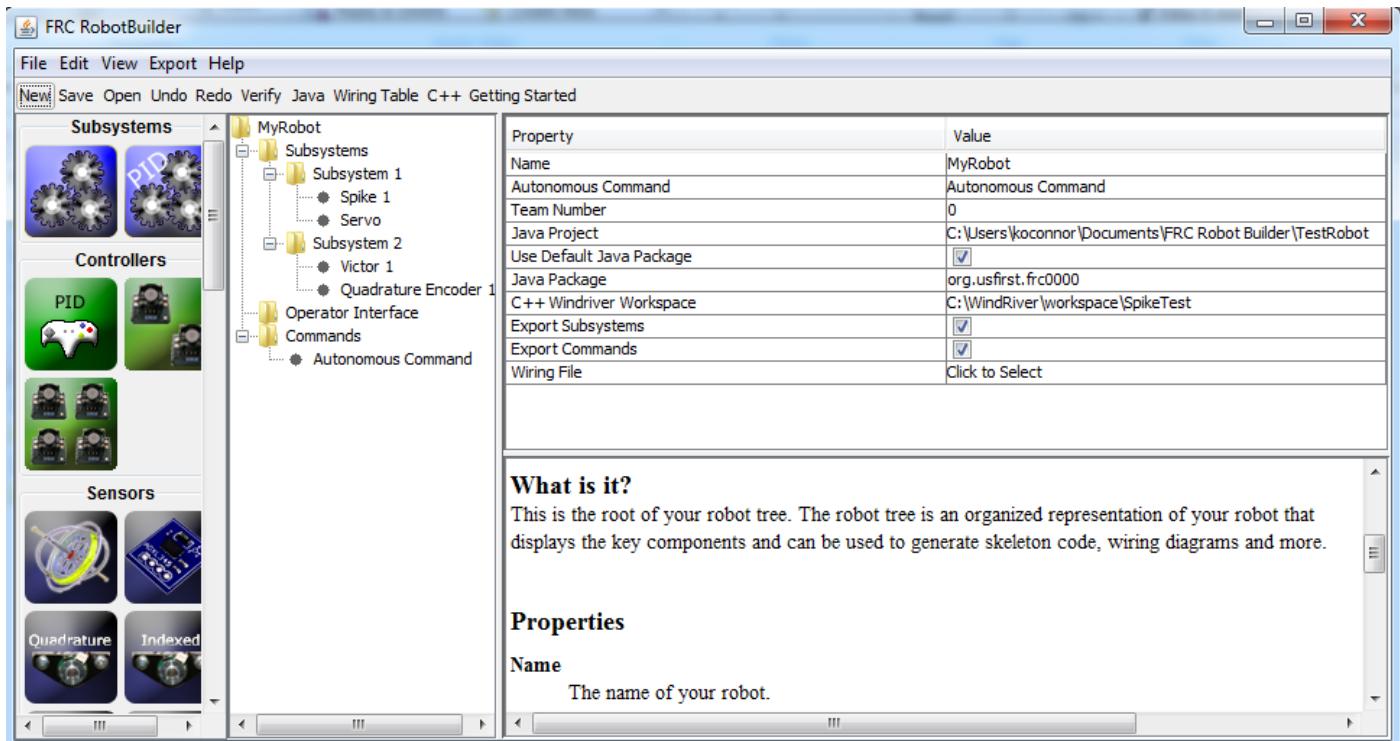
NetConsole for cRIO is a LabVIEW program that, combined with enabling the plugin on the robot with the cRIO Imaging Tool, allows for remote access to the serial console on the cRIO over the network. This allows the user to view diagnostic output from the cRIO, WPILib and any print statements they have added to their code as well as provide input to the serial console. The NetConsole for cRIO tool is installed as part of the Utilities Update found [here](#), however it also requires support files from the LabVIEW DVD included in the Kickoff Kit of Parts (cRIO Tools or full LabVIEW install options). Additional information and instructions for using the NetConsole for cRIO utility are available [here](#).

FRC Driver Station Log Viewer



The FRC Driver Station Log Viewer is a LabVIEW program used to view logs created by the FRC Driver Station. These logs contain information such as battery voltage, trip time, CPU% and robot mode, as well as events such as joystick removal. The FRC Driver Station Log Viewer is included in the FRC Driver Station Update found [here](#), however it also requires the installation of support files from the LabVIEW DVD included in the Kickoff Kit (all 3 options on the DVD include the Driver Station support files). More information about the FRC Driver Station Log Viewer and understanding the logs can be found [here](#).

Robot Builder



Property	Value
Name	MyRobot
Autonomous Command	Autonomous Command
Team Number	0
Java Project	C:\Users\koconnor\Documents\FRC Robot Builder\TestRobot
Use Default Java Package	<input checked="" type="checkbox"/>
Java Package	org.usfirst.frc0000
C++ Windriver Workspace	C:\WindRiver\workspace\SpikeTest
Export Subsystems	<input checked="" type="checkbox"/>
Export Commands	<input checked="" type="checkbox"/>
Wiring File	Click to Select

What is it?

This is the root of your robot tree. The robot tree is an organized representation of your robot that displays the key components and can be used to generate skeleton code, wiring diagrams and more.

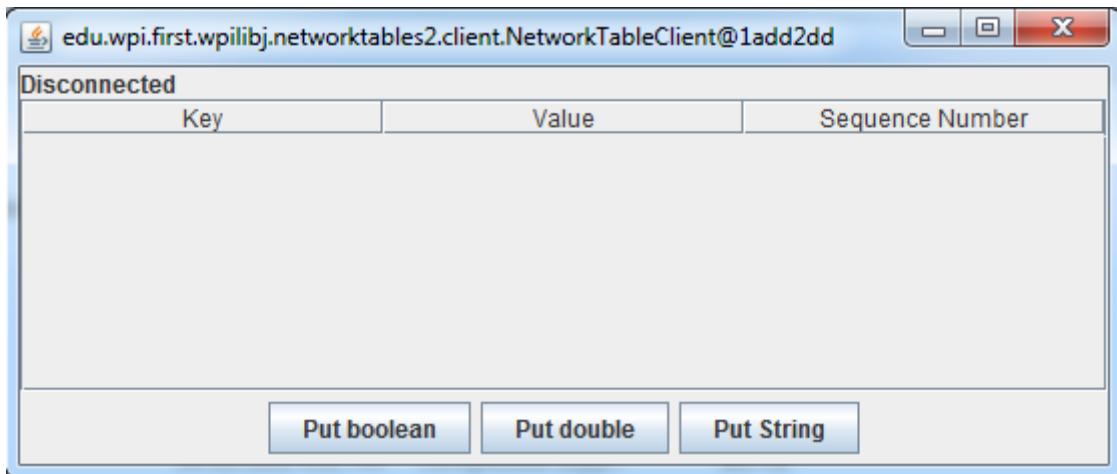
Properties

Name

The name of your robot.

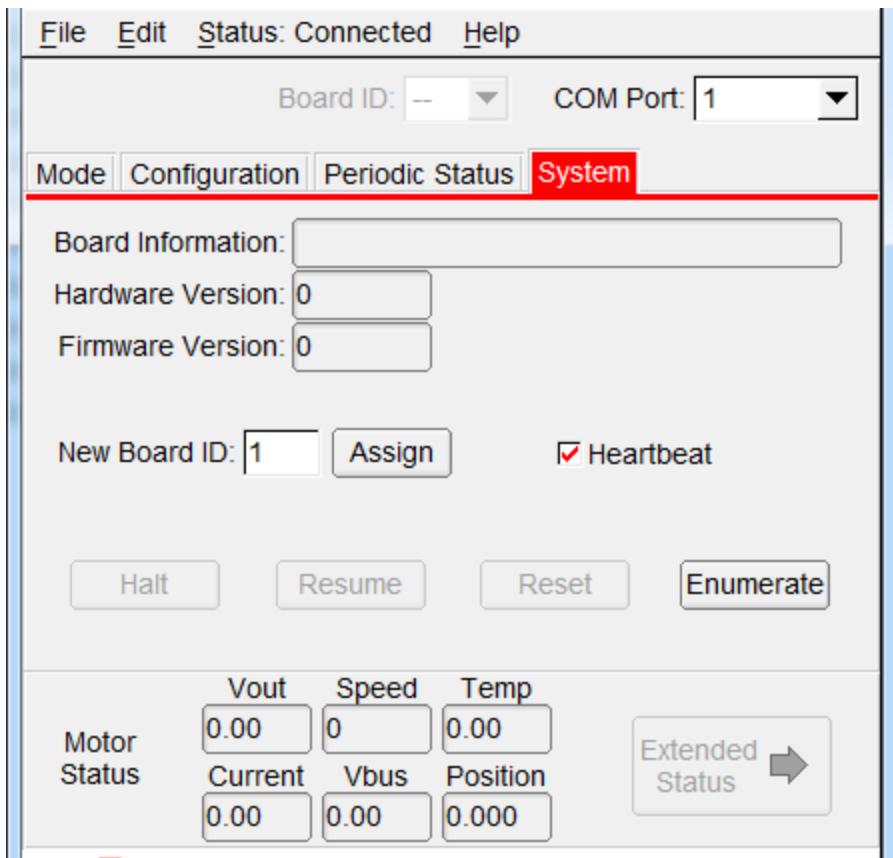
Robot Builder is a tool designed to aid in setup and structuring of a Command Based robot project for C++ or Java. Robot Builder allows you to enter in the various components of your robot subsystems and operator interface and define what your commands are in a graphical tree structure. Robot Builder will then verify that you have no port allocation conflicts and can generate a wiring table indicating what is connected to each port as well as C++ or Java code. The code created generates the appropriate files, constructs the appropriate objects and adds LiveWindow code for each sensor and actuator, but does not write any of the actual Subsystem or Command methods. The user must write the appropriate code for these methods for the robot to function. Robot Builder is installed with the [C++ or Java language specific updates](#) (found in the WindRiver/WPIlib and sunspotfrcsdk/tools directories respectively). Note that teams may need to install the Java Runtime Environment to use the Robot Builder on computers not set up for Java programming. More information about Robot Builder can be found [here](#). More information about the Command Based programming architecture can be found [here](#).

Network Tables Viewer



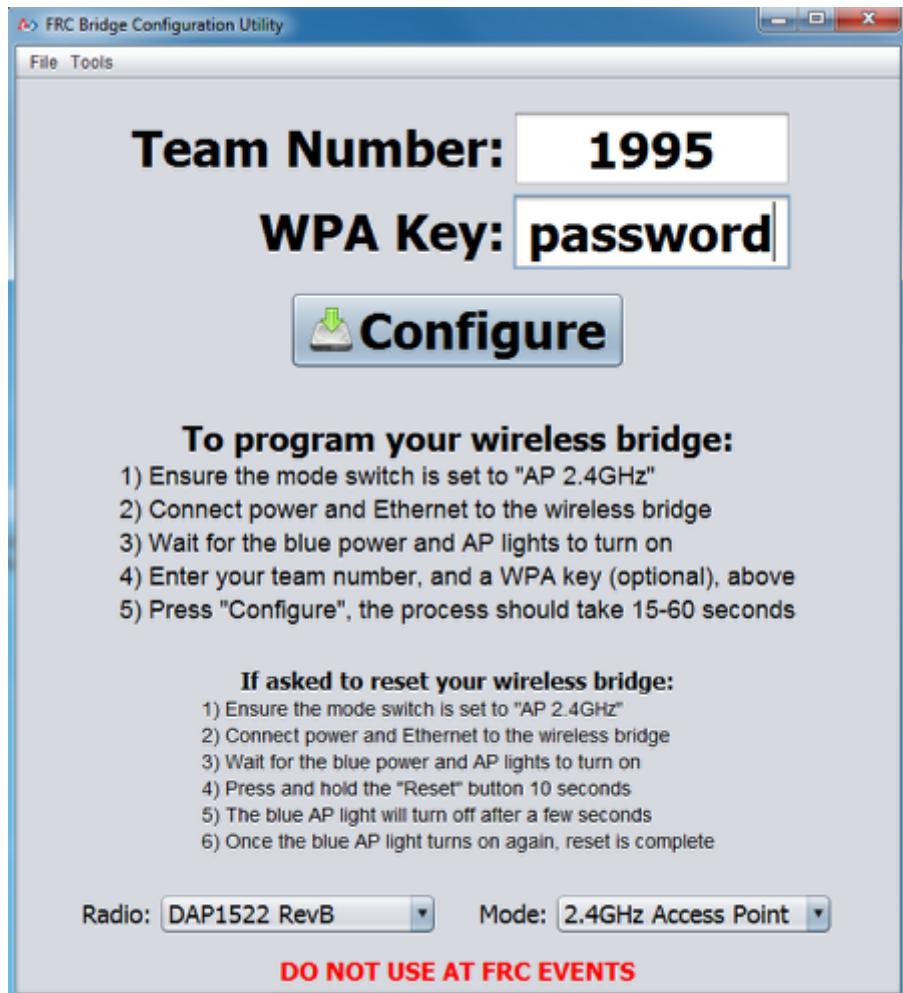
The Network Table Viewer is a utility used to view, modify and add to the contents of the Network Tables for debugging purposes. It displays all keys currently in the Network Table along with the value and Sequence Number and can be used to modify the value of existing keys or add new keys to the Table. The Network Table Viewer is included in the [C++ and Java](#) language updates (found in the WindRiver/WPILib and sunspotfrcsdk/tools directories respectively). LabVIEW teams can use the Variables tab of the LabVIEW Dashboard to accomplish this functionality. Note that teams may need to install the Java Runtime Environment to use the Network Tables Viewer on computers not set up for Java programming. Additional documentation on the Network Table Viewer can be found [here](#).

BDC-COMM



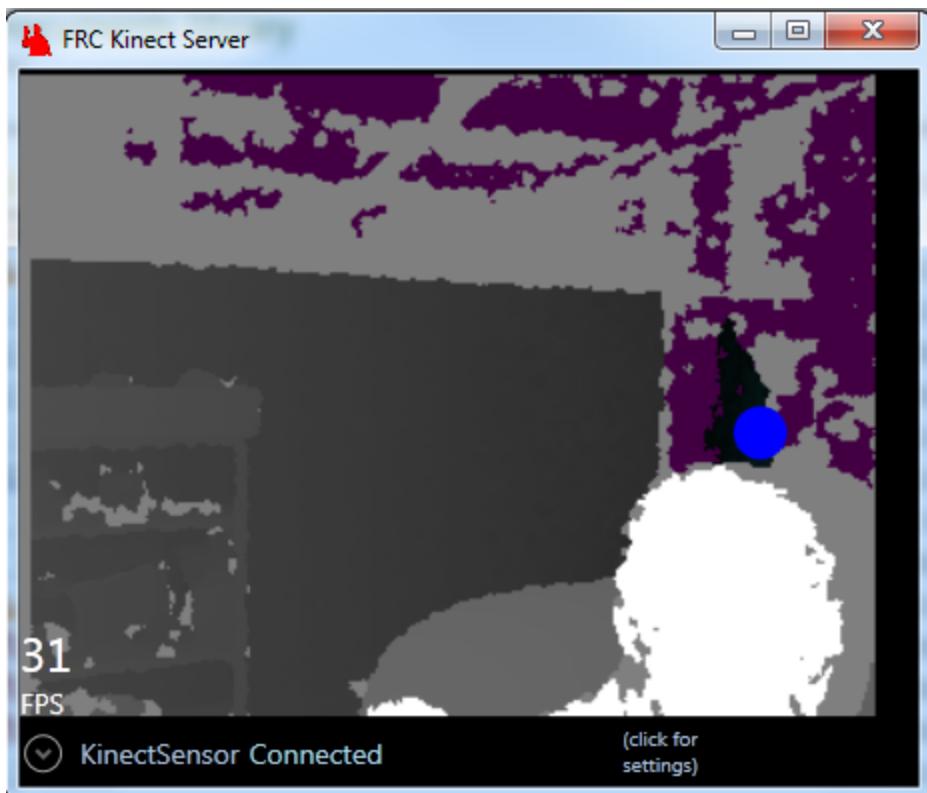
BDC-COMM is a software utility used to configure, update and test Black Jaguar motor controllers over the Serial/CAN interface. This tool can be used to update the Black Jaguar firmware, set the Board ID, and set configuration values such as the fault time and soft limits. The tool can also be used to control, and report the status of, an individual Jaguar in the various modes for testing. BDC-COMM is installed as part of the Utilities Update found [here](#) or can be downloaded from [here](#).

FRC Bridge Configuration Utility



The FRC Bridge Configuration Utility is a tool used to configure the D-Link DAP-1522 radio for practice use at home. This tool sets the appropriate IP, and network settings for proper network connection, as well as the QOS settings required to mimic the bandwidth limiting and packet prioritization experience on the FRC playing field. The FRC Bridge Configuration Utility can be downloaded [here](#). Instructions on using the FRC Bridge Configuration Utility to configure your radio can be found [here](#).

FRC Kinect Server



The FRC Kinect Server is a software tool that interfaces with a Microsoft Kinect device and provides the information to the FRC Default Dashboard and Robot via the Driver Station. The FRC Kinect Server utilizes the Microsoft Kinect for Windows SDK's skeleton capabilities in order to provide both raw skeleton data and processed pseudo-joystick data to the dashboard and robot. The FRC Kinect Server is available [here](#). Additional information about the FRC Kinect Server, including installation instructions is available [here](#).

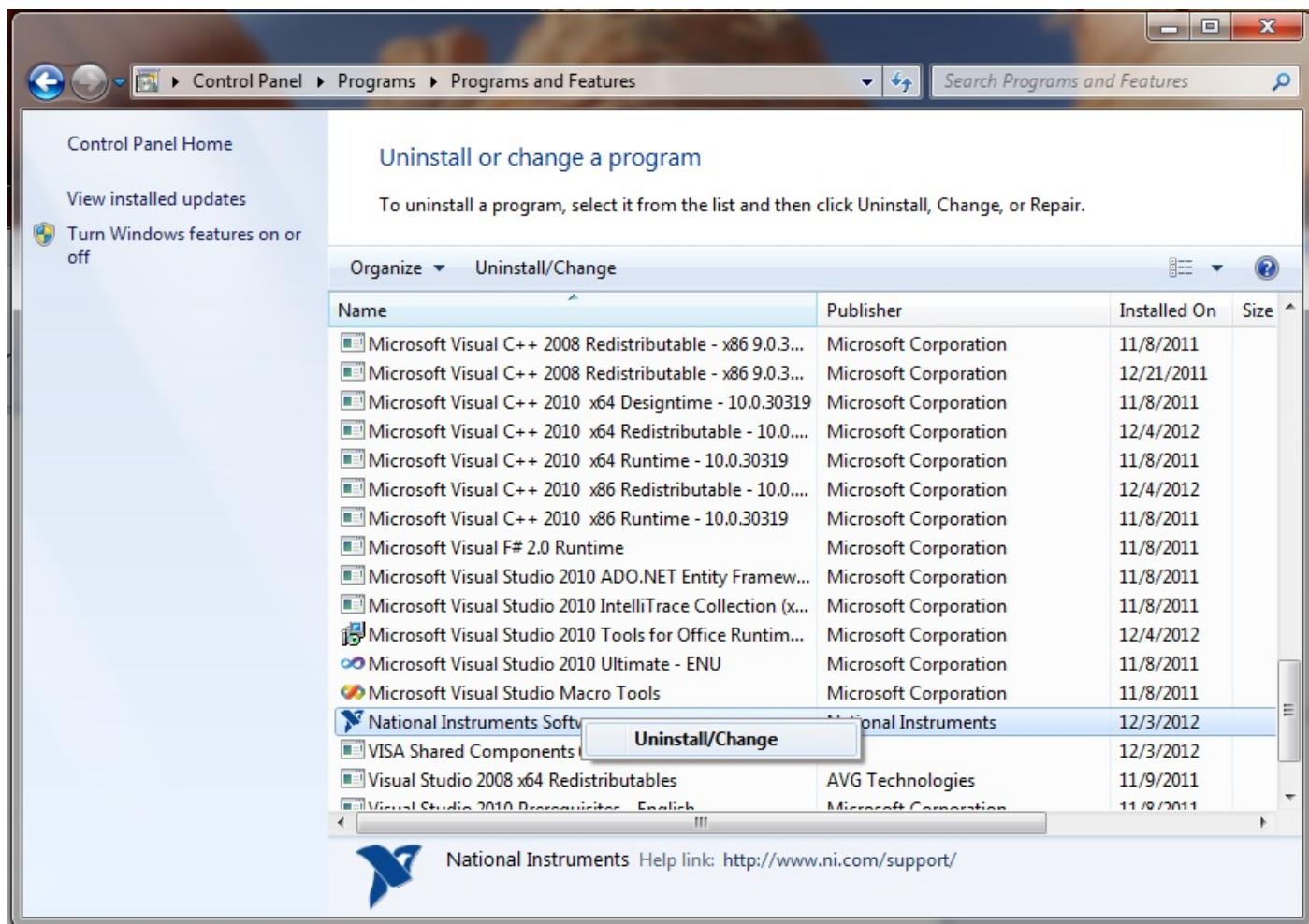
Installing LabVIEW for FRC 2013

This documentation covers the installation of all NI software components for teams using the LabVIEW software for development (LabVIEW, Utilities and Driver Station)

Insert DVD

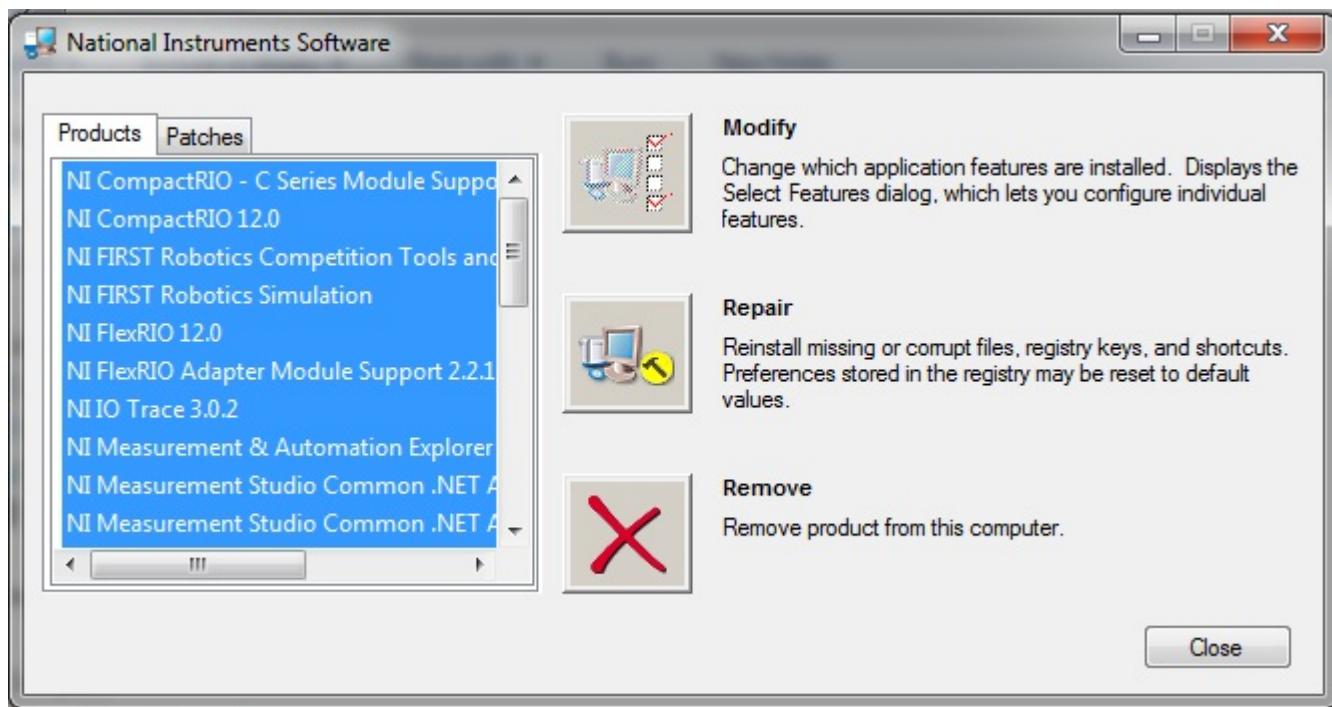
The base install for the LabVIEW environment is located on the NI DVD found in your Kit of Parts. Insert the DVD into the drive, if the installer launches automatically select **Exit**.

Uninstall Old Versions (Optional)



Before installing the new version of LabVIEW it is recommended to remove any old versions, note that old versions will coexist with the new version, but the license for the FRC 2012 software will be expiring very shortly. Make sure to back up any team code located in the "User\LabVIEW Data" directory before uninstalling. Then click **Start >> Control Panel >> Uninstall a Program**. Locate the entry labeled "**National Instruments Software**", right-click on it and select **Uninstall/Change**.

Select Components to Uninstall



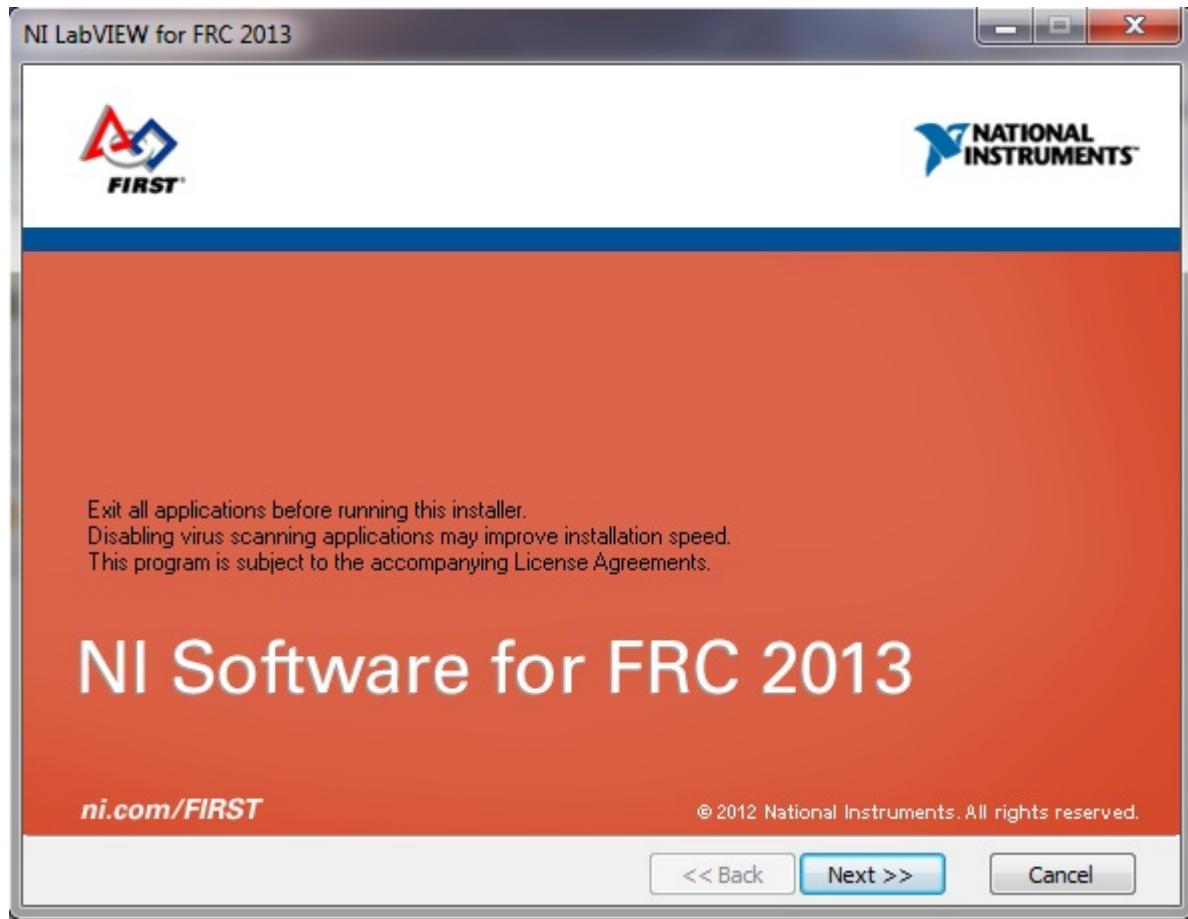
In the left pane of the dialog box that appears, **select all entries**. The easiest way to do this is to click the top entry to highlight it, then scroll down to the bottom entry, press and hold shift and click on the last entry then release shift. Click **Remove**. Wait for the uninstaller to complete and reboot if prompted.

Base Installation



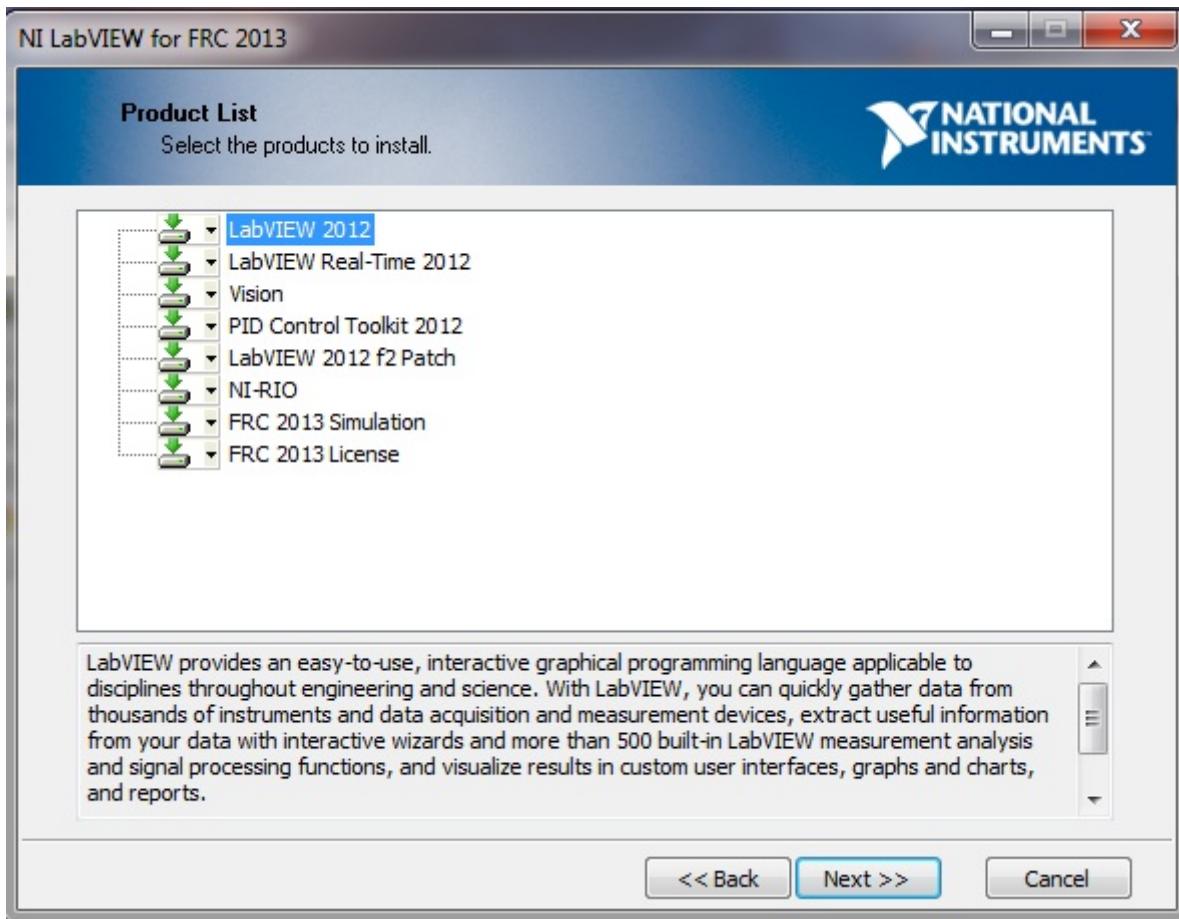
Browse to the drive and right-click on **autorun.exe** then select **Run as Administrator**. If a security prompt appears, click **Yes**. Select the **Install Everything** option to install LabVIEW and the support files for the Utilities and Driver Station.

Installer Splash Screen



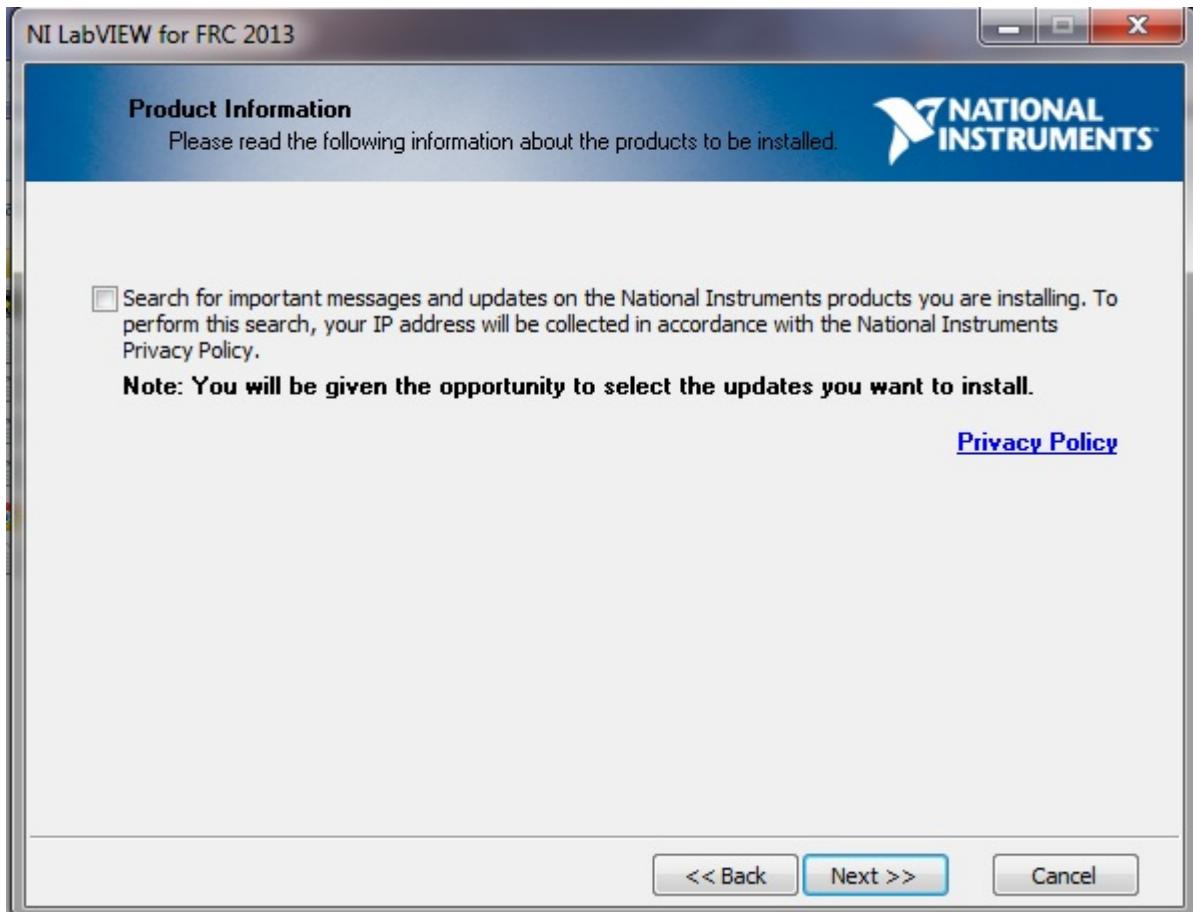
On the installer splash screen, click **Next**.

Product List



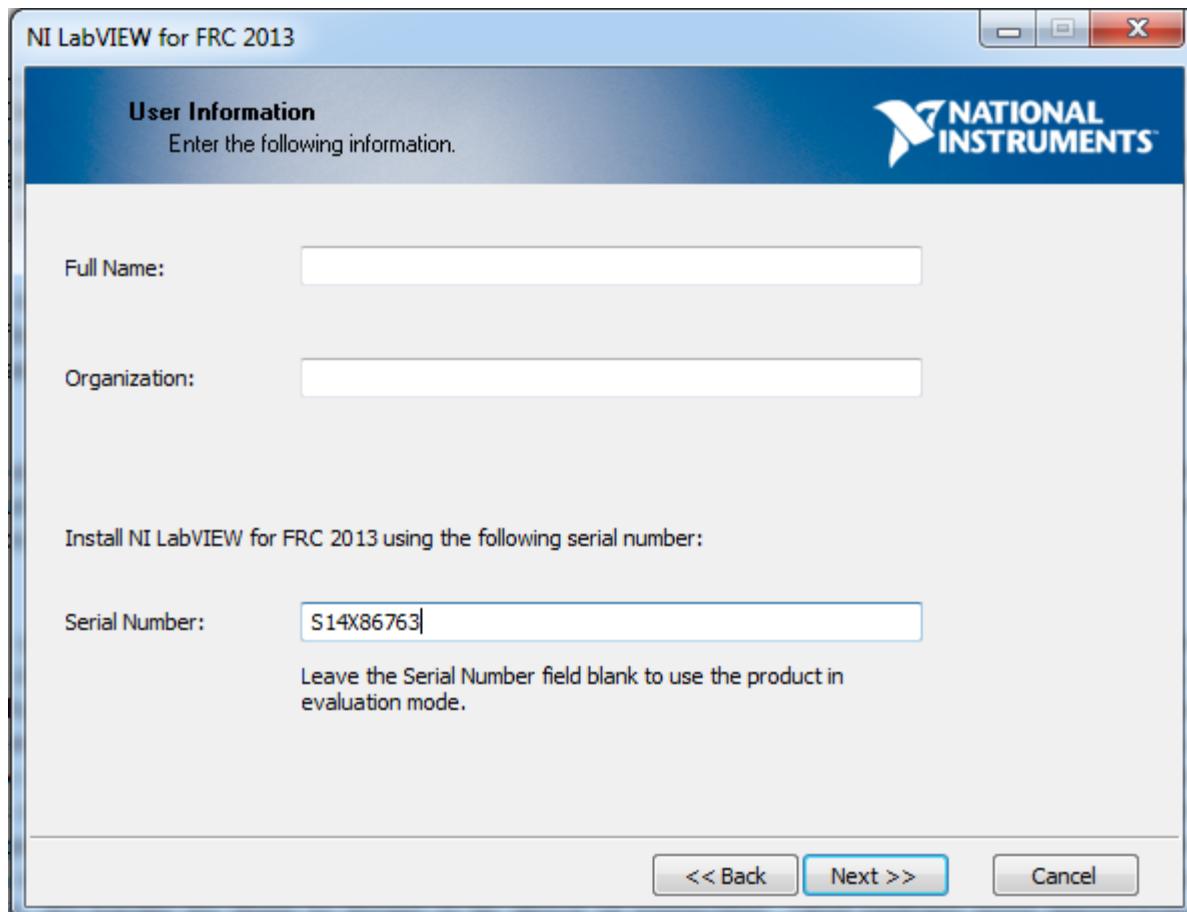
On the Product List page, click **Next**.

Search for Updates



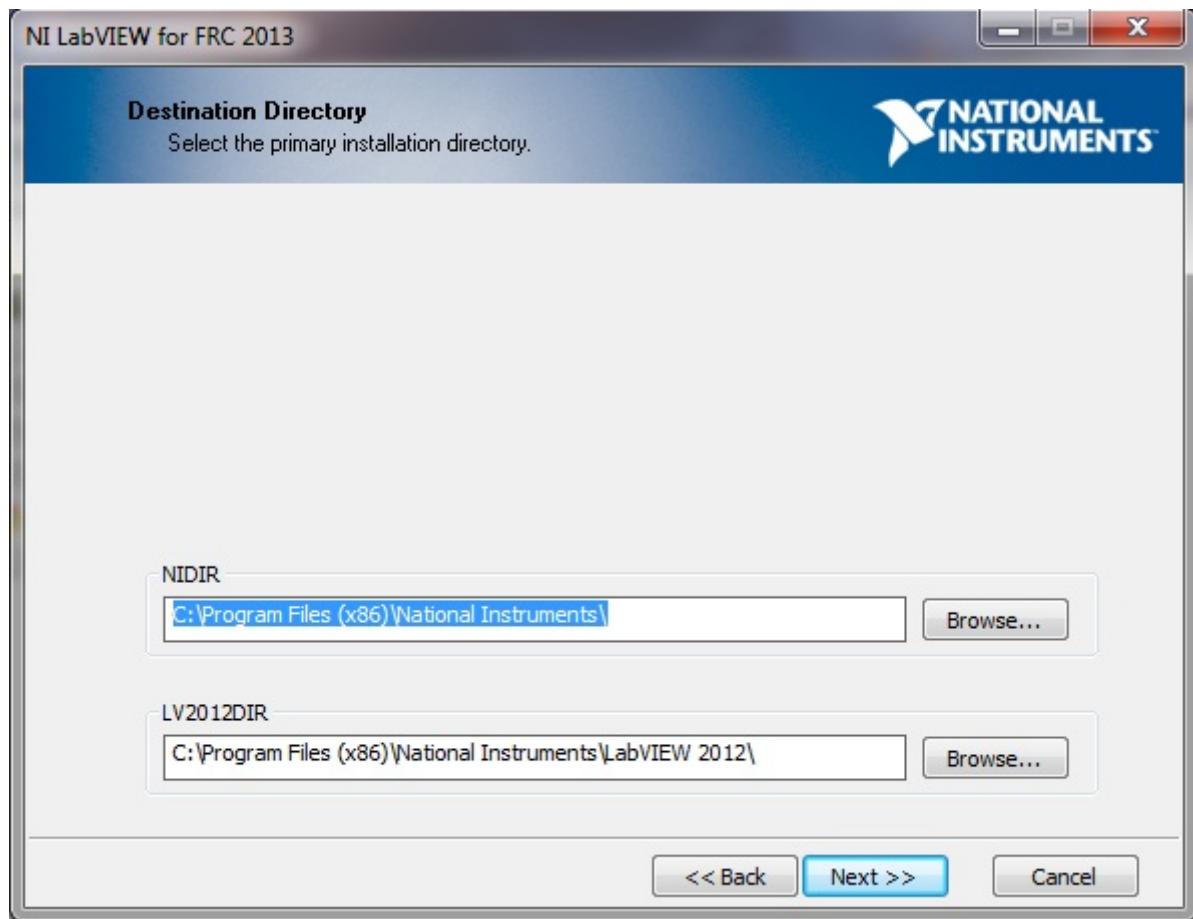
Uncheck the box to "Search for important...." then click **Next**.

Serial Number



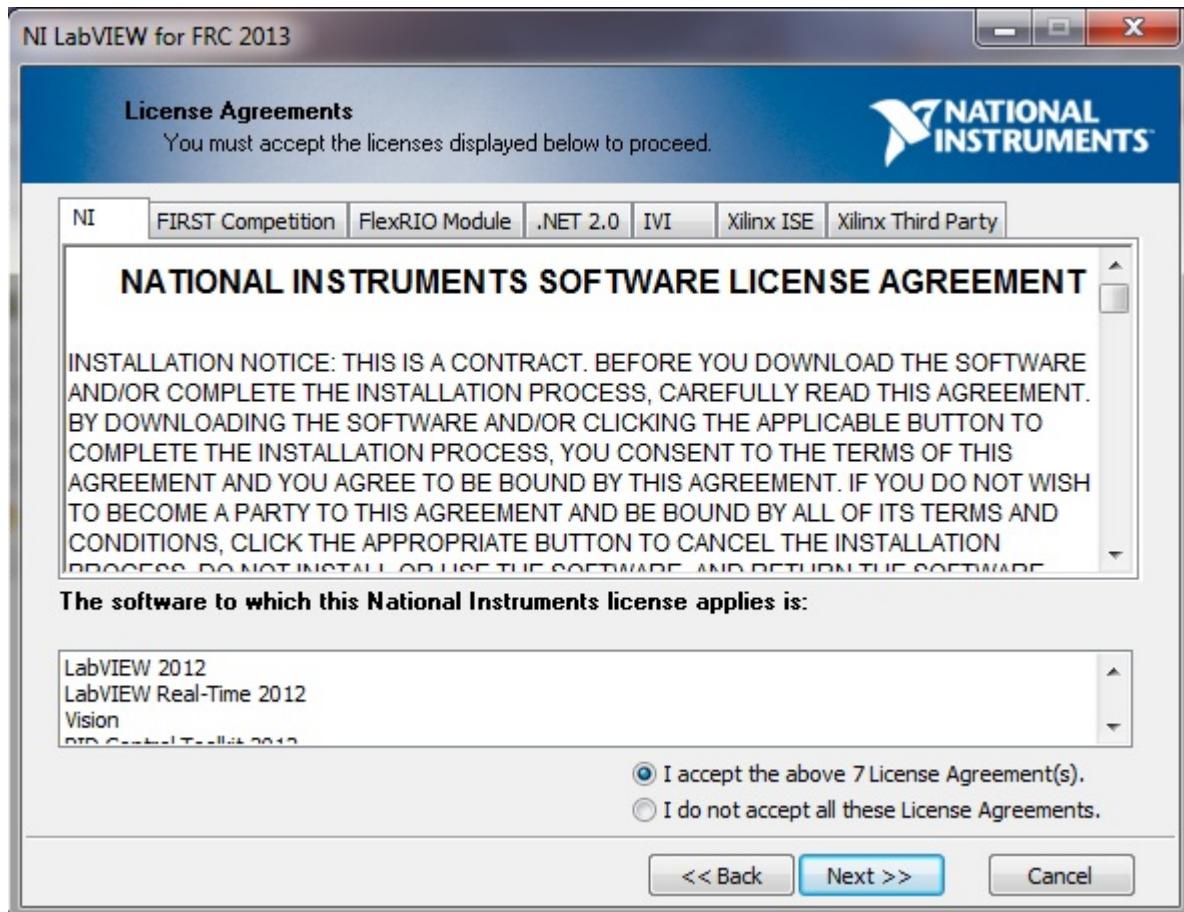
On the Serial Number page enter your name and organization, then enter the Serial Number provided on the card included with the LabVIEW DVD. Then click **Next**.

Installation Directory



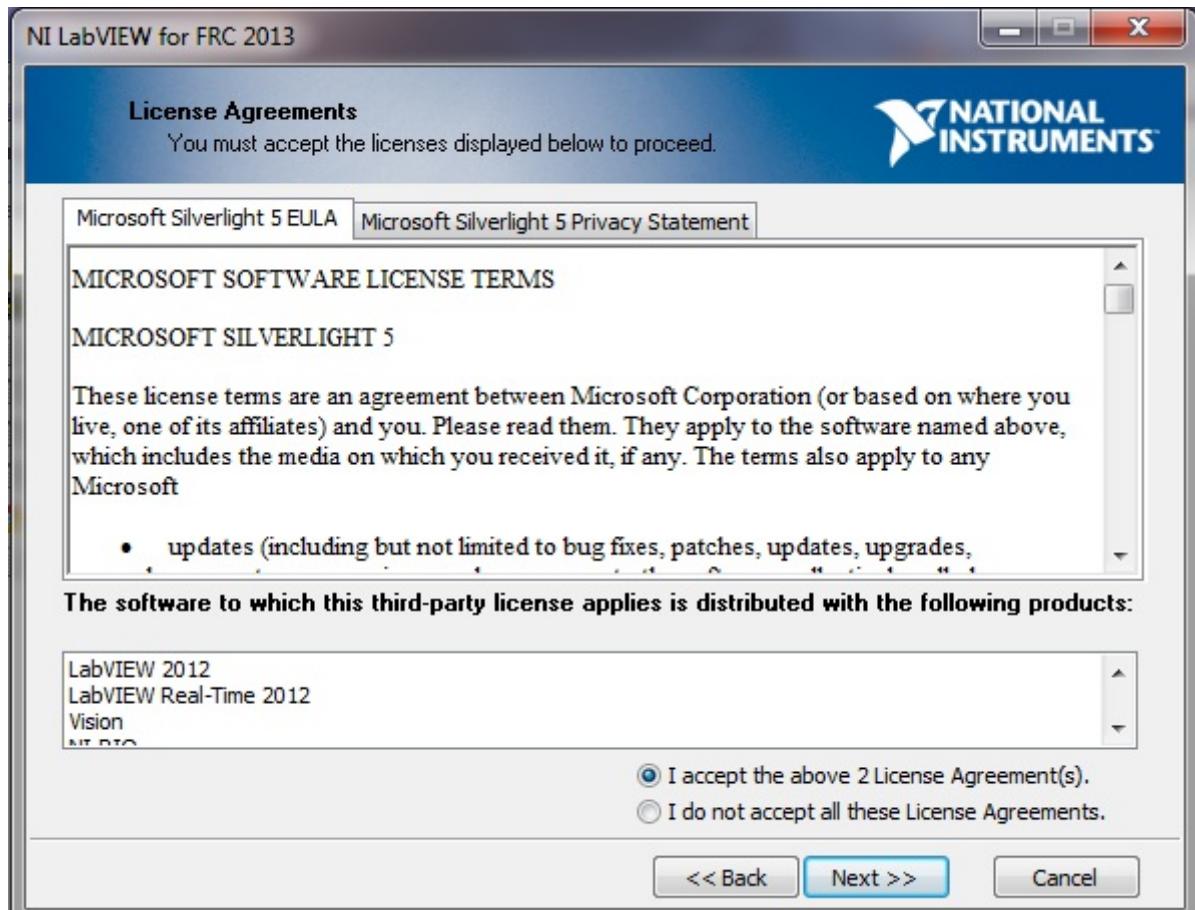
Select the installation directory. **Leaving the default directory is strongly recommended.** Then click **Next**.

License Agreements



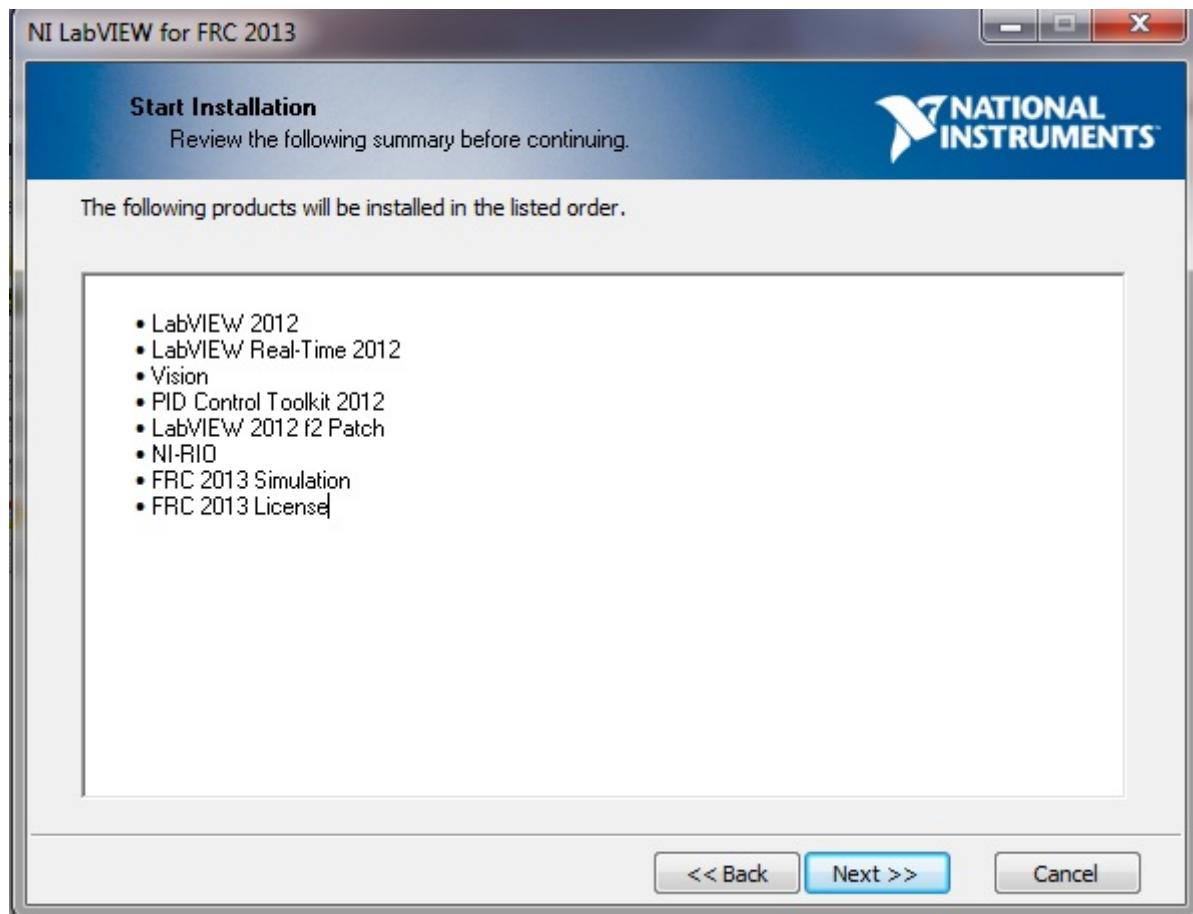
Select the **I accept...** bubble to accept the license agreements shown, then click **Next**.

SilverLight License Agreements



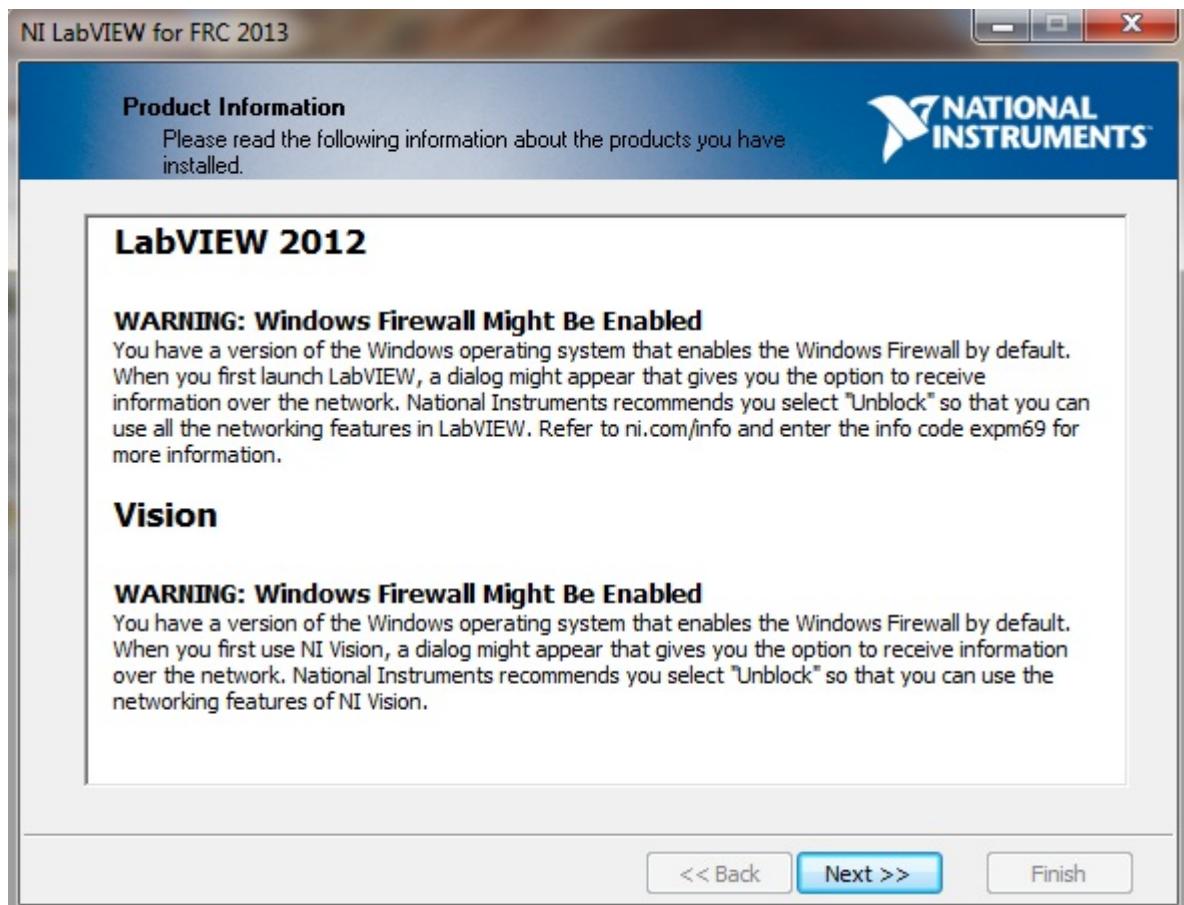
Select the **I accept...** bubble to accept the license agreements shown, then click **Next**.

Start Installation



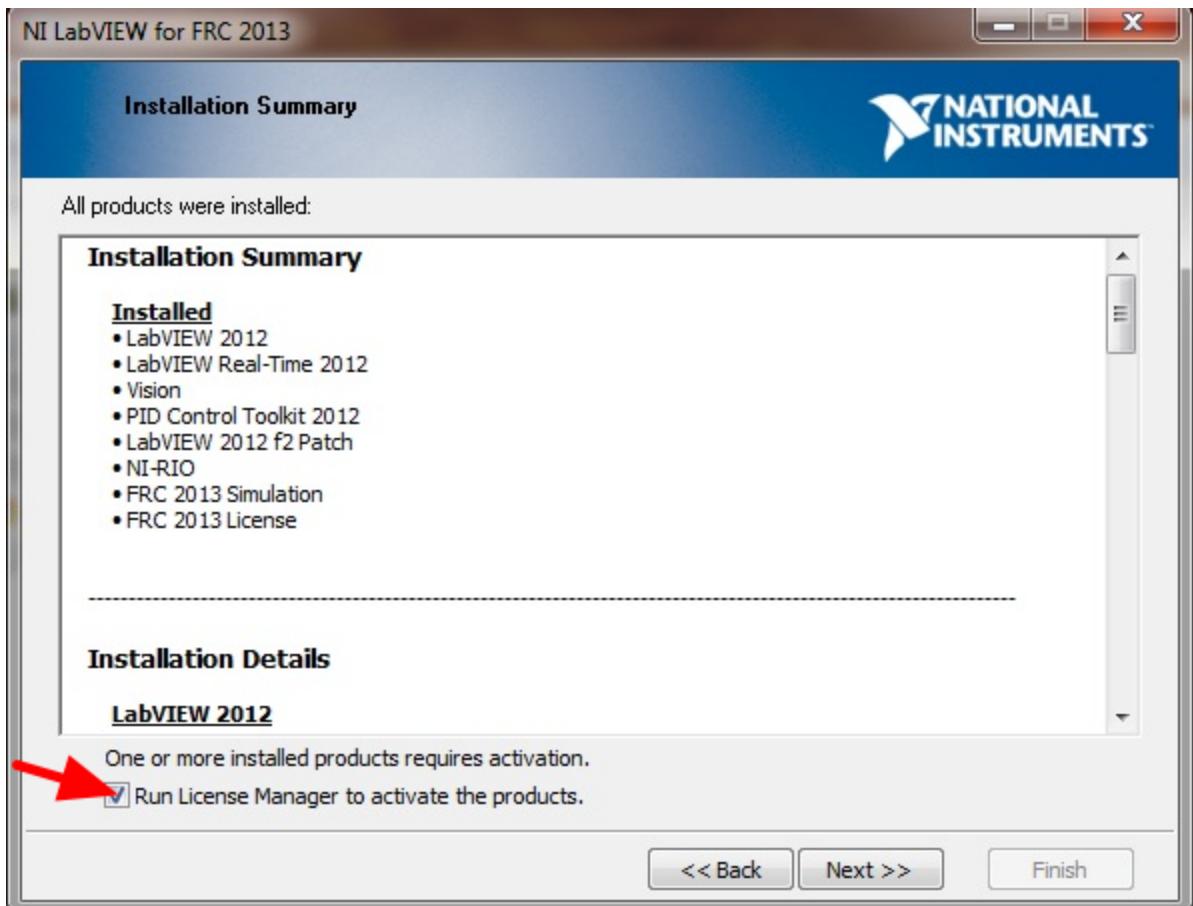
Click **Next** to start the installation.

Firewall Warning



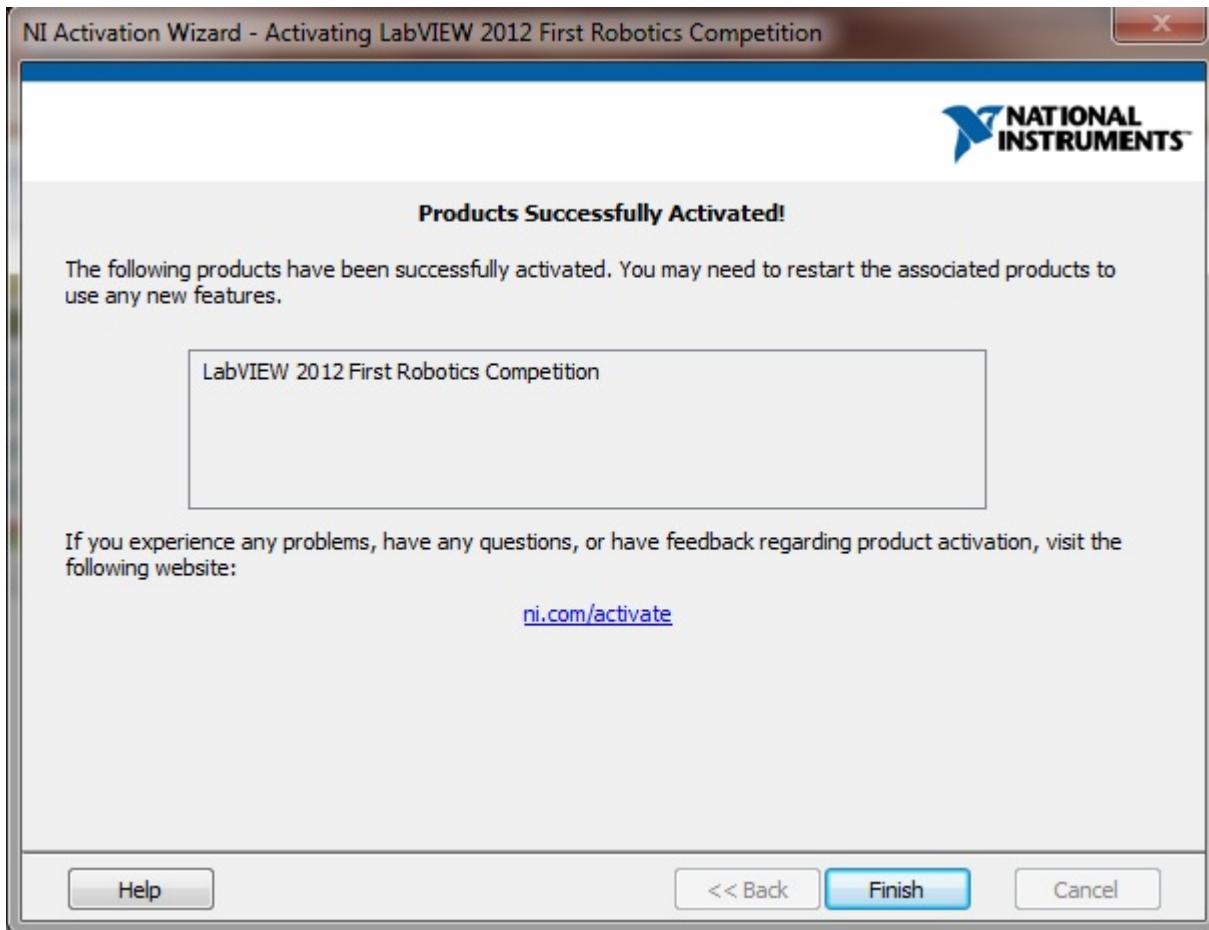
Click **Next** to proceed through the Firewall Warning.

Installation Summary



Make sure you have an Internet connection, the **Run License Manager...** box is checked, then click **Next**.

Finish Installer



After the activation completes, click **Finish** to exit the installer. If a NI Customer Experience prompt appears, select the option you prefer, then click **Ok**. If prompted to reboot, click **Yes**.

NI Utilities Update (Required to Image cRIO)



FRC Utilities

➤ **Install FRC Utilities**

[View Readme](#)

[Browse the Media](#)

[Exit](#)

FRC 2013 Tools Update

ni.com/FIRST

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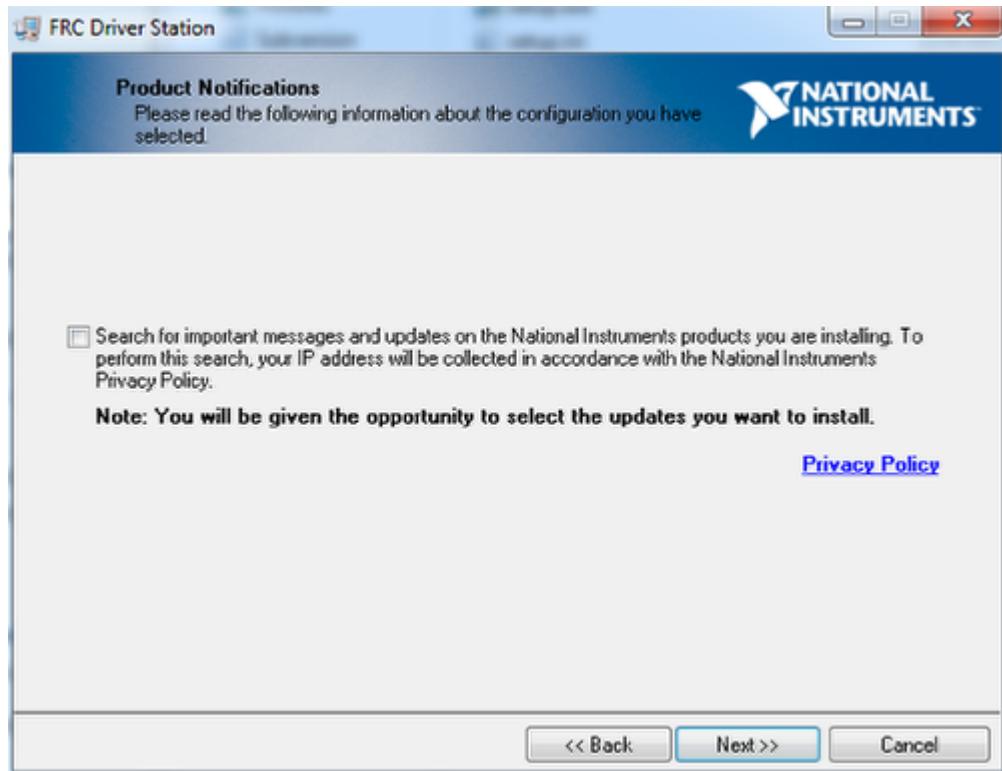
The previous installation steps installed the support files needed for the NI FRC Utilities, but the Utilities themselves are contained in a separate update for release timing purposes. This installation is required to re-image your cRIO. Go [here](#) to download the FRC Utilities Update. Unzip the downloaded file, then locate and double-click **autorun.exe**. Click **Install FRC Utilities** to continue. If you see a security dialog pop-up, click **Yes**.

Utilities Update Installer



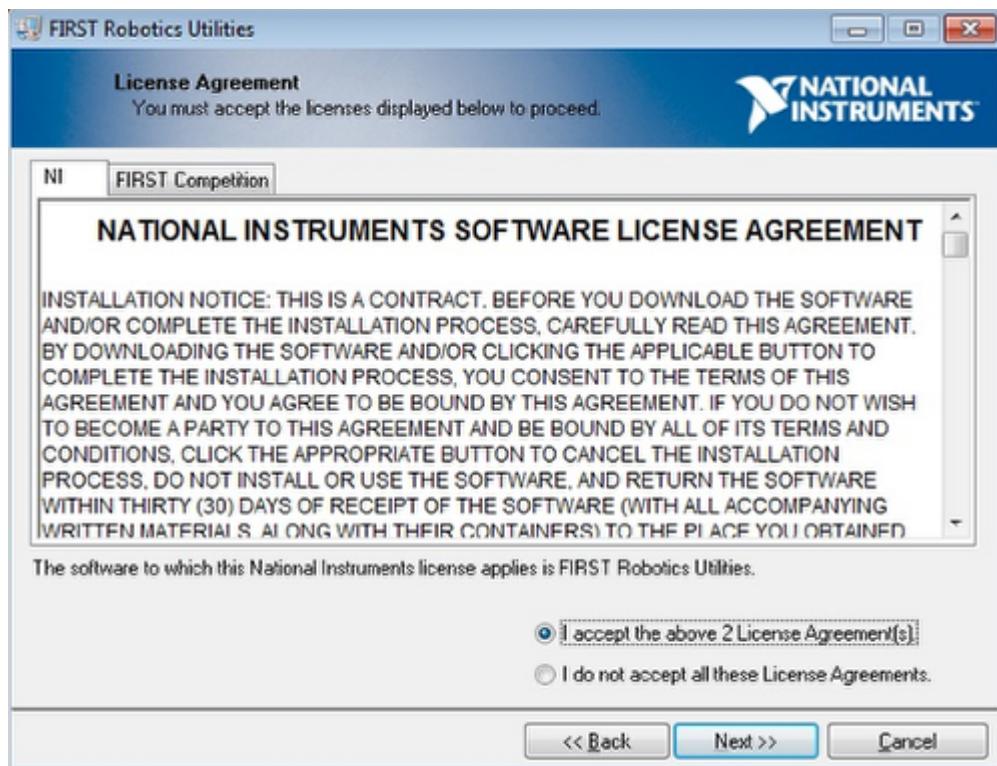
Click **Next** to continue.

Search for Updates



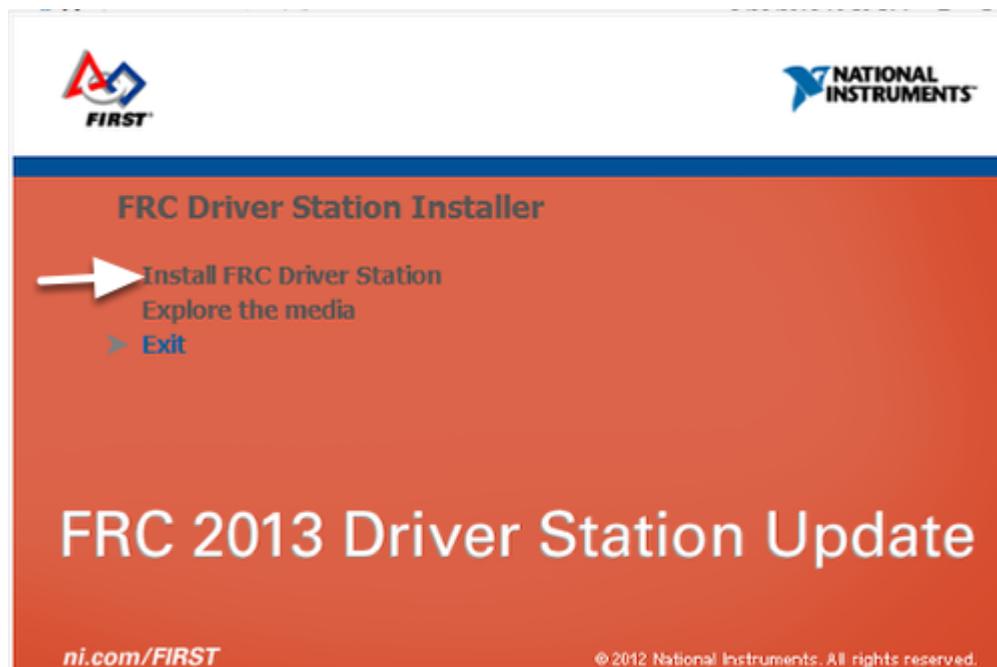
Uncheck the box to **Search for important....** then click **Next** to start the installation.

License Agreement



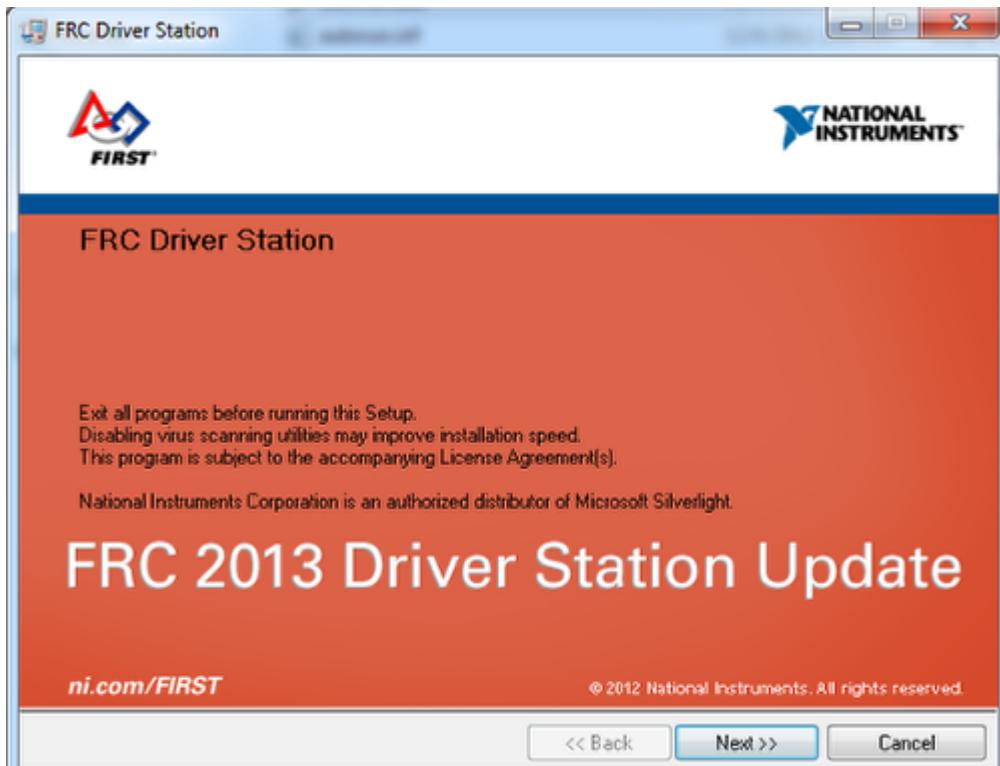
Select the **I accept** bubble to accept the license agreements, then click **Next** to start the installation. When the installation completes, click **Finish** to exit the installer.

FRC Driver Station Update (Required to Control Robot)



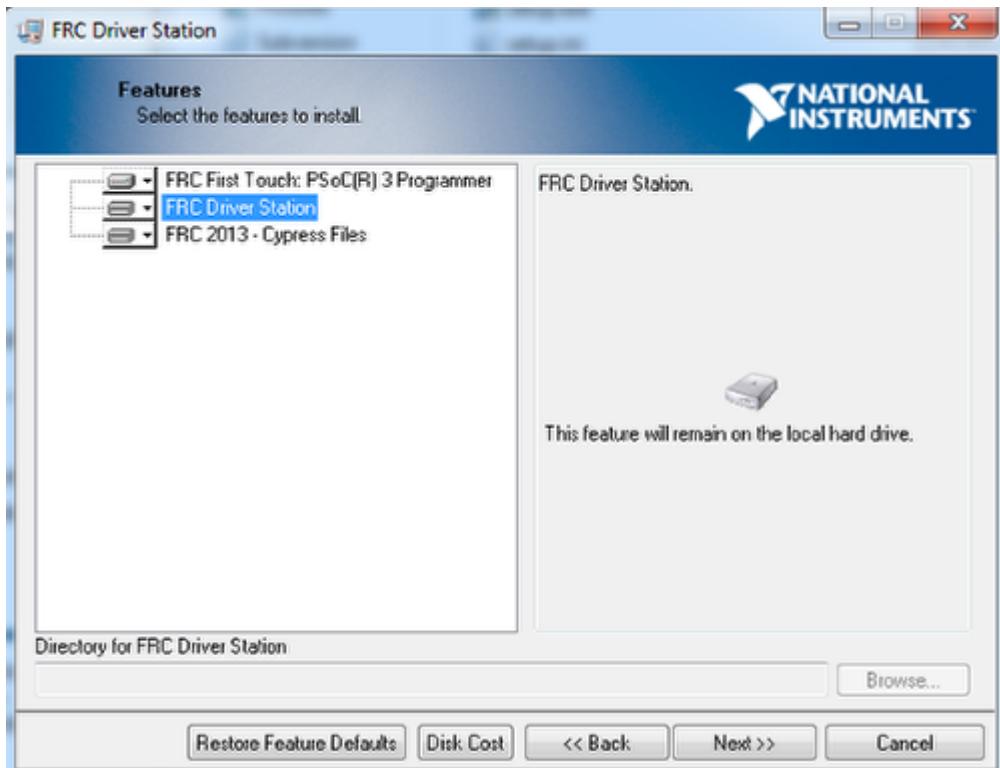
The NI Tools install installs the support files for the FRC Driver Station, the Driver Station program itself is contained in a separate update for release timing purposes. Go [here](#) to download the FRC Driver Station Update. Unzip the downloaded file, then locate and double-click **autorun.exe**. Click **Install Driver Station** to continue. If you see a security dialog pop-up, click **Yes**.

Driver Station Installer



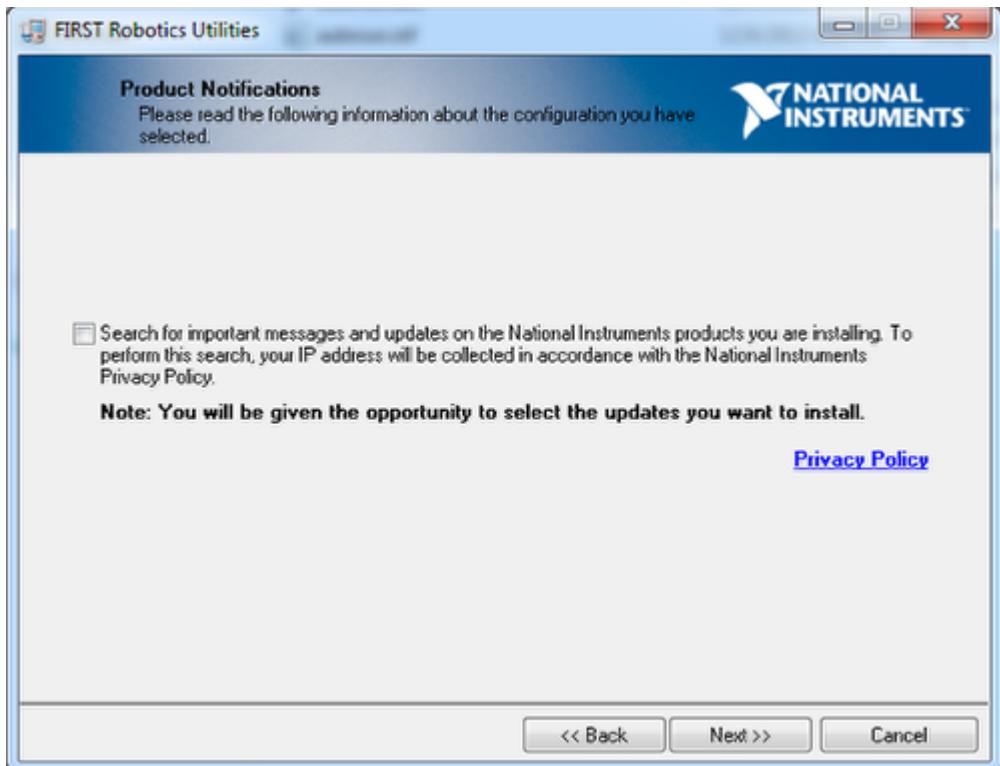
Click **Next** to continue.

Install Options



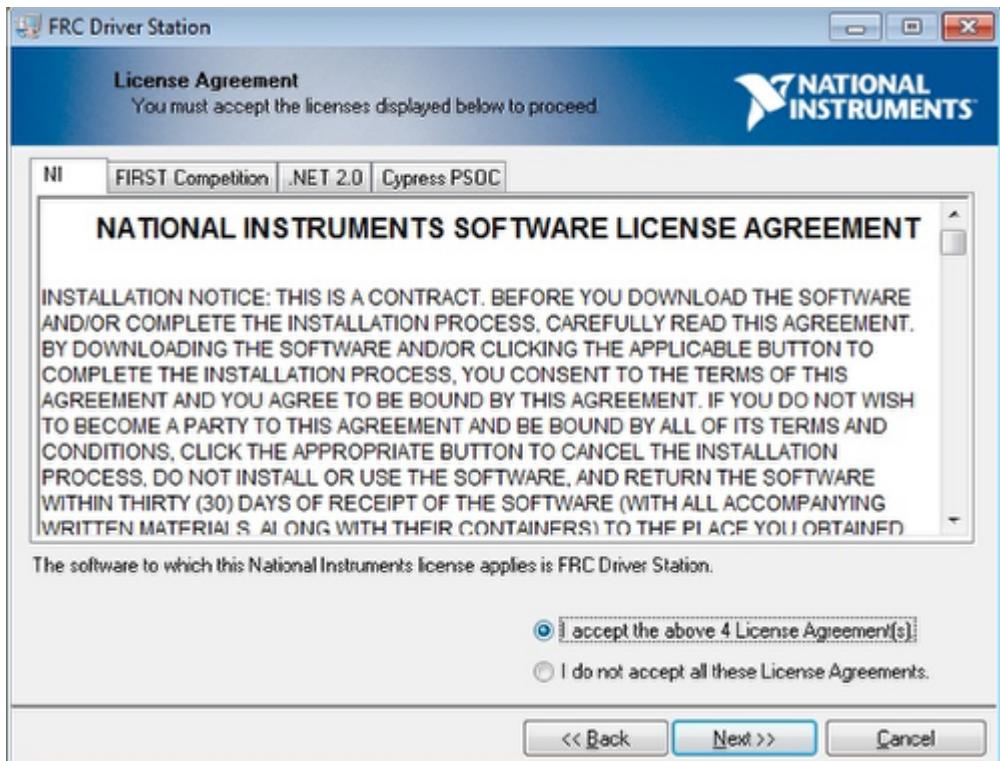
Leave the install options at the defaults and click **Next**.

Search for Updates



Uncheck the box to **Search for important....** then click **Next**.

License Agreement



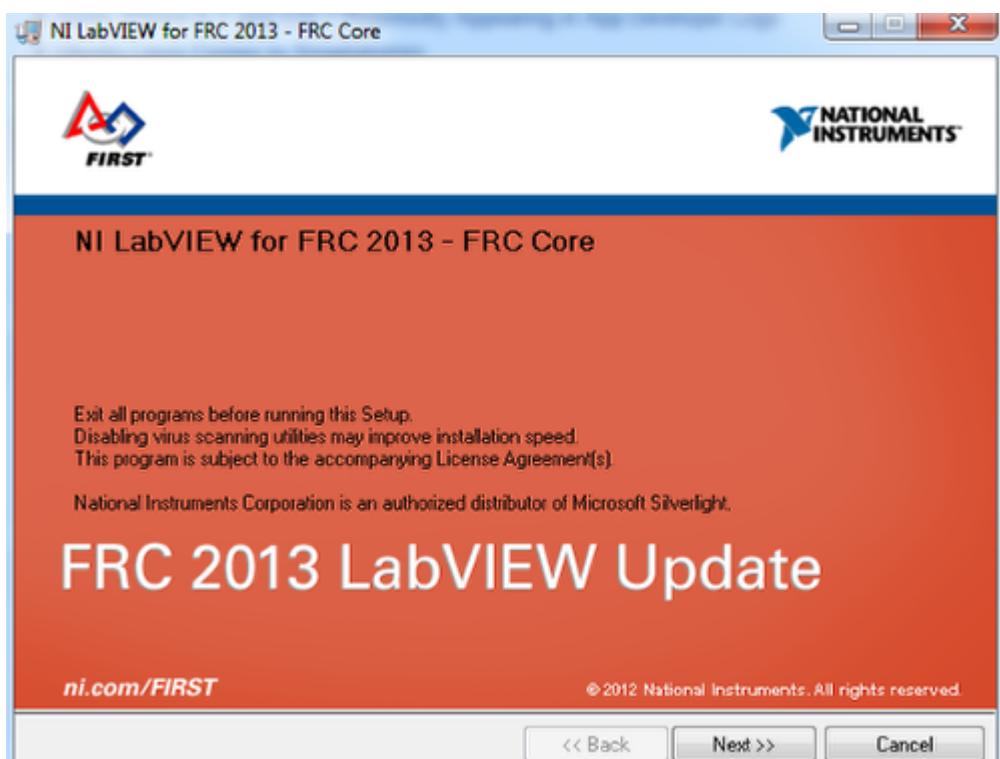
Click "**I accept the License Agreement.**" to accept the terms of the license agreements shown, then click **Next**. When the installation completes, click **Finish** to exit the installer.

LabVIEW Language Update



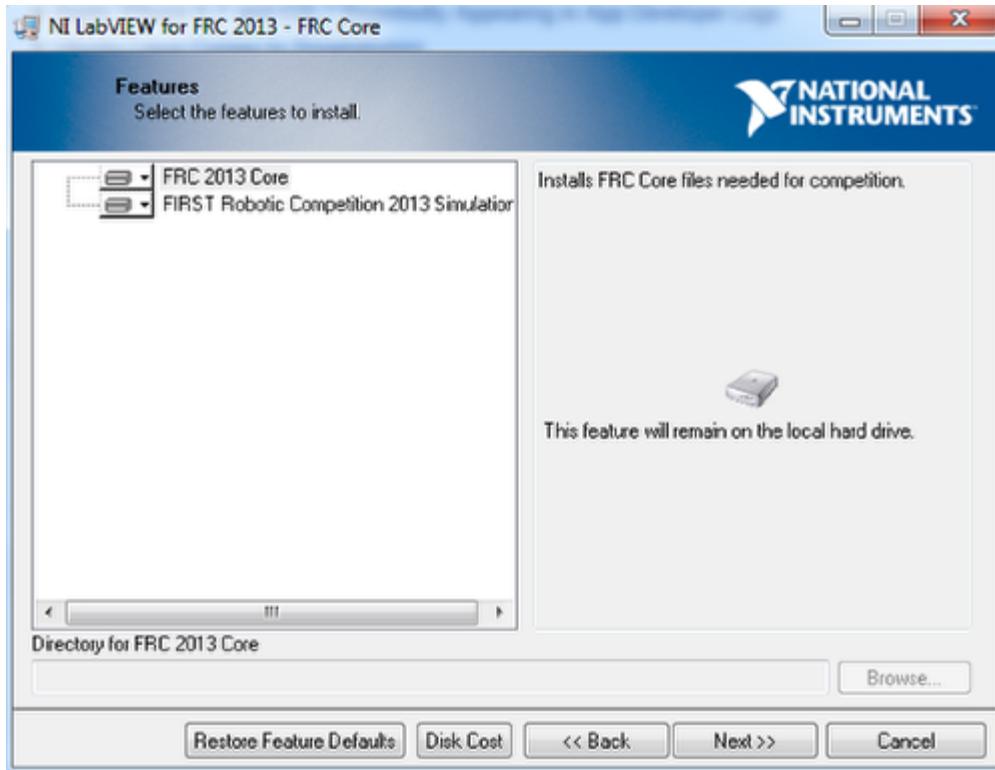
The LabVIEW Language Update contains the FRC specific libraries and components needed to program an FRC robot in LabVIEW. Go [here](#) to download the FRC LabVIEW Update. Unzip the downloaded file, then locate and double-click **autorun.exe**. Click **Install FRC 2013 LabVIEW Update** to continue. If a security prompt appears, click **Yes**.

LabVIEW Update Installer



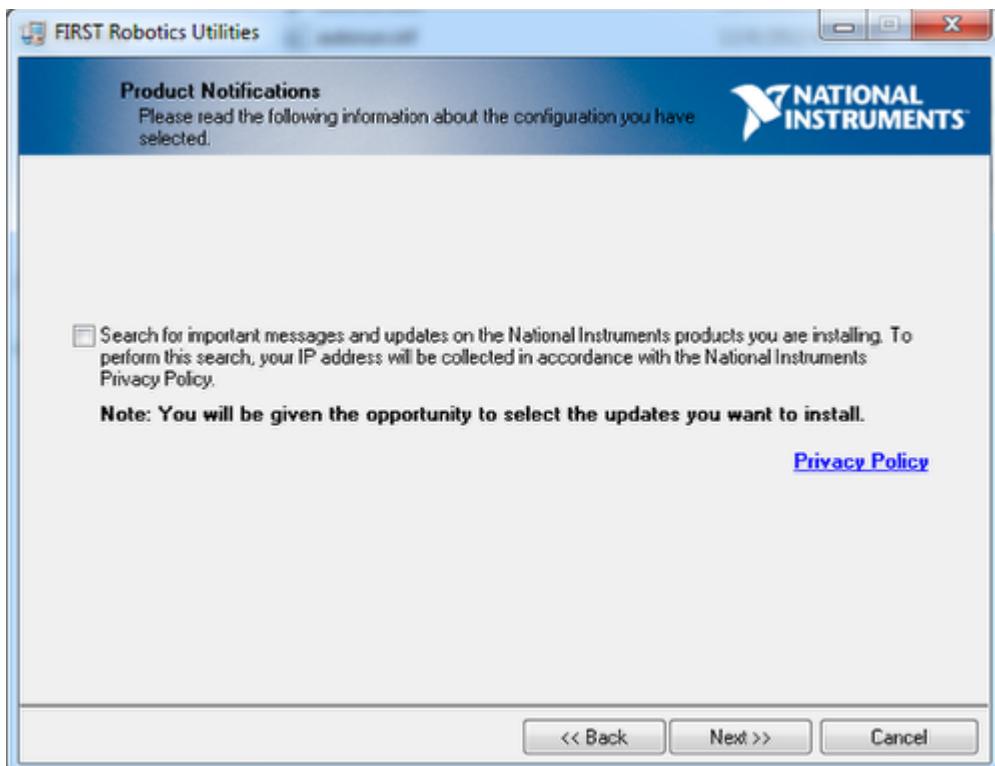
Click **Next** to continue.

Product List



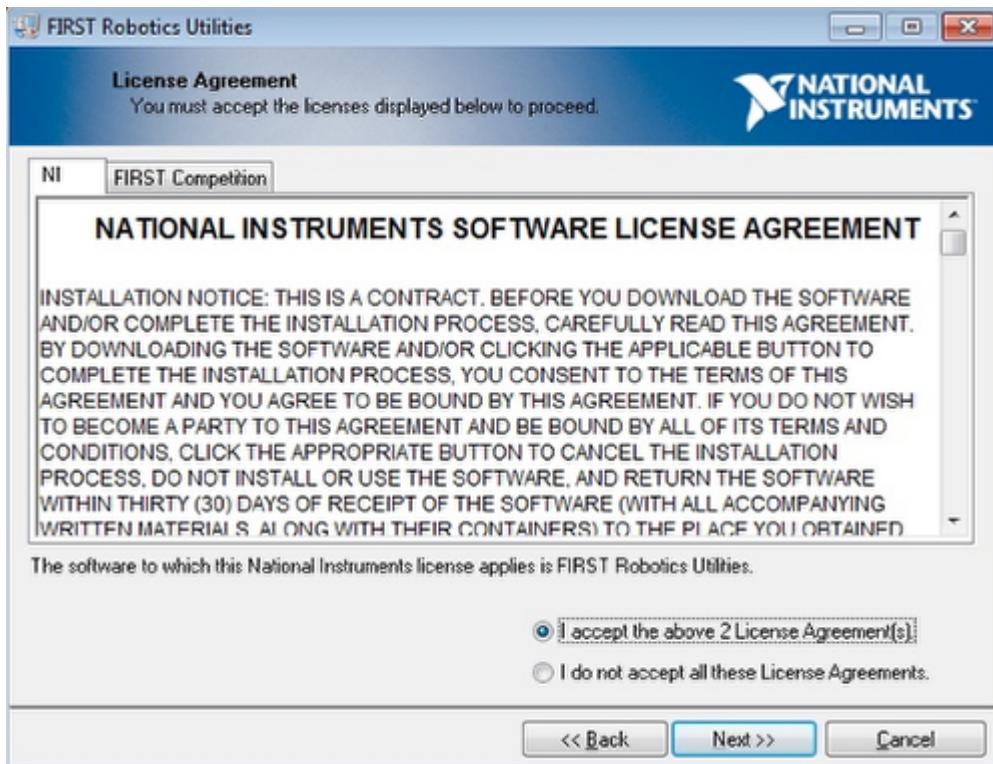
Click **Next** to continue.

Search for Updates



Uncheck the box to **Search for important....** then click **Next**.

License Agreement



Select the **I accept** bubble to accept the license agreements, then click **Next** to start the installation. When the installation completes, click **Finish** to exit the installer.

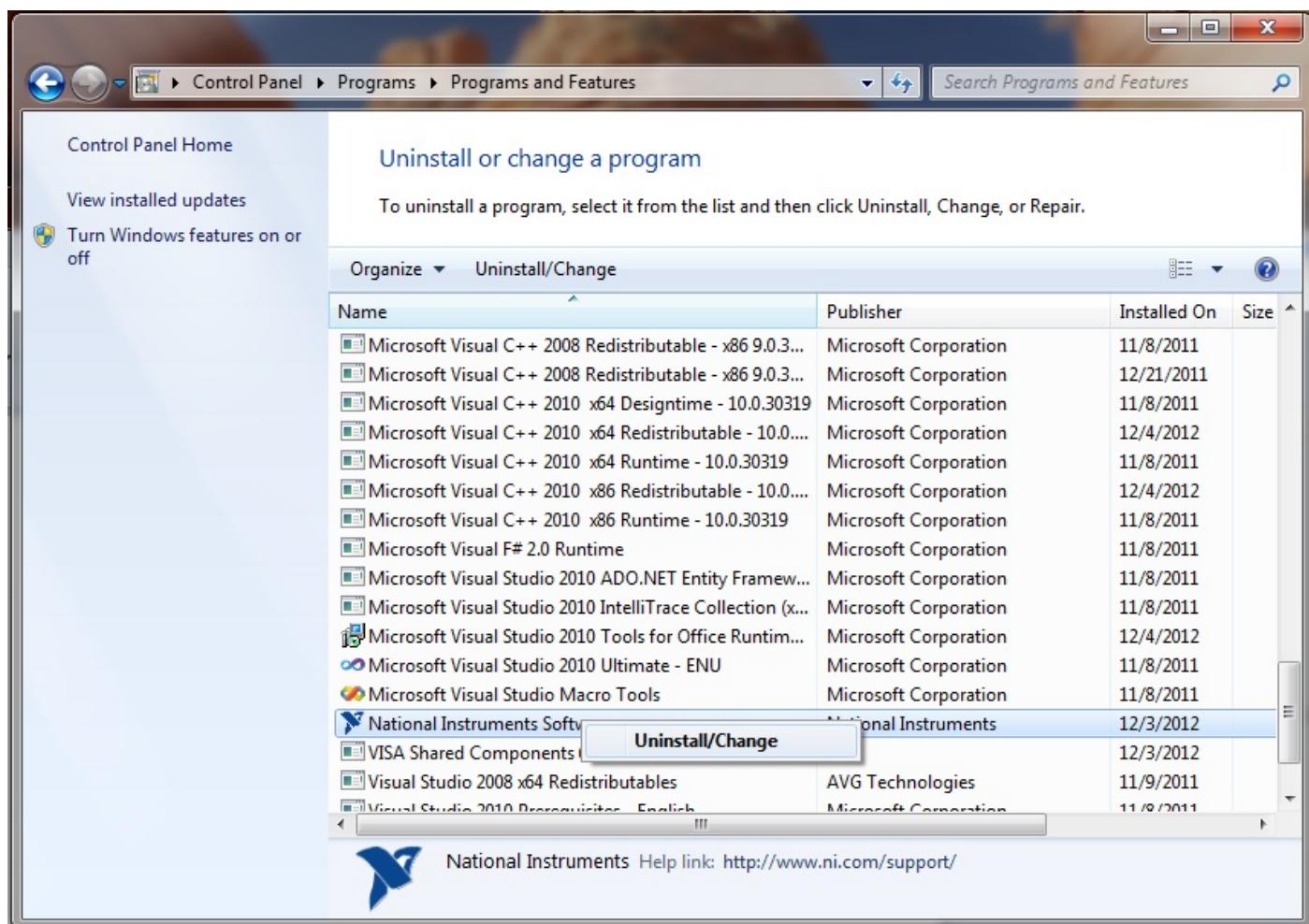
Imaging Your cRIO

Now that you have the software tools installed and updated, the next step is to [image your cRIO controller](#).

Installing the 2013 FRC Tools and Driver Station (for C++ or Java)

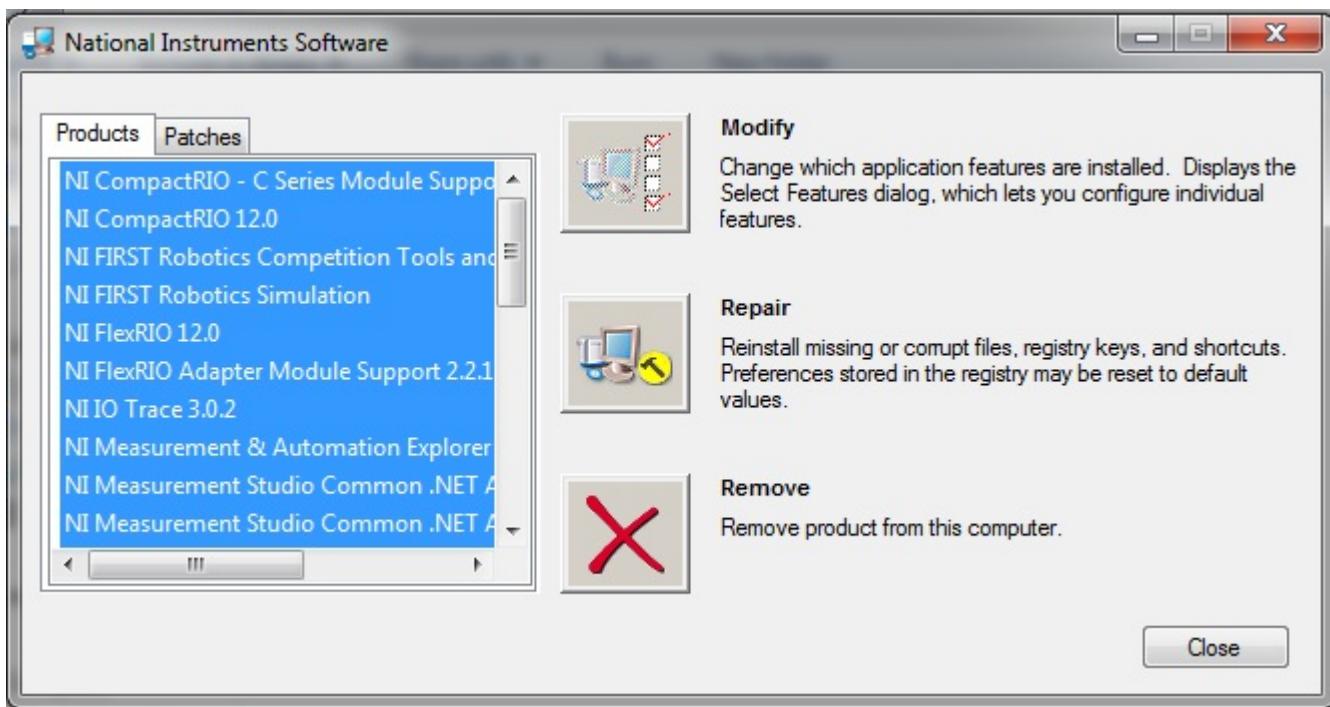
This document covers the installation of the 2013 FRC Tools including the FRC Utilities (cRIO Imaging Tool, Axis Camera Tool, NetConsole) and the FRC Driver Station. If you have not already installed the development environment see [Installing the C++ Development Tools](#) or [Installing the Java Development Tools](#), then return when complete.

Uninstall Old Versions (Optional)



Before installing the new version of LabVIEW it is recommended to remove any old versions, note that old versions will coexist with the new version, but the license for the FRC 2012 software will be expiring very shortly. Make sure to back up any team code located in the "User\LabVIEW Data" directory before uninstalling. Then click **Start >> Control Panel >> Uninstall a Program**. Locate the entry labeled "**National Instruments Software**", right-click on it and select **Uninstall/Change**.

Select Components to Uninstall



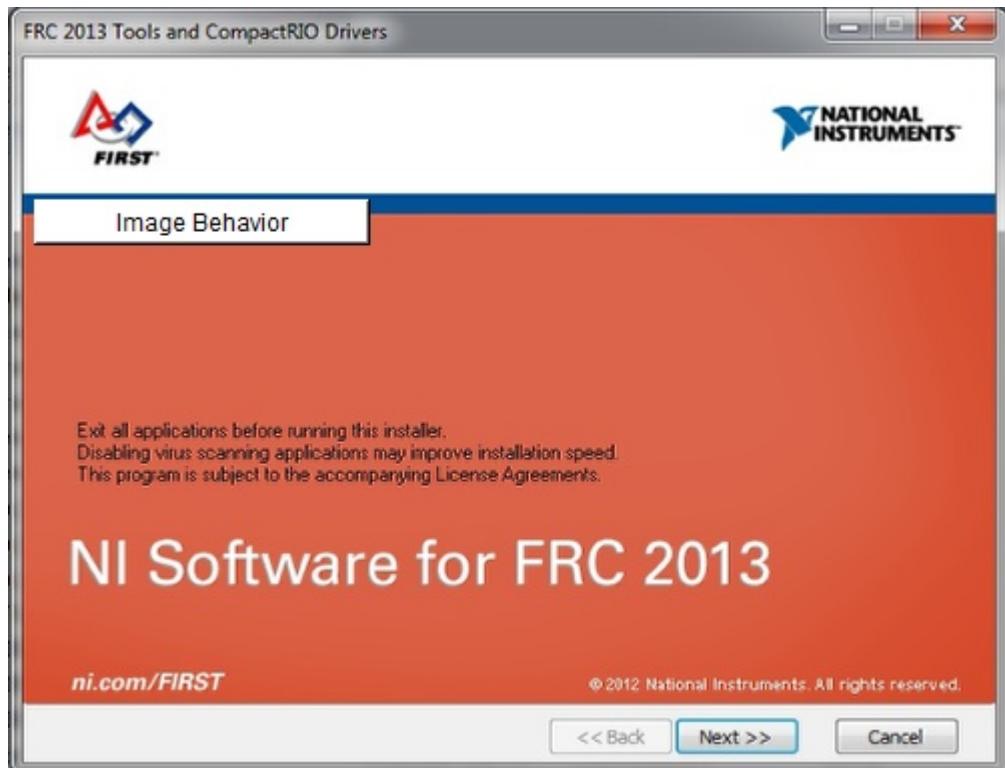
In the left pane of the dialog box that appears, **select all entries**. The easiest way to do this is to click the top entry to highlight it, then scroll down to the bottom entry, press and hold shift and click on the last entry then release shift. Click **Remove**. Wait for the uninstaller to complete and reboot if prompted.

Installing the NI Tools (Required for Imaging cRIO or running Driver Station)



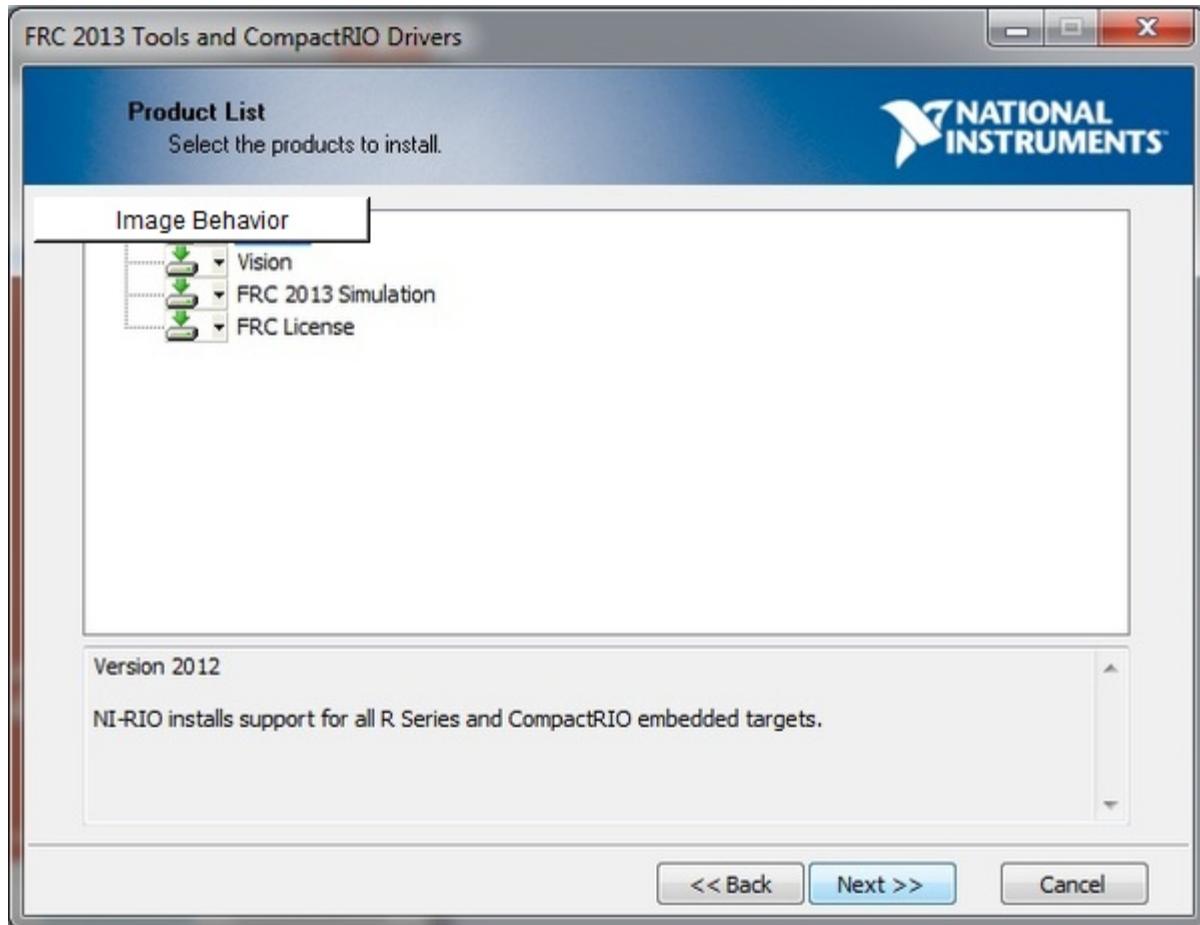
In order to work with your cRIO, you will need a number of the NI tools in addition to the C++ or Java development environment. This installation is not required on all computers used for code development, only computers used to image the cRIO or run the FRC Driver Station. The base install for these tools is located on the NI DVD found in your Kit of Parts. Insert the DVD into the drive, if the installer does not launch automatically, browse to the drive and double click on **autorun.exe**. Select the **Install Only FRC Tools** option to install the support files for the FRC utilities and Driver Station.

FRC Tools Installer



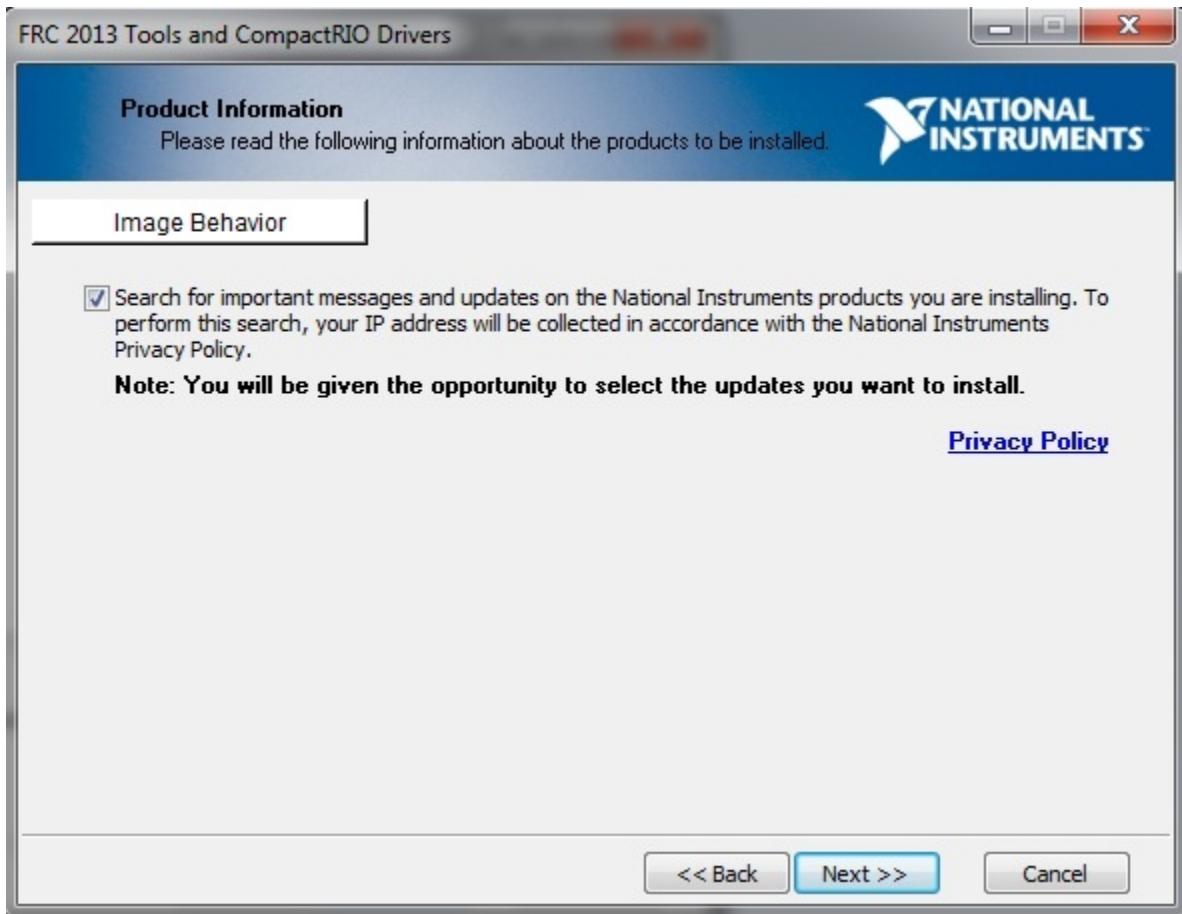
Click **Next** to advance.

Items to Install



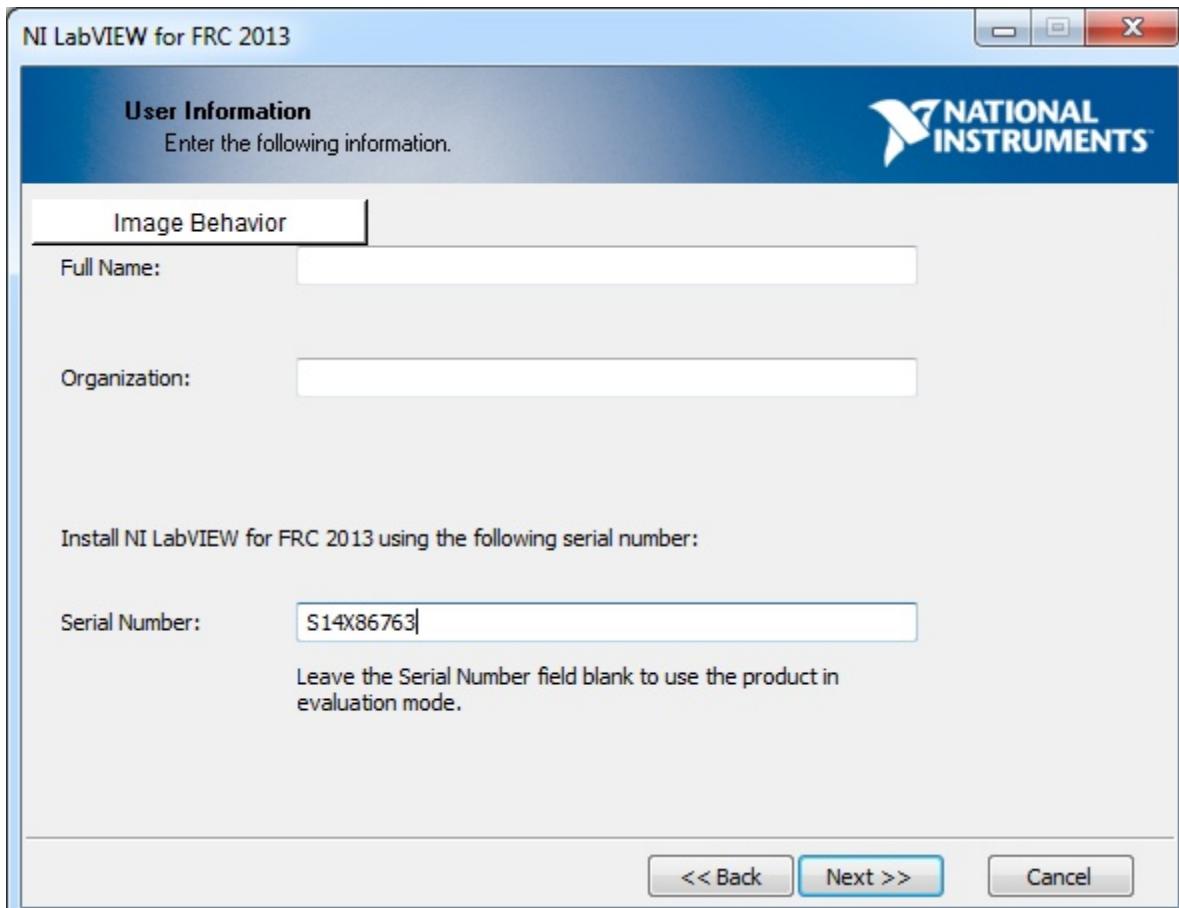
This screen displays the items to be installed. Click **Next** to continue.

Search for Updates



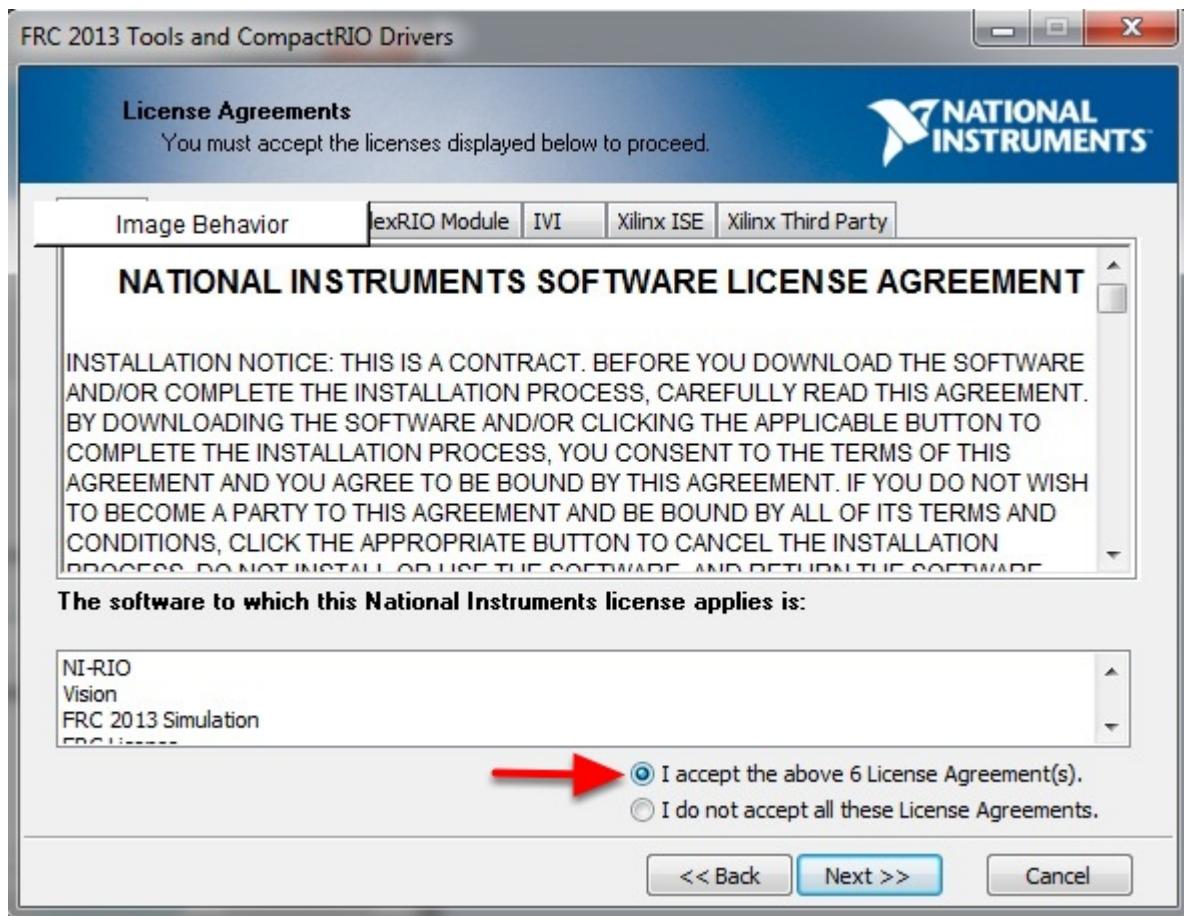
You may uncheck the box on this page before clicking **Next**. Leaving the box checked will not cause any issues, but an additional screen will be displayed where the installer checks for updates.

Enter Serial Number



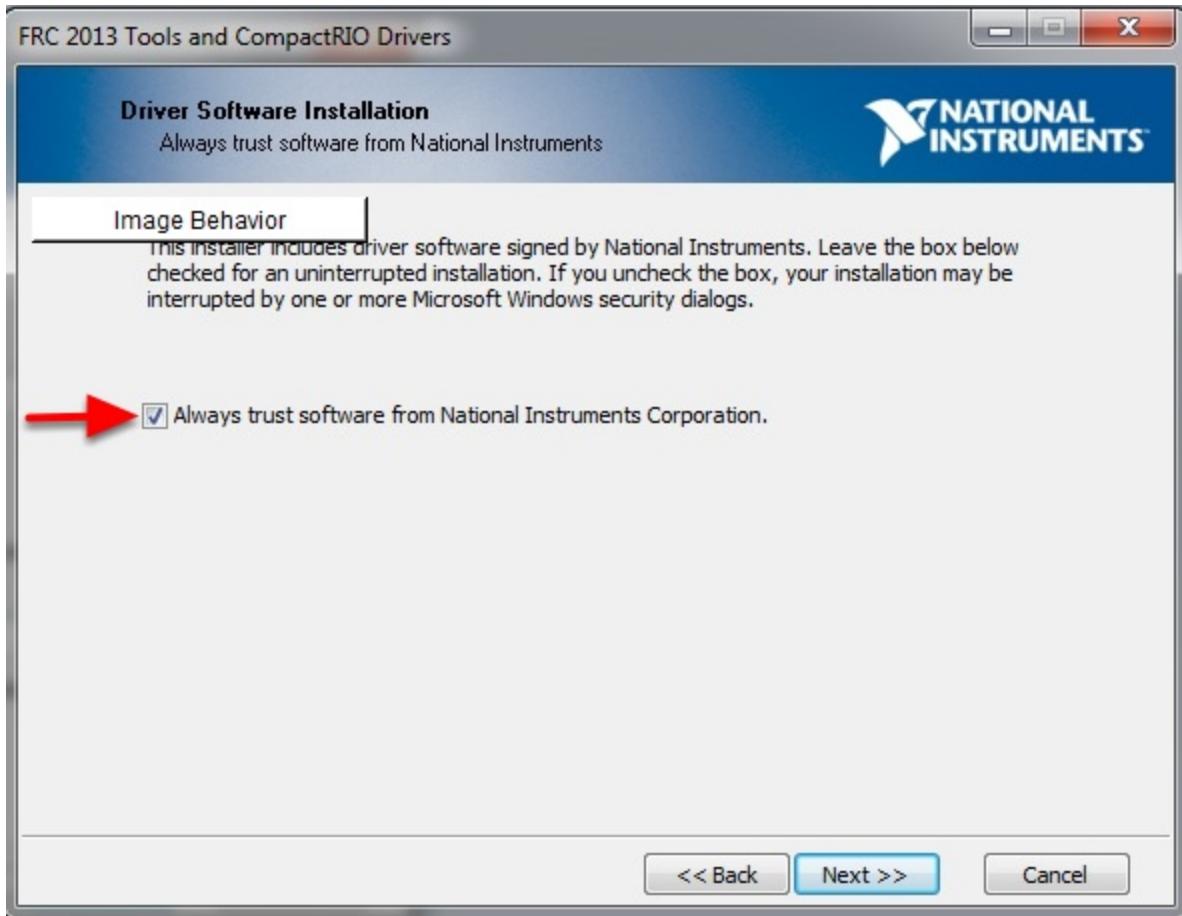
Enter your name, your organization and the FRC 2013 Serial Number, provided on a card included with the LabVIEW DVD into the boxes, then click **Next**.

License Agreements



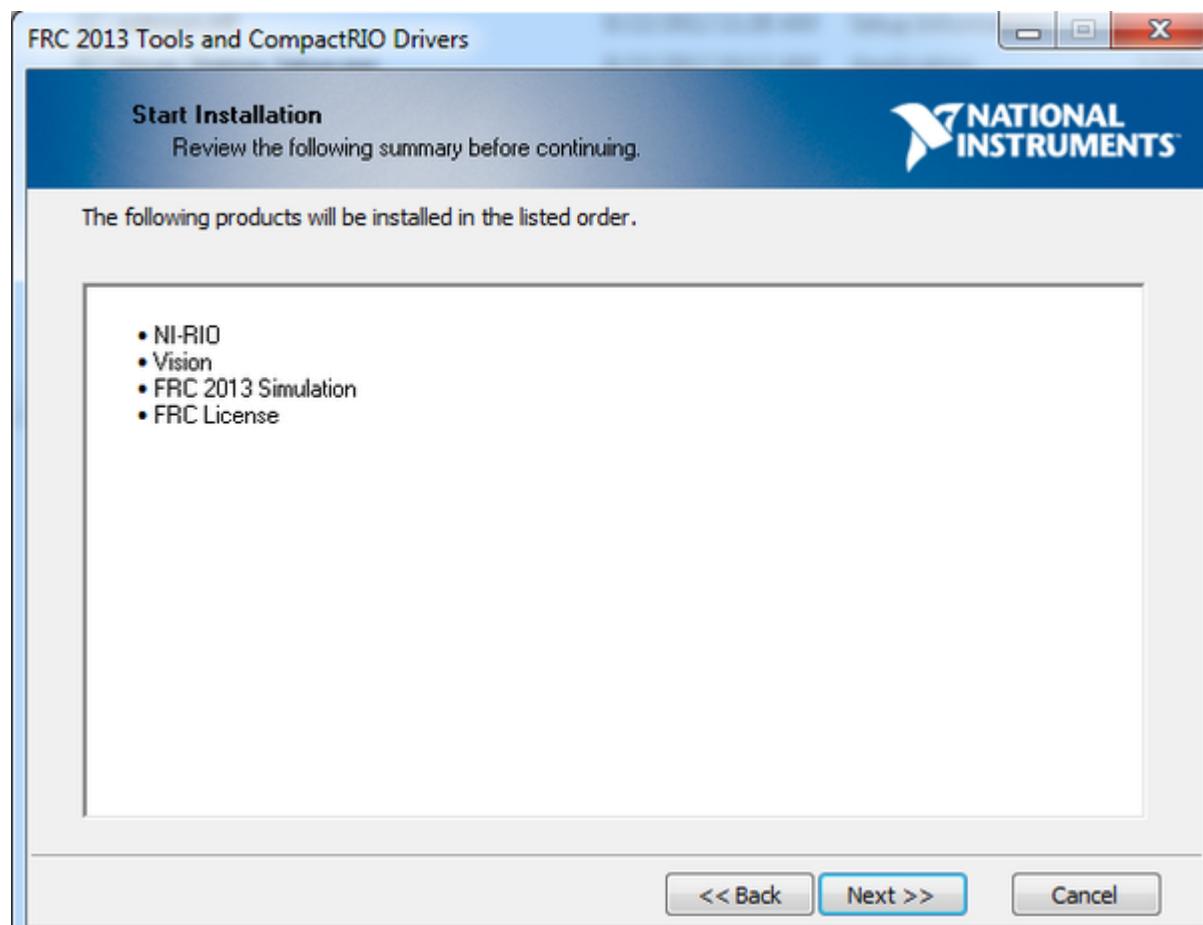
Click the bubble next to "I accept...." indicating that you accept the license agreements displayed on each tab, then click **Next**. Do the same on the next page which presents additional license agreements.

Trust Software



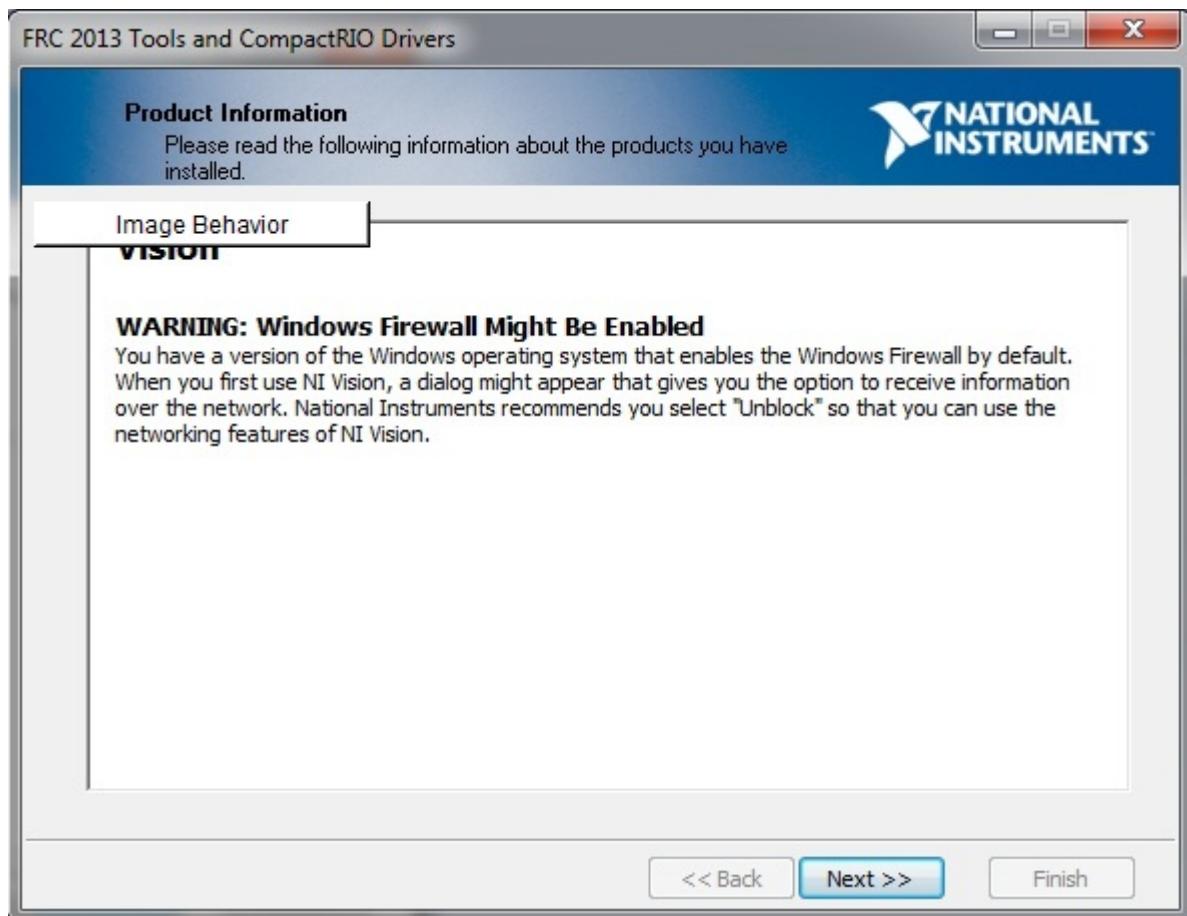
Make sure the box is checked to **Always trust software...** Then click **Next**.

Start Installation



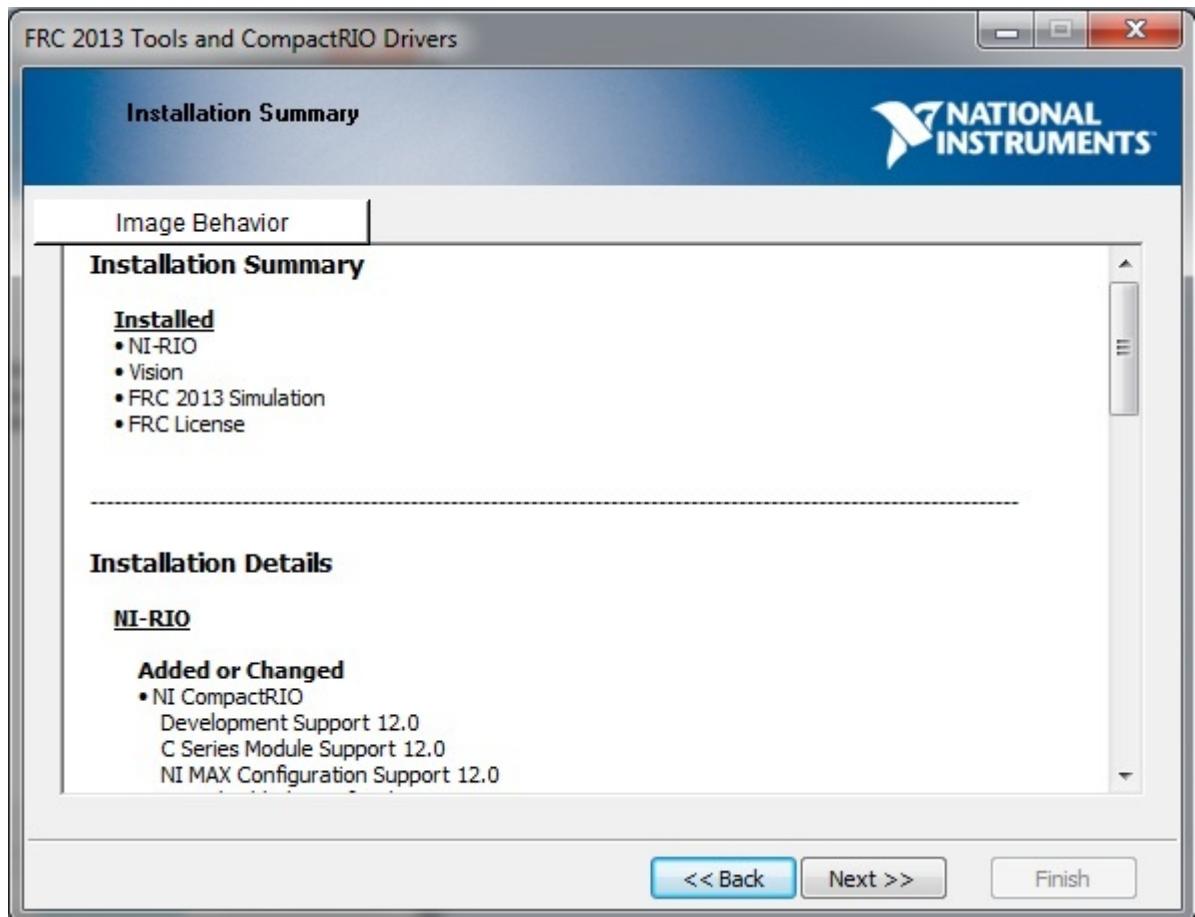
Click **Next** to start the installation.

Firewall Warning



Click **Next** to advance through the Windows Firewall screen.

Installation Complete



Click **Next** to continue, then **Finish** to exit the installer.

NI Utilities Update (Required to Image cRIO)



FRC Utilities

➤ **Install FRC Utilities**

[View Readme](#)

[Browse the Media](#)

[Exit](#)

FRC 2013 Tools Update

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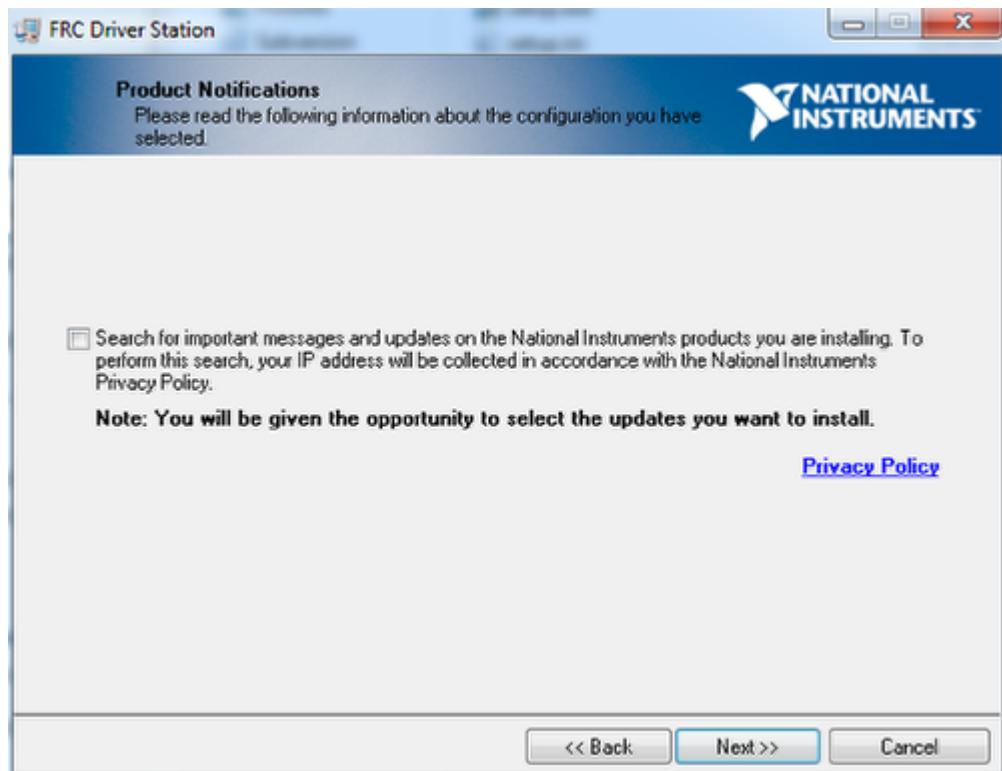
The previous installation steps installed the support files needed for the NI FRC Utilities, but the Utilities themselves are contained in a separate update for release timing purposes. This installation is required to re-image your cRIO. Go [here](#) to download the FRC Utilities Update. Unzip the downloaded file, then locate and double-click **autorun.exe**. Click **Install FRC Utilities** to continue. If you see a security dialog pop-up, click **Yes**.

Utilities Update Installer



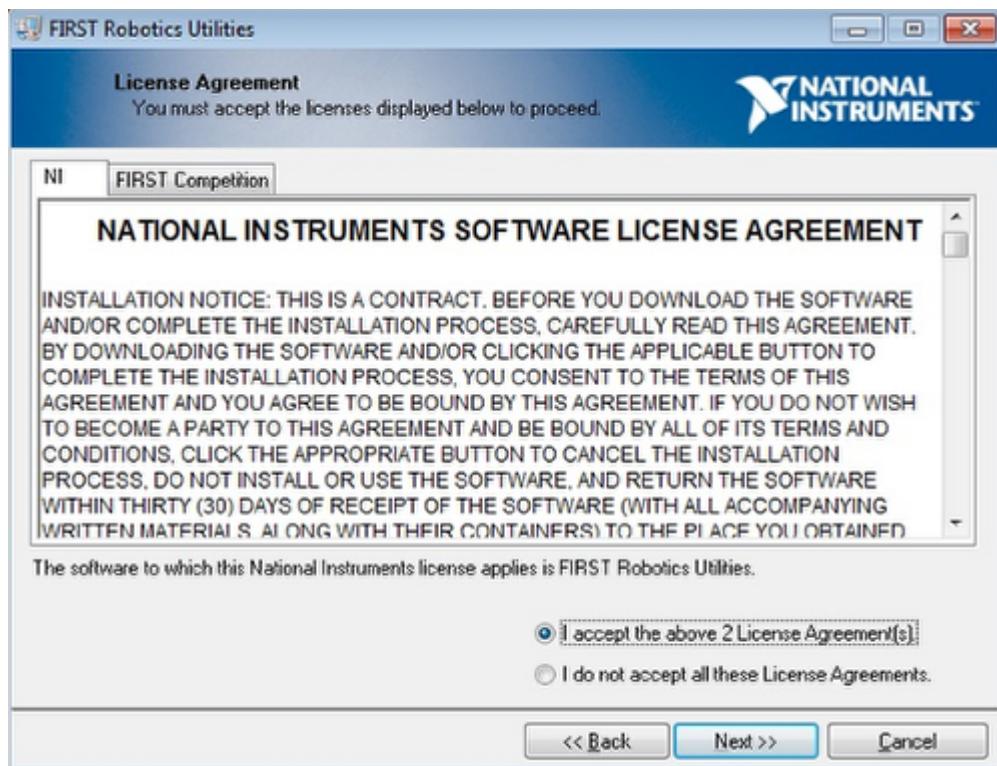
Click **Next** to continue.

Search for Updates



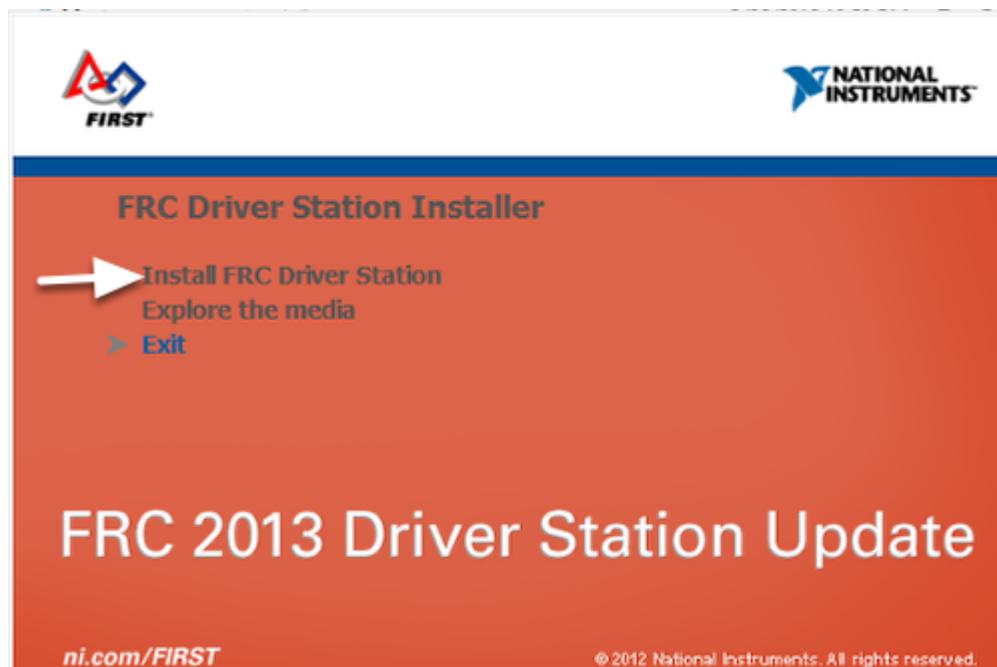
Uncheck the box to **Search for important....** then click **Next**.

License Agreement



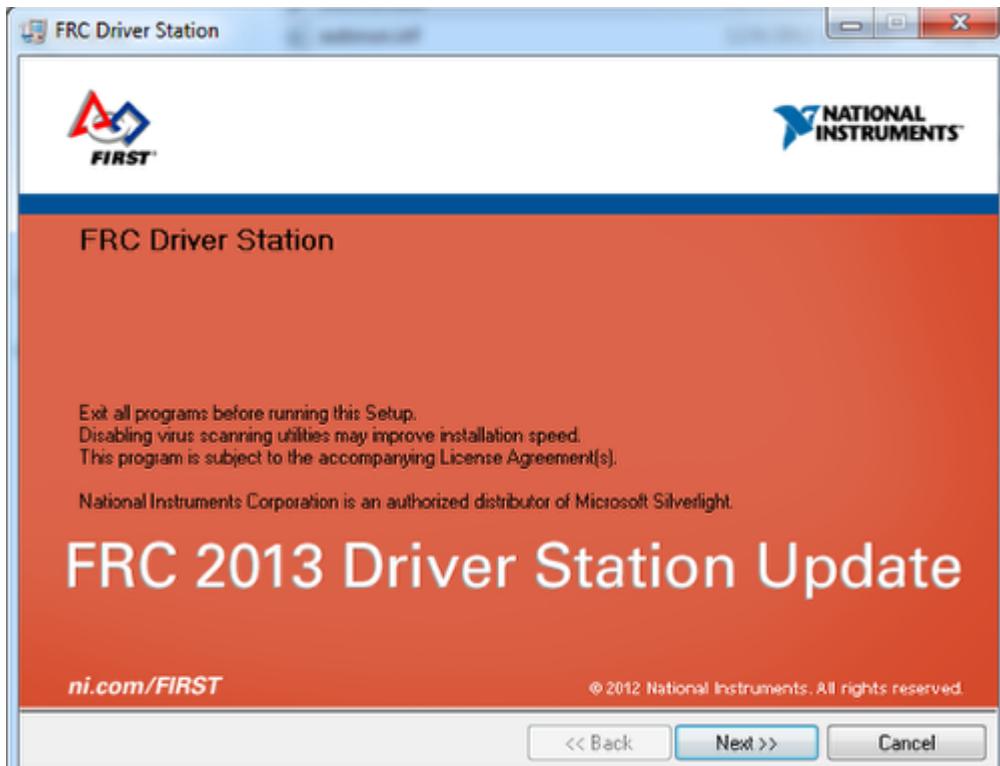
Select the **I accept** bubble to accept the license agreements, then click **Next** to start the installation. When the installation completes, click **Finish** to exit the installer.

FRC Driver Station Update (Required to Control Robot)



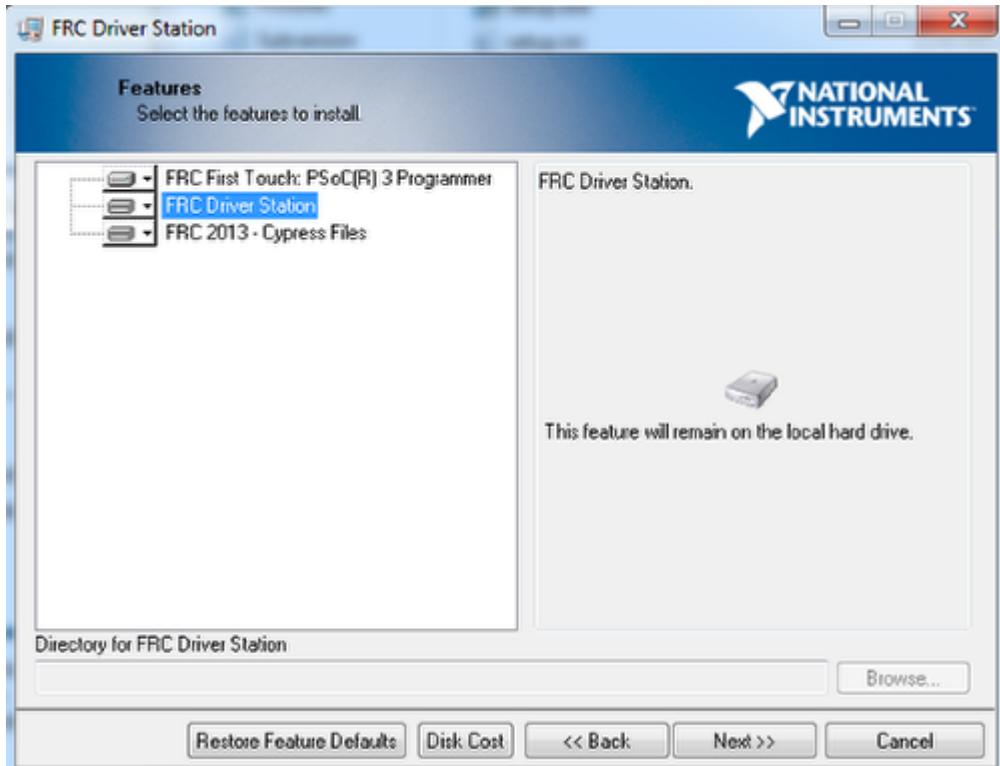
The NI Tools install installs the support files for the FRC Driver Station, the Driver Station program itself is contained in a separate update for release timing purposes. Go [here](#) to download the FRC Driver Station Update. Unzip the downloaded file, then locate and double-click **autorun.exe**. Click **Install Driver Station** to continue. If you see a security dialog pop-up, click **Yes**.

Driver Station Installer



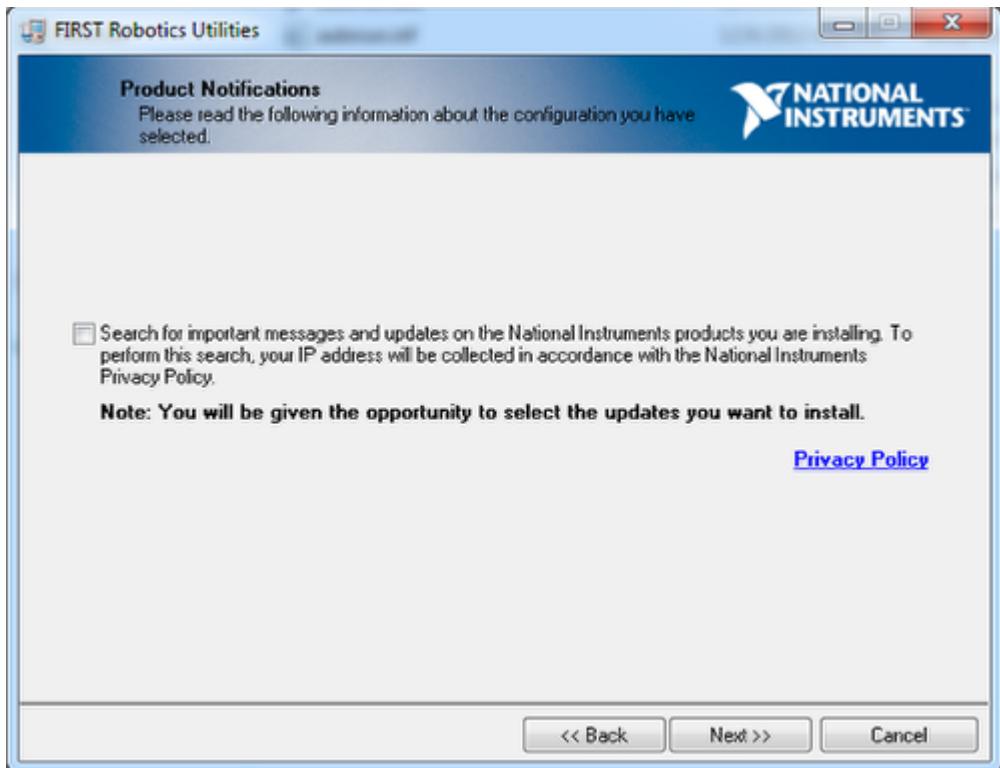
Click **Next** to continue.

Install Options



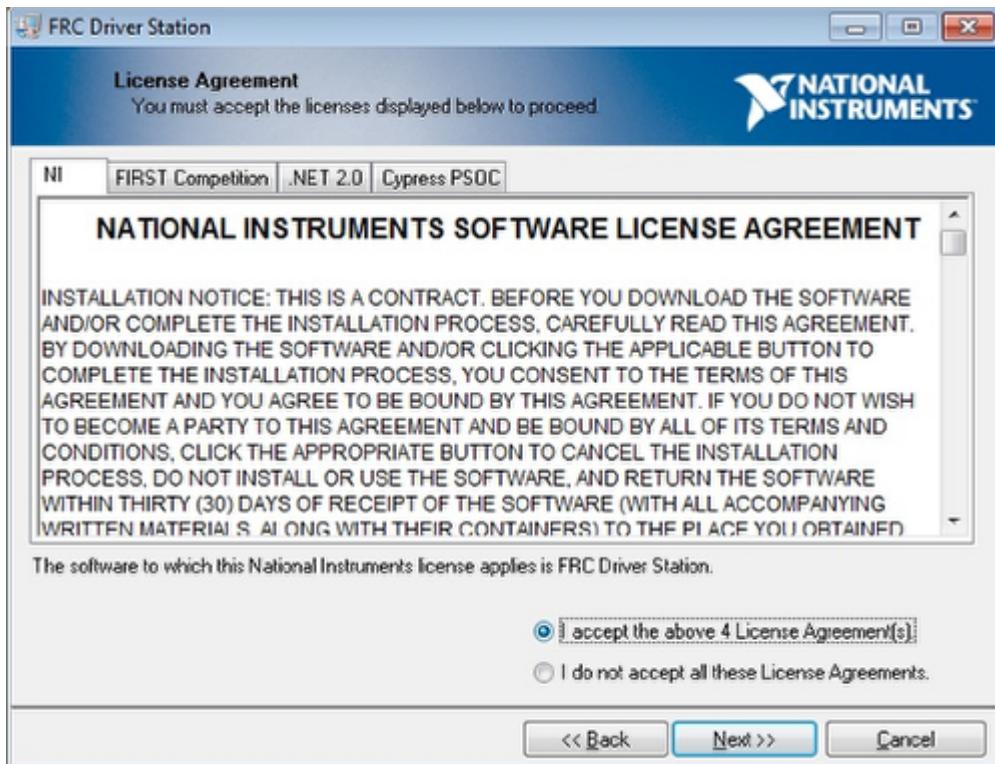
Leave the install options at the defaults and click **Next**.

Search for Updates



Uncheck the box to **Search for important....** then click **Next** to start the installation. When the installation completes, click **Finish** to exit the installer.

License Agreement



Click "**I accept the License Agreement.**" to accept the terms of the license agreements shown, then click **Next**. When the installation completes, click **Finish** to exit the installer.

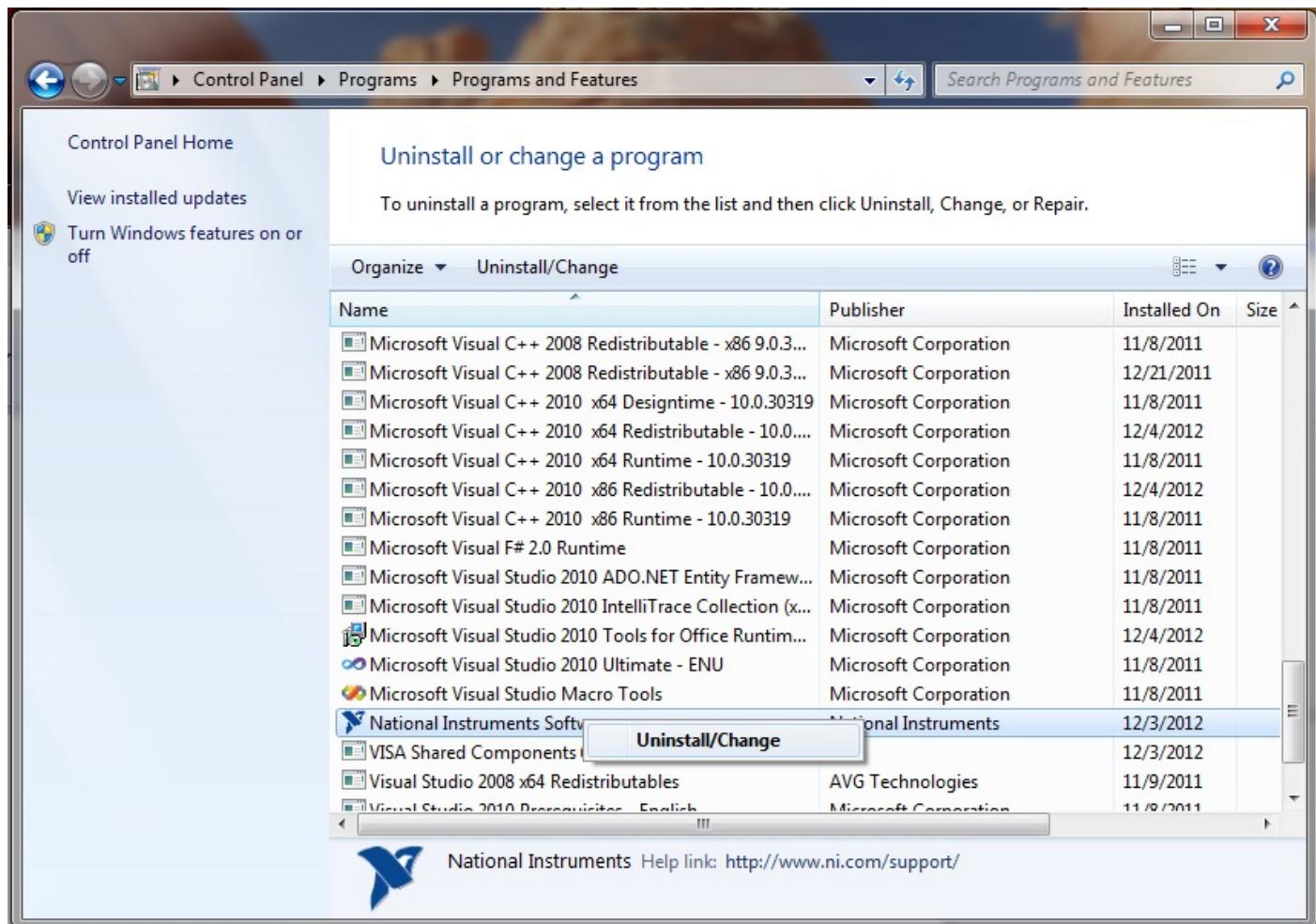
Imaging Your cRIO

Now that you have the software tools installed and updated, the next step is to [image your cRIO controller](#).

Installing the 2013 FRC Driver Station (for Standalone Driver Stations)

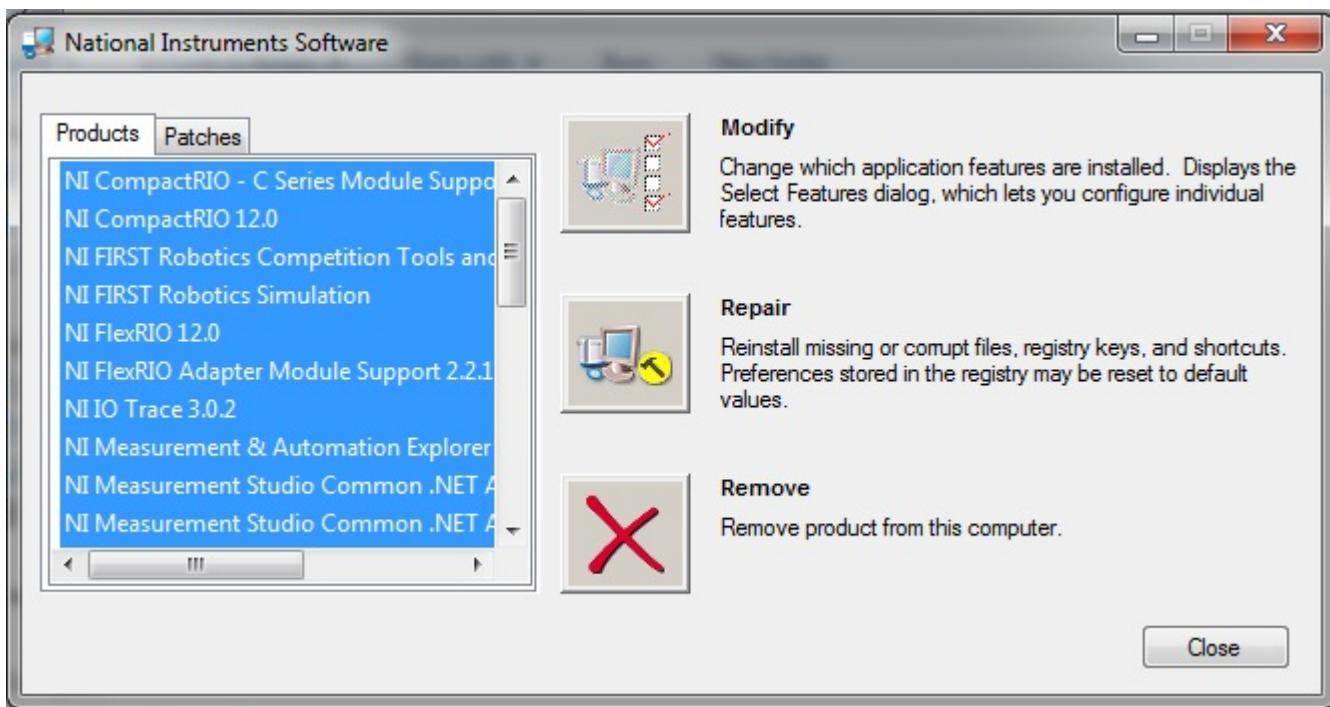
This document details the procedure for installing the FRC Driver Station on a standalone machine, without any of the development tools. For installing the Driver Station with LabVIEW, see [here](#). For installing the Driver Station with the FRC Tools for C++ or Java programming, see [here](#).

Uninstall Old Versions (Optional)



Before installing the new version of LabVIEW it is recommended to remove any old versions, note that old versions will coexist with the new version, but the license for the FRC 2012 software will be expiring very shortly. Make sure to back up any team code located in the "User\LabVIEW Data" directory before uninstalling. Then click **Start >> Control Panel >> Uninstall a Program**. Locate the entry labeled "**National Instruments Software**", right-click on it and select **Uninstall/Change**.

Select Components to Uninstall



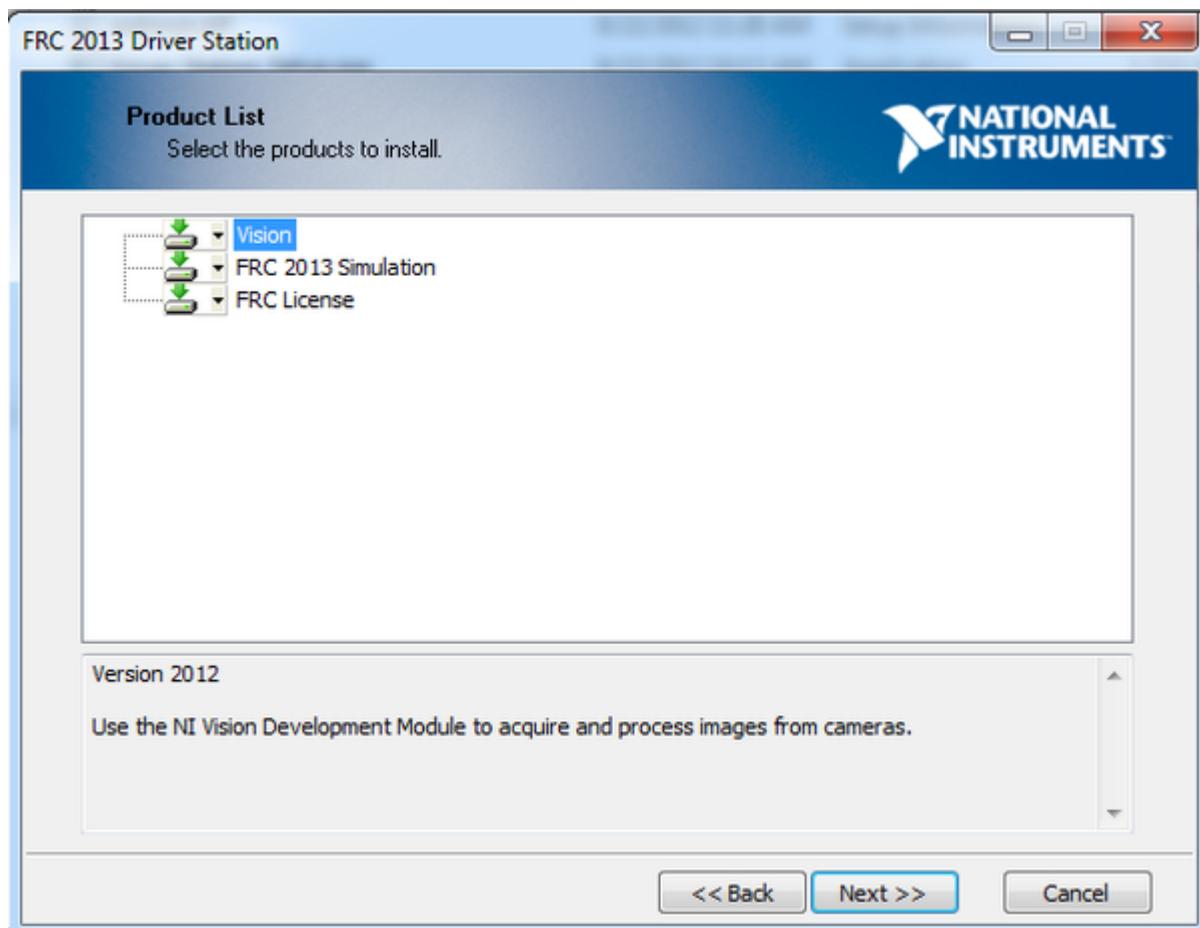
In the left pane of the dialog box that appears, **select all entries**. The easiest way to do this is to click the top entry to highlight it, then scroll down to the bottom entry, press and hold shift and click on the last entry then release shift. Click **Remove**. Wait for the uninstaller to complete and reboot if prompted.

Installing the Driver Station Support Files



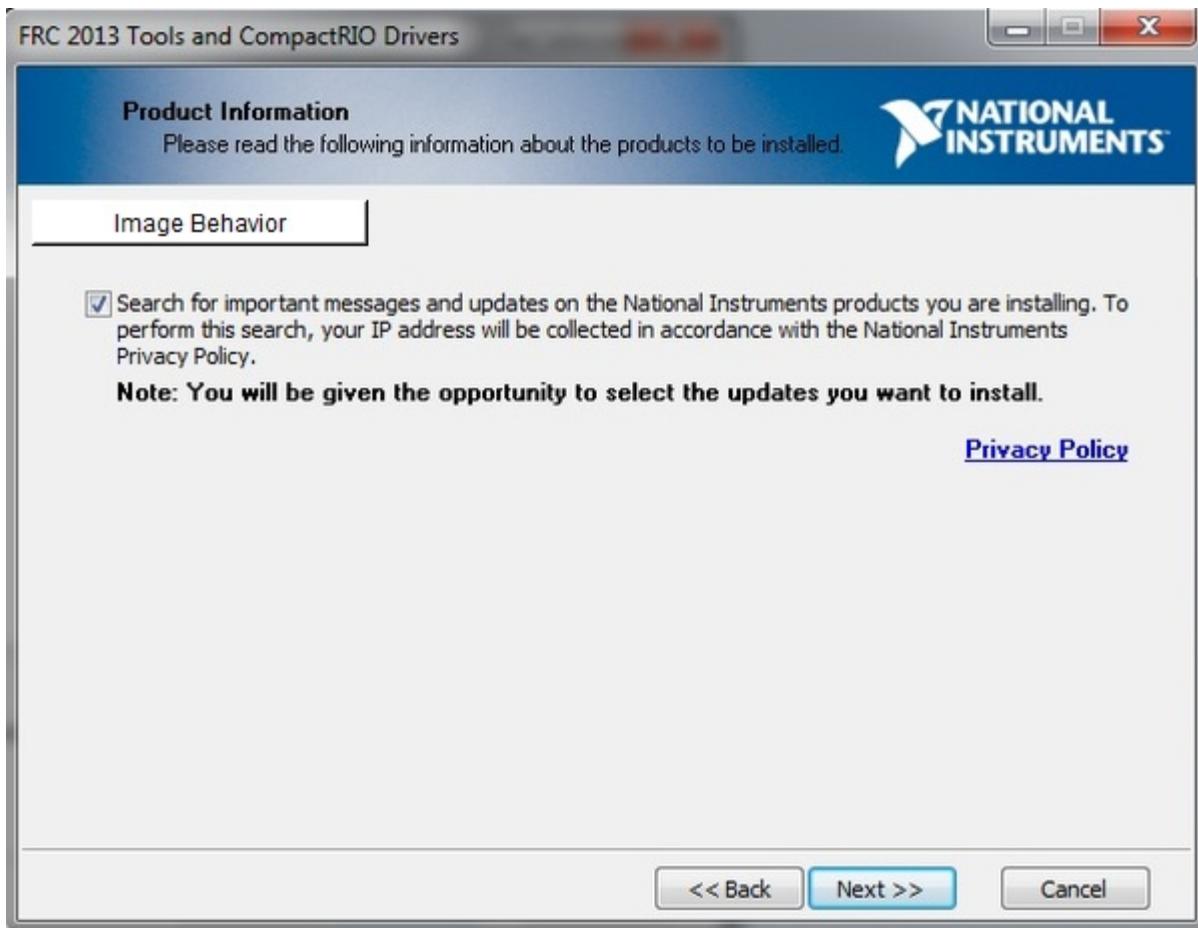
The base install for the FRC Driver Station is located on the NI DVD found in your Kit of Parts. Insert the DVD into the drive, if the installer does not launch automatically, browse to the drive and double click on **autorun.exe**. Select the **Install Only Driver Station Support** option to install the support files for the Driver Station..

Items to Install



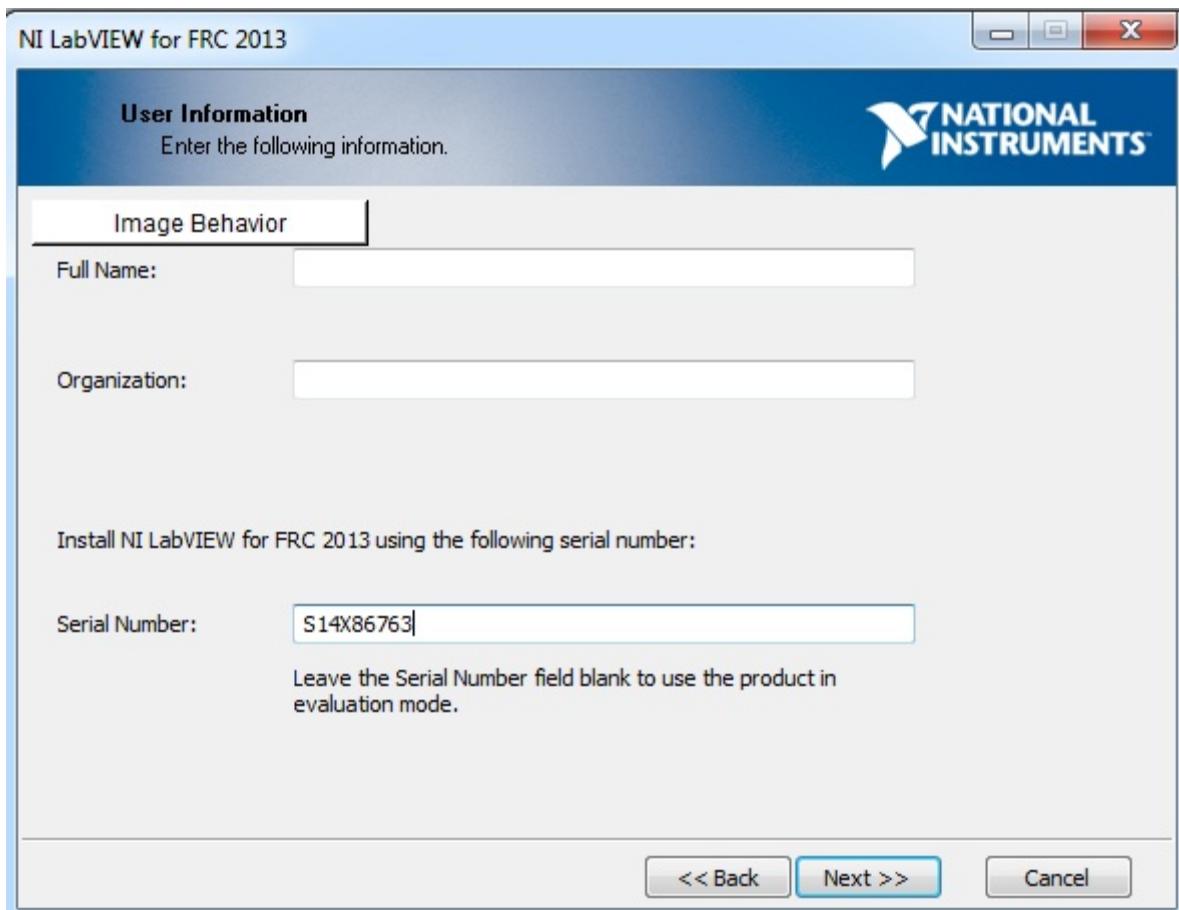
This screen displays the items to be installed. Click **Next** to continue.

Search for Updates



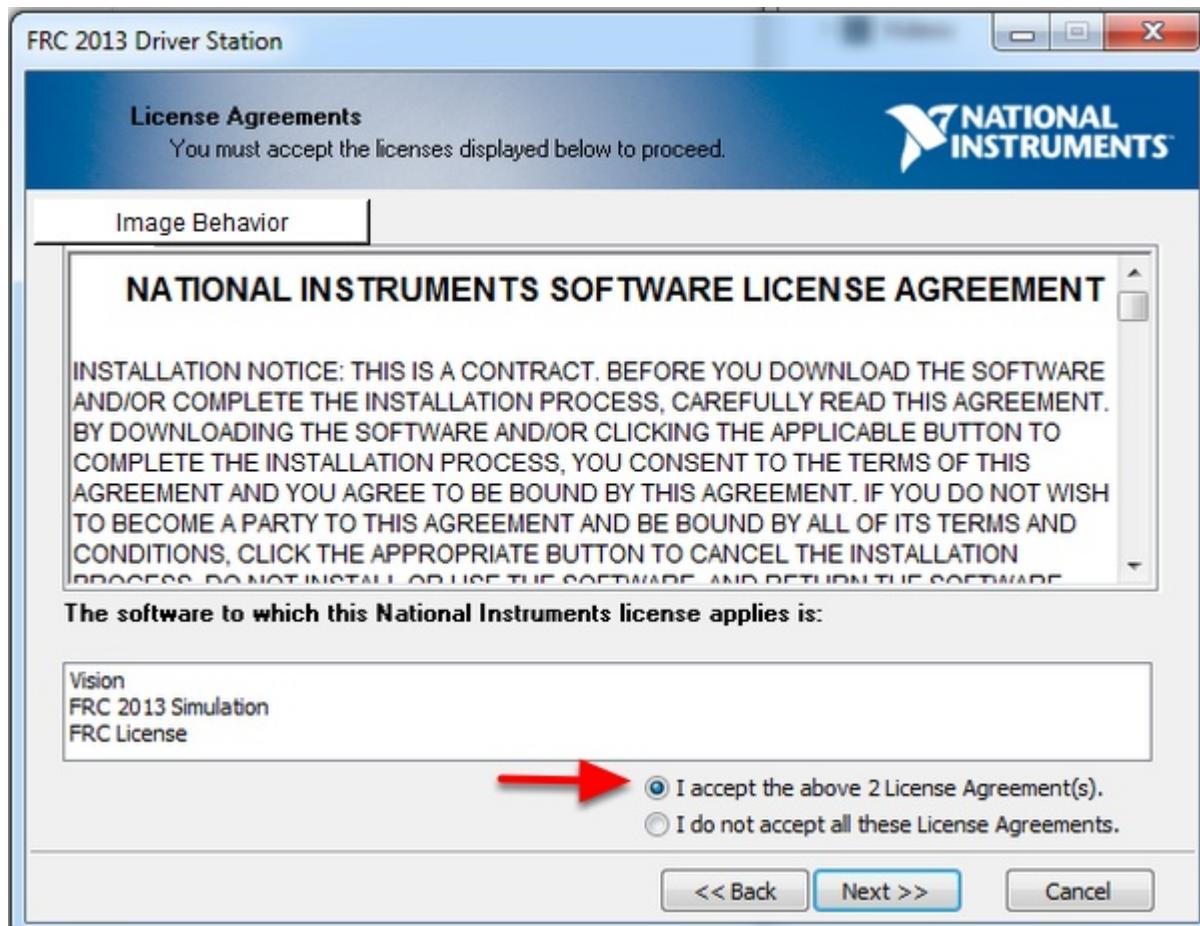
You may uncheck the box on this page before clicking **Next**. Leaving the box checked will not cause any issues, but an additional screen will be displayed where the installer checks for updates.

Enter Serial Number



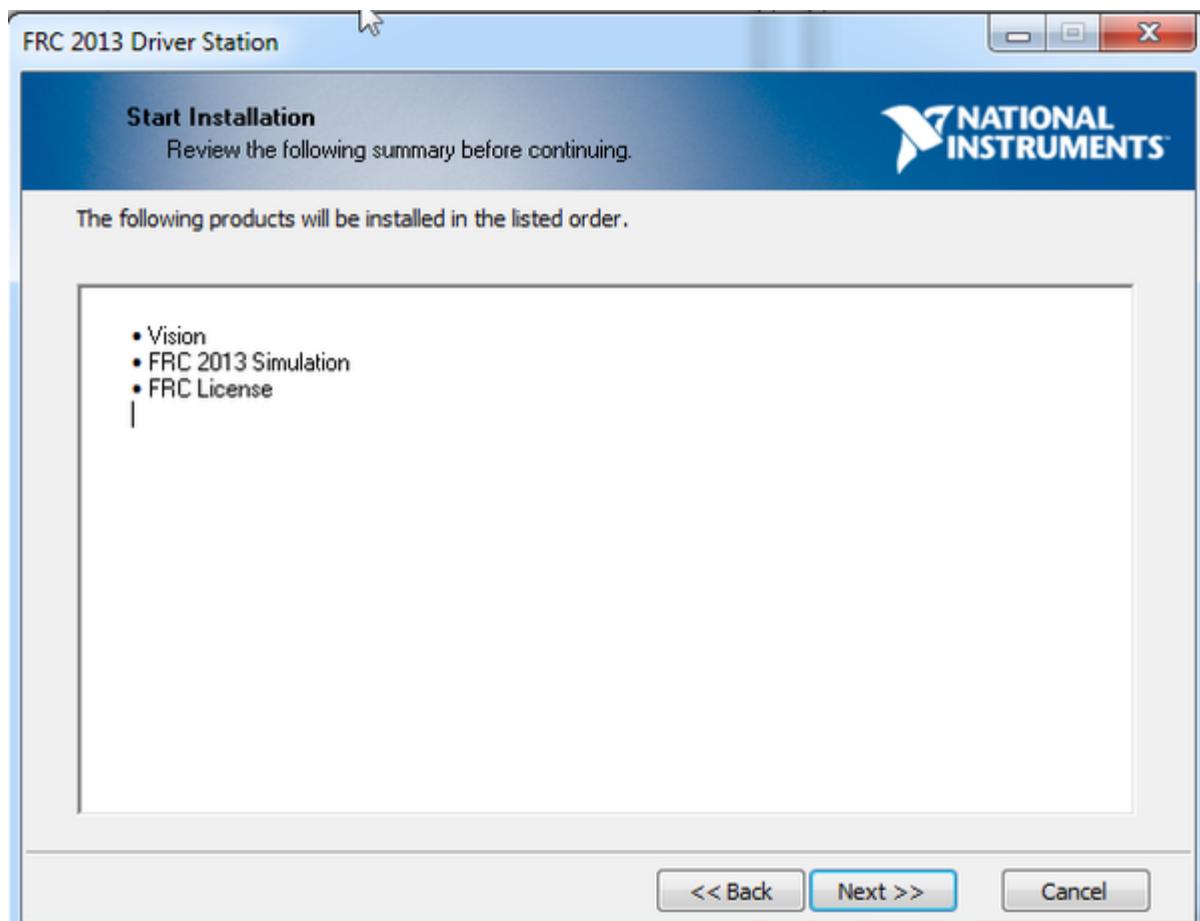
Enter your name, your organization and the FRC 2013 Serial Number from the card included with the LabVIEW DVD into the boxes, then click **Next**.

License Agreements



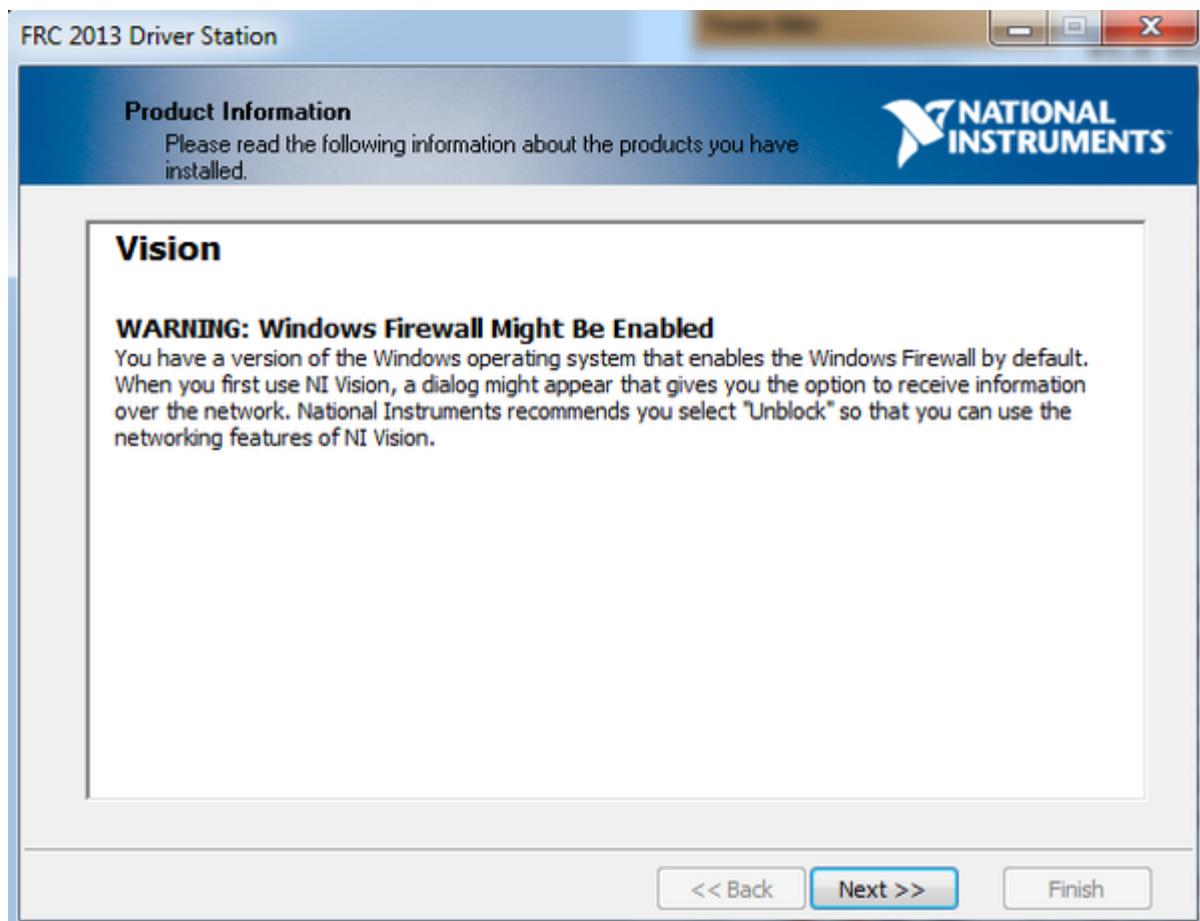
Click the bubble next to "I accept...." indicating that you accept the license agreements displayed on each tab, then click **Next**. Do the same on the next page which presents additional license agreements.

Start Installation



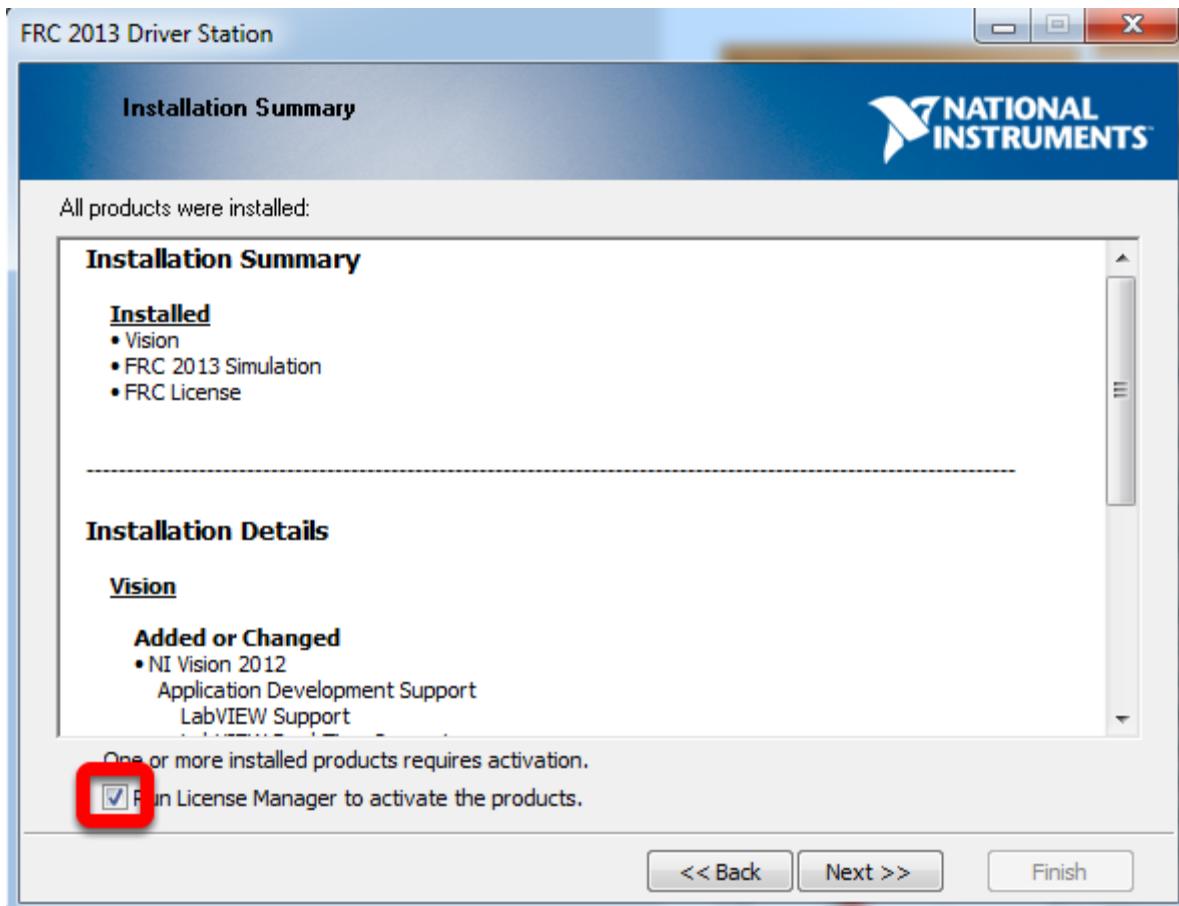
Click **Next** to continue.

Firewall Warning



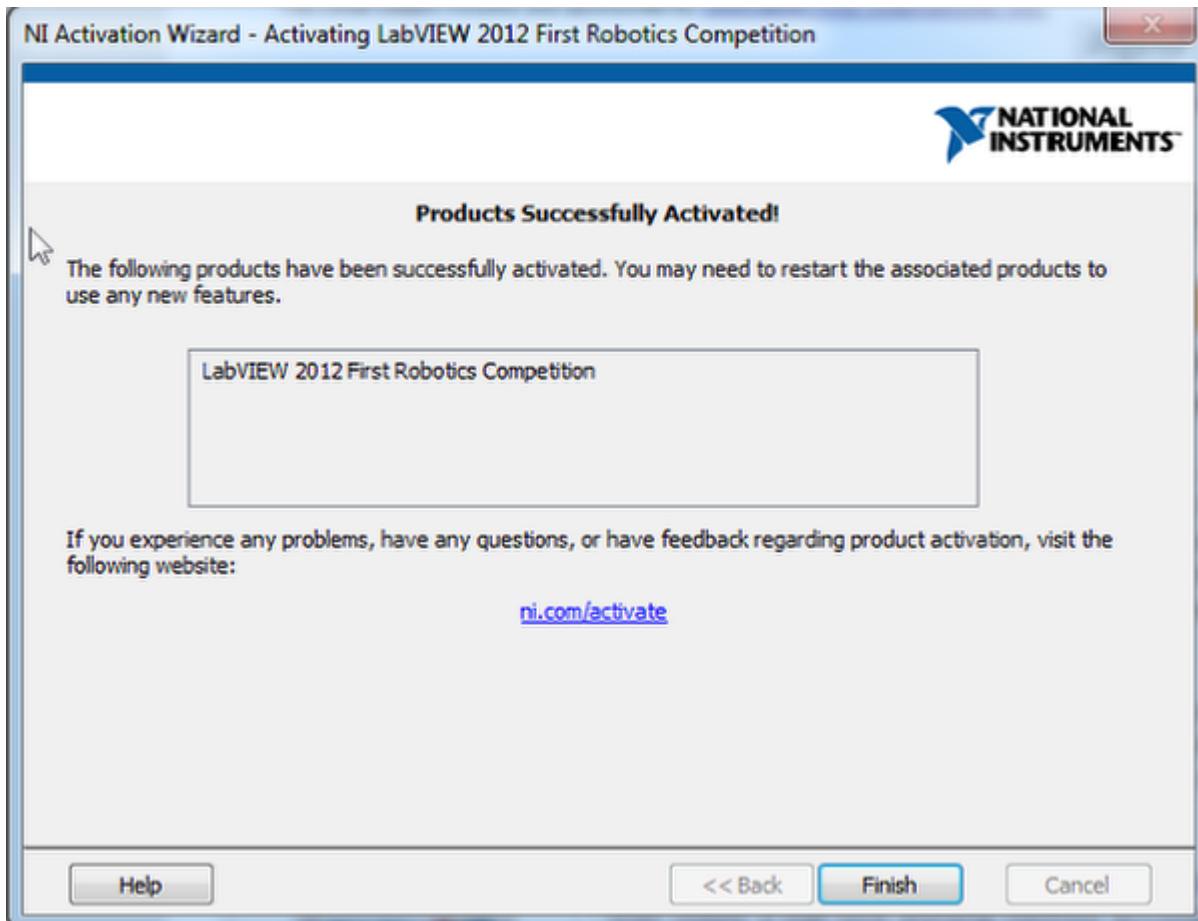
Click **Next** to advance through the Windows Firewall screen.

Installation Summary



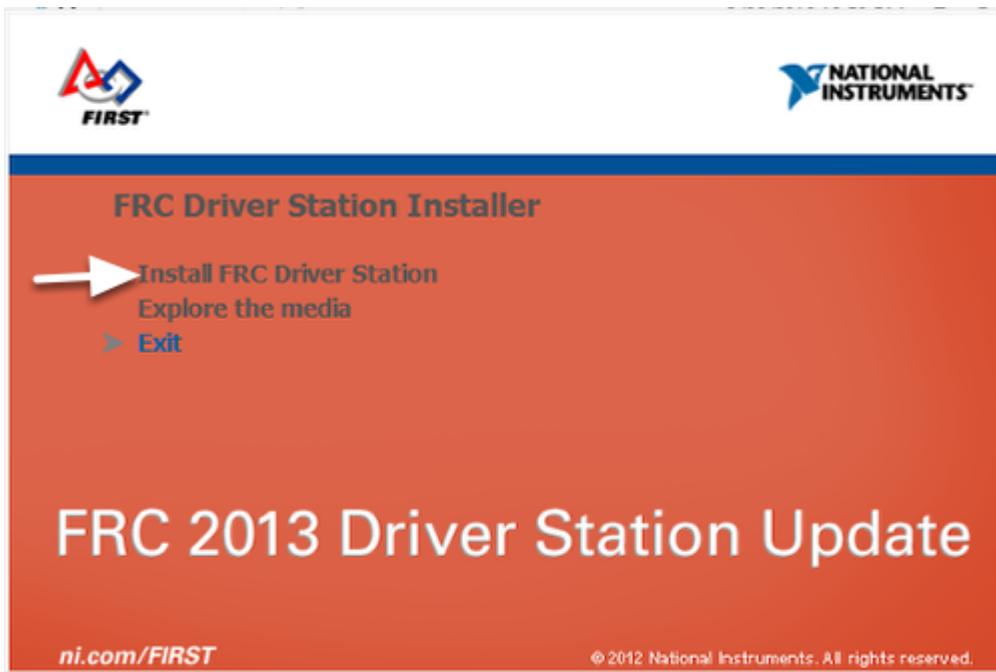
Make sure the checkbox is checked to **Run License Manager to activate the products**. Check that your computer is connected to the internet, then click **Next** to run the License Manager.

Installation Complete



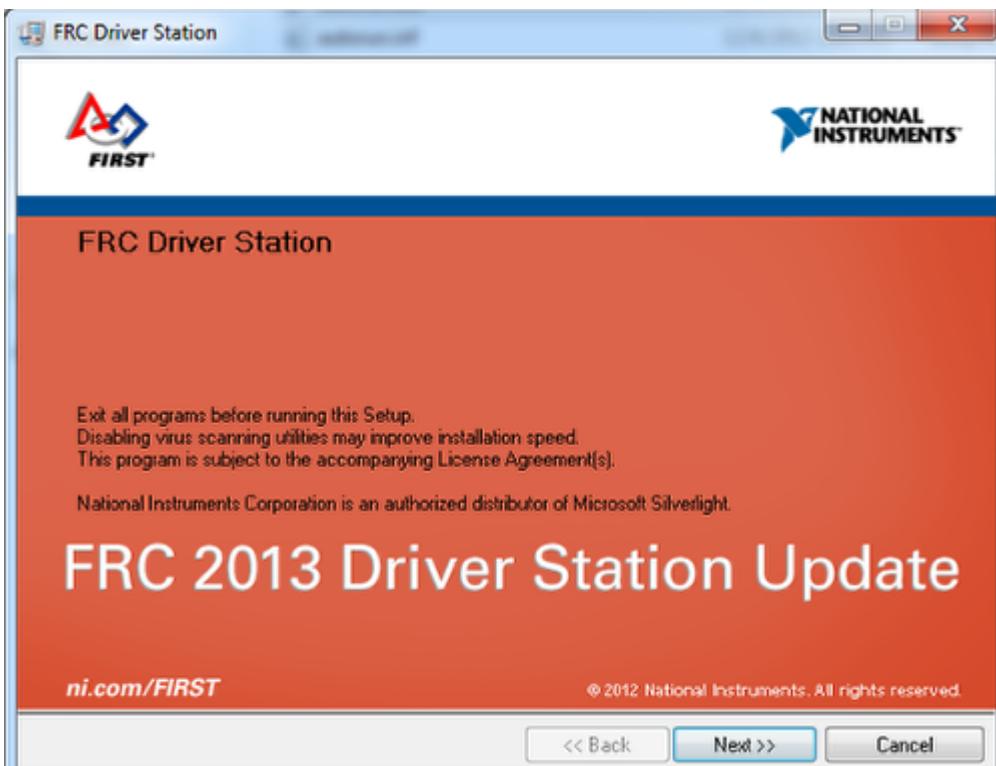
After the License Manager completes, you should see this screen indicating that the product was activated successfully. Click **Finish** to exit the installer.

FRC Driver Station Update (Required to Control Robot)



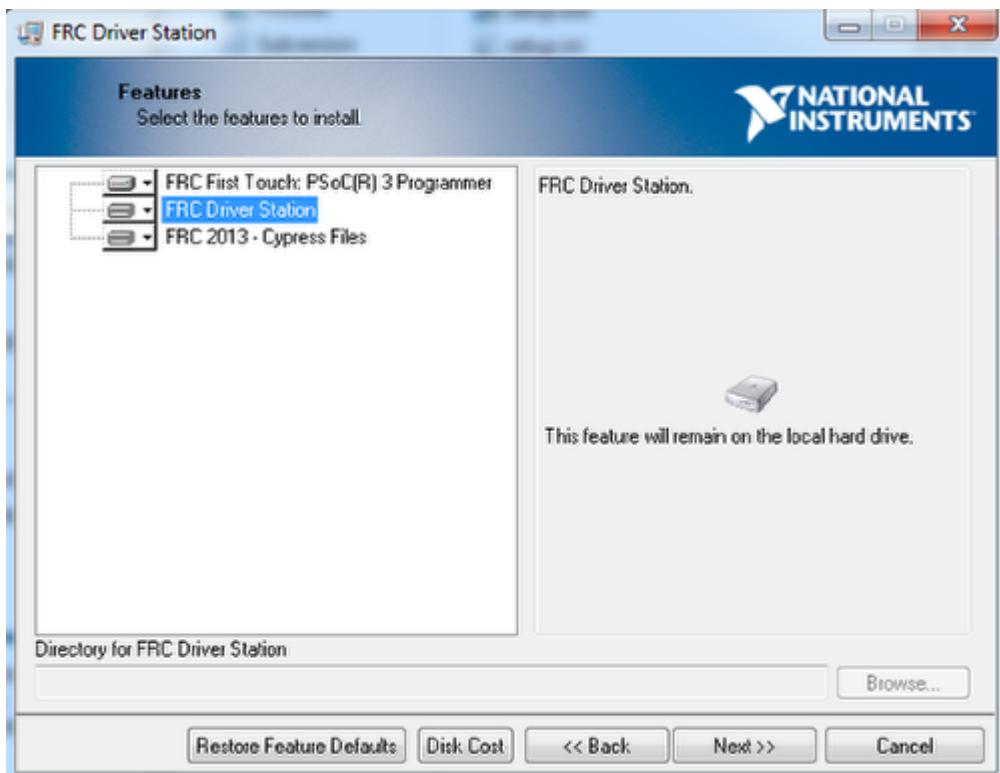
The Driver Station Support install installs the support files for the FRC Driver Station, the Driver Station program itself is contained in a separate update for release timing purposes. Go [here](#) to download the FRC Driver Station Update. Unzip the downloaded file, then locate and double-click autorun.exe. Click **Install Driver Station** to continue. If you see a security dialog pop-up, click Yes.

Driver Station Installer



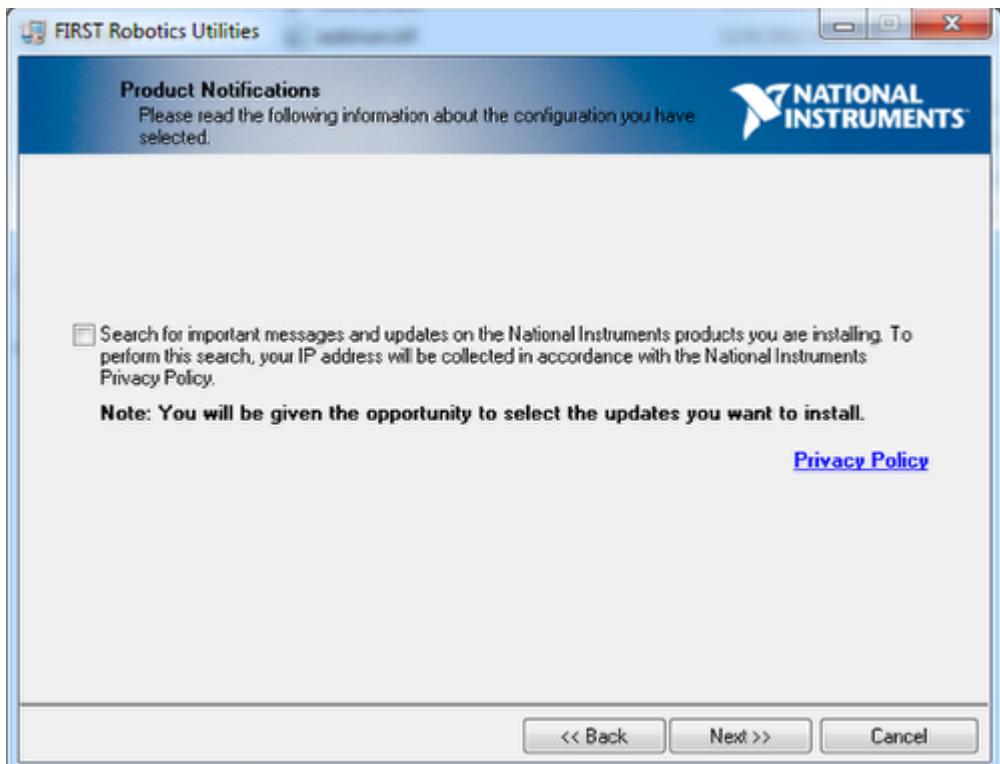
Click **Next** to continue.

Install Options



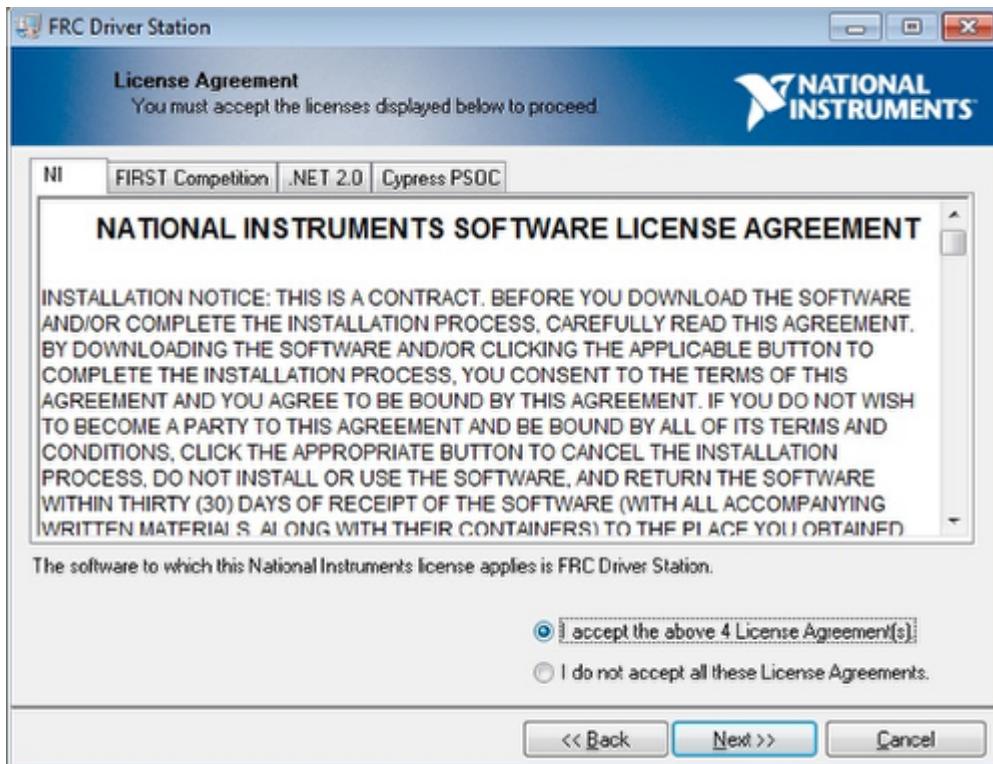
Leave the install options at the defaults and click **Next**.

Search for Updates



Uncheck the box to **Search for important....** then click **Next**.

License Agreement

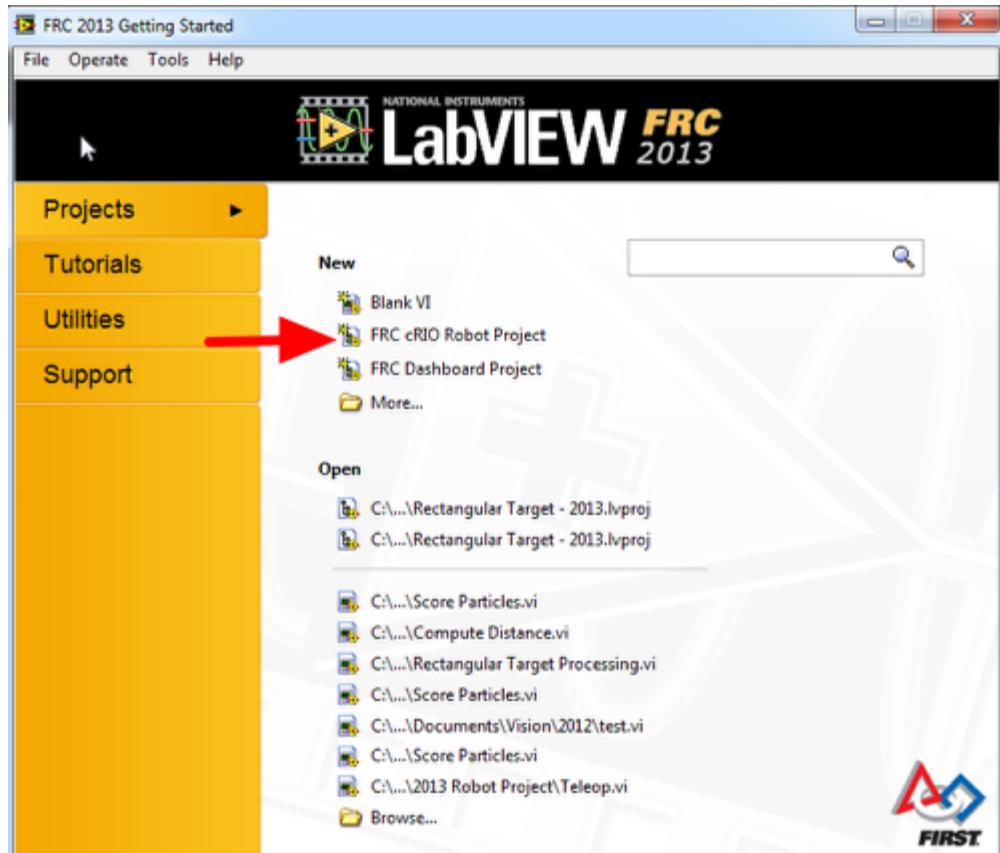


Click "**I accept the License Agreement.**" to accept the terms of the license agreements shown, then click **Next**. When the installation completes, click **Finish** to exit the installer.

Building and Loading your First LabVIEW Program

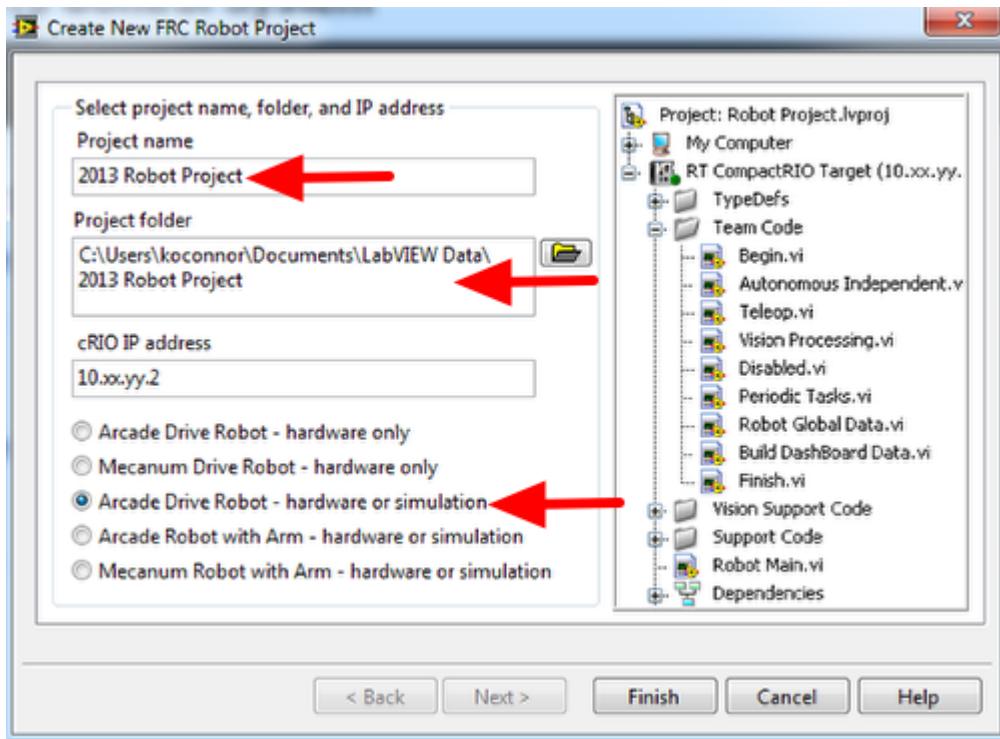
This document covers how to build and load an FRC LabVIEW program onto a cRIO.

Creating a Project



Launch LabVIEW and click the FRC cRIO Robot Project link in the Projects window to display the Create New FRC Robot Project dialog box.

Configuring Project



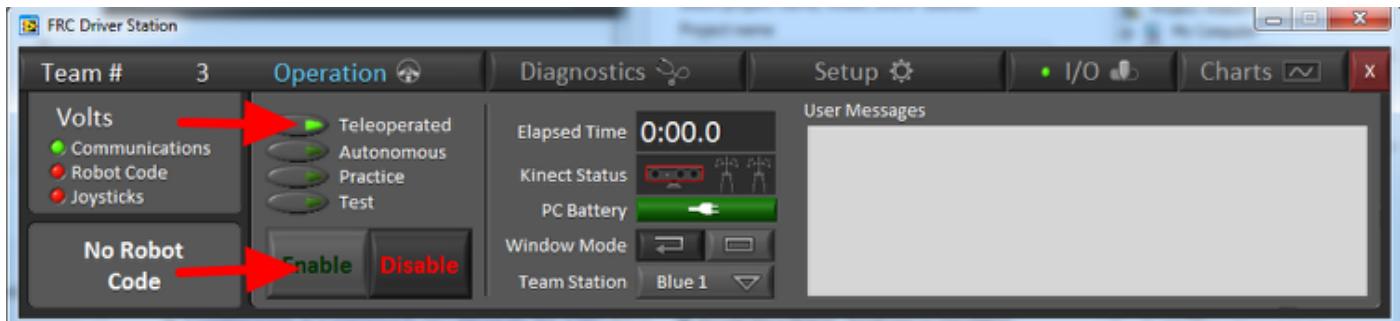
In the Project name text box, enter the name you want to use to identify the new FRC robot project. In the Project folder text box, enter the location on the host machine to which you want to save the project files and VIs. Select a robot type, if unsure, use the default **Arcade Drive Robot - hardware or simulation**. **Don't click Finish yet.**

Configure cRIO IP

Team Number	cRIO IP Address
45	10.0.45.2
234	10.2.34.2
1107	10.11.7.2

In the cRIO IP address text box, enter the IP address of the cRIO to which you want to deploy the project. The IP address of the cRIO must be in the form 10.xx.yy.2, where yy corresponds to the last two digits of the team number and xx corresponds to the remaining first or first two digits of the team number. Note that the team number entered here should not contain any leading zeroes. Then click **Finish**.

Running the Program



1. In the Project Explorer window, double-click the Robot Main.vi item to open the Robot Main VI.
2. Click the Run button (White Arrow on the top ribbon) of the Robot Main VI to deploy the VI to the cRIO. LabVIEW deploys the VI, all items required by the VI, and the target settings to memory on the cRIO.
3. Using the Driver Station software, put the robot in Teleop Mode and click **Enable**.
4. Move the joysticks and observe how the robot responds.
5. Click the Abort button of the Robot Main VI. Notice that the VI stops. When you deploy a program with the Run button, the program runs on the cRIO, but you can manipulate the front panel objects of the program from the host computer.

More Info

Refer to the LabVIEW Robotics Programming Guide for the FIRST Robotics Competition for more information about creating and running a LabVIEW program. You can access this guide by selecting the Tutorials tab on the LabVIEW Getting Started window, by navigating to the Program Files\National Instruments\LabVIEW 2012\manuals\FRC Programming Guide directory and opening index.html or by browsing to <http://www.ni.com/info> and entering “FRCTutorials” for the Info Code.

Imaging your cRIO

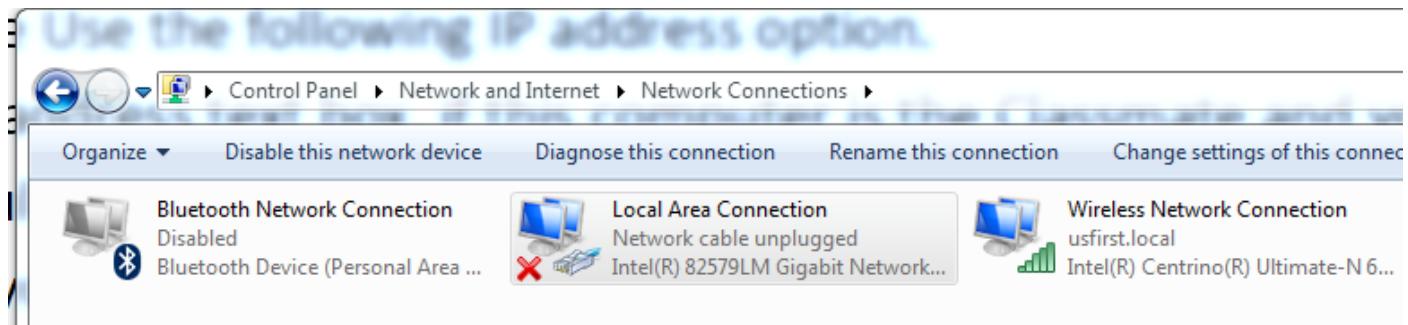
Before imaging your cRIO, you must have completed installation of the development environment and language updates for the appropriate programming language ([C++](#), [Java](#), LabVIEW). If using C++ or Java, you must also complete the [NI FRC Tools installation](#). You also must have the cRIO power properly wired to the Power Distribution board (see this document for instructions)

Configure computer IP address

Team Number	IP Address
45	10.0.45.5
234	10.2.34.5
1024	10.10.24.5

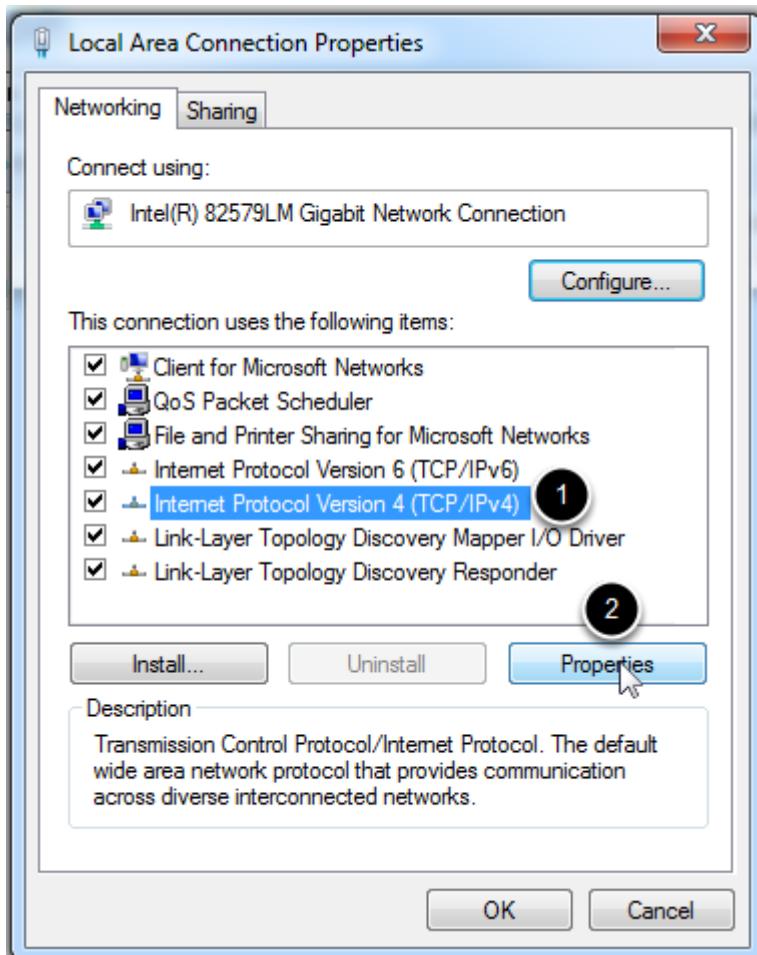
To image the cRIO, the IP address of your computer should be set to 10.xx.yy.5 where XXYY is your 4 digit team number (see chart for examples). The instructions below detail how to set this on Windows 7, there may be slight differences on Vista or XP. *Note: If you are planning on running the Driver Station software on a separate PC, you should use an address ending in .6 instead of .5 as the Driver Station uses .5*

Network Adapter Properties



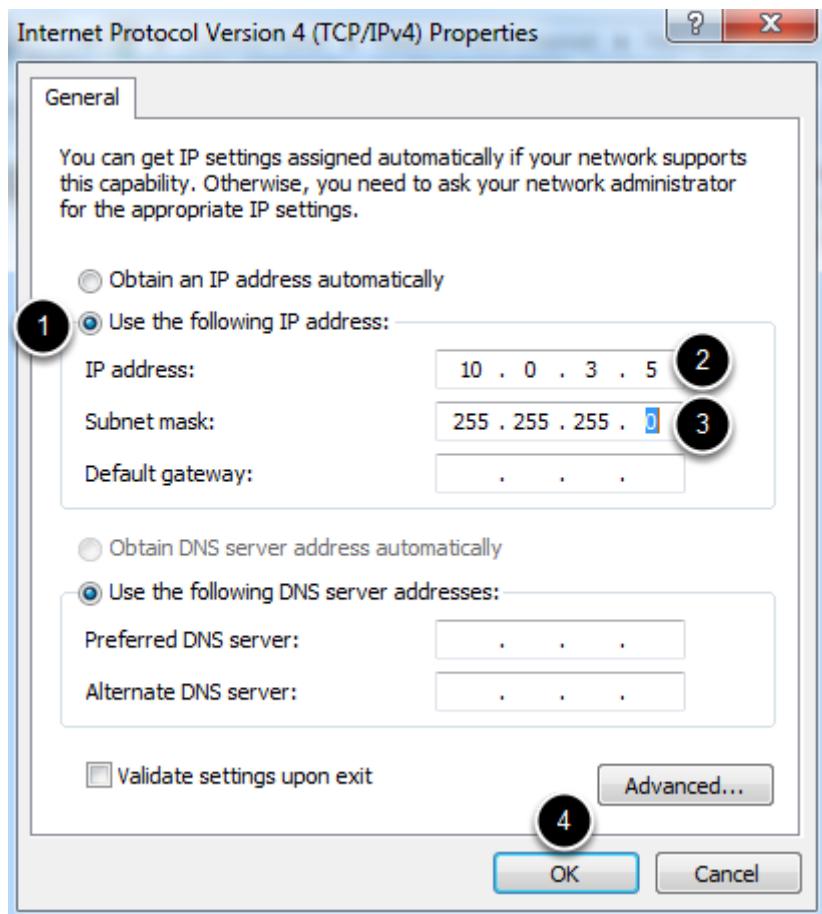
To set the IP address, click on **Start > Control Panel > View Network Status and Tasks > Change Adapter Settings**, then double-click on **Local Area Connection** to display the Local Area Connection Properties dialog.

TCP/IP Properties



Click on **Internet Protocol Version 4 (TCP/IPv4)** to highlight it, then click **Properties**.

Set IP address

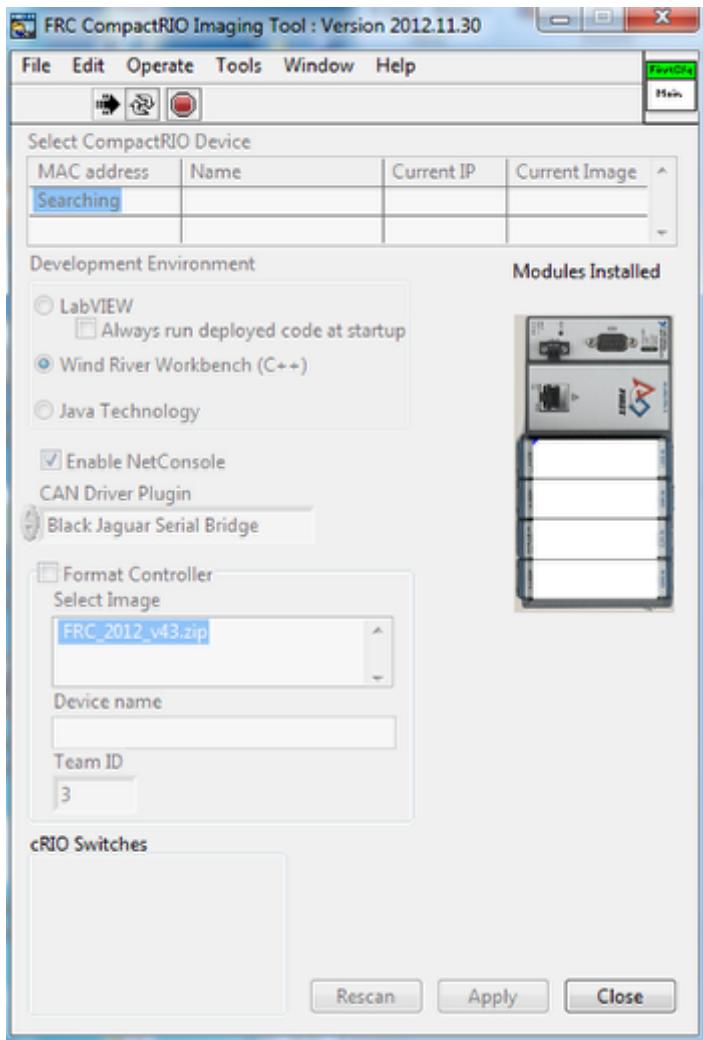


On the TCP/IP properties page:

1. Click the bubble next to **Use the following IP address**
2. Enter your **10.xx.yy.5** or **.6** address into the **IP address** box
3. Change the **Subnet mask** to **255.255.255.0**
4. Click **OK**. Then click **Close** on the Local Area Connection Properties dialog box,

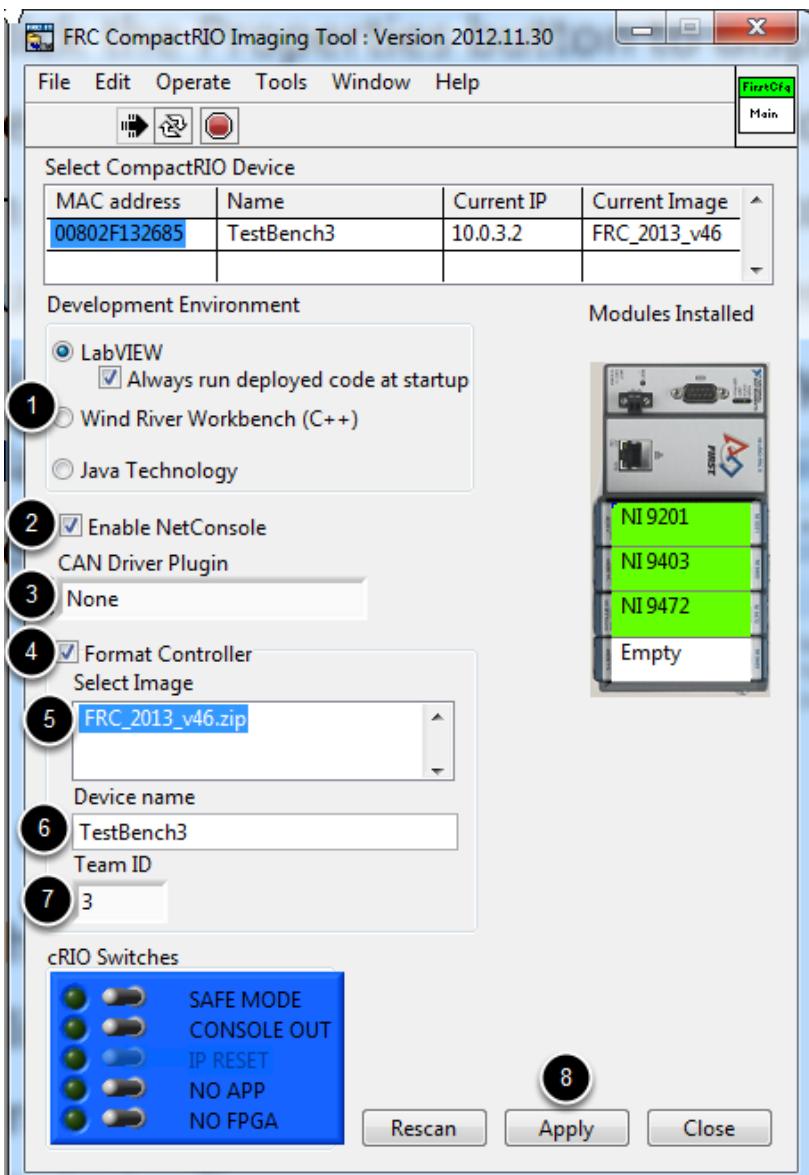
Note: For proper operation on the playing field at competition the subnet mask should be set back to **255.0.0.0** after imaging is complete if this PC will be used as a Driver Station.

Connect cRIO Ethernet to PC



Connect the ethernet cord from the cRIO to the PC. It is sometimes helpful to use a network switch between the cRIO and PC to prevent the PC from disabling the ethernet port when the cRIO reboots. It is **NOT** recommended to try re-imaging over WiFi. The imaging tool will begin searching for your cRIO automatically.

Select Options and Image cRIO



Once your cRIO is detected, it should be displayed in the box near the top of the Imaging Tool. Select the options you wish to use, then image the cRIO:

1. Select the programming language to use. LabVIEW teams are strongly recommended to check the **Always run deployed code at startup** checkbox.
2. Select whether to enable NetConsole (Java teams will have NetConsole enabled automatically)
3. Select a CAN plugin if appropriate. Note that if you select a CAN plugin with the Console Out feature enabled, on a 4-slot cRIO-FRCII the Console Out will be disabled automatically, on an 8-slot cRIO-FRC you will see a prompt to flip the switch to disable Console Out.
4. Check the box next to **Format Controller**.
5. Verify that the image listed is **FRC_2013_v46.zip**. If there is no image listed in this box or the image is not v46, make sure you have installed the latest update for your programming language.
6. Enter a name for the cRIO device.
7. Enter your FRC team number in the **Team ID** box.

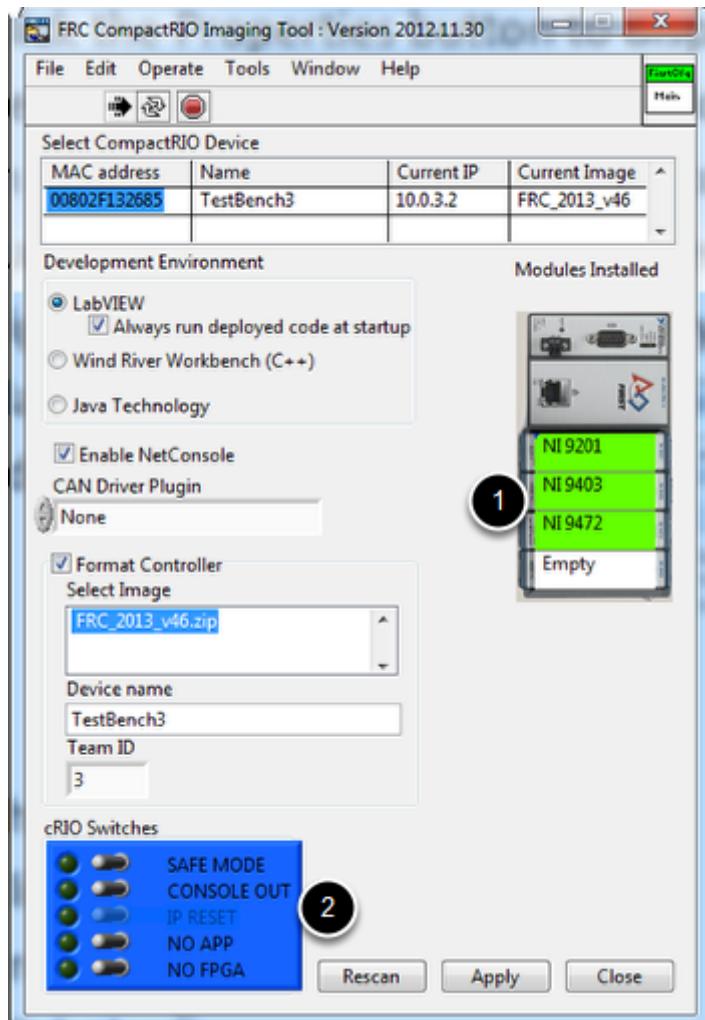
8. Click **Apply**. The cRIO imaging tool will begin imaging your cRIO, after it is complete, you should see a message indicating that the imaging is complete and you need to load code in order to use the cRIO.

Note: For proper operation on the playing field at competition the subnet mask should be set back to 255.0.0.0 after imaging is complete if this PC will be used as a Driver Station.

For instructions on connecting the Driver Station to the cRIO for the first time and verifying connectivity see [Using the Classmate with your cRIO](#).

For instructions on writing and loading your first program see one of these documents or manuals: C++, Java, [LabVIEW](#).

Other Features of the Imaging Tool



The cRIO Imaging Tool contains two other features you may find useful:

1. Module Validation: The cRIO Imaging Tool will show the modules currently detected by the cRIO and highlight valid slots in green and invalid slots in red. Hover over any invalid or empty slot for more information about the correct module to install there.
2. cRIO Switches: On the 8-slot cRIO-FRC this box will show the status of the hardware DIP switches, no changes can be made to the 8-slot switch configuration using this tool. For the 4-slot cRIO-FRC the hardware dip switches have been removed and replaced by virtual software switches which can be configured using the cRIO Imaging Tool.

Troubleshooting cRIO Imaging

If the cRIO Imaging Tool is unable to locate the cRIO, or a Timeout error message is displayed during cRIO Imaging, the issue is likely with the network configuration. One or more of the following steps may be necessary in order to image your cRIO:

1. Disable all other Network Adapters on the computer. Open the Network Connections window from the Control Panel (see **Network Adapter Properties** step above), then for each adapter other than the Local Area Connection you are using to image the cRIO, right-click on the adapter and select **Disable**.
2. Try using a network switch between the cRIO and computer: Some computers have issues reconnecting to the cRIO after the cRIO reboots as part of the imaging process. Placing a switch between the two devices, such as the D-Link DAP-1522 provided in the Kit of Parts typically mitigates this problem.
3. Disable Windows Firewall: Windows Firewall may be blocking the cRIO Imaging Tool, preventing it from detecting the cRIO. If possible, temporarily disable the Firewall by going to **Start > Control Panel > System and Security > Windows Firewall > Turn Windows Firewall on or off**. If the Firewall cannot be disabled, make sure that the FRC cRIO Imaging Tool is allowed through by selecting **Allow a program or feature through Windows Firewall** from the Windows Firewall screen, then click **Change Settings** and make sure that **FRC CRIo Imaging Tool** is listed and has a checkmark for all three network locations. If it is not listed you will have to add it using the **Allow another program...** button and browsing to the imaging tool location C:\Program Files\National Instruments\LabVIEW 2012\project\cRIO Tool
4. Try a different PC: If none of the above steps work, try using a different computer to image the cRIO.

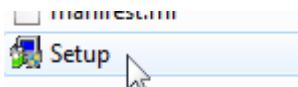
Programming your radio for home use

This guide will show you how to use the 2013 FRC Bridge Configuration Tool software to configure your robot's wireless bridge for use outside of FRC events.

Before you begin using the software:

1. Disable WiFi connections on your computer, as it may prevent the configuration utility from properly communicating with the bridge
2. Make sure no devices are connected to your computer via ethernet, other than the wireless bridge.

Install the Software



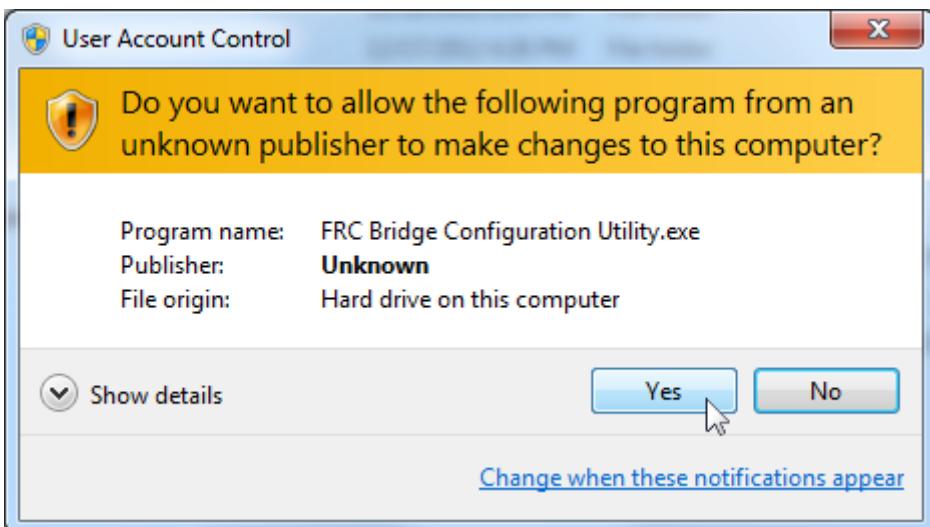
Run the "Setup.exe" program, and follow the instructions in the installation wizard.

Launch the software



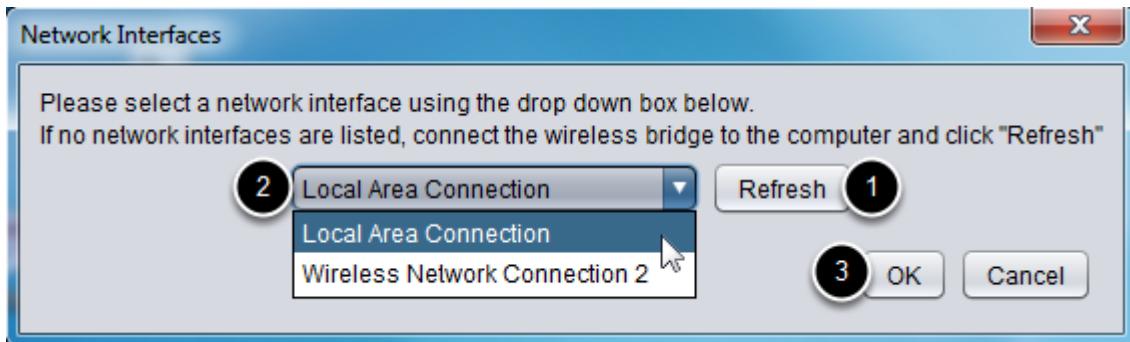
Double-click the shortcut on the desktop to launch the program

Allow the program to make changes, if prompted



If your computer is running Windows Vista or Windows 7, a prompt may appear about allowing the configuration utility to make changes to the computer. Click "Yes" if the prompt appears.

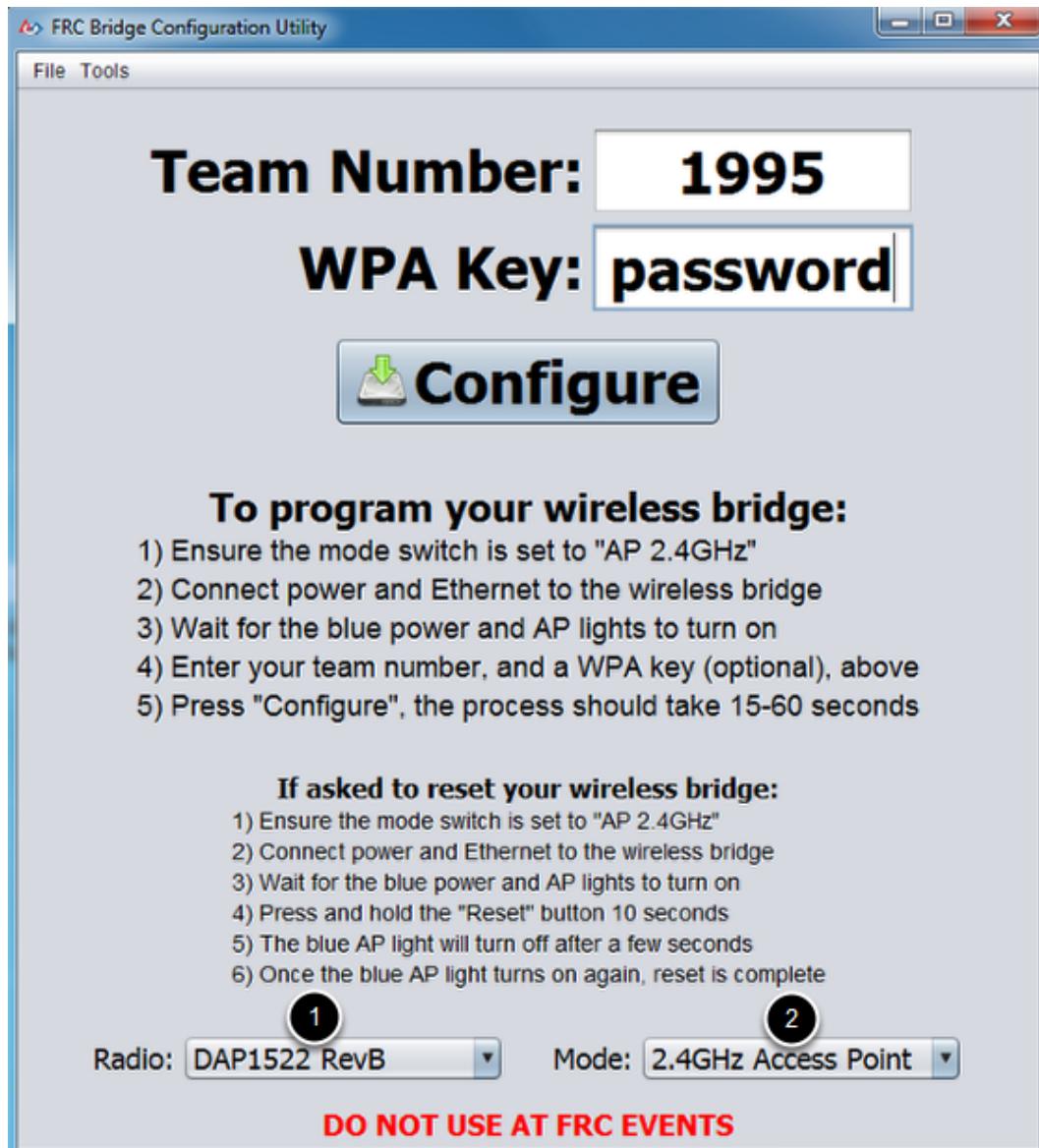
Select the network interface



Use the pop-up window to select the which ethernet interface the configuration utility will use to communicate with the wireless bridge. On Windows machines, ethernet interfaces are typically named "Local Area Connection". The configuration utility can not program a bridge over a wireless connection.

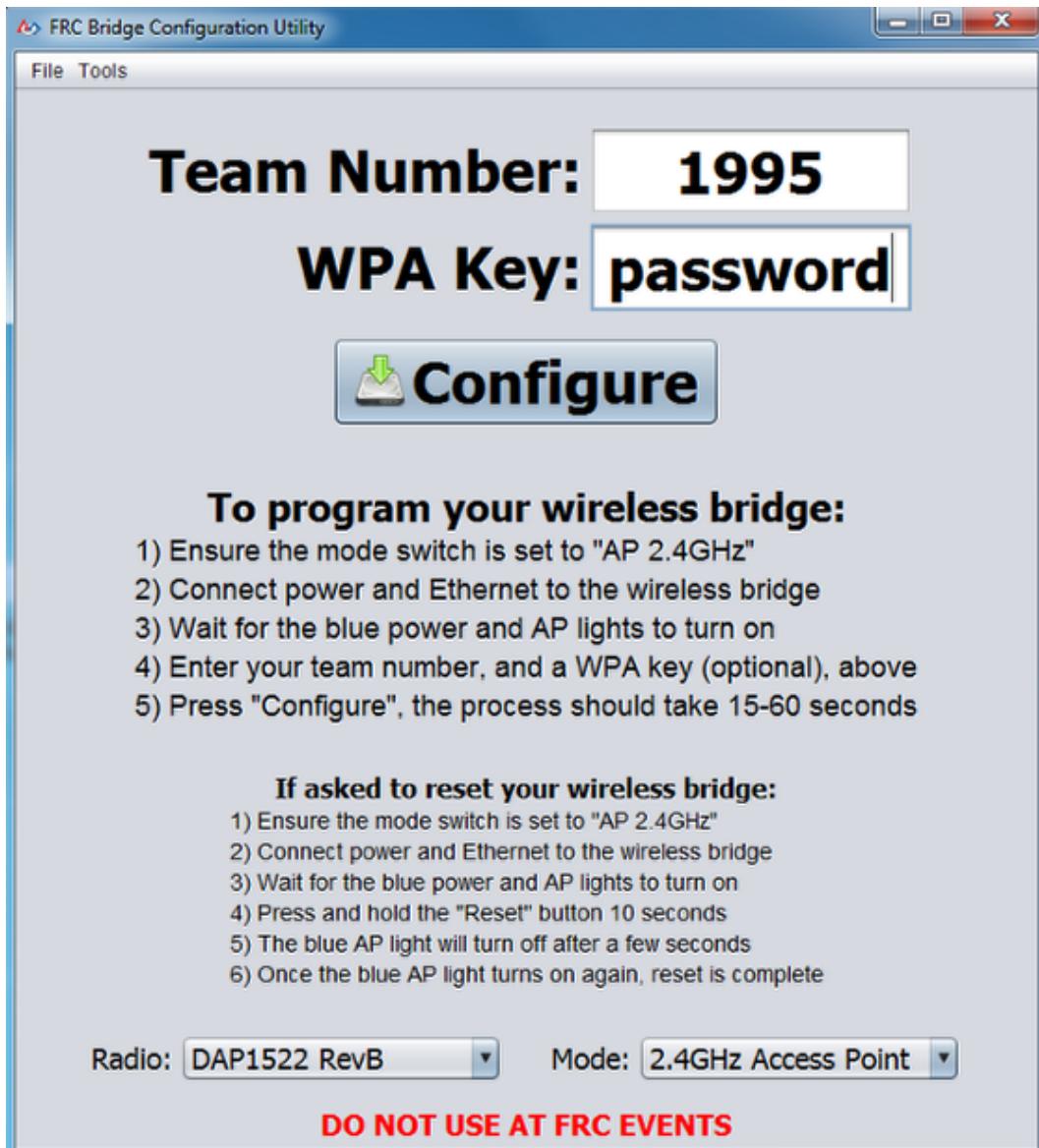
1. If no ethernet interfaces are listed, click "Refresh" to re-scan for available interfaces
2. Select the interface you want to use from the drop-down list
3. Click "OK"

Select a bridge model and operating mode



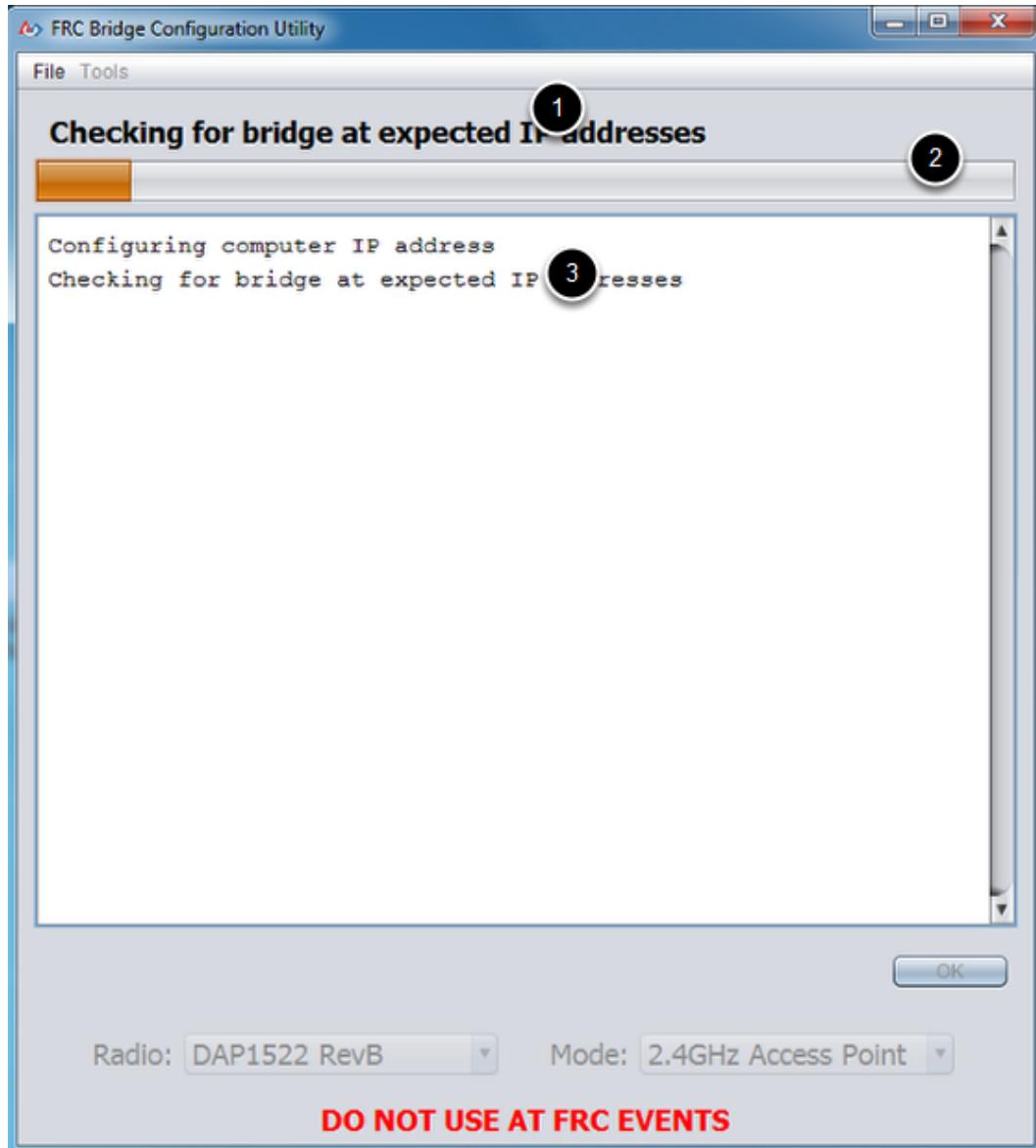
1. Select which DAP1522 revision you are configuring using the drop-down list
2. Select which operating mode you want to configure. For most cases, the default selection of 2.4GHz Access Point will be sufficient.

Prepare and start the configuration process



Follow the on-screen instructions for preparing your wireless bridge, entering the settings the bridge will be configured with, and starting the configuration process. These on-screen instructions update to match the bridge model and operating mode chosen at the bottom of the window.

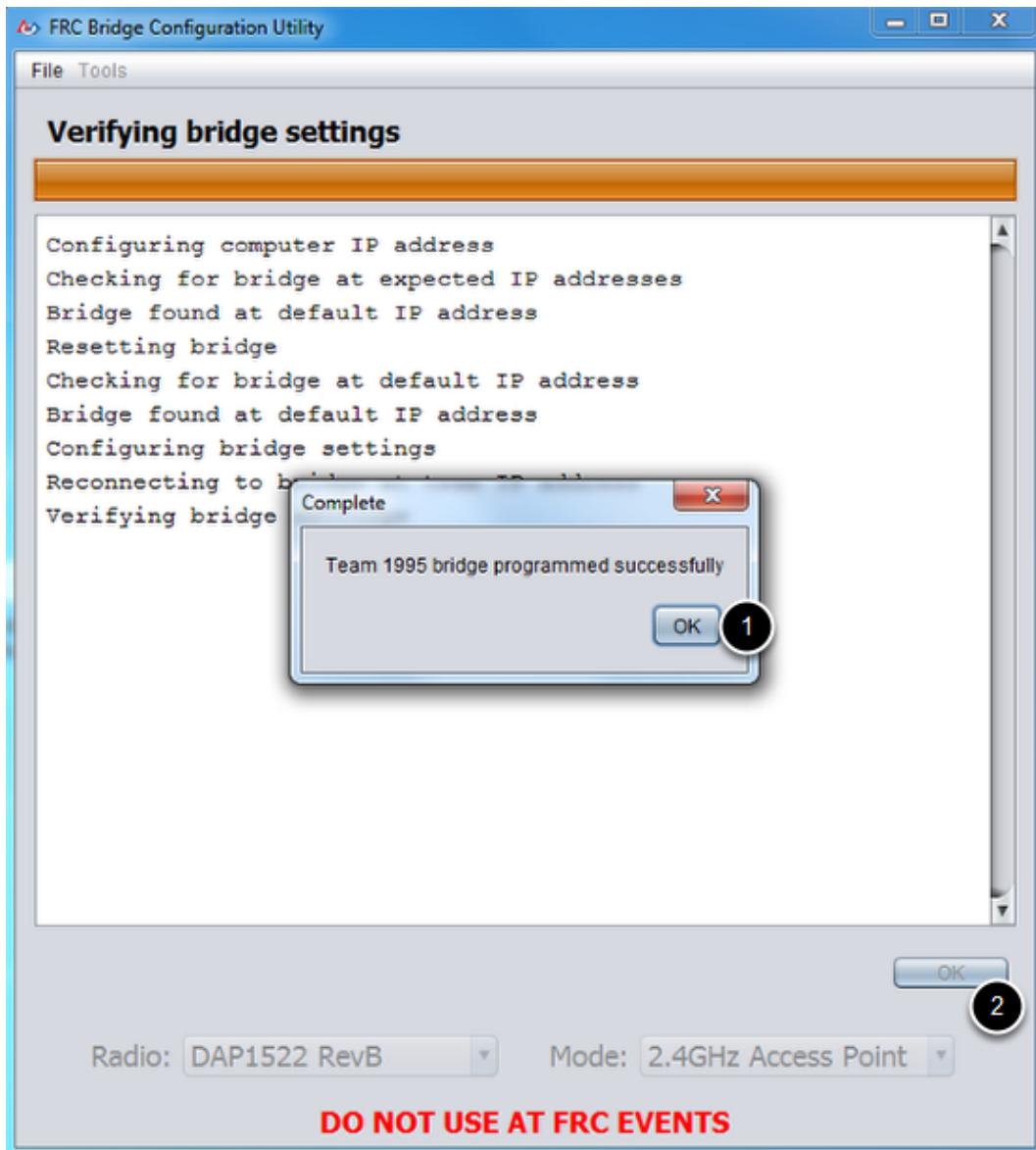
Configuration Progress



Throughout the configuration process, the window will indicate:

1. The step currently being executed
2. The overall progress of the configuration process
3. All steps executed so far

Configuration completed



Once the configuration is complete:

1. Press "OK" on the dialog window
2. Press "OK" on the main window to return to the settings screen

Configuration errors



If an error occurs during the configuration process, follow the instructions in the error message to correct the problem.

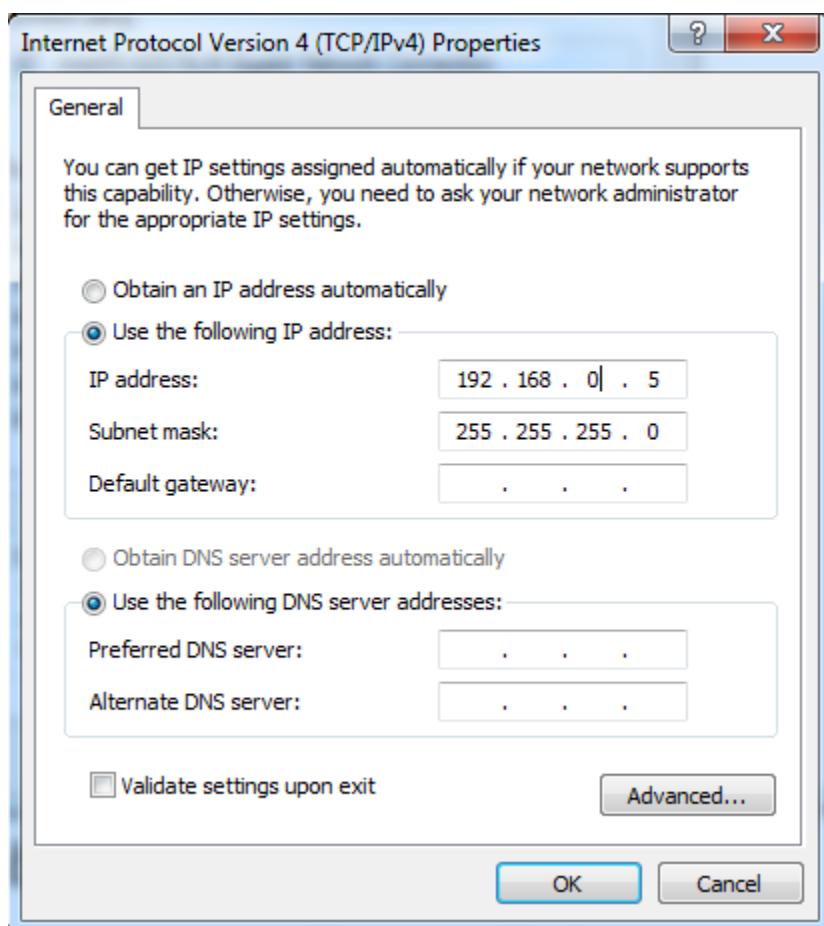
Configuring an Axis Camera

Two different Axis camera models are supported by the FRC software, the Axis 206 and Axis M1011. This document provides instructions on how to configure one of these cameras for FRC use. To follow the instructions in this document, an installation of [LabVIEW](#) or the [NI FRC Tools for C++ or Java teams](#) is required.

Connect the camera

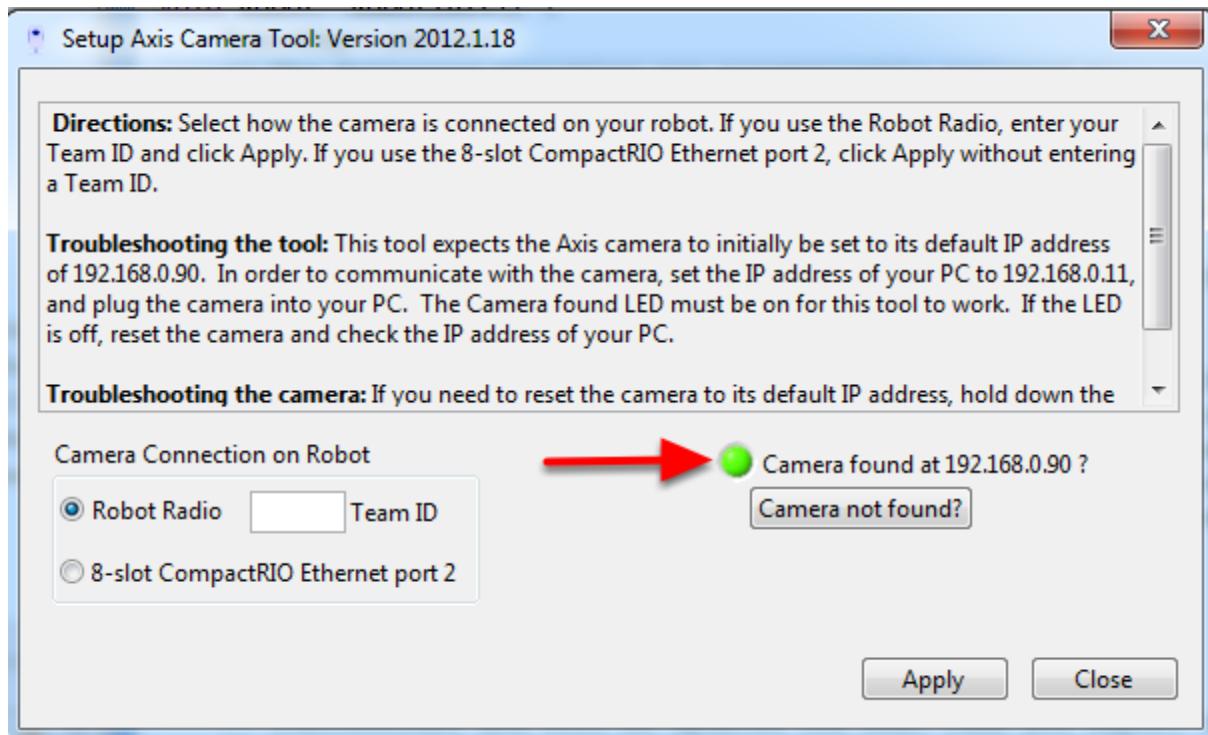
Connect the Axis camera to the computer using an Ethernet cable. Most modern computers are equipped with auto-sensing ports and will work with a normal Ethernet cable, but a crossover cable, or network switch between the devices may be necessary for some computers.

Configure computer IP address



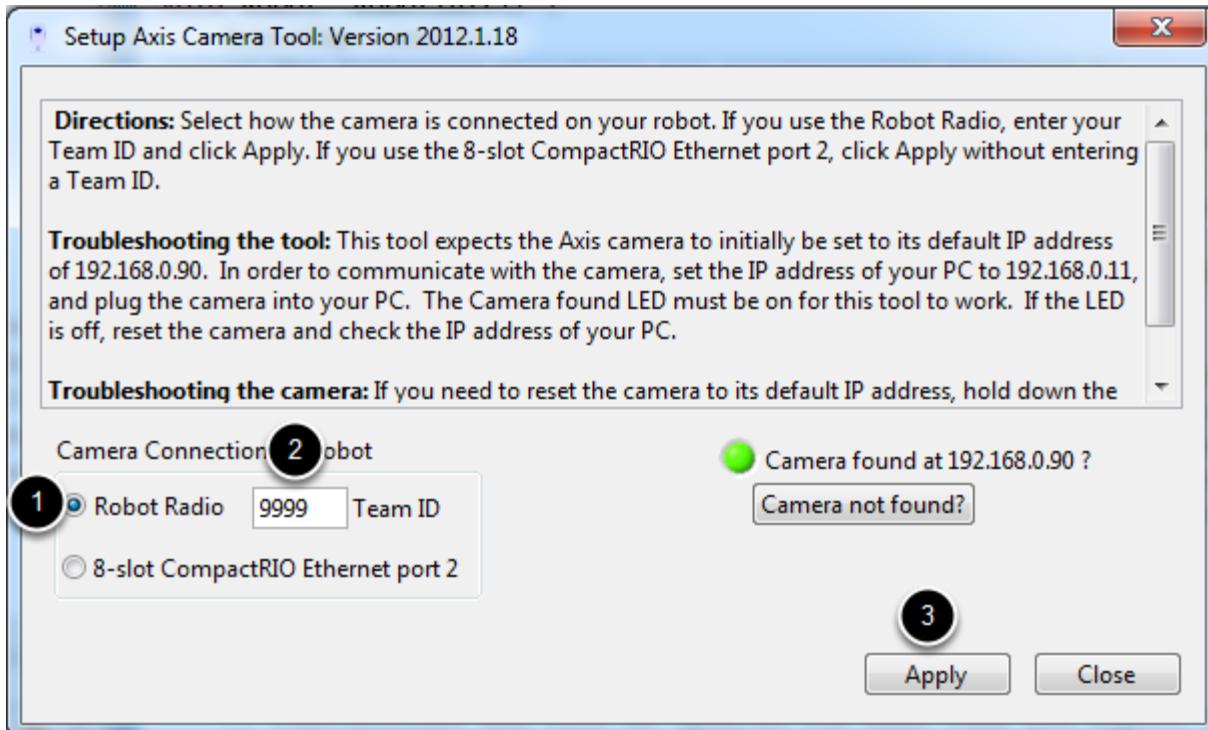
Set your computer's IP address to 192.168.0.5. For instructions on how to set your computer IP, see the [Imaging your cRIO document](#).

Launch the Setup Axis Camera Tool



Double click on the desktop icon that says Setup Axis Camera to launch the Setup Axis Camera Tool. The camera should be automatically detected and the green indicator light should be lit. If it is not, make sure the camera is powered on (the ring on the camera face should be green) and connected to your computer. If the indicator remains off follow the instructions in the tool textbox next to **Troubleshooting the camera** to reset the camera. You can also use the **Camera not found?** button to check the IP address of your computer.

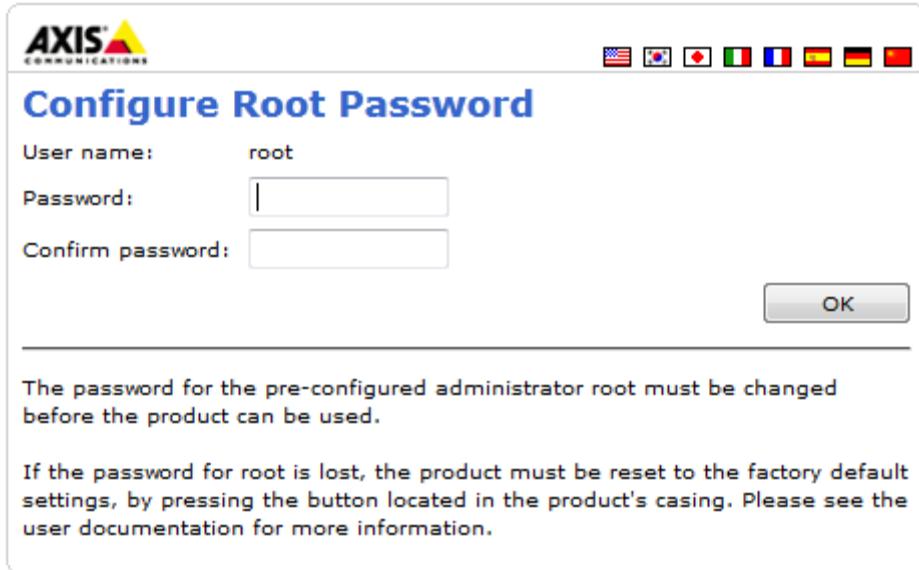
Setup the Camera



The recommended configuration (and the default expected by the robot code examples and FRC Dashboard) is to connect the camera to the Robot Radio. To configure the camera for this setup:

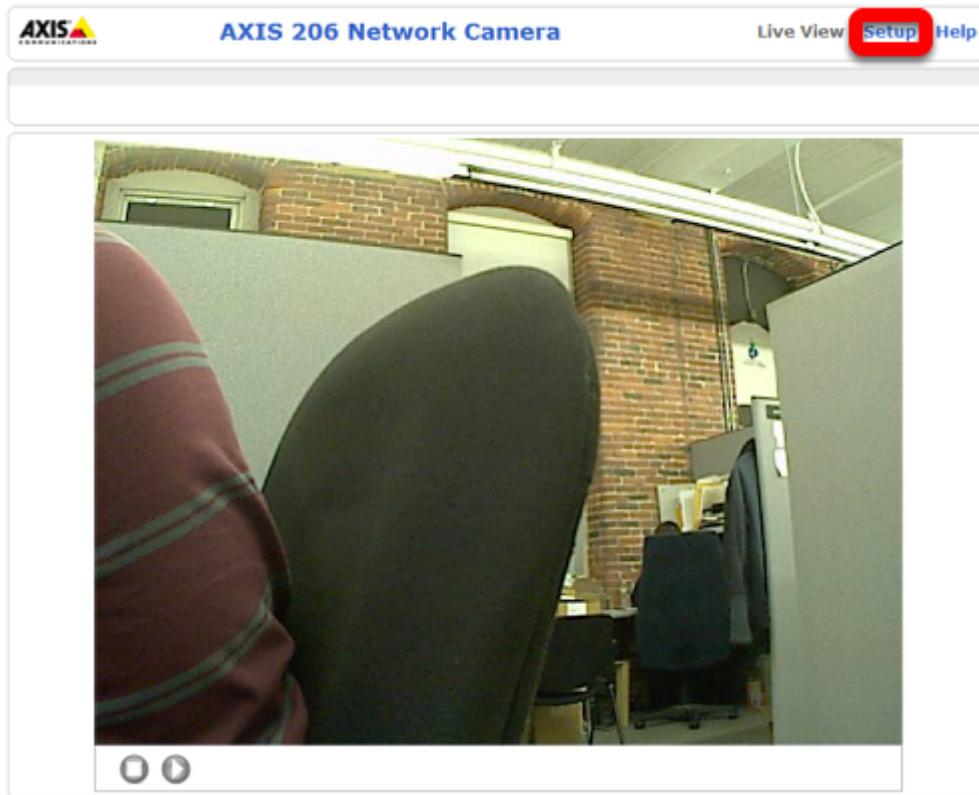
1. Make sure the **Robot Radio** bubble is selected
2. Enter your FRC team number in the **Team ID** box
3. Press **Apply**.

Manual Camera Configuration



It is recommended to use the Setup Axis Camera Tool to configure the Axis Camera. If you need to configure the camera manually, follow the instructions above for connecting the camera to the computer and setting the IP, then open a web browser and enter **192.168.0.90** in the address bar and press enter. You should see a Configure Root Password page, set this password to whatever you would like, but **admin** is recommended.

Setup Page



Click **Setup** to go to the setup page.

Configure Users

The screenshot shows the 'Users' configuration page for the AXIS 206 Network Camera. The left sidebar has a tree view with 'Basic Configuration' expanded, showing '1. Users' (highlighted with a red box), '3. Date & Time', and '4. Video & Image'. Other collapsed sections include 'Video & Image', 'Live View Config', 'System Options', and 'About'. The main content area is titled 'Users' and shows a 'User List' table with one entry: 'root' under 'User Name' and 'Administrator' under 'User Group'. Below the table are three buttons: 'Add...', 'Modify...', and 'Remove'. A red arrow points to the 'Add...' button. Further down, there's a 'User Settings' section with a checkbox labeled 'Enable anonymous viewer login (no user name or password required)' which is checked. There are also fields for 'Maximum number of simultaneous viewers limited to: 10 [0..10]' and a note: 'Subsequent viewers will see a blank image.' At the bottom are 'Save' and 'Reset' buttons.

On the left side click **Users** to open the users page. Click **Add** then enter the Username **FRC**, Password **FRC** and click the **Administrator** bubble, then click **OK**. If using the SmartDashboard, check the **Enable anonymous viewer login** box. Then click **Save**.

Configure Image Settings

The screenshot shows the 'Image Settings' page of the AXIS 206 Network Camera configuration interface. The left sidebar contains navigation links: Basic Configuration, Video & Image (selected), Advanced, Live View Config, System Options, Language (with a USA flag icon), and About. The main content area is titled 'Image Settings' and includes sections for 'Image Appearance', 'Overlay Settings', 'Video Stream', and 'Test'. In the 'Image Appearance' section, Resolution is set to 320x240 pixels and Compression is set to 30 [0..100]. Other settings include Rotate Image (0 degrees), Color level (50 [0..100]), Brightness (50 [0..100] - note: Does not affect Test image), and Sharpness (0 - note: Does not affect Test image). A note states: '* Changes to color level do not affect Test image (exception 0 = B/W)'. The 'Overlay Settings' section has checkboxes for Include date, Include time, and Include text (with a placeholder box). The 'Place text/date/time at' dropdown is set to 'top'. The 'Video Stream' section shows Maximum video stream time set to 'Unlimited' (radio button selected) and Maximum frame rate set to 'Unlimited' (radio button selected). The 'Test' section contains a note 'Test settings before saving.' and buttons for 'Save', 'Reset', and 'Test'.

Click **Video & Image** on the left side to open the image settings page. Set the **Resolution** and **Compression** to the desired values (recommended **320x240, 30**). To limit the framerate to under 30 FPS, select the **Limited to** bubble under **Maximum frame rate** and enter the desired rate in the box. Color, Brightness and Sharpness may also be set on this screen if desired. Click **Save** when finished.

Configure Network Settings

The screenshot shows the 'Basic TCP/IP Settings' page of the AXIS 206 Network Camera. On the left sidebar, under 'Basic Configuration', '2. TCP/IP' is selected. The main area shows 'Network Settings' with a 'View current network settings' button. Under 'IP Address Configuration', the 'Use the following IP address' radio button is selected (indicated by a red arrow). The 'IP address' field contains '10.0.3.11', 'Subnet mask' contains '255.255.255.0', and 'Default router' contains '10.0.3.1'. Both the IP address and Default router fields are highlighted with red boxes. Below these fields are sections for 'Services' (with 'Enable ARP/Ping setting of IP Address' checked) and 'AXIS Internet Dynamic DNS Service' (with a 'Settings...' button). At the bottom are 'Save' and 'Reset' buttons, and a link to 'See also the advanced TCP/IP settings'.

To connect the camera directly to the DLink DAP-1522 on the robot, the IP settings need to be changed. Click **Basic Configuration** then **TCP/IP** on the left side of the screen to go to the network configuration page. Click the bubble to **Use the following IP address**, then enter 10.xx.yy.11 in the box where xxxy is your 4-digit team number (pictured example is set for team 3). In the **Default Router** box enter 10.xx.yy.1. Click **Save**. Your Axis camera is now set up for use on the robot.

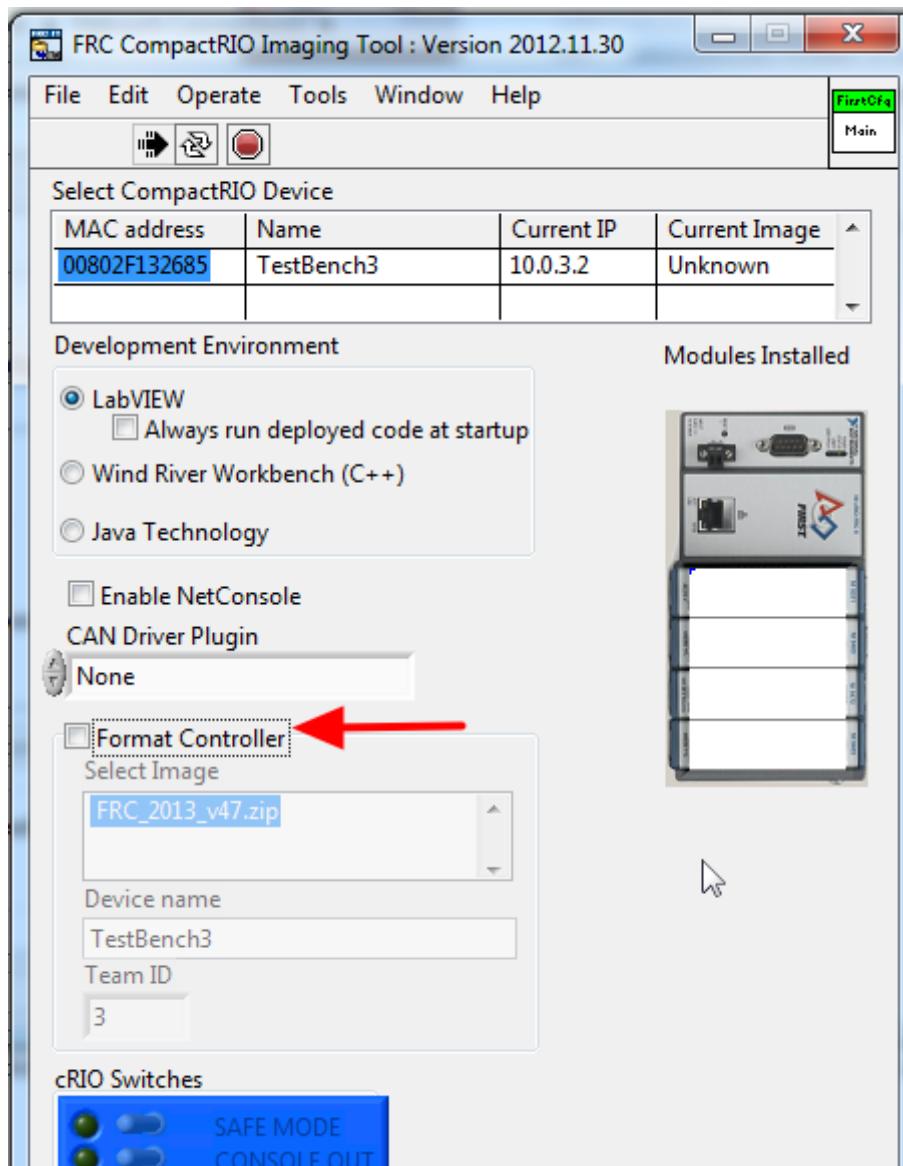
2013 Software Notes

This article describes changes to the libraries and tools and known issues for the released software as of the 2013 Kickoff.

Known Issues

Below is a compiled list of known issues for official FRC software for 2013 (**Updated 1/81/12**)

cRIO Imaging Tool



1. The cRIO Imaging Tool displays the run and stop buttons, causing it to no longer fit on the screen of PCs with 1024x600 or smaller screen resolution (including Classmates) (**Updated: 1/8/12**)

Workaround: The recommended workaround is to use a PC with a larger resolution for imaging. If a low resolution PC must be used, after the cRIO is detected, click on an empty part of the cRIO Imaging Tool such as the space to the left of the cRIO picture. Use the tab key to highlight elements of the display until the **Format Controller** element is highlighted (shown by a dashed box around the text). From this point, **pressing Tab** once will highlight the Rescan button, twice will select Apply and 3 times will select Close, then press **Enter** to select the button. If you are unsure which menu item you are on, or need to cycle back around, you can either continue pressing tab, or click on the open space again.

Driver Station

1. The Dashboard switch button for choosing between Default, LabVIEW, Java, and C++ will not always immediately launch the new DS. (**Updated: 1/7/12**)

Workaround: Clicking to remote and back to local is the workaround and this issue only occurs when the change is made, not in future launches of the DS.

2. The Charts tab show CPU usage and logs it to disk. Unfortunately, the CPU trace is being plotted against the voltage scale. This means that the CPU usage of the cRIO often looks higher than it is or goes off-scale. (**Updated 1/7/12**)

Workaround: It is correct when viewing the logs using the log file viewer.

3. The Driver Station Log File Viewer provided with the Kickoff release of the Driver Station Update is not the latest version and will not read logs produced by the 2013 Driver Station. (**Updated 1/7/12**)

Workaround: No workaround is available at this time. After the final changes to the DS Log File Viewer are made, making it even easier for teams to interpret the information provided by the new DS logs, a version of this Viewer and source code will be posted.

FRC Bridge Configuration Utility

1. Attempting to program a bridge with firmware revision 2.02 results in an "Illegal firmware" message. (**Updated 1/8/12**)

Workaround: A new version of the FRC Bridge Configuration Utility (version 01.08.13.195) [has been posted](#) that handles this version of the firmware. This version will install over any previously installed version, no uninstall is necessary.

LabVIEW

1. If the robot is in teleOp-Enabled and you quickly click on the test button and then on enabled, the robot may no longer be running the test VI. (**Updated 1/7/12**)

Workaround: Click more slowly or disable, then enable again.

RobotBuilder

1. The embedded context help files in RobotBuilder are incomplete and will be updated over time. (**Updated: 1/7/12**)

Workaround: Refer to the online documentation for information on specific sensors and actuators that aren't fully documented in RobotBuilder.

SmartDashboard

1. The SmartDashboard sometimes has issues with the initial layout of subsystems in Test mode.
(Updated 1/7/12)

Workaround: You can rearrange any of the SmartDashboard widgets by putting it into Edit mode, dragging the widgets to the new locations, and turning off Edit mode. The SmartDashboard will remember the new layout if you save it.

Changes for C++ and Java

The new big features in the 2013 FRC software release include:

1. RobotBuilder - robot program creation tool to help rapidly create robot programs.
2. TableViewer - allows teams to view the NetworkTable variables and values.
3. NetworkTables - reimplemented version of the protocol and code. See notes below.
4. SmartDashboard - now implements Test mode for verifying the correct operation of the robot sensors and actuators.

The following library API changes may effect existing code that was written with the previous versions of WPILib:

1. SmartDashboard APIs have changed slightly, the SmartDashboard.Log methods have been replaced with SmartDashboard.Put methods. In addition the individual numeric formats have been replaced with a single format called Number, for example PutNumber() and GetNumber(). See the appropriate documentation for details. The SmartDashboard is now initialized by the template code, getInstance no longer needs to be called.
2. Iterative robot templates no longer have the continuous methods. That is AutonomousContinuous, TeleopContinuous and DisabledContinuous methods are no longer included in the library. If you are looking for similar functionality threads is a possible alternative.
3. The SetSetpointRange() methods have been removed from the PIDSubsystem class. In the previous versions they only set internal class variables, but did not effect robot operation. Calls to these methods can be removed from existing code. To get this functionality, use the GetPIDController() method to get a reference to the underlying PIDController and make the corresponding calls there.
4. The NetworkTables implementation has been completely rewritten. You should expect to see more predictable and improved performance this year. Some of the existing APIs have changed as well. Transactions from last year have been replaced with transferring of arrays. There are other minor changes in the APIs. See the JavaDocs or the C++ reference guides for more information.

Other Changes:

1. Test methods have been added to the templates for use with the new Test mode.
2. A 2013 Vision Example has been added for both languages. NIVision Linear Averages function and Rect struct have been added to Java.
3. Classes have been added to the libraries for Talon speed controllers and HiTechnic Color Sensors
4. The PWM timings on the Victor Class have been modified to better support the Victor 888.
5. PIDController has had a Feedforward term F added.
6. Added TankDrive methods with a squareInputs parameter for disabling input squaring if desired.
7. Added get() method for relays.
8. Java - Motor Safety has been fixed for Victor and Jaguar
9. Java - PIDController has had anit-windup code added (present in C++ last year)

Other notes:

1. We're in the process of moving much of the documentation to the ScreenSteps format and where it exists expect to find the newest and most accurate information here. It our hope to be able to rapidly turn around issues with the documentation and make updates. Please let us know through the *FIRST* Support Forums if there are issues that you would like to see addressed.
2. You need to set the Axis Camera to allow anonymous connections when using it with the SmartDashboard.
3. The SmartDashboard, RobotBuilder, and TableViewer are automatically included with the installers for NetBeans and Workbench. If you would like to write your own custom widgets to do vision processing for the SmartDashboard that take advantage of the JavaCV libraries, there is an installer on the SmartDashboard project on the FIRSTForge server that will install SmartDashboard in the c:\ProgramFiles directory. See the article [here](#) for installation and configuration instructions.
4. There are a number of examples of using the old LabVIEW dashboard that still exist in the distributions. You may use those examples with LabVIEW written dashboards, but the recommended method of creating dashboards is to use the NetworkTable based SmartDashboard methods.

Support Resources

In addition to the documentation here, there are a variety of other resources available to FRC teams to help understand the Control System and software.

Other Documentation

In addition to this site there are a few other places teams may check for documentation:

- [NI FRC Community Documents Section](#)
- [USFIRST.org Technical Resources Page](#)
- [VEXPro Jaguar Page](#)

Forums

Stuck? Have a question not answered by the documentation? Official Support is provided on these forums:

- [NI FRC Community Discussion Section](#) (cRIO, LabVIEW and Driver Station software questions)
- [USFIRST.org Control System Forum](#) (wiring, hardware and Driver Station questions)
- [USFIRST.org Programming Forum](#) (programming questions for C++, Java, or LabVIEW)

NI Phone Support

Have a LabVIEW, cRIO, or Driver Station question? NI provides phone support for FRC teams during the build season (1/5/12-2/19/12) Monday through Friday 1pm-7pm CST by calling 800-531-5066.

Bug Reporting

Found a bug? Let us know by reporting it on the [WPILib Bug Tracker](#). Note that you will have to create a FIRSTForge account if you do not already have one, but **you do not need** to apply for project membership.